JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.i
An Autonomous Institute, with NAAC "A" Grade
Affiliated to DBATU, RTMNU & MSBTE, Mumbai
Department of Civil Engineering
"Building Better Development"
Session 2022-23

VISION	MISSION
❖ To be a well-known center for shaping professional leaders Global Standards in Civil Engineering	❖ Provide quality education and excellent learning Environment for overall development of students. ❖ Making Sustainable efforts for integrating academics with Industry.

MINUTES OF MEETING FOR 07TH BOARD OF STUDIES MEETING NO. BOS/DOCE/07/2021

27/12/2022

Mode of Conduct: Online

The 07th Meeting of the Board of Studies was held on Tuesday, 27th December, 2022 at 1.30 pm in Nalanda Building (ND-114). The following members were present:

Name of the Faculty	Designation
1. Mrs. Atika Ingole, Asst. Prof., Civil Engineering Department, JDCOEM	Chairman, BOS
2. Mr. Atul Gautam, Asst. Prof., Civil Engineering Department, JDCOEM	Member, BOS
3. Mr. Nilesh Pal, Asst. Prof. Civil Engineering Department, JDCOEM	Member, BOS
4. Mr. Shahrukh Kureshi, Asst. Prof., Civil Engineering Department, JDCOEM	Member, BOS
5. Ms. Shital Navghare, Asst. Prof., Civil Engineering Department, JDCOEM	Member, BOS
6. Ms. Tina Khandale, Asst. Prof., Civil Engineering Department, JDCOEM	Member, BOS
7. Ms. Tejaswini Junghare, Asst. Prof., Civil Engineering Department, JDCOEM	Secretary, BOS

The following persons were invited to attend the meeting:

1. Dr. P. Y. Pawade — Subject Expert
2. Dr. K. N. Kadam — Subject Expert

Item No. 1 Confirmation of the previous BOS meeting.

Secretary, BOS welcome Invitees, Subject experts, BOS, Chairman and Members. Meeting was started with review of previous minutes of meetings. Chairman, Mrs. Atika Ingole precedes the meeting as per the agenda.

Item No. 2 Action taken report for last meeting minutes.

Action taken report of previous minutes of meeting has been reviewed in the meeting.

Item No. 3 Scheme Revision

i. Subject Experts suggested following changes in the courses of IV Semester, V Semester and VI Semester,
   a. The course name Concrete Technology and Design of RCC Elements should be included as Concrete Technology in IV Semester and Design of RC Structure in V Semester.
   b. The Audit Courses Research Methodology and Intellectual Property Rights should be kept in V and VI Semester.
   c. The open elective courses should not be offered in Final Year and credits should be revised.
   d. The professional elective bucket should be revised.

ii. BOS approved the incorporation of MOOCS courses in the scheme.

Item No. 4 Syllabus Revision

The discussion on revised syllabus has been held in the meeting and following points

were suggested by subject experts,

i. The syllabus of course Structural Analysis is required to be revised.
ii. The VI Semester course, name Design of Steel Structure Lab can be removed.

Item No. 5	Rubrics of Continuous Assessment.

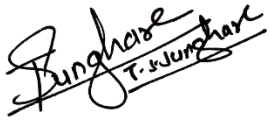
The rubrics of continuous assessment have been approved by BOS.

Item No. 6	MOOCs Courses

The institute policy of 20% online courses, major and minor guidelines and inclusion of MOOCS courses in the scheme has been discussed in detailed. The same guidelines have been approved in the meeting.

Item No. 7	VIII Semester Internship

The BOS approved the guidelines of VIII Semester Internship.



Ms. Tejaswini Junghare
BOS, Secretary
Assistant Professor,
Department of Civil Engineering,
JDCOEM, Nagpur

Following members of Board of Studies were present for the meeting:

Sr No	Name of the BOS Members	Designation
1	Dr. P. Y. Pawdee, Professor, G. H. R. C. E., Nagpur.	Subject Expert, BOS
2	Dr. K. N. Kadam, Associate Professor, G. C. O. E., Nagpur.	Subject Expert, BOS
3	Ms. Tina Khandale, Asst. Prof., Department of Civil Engineering, JDCOEM, Nagpur.	Member, BOS
4	Ms. Shital Navghare, Asst. Prof., Department of Civil Engineering, JDCOEM, Nagpur.	Member, BOS
5	Ms. Tejaswini Junghare, Asst. Prof., Department of Civil Engineering, JDCOEM, Nagpur.	Secretary, BOS
6	Mr. Shahrukh Kureshi, Asst. Prof., Department of Civil Engineering, JDCOEM, Nagpur.	Member, BOS
7	Mr. Nilesh Pal, Asst. Prof., Department of Civil Engineering, JDCOEM, Nagpur.	Member, BOS
8	Mr. Atul Gautam, Asst. Prof., Department of Civil Engineering, JDCOEM, Nagpur.	Member, BOS
9	Mrs. Atika Ingole, Asst. Prof., Department of Civil Engineering, JDCOEM, Nagpur.	Chairman, BOS

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Teaching Scheme for: Civil Engineering Branch Code: CE

Semester: III

Sr. No	Category of the Subject	Course Name	Teaching Scheme			Evaluation Scheme				Credits	Teaching mode
			L	T	P	CA	MSE	ESE/Ext. Prac	Total		
1	HSMC	Civil Engineering - Societal & Global Impact	2	0	0	20	20	60	100	2	PowerPoint Presentation, MOOCs Platform, Video Lecture
2	BSC	Engineering Mathematics-III	2	1	0	20	20	60	100	3	MOOCs Platform
3	ESC	Building Drawing and Drafting	2	1	0	20	20	60	100	3	Animated Video, PowerPoint Presentation
4	ESC	Mechanics of Rigid bodies	2	1	0	20	20	60	100	3	Animated Video, PowerPoint Presentation, MOOCs Platform,
5	ESC	Energy Science and Engineering	3	0	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
6	PCC	Basic Geology and Geotechnical Engineering	3	0	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
7	MC	Universal Human Values	3	0	0	20	20	60	100	3	PowerPoint Presentation
8	ESC	Building Drawing and Drafting Lab	0	0	4	60	0	40	100	2	Video Lecture
9	ESC	Mechanics of Rigid bodies Lab	0	0	2	60	0	40	100	1	Virtual Lab Video Lecture
10	PCC	Basic Geology and Geotechnical Engineering Lab	0	0	2	60	0	40	100	1	Virtual Lab Video Lecture
			17	**3**	**8**					**24**	

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Teaching Scheme for: Civil Engineering Branch Code: CE

Semester: IV

Sr. No	Category of the Subject	Course Name	Teaching Scheme			Evaluation Scheme				Credits	Teaching mode
			L	T	P	CA	MSE	ESE/Ext. Prac	Total		
1	BSC	Life Science	2	0	0	20	20	60	100	2	PowerPoint Presentation
2	PCC	Hydrology & Water Resource Engineering	2	1	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
3	PCC	Concrete Technology	2	1	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
4	PCC	Solid Mechanics	2	1	0	20	20	60	100	3	Animated Video, PowerPoint Presentation, MOOCs Platform
5	PCC	Surveying and Geomatics	2	0	0	20	20	60	100	2	Animated Video, PowerPoint Presentation, MOOCs Platform
6	PCC	Materials, Testing & Evaluation	2	0	0	20	20	60	100	2	PowerPoint Presentation, MOOCs Platform, Video Lecture
7	PCC	Concrete Technology Lab	0	0	2	60	0	40	100	1	Virtual Lab Video Lecture
8	PCC	Solid Mechanics Lab	0	0	2	60	0	40	100	1	Virtual Lab Video Lecture
9	PCC	Surveying and Geomatics Lab	0	0	4	60	0	40	100	2	Virtual Lab Video Lecture
10	MC	Innovation and Entrepreneurship Development	2	0	0	10	15	25	50	AU	Video Lecture
11		MOOCSs Course (SWAYAM/NPTEL)							100	2	, MOOCs Platform,
			14	**3**	**8**					**21**	

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Teaching Scheme for: Civil Engineering Branch Code: CE

Semester:V

Sr. No	Category of the Subject	Course Name	Teaching Scheme			Evaluation Scheme				Credits	Teaching mode
			L	T	P	CA	MSE	ESE/ Ext.Prac	Total		
1	HSMC	Professional Practice, Law & Ethics	2	0	0	20	20	60	100	2	PowerPoint Presentation, MOOCs Platform, Video Lecture
2	PCC	Design of RCC Elements	2	1	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
3	PCC	Fluid Mechanics	2	1	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
4	PCC	Structural Analysis	2	1	0	20	20	60	100	3	Animated Video, PowerPoint Presentation, MOOCs Platform
5	PCC	Transportation Engineering	3	0	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
6	OEC	Open Elective-I	4	0	0	20	20	60	100	4	PowerPoint Presentation, MOOCs Platform, Video Lecture
7	PCC	Fluid Mechanics Lab	0	0	2	60	0	40	100	1	Virtual Lab Video Lecture
8	PCC	Structural Analysis Lab	0	0	2	60	0	40	100	1	Virtual Lab Video Lecture
9	PCC	Transportation Engineering Lab	0	0	2	60	0	40	100	1	Virtual Lab Video Lecture
10	PROJECT	Mini Project & Seminar	0	0	2	30	0	20	50	1	PowerPoint Presentation
11	PROJECT	Field Visit	0	0	0	60	0	40	100	3	
12	MC	Consumer Affair	2	0	0	10	15	25	50	AU	PowerPoint Presentation
			17	**3**	**8**					**25**	

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Teaching Scheme for: Civil EngineeringBranch Code: CE
Semester: VI

Sr. No	Category of the Subject	Course Name	Teaching Scheme			Evaluation Scheme				Credits	Teaching mode
			L	T	P	CA	MSE	ESE/ Ext.Prac	Total		
1	PCC	Design of Steel Structures	2	1	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
2	PCC	Environmental Engineering	3	0	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
3	PEC	Professional Elective I	3	0	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
4	PEC	Professional Elective-II	3	0	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
5	OEC	Open Elective-II	4	0	0	20	20	60	100	4	PowerPoint Presentation, MOOCs Platform, Video Lecture
6	PCC	Environmental Engineering Lab	0	0	2	60	0	40	100	1	Virtual Lab Video Lecture
7	PROJECT	Mini Project & Seminar	0	0	2	30	0	20	50	1	PowerPoint Presentation
8	PROJECT	CRT	0	0	2	50	0	0	50	1	PowerPoint Presentation
9	PROJECT	Skill Development	0	0	2	15	0	35	50	1	MOOCs Platform,
10	MC	Research Methodology	2	0	0	10	15	25	50	AU	PowerPoint Presentation, MOOCs Platform
			17	**1**	**8**					**20**	

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Teaching Scheme for: Civil Engineering Branch Code: CE

Semester:VII

Sr. No	Category of the Subject	Course Name	Teaching Scheme			Evaluation Scheme				Credits	Teaching mode
			L	T	P	CA	MSE	ESE/ Ext.Prac	Total		
1	PCC	Engineering Economics, Estimating and Costing	3	0	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
2	PEC	Professional Elective III	2	1	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
3	PEC	Professional Elective IV	2	1	0	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
4	PEC	Professional Elective V	3	0	-	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
5	OEC	Open Elective-III	4	0	0	20	20	60	100	4	PowerPoint Presentation, MOOCs Platform, Video Lecture
6	PCC	Engineering Economics, Estimation and Costing Lab	0	0	2	60	0	40	100	1	Chalk, Duster
7	PROJECT	Project-1	0	0	6	75	0	75	150	5	PowerPoint Presentation
8	MC	IPR (Intellectual Property Rights)	2	0	0	10	15	25	50	AU	PowerPoint Presentation, MOOCs Platform,
			16	**2**	**8**					**22**	

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Teaching Scheme for: Civil Engineering Branch Code: CE

Semester:VIII

Sr. No	Category of the Subject	Course Name	Teaching Scheme			Evaluation Scheme				Credits	Teaching mode
			L	T	P	CA	MSE	ESE/ Ext.Prac	Total		
1	PEC	Professional Elective VI	3	0	-	20	20	60	100	3	PowerPoint Presentation, MOOCs Platform, Video Lecture
2	OEC	Open Elective-IV	4	0	-	20	20	60	100	4	PowerPoint Presentation, MOOCs Platform, Video Lecture
3	PROJECT	Project-2	0	0	4	50	0	50	100	3	PowerPoint Presentation
OR											
4	PROJECT	Internship (Full Semester)	0	0	0	150	-	150	300	10	-
5		MOOCSs Course (SWAYAM/NPTEL)							100	2	MOOCs Platform
			7		**4**					**12**	

Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4T003	Concrete Technology	2	1	0	3

Prerequisites for the course	
1	Basics of Civil Engineering
2	a basic understanding of chemical reactions, compounds, and elements.
3	Basic mathematical skills such as algebra and geometry are necessary for understanding concepts such as mix design, strength calculations, and testing results.
4	A basic understanding of physics concepts such as mechanics, force, and energy is necessary for understanding the behavior of materials and structures.
5	A basic understanding of civil engineering principles, including structures, construction materials, and testing methods, is necessary for understanding the principles and practices of concrete making.

Prior Reading Material/useful link	
1	http://assets.press.princeton.edu/chapters/s9638.pdf
2	https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/ADVANCED%20MATERIAL%20DESIGN/pdf.

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Identify Quality Control tests on concrete making materials
2	CO2	Understand the behavior of fresh and hardened concrete
3	CO3	Understand the durability requirements of concrete
4	CO4	Understand the need for special concretes.
5	CO5	Design concrete mixes as per standard methods.
6	CO6	Identify Quality Control tests on concrete making materials

Syllabus:

Course Content	
Unit I	Concrete Making Materials: Cement, Fine Aggregate, Coarse aggregate,Water, Chemical & Mineral admixtures. [06 hrs]
Unit II	Quality tests on cement: Different test on cement as per Indian standards Hydration of Cement: Bogue's compounds, Hydration, Gel formation, Types of cement, pore & capillary water. [06 hrs]
Unit III	Aggregates: Tests on aggregates as per Indian standards, Bulking of sand, Sieve analysis – Grading. Fresh concrete: Properties of fresh concrete- Workability – different tests of workability- Factors influencing workability compaction, finishing, curing. [06 hrs]
Unit IV	Hardened concrete: Tests on hardened concrete as per IS codes – Relationship between different strengths – factors influencing strength, NDT techniques. Durability: Factors influencing durability – Chemical effects on concrete- Carbonation, Sulphate attack, Chloride attack. [06 hrs]
Unit V	Concrete Mix design: Different methods of mix design – factors affecting mixdesign – exercises. Special concrete: Heavy density concrete, underwater concrete, self-compactingconcrete, light weight concrete etc. [06 hrs]

Text Books:	
1	Shetty M. S., "Concrete Technology", S. Chand Publication.
2	Pillai & Menon: RCC Design.
3	Dr. Shah V.L. & Karve S.R.: Limit State Design
Reference Book:	
1	Gambhir M L, "Concrete Technology", Tata McGraw Hill.
2	Neville.A.M, Brooks .J. J, "Concrete Technology", Pearson Publication.
	Jain A.K.: Plain & Reinforced Concrete, Vol. I & II
	Sinha S.K. & Roy S.K.: Fundamentals of RCC.
Useful Link:	
1	https://onlinecourses.nptel.ac.in/noc23_ce50/preview
2	https://onlinecourses.nptel.ac.in/noc23_ce50/preview

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Rahul Ralegaonkar	Professor	VNIT, Nagpur
2.	Dr. Anant Pande	Professor	YCCE, nagpur
3.	Mrs. Atika Ingole	Assistant Professor	JDCOEM,Nagpur
4.	Mr. Atul Gautam	Assistant Professor	JDCOEM,Nagpur
5.	Mr. Parag Pal	Alumni	SAI Consulting Engeeneers PVT. Ltd, Bangalore

Laboratory:

Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4L001	Concrete Technology	0	0	2	1

Sr. No.	Learning Outcome number	Learning Outcome Statement
1	LO1	Demonstrate tests on ingredients of concrete and concrete mix
2	LO2	Analyze the data obtained from testings.
3	LO3	Evaluate the properties of ingredients of concrete and concrete mix and checkit‟s suitability in construction
4	LO4	Judge the material behaviour in fresh and hardened state.

Syllabus:

Sr. No.	**Name of Experiments**
1	Determination of specific gravity of the given cement sample.
2	Determine fineness of the given cement sample.
3	Determine soundness of the given cement sample.
4	Determine standard consistency, initial and final setting time of concrete.
5	Determine bulking of fine aggregates.
6	Determine the workability of concrete by slump cone test and compaction factor test.
7	Determine effect on workability after addition of admixture-Accelerator, Retarder, SuperPlasticizer.
8	Find Compressive, flexural and tensile strength of concrete as per Indian standards.
9	Exercise and verification of Concrete Mix Design as per IS 10262: 2019 Method.
10	Determine the quality of concrete by Non-destructive Testing methods using Rebound Hammer and ultrasonic Pulse velocity apparatus (Demo only).

Semester	Course Code	Name of Course	L	T	P	Credits
V	CE5T002	Design of RC Structure.	3	0	0	3

Prerequisites for the course	
1.	Concrete Technology
2.	Understanding of properties and behavior of materials, especially concrete
3.	Familiarity with common structural elements such as beams, columns, and slabs
4.	Knowledge of different types of loads on structures and how they affect structural behavior
5.	Understanding of different design philosophies for reinforced concrete structures
6.	Ability to perform calculations for flexural, shear, bond, and torsional loads on beams

Prior Reading Material/useful link	
1.	https://www.youtube.com/watch?v=45ou1yjuoUk
2.	https://www.youtube.com/watch?v=WSRqJdT2COE
3.	https://structuralengineeringbasics.com/types-of-loads-on-structures/
4.	https://www.youtube.com/watch?v=spugqjcuPiU

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Recall the basic concept of Concrete Technology and relevant IS code.
2	CO2	Identify the principles of analysis and design of RC structures viz Beam, Column, footing etc.
3	CO3	Apply the knowledge and skills in practical problems.
4	CO4	Analyze the results in designing various concrete members.
5	CO5	Design the various concrete members of structures like beam, column, footing and slab with relevant IS code.
6	CO6	Compare the results with relevant software’s.

Syllabus:

Course Content	
Unit I	**Design Philosophies and Analysis:** Design philosophies of RC structures (WSM, LSM), Structural elements, Loads onstructures, and Structural properties of concrete, Role of structural engineer. RC sections in flexure - theory & analysis - singly and doubly reinforced - rectangular and flanged sections. [07 hrs]
Unit II	**Beams:** Design of beams for flexure, shear, bond and torsion: simply supported, continuous &cantilever, redistribution of moments. [07 hrs]
Unit III	**Design of Columns**: Short & long - axially loaded, uniaxial & biaxial moments. [07 hrs]
Unit IV	**Column Footings:** Isolated column footings - axial load, uniaxial and biaxial moments, eccentric footing.Footings in difficult soil conditions. [07 hrs]
Unit V	**Slabs**: Slabs - one way and two way - simply supported, cantilever and continuous. Design ofstaircase - Dog legged and open well. [07 hrs]

Text Books:	
1	Shah V. L. and Karve S. R., "Limit State Theory and Design of Reinforced Concrete", StructuresPublications, Pune, 2005.
2	Punmia B. C., Jain A. K. and Jain A. K., "Limit State Design of R.C. Structures", Laxmi PublicationsPvt. Ltd., 2008.
Reference Book:	
1	Dayaratnram, "Design of Reinforced Concrete Structures" Oxford and IBH, New Delhi, 2011.
2	Sinha N. C., Roy S. K., "Fundamentals of Reinforced Concrete", S. Chand and Co., New Delhi,2010.

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1	Dr. Anant Pande	Professor	YCCE, nagpur
2	Dr. K. N. Kadam	Associate Professor	GCOE, Nagpur
3	Prof. Atika Ingole	Assistant Professor	JDCOEM, Nagpur
4	Prof. Atul Gautam	Assistant Professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
V	CE5T004	Structural Analysis	2	1	0	3

Prerequisites for the course	
1.	Solid mechanics
2.	Mechanics of Rigid Bodies
3.	Basic knowledge of mechanics of materials, including stress, strain, deformation, and equilibrium equations
4.	Understanding of the properties of materials commonly used in structural engineering, such as steel, concrete, and timber
5.	Knowledge of basic mathematics, including calculus and linear algebra
6.	Familiarity with the principles of statics and dynamics

Prior Reading Material/useful link	
1.	https://www.bu.edu/moss/mechanics-of-materials-strain/
2.	https://www.bu.edu/moss/mechanics-of-materials-torsion/
3.	https://structuralengineeringbasics.com/what-types-of-construction-building-materials/
4.	https://www.planradar.com/gb/top-15-innovative-construction-materials/

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Recall the concepts involved in various methods of structural analysis.
2	CO2	Compare the applications of analysis methods and their respective theorems.
3	CO3	Build the Shear force and Bending Moment diagrams and fixed end moments for various methods.
4	CO4	Analyse the frame structures, trusses, arches etc. subjected to various loading conditions.
5	CO5	Evaluate the moments produced due to external loading.
6	CO6	Compile the results of analysis and predict the behaviour of structure subjected to loading.

Syllabus:

Course Content	
Unit I	Introduction of Statically indeterminate Structures: Concept of Static indeterminacy, Analysis of fixed and continues beams by theorem ofthree Moments, effects of sinking of support. [08 hrs]
Unit II	Strain energy method as applied to the analysis of redundant frames and redundant truss up to two Degrees, Analysis of Two-Hinged arches. Three Hinged Arch, parabolic arches. Bucking of columns and beams. Eulers and Rankines formula. [08 hrs]
Unit III	Slope defection method as applied to indeterminate beams & continues beams and portal frame. Moment Distribution Method applied to frames andbeams (Non-Sway and Sway). [08 hrs]
Unit IV	Kani's method applied to symmetrical and unsymmetrical frames withsway (Upto one bay two storey). Flexibility Method of structural analysis, Introduction to flexibility method up to two DOF. [08 hrs]
Unit V	Direct stiffness method as applied to continuous beams and portal frames Formulation of stiffness matrix for TRUSS/BAR element, Member load matrix and structure load matrix formulations. Basic concept of structural analysis software that can be used to analyze, design, and model structures in 3D. [08 hrs]

Text Books:	
1	Ramamrutham S.S. and Narayan R., "Theory of Structures", DhanpatRai and Son's, New Delhi.
2	Vazirani V. N. and Ratwani M. M., "Analysis of Structures", Khanna Publishers, New Delhi, 1994.
	Bhavikatti S. S., "Structural Ananlysis (Volume II), Vikas Publishing House Ltd., Delhi.
Reference Book:	
1	Pandit G. S. and Gupta S. P., "Structural Analysis", Tata McGraw Hills publishing company Ltd., New Delhi

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1	Dr. Anant Pande	Professor	YCCE, nagpur
2	Dr. K. N. Kadam	Associate Professor	GCOE, Nagpur
3	Prof. Atika Ingole	Assistant Professor	JDCOEM, Nagpur
4	Prof. Tina Khandale	Assistant Professor	JDCOEM, Nagpur

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Department of Civil Engineering
Building Better Development

Program: B. Tech in Civil Engineering

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7T001	Engineering Economics, Estimating, Costing	3	0	0	3

Prerequisites for the course	
1	Types of Building and construction units
2	Component of Building and their types
3	Types of Masonry

Prior Reading Material/useful links	
1.	https://theconstructor.org/building/types-masonry-foundations-construction-uses/18989/
2.	https://civiljungle.com/building-components/
3.	https://architectureideas.info/2013/07/stair-shapes/

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Acquaint with various economic financial aspects construction industry and provisions in estimate.
2	CO2	Explain the aspects involved in engineering economics and its relevance in estimating and costing.
3	CO3	Categorize different methods adapted for estimates of different civil engineering works.
4	CO4	Apply the knowledge of estimating in rate analysis for costing of works.
5	CO5	Estimate quantities of different item of work for rate analysis.
6	CO6	Develop the detailed estimate of valuation various civil engineering works, along with its rate analysis.

Syllabus:

Course Content	
Unit I	Engineering Economics: Importance of Construction and Infrastructure in Economic Development and Growth. Sources of Finance for Construction Industry, Concepts of Time Value of Money, Discounted Cash Flow, Internal Rate of Return, Numerical Problem Based on Calculation Of IRR. Affordable Housing Scheme by Government of India.[08hrs]
Unit II	Introduction to Estimating: Purpose of Estimating & Costing. Administrative Approval & Technical Sanction. Types of Estimating. Checklist of Item of Work. Modes of Measurement, Rules for Deduction as per IS 1200. Specifications of Items of Work, Types of Specification. Numerical on Approximate Estimates. [08hrs]
Unit III	Detailed Estimate: Methods of Detailed Estimate, Provisions in Detailed Estimate: Contingencies, Work Charge Establishment Percentage ChargesEtc. Detailed Estimates of Load Bearing and Framed Structures. Calculation of Reinforcing Steel with Bar Bending Schedule. Estimate for Civil Engineering Works: Methods of Calculating Earthwork. Estimates of Roads & Canals. Irrigation Works: Estimates of Permanent Land, Temporary Land. [08hrs]
Unit IV	Rate Analysis: Introduction, Purpose and Principles of CSR, Factors Affecting Analysis of Rates, Current Market Rates of Materials and Labour, Rate Analysis of Different Items of Work. [08hrs]
Unit V	Valuation: Purpose of Valuation, Factors Affecting Property Price and Cost, Types of Value. Different Types of Lease, Sinking Fund, Depreciation, and Its Methods, Capitalized Value, Methods of Valuation, Net & Gross Income And Rent Fixation. [08hrs]

Text Books:	
1	Dutta B. N. (2012) “Estimating and Costing”, UBS Publishers Distributors, New Delhi
2	Rangwala S. C. (1990), “Elements of Estimating and Costing”, Charotar Publication, Anand
3	Birdi G. S. (2014) “Estimating and Costing”, DhanpatRai& Sons, N. Delhi
4	Tarquin, A.J and Blank L.T, (1976) Engineering economy and behavioral approach. McGraw Hill Company.
5	Taylor, G.A. (1968). Managerial and Engineering Economy. East-West Edition.
Reference Book:	
1	Govt. of Maharashtra P.W. and Housing Department Publication edition 1979 and 1981
2	P. W. D. Maharashtra, “Standard Specifications”, Volumes I & II
3	C.P.W.D. Specifications
4	C.P.W.D. Schedule of Rates
5	P.W.D. Maharashtra Schedule of Rates
6	Publications of Bureau of Indian Standards: IS 1200 all parts, and other relevant.
Useful links	
1	https://www.digimat.in/nptel/courses/video/105104161/L08.html
2	https://www.studypool.com/documents/15282339/estimation-and-costing
3	https://www.erforum.net/2020/05/estimation-costing-handwritten-note-pdf-download.html

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE
3.	Prof. Shahrukh Kureshi	Assistant Professor	JDCOEM,Nagpur
4.	Prof. Shital Navghare	Assistant Professor	JDCOEM,Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE01A	Traffic Engineering	2	1	0	3

Prerequisites for the course	
1.	Knowledge of basic physics, including motion, force, and energy.
2.	Traffic engineering principles, including traffic flow theory and capacity analysis.
3.	Knowledge of road design and construction, including geometric design principles and standards
4.	Awareness of traffic safety issues and regulations.

Prior Reading Material/useful link	
1.	https://www.pbs.org/video/science-trek-force-and-motion/
2.	https://www.youtube.com/watch?v=nzeHzzqFIYk
3.	https://www.civil.iitb.ac.in/~vmtom/nptel/301_IntroGD/web/web.html
4.	https://indiancc.mygov.in/wp-content/uploads/2021/06/mygov-999999999803618977.pdf

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Acquire the knowledge of traffic survey, road geometry, traffic safety and Intelligent Transportation System.
2	CO2	Understand the survey methods, traffic controlling devices, traffic management, and modern techniques for transportation system.
3	CO3	Apply the knowledge of geometric and safety parameters, establishing the comparison between traditional and modern intelligent transportation systems.
4	CO4	Examine the road geometry, traffic surveys, its safety measures and working of Intelligent Transportation System.
5	CO5	Explain the various parameters involved in traffic engineering and modern techniques in traffic engineering.
6	CO6	Design the traffic management system.

Syllabus:

Course Content	
Unit I	General: Road, road user & road vehicle characteristics, traffic on Indian roads. Traffic Surveys: speed, journey time and delay studies, methods of measurement of spot speed, headways gaps, measurements of running and journey speeds, origin and destination surveys, survey methods, sample size, data analysis &presentation, highway capacity, level of service[10 hrs]
Unit II	Road geometry: Hierarchy of urban roads and their standards, diverging, merging, crossing, weaving, maneuvers and conflict points, types of road junction, channelization of traffic flow, traffic rotary design, grade separated intersections, drive ways. Traffic controlling devices: Traffic signs, road markings, traffic signals, design of signalized intersections& signaling systems, Queuing theory. [8 hrs]
Unit III	Traffic Safety: Driver's error, vehicle & road surface laws and enforcement, traffic accident conditions in India, collection and interpretation of accident data and recording in standard Format, skidding, speed and weather effects on accidents, analysis of accidents, pedestrian, cyclist& auto vehicle driver's safety, traffic regulation, 3E's of traffic management. [10 hrs]
Unit IV	Introduction to Intelligent Transportation Systems (ITS) – Definition of ITS and Identification of ITS Objectives, Historical Background, Benefits of ITS - ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), video data collection. [10 hrs]
Unit V	Importance of telecommunications in the ITS system, Information Management, Traffic Management Centers (TMC). Vehicle – Roadside communication – Vehicle Positioning System. ITS functional areas – Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control Systems (AVCS), Advanced Public Transportation Systems (APTS), Advanced Rural Transportation Systems (ARTS). [10 hrs]

Text Books:	
1	Highway Engineering: (1991) Khanna S.K. and Justo C.E.G., Nem Chand & Bros.
2	Traffic Engineering and Transportation Planning: (1987) Kadiyali, Khanna Publications.
ReferenceBook:	
1	Transport planning and Traffic Engineering, edition Latest, C A O'Flaherty, Butterworth Heinemann Publications.
2	Introduction to Transportation Engineering, edition Latest, James H Bank, Tata Mcgraw-Hill Publications.
3	Transportation Engineering an Introduction, edition C. JotinKhisty, PHI Publication.
Useful Links:	
1	Traffic Surveys: https://nptel.ac.in/courses/105101008
2	Road geometry: https://archive.nptel.ac.in/courses/105/107/105107220/

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE
3.	Dr. Rahul Ralegaonkar	Professor	VNIT,Nagpur
4.	Mr. Gaurav Rangari	Assistant Professor	JDCOEM, Nagpur
5.	Ms. Shital Navghare	Assistant Professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE01B	Contract Management	2	1	0	3

Prerequisites for the course	
1.	Basics of Contract Law
2.	Indian Contract Act 1872
3.	Risk Management in Construction
4.	Basics of Dispute Resolution

Prior Reading Material/useful link	
1	https://www.youtube.com/watch?v=xF-FkvmnXck
2	https://www.youtube.com/watch?v=oEO5IrFv7ts
3	https://www.youtube.com/watch?v=IBL9MqvpPlM
4	https://www.youtube.com/watch?v=PpDngLCiTHo

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Define various contracts, their suitability and the procurement process involved in construction projects.
2	CO2	Explain the need of understanding and reviewing various provisions included in the contract for effective management of the projects
3	CO3	Apply legal aspects of construction projects, of construction contract, of issues related to contract administration.
4	CO4	Analyze various contract management processes involved in construction projects disputes resolution techniques.
5	CO5	Evaluate various criteria, parameters, laws, contract documents and dispute resolution methods leading to a valid contract document
6	CO6	Create construction contract documents satisfying the indispensable clauses and conditions.

Syllabus:

Course Content	
Unit I	Construction Contract: Agreement, Contract, essential conditions, Indian Contract Act 1872, types of contracts, terminology of contract. Construction Specifications: Standard specifications, general specification, development, interpretation. [6 hrs]
Unit II	Tender and tender documents: Definitions, List of Documents, EMD, Security Deposit, Invitation for Tenders and sale of Documents, Preparation of Tender Documents and its submission, Receipt of Tender Documents and its opening, Evaluation of Tender and Award of contract–Letter of Award, Letter of Intent, Issues in tendering process. [8 hrs]
Unit III	Administration/Performance of contract: Responsibilities of Principal & Contractor, Monitoring and Quality control/assurance, Settlement of claims − Advances, Bills, Extension for time, Extras & Variations, Cost Escalations. Security Deposit, Retention Money, Performance Bond, Liquidated Damages, Penalties, Statutory Requirements. Breach of contract: Definition and Classification, Common Breaches by – Principal, Contractor, Damage Assessment, Claims for Damages. [8 hrs]
Unit IV	Dispute Resolution Mechanism: General, Methods for dispute resolution−Negotiations, Mediation, Conciliation, Dispute Resolution Boards, Arbitration, Litigation/Adjudication by courts. Conciliation − Appointment of Conciliator, Role of Conciliator, Special Features of Conciliation Dispute Resolution Boards (DRB), Constitution of DRB, Functioning of DRB, Procedure for Hearings, Status of Award. [8 hrs]
Unit V	Contract document: Drafting of clauses, development, and interpretation, CPWD conditions of contract, FIDIC conditions of contract. BOT contract: PPP framework, types of risk, concession agreement, drafting of clauses, development, and interpretation. Laws affecting Engineers: Labour Law, Sales Tax, VAT, Service Tax, Excise Duty Relational Contract: Partnering, alliancing, key elements, processes. [6 hrs]

Text Books:	
1	L.S. RanagaRao Contract Management and Dispute Resolutions Engineering staff College of India January 2008.
2	C. J. Schexnayder and R. E. Mayo, Construction Management Fundamentals, McGraw Hill, New Delhi.2003.
3	General Conditions of Contract, Central Public Works Department, New Delhi,2010.
Reference Book:	
1	D.S. Berrie and B.c. Paulson, Professional construction management including C.M.,Design construct and general contracting, McGraw Hill International, Third Edition 1992.
2	V. K. Raina, Construction & Contract Management Practices, SPD, New Delhi

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Anant Pande	Professor	YCCE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
3.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
4.	Mr. Kamlesh Meshram	Assistant Professor	JDCOEM,Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE01C	Waste Water Management	2	1	0	3

Prerequisites for the course	
1.	Water quality parameters, including pH, dissolved oxygen, and nutrient concentrations.
2.	Basic understanding of fluid mechanics and hydraulic principles.
3.	Knowledge of environmental regulations related to wastewater treatment and disposal.
4.	Understanding of health and safety considerations in wastewater treatment operations.

Prior Reading Material/useful link	
1.	https://www.intechopen.com/chapters/69568
2.	https://www.youtube.com/watch?v=MZ6GCH2nLy0
3.	https://www.youtube.com/watch?v=yfvwaT6jgdc
4.	https://www.youtube.com/watch?v=9Zvz2gniyYY

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Recall the various treatment processes on the waste and sludge.
2	CO2	Explain the wastewater quantity along with it’s treatment process.
3	CO3	Apply the knowledge of waste water and sludge to treat at various stages.
4	CO4	Distinguish the various stages in waste water and sludge treatment.
5	CO5	Justify the quality of treated waste water and sludge.
6	CO6	Design the waste water and sludge treatment units.

Syllabus:

Course Content	
Unit I	Introduction, Quantity & Quality of Wastewater: Components of Wastewater Flows, Wastewater Sources & Flow rate, variations in Flow rates & Strength, Characteristics of wastewater, quantity of wastewater. [6 hrs]
Unit II	Primary Treatment of Wastewater: Physical Unit Operations- Screening, Grit Removal, Oil & Grease Removal, Primary Sedimentation. [6 hrs]
Unit III	Secondary Treatment of Wastewater: Fundamentals of Biological Treatment, Microbial Metabolism, Bacterial Growth, Suspended & Attached Growth Processes, Activated Sludge Process & its Modifications, Trickling Filters, Secondary Clarification, Aerated Lagoons, Oxidation Ditch. [6 hrs]
Unit IV	Anaerobic Treatment of Wastewater Anaerobic Suspended & Attached Growth Processes, Factors affecting Anaerobic Processes, Anaerobic Lagoons, UASB, Septic Tank, Anaerobic Baffled Reactor [6 hrs]
Unit V	Sludge Treatment Solid Sources, Characteristics & Quantities, Sludge Pumping, Introduction to mass balance approach, Treatment-Thickening, Stabilization, Design of Sludge Digester, Conditioning, Dewatering, Drying [4 hrs]

Text Books:	
1	Manual on sewerage and sewage Treatment-Government of India Publication
2	Masters G.M., "Introduction to Environmental Engineering and Science"
3	Metcalf & Eddy, "Waste Water Engineering Treatment & Disposal", Tata McGraw Hill, 1982
Reference Book:	
1	Garg S.K., "Sewage Disposal and Air Pollution Engineering", Khanna Publishers
2	Rao M.N. &Datta, Waste water treatment
3	Ehalers Victor & Earnest W Steel, Municipal and Rural sanitation

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
2.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
3.	Mr. Nilesh Pal	Assistant professor	JDCOEM, Nagpur
4.	Mr. Gaurav Rangari	Assistant professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE01D	Advanced Construction Material	2	1	0	3

Prerequisites for the course	
1.	Chemistry and physics, including materials science, mechanics, and thermodynamics.
2.	Types of concrete, including Portland cement concrete and lime concrete.
3.	Manufacturing process and properties of different types of cement, including ordinary Portland cement and pozzolana cement.
4.	Different types of admixtures used in concrete and their effects on the properties and behavior of the material.

Prior Reading Material/useful link	
1.	https://theconstructor.org/concrete/types-concrete-admixtures/5558/
2.	https://www.amazon.in/Thermodynamics-Physicists-Materials-Scientists-Undergraduate-ebook/dp/B0B653ZQG1
3.	https://civiltoday.com/civil-engineering-materials/cement/250-types-of-cement

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	List the various advanced construction materials.
2	CO2	Classify the construction materials based on different modes.
3	CO3	Utilize the various construction materials for an advancement in construction industry.
4	CO4	Analyze the quality and requirement of materials for specific structural purpose.
5	CO5	Decide application of material as per the requirement of desired structural construction.
6	CO6	Adopt the advanced material for modernization of construction Work.

Syllabus:

Course Content	
Unit I	Construction Materials: Classifications of Construction Materials. Consideration of physical, Mechanical, thermo-physical Properties, characteristics behaviour under stress, selection criteria for construction materials, green building materials, waste products, reuse and recycling [8 hrs]
Unit II	Materials for making Mortar and concrete: Lime manufacture, properties, hardening of lime, types of lime, lime concrete uses, cement, aggregates, water, characteristics, properties and uses of Pozzolana materials, Types of mortars, special mortars, properties and applications, admixtures [8 hrs]
Unit III	Ceramic Materials: Classification, Refractories, glass, glass wool,mechanical, thermal and electrical properties, fire resistance materials, Uses and application. Polymeric Materials: Polymerization mechanism and depolymerisation. Rubber and plastics, properties, effect of temperature on mechanical properties. Uses and application. [8 hrs]
Unit IV	Types of structural steels, special steel, alloy steel, stainless steel, light gauge steel, Corrosion of concrete in various environments. Corrosion of reinforcing steel. Electro-chemical process, measures of protection. Ferro-cement, material and properties. Polymers in Civil Engineering Polymers, fibres and composites, Fibre reinforced plastic in sandwich panels, modeling. [8 hrs]
Unit V	Architectural use and aesthetics of composites. Adhesives and sealants. Structural elastomeric bearings and resilient seating. Moisture barriers, Polymer foams and polymers in Building Physics. Polymer concrete composites. [8 hrs]

Text Books:	
1	Rangawala S.C. Engineering Materials Chortor Publications 1991.
2	S.K. Duggal, Building Materials, New Age International Publications 2006.
Reference Book:	
1	Bruntley L.R Building Materials Technology Structural Performance & Environmental Impact McGraw Hill Inc 1995.
2	R. Chudley, Construction Technology, Vol I - IV Longman Group Construction Ltd. 1973

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Rahul Ralegaonkar	Professor	VNIT, Nagpur
2.	Mrs. Atika Ingole	Assistant Professor	JDCOEM,Nagpur
3.	Mr. Atul Gautam	Assistant Professor	JDCOEM,Nagpur
4.	Mr. Parag Pal	Alumni	SAI Consulting Engeeneers PVT. Ltd, Bangalore

Semester	Course Code	Name of Course	L	T	P	Credits
	CE7TE01E	Bridge Engineering	2	1	0	3

Prerequisites for the course	
1.	Foundations and substructures of bridges.
2.	Different types of bridges, including their classifications, types of materials used, and factors to consider in their design.
3.	Different types of loads that bridges are subjected to, including dead loads, live loads, and impact effects, as well as the various design codes and standards that regulate them.

Prior Reading Material/useful link	
1.	https://archive.nptel.ac.in/courses/105/105/105105216/
2.	https://archive.nptel.ac.in/courses/105/105/105105216/
3.	https://archive.nptel.ac.in/courses/105/105/105105165/

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Define the bridges, its components and specifications for analysis and design.
2	CO2	Interpret the design procedure for bridge components under various classifications.
3	CO3	Develop a bridge structure adapting IS Specifications for different bridge components.
4	CO4	Distinguish between various specifications s provided by IS standards for different components of bridge and its classification.
5	CO5	Recommend the bridge type according to its utility and specification as per the recommendations.
6	CO6	Design the various bridge components according to bridge classifications as per IS Specifications.

Syllabus:

Course Content	
Unit I	Components of Bridges Classification – Importance of Bridges – Investigation for Bridges –Selection of Bridge site –Economical span – Location of piers and abutments – Subsoil exploration – Scour depth – Traffic projection – Choice of bridge type. [8 hrs]
Unit II	IRC Standards Specification of road bridges – width of carriageway – loads to be considered – dead load – IRC standard live load – Impact effect. [6 hrs]
Unit III	General Design Considerations Design of culvert – Foot Bridge - Slab Bridge – T-beam Bridge – Box Culvert-Fly over bridges. [6 hrs]
Unit IV	Bridge sub structure Evaluation of sub structures – Pier and abutments caps – Design of pier – Abutments – Type of foundations. [6 hrs]
Unit V	Bearings for Bridges Importance of Bearings – Bearings for slab bridges – Bearings for girder bridges – Electrometric bearing – Joints – Expansion joints. [6 hrs]

Text Books:	
1	Design of Bridge Structures, T.R. Jagadeesh, Prentice Hall of India Ltd.
2	Theory and Design of Bridges, Petros P. Xanthakos, John Wiley & Sons.
3	Bridge engineering by S. Ponnuswamy, TataMcGraw-Hill, 1986.
Reference Book:	
1	Bridge superstructure by N.Rajagopalan, Narosa Publishing House, 2006.
2	Hydraulic factors in bridge design, R. V. Farraday, F. G. Charlton, Hydraulics Research.

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE
3.	Mrs. Atika Ingole	Assistant Professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE02A	Highway Soil Mechanics	2	1	0	3

Prof. Atul Gautam

Prerequisites for the course	
1.	Basic understanding of soil mechanics and geotechnical engineering principles.
2.	Soil properties and behavior, including soil types and classification systems.
3.	Soil sampling methods and exploration techniques.

Prior Reading Material/useful link	
1.	https://www.youtube.com/watch?v=V1m3cB-Aqy8
2.	https://environment.uwe.ac.uk/geocal/SoilMech/classification/default.htm
3.	https://www.slideshare.net/jagadish108/3-sampling

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Define the terminologies involved highways soil mechanics.
2	CO2	Demonstrate soil investigations and various characteristics of soil.
3	CO3	Identify the properties of soil for the highway works.
4	CO4	Examine the soil properties form the testing to know the suitability.
5	CO5	Determine the behavior of soil from different analysis methods and theories.
6	CO6	Plan the highway drainage work from the properties of soil and its analysis.

Syllabus:

Course Content	
Unit I	Site Investigation: Planning and exploration Methods of Sampling, Geophysical methods, SPT, lab and field CBR value, Determination of k value on field. Soil classification systems, HRB classification, Group Index Method. [6 hrs]
Unit II	Shear strength of soil: Introduction, Elastic properties of soil – Tangent, Secant modulus, Poisson's ratio, Shear Modulus, Terzaghi's effective stress principle, effective shear parameters, measurement of pore pressures. [8 hrs]
Unit III	Stability of slopes: Introduction, Types, Different methods of analysis of slopes for Øu = 0 & C-Ø soil, Location of most critical circle, Stability Analysis of Slopes, Friction circle method, Taylor's stability number. [8 hrs]
Unit IV	Soil Compaction: Theories of compaction, factors affecting compaction, Method of Compaction Laboratory and Field. Compaction Energy of Road. Earth Pressure Theories: Coulomb's Wedge Theory, Culmann's method. Sheet pile walls and their analysis. [8 hrs]
Unit V	Highway Drainage: Importance, Surface drainage, Sub-surface drainage, Design of Surface and subsurface drainage system, Road construction in waterlogged and coastal areas. [5 hrs]

Text Books:	
1	"Foundation Engineering", G A Leonards, McGraw-Hill, Kogakusha, 1962, ISBN : 0750908203
2	"Drainage of Highway and Airfield Pavements" Harry R Cedegren, Wiley; 1 edition, 1974, ISBN-13: 978-0471141815
3	"Highway Engg", S.K. Khanna, C.E.G. Justo, and Veeraragavan A 10th edition. Nem Chand Bros Rookee ISBN 978-81-85240-72-5
Reference Book:	
1	"Soil Mechanics for Road Engineers" – HMSO, London. ISBN 10: 0115502785
2	"Designing with Geosynthetics", Robert M Koerner, 6th edition, Vol 2, ISBN: 9781465345240, 1465345248, 1986
3	Soil Mechanics in Highway Engineering, Rodriguez,A,R, Castillo del.h, Trans Tech Publications
4	Essentials of Soil Mechanics and Foundations, David McCarthy, Pearson Education
5	Basic Soil Mechanics, R. Whitlow, Pearson Education

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE
3.	Mr. Atul Gautam	Assistant Professor	JDCOEM,Nagpur
4.	Mr. Parag Pal	Alumni	SAI Consulting Engineers PVT.Ltd, Bangalore

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE02B	Sustainable Construction Engineering	2	1	0	3

Prerequisites for the course	
1.	Knowledge of sustainable development principles and practices, including their environmental, economic, and social aspects.
2.	Concept of ecological design and its major contributions to sustainable building.
3.	Sustainable site and landscape design, including stormwater management and heat island mitigation.

Prior Reading Material/useful link	
1.	https://www.youtube.com/watch?v=7V8oFI4GYMY
2.	https://en.wikipedia.org/wiki/Ecological_design
3.	https://www.youtube.com/watch?v=I1iIkv4rOuo

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Define sustainability, its need and strategies for sustainable environment.
2	CO2	Explain the various aspects involved to build sustainable environment.
3	CO3	Organize indoor environment quality considering all the parameters of sustainability.
4	CO4	Examine the environmental aspects to work on the sustainability.
5	CO5	Choose the strategy to maintain sustainability as per the requirement.
6	CO6	Plan the sustainable environment considering the need, strategies, ecological design and environmental quality.

Syllabus:

Course Content	
Unit I	Sustainability in the built environment: sustainable development relative to ecological, economic and social conditions – efforts in sustainable development and construction – international organizations involved. Ethics and sustainability: environmental and resource concerns – resource consumption by construction industry – Green building movement. [6 hrs]
Unit II	Ecological design – concept, major contributions, Building assessment and eco labels standards LEED, GRIHA assessment structure and process. Green building design process – documentation requirements. [6 hrs]
Unit III	Sustainable site and landscape- storm water management, heat island mitigation, assessment of sustainable sites. Building energy issues, building energy design strategy, building envelope – internal load reduction, energy optimization, renewable energy systems. Reducing carbon footprint. Built environment hydrologic cycle, water resources issues [6 hrs]
Unit IV	Strategies for conservation and recycling – waste water and storm water handling strategies. Materials resources – Life cycle assessment – embodied energy – Green building materials and products – assessing for environmental impacts – design for deconstruction – LEED credits for different aspects [6 hrs]
Unit V	Indoor environmental quality – issues and causes components of integrated design, emissions from building materials. Construction operations, site planning, indoor air quality during construction, materials management, Construction and Demolition, waste management – building commissioning – LEED credits for different aspects. Green building economics – quantifying benefits. Recent advances in sustainable construction [6 hrs]

Text Books:	
1	"Sustainable Building Design Manual – Volume II", Published by TERI, New Delhi, 2004
2	Kibert, C. J., "Sustainable Construction: Green Building Design and
	Delivery", John Wiley & Sons, 2013
3	Steven V. Szokolay., "Introduction to Architectural Science – The Basis of Sustainable Design", Elsevier, 2007
Reference Book:	
1	Sandy Halliday, "Sustainable Construction", Routledge, (Taylor & Francis Group), 2013
2	DejanMumovic and Mat Santamouris (Ed), "A Handbook of Sustainable Building Design and Engineering", Earthscan Publishing, 2009
3	Osman Attmann, "Green Architecture: Advanced Technologies and Materials", McGraw Hill, 2010.
Useful Link:	
1.	https://onlinecourses.nptel.ac.in/noc19_ce40/

Contribution for Syllabus Design:

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1.	Dr. Anant Pande	Professor	YCCE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
3.	Prof. Shahrukh Kureshi	Assistant Professor	JDCOEM,Nagpur
4.	Prof. Shital Navghare	Assistant Professor	JDCOEM,Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE02C	Solid and Hazardous Waste Management	2	1	0	3

Prerequisites for the course	
1.	Basic principles of environmental science and engineering.
2.	Types and characteristics of solid waste.
3.	Knowledge of waste management hierarchy and the principles of reduce, reuse and recycle.

Prior Reading Material/useful link	
1.	https://www.researchgate.net/publication/295980998_Principles_of_Environmental_Sciences
2.	https://prepp.in/news/e-492-types-of-solid-waste-environment-notes
3.	https://www.conserve-energy-future.com/reduce-reuse-recycle.php

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Acquire the knowledge of different types of sources, sampling and characteristics of solid waste.
2	CO2	Explain about municipal solid waste management along with waste collection, its process techniques and its risk assessment.
3	CO3	Identify types of wastes, methods of collection of wastes.
4	CO4	Examine the problems for solid waste disposal to use the various techniques accordingly.
5	CO5	Interpret the waste processes techniques for solid waste management and risk assessment.
6	CO6	Adapt the solid waste management techniques.

Syllabus:

Course Content	
Unit I	Introducing Municipal Solid Waste Management Overview: Problems and Issues of Solid Waste Management – Need for Solid Waste Management-Functional Elements such as Waste Generation, Storage, Collection, Transfer and Transport, Processing, Recovery and Disposal in The Management of Solid Waste [6 hrs]
Unit II	Waste Collection, Storage and Transport Collection and Storage of Municipal Solid Waste; Methods of Collection -House to House Collection - Collection Routes; On Site Storage Methods-Materials used for Containers - Recycling and Reuse of Waste -Need for Transfer and Transport; Transfer Station-Selection of Location, Operation and Maintenance; Transportation Methods-Manual. [6 hrs]
Unit III	Waste Processes Techniques Processing Techniques-Biological and Chemical Conversion Technologies-Composting and Its Methods, Vermi-Composting, Mechanical Composting, In Vessel Composting, Incineration, Pyrolysis, Gasification. [6 hrs]
Unit IV	Hazardous Waste Definition, Sources, Hazardous Characteristics, Management, Treatment and Disposal Electronic Waste Waste Characteristics, Generation, Collection, Transport and Disposal Biomedical Waste Definition, Sources, Classification, Collection, Segregation- Color Coding, Treatment and Disposal. [6 hrs]
Unit V	Quantitative Risk Assessment, Remedial Investigations, Containment and Alternative Analysis. [4 hrs]

Text Books:	
1	Integrated Solid Waste Management: Techobanglous, Thisen and Vigil, McGraw Hill International.
2	Hazardous Waste Management: Lagrega, Buckingham and Evans, McGraw Hill International.
3	Solid Waste Management in Developing Countries: A.D. Bhide, Nagpur publications.
Reference Book:	
1	Environmental Pollution Control Engineering: C.S. Rao, Wiley Eastern, Manual of solid waste of management, CPHEEO.
2	E-Waste: Implications, Regulations, and Management in India and Current Global Best Practices, RakeshJohri, the Energy and Resources Institute.

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
2.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
3.	Mr. Nilesh Pal	Assistant professor	JDCOEM, Nagpur
4.	Mr. Gaurav Rangari	Assistant professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE02D	Rock Mechanics	2	1	0	3

Prerequisites for the course	
1.	Basic knowledge of geology and minerals
2.	Knowledge of rock mechanics and their behavior
3.	Basic knowledge of construction techniques and practices in rock

Prior Reading Material/useful link	
1.	https://opengeology.org/textbook/3-minerals/
2.	https://link.springer.com/chapter/10.1007/978-3-540-73295-2_1
3.	https://www.youtube.com/watch?v=FLAM5Yd5PjA

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Recall the various classifications of rocks, it's failure theories, applications in foundation, strengthening processes and its role in tunnel and mining engineering.
2	CO2	Explain the properties of rocks, testing on rocks and their application in foundation, tunnels and mining.
3	CO3	Apply the knowledge to predict type of rock, strength of rock, failure theories with respect to various civil engineering applications.
4	CO4	Examine the various properties of rocks which will help in predicting the strength and behavior of rocks for designing structures in/on rocks masses.
5	CO5	Choose the type if rock foundation according to their classifications, properties, failure theories, strengthening treatments for tunneling operation.
6	CO6	Design the shallow and deep foundation considering the mechanics.

Syllabus:

Course Content	
Unit I	Classification of rocks, geological petro graphic and engineering. Index properties of rocks- porosity, density, permeability, durability and slake. Core recovery, RQD and its importance in engineering Stress-strain behaviour, factors influencing the strength of rock, temperature, confining pressure, strain rates, modes of failures of rocks. [8 hrs]
Unit II	Failure theories of rocks Mohr's hypothesis, Griffith's Criteria, Muller's extension of Griffith's theory, elementary theory of crack propagation, failure of rock by crack propagation, effects of cracks of elastic properties. Testing of rocks: Laboratory and field test, assessment of in-situ strength [8 hrs]
Unit III	Rock Foundation: Shallow and deep investigation for foundation design and construction aspect, slope stability analysis, mode of failures in rock. Design of slopes, excavation in rock and stabilization concepts [8 hrs]
Unit IV	Strengthening of rocks: Foundation treatment for dams and heavy structures by grouting and rock reinforcement. Methods and principles of grouting, principles of design of rock bolts [8 hrs]
Unit V	Tunnels – Basic terminology and application, site investigations, methods of excavation of tunnels supports and stabilization, construction control and maintenance, tunnel ventilation, control of ground water and gas Underground Mining; mining methods, planning and design, mining equipment and mining procedures, cause for subsidence and its remedial measures [8 hrs]

Text Books:	
1	Engineering Rock Mechanics: An Introduction to the Principles by J. A. Hudson and J. P. Harrison
Reference Book:	
1	Rock Mechanics: For Underground Mining by Barry H.G. Brady

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Sr. No.	Name of Person	Designation	Organization
1.	Dr. Anant Pande	Professor	YCCE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
3.	Prof. Shahrukh Kureshi	Assistant Professor	JDCOEM,Nagpur
4.	Prof. Shital Navghare	Assistant Professor	JDCOEM,Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE02E	River Engineering	2	1	0	3

Prerequisites for the course	
1.	Knowledge of erosion and sedimentation control measures
2.	Understanding of bedforms and their characteristics
3.	Water quality and environmental impact assessment

Prior Reading Material/useful link	
1.	https://archive.nptel.ac.in/courses/105/103/105103204/
2.	http://nitttrc.edu.in/nptel/courses/video/126105012/lec55.pdf
3.	https://archive.nptel.ac.in/courses/103/106/103106159/

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Acquire the knowledge of sediments, river flow, its resistance & total load transport.
2	CO2	Explain sediment problems and flow characteristics in alluvial stream along with bed load mechanism.
3	CO3	Apply bed load equations for channel design carrying sediments with flow regimes.
4	CO4	Analyze total load transport considering sediment properties and flow regimes.
5	CO5	Evaluate the river flow characteristics considering bed load mechanism.
6	CO6	Design of channel carrying sediments.

Syllabus:

Course Content	
Unit I	Origin and properties of sediments: Nature of sediment problems, origin and formation of sediments, properties of sediments, incipient motion of sediment particles, tractive force approach, cohesive materials. [6 hrs]
Unit II	Regimes of flow: Description of regimes of flow, ripple, dune, antidune, prediction of regimes of flow. Resistance to flow & velocity distribution in alluvial streams: velocity distribution in turbulent flow over rough boundaries, resistance and velocity distribution in alluvial streams. [8 hrs]
Unit III	Bed load transport & saltation: Bed load equations, bed load equations based upon dimensional considerations and semi-theoretical equations, general comments on bed load equations, saltation. [6 hrs]
Unit IV	Suspended load transport: Mechanism of suspension, equation of diffusion, sediment distribution equation, relations for suspended load, wash load, transport of suspended sediment. [6 hrs]
Unit V	Total load transport: sediment samplers design of canals carrying sediment laden water Types of sediment samplers Design of channels carrying sediment laden water Sediment transport through pipes. [6 hrs]

Text Books:	
1	Garde R J and RangaRaju K G, Mechanics of Sediment Transportation and Alluvial Stream Problems Wiley Eastern Ltd., 1985.
2	Yang C.T., Sediment Transport- Theory and Practice, The McGraw Hill Companies Inc. 1996.
Reference Book:	
1	Chang H.H., Fluvial Processes in River Engineering John Wiley 1988.
2	Simons D.B. and Senturk F., Sediment Transport Technology, Water Resources Publications, Fort Collins, Colorado 1977.

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2.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
3.	Mr. Nilesh Pal	Assistant professor	JDCOEM, Nagpur
4.	Mr. Gaurav Rangari	Assistant professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE03A	Dock, Harbour and Tunnel Engineering	3	0	-	3

Prerequisites for the course	
1	Structural mechanics and material properties
2.	Familiarity with coastal and marine engineering
3.	Understanding of surveying and site planning

Prior Reading Material/useful link	
1.	https://archive.nptel.ac.in/courses/114/106/114106025/
2.	https://archive.nptel.ac.in/courses/105/105/105105212/
3.	https://archive.nptel.ac.in/courses/114/106/114106025/

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Identify various component parts of dock, harbor and tunnel.
2	CO2	Demonstrate the fundamental principles of wave hydrodynamics and port cargo handling.
3	CO3	Develop the convenient mode of transportation for desired condition.
4	CO4	Classify the navigation aids at harbour and application of various shapes of tunnels.
5	CO5	Explain the construction techniques, maintenance and renovation aspects of various modes of transportation.
6	CO6	Elaborate the methods of route alignment geometric design of elements of Harbour and Tunnel structures.

Syllabus:

Course Content	
Unit I	Water Transportation: Advantages and Disadvantages, Modern trends in water transportation. Harbour Planning: Selection of Site, Ship characteristics, Characteristics of good harbour, Size of harbour, Defects in Harbours. Harbour Layout and Terminal Facilities. Natural Phenomena: Tides, Wind, Water waves, Currents phenomena, Characteristics and effects on marine structures, Littoral drift. Wave action on Coastal Structures and Coastal Protection Works – Coastal Regulation Zone, 2011. [8 hrs]
Unit II	Marine Structure: General design aspects, Breakwaters – function, types general design principles, Wharves, Quays, Jetties, Piers, Pier heads, Dolphin, Fenders, Mooring Accessories. [6 hrs]
Unit III	Docks and Repair Facilities: Harbor docks, Wet docks, Repair docks, Lift docks, Floating docks, Slipways. Port: Definition, Port building facilities, Transit sheds, Warehouses, Cargo handling facility, Services for shipping terminals, Inland port facilities planning. [6 hrs]
Unit IV	Tunnel Engineering: Introduction, Shape and Size of Tunnel Shafts, Pilot Tunnels, Tunneling in Hard Rock and Soft Materials, Drilling-Patterns, Blasting, Timbering, Mucking, Tunnel Lining, Advances in Tunneling Methods, Safety Measures, Ventilation, Lighting and Drainage of Tunnels [8 hrs]
Unit V	Tunneling Methods: Types and purpose of tunnels; factors affecting choice of excavation technique; Methods – soft ground tunneling, hard rock tunneling, shallow tunneling, deep tunneling; Shallow tunnels – cut and cover, cover and cut, pipe jacking, jacked box excavation techniques, methods of muck disposal, supporting, problems encountered and remedial measures [8 hrs]

Text Books:	
1	Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, V Scitech Publications (India), Chennai, 2010
2	Harbour, Dock And Tunnel Engineerin, R. Srinivasan ,Charoter publishing house.
Reference Book:	
1	Ozha&Ozha, “Dock and Harbour Engineering”, 1 st Edition, Charotar Books, Anand., 1990.
2	Venkatramaiah. C., Transportation Engineering-Vol.2 Railways, Airports, Docks and Harbours, Bridges and Tunnels., Universities Press (India) Private Limited, Hyderabad, 2015.

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2.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
3.	Mr. Nilesh Pal	Assistant professor	JDCOEM, Nagpur
4.	Mr. Gaurav Rangari	Assistant professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE03B	Construction Methods and Equipment Management	3	0	-	3

Prerequisites for the course	
1.	Basic construction materials such as concrete, asphalt, soil, and rock.
2.	Construction processes and techniques.
3.	Safety procedures and regulations in construction.

Prior Reading Material/useful link	
1.	https://www.youtube.com/watch?v=ULt4aEst4mM
2.	https://www.youtube.com/watch?v=2B7DhQvL8kw&list=PLwdnzlV3ogoVGSUhjx4VzW-dGz7DqQFoj
3.	https://www.youtube.com/watch?v=YLH-Ih8omjI

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Acquire the knowledge about standard designations, sizes, and graduations of equipment.
2	CO2	Explain terminology and units of measurements related to equipment usage in industrial, heavy civil and commercial projects.
3	CO3	Solve cost analysis for owning and operating heavy equipment.
4	CO4	Analyze the construction methods and equipment for the proper selection, application, utilization, and productivity of heavy equipment.
5	CO5	Compare the general process/methods for constructing industrial, heavy civil and commercial projects.
6	CO6	Choose appropriate construction equipment for desired construction works.

Syllabus:

Course Content	
Unit I	Excavating Equipment: Different types of Excavator, their selection, Type of loaders their bucket attachments, loader production rates, calculation of wheel loader production. Compacting and Stabilization Equipment: Compaction of soil and rock, types of compacting equipment, roller production estimating, Dynamic compaction, Soil stabilization- Lime stabilization and Cement stabilization. [8 hrs]
Unit II	Earthmoving Equipment: Tractors and attachments, dozers and rippers, scrapers, shovels, draglines, trenching machines, clamshell, hoes, trucks and wagons, dumpers, rollers and compactors [6 hrs]
Unit III	Pile driving Equipment: Types, pile driving hammers, single acting anddouble acting, differential acting hammers, hydraulic and diesel hammers, vibratory drivers Pumping Equipment: Reciprocating, diaphragm & centrifugal pumps, well point system. [10 hrs]
Unit IV	Concrete Manufacture, transport, placing and compacting equipment, mixers, central batching and mixing plants, transit mixers, concrete pumps. Asphalt Mix Production and Placement - Asphalt Plants, and Paving Equipment. [7 hrs]
Unit V	Hoisting Equipment, builder's hoists, forklifts, cranes, belt-conveyors, cableways, ropeways. Planning Process for Equipment and Methods; Cost of Owning and Operating, Depreciation. Equipment Life and Replacement Procedures - Physical, profit and economic life, Replacement analysis [5 hrs]

Text Books:	
1	Construction Planning, Equipments and Methods. R. L. Peurify, TMH, 1996
2	Construction Equipment and its Planning and Applications, Mahesh Varma, Metropolitan Book Co. (P) Ltd., New Delhi, India.
Reference Book:	
1	Construction Machinery and Equipment in India, (A compilation of articles Published in Civil Engineering and Construction Review), Publish by Civil Engineering and Construction Review New Delhi,1991

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Rahul Ralegaonkar	Professor	VNIT, Nagpur
2.	Dr. Anant Pande	Professor	YCCE, nagpur
3.	Mrs. Atika Ingole	Assistant Professor	JDCOEM,Nagpur
4.	Mr. Atul Gautam	Assistant Professor	JDCOEM,Nagpur
5.	Mr. Parag Pal	Alumni	SAI Consulting Engeeneers PVT. Ltd, Bangalore

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE03C	Environmental Impact Assessment and Life Cycle Analysis	3	0	-	3

Prerequisites for the course	
1.	Awareness of sustainable development concepts and practices
2.	Basic knowledge of statistics and data analysis
3.	Sustainable development concepts and practices

Prior Reading Material/useful link	
1.	https://www.youtube.com/watch?v=XKA47nPaeLU
2.	https://www.youtube.com/watch?v=xBEpm79pXaw
3.	https://www.youtube.com/watch?v=8v4sZSDz484

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Recall the concept of Sustainable Development and justify the methods of achieving SD.
2	CO2	Explain the importance of EIA as an integral part of planning process.
3	CO3	Identify the environmental attributes.
4	CO4	Analyze the role of public participation in environmental decision making process and life cycle assessment.
5	CO5	Choose the different methodologies to predict and assess the impacts of project on various aspects of environment.
6	CO6	Predict the Statistics of Environmental Data.

Syllabus:

Course Content	
Unit I	The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report [8 hrs]
Unit II	Environmental attributes-Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods- Ad-hoc methods, Checklists methods [6 hrs]
Unit III	An Introduction to Sustainability Concepts and Life Cycle Analysis (Introduction, Material flow and waste management, what it all means for an engineer? Water energy and food nexus) [6 hrs]
Unit IV	Environmental Data Collection and LCA Methodology (Environmental Data Collection Issues, Statistical Analysis of Environmental Data, Common Analytical Instruments [6 hrs]
Unit V	Life Cycle Assessment – Detailed Methodology and ISO Framework (Detailed Example on LCA Comparisons, LCA Benefits and Drawbacks, Historical Development and LCA Steps from ISO. [6 hrs]

Text Books:	
1	Environmental Impact Analysis Handbook – by Rau Whooten; McGraw Hill publications
2	Environmental Impact Assessment – by Larry Canter; McGraw Hill publications
Reference Book:	
1	Environmental Impact Analysis – A Decision Making Tool by R K Jain
2	Handbook of Environment Impact Assessment by Judith Petts; McGraw Hill publications

Contribution for Syllabus Design:

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1.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
2.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
3.	Mr. Nilesh Pal	Assistant professor	JDCOEM, Nagpur
4.	Mr. Gaurav Rangari	Assistant professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE03D	Advanced Design of Concrete Structures	3	0	-	3

Prerequisites for the course	
1	Different types of structural members and their behavior under different loading conditions.
2.	Different types of structural systems, including beams, columns, slabs, and footings.
3.	Behavior of structural members under different types of loading, including axial, bending, shear, and torsion.

Prior Reading Material/useful link	
1	https://www.youtube.com/watch?v=Q8_qR7oFKRA
2.	https://www.youtube.com/watch?v=H1sWkfHb2Hg
3.	https://www.youtube.com/watch?v=miPwo-Y1GGQ

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Recognize the design philosophy of reinforced concrete structures.
2	CO2	Understand the behavior and failure modes different concrete members
3	CO3	Apply the knowledge & skills in practical problems.
4	CO4	Analyze the results in designing various concrete member of structure.
5	CO5	Evaluate and design a complete structural system through a comprehensive design project.
6	CO6	Produce a comple06’te project document and present in a concise and complete manner to include structural drawings and structural calculations.

Syllabus:

Course Content	
Unit I	Design of circular water tank with roof slab/dome resting on ground by approximate methods/IS code method (by Working Stress Method). Design of rectangular water tank with one-way roof slab resting on ground by approximate methods/ IS code method (by Working Stress Method). [7 hrs]
Unit II	Analysis and design of columns subjected to biaxial moments, design of long columns. [6 hrs]
Unit III	Design of RCC Cantilever and Counter-fort Retaining wall. Design of Dog Legged Staircase. [8 hrs]
Unit IV	Design of combined footing (Rectangular footing / Trapezoidal footing) [8 hrs]
Unit V	Moment redistribution: Analysis and Design of fixed beam, propped cantilever, two-span symmetric continuous beam. [6 hrs]

Text Books:	
1	Illustrated Design of Reinforced Concrete Buildings, V. L. Shah and S. R. Karve, 9th Edition, Standard Publisher Distributors.
2	Reinforced Concrete Design, S. Sinha, 3rd Edition, Tata McGraw Hill Publications.
3	Fundamentals of Reinforced Concrete Design, M. L. Gambhir, 1st Editions, PHI Learning Pvt. Ltd. 4. Limit State Design of Reinforced Concrete, P. C. Varghese, 2nd Edition, PHI Learning Pvt. Ltd.
4	Reinforced Concrete Design, D. Menon and S. Pillai, 3rd Edition, Tata McGraw-Hill publications
Reference Book:	
1	Limit State Design of Reinforced Concrete (As per IS 456:2000), Dr. B. C.Punmia, A.K. Jain and Dr. A. K. Jain, 1st Edition, Laxmi publications.
2	Reinforced Concrete: Limit State Design, Ashok K. Jain, 7th Edition, Nem Chand and Brothers Publishers.
3	Design of Foundation Systems: Principles and Practices, Nainan P. Kurian, 3rd Edition, Alpha Science International Publisher.
4	Practical Design of Reinforced Concrete Structures, Karuna Moy Ghosh, 1st Edition, PHI Learning Pvt. Ltd.
5	Limit State Theory and Design of Reinforced Concrete, Dr. V. L. Shah and Dr. S. R. Karve, 8th Edition, Structures Publications

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2.	Dr. Anant Pande	Professor	YCCE, nagpur
3.	Mrs. Atika Ingole	Assistant Professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7TE03E	Environmental Geo-technology	3	0	-	3

Prerequisites for the course	
1	Basic knowledge of geotechnical engineering, soil mechanics, and environmental science.
2.	Understanding of waste management practices and environmental regulations.
3.	Knowledge of soil properties and behavior, including Atterberg limits, shear strength, and permeability.
4.	Understanding of landfill design and components, including liner systems and leachate collection.

Prior Reading Material/useful link	
1	https://www.twi-global.com/technical-knowledge/faqs/geotechnical-engineering
2.	https://www.sciencedirect.com/topics/earth-and-planetary-sciences/landfill-design
3.	https://www.queensu.ca/research/features/engineering-solutions-leachate-liners-landfills-and-learning

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Define the various geo-environmental parameters.
2	CO2	Explain soil water environment interaction, application of waste and its disposal and soil remediation.
3	CO3	Identify geo-environmental applications and soil remediation.
4	CO4	Examine soil water environment interaction, landfill components and variation in engineering properties of soil.
5	CO5	Determine effect of geo-environmental parameter on soil.
6	CO6	Choose waste management system, water and gas disposal facility, and site for landfilling and soil remediation methods.

Syllabus:

Course Content	
Unit I	Introduction and Soil-water-environment interaction Introduction to geo-environmental Engineering, Soil-water-environment interaction relating to geotechnical problems. Waste: source, classification and management of waste, Physical, chemical and geotechnical characterization of Municipal solid waste, Impact of waste dump and its remediation [6 hrs]
Unit II	Geotechnical application of waste and disposal Geotechnical use of different types such as Thermal power plant waste, MSW, mine waste, industrial waste. Waste disposal facilities, Parameters controlling the selection of site for sanitary and industrial landfill. Site characterization. MoEF guidelines. [6 hrs]
Unit III	Landfill Components Landfill Layout and capacity components, components of landfill and its functions type and functions of liner and cover systems, Compacted clay liner, selection of soil for liner, methodology for construction. [6 hrs]
Unit IV	Leachate, Gas Management and Geosynthetics Management of Leachate and gas. Various components of leachate collection and removal system and its design, gas disposal/utilization. Closure and post closure monitoring system. Geosynthetics- Geo membranes - geosynthetics clay liners -testing and design aspects. [8 hrs]
Unit V	Soil remediation Investigation of contaminated soil, sampling, assessment, Remediation, , thermal remediation, pump and treat method, Phyto remediation and electro-kinetic remediation , Change in engineering properties due to change in environment, variation in Engineering properties of soil– Atterberg's limits, shear strength, permeability and swelling due to change in environment. [8 hrs]

Text Books:	
1	Hsai–yang Fang., "Introduction to Environmental Geo-technology" CRC press New York, 1997
Reference Book:	
1	Cairmey .T. , "Contaminated land problems and solutions", Blackie Academic &Professional, New York, 1993.

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3.	Mr. Nilesh Pal	Assistant professor	JDCOEM, Nagpur
4.	Mr. Gaurav Rangari	Assistant professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7O002A	Smart City	4	0	0	4

Prerequisites for the course	
1	Urban Planning and Design
2	Information and Communication Technology
3	Social and Cultural Dimensions of Urban Development
4	Energy Systems and Sustainability

Prior Reading Material/useful link	
1.	https://www.youtube.com/watch?v=q_XmlG3CwNk
2.	https://www.youtube.com/watch?v=ZAWE5YDHsMY&list=PLbMVogVj5nJSduBmvmodjeFjX04_0gMjj
3.	https://www.youtube.com/watch?v=tRwy7J7k_g4
4.	https://www.youtube.com/watch?v=mh51mAUexK4&list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Define the roles and functions of various technologies (sensors, RFID, cloud computing) that can be used for implementing smart cities and their relation to each other to achieve the sustainability. goals.
2	CO2	Explain the concept of a smart city and key challenges/problems facing professionals in India and other cities around the world.
3	CO3	Apply the existing technologies to give solutions towards planning and moving a current city towards a smart and sustainable one.
4	CO4	Discover the opportunities of Smart, Sustainable Cities and Smart Transportation based on latest technologies for the managers and policy makers.
5	CO5	Criticize the solutions and plans proposed by others and learn about state-of-the-art strategies for effectively managing the transition from legacy infrastructures to smart urban systems.
6	CO6	Compose a solution/plan for a smart and sustainable city keeping in mind the current Indian scenario.

Syllabus:

Course Content	
Unit I	Introduction to the Smart Cities, Conceptualizing cities as complex socio-technical systems, what is digitalization? General Implications of digitalization, Implications on digitalization on cities, Perspectives on Smart Cities, Challenges of Urban Development, Urban Information System. [6 hrs]
Unit II	Smart Urban Energy Systems, Conceptualization of Smart Urban Energy Systems, The infrastructure layer of smart urban energy systems, The services layer of smart urban energy systems, Data/digital layer of smart urban energy systems, Managerial and Policy takeaways. Opportunities of Smart and Sustainable Cities, Intelligent and Sustainable Buildings. [8 hrs]
Unit III	Smart Transportation, Conceptualization of smart urban transportation systems, the "improve" pathway, The "shift" pathway, Transition in Socio-Technical systems, Data/Digital layer, Potential of the digital layer. [6 hrs]
Unit IV	Challenges on the Services layer, Challenges on the Infrastructure layer, Challenges for managers, Challenges for policy-makers. [6 hrs]
Unit V	Internet of Things, Big Data Analysis on City Operation Data, Virtual and Sensible City, Smart and Sustainable City Practice and Research in India and Abroad. [6 hrs]

Text Books:	
1	Smart City on Future Life - Scientific Planning and Construction by Xianyi Li (Jan 1, 2012)
2	The Age of Intelligent Cities: Smart Environments and Innovation-for-all Strategies (Regions and Cities) by NicosKomninos (2014)
Reference Book:	
1	Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia by Anthony Townsend (Oct 7, 2013)

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1.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
2.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
3.	Mr. Kamlesh Meshram	Assistant Professor	JDCOEM,Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7O002B	Robotics in Civil Engineering	4	0	0	4

Prerequisites for the course	
1	Overview of manufacturing processes and technologies.
2	Communication and collaboration in construction projects.
3	Emerging trends and innovations in the construction industry
4	Introduction to electronics and control systems

Prior Reading Material/useful link	
1.	https://www.youtube.com/watch?v=jdFrBtHeJbs&list=PLSGws_74K01-g9nnTMBssGURHawYYQfMQ
2.	https://www.youtube.com/watch?v=cL8K32DB7y8
3.	https://www.youtube.com/watch?v=Uiqlu2gJu3k&list=PLOzRYVm0a65dRU1hBCsd3rqyhjpcGCioi
4.	https://www.youtube.com/watch?v=RcuGxWc0HyQ

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Recall the features of robots in civil engineering.
2	CO2	Understand the manufacturing terminology of robot.
3	CO3	Choose various types of robots in different construction based on their application.
4	CO4	Analyze the system development and problem identification methods
5	CO5	Evaluate the functions and feasibility of working methods of robots.
6	CO6	Adopt systems development methodology for robotics in the field work.

Syllabus:

Course Content	
Unit I	Background and historical development, Automation and Robotics, Applications in construction, Practical robots developed in the construction industry. [6 hrs]
Unit II	Introduction to different types of robots, their features and advantages: Concrete Floor Finishing Robot, Ceiling Panel Position Robot, Activated Concrete cutting Robot, Exterior Wall Painting Robot, Automatic Silo Lining System, Fireproofing Spray Robot, Radio Control Auto-Released Clamp. [8 hrs]
Unit III	Potential benefits including Economic, Safety, and Quality discussions on potential labor issues. Terminology and typical system components, Stationary versus mobile robotics. [6 hrs]
Unit IV	Problem identification methodologies: Fishbone Diagram, Problem Tree, SWOT Analysis, SQUID. Feasibility analysis: Technical, Economic, Legal, Operational, Scheduling feasibilities. [8 hrs]
Unit V	Systems development methodologies: SDLC, the agile approach, and object-oriented systems analysis Case Study. [6 hrs]

Text Books:	
1	Construction Automation And Robotics In Civil Engineering Education Programs by Walter W. Boles" Member, ASCE, and Jing Wang.
2	Advanced Robotics in Civil Engineering and Construction by RoozbehKangari.
Reference Book:	
1	Automation and Robotics in Construction: A Feasibility Study by Kangari R., and Halpin, D. W.

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
2.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
3.	Mr. Kamlesh Meshram	Assistant Professor	JDCOEM, Nagpur

(Laboratory)

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7L001	Engineering Economics, Estimation and Costing Lab	0	0	2	1

Syllabus:

Sr. No.	**NameofExperiments**
Term work include detailed study and working of following set of assignments	
1.	Detailed estimate for a two storied RCC or load bearing wall building
2.	Preparing detailed estimate for any four of the following:
	a. A small culvert
	b. A stretch of a road about 1 Km. long including earthwork
	c. A reach of canal about 1 Km. long
	d. A percolation tank
	e. A factory shed of steel frame
	f. Water supply scheme
	g. Drainage scheme
	h. Water Treatment plants
3.	Valuation report including valuation certificate for any one of the following:
	a. A building for residential purpose or commercial purpose
	b. A hotel
	c. A theatre
4.	Drafting of Detailed specification for any five civil engineering items. This shall include at least one item each from Roads, Irrigation works, Water Supply, Sanitation and buildings.

Semester	Course Code	Name of Course	L	T	P	Credits
VII	CE7P002	**Project I**	0	0	6	5

Syllabus:

This course is the next phase of mini project which was conducted in VI Semester followed by the same project batches. Project work shall be evaluated by mid-term seminar/s, the quality of work carried out, project report submission and the viva-voce examination.

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere
Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.in
An Autonomous Institute, with NAAC "A" Grade
Affiliated to DBATU, RTMNU, MSBTE, Mumbai
Department of Civil Engineering
"Building Better Development"

Program: B. Tech in Civil Engineering

Semester	Course Code	Name of Course	L	T	P	Credits
VIII	CE8TE02A	Professional Elective VI Planning and Design of Airports	3	0	-	3

Prerequisites for the course	
1	Basic understanding of aviation industry and air transportation system
2	Knowledge of civil engineering principles and practices
3	Understanding of airport operations and management
4	Familiarity with airport design standards and regulations

Prior Reading Material/useful link	
1	Airport Planning: https://archive.nptel.ac.in/courses/105/107/105107123/
2	Aircraft Characteristics: https://onlinecourses.nptel.ac.in/noc22_ae14/preview
3	Airport Design: https://archive.nptel.ac.in/courses/105/107/105107123/
4	Structural Design of Airport Pavements: https://nptel.ac.in/courses/105104098
5	Airport Lighting: https://archive.nptel.ac.in/courses/105/107/105107123/

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Define the scope of planning and orientation of airport elements.
2	CO2	Explain the various components of the airport, grouped by airside, terminal, and groundside facilities.
3	CO3	Identify the concepts of demand forecasting, the aircraftcharacteristics impact on airport design and its influence upon the surrounding environment.
4	CO4	Examine the practical solution to planning and designing of an airport and airport pavement.
5	CO5	Judge the requirements to satisfy complete site investigation, selection and preliminary design for a small general aviation airport understanding its relationship to local economic development.
6	CO6	Develop professional skills relating to airport planning and design.

Syllabus:

Course Content	
Unit I	Airport Planning**:** The Nature of Civil Aviation and Airports, Introduction, Commercial Service Aviation, General Aviation, Civil Aviation Reports, Historical Review of the Legislative Role in Aviation, State Roles in Aviation and Airports, Aviation Organizations and their functions. [05 Hrs.]
Unit II	Aircraft Characteristics Related to Airport Design: Dimensional standards, landing gear configurations, aircraft weight, Atmospheric conditions affecting Aircraft performance, Aircraft performance characteristics. Air Traffic Management, Airport Planning Studies, Forecasting for Airport Planning. [07 Hrs.]
Unit III	Airport Design: Geometric Design of the Airfield; Airport design standards, Airport classification, Runways, Runway configurations, Taxiways and Taxi lanes, Aprons, Control tower visibility requirements. [08 Hrs.]
Unit IV	Structural Design of Airport Pavements: Introduction, Soil investigation and evaluation, effect of frost on soil strength, subgrade stabilization, Design of flexible pavement, Design of rigid pavement. [08 Hrs.]
Unit V	Airport Lighting, Marking, and Signage; Airport Drainage; Planning and Design of the Terminal Area. Special Topics in Airport Planning and Design: Airport Security Planning, Airport Airside Capacity and Delay. Finance Strategies for Airport Planning, Environmental Planning, Heliports. [08 Hrs.]

Text Books:	
1	Airport Planning and Designing by S.K. Khanna, M.G. Arora.
2	Robert Horonjeff, Francis Mc Kelvey, William Sproule and Seth Young, "Planning and Design of Airports" 5th Edition, 2010.
Reference Book:	
1	Norman J. Ashford, Saleh Mumayiz and Paul H. Wright, "Planning, Design and Development of 21st Century Airports", 4th Edition, John Wiley &Sons, 2011

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE
3.	Mr. Atul Gautam	Assistant Professor	JDCOEM,Nagpur
4.	Mr. Parag Pal	Alumni	SAI Consulting Engeeneers PVT.Ltd, Bangalore

Semester	Course Code	Name of Course	L	T	P	Credits
VIII	CE8TE02B	Professional Elective VI Infrastructure Planning and Management	3	0	-	3

Prerequisites for the course	
1	Basic understanding of the concept of infrastructure and its various sectors such as power, water supply, transportation, telecommunications, and urban/rural infrastructure.
2	Knowledge of the infrastructure project lifecycle and the stages involved in successful infrastructure planning and implementation.
3	Understanding of the role and importance of infrastructure in economic development.
4	Familiarity with the organizations and players involved in infrastructure development and their functions.

Prior Reading Material/useful link	
1	https://www.blackridgeresearch.com/blog/what-is-infrastructure-and-types-of-infrastructure-projects-for-economic-development
2	https://egyankosh.ac.in/bitstream/123456789/39255/1/Unit-3.pdf
3	https://www.iea.org/reports/digitalisation-and-energy

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Define the basic concepts, involvements, challenges and strategies related to Infrastructure Projects
2	CO2	Explain the role of private sector and technological aspect in infrastructure growth, drawing reference from historical perspective.
3	CO3	Identify various strategies and challenges faced for successful Infrastructure Project planning and implementation.
4	CO4	Examine those strategies and challenges faced for successful Infrastructure Project implementation from sustainable point of view.
5	CO5	Decide integrated framework for infrastructure planning and management.
6	CO6	Develop infrastructure modeling and Life Cycle Analysis techniques for appropriate infrastructure planning and management.

Syllabus:

Course Content	
Unit I	An overview of Basic Concepts Related to Infrastructure: Introduction to Infrastructure, an overview of the Power Sector in India. An Overview of the Water Supply and Sanitation Sector, the Road, Rail, Air and Port Transportation Sectors, Telecommunications Sector, Urban Infrastructure Rural Infrastructure, Introduction to Special Economic Zones, Organizations and Players in the field of Infrastructure, The Stages of an Infrastructure Project Lifecycle, an overview of Infrastructure Project Finance. [05 Hrs]
Unit II	Private Involvement in Infrastructure: A Historical Overview of Infrastructure Privatization. The Benefits of Infrastructure Privatization, Problems with Infrastructure Privatization, Challenges in Privatization, Privatization of Road Transportation Infrastructure in India. [07 Hrs]
Unit III	Challenges to Successful Infrastructure Planning and Implementation: Mapping and Facing the Landscape of Risks in Infrastructure Projects, Economic and Demand Risks, Socio-Environmental Risks, Cultural Risks in International Infrastructure Projects, Legal and Contractual Issues in Infrastructure, Challenges in Construction and Maintenance of Infrastructure. [08 Hrs]
Unit IV	Strategies for Successful Infrastructure Project Implementation: Risk Management Framework for Infrastructure Projects, Shaping the Planning Phase of Infrastructure Projects to mitigate risks, Introduction to Fair Process and Negotiation, Negotiating with multiple Stakeholders on Infrastructure Projects, Sustainable Development of Infrastructure, [08 Hrs]
Unit V	Information Technology and Systems for Successful Infrastructure Management, Innovative Design and Maintenance of Infrastructure Facilities, Infrastructure Modeling and Life Cycle Analysis Techniques, Capacity Building and Improving the Governments Role in Infrastructure Implementation, An Integrated Framework for Successful Infrastructure Planning and Management - Infrastructure Management Systems and Future Directions. [08 Hrs]

Text Books:	
1	Grigg, Neil, Infrastructure engineering and management, Wiley, (1988).
2	Hudson, Haas, Uddin, Infrastructure management: integrating design, construction, maintenance, rehabilitation, and renovation, McGraw Hill, (1997).
Reference Book:	
1	World Development Report 1994: Infrastructure for Development (1994).
2	Zimmerman, K. and F. Botelho, “Pavement Management Trends in the United States,” 1st European Pavement Management Systems Conference, Budapest, September (2000).

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Rahul Ralegaonkar	Professor	VNIT, Nagpur
2.	Mrs. Atika Ingole	Assistant Professor	JDCOEM,Nagpur
3.	Mr. Kamlesh K. Meshran	Assistant Professor	JDCOEM,Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VIII	CE8TE02C	Professional Elective VI Environmental Principles and Laws	3	0	-	3

Prerequisites for the course	
1	Basic understanding of legal concepts and terminologies
2	Knowledge of Indian legal system and judiciary
3	Basic knowledge of the Indian Constitution
4	Understanding of environmental issues and challenges

Prior Reading Material/useful link	
1	https://www.youtube.com/watch?v=aNjslubyYdI
2	https://byjus.com/free-ias-prep/constitution-of-india-an-overview/
3	https://www.youtube.com/watch?v=jUEw1f7up2o

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Acquire the knowledge about role of laws, policies and institutionsin the conservation and management of natural resources.
2	CO2	Interpret various laws on hazards causing impacts on environment.
3	CO3	Build the environment reducing the impacts of activities and considering laws and acts.
4	CO4	Take inference from the laws of environment and acts.
5	CO5	Evaluate the role of law and policy in conservation and management of natural resources and prevention of pollution.
6	CO6	Develop the region by constructing civil engineering works with reference to the environmental laws, policy and referring to the legal facts.

Syllabus:

Course Content	
Unit I	**Basic Concepts in Environmental Law**: An introduction to the legal system; Constitution, Acts, Rules, Regulations; Indian Judiciary, Doctrine of precedents, judicial review. General principles in Environmental law: Precautionary principle; Polluter pays principle; Sustainable development. [08 Hrs]
Unit II	**Forest, Wildlife and Biodiversity related laws**: Evolution and Jurisprudence of Forest and Wildlife laws; Colonial forest policies; Forest policies after independence ,Statutory framework on Forests, Wildlife and Biodiversity: IFA, 1927 [06 Hrs]
Unit III	**Air, Water and Marine Laws:** National Water Policy and some state policies Laws relating to prevention of pollution, access and management of water and institutional mechanism: Water Act, 1974; Water Cess Act, 1977, EPA, 1986. Pollution Control Boards Ground water and law Judicial remedies and procedures Marine laws of India; Coastal zone regulations. Legal framework on Air Pollution: Air Act,1981; EPA, 1986 [06 Hrs]
Unit IV	**Hazardous Substances and Activities** : Legal framework: EPA and rules made thereunder; PLI Act,199 Principles of strict and absolute liability [06 Hrs]
Unit V	**International Environmental law** : An introduction to International law; sources of international law; law of treaties; signature, ratification Evolution of international environmental law: Customary principles; Common but differentiated responsibility [06 Hrs]

Text Books:	
1	Birnie P. (2009) et al., International Law and the Environment, 3rd ed., Oxford.
2	Desai A. (2002) Environmental Jurisprudence, 2nd ed., Modern Law House, Allahabad.
3	Gadgil M. and Guha R. (1995) Ecology and Equity, Oxford, New Delhi.
Reference Book:	
1	Gadgil M. and Guha R. (1997) This Fissured Land, Oxford, New Delhi.
2	Guha R. (2000) Environmentalism: A Global History, Oxford, New Delhi.

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Rahul Ralegaonkar	Professor	VNIT, Nagpur
2.	Mr. Nilesh Pal	Assistant professor	JDCOEM, Nagpur
3.	Mr. Gaurav Rangari	Assistant professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VIII	CE8TE02D	Professional Elective VI Advanced Structural Analysis	3	0	-	3

Prerequisites for the course	
1	Understanding of basic principles of structural analysis and design.
2	Knowledge of mathematics including calculus, differential equations, and linear algebra.
3	Familiarity with mechanics of materials and strength of materials.
4	Knowledge of structural elements such as beams, columns, and frames.
5	Familiarity with various types of loads acting on structures including static, dynamic, and seismic loads.

Prior Reading Material/useful link	
1	https://www.youtube.com/watch?v=UvqO2JfIcsw
2	https://www.youtube.com/watch?v=H1sWkfHb2Hg
3	https://structuralengineeringbasics.com/types-of-loads-on-structures/

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Recall the various advanced methods of structural analysis.
2	CO2	Identify the behavior of structural components or structures using methods of analysis under different loading.
3	CO3	Interpret the application of analysis methods according to the structural component.
4	CO4	Analyze the structural component and structures adopting advanced structural analysis methods.
5	CO5	Evaluate the structural behavior from the analysis.
6	CO6	Formulate the structural component based on its analysis.

Syllabus:

Course Content	
Unit I	Approximate methods of analysis of multi-bay multi-storey Frames by – (a) Cantilever method, (b) Portal method & (c) Factor method. Analysis of Beam Curved in Plan (Statically Determine Beams Only) Introduction, circular beam loaded uniformly and supported on symmetrically placed columns, semicircular Beams, Varandah circular beams. Infinite & semi-infinite beams resting on elastic foundations. [10 Hrs]
Unit II	Cantilever moment distribution method, application to rigid jointed plane frames. Vierndeel girders - analysis for vertical sway cases only. [08 Hrs]
Unit III	Advanced Matrix Method of Analysis For Plane Frames, Analysis of Symmetrical & Unsymmetrical plane frames Effects of Shear deformation. Symmetry, Anti-symmetry conditions for solving symmetric frames. [08 Hrs]
Unit IV	Analysis of columns loaded laterally. Structural response to earthquake, analysis of multistoried frames by I.S.code provisions. [06 Hrs]
Unit V	Introduction to theory of elasticity - (treatment in Cartesian coordinates), state of stress at a point, stress –equilibrium equations, strain-components, stress - strain relations, generalized Hooke's law, strain plane stress and plane conditions,stress and compatibility for 2D. [06 Hrs]

Text Books:	
1	Norris, Wilbur, Elementary Structural Analysis
2	Timoshenko & Goodier, Theory of Elasticity
3	Jaikrishna, Chandrashekharan, Element of Earthquake Engineering, Sarita Publication, Meerut (U.P.)
Reference Book:	
1	Matrix Method of Structural Analysis - Gere and Weaver
2	Structural Dynamics- Clough &Penzin

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Rahul Ralegaonkar	Professor	VNIT, Nagpur
2.	Dr. Anant Pande	Professor	YCCE, Nagpur
3.	Mrs. Atika Ingole	Assistant Professor	JDCOEM, Nagpur
4.	Ms. Tinu Khandale	Assistant Professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VIII	CE8TE02F	Professional Elective VI Disaster Management	3	0	-	3

Prerequisites for the course	
1	Basic knowledge of natural hazards such as earthquakes, floods, landslides, cyclones, and droughts.
2	Understanding of the principles of risk and vulnerability in disasters.
3	Knowledge of the different types of disasters, including natural and man-made disasters.
4	Basic knowledge of the geological and geographical features of the Indian subcontinent, including plate tectonics, seismic zones, and climatic conditions.

Prior Reading Material/useful link	
1	https://www.preventionweb.net/understanding-disaster-risk/component-risk/hazard
2	https://public.wmo.int/en/our-mandate/focus-areas/natural-hazards-and-disaster-risk-reduction
3	https://chhattisgarh.pscnotes.com/prelims-notes/environment/natural-hazards-floods-droughts-cyclones-landslides/

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Recall basic conceptual understanding of disasters.
2	CO2	Illustrate the approaches of Disaster Management.
3	CO3	Build skills to respond to disaster.
4	CO4	Analyze disaster management techniques for its application.
5	CO5	Discuss the social issues of the environment with associated acts.
6	CO6	Predict the Building design and construction in highly seismic zones.

Syllabus:

Course Content	
Unit I	Definition and types of disaster: Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-made disasters, earthquakes, floods drought, landside, land subsidence, cyclones, volcanoes, tsunami, avalanches, global climate extremes. Man-made disasters. [08 Hrs]
Unit II	Study of Important disasters: Earthquakes and its types, magnitude and intensity, seismic zones of India, major fault systems of India plate, flood types and its management, drought types and its management, landside and its managements case studies of disasters in Sikkim. [06 Hrs]
Unit III	Mitigation and Management techniques of Disaster: Basic principles of disasters management, Disaster Management cycle, Disaster management policy, National and State Bodies for Disaster Management, Early Warming Systems, Building design and construction in highly seismic zones, retrofitting of buildings. [06 Hrs]
Unit IV	Training, awareness program and project on disaster management: Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management, Mini project on disaster risk assessment and preparedness for disasters with reference to disasters in Sikkim and its surrounding areas. [06 Hrs]
Unit V	Mini project on disaster risk assessment and preparedness for disasters with reference to disasters in Sikkim and its surrounding areas [06 Hrs]

Text Books:	
1	Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012).
2	Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3	Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
Reference Book:	
1	Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
2	Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE
3.	Mr. Atul Gautam	Assistant Professor	JDCOEM, Nagpur **n**

Semester	Course Code	Name of Course	L	T	P	Credits
VIII	CE8O002A	Open Elective IV Ergonomics in Civil Engineering	4	0	-	4

Prerequisites for the course	
1	Basic knowledge of human anatomy and physiology
2	Understanding of the physical and mental demands of various civil engineering tasks
3	Knowledge of the principles of ergonomics and its application in engineering design
4	Understanding of the various factors that can affect human performance and productivity
5	Knowledge of design factors that influence the work environment, such as lighting, temperature, and noise

Prior Reading Material/useful link	
1	https://www.physio-pedia.com/Ergonomics
2	https://ergo-plus.com/workplace-ergonomics-benefits/
3	https://ehs.ucsf.edu/ergonomics-human-factors-program

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Acquire the knowledge of the elements of Ergonomics, practical ergonomics, workload estimation and its design parameters.
2	CO2	Relate the study of ergonomics in civil engineering operations.
3	CO3	Organize the procedures to reduce human efforts.
4	CO4	Analyze the human work load in civil engineering for different practices considering the practical ergonomics.
5	CO5	Appraise the elements of ergonomics ameliorating procedural practices.
6	CO6	Develop a system encapsulating aspects of ergonomics to ease human efforts.

Syllabus:

Course Content	
Unit I	Elements of Ergonomics practice: The physical basis of man's perception of his environment, The human body. [06 Hrs]
Unit II	Practical Ergonomics: Design Factors, Environmental factors, Organizational factors. [06 Hrs]
Unit III	Estimation of Human workload in various civil engineering aspects: Mixing concrete ingredients, manual material handling, brickwork. [06 Hrs]
Unit IV	Estimation of Human work load in various civil engineering aspects: binding of stirrups, plastering of walls, construction of scaffolding. [06 Hrs]
Unit V	Design of Onsite-workstations for (i) stirrups making (ii) fabrication of centering of columns, plinth beams, slabs. [06 Hrs]

Text Books:	
1	Man in his working environment, by Hywel Murrel.
Reference Book:	
1	Ergonomics design for people at work, by Kodak.

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE
3.	Mr. Atul Gautam	Assistant Professor	JDCOEM,Nagpur
4.	Mr. Parag Pal	Alumni	SAI Consulting Engeeneers PVT.Ltd, Bangalore

Semester	Course Code	Name of Course	L	T	P	Credits
VIII	CE8O002B	Open Elective IV Elements of Earthquake	4	0	-	4

Ms. Tejaswini Junghare

Prerequisites for the course	
1	Structural Analysis
2	Basic Geology and Geotechnical Engineering

Prior Reading Material/useful link	
1	Structural Analysis - I (English, Paperback, Bhavikatti S. S.)
2	Geology for Geotechnical Engineers Paperback by J. C. Harvey

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Define the earth interior, seismic parameters, earthquake resistant structures.
2	CO2	Interpret the behavior of ground motions and civil engineering structures during earthquake.
3	CO3	Apply the knowledge of seismology for improvement of civil engineering structure during earthquake.
4	CO4	Compare the structural behavior according to the various seismic parameters
5	CO5	Explain the earth geology, quantification of earthquake, its effect on civil engineering structures and their repairs and rehabilitation.
6	CO6	Discuss the earth's interior, seismology and its application in civil engineering structures.

Syllabus:

Course Content	
Unit I	Introduction to Earthquakes: Geology of Earth, Configuration of Tectonic Plates in a Globe, Behavior of Plates, Their Motion and Effects, Causes of Earthquake and their Characteristics, Earthquake Parameters, Magnitudes, Intensity. [06 Hrs]
Unit II	Seismic Waves, Recording of Earthquakes, Analysis and Interpretation of Earthquake Data, Determination of Magnitude, Location of Epicenter, Focal Depth. [06 Hrs]
Unit III	Seismicity of the World, History of Earthquakes in India and Abroad, Case Studies of Effects of Earthquakes, Causes and Sources of Earthquake Damage.[06 Hrs]
Unit IV	Non-Engineered Earthquake Resistant Structures, Load Bearing Structures, Masonry Structures, Seismic Zoning of India (IS 1893:2002 Part I), Seismic Coefficients for Different Zones, Definitions, Irregularities in Buildings, Consequences of Irregularities. [06 Hrs]
Unit V	Strengthening, Rehabilitation and Retrofitting of Earthquake Damaged Structures, Earthquake Disaster Management, Mitigation and Social Aspects of Earthquakes, Lessons from Past Earthquake: - Study of Damages Caused Due to Past Earthquake and Remedial Measures. [06 Hrs]

Text Books:	
1	Duggal S. K., Earthquake Resistant Design of Structures, Oxford University Press 2007
2	Amita Sinvhal; Understanding Earthquake Disasters, Tata McGraw Hill
Reference Book:	
1	P. N. Agraval; Engineering Seismology Oxford & IBH Publishing
2	C.V.R.Murty; Earthquake Tips National Information Centre of Earthquake Engineering IIT Kanpur

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE
3.	Mr. Atul Gautam	Assistant Professor	JDCOEM,Nagpur
4.	Ms. Tinu Khandale	Assistant Professor	JDCOEM,Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VIII	CE8O002C	Open Elective IV Metro System and Engineering	4	0	-	4

Prerequisites for the course	
1	Sustainable transportation systems and green infrastructure
2	Human factors and ergonomics in transportation design
3	Data analytics and visualization for transportation planning
4	Cyber security and data privacy in transportation systems

Prior Reading Material/useful link	
1	https://www.youtube.com/watch?v=aswfxJ2H0dA&list=PLLy_2iUCG87A6dwmEFv_ET4Bb0wAVcUrx
2	https://www.youtube.com/watch?v=qG_clin0Tis&list=PL819F5B524B56D0D3
3	https://www.youtube.com/watch?v=q4pyaVZjqk0
4	https://www.youtube.com/watch?v=-dNsW2AOGYY&list=PLyqSpQzTE6M-q0Xgn0icEHvUS7WQxvenv

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Acquire the knowledge of metro system and various engineering operations involved in it.
2	CO2	Explain the various operations working simultaneously in metro system and planning.
3	CO3	Apply the knowledge of various engineering operations in metro system.
4	CO4	Distinguish the role of different operations in metro system.
5	CO5	Perceive the knowledge of safety and control over the engineering operations.
6	CO6	Plan the metro system including all engineering operations.

Syllabus:

Course Content	
Unit I	General: Overview of Metro Systems; Need for Metros, Routing Studies, Basic Planning and Financial. Civil Engineering: Overview and Construction Methods For: Elevated and Underground Stations; Viaduct Spans and Bridges; Underground Tunnels; Depots; Commercial and Service Buildings. [06 Hrs]
Unit II	Initial Surveys & Investigations; Basics of Construction Planning & Management, Construction Quality & Safety Systems. Traffic Integration, Multimodal Transfers and Pedestrian Facilities; Environmental and Social Safeguards; Track Systems-Permanent Way. Facilities Management [06 Hrs]
Unit III	Electronics and Communication Engineering: Signaling Systems; Automatic Fare Collection; Operation Control Centre; SCADA And Other Control Systems; Platform Screen Doors. [06 Hrs]
Unit IV	Mechanical & TV + AC: Rolling Stock, Vehicle Dynamics and Structure; Tunnel Ventilation Systems; Air Conditioning for Stations and Buildings;Fire Control Systems; Lifts and Escalators [06 Hrs]
Unit V	Electrical: OHE, Traction Power; Substations- TSS And ASS; Power SCADA; Standby and Back-Up Systems; Green Buildings, Carbon Credits and Clear Air Mechanics. [06 Hrs]

Text Books:	
1	Manual of specification and standard of Elevated Mass Rapid Transit System.
2	Code for Practice for Project Management for Construction and Development, 5th Edition Wiley Blackwell by CIOB (The Chartered Institute of Building)
Reference Book:	
1	SP 7: 2016, National Building Code of India 2016 (NBC 2016)

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Anant Pande	Professor	YCCE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
3.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
4.	Mr. Kamlesh K. Meshram	Assistant Professor	JDCOEM,Nagpur

(Laboratory)

Semester	Course Code	Name of Course	L	T	P	Credits
	CE8P001	Project 2	0	0	4	3

Syllabus:

Course Content	
Unit I	Every student has to undertake a project of professional interest.
Unit II	The project may be related to a theoretical analysis, an experimental investigation, a proto-type design, a new correlation and analysis of data, fabrication and setup of new equipment.
Unit III	The students will carry out the Project work in a group which is finalized in VIII semester and submit a project report at the end of the semester.
Unit IV	Each group shall deliver seminar/seminars on the project work done during the semester.

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Anant Pande	Professor	YCCE, Nagpur
2.	Dr. Prashant Pawade	Professor	GHRCOE, Nagpur
3.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
4.	Mrs. Atika Ingole	Assistant Professor	JDCOEM, Nagpur

Semester	Course Code	Name of Course	L	T	P	Credits
VIII	CE8P002	Internship/Field Training	0	0	0	10

Syllabus:

Course Content:

Students can undertake six months industry project during the internship. This scheme will provide students to undergo internship with stream majors at industry / well known academic institutions /R&D Laboratory premises and earn real world exposure.

Contribution for Syllabus Design:

Sr. No.	Name of Person	Designation	Organization
1.	Dr. Anant Pande	Professor	YCCE, Nagpur
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3.	Dr. Kshitija Kadam	Professor	GCOE, Nagpur
4.	Mrs. Atika Ingole	Assistant Professor	JDCOEM,Nagpur
5.	Mr. Atul Gautam	Assistant Professor	JDCOEM,Nagpur

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BoS

Chairman
BoS

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6TH BOARD OF STUDIES MEETING NO. BOS/CSE/06/2021-22 — 22/03/2022

Mode: Online Google Meet
Link: https://meet.google.com/fcv-otci-vtx

The 6th Meeting of the Board of Studies was held on Tuesday, 23th March, 2022 at 02:00 P.M. in Department of Computer Science and Engineering, JDCOEM through Online Google Meet App. The following members were present in the meeting:

Sr. No.	Name of faculty	Designation
1	Prof. Supriya Sawwashere	Chairman
2	Dr. Mahendra Gaikwad	Member (Expert)
3	Mr. Shrikant Ardhapurkar	Member (Industry)
03	Prof. Ajay Karare	Member (Expert)
4	Prof. Nisha Dable	Secretary
5	Prof. Ashish Nanotkar	Member
6	Prof. Aniket Bhoyar	Member
7	Prof. Kiran Bode	Member

Minutes of Meeting

1) Meeting Started on 23rd March 2022 at 02.00 P.M. by welcoming Dr.Mahendra Gaikwad (G.H.Raisoni College of Engineering), Mr. Shrikant Ardhapurkar (Crypto Forensics, Nagpur) and Mr. Ajay Karare (Asst. Prof., RKNEC, Nagpur) and all members of BOS Committee by Prof. Nisha Dable (Secretary, BoS CSE)
2) Prof. Nisha Dable explained the action taken report on 5th Meeting of BOS & Overview the agenda of Current Meeting.

Item No. 1	Confirmation of the previous BOS meeting.

The previous meeting (5th BOS Meeting) was held on 06/07/2021 for discussion on the finalization of scheme and syllabus of third yr. B. Tech and Revised under Autonomous scheme &"Introduction to Computer Programming" in I semester under self-study mode through NPTEL/Sway am portal.

Item No. 2	Action Taken Report of the Previous BOS Meeting

The secretary presented the minutes of BOS/CSE/05/2021-22, to all the members and action taken on it.

Following points were presented under this item.

Sr. No.	Item	Action Taken
1	To approve the absorption & equivalence scheme for the 5th semester students from University pattern to JDCOEM Autonomous pattern.	There is no need for the students to appear for any equivalent subject to absorb the students from DBATU to Autonomous in V SEM (III year) from session 2021-22.
2	In finalization of the scheme for 5th Semester 1) To cover the contents from basics in python up to the packages (ex. Panda) in "Python Programming Lab" in V SEM CSE. 2) To include "High Performance Computer Architecture" as an Elective I in 5th semester CSE.	The suggestions have been incorporated.
3	To consider the subject "Introduction to Computer Programming" in I semester under self-study mode through NPTEL/Swayam portal. The course "Programming in C" has been finalized for the said subject in the scheme.	The enrollment process of NPTEL courses has been closed and semester I has been started late. The suggestions will be incorporated in next academic year.

Item No. 3	To Check Status of Syllabus

- The designed syllabus and scheme were discussed, and we have shown the 5th sem and 6th sem syllabus with all required changes suggested by expert. All the expert are approved the scheme of 5th sem and 6th sem.

- We have also revised Mtech Scheme of CSE with some minor changes in the scheme.

All the expert are approved the scheme.

Item No. 4	To finalize the syllabus of 7th & 8th Semester

The designed syllabus and scheme were discussed, all the experts have suggested that there is some minor changes in syllabus.

1) In elective IV i.e. **"Digital Image Processing"** to adopt a some Image technique.

2) In elective IV i.e. **"Randomized Algorithm"** to minimize the syllabus.

3) To revised the syllabus of **"Bio-Medical"** informatics.

4) In **"Research Methodologies"** subject add some testing module, testing methods and some Testing component.

5) Try to minimize the syllabus and set syllabus according to Hours.

Item No. 5	To Check the Credit & Reduce the Syllabus

The Experts have suggested that to check the syllabus content and credit of the for the particular subjects. Manage the syllabus according credit and hours which is mention in the scheme. Try to minimize the syllabus.

Approved the revised syllabus of MTech Computer Science & Engineering.

The meeting was concluded with vote of thanks.

Prof. Supriya Sawwashere
Chairman, Board of Studies,
JDCOEM, Nagpur

Sr. No.	Name of the Faculty	Sign
1.	Prof. Supriya Sawwashere	
2.	Prof. Nisha Dable	present
3.	Prof. Aniket Bhoyar	present
4.	Prof. Ashish Nanotkar	✓
5.	Prof. Kiran Bode	✓
External Member		
1	Dr. M. A. Gaikwad	✓
2	Mr. Shrikant Ardhapurkar	✓
3	Mr. Ajay Karare	✓

Course Structure and Syllabus

For

B. Tech. Computer Science & Engineering Programme

Curriculum for Semester- I [First Year]

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/Ext. Pra.	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics-I	3	1	0	20	20	60	100	4
3	BSC	CS1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	CS1T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	CS1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	CS1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**18**

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Curriculum for Semester- II [First Year]

2nd Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/Ext. Pra.	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	60	0	40	100	2
2	BSC	MA2T001	Engineering Mathematics-II	3	1	0	20	20	60	100	4
3	BSC	CS2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	CS2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	IL2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	CS2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field Training	Credit to be given in III Sem.							
9	ESC	CS2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**16**
				23							

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Program: B. Tech. in Computer Science & Engineering

3rd Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				
				L	T	P	CA	MSE	ESE	Total	Credit
1	HSMC	CS3T001	Organizational Behaviour	2	0	0	20	20	60	100	2
2	BSC	CS3T002	Linear Algebra and Transform	2	1	0	20	20	60	100	3
3	ESC	CS3T003	Programming for Problem Solving	3	0	0	20	20	60	100	3
4	HSMC	CS3T004	Universal Human Values(UHV)	2	1	0	20	20	60	100	3
5	PCC	CS3T005	Digital Electronics and Microprocessor	3	0	0	20	20	60	100	3
6	PCC	CS3T006	Data structure & Algorithms	3	0	0	20	20	60	100	3
7	PCC	CS3T007	Operating System	3	0	0	20	20	60	100	3
8	PCC	CS3L008	Digital Electronics and Microprocessor (Lab)	0	0	2	60	0	40	100	1
9	PCC	CS3L009	Data structure and Algorithms(Lab)	0	0	2	60	0	40	100	1
10	PCC	CS3L010	Web Designing (Lab)	0	0	2	60	0	40	100	1
				18	**2**	**6**	**320**	**140**	**540**	**1000**	**23**

4th Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				
				L	T	P	CA	MSE	ESE	Total	Credit
1	PCC	CS4T001	Computer Architecture Organization	3	0	0	20	20	60	100	3
2	PCC	CS4T002	Java Programming	3	0	0	20	20	60	100	3
3	PCC	CS4T003	Formal Language Automata Theory	2	1	0	20	20	60	100	3
4	PCC	CS4T004	Computer Network	3	0	0	20	20	60	100	3
5	PCC	CS4T005	Database Management Systems	3	0	0	20	20	60	100	3
6	PCC	CS4T006	Numerical Methods and Discrete Mathematics	3	0	0	20	20	60	100	3
7	PCC	CS4L007	JAVA Programming (Lab)	0	0	2	60	0	40	100	1
8	PCC	CS4L008	Computer Networks(Lab)	0	0	2	60	0	40	100	1
9	PCC	CS4L009	Database Management Systems (Lab)	0	0	2	60	0	40	100	1
10	MC	CS4T010	Consumer Affairs	2	0	0	15	10	25	50	Audit
11	PROJECT	CS4P011	Field Training/ Industrial Visit	0	0	0	30	0	20	50	1
12	PCC	CS4T012	NPTEL	0	0	0	25	0	25	50	2
				19	**1**	**6**	**370**	**130**	**550**	**1050**	**24**

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Program: B. Tech. in Computer Science & Engineering
5th Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit	Teaching Mode
				L	T	P	CA	MSE	ESE	Total		
1	ESC	CS5T001	Internet of Things	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
2	PCC	CS5T002	TCP/IP	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
3	PCC	CS5T003	Design and Analysis of Algorithm	2	1	0	20	20	60	100	3	PPT, Board, Chalk,
4	PCC	CS5O001	Open Elective-1	3	1	0	20	20	60	100	4	PPT, Board, Chalk,
5	PEC	CS5TE01	Elective -1	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
6	ESC	CS5L004	Internet of Things (Lab)	0	0	2	60	0	40	100	1	PC, PPT
7	PCC	CS5L005	TCP/IP(Lab)	0	0	2	60	0	40	100	1	PC, PPT
8	PCC	CS5L006	Design and Analysis of Algorithm (Lab)	0	0	2	60	0	40	100	1	PC, PPT
9	PROJECT	CS5P007	Mini Project	0	0	0	25	0	25	50	1	PC
10	PROJECT	CS5P008	Field Training/ Industrial Visit	0	0	0	30	0	20	50	1	-
11	MC	CS5T009	Innovation and Entrepreneurship Development	2	0	0	15	10	25	50	Audit	PPT, Board, Chalk,
				16	**2**	**6**	**350**	**110**	**490**	**950**	**21**	

Open Elective-1 : OSOS (Open Source Operating System)

Elective-1

Code	Subject
CS5TE01A	Augmented Reality
CS5TE01B	Block Chain
CS5TE01C	3D Printing & Design

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Program: B.Tech. in Computer Science & Engineering

6th Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit	Teaching Mode
				L	T	P	CA	MSE	ESE	Total		
1	PCC	CS6T001	Artificial Intelligence & Robotics	3	0	0	20	20	60	100	3	PPT, Board, Chalk
2	PCC	CS6T002	Neural Networks and Machine Learning	3	0	0	20	20	60	100	3	PPT, Board, Chalk
3	PEC	CS6TE02	Elective -II	3	0	0	20	20	60	100	3	PPT, Board, Chalk
4	PEC	CS6TE03	Elective-III	3	0	0	20	20	60	100	3	PPT, Board, Chalk
5	OEC	CS6O002	Open Elective-2	3	1	0	20	20	60	100	4	PPT, Board, Chalk
6	PCC	CS6L003	Neural Networks and Machine Learning(Lab)	0	0	2	60	0	40	100	1	PC, PPT,
7	PCC	CS6L004	Full Stack Development(Lab)	0	0	2	60	0	40	100	1	PC, PPT,
8	PCC	CS6L005	Advance Java Programming(LAB)	0	0	2	60	0	40	100	1	PC, PPT,
9	PROJECT	CS6P006	Mini Project	0	0	2	25	0	25	50	1	PC, PPT,
10	PROJECT	CS6P007	CRT(Campus Recruitment Training)	0	0	2	50	0	0	50	1	PPT, Board, Chalk
11	PROJECT	CS6P008	Skill Development	0	0	2	15	0	35	50	1	PPT, Board, Chalk
12	MC	CS6T009	Intellectual Property Rights	2	0	0	15	10	25	50	Audit	PPT, Board, Chalk
				17	**1**	**12**	**385**	**110**	**505**	**1000**	**22**	

Open Elective-2 : SE (Software Engineering)

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Program: B. Tech. in Computer Science & Engineering
7th Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit	Teaching Mode
				L	T	P	CA	MSE	ESE	Total		
1	ESC	CS7T001	Data Science	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
2	ESC	CS7T002	Cyber Security & Cryptography	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
3	OEC	CS7O003	Open Elective -3	3	1	0	20	20	60	100	4	PPT, Board, Chalk,
4	PEC	CS7TE04	Elective-IV	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
5	PEC	CS7TE05	Elective -V	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
6	PCC	CS7L006	Data Science using R(Lab)	0	0	2	60	0	40	100	1	PC, PPT
7	PCC	CS7L007	Cyber Security & Cryptography (Lab)	0	0	2	60	0	40	100	1	PC, PPT
8	PROJECT	CS7P008	Project Phase I	0	0	6	50	0	50	100	3	PC, PPT
9	MC	CS7T009	Research Methodology	2	0	0	15	10	25	50	Audit	PPT, Board, Chalk,
				17	**1**	**10**	**285**	**110**	**415**	**850**	**21**	

Elective IV

Course Code	Name of Subject
CS7TE04A	Semantic Web
CS7TE04B	Big Data Analytic Technique
CS7TE04C	Digital Image Processing
CS7TE04D	Randomized Algorithms

Elective V

Course Code	Name of Subject
CS7TE05A	Natural Language Processsing
CS7TE05B	Advanced Computer Vision
CS7TE05C	AI In Wireless Communication
CS7TE05D	Biomedical Informatics

Open Elective-3: PHP Development

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Program: B.Tech. in Computer Science & Engineering

8th Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit	Teaching Mode
				L	T	P	CA	MSE	ESE	Total		
1	PEC	CS8TE06	Elective –VI	3	0	0	20	20	60	100	3	PPT, Board, Chalk
2	OEC	CS8O004	Open Elective -4	3	1	0	20	20	60	100	4	PPT, Board, Chalk
4	PROJECT	CS8P001	Project Phase II	0	0	4	50	0	50	100	3	PC, PPT,
				6	**1**	**4**	**90**	**40**	**170**	**300**	**10**	

Elective VI

Course Code	Name of Subject
CS7TE06A	High Performance Computer Architecture
CS7TE06B	Full Stack Development
CS7TE06C	Advanced Software Testing Methodology
CS7TE06D	Advanced Database System

Open Elective-4 : Ethical Hacking

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Program: B. Tech. in Computer Science & Engineering
7th Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit	Teaching Mode
				L	T	P	CA	MSE	ESE	Total		
1	ESC	CS7T001	Data Science	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
2	ESC	CS7T002	Cyber Security & Cryptography	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
3	OEC	CS7O003	Open Elective -3	3	1	0	20	20	60	100	4	PPT, Board, Chalk,
4	PEC	CS7TE04	Elective-IV	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
5	PEC	CS7TE05	Elective -V	3	0	0	20	20	60	100	3	PPT, Board, Chalk,
6	PCC	CS7L006	Data Science using R(Lab)	0	0	2	60	0	40	100	1	PC, PPT
7	PCC	CS7L007	Cyber Security & Cryptography (Lab)	0	0	2	60	0	40	100	1	PC, PPT
8	PROJECT	CS7P008	Project Phase I	0	0	6	50	0	50	100	3	PC, PPT
9	MC	CS7T009	Research Methodology	2	0	0	15	10	25	50	Audit	PPT, Board, Chalk,
				17	**1**	**10**	**285**	**110**	**415**	**850**	**21**	

Elective IV

Course Code	Name of Subject
CS7TE04A	Semantic Web
CS7TE04B	Big Data Analytic Technique
CS7TE04C	Digital Image Processing
CS7TE04D	Randomized Algorithms

Elective V

Course Code	Name of Subject
CS7TE05A	Natural Language Processsing
CS7TE05B	Advanced Computer Vision
CS7TE05C	AI In Wireless Communication
CS7TE05D	Biomedical Informatics

Open Elective-3: PHP Development

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KATOL ROAD, NAGPUR
Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.in
(An Autonomous Institute, with NAAC "A" Grade)
Affiliated to DBATU, RTMNU & MSBTE Mumbai
Department of CSE & AI
"A Place to Learn, A Chance to Grow"
Session: 2022-23

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7T001	Data Science	3	0	0	3

Prerequisites for the course	
1.	Basics Knowledge of data structure and algorithm.
2.	Understand sorting, searching and hashing algorithms.

Prior Reading Material/useful links	
1	https://www.google.co.in/books/edition/What_Is_Data_Science/-OQ2q5JqOdEC?hl=en&gbpv=1&dq=Data+Science&printsec=frontcover
2	https://www.google.co.in/books/edition/Data_Science_for_Business/4ZctAAAAQBAJ?hl=en&gbpv=1&dq=Data+Science&printsec=frontcover
3	https://www.google.co.in/books/edition/Getting_Started_with_Data_Science/b4YxCwAAQBAJ?hl=en&gbpv=1&dq=Data+Science&printsec=frontcover

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students shall be able to Build the fundamentals of data science.
2	CO2	Students shall be able to Apply Data Collection and Data Pre-processing Strategies.
3	CO3	Students shall be able to Compare and choose data visualization method for effective visualization of data
4	CO4	Students shall be able to Implement regression models, model evaluation and validation
5	CO5	Students shall be able to Test Multiple Parameters by using Grid Search

Syllabus:

Course Contents		Hours
Unit I	**Introduction to Data Science:** What is Data Science, importance of data science, Big data and data Science, The current Scenario, Industry Perspective Types of Data: Structured vs. Unstructured Data, Quantitative vs. Categorical Data, Big Data vs. Little Data, Data science process, Role Data Scientist.	7
Unit II	**Data Collection and Data Pre-Processing:** Data Collection Strategies, Data Pre-Processing Overview, Data Cleaning, Data Integration and	7

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	Transformation, Data Reduction, Data Discretization.	
Unit III	**Exploratory Data Analytics** : Descriptive Statistics, Mean, Standard Deviation, Skewness and Kurtosis, Box Plots, Pivot Table, Heat Map, Correlation Statistics.	7
Unit IV	**Model Development** : Simple and Multiple Regression, Model Evaluation using Visualization, Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Measures for In-sample Evaluation, Prediction and Decision Making, Feature Engineering	7
Unit V	**Model Evaluation** : Generalization Error, Out-of-Sample Evaluation Metrics, Cross Validation, Overfitting, Under Fitting and Model Selection, Prediction by using Ridge Regression, Testing Multiple Parameters by using Grid Search	7

Text Books	
1.	Mitchell, Tom. M., "Machine Learning", McGraw-Hill Education, 1st Edition, May 2013.
2.	Segaran, Toby. "Programming Collective Intelligence- Building Smart Web 2.0 Applications", O'Reilly Media, August 2007.
3.	Miroslav, Kubat. "An Introduction to Machine Learning", Springer Publishing.

Reference Books	
1.	Bishop, C. M., "Pattern Recognition and Machine Learning", Springer Publishing.
2.	Conway, Drew and White, John Myles, "Machine Learning for Hackers", O'Reilly Media, February 2012.

Useful Links	
1.	http://nptel.ac.in/courses/106105031/lecture by Dr. Debdeep Mukhopadhyay IIT Kharagpur
2.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033-computer-system engineering-spring-2009/video-lectures/ lecture by Prof. Robert Morris and Prof. Samuel Madden MIT.
3.	https://www.google.co.in/books/edition/Applied_Cryptography_and_Network_Secur it/srsyEAAAQBAJ?hl=en&gbpv=1&dq=cyber+security+%26+cryptography+notes &printsec=frontcover
4.	https://www.google.co.in/books/edition/Applied_Cryptography_and_Network_Secur it/OrBI6J5wHewC?hl=en&gbpv=1&dq=cyber+security+%26+cryptography+notes& printsec=frontcover

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7T002	Cyber Security & Cryptography	3	1	0	4

	Prerequisites for the course
1.	Basics Knowledge of Cyber Security.
2.	Understand various Authentication algorithms

	Prior Reading Material/useful links
1.	https://blog.rsisecurity.com/what-is-cryptography-in-cyber-security/
2.	https://www.tutorialspoint.com/what-is-the-difference-between-cryptography-and-cyber-security
3.	https://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Understand basic concepts of Cyber security.
2	CO2	Student will able to Apply security principles to system design and Symmetric Encryption algorithms to provide confidentiality
3	CO3	Student will able to Compare and apply various authentication Techniques and different cryptographic operations of public key cryptography.
4	CO4	Student will able to Evaluate and Communicate the human role in security systems with an emphasis on ethics, social engineering vulnerabilities.
5	CO5	Student will able to Select and apply appropriate Intrusion detection and prevention techniques and to examine various security algorithms to Interpret security incidents

Syllabus:

Course Contents		Hours
Unit I	**Introduction to Cyber Security:** Overview of cyber security , Internet Governance-Challenges and constraints,Cyber threats:-Cyber Warfare-Cyber Crime-Cyber terrorism ,Cyber Espionage, Need for	7

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	comprehensive cyber security policy, need for nodal authority, Cyber security regulations, Roles of international law.	
Unit II	**Cryptography and Block Ciphers principles:** Introduction, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security, Substitution and Transposition techniques, Symmetric and Asymmetric key cryptography, Steganography, Cryptographic independent dimensions. Cryptanalytic attack and brute force attack, Symmetric key Ciphers: Block Cipher principles, DES.	7
Unit III	**Public Key Cryptosystems and Authentication Requirements:** Principles of public key cryptosystems, RSA algorithm, Diffie-Hellman Key Exchange, introductory idea of Elliptic curve cryptography. Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512) Message authentication codes: Authentication requirements, Digital signature	7
Unit IV	**Key Management, Distribution and Cyber Security Vulnerabilities** Distribution of Public Keys, Kerberos, X.509 Authentication Service, PGP, SSL, IPSEC. Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Weak Authentication, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Ethical Hacking.	7
Unit V	**Securing Web Application Services, Servers and cyber forensics:** Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Security Considerations, Challenges, Intrusion detection and Prevention Techniques, System Integrity Validation, Honey pots, password management. Introduction to Cyber Forensics.	8

Text Books	
1.	William Stallings, "Crpyptography and Network security Principles and Practices", Pearson/PHI.
2.	Wade Trappe, Lawrence C Washington, " Introduction to Cryptography with coding theory", Pearson.
3.	J. Katz and Y. Lindell, Introduction to Modern Cryptography, CRC press, 2008.
4.	Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing – Prentice Hall of India.

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Reference Books	
1.	Golreich O, Foundations of Cryptography, Vol.1.2, Cambridge University Press, 2004
2.	Menezes, et.al, Handbook of Applied Cryptography, CRC Press, 2004.
3.	Introduction to Cryptography and Network Security By Behrouz A. Forouzan · 2008, McGraw-Hill Higher Education
4.	Cyber Security Cryptography and Machine Learning Fourth International Symposium, CSCML 2020, Be'er Sheva, Israel, July 2–3, 2020, Springer International Publishing.

Useful Links	
1.	http://nptel.ac.in/courses/106105031/lecture by Dr. Debdeep Mukhopadhyay IIT Kharagpur
2.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033-computer-system engineering-spring-2009/video-lectures/ lecture by Prof. Robert Morris and Prof. Samuel Madden MIT.
3.	https://www.google.co.in/books/edition/Applied_Cryptography_and_Network_Securit/srsyEAAAQBAJ?hl=en&gbpv=1&dq=cyber+security+%26+cryptography+notes&printsec=frontcover
4.	https://www.google.co.in/books/edition/Applied_Cryptography_and_Network_Securit/OrBI6J5wHewC?hl=en&gbpv=1&dq=cyber+security+%26+cryptography+notes&printsec=frontcover

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7O003	PHP Development	3	1	0	4

Prerequisites for the course	
1.	https://www.tutorialspoint.com/php/php_tutorial.pdf
2.	https://www.w3schools.com/php/
3.	https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/UNIT4.pdf

Prior Reading Material/useful links	
1.	Study command line arguments from PHP scripts.
2.	Basics of JavaScript Language programming.
3.	Introduction to Computer programming such as datatypes, statement.

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Accessing command line arguments from PHP scripts
2	CO2	Student will able to Generating web pages dynamically using PHP
3	CO3	Student will able to Retrieving Web Pages manipulating from data
4	CO4	Student will able to Regular Expression with PHP to make strong validation Exception Handling
5	CO5	Student will able to Integrating database content to generate dynamic Web pages

Syllabus:

Course Contents		Hours
Unit I	Introduction to PHP: Web Architecture, Overview of PHP Platform, Why we use, Some of PHP's strengths , Some of Availability across multiple platforms , Comparing PHP with other Web scripting languages or technology , PHP delimiters , Variable initialization with PHP, PHP Data types , PHP Constants , PHP Operators.	8
Unit II	PHP Statement: If else , If else if else, Nested If , Switch Case , Jump Statements (Break , Continue , Exit) , For loop, While loop , Do while	

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	loop , Nested Loop , How to use an important programming construct: arrays , Numerically Indexed arrays ,Non-Numerically Indexed arrays (Associative Array) Multidimensional arrays , Array sorting .	
Unit III	Introducing ARRAY, Functions, How to use an important programming construct: arrays Numerically Indexed arrays Non- Numerically Indexed arrays (Associative Array) Multidimensional arrays, Introducing Functions, Defining functions, using parameters, Understanding scope , Returning values Call By Value & Call By reference, Using Require() and include().	7
Unit IV	FORMS IN PHP: PHP FORM handling, PHP FORM Validation, FORM Required, FORM URL/Email, File uploading Concepts, Multiple File Upload , Multiple File Upload , Downloading file from server using header.	7
Unit V	State Management Session, Cookie, Query String, Understanding Basic Session Functionality, Starting a Session, Registering Session variables, Using Session Variables, Destroying the variables and Session, What is a Cookie, Setting Cookies with PHP, Using Cookies with Sessions, Deleting Cookies, Implementing Query String, Hidden Fields.	7

Text Books	
1.	Programming PHP By Rasmus Lerdorf, Kevin Tatroe, Bob Kaehms, Ric McGredy, Nathan Torkington, Paula M. Ferguson · 2002
2.	PHP and MySQL Web Development By Luke Welling, Laura Thomson · 2008
3.	PHP Essentials By Neil Smyth · 2010
4.	Modern PHP New Features and Good Practices By Josh Lockhart · 2015

Reference Books	
1.	Core PHP Programming, By Leon Atkinson, Zeev Suraski · 2004
2.	PHP and MySQL Web Development, Second Edition, By Luke Welling, Laura Thomson · 2003
3.	PHP and MySQL Web Development: A Beginner's Guide, By Marty Matthews · 2014
4.	RESTful PHP Web Services, Learn the Basic Architectural Concepts and Steps Through Examples of Consuming and Creating RESTful Web Services in PHP By Samisa Abeysinghe · 2008

Useful Links	
1.	https://assets.ctfassets.net/nkydfjx48olf/5qFMF3mvitLMahX67i7iOb/028229996c13cbc27a0538f055a41b46/php_cookbook.pdf

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2.	https://iare.ac.in/sites/default/files/lecture_notes/IARE_WT_NOTES.pdf
3.	https://www.geeksforgeeks.org/php-tutorials/
4.	https://ecomputernotes.com/php

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7TE04A	Semantic Web	3	0	0	3

Prerequisites for the course	
1.	Study fundamentals of Semantic Web technologies.
2.	Creating structured web documents in XML

Prior Reading Material/useful links	
1.	https://www.techtarget.com/searchcio/definition/Semantic-Web
2.	https://www.analyticssteps.com/blogs/what-semantic-web-working-importance-and-applications
3.	https://www.techtarget.com/searchcio/definition/Semantic-Web

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Understand the fundamentals of Semantic web
2	CO2	Student will able to Creating structured web documents in XML
3	CO3	Student will able to Apply ontology engineering to various problems.
4	CO4	Student will able to Understand Semantic Web query languages (SPARQL)
5	CO5	Student will able to Program semantic applications with Java and Jena API.

Syllabus:

Course Contents		Hours
Unit I	**Semantic Web Vision**: Todays' web, Examples of semantic web from today's web, Semantic web technologies, layered approach Structured web documents in XML: The XML language, Structuring, Namespaces, Querying and Addressing XML documents, Processing	7

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	Irreducible and aperiodic Markov chain, fundamental theorem of Markov chain (statement only), coupling and Random walk	
Unit III	**Metropolis Algorithm**: Mixing time of Random Walk on Cycles, Proof of the fundamental Theorem of Markov chains, Finishing proof of the fundamental Theorem of Markov chains, hitting time, commute time, cover time, Monte Carlo Method, FPRAS for DNF Counting, FPRAS for Independent Set Counting using Monte Carlo Method	7
Unit IV	**Introduction to Probabilistic Methods:** Probabilistic method of expectation, alteration; Lovasz Local Lemma and its application, Method of Conditional Expectation for De-randomization, Overview of path coupling.	7
Unit V	**Introduction to Universal Hash Family**: Perfect Hashing, Cuckoo Hashing, Bloom Filter, Count Min Sketch, Construction of Universal Hash Family, Locality Sensitive Hashing (LSH), Nearest Neighbor Search (NNS), Point Location in Equal Balls (PLEB), Johnson Lindenstrauss Lemma Sub-Gaussian Random Variables	8

Text Books	
1.	Randomized Algorithms: Rajeev Motwani, Prabhakar Raghavan, Cambridge University Press.
2.	Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and Data Analysis by Eli Upfal and Michael Mitzenmacher
3.	Computational Geometry: Algorithms and Applications, by Mark de Berg, Otfried Cheong, Marc van Kreveld, and Mark Overmars, 3rd edition, Springer-Verlag, 2008.
4.	Algorithmic and Analysis Techniques in Property Testing, by Dana Ron. Found. Trends Theor. Comput. Sci. 5, 2 (February 2010), 73-205.

Reference Books	
1.	Randomized Algorithms, By Rajeev Motwani · 2001, Cambridge University Press
2.	Probability and Computing Randomized Algorithms and Probabilistic Analysis By Michael Mitzenmacher, Eli Upfal · 2005
3.	Towards Dynamic Randomized Algorithms in Computational Geometry By Monique Teillaud · 1993
4.	Probability and Computing Randomization and Probabilistic Techniques in Algorithms and Data Analysis By Michael Mitzenmacher, Eli Upfal · 2017

Useful Links	
1.	https://www.google.co.in/books/edition/Randomized_Algorithms/QKVY4mDivBEC?hl=en&gbpv=1&dq=Randomized+Algorithms&printsec=frontcover

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Unit II	**Describing Web Resources:** Introduction, RDF: Basic Ideas,RDF: XML-Based Syntax,RDF serialization, RDF Schema: Basic Ideas,RDF Schema: The Language ,RDF and RDF Schema	7
Unit III	**Logic and Inference Rules:** Introduction, Monotonic Rules syntax, semantics & examples, Nonmonotonic rules – syntax & examples, Encoding in XML.	7
Unit IV	**Ontology Engineering**: Introduction, Manual construction of Ontology, Reusing existing ontology, using Semi-automatic methods, Knowledge semantic web architecture	7
Unit V	**SPARQL, Ontology Language**: SPARQL simple Graph Patterns, Complex Graph Patterns, Group Patterns, Queries with Data Values, Filters OWL Formal Semantics. SchemaWeb Ontology Language: Introduction, OWL language, Examples, OWL in OWL, Future extensions.	8

Text Books	
1.	A Semantic web Primer: Grigoris Antoniou and Frank Van Hermelen , MIT Press
2.	Semantic Web programming, John Hebler et.el, Wiley
3.	Foundations of Semantic Web Technologies, Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, CRC Press
4.	Michael C. Daconta, Leo J. Obrst, and Kevin T. Smith, "The Semantic Web: A Guide to the Futureof XML, Web Services, and Knowledge Management", Fourth Edition, Wiley Publishing, 2003.

Reference Books	
1.	John Davies, Rudi Studer, and Paul Warren John, "Semantic Web Technologies: Trends and Research in Ontology-based Systems", Wiley and Son's, 2006.
2.	John Davies, Dieter Fensel and Frank Van Harmelen, "Towards the Semantic Web: Ontology- Driven Knowledge Management", John Wiley and Sons, 2003.
3.	Semantic Web and education By Vladan Devedzic · 2006
4.	Semantic Web Technologies for E-learning, Darina Dicheva, Jim E. Greer, Riichiro Mizoguchi, IOS Press

Useful Links	
1.	https://mrcet.com/downloads/digital_notes/CSE/IV%20Year/SEMANTIC%20WEB&SOCIAL%20NETWORKS.pdf
2.	https://www.google.co.in/books/edition/Semantic_Web_Engineering_in_the_Knowl

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	edg/ipN-3GWuQXgC?hl=en&gbpv=1&dq=semantic+web+course+objectives&printsec=frontcover
3.	https://www.google.co.in/books/edition/Semantic_Web_Services/wglTWr-uS3UC?hl=en&gbpv=1&dq=semantic+web+course+objectives&printsec=frontcover
4.	https://www.google.co.in/books/edition/Social_Networks_and_the_Semantic_Web/giOwMTn2PNYC?hl=en&gbpv=1&dq=semantic+web+course+objectives&printsec=frontcover

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7TE04B	Big Data Analytic Technique	3	0	0	3

	Prerequisites for the course
1.	Understand the key issues in big data management
2.	Study the tools and techniques required in handling large amounts of datasets.

	Prior Reading Material/useful links
1.	https://mrcet.com/downloads/digital_notes/CSE/IV%20Year/(R17A0528%20)%20Big%20Data%20Analytics%20Digital%20notes.pdf
2.	https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SIT1606.pdf
3.	https://www.getsmarter.com/blog/career-advice/big-data-analysis-techniques/

Course Objectives

1.	To provide an overview of an exciting growing field of big data analytics.
2.	To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map-Reduce.
3.	To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
4.	To enable students to have skills that will help them to solve complex real-world problems in for decision support.
5.	To make students comfortable with tools and techniques required in handling large amounts of datasets.

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
2	CO2	Student will able to Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics
3	CO3	Student will able to Interpret business models and scientific computing paradigms, and apply software tools for big data

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		analytics.
4	CO4	Student will able to Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.
5	CO5	Student will able to Develop Big Data Solutions using Hadoop Eco System

Syllabus:

Course Contents		Hours
Unit I	**Introduction to Big Data:** Introduction to Big Introduction to Big Data, Big Data characteristics, types From 0-3 Data of Big Data, Traditional vs. Big Data business approach, Ref. Case Study of Big Data Solutions.	7
Unit II	**Introduction to Hadoop** : What is Hadoop? Core Hadoop Components; Hadoop Ecosystem; Physical Architecture; Hadoop limitations.	7
Unit III	**NoSQL:** What is NoSQL? NoSQL business drivers;NoSQL case studies; NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Bigtable) stores, Document stores, Variations of NoSQL architectural patterns; Using NoSQL to manage big data: What is a big data NoSQL solution? Understanding the types of big data problems; analyzing big data with a shared-nothing architecture; choosing distribution models: master-slave versus peer-to-peer; four ways that NoSQL systems handle big data problems	7
Unit IV	**Map Reduce and the New Software:** Distributed File Systems: Physical Organization of Compute Nodes, Large-Scale File-System Organization. MapReduce: The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of MapReduce Execution, Coping With Node Failures. Algorithms Using MapReduce: Matrix-Vector Multiplication by MapReduce, Relational-Algebra Operations, Computing Selections by MapReduce, Computing Projections by MapReduce, Union, Intersection, and Difference by MapReduce, Computing Natural Join by MapReduce, Grouping and Aggregation by MapReduce, Matrix Multiplication, Matrix Multiplication with One MapReduce Step.	8
Unit V	**Finding Similar Item:** Applications of Near-Neighbor Search, Jaccard Similarity of Sets, Similarity of Documents, Collaborative Filtering as a Similar-Sets Problem .	7

Text Books	
1.	Anand Rajaraman and Jeff Ullman "Mining of Massive Datasets", Cambridge University Press,

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2.	https://iare.ac.in/sites/default/files/lecture_notes/IARE_WT_NOTES.pdf
3.	https://www.geeksforgeeks.org/php-tutorials/
4.	https://ecomputernotes.com/php

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	domain concepts, smoothing frequency-domain filters, Sharpening frequency domain filters.	
Unit IV	Image Filtering Techniques: Low Pass Filters – Smoothing, High Pass Filters - Edge Detection, Sharpening; Image Restoration: Noise Models, Model of Image Degradation/Restoration Process, Noise Reduction, Inverse Filtering, M Minimum Mean Square Error (Weiner) Filtering.	8
Unit V	Colour Image processing: Colour fundamentals, Colour models, Representation of Color in Images, Colour transformation, Smoothing and Sharpening, Colour segmentation. Image Morphology: Different Morphological Algorithm, Morphological Measures	7

Text Books	
1.	Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson Education, Third Edition, 2008.
2.	Anil K. Jain, Fundamentals of Digital Image Processing', Pearson 2002. Gonzalez & Woods - Digital Image Processing Using Matlab
3.	Bhabatosh Chanda and Dwijesh Majumder - Digital Image Processing
4.	Kenneth R. Castleman, Digital Image Processing, Pearson, 2006

Reference Books	
1.	Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
2.	William K. Pratt, Digital Image Processing' , John Wiley, New York, 2002
3.	Milan Sonka etaI, 'IMAGE PROCESSING, ANALYSIS AND MACHINE VISION', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999.
4.	D. E. Dudgeon and RM. Mersereau, Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.

Useful Links	
1.	https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/course_outcome/core_electives_3/BEC007%20CO%20DIGITAL%20IMAGE%20PROCESSING.pdf
2.	https://www.cis.rit.edu/class/simg712-90/notes/12-Basic_Principles_DIP.pdf
3.	https://www.google.co.in/books/edition/Image_Processing/smBw4xvfrIC?hl=en&gbpv=1&dq=What+is+the+basic+principle+of+digital+image+processing%3F&printsec=frontcover
4.	https://www.google.co.in/books/edition/Principles_of_Digital_Image_Processing/FILBBAAAQBAJ?hl=en&gbpv=1&dq=What+is+the+basic+principle+of+digital+image+processing%3F&printsec=frontcover

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7TE04D	Randomized Algorithms	3	0	0	3

	Prerequisites for the course
1.	Understand the principles of random signals.
2.	Study the basics of Design and Analysis of Algorithm.

	Prior Reading Material/useful links
1.	https://www.geeksforgeeks.org/randomized-algorithms/
2.	https://ocw.mit.edu/courses/6-856j-randomized-algorithms-fall-2002/
3.	http://theory.stanford.edu/people/pragh/amstalk.pdf

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students have the basics of probability, events and random experiments.
2	CO2	They can analyze that the random variable is always a numerical quantity.
3	CO3	Students can use the multiple random variables and relate through examples to real problems.
4	CO4	Students can have the concept of random processes in both deterministic and non deterministic types.
5	CO5	Students can Use the Power density spectrum and its properties and the types of noise

Syllabus:

Course Contents		Hours
Unit I	**Introduction to Randomized Algorithms:** Review of Basic Probability, Polynomial Identity Testing, Schwartz - Zippel Lemma, Reduction from Perfect Bipartite Matching to PIT, Randomized Quick sort, Markov, Chebyshev, and Chernoff bounds, Tossing coins, coupon collector problem, birthday paradox, Balls and bins, Two point sampling.	7
Unit II	**Randomized rounding:** Multi-commodity flow, Introduction to Markov chain, randomized algorithm for 2SAT, stationary distribution,	

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2.	https://www.google.co.in/books/edition/Randomized_Algorithms_for_Analysis_and_C/KyGmPavw7OMC?hl=en&gbpv=1&dq=Randomized+Algorithms&printsec=frontcover
3.	https://www.google.co.in/books/edition/Design_and_Analysis_of_Randomized_Algori/XARmmrB86UEC?hl=en&gbpv=1&dq=Randomized+Algorithms&printsec=frontcover
4.	https://www.google.co.in/books/edition/Randomized_Algorithms_in_Automatic_Contr/sK0qBAAAQBAJ?hl=en&gbpv=1&dq=Randomized+Algorithms&printsec=frontcover

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7TE05A	Natural Language Processing	3	0	0	3

Prerequisites for the course	
1.	Basics of Neural Networks and Machine Learning and Process.
2.	Study the Character Encoding, Word Segmentation, Sentence Segmentation.

Prior Reading Material/useful links	
1.	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_natural_language_processing.htm
2.	https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/nlp1-4.pdf
3.	https://www.geeksforgeeks.org/introduction-to-natural-language-processing/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Apply the principles and Process of Human Languages such as English and other Indian Languages using computers.
2	CO2	Student will able to Realize semantics and pragmatics of English language for text processing.
3	CO3	Student will able to Create CORPUS linguistics based on digestive approach (Text Corpus method)
4	CO4	Student will able to Check a current methods for statistical approaches to machine translation.
5	CO5	Student will able to Perform POS tagging for a given natural language and Select a suitable language modelling technique based on the structure of the language.

Syllabus:

Course Contents		Hours
Unit I	Introduction to NLP - Various stages of NLP –The Ambiguity of Language: Why NLP Is DifficultParts of Speech: Nouns and Pronouns, Words: Determiners and adjectives, verbs, Phrase Structure. Statistics Essential Information Theory : Entropy, perplexity, The relation to	7

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	language, Cross entropy.	
Unit II	Character Encoding, Word Segmentation, Sentence Segmentation, Introduction to Corpora, Corpora Analysis. Inflectional and Derivation Morphology, Morphological analysis and generation using Finite State Automata and Finite State transducer.	7
Unit III	N gram models, Smoothing, Part of speech tagging, Hidden Markov models, Viterbi algorithm, Forward - backward algorithm, EM training, Models for Named Entity Recognition, Neural Language Models - Recurrent Neural Networks and Long Short term Memory networks	7
Unit IV	Methodological Preliminaries, Supervised Disambiguation: Bayesian classification, An informationtheoretic approach, Dictionary-Based Disambiguation: Disambiguation based on sense, Thesaurusbased disambiguation, Disambiguation based on translations in a second-language corpus.	7
Unit V	Markov Model: Hidden Markov model, Fundamentals, Probability of properties, Parameter estimation, Variants, Multiple input observation. The Information Sources in Tagging: Markov model taggers, Viterbi algorithm, Applying HMMs to POS tagging, Applications of Tagging	8

Text Books	
1.	Christopher D. Manning and Hinrich Schutze, " Foundations of Natural Language Processing" , 6 th Edition, The MIT Press Cambridge, Massachusetts London, England, 2003
2.	Daniel Jurafsky and James H. Martin "Speech and Language Processing", 3rd edition, Prentice Hall, 2009.
3.	NitinIndurkhya, Fred J. Damerau "Handbook of Natural Language Processing", Second Edition, CRC Press, 2010.
4.	James Allen "Natural Language Understanding", Pearson Publication 8th Edition. 2012..

Reference Books	
1.	Chris Manning and HinrichSchütze, "Foundations of Statistical Natural Language Processing", 2nd edition, MITPress Cambridge, MA, 2003.
2.	Hobson lane, Cole Howard, Hannes Hapke, "Natural language processing in action" MANNING Publications, 2019.
3.	Neural Network Methods in Natural Language Processing By Yoav Goldberg · 2017
4.	Deep Learning for Natural Language Processing Develop Deep Learning Models for your Natural Language Problems By Jason Brownlee · 2017

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Useful Links	
1.	https://www.google.co.in/books/edition/Introduction_to_Natural_Language_Process/72yuDwAAQBAJ?hl=en&gbpv=1&dq=natural+language+processing+Course+Objectives&printsec=frontcover
2.	https://www.cs.mcgill.ca/~jcheung/teaching/fall-2015/comp599/comp599-outline.pdf
3.	https://luddy.iupui.edu/courses/info-b443/
4.	https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/nlp1-4.pdf

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7TE05B	Advanced Computer Vision	3	0	0	3

Prerequisites for the course	
1.	Understanding on detailed models of image formation.
2.	Examine various clustering algorithms

Prior Reading Material/useful links	
1.	https://www.studocu.com/in/document/amrita-vishwa-vidyapeetham/computer-vision/computer-vision-lecture-notes-all/23202964
2.	http://eecs.northwestern.edu/~yingwu/teaching/EECS432/Notes/vision.pdf
3.	https://www.mccormick.northwestern.edu/electrical-computer/academics/courses/descriptions/432.html

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Appreciate the detailed models of image formation.
2	CO2	Student will able to Analyse the techniques for image feature detection and matching.
3	CO3	Student will able to Apply various algorithms for pattern recognition.
4	CO4	Student will able to Examine various clustering algorithms.
5	CO5	Student will able to Analyze structural pattern recognition and feature extraction techniques

Syllabus:

Course Contents		Hours
Unit I	Image formation and Image model- Components of a vision system- Cameras- camera model and camera calibration- Radiometry- Light in space- Light in surface - Sources, shadows and shading.	7
Unit II	Multiple images-The Geometry of multiple views- Stereopsis- Affine structure from motion- Elements of Affine Geometry Affine structure and motion from two images- Affine structure and motion from multiple images- From Affine to Euclidean images.	7

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Unit III	High level vision- Geometric methods- Model based vision- Obtaining hypothesis by pose consistency, pose clustering and using Invariants, Verification.	7
Unit IV	Introduction to pattern and classification, supervised and unsupervised learning, Clustering Vs classification, Bayesian Decision Theory- Minimum error rate classification Classifiers, discriminant functions, decision surfaces- The normal density and discriminant-functions for the Normal density.	8
Unit V	Linear discriminant based classifiers and tree classifiers Linear discriminant function based classifiers- Perceptron- Minimum Mean Squared Error (MME) method, Support Vector machine, Decision Trees: CART, ID3.	7

Text Books	
1.	Bernd Jahne and Horst HauBecker, Computer vision and Applications, Academic press, 2000.
2.	David A. Forsyth & Jean Ponce, Computer vision – A Modern Approach, Prentice Hall, 2002.
3.	C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
4.	R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification, John Wiley, 2001.

Reference Books	
1.	Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, 2004.
2.	S. Theodoridis and K. Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009.
3.	Computer Vision and Image Processing Fundamentals and Applications By Manas Kamal Bhuyan · 2019.
4.	Advanced Topics in Computer Vision, 2013, Springer London

Useful Links	
1.	https://www.google.co.in/books/edition/Concise_Computer_Vision/ZCu8BAAAQBAJ?hl=en&gbpv=1&dq=advanced+computer+vision+notes&printsec=frontcover
2.	https://www.studocu.com/in/document/amrita-vishwa-vidyapeetham/computer-vision/computer-vision-lecture-notes-all/23202964
3.	https://faculty.ucmerced.edu/mcarreira-perpinan/teaching/ee589/lecture-notes.pdf
4.	http://vision.stanford.edu/teaching/cs131_fall1718/files/cs131-class-notes.pdf

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7TE05C	AI In Wireless Communication	3	0	0	3

	Prerequisites for the course
1.	Basics of AI as applied to Wireless communication.
2.	Study the principles of AI.

	Prior Reading Material/useful links
1.	https://spectrum.ieee.org/ai-for-wireless
2.	https://www.hindawi.com/journals/wcmc/si/862756/
3.	https://www.rohde-schwarz.com/in/knowledge-center/webinars/artificial-intelligence-in-future-wireless-communication-register_255346.html

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Identify and describe the various components used in Cognitive Radio
2	CO2	Student will able to Interpret various Cognitive Radio Networks
3	CO3	Student will able to Produce optimized solution in wireless communication for using Artificial Intelligence
4	CO4	Student will able to Analyze the implications of applying AI systems to organizations and future of work.
5	CO5	Student will able to Implement AI frameworks and platforms to improve business, organizational, and technology outcomes.

Syllabus:

Course Contents		Hours
Unit I	Fundamentals of Artificial Intelligence Introduction, A.I. Representation, Non-AI &AI Techniques, Representation of Knowledge, Knowledge Base Systems, State Space Search, Production Systems, Problem Characteristics, types of production systems, Intelligent Agents and Environments, concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation	8
Unit II	Artificial Intelligence In Wireless Communications	

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	Introduction to Cognitive Radio - Cognitive Radio Design - Cognitive Engine Design Component Descriptions, Artificial Intelligence Techniques	
Unit III	Introduction to generic wireless channels, databases, feature extraction, classification and decision. Artificial Intelligence (AI) in the digital era and the role of network intelligence in mobile applications (APPs), digital assistants and autonomous vehicles.	7
Unit IV	Introduction to 5G (Network of networks) covering devices, systems, things/machines and big data. Overview of technology enablers in 5G architecture, system Design and framework for the 5G edge supporting massive IoT devices/cyber physical systems.	7
Unit V	Introduction to the trends in Machine Learning (ML) and Analytics in the 5G network management and evolution to Zero-Touch Networks (ZTN) framework. Application of ML (supervised learning, unsupervised learning and reinforcement learning) in the 5G ZTN including principle of 5G user analytics at the cell site, cell edge and core network.	7

Text Books	
1.	Thomas W. Rondeau, Charles W. Bostian, "Artificial Intelligence in Wireless Communications", Artech house, 2009.
2.	Elaine Rich and Kevin Knight: "Artificial Intelligence." Tata McGraw Hill
3.	Stuart Russell & Peter Norvig : "Artificial Intelligence : A ModernApproach", Pearson Education, 2nd Edition.
4.	Erik Dhalman et al., "5G NR: The next generation wireless access network technology", 2018

Reference Books	
1.	Ivan Bratko : "Prolog Programming For Artificial Intelligence" , 2nd Edition Addison Wesley, 1440.
2.	Eugene, Charniak, Drew Mcdermott: "Introduction to Artificial Intelligence.", Addison Wesley
3.	Patterson: —Introduction to AI and Expert Systems‖, PHI
4.	Devaki Chandramouli et al., "5G for the Connected World", Wiley, 2019 Evaluation

Useful Links	
1.	https://www.google.co.in/books/edition/Wireless_Communication_with_Artificial_I/1119EAAAQBAJ?hl=en&gbpv=1&dq=AI+In+Wireless+Communication&printsec=frontcover
2.	https://www.google.co.in/books/edition/Artificial_Intelligent_Techniques_for_Wi/

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	VJhEAAAQBAJ?hl=en&gbpv=1&dq=AI+In+Wireless+Communication&printsec=frontcover
3.	https://ptu.ac.in/wp-content/uploads/2020/10/6-12 18M_Tech_ECE__WIRELESS_COMMUNICATION.pdf
4.	https://www.iare.ac.in/?q=courses/electronics-and-communication-engineering-autonomous/open-elective-%E2%80%93-i

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7TE05D	Biomedical Informatics	3	0	0	3

Prerequisites for the course	
1.	Understand fundamental characteristics of data, information, and knowledge in the Health Informatics domain.
2.	Understand basic principles of knowledge management systems in biomedicine.

Prior Reading Material/useful links	
1.	https://www.ohsu.edu/school-of-medicine/medical-informatics-and-clinical-epidemiology/what-biomedical-informatics
2.	https://openhealthinformatics.org/wp-content/uploads/2020/03/INM337-S1-Introduction-to-Health-Informatics.pdf
3.	https://www.studocu.com/en-us/document/ohio-university/health-informatics/lecture-notes-lecture-week-1-introduction-to-health-informatics-goes-through-an-overview-about-what-we-will-be-learning-for-the-semester-49-slides-w-study-topics-at-the-end/815269

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Understand fundamental characteristics of data, information, and knowledge in the Health Informatics domain.
2	CO2	Student will able to familiar with common algorithms for health applications and IT components in representative clinical processes.
3	CO3	Student will able to Develop understanding of population health and precision medicine.
4	CO4	Student will able to Understand basic principles of knowledge management systems in biomedicine.
5	CO5	Student will able to Develop understanding of various aspects of Health Information Technology standards

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Syllabus:

Course Contents		Hours
Unit I	**Clinical informatics:** Nursing (nursing informatics), dentistry (dental informatics), pathology (pathology informatics), Health information management (HIM), Health Information Analysis.	7
Unit II	**Bioinformatics:** Domain-based definitions, Concept-oriented definitions, domain oriented definitions, formulating a definition of informatics based on data, information and knowledge, bioinformatics vs. biomedical informatics.	7
Unit III	**Imaging informatics:** PACS systems, biological science, clinical services, science, medical / biomedical engineering ,cognitive science , applications.	7
Unit IV	**Consumer health informatics:** Consumer health Informatics, Patient-Focused Informatics, Health Literacy, Various types and application of Consumer health Informatics, Consumer Education, Sharing and distribution of the content of EHRs and personal health data between professionals,Component of consumer health informatics	8
Unit V	**Bio Health informatics** –Introduction to health informatics and its significance Definitions and key concepts in health informatics Background disciplines, historical overview, and future challenges.	7

Text Books	
1.	Principles of Biomedical Informatics By Ira Kalet · 2013
2.	Ledley RS, Lusted LB. Reasoning foundation of medical diagnosis. *Science*. 1959;130(3366):9–21. [PubMed] [Google Scholar]
3.	Collen MF. Health care information systems: a personal historic review; Proceedings of ACM conference on History of medical informatics; Bethesda, MD: Association for Computing Machinery. 1987.
4.	Biomedical Informatics, Computer Applications in Health Care and Biomedicine, By Edward H. Shortliffe · 2006

Reference Books	
1.	Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 2021
2.	Biomedical Informatics, Computer Applications in Health Care and Biomedicine, 2013
3.	Biomedical Informatics, Discovering Knowledge in Big Data By Andreas Holzinger · 2014
4.	Methods in Biomedical Informatics, A Pragmatic Approach, 2013

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Useful Links	
1.	https://www.google.co.in/books/edition/Unifying_the_Applications_and_Foundation/3RW3DAAAQBAJ?hl=en&gbpv=1&dq=Biomedical+Informatics&printsec=frontcover
2.	https://www.google.co.in/books/edition/Biomedical_Informatics/2GbdCgAAQBAJ?hl=en&gbpv=1&dq=Biomedical+Informatics&printsec=frontcover
3.	https://www.google.co.in/books/edition/Medical_Informatics/ku0ubWDKFZgC?hl=en&gbpv=1&dq=Biomedical+Informatics&printsec=frontcover
4.	https://www.google.co.in/books/edition/Public_Health_and_Informatics/81A2EAAAQBAJ?hl=en&gbpv=1&dq=Biomedical+Informatics&printsec=frontcover

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7L006	Data Science using R(Lab)	0	0	2	2

Prerequisites for the course	
1.	Study critical R programming concepts.
2.	Analyse data and generate reports based on the data.

Prior Reading Material/useful links	
1.	https://www.simplilearn.com/learn-data-science-with-r-basics-skillup
2.	https://cdlsiet.ac.in/wp-content/uploads/2023/03/R-Language-Lab-Manual-lab-1.pdf
3.	https://crd230.github.io/lab1.html

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Show the installation of R Programming Environment.
2	CO2	Student will able to Utilize and R Data types for developing programs.
3	CO3	Student will able to Make use of different R Data Structures.
4	CO4	Student will able to Develop programming logic using R Packages.
5	CO5	Student will able to Analyze the datasets using R programming capabilities.

List of Practical's:

	Course Contents	Hours
1	**1. RAS CALCULATOR APPLICATION** a. Using with and without R objects on console b. Using mathematical functions on console c. Write an R script, to create R objects for calculator application and save in a specified location in disk	2
2	**DESCRIPTIVE STATISTICS IN R** a. Write an R script to find basic descriptive statistics using summary, str, quartile function on mtcars& cars datasets.	2

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	b. Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset.	
3	**READING AND WRITING DIFFERENT TYPES OF DATASETS** a. Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location. b. Reading Excel data sheet in R.	2
4	**VISUALIZATIONS** a. Find the data distributions using box and scatter plot. b. Find the outliers using plot. c. Plot the histogram, bar chart and pie chart on sample data.	2
5	**REGRESSION MODEL** Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. Require (foreign), require (MASS).	2
6	**MULTIPLE REGRESSION MODEL** Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset.	2
7	Create a data set and do statistical analysis on the data using R.	2
8	Implement different data structures in R (Vectors, Lists, Data Frames)	2
9	Implement data frames in R. Write a program to join columns and rows in a data frame using cbind() and rbind() in R.	2
10	Create a data set and do statistical analysis on the data using R.	2

	Text Books
1.	Yanchang Zhao, "R and Data Mining: Examples and Case Studies", Elsevier, 1st Edition, 2012
2.	Jared P. Lander, R for Everyone: Advanced Analytics and Graphics, 2 nd Edition, Pearson Education, 2018.
3.	S. R. Mani Sekhar and T. V. Suresh Kumar, Programming with R,1 st Edition,, CENGAGE, 2017.
4.	Data Science and Machine Learning, Mathematical and Statistical Methods, By Dirk P. Kroese, Zdravko Botev, Thomas Taimre, Radislav Vaisman · 2019

	Reference Books
1.	Process Mining, Data Science in Action, By Wil van der Aalst · 2016
2.	R for Data Science, Import, Tidy, Transform, Visualize, and Model Data, By Hadley Wickham, Garrett Grolemund · 2016
3.	R and Data Mining, Examples and Case Studies, By Yanchang Zhao · 2012

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4.	Foundations of Data Science, By Avrim Blum, John Hopcroft, Ravindran Kannan · 2020

Useful Links	
1.	http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/
2.	http://www.ats.ucla.edu/stat/r/dae/rreg.htm
3.	http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html
4.	http://www.ats.ucla.edu/stat/r/data/binary.csv

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Education to Eternity

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7L007	Cyber Security & Cryptography(Lab)	0	0	2	3

Prerequisites for the course	
1.	Study the basics of Cyber Security & Cryptography.
2.	Understand various applications of cryptography and security issues.

Prior Reading Material/useful links	
1.	https://cse29-iiith.vlabs.ac.in/
2.	http://www.anuraghyd.ac.in/cse/wp-content/uploads/sites/10/NS-CRYPTO-LAB-Final11.pdf
3.	https://sriindu.ac.in/wp-content/uploads/2023/02/R18CSE41L1-Crytography-Network-Security-Lab.pdf

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Student will able to Analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.
2	CO2	Student will able to Examine various Security algorithms.
3	CO3	Student will able to Know the methods of conventional encryption
4	CO4	Student will able to Understand various applications of cryptography and security issues practically.
5	CO5	Student will able to Understand the concepts of public key encryption and number theory. CO3:

List of Practical's:

Course Contents		Hours
1	Study of steps to protect your personal computer system by creating User Accounts with Passwords and types of User Accounts for safety and security	2
2	Study the steps to protect a Microsoft Word Document of different version with different operating system.	2
3	Study the steps to remove Passwords from Microsoft Word	2

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4	Study various methods of protecting and securing databases.	2
5	Study "How to make strong passwords" and "passwords cracking techniques"	2
6	Implement RSA Algorithm using HTML and JavaScript	2
7	Implement the Diffie-Hellman Key Exchange algorithm for a given problem.	2
8	Calculate the message digest of a text using the SHA-1 algorithm	2
9	Implement the SIGNATURE SCHEME - Digital Signature Standard	2
10	Apply DES algorithm for practical applications	2

Text Books	
1.	The Network Security Test Lab, A Step-by-Step Guide, By Michael Gregg · 2015
2.	Introduction to Cryptography and Network Security, By Behrouz A. Forouzan · 2008
3.	Lab Manual to Accompany Access Control, Authentication, and Public Key Infrastructure, By Bill Ballad, Tricia Ballad, Erin K. Banks · 2011
4.	Lab Manual for Security+ Guide to Network Security Fundamentals, By Mark Ciampa · 2015

Reference Books	
1.	Introduction to Computer and Network Security, Navigating Shades of Gray By Richard R. Brooks · 2013
2.	Hands-On Information Security Lab Manual By Michael E. Whitman, Herbert J. Mattord · 2010
3.	Cryptography and Steganography. A Multilayer Data Security Approach By Jagdish Chandra Patni, Hitesh Kumar Sharma · 2021
4.	Fundamentals of Cryptography Introducing Mathematical and Algorithmic Foundations, By Duncan Buell · 2021

Useful Links	
1.	https://sriindu.ac.in/wp-content/uploads/2023/02/R18CSE41L1-Crytography-Network-Security-Lab.pdf
2.	https://www.csa.iisc.ac.in/~cris/about.html
3.	https://www.vvitengineering.com/lab/odd/CS6711-Security-Lab-Manual.pdf
4.	https://www.gvpce.ac.in/syllabi/MTech15-16/cyber-security/nsclab.pdf

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7P008	Project Phase I	0	0	6	3

Prerequisites for the course	
1.	Study the new technologies or improving existing ones.
2.	Develop new computational models or simulations that help advance their research.

Prior Reading Material/useful links	
1.	https://www.youtube.com/watch?v=p8e5ZEpRmx0
2.	https://www.youtube.com/watch?v=if_z7pMA85g
3.	https://www.youtube.com/watch?v=V5yv5TNpiLE

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to creation of new technologies or innovations.
2	CO2	Students will able to address complex problems or challenges
3	CO3	Students will able to develop new computational models or simulations that help advance their research.
4	CO4	Students will able to create new products or services that can be commercialized.
5	CO5	Students will able to impact various aspects of society, from improving productivity and efficiency to enhancing user experience and addressing social challenges.

The project should enable the students to combine the theoretical and practical concepts studied in his/her academics. The project work should enable the students to exhibit their ability to work in a team, develop planning and execute skills and perform analyzing and trouble shooting of their respective problem chosen for the project. The students should be able to write technical report, understand the importance of teamwork and group task. The students will get knowledge about literature survey, problem definition, its solution, and method of calculation, trouble shooting, costing, application and scope for future development.

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Project work

The project work is an implementation of learned technology. The knowledge gained by studying various subjects separately supposed to utilize as a single task. A group of 03/04 students will have to work on assigned work. The topic could be a product design, specific equipment, live industrial problem etc. The project work involves experimental/theoretical/computational work. It is expected to do necessary literature survey by referring current journals belonging to Information Technology reference books and internet. After finalization of project, requisites like equipments, data, tools etc. should be arranged.

Project Activity

The project groups should interact with guide, who in turn advises the group to carry various activities regarding project work on individual and group basis. The group should discuss the progress every week in the project hours and follow further advice of the guide to continue progress. Guide should closely monitor the work and help the students from time to time. The guide should also maintain a record of continuous assessment of project work progress on weekly basis.

Phase I

1) Submission of project/problem abstract containing problem in brief, requirements, broad area, applications, approximate expenditure if required etc.
2) Problem definition in detail.
3) Literature survey.
4) Requirement analysis.
5) System analysis (Draw DFD up to level 2, at least).
6) System design, Coding/Implementation (20 to 30%).

Text Books	
1.	Planning and Implementing Your Final Year Project — with Success! By Mikael Berndtsson, Jörgen Hansson, B. Olsson, Björn Lundell · 2013
2.	Computer Science Project Work Principles and Pragmatics By Sally Fincher, Marian Petre, Martyn Clark · 2001
3.	Thesis Projects, A Guide for Students in Computer Science and Information Systems By Mikael Berndtsson · 2008

Reference Books	
1.	SOFTWARE ENGINEERING PROJECT MANAGEMENT By Bill Brykczynski, Richard D. Stutz · 2006

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2.	Software Engineering Body of Knowledge By IEEE Computer Society · 2014
3.	Quality Software Project Management By Robert T. Futrell · 2002

Useful Links	
1.	https://www.google.co.in/books/edition/Project_Summaries/0ggTG_ya8acC?hl=en&gbpv=1&dq=major+project+objective+in+computer+science+engineering&pg=PA78&printsec=frontcover
2.	https://www.google.co.in/books/edition/Real_World_Software_Projects_for_Compute/X6seEAAAQBAJ?hl=en&gbpv=1&dq=major+project+objective+in+computer+science+engineering&printsec=frontcover
3.	https://www.logicraysacademy.com/blog/final-year-projects-for-cse/

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	CS7T009	Research Methodology	2	0	0	Audit

Prerequisites for the course	
1.	Understand and use basic data analysis techniques.
2.	Study the basic data collection methods with emphasis on secondary and survey research.

Prior Reading Material/useful links	
1.	https://mrcet.com/downloads/digital_notes/CSE/Mtech/I%20Year/RESEARCH%20METHODLOGY.pdf
2.	https://ccsuniversity.ac.in/bridgelibrary/pdf/MPhil%20Stats%20Research%20Methodology-Part1.pdf
3.	https://www.drnishikantjha.com/papersCollection/Research%20Methodology%20.pdf

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to Identify a research problem stated in a study
2	CO2	Students will able to Obtain skills to identify a business problem/ need, translate it into a research question, and design an appropriate way to answer it.
3	CO3	Students will able to Develop skills to design a research project and collect data.
4	CO4	Students will able to Develop skills to critically evaluate the quality of other researchers' findings and the process used to obtain them.
5	CO5	Students will able to Identify the overall process of designing a research study from its inception to its report.

Syllabus:

Course Contents		Hours
Unit I	Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research, Review of literatures: Primary source,	

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	Secondary source, Identifying gap areas from literature review, Searching e- resources, using search engines, Searching data base.	
Unit II	Types of Research; Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.	7
Unit III	Research Sampling and Design: Sampling of data: Concept of sampling, Probability sampling techniques , Non probability sampling techniques , Sampling error, Research Design: Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design,	7
Unit IV	Methods, Collection and Analysis of Data: Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation, Application of computer in research data analysis.	8
Unit V	Presentation of Research: Citation Styles- APA, MLA etc., Research ethics and Plagiarism, Indexing of journal and research output, Report writing steps in report writing, layout of report writing, reference and bibliography.	7

Text Books	
1.	Research Methodology, Methods and Techniques by C.R Kothari, 2nd Edition.
2.	Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes. 4.
3.	The Science of Education Research, Eurasia Publishing House, New Delhi by George J. (1964),
4.	Advanced focus Group Research, Sage Publication, India Ltd, New Delhi by Fern Edward F. (2001)

Reference Books	
1.	Research Methodology in Management, Himalaya Publishing House, New Delhi by Michael V.P.
2.	Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
3.	Research Methodology, A Handbook for Beginners, By Pagadala Suganda Devi · 2017
4.	Research Methodology, A Step-by-Step Guide for Beginners, By Ranjit Kumar · 2010

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8th Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit	Teaching Mode
				L	T	P	CA	MSE	ESE	Total		
1	PEC	CS8TE06	Elective –VI	3	0	0	20	20	60	100	3	
2	OEC	CS8O004	Open Elective -4	3	1	0	20	20	60	100	4	
4	PROJECT	CS8P001	Project Phase II	0	0	4	50	0	50	100	3	
				6	**1**	**4**	**90**	**40**	**170**	**300**	**10**	

Elective VI

Course Code	Name of Subject
CS7TE06A	High Performance Computer Architecture
CS7TE06B	Full Stack Development
CS7TE06C	Advanced Software Testing Methodology
CS7TE06D	Advanced Database System

Open Elective-4 : Ethical Hacking

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Program: B.Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VIII	CS8TE06	High Performance Computer Architecture	3	0	0	3

Prerequisites for the course	
1.	Computer Architecture Organization
2.	Data structure & Algorithms
3.	Digital Electronics and Microprocessor

Prior Reading Material/useful links	
1.	https://nptel.ac.in/courses/106105033
2.	https://www.cse.iitd.ac.in/~srsarangi/courses/2021/col_718_2021/index.html
3.	https://www.cse.iitd.ac.in/~srsarangi/courses/2021/col_718_2021/index.html

Course Objectives:

1.	Use their learned skills, knowledge and abilities to develop computer architecture.
2.	Apply basic design principles to present ideas, information, products, and services on Architecture
3.	To learn about basic concepts of pipelining and dynamic Scheduling.
4.	To learn objectives and applications of Memory Hierarchies
5.	Apply basic design principles of Parallel and Scalable Architecture

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to develop computer architecture.
2	CO2	Students will know the basic concepts of parallelism
3	CO3	Students will become familiar with pipelining and hazards in pipeline.
4	CO4	Students will come to Instruction Level Parallelism and Dynamic Scheduling
5	CO5	Students will become familiar with memory hierarchies.

Syllabus:

Course Contents		Hours
Unit I	Theory of Parallelism: Parallel Computer Models, The State of Computing, Multiprocessor and Multicomputer, Multivector and SIMD Computers, PRAM and VLSI Models, Architectural Development Tracks.	7
Unit II	Pipelining, Basic concepts, instruction and arithmetic pipelines, hazards in pipeline: structural, data and control hazards, overview of hazard resolution technique, Dynamic instruction scheduling, branch prediction	7

	techniques, Pipeline optimization techniques.	
Unit III	Instruction Level Parallelism: Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Reducing Branch Costs with Prediction, Dynamic Scheduling: Algorithm, Data level and Thread Level Parallelism.	7
Unit IV	Memory Hierarchies: Basic concept of hierarchical memory organization, Hierarchical memory technology, main memory, Inclusion, Coherence and locality properties, cache memory design and implementation, Techniques for reducing cache misses, RAID.	7
Unit V	Parallel and Scalable Architecture: Multiprocessors and Multicomputer: Multiprocessor System Interconnect, Cache Coherence and synchronization Mechanism, Multivector and SIMD Computers: Vector Processing Principles, Compound Vector Processing	7

Text Books	
1.	John. Hennessy & David A. Patterson, "Computer Archniecture A quantitative approach", 5th Edition, Morgon Kaufmann Publiations.
2.	Kai Hwang and A. Briggs, "Computer Architecture and parallel Processing", International edition McGraw-Hill.
3	Robert D. Kent, Todd W. Sands "High Performance Computing Systems and Applications" Springer US
4	High Performance Computing Systems and ApplicationsBy Jonathan Schaeffer · 2011Springer US

Reference Books	
1.	Kai Hwang and NareshJotwani, "Advanced Computer Architecture: Parallelism, Scalibility and Programmability" 2nd Edition, THM Publications
2.	David A. Kular and Jasvinder Pal Singh, "Parallel Computer Architecture", Morgan Kaufmann Publications.
3	High Performance Embedded Architectures and CompilersFirst International Conference, HiPEAC 2005, Barcelona, Spain, November 17-18, 2005,
4	Introduction to High Performance Computing for Scientists and Engineers By Georg Hager, Gerhard Wellein · 2010CRC Press

Useful Links	
1.	https://www.youtube.com/watch?v=tawb_aeYQ2g
2.	https://www.google.co.in/books/edition/High_Performance_Datacenter_Networks/hddcAQAAQBAJ?hl=en&gbpv=1&dq=high+performance+computer+architecture+book&printsec=frontcover
3.	https://www.google.co.in/books/edition/High_Performance_Embedded_Architectures/Lc8GCAAAQBAJ?hl=en&gbpv=1&dq=high+performance+computer+architecture+book&printsec=frontcover
4.	https://www.google.co.in/books/edition/High_Performance_Computing_Systems_and_A/hDGZ9cB6zrUC?hl=en&gbpv=1&dq=high+performance+computer+architecture+book&printsec=frontcover

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VIII	CS8TE06B	Full Stack Development	3	0	0	3

Prerequisites for the course	
1.	Web Designing (Lab)
2.	Python Programming(Lab)
3.	Advance Java Programming(LAB)

Prior Reading Material/useful links	
1.	https://www.w3schools.com/whatis/whatis_fullstack.asp
2.	https://www.coursera.org/articles/full-stack-developer
3.	https://www.geeksforgeeks.org/what-is-full-stack-development/

Course Objectives:

1.	Use their learned skills, knowledge and abilities to develop web sites for the internet.
2.	Apply basic design principles to present ideas, information, products, and services on Websites.
3.	Apply basic programming principles to the construction of websites.
4.	Effectively manage website projects using available resources.
5.	Create visualizations in accordance with UI/UX theories.

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will develop an understanding of the formalistic (aesthetic) aspects of design and visual communication
2	CO2	Students will demonstrate cross-platform (web, mobile, broadcast, print) storytelling skills.
3	CO3	Students will become familiar with graphic design and/or game theory and be able to apply this theory to real world projects.
4	CO4	Students will develop and understanding of information design and usability as it applies to interactive media projects.
5	CO5	Students will utilize coding and software tools to analyze and present data in a professional manner that could be translated to web-based or app-based media.

Syllabus:

Course Contents		Hours
Unit I	**Basic HTML, Advanced HTML** HTML-Introduction, HTML-Basic Formatting Tags, HTML-Grouping Using Div Span, HTML-Lists, HTML-Images , HTML-Hyperlink, HTML-Table,	7

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	HTML-I frame, HTML-Form, Adding audio, Drag & drop, User location: geo location, Saving,information – local Storage, Saving information–session.	
Unit II	**CSS** What Is CSS? How to write CSS: syntax, Using style sheets, Using external style sheets, Identitiesand classes, Style entire elements, CSS Comments, Change background colors, Setting backgroundimages, Change text color, Text formatting using CSS, Font Properties, Text Properties, Stylinghyperlinks using CSS, Styling lists using CSS, Setting element width and height, Adding borders,	7
Unit III	**Javascript Basics** JavaScript Essentials, What is JavaScript?, JavaScript: Internal vs. External, JavaScript comments,document.write(); Display info from the browser: alert & confirm, Prompting the user for Information, Programming fundamentals: Variables, Add two sentences together: concatenation,String Manipulation, Comparing variables and values, Programming fundamentals: If...ElseStatements, Else...If Statements, Switch Statements, Functions; JavaScript Events, Selecting HTMLElements using getElementById(), Escaping content, Programming fundamentals: Arrays, ForLoops, While Loops, Breaking Out Of Loops, Skipping A Loop Cycle.	8
Unit IV	**ReactJS** Introduction ,Templating using JSX ,Components, State and Props , Lifecycle of Components,State and Props ,Lifecycle of Components ,Rendering List and Portals ,Error Handling ,Routers ,Redux and Redux Saga ,Immutable.js , Service Side Rendering ,Unit Testing , Webpack .	7
Unit V	**PHP** Overview Of PHP, Basic Scripting and Looping Constructs Conditional Constructs, Modularity through Include Files, PHP Operators, PHP Functions, New Features, Arrays in PHP,Basic OOP in PHP,Writing OOP PHP	7

Text Books	
1.	Web Development for beginners: Learn HTML/CSS/Javascript step by step with this Coding uide, Programming Guide for beginners, Website development, White Belt Mastery, ISBN9781667003771.
2.	The Road to React: Your journey to master React.js in JavaScript (2021 Edition), Kindle Edition.
3.	Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5, Publisher Shroff Publishers & Distributers, ISBN-13 978-9352130153
4.	Full Stack Web Development For BeginnersLearn Ecommerce Web Development Using HTML5, CSS3, Bootstrap, JavaScript, MySQL, and PHP

Reference Books	
1.	Mastering Html, Css&Javascript Web Publishing , BPB Publications , ISBN-13 978-8183335157
2.	A Complete Overview On: Web-development, Notion Press, ISBN-13978-1685098407.

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3	Full Stack Development with JHipsterBuild Full Stack Applications and Microservices with Spring Boot and Modern JavaScript Frameworks, 2nd EditionBy Deepu K Sasidharan, Sendil Kumar N · 2020
4	Full Stack JavaScript Development With MEANMongoDB, Express, AngularJS, and Node.JSBy Colin J Ihrig, Adam Bretz · 2014

Useful Links	
1.	https://www.google.co.in/books/edition/Hands_On_Full_Stack_Development_with_Go/HHWPDwAAQBAJ?hl=en&gbpv=1&dq=Full+Stack+Development+book&printsec=frontcover
2.	https://www.google.co.in/books/edition/Modern_Full_Stack_Development/XLfZDwAAQBAJ?hl=en&gbpv=1&dq=Full+Stack+Development+book&printsec=frontcover
3.	https://www.youtube.com/watch?v=nu_pCVPKzTk
4.	https://careerfoundry.com/en/blog/web-development/what-is-a-full-stack-web-developer/

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VIII	CS8TE06C	Advance Software Testing Methodology	3	0	0	3

Prerequisites for the course	
1.	Computer Architecture Organization
2.	Advanced Computer Vision
3.	Software Engineering

Prior Reading Material/useful links	
1.	https://www.techtarget.com/whatis/definition/software-testing
2.	https://reqtest.com/testing-blog/advanced-software-testing-techniques/
3.	https://stackify.com/best-software-testing-methods/

Course Objectives:

1.	Ability to understand and use regression testing techniques.
2.	Ability to understand and use mutation testing techniques.
3.	Ability to understand and use automated oracle generation techniques.
4.	Gaining confidence in and providing information about the level of quality.
5.	To make sure that the end result meets the business and user requirements.

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to understand software testing and verification concepts.
2	CO2	Students will able to understand and apply test adequacy measurements.
3	CO3	Students will able to understand and use automated test generation techniques.
4	CO4	Students will able to use various source code or bytecodeanlaysis tools/frameworks.
5	CO5	Students will able to understand and apply automated debugging and repair techniques.

Syllabus:

Course Contents		Hours
Unit I	**Testing Process** Introduction, Test Planning, Monitoring, and Control– Test Analysis, Test Design:- Test Implementation, Test Execution, Evaluating Exit Criteria and Reporting, Test Closure Activities.	7

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Unit II	**Test Management in Context** Risk-Based Testing and Other Approaches for Test Prioritization and Effort Allocation, Test Documentation and Other Work Products, Test Estimation, Defining and Using Test Metrics. Business Value of Testing, Distributed, Outsourced, and Insourced Testing, Managing the Application of Industry Standards.	7
Unit III	**Reviews & Defect Management** Introduction Reviews ,vulnerabilities in Management Reviews and Audits, Managing Reviews, Metrics for Reviews, Introduction Defect Management ,The Defect Lifecycle and the Software Development Lifecycle, Defect Report Information, Assessing Process Capability with Defect Report Information.	7
Unit IV	**Improving the Testing Process** Introduction, Test Improvement Process, Improving the Testing Process, Improving the Testing Process with TMMi Improving the Testing Process with TPI Next, Improving the Testing Process with CTP, Improving the Testing Process with STEP	7
Unit V	**Test Tools and Automation Testing Tools :**Introduction, Tool Selection, . Tool Lifecycle, Tool Metrics, Automation testing Tools :-Selenium WebDriver Tools ,QTP/UFT, Load Runner & QC AutoIT, Rest Assured Framework, ,Agile Scrum Methodology, AppiumDriver. Framework TestNG ,POM.	8

	Text Books
1.	Advanced Software Testing - Vol. 2, 2nd Edition, 2nd Edition.
2.	Learning Path Learn Selenium , O'Reilly Media, INC.
3	Guide to Advanced Software TestingBy Anne MetteJonassen Hass · 2008, Artech House
4	Advanced Software Testing - Vol. 2, 2nd EditionGuide to the ISTQB Advanced Certification As an Advanced Test ManagerBy Rex Black · 2014

	Reference Books
1.	Paul C. Jorgensen, Software Testing: A Craftsman"s Approach, 3rd Edition, CRC Press, 2007.
2.	Boris Beizer, Software Testing Techniques, Dreamtech, 2009
3.	Advanced Software Testing – Vol.1, 2nd EditionGuide to the ISTQB Advanced Certification as an Advanced Test AnalystBy Rex Black · 2015
4.	Advanced Automated Software TestingFrameworks for Refined PracticeBy IzzatAlsmadi · 2012

	Useful Links
1.	https://www.youtube.com/watch?v=6rNgPXz9A9s
2.	https://www.youtube.com/watch?v=SpFY3360Wuc
3.	https://www.softwaretestinghelp.com/software-development-testing-methodologies/
4.	https://stackify.com/best-software-testing-methods/

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Semester	Course Code	Name of the course	L	T	P	Credits
VIII	CS8TE06D	Advance Database System	3	0	0	3

Prerequisites for the course	
1.	Database Management Systems
2.	Database Management Systems (Lab)

Prior Reading Material/useful links	
1.	https://ecomputernotes.com/database-system/adv-database
2.	https://www.business.rutgers.edu/sites/default/files/documents/phd-syllabus-advanced-database-systems.pdf
3.	https://learn.saylor.org/course/view.php?id=91

Course Objectives:

1.	To explain basic Advance database concepts, applications, data models, features.
2.	To demonstrate the use of NoSQL Database & Types.
3.	To Describe the basics of Advance database and construct queries .
4.	To emphasize the importance of Big Data.
5.	To facilitate students in Advance Database design.

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to Apply the basic concepts of Advance Database Systems and Applications.
2	CO2	Students will able to Use of the Advance database and construct queries using SQL in database creation and interaction
3	CO3	Students will able to Describe Apache Cassandra InterfacesAnalyse and techniques of Cassandra Command Line Interface.
4	CO4	Students will able to Apply the basic concepts of Basic operations with MongoDB shell.
5	CO5	Students will able to implement integration of security and recovery in database systems;

Syllabus:

Course Contents		Hours
Unit I	**Introduction to ADBS** Introduction to Advanced Database , Comparision of DBMS & ADBMS, DBMS Advanced Features and Distributes Database (Query Processing and Evaluation, Transaction Management and Recovery, Database Security and Authorisation, Distributed Databases), Types of ADBS (Network database Systems, Object-Oriented Database Systems, Hierarchical Database Systems)	6

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Unit II	**NoSQL database concepts** Differentiate SQL and NoSQL databases. Types of NoSQL databases, NoSQL data modeling, Benefits of NoSQL, comparision between SQL and NoSQL database system. Use NoSQL database to solve given queries.NoSQL using MongoDB: Introduction to MongoDB Shell, Running the MongoDB shell, MongoDB client, Basic operations with MongoDB shell,	8
Unit III	**Big Data** Overview of Big Data and NoSQL Database: The 3 Vs. of Big Data, Data Evolution ,Features of Big Data ,Big Data-Use Cases , Big Data Analytics, Traditional Technology vs. Big Data Technology,ApacheHadoop , HDFS, Map Reduce , NoSQL Databases, Approaches to NoSQL Databases-Types	7
Unit IV	**Apache Cassandra** Introduction to Apache Cassandra: Characteristics, History of Cassandra, Features of Cassandra ,When is Cassandra Used ? , Simple Cassandra Program, Cassandra Command Line Interface, Advantages of Cassandra, Limitations of Cassandra.	7
Unit V	**Apache Cassandra Interfaces** Cassandra supports Cassandra Query Language or CQL, DDL and DML Statements ,DML Statements – COPY Apache Cassandra Interfaces :Cassandra Interfaces , Cassandra Command Line Interface ,Cqlsh Options ,Cqlsh Commands ,Cqlsh Shell Commands , Querying Cassandra	8

Text Books	
1.	Mastering Apache Cassandra - Second Edition by NishantNeeraj (Author)
2.	Henry Korth, Abraham Silberschatz& S. Sudarshan, *Database System Concepts*, McGraw-Hill Publication, 6th Edition, 2011
3.	Learning Apache Cassandra - Second Edition by SandeepYarabarlaReleased April 2017 Publisher(s): Packt Publishing ISBN: 9781787127296
4.	Advanced Database SystemsBy Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T. Snodgrass, V.S. Subrahmanian, Roberto Zicari · 1997

Reference Books	
1.	Mastering Apache Cassandra 3.x: An expert guide to improving database scalability and availability without compromising performance, 3rd Edition
2.	Joel Murach, Murach's Oracle SQL and PL/SQL *for Developers,* Mike Murach&Associates, 2nd Edition, 2014.
3.	Wiederhold, *Database Design*, McGraw-Hill Publication, 2nd Edition, 1983.
4.	Advanced Database Systems, By Nabil R. Adam, Bharat K. Bhargava · 1993, Springer

Useful Links	
1.	https://www.google.co.in/books/edition/Database_Systems_The_Complete_Book/-5mqs4hQIBcC?hl=en&gbpv=1&dq=Advance+Database+System&printsec=frontcover
2.	https://www.youtube.com/watch?v=hKljaVcCMgg
3.	https://www.youtube.com/watch?v=poEfLYH9W2M
4.	https://www.youtube.com/watch?v=m72mt4VN9ik

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VIII	IT8P002	Major Project	0	0	4	4
Prerequisites for the course						
1.	Mini Project					

Prior Reading Material/useful links	
1.	https://www.youtube.com/watch?v=p8e5ZEpRmx0
2.	https://www.youtube.com/watch?v=if_z7pMA85g
3.	https://www.youtube.com/watch?v=V5yv5TNpiLE

Course Objectives:

1.	To Developing new technologies or improving existing ones
2.	To Solving complex problems
3.	To Enhancing human-computer interaction.
4.	To Advancing scientific research.
5.	To Creating new business opportunities.

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to creation of new technologies or innovations.
2	CO2	Students will able to address complex problems or challenges
3	CO3	Students will able to develop new computational models or simulations that help advance their research.
4	CO4	Students will able to create new products or services that can be commercialized.
5	CO5	Students will able to impact various aspects of society, from improving productivity and efficiency to enhancing user experience and addressing social challenges.

This is continuous work to the project phase I. Every students will have to submit a completed report (3 copies)* of the project work. Report preparation guidelines should be followed as per given format. The students will prepare a power point presentation of the work. Panel of examiners comprising of guide, internal examiner, senior faculty, external examiner, etc. will assess the performance of the students considering their quality of work.

Phase II
1. Coding/Implementation.
2. Use cases.
3. Testing/Trouble shooting.
4. Data dictionary/ Documentation.

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5. Finalization of project in all respect.
6. *(For guide, Personal copy, Departmental library.)
7. In a presentation, the students should focus to clarify problem definition and analysis of the problem.

Text Books	
1.	Planning and Implementing Your Final Year Project — with Success!By Mikael Berndtsson, Jörgen Hansson, B. Olsson, BjörnLundell · 2013
2.	Computer Science Project WorkPrinciples and PragmaticsBy Sally Fincher, Marian Petre, Martyn Clark · 2001
3.	Thesis Projects, A Guide for Students in Computer Science and Information Systems By Mikael Berndtsson · 2008

Reference Books	
1.	SOFTWARE ENGINEERING PROJECT MANAGEMENTBy Bill Brykczynski, Richard D. Stutz · 2006
2.	Software Engineering Body of KnowledgeBy IEEE Computer Society · 2014
3.	Quality Software Project ManagementBy Robert T. Futrell · 2002

Useful Links	
1.	https://www.google.co.in/books/edition/Project_Summaries/0ggTG_ya8acC?hl=en&gbpv=1&dq=major+project+objective+in+computer+science+engineering&pg=PA78&printsec=frontcover
2.	https://www.google.co.in/books/edition/Real_World_Software_Projects_for_Compute/X6seEAAAQBAJ?hl=en&gbpv=1&dq=major+project+objective+in+computer+science+engineering&printsec=frontcover
3.	https://www.logicraysacademy.com/blog/final-year-projects-for-cse/

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SESSION 2020-24

3rd Semester Artificial Intelligence

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	HSMC	AI3T001	Organization Behaviour	2	0	0	20	20	60	100	2
2	HSMC	AI3T002	Universal Human Values	2	1	0	20	20	60	100	3
3	BSC	AI3T003	Mathematics-III	3	1	0	20	20	60	100	4
4	ESC	AI3T004	Statistical Data Analysis	3	0	0	20	20	60	100	3
5	PCC	AI3T005	Computer Architecture and Organisation	3	0	0	20	20	60	100	3
6	PCC	AI3T006	Internet of Things	2	1	0	20	20	60	100	3
7	PCC	AI3T007	Data Structure & Algorithm	2	1	0	20	20	60	100	3
8	ESC	AI3L008	Introduction to IoT (Lab)	0	0	2	60	0	40	100	1
9	ESC	AI3L009	DSA (Lab)	0	0	2	60	0	40	100	1
10	ESC	AI3L010	Data Analytics (Lab)	0	0	2	60	0	40	100	1
				17	**4**	**6**	**320**	**140**	**540**	**1000**	**24**

4th Semester Artificial Intelligence

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PCC	AI4T001	Theory of Computation	2	1	0	20	20	60	100	3
2	PCC	AI4T002	Design & Analysis of Algorithm	2	1	0	20	20	60	100	3
3	PCC	AI4T003	Operating System & Virtualization	3	0	0	20	20	60	100	3
4	PCC	AI4T004	Neural Networks & Fuzzy System	3	0	0	20	20	60	100	3
5	PCC	AI4T005	Discrete Mathematics & Graph Structures	3	0	0	20	20	60	100	3
6	PCC	AI4T006	Database Management Systems	3	0	0	20	20	60	100	3
7	PCC	AI4L007	Introduction to Robotics-(Lab)	0	0	2	60	0	40	100	1
8	PCC	AI4L008	Neural Networks & Fuzzy System (Lab)	0	0	2	60	0	40	100	1
9	PCC	AI4L009	DBMS-(Lab)	0	0	2	60	0	40	100	1
10	MC	AI4T010	Consumer Affairs	2	0	0	10	15	25	50	Audit
11	PROJECT	AI4P011	Field Training (Project)	0	0	0	30	0	20	50	1
				18	**2**	**6**	**340**	**135**	**525**	**1000**	**22**

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Program: B.Tech. in Artificial Intelligence

Semester	Course Code	Name of the course	L	T	P	Credits
V	AI5P008	Field Training/ Industrial Visit	0	0	2	1

Prerequisites for the course	
1.	Understand the visiting companies shall be relevant and suitable ones to the specialization and academic requirements.
2	Learning Important tool for attracting investment and technology.

Prior Reading Material/useful links	
1.	https://www.quora.com/What-are-some-good-places-for-an-industrial-trip-of-CSE-students
2.	https://www.suas.ac.in/industrial-visit-for-computer-science-and-information-technology-5th-sem-students/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to functional opportunity in different sectors.
2	CO2	Students will able to helps to combine theoretical knowledge with industrial knowledge.
3	CO3	Students will able to provide an insight into the real working environment,
4	CO4	Students will able to get to learn a lot of things that will help in their development and also for the future.
5	CO5	Students will able to acquire and apply fundamental principles of science and engineering.

Industrial visits are an integral part of Engineering and acknowledgement of technology upgrades. The purpose of industrial visits for students is to provide technical knowledge with the technological development in the industry and to understand the gap between theoretical and practical knowledge that could be passed in future.

This experience can help students to provide information regarding the functioning of various industries and associated problems and limitations.

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5th Semester Artificial Intelligence

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PCC	AI5T001	AI & Cognitive Robotics	3	0	0	20	20	60	100	3
2	PCC	AI5T002	Digital Image Techniques and Analysis	2	1	0	20	20	60	100	3
3	PCC	AI5T003	Machine Learning & Deep Learning	2	1	0	20	20	60	100	3
4	PCC	AI5O001	Open Elective -I	3	0	0	20	20	60	100	3
5	PEC	AI5TE01	Elective -I	3	0	0	20	20	60	100	3
6	PCC	AI5L004	Machine Learning & Deep Learning (Lab)	0	0	2	60	0	40	100	1
7	PCC	AI5L005	Digital Image Techniques and Analysis (Lab)	0	0	2	60	0	40	100	1
8	PCC	AI5L006	AI & Cognitive Robotics (Lab)	0	0	2	60	0	40	100	1
9	PROJECT	AI5P007	Mini Project	0	0	2	0	0	50	50	1
10	PROJECT	AI5P008	Industrial Visit	0	0	0	30	0	20	50	1
10	IED	AI5T008	Innovation and Enterprenership Development	2	0	0	10	15	25	50	Audit
				15	**2**	**8**	**290**	**115**	**495**	**900**	**21**

Open Elective 1: Ethics in IT

6th Semester Artificial Intelligence

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PCC	AI6T001	Advanced Computer Vision	2	1	0	20	20	60	100	3
2	ESC	AI6T002	Data Science	2	1	0	20	20	60	100	3
3	PEC	AI6TE02	Elective -II	3	0	0	20	20	60	100	3
4	PEC	AI6TE03	Elective-III	3	0	0	20	20	60	100	3
5	OEC	AI6O002	Open Elective-II	3	1	0	20	20	60	100	4
6	PCC	AI6L003	Data Science Using R -Lab	0	0	2	60	0	40	100	1
7	PCC	AI6L004	Advanced Computer Vision (Lab)	0	0	2	60	0	40	100	1
8	PCC	AI6L005	Big Data Tools & Techniques(LAB)	0	0	2	60	0	40	100	1
9	PROJECT	AI6P006	Mini Project	0	0	2	25	0	25	50	1
10	PROJECT	AI6P007	CRT(Campus Recruitment Traini	0	0	2	60	0	40	100	1
11	PROJECT	AI6P008	Skill Development	0	0	2	15	0	35	50	1
10	IPR	AI6T007	Intellectual Property Rights	2	0	0	10	15	25	50	Audit
				15	**3**	**12**	**390**	**115**	**545**	**1050**	**22**

Open Elective 2: Object Oriented Methodology

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Semester	Course Code	Name of the course	L	T	P	Credits
5th	AI3T008	Innovation and Entrepreneurship Development	2	0	0	2

Prerequisite for the course	
1	Business Communication

Prior Reading Material/ weblinks	
1	https://www.nextiva.com/blog/what-is-business-communication.html

Course Outcomes:
Students will be able to:

Sr.No.	Course outcome number	COutcomes
1	CO1	To gain an expansive and deep appreciation of entrepreneurship and its pivotal role in the economy.
2	CO2	To approach entrepreneurship with clarity and focus, and an enhanced understanding of the key success factors as well as possible risks and potential mitigation strategies.
3	CO3	To navigate the opportunities and challenges of entrepreneurship more effectively with the additional insights available.
4	CO4	To evaluate the key factors needed to develop a successful business
5	CO5	To recognize the value of problem-solving, effective business management

Syllabus:

Course Contents	
Unit I	Entrepreneurial Journey, Entrepreneurial Discovery, Ideation, and Prototyping [4hrs]
Unit II	Testing, Validation, and Commercialization, Disruption as a Success Driver, Technological Innovation and Entrepreneurship – 1, Technological Innovation and Entrepreneurship – 2 [6 hrs]
Unit III	Raising Financial Resources, Education and Entrepreneurship, Beyond Founders and Founder-Families [4 hrs]
Unit IV	India as a Start-up Nation, National Entrepreneurial Culture [4 hrs]
Unit V	Entrepreneurial Thermodynamics, Entrepreneurship and Employment,Start-up Case Studies. [6 hrs]
Text Books	
1	Innovation and Entrepreneurship: Practice and Principles by Peter F Drucker
2	The Innovator's Solution: Creating and Sustaining Successful Growth by Clayton M Christensen
Reference Books	
1	Zero to One: Notes on Startups, or How the Build the Future by Peter Thiel
2	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses by Eric Ries
Useful links	
1	https://www.lakeforest.edu/academics/majors-and-minors/entrepreneurship-and-innovation/student-learning-
2	https://www.indeed.com/career-advice/career-development/innovative-

CS6P007	Campus Recruitment Training	1 Credit

About CRT Training Campus Recruitment training (CRT) at is designed to aid candidates in their preparation for Recruitment through Campuses or outside campuses (i.e On campus or off campus). Students in their final step of graduation looking for placement in reputed organizations can make use of this training to get trained to deliver their best in the selection processes of organizations.

COURSE OBJECTIVES

1. To enhance the problem solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of campus recruitment drive.
2. To groom the students to the corporate level
3. To ensure that all eligible students are employed by the end of the final year of study.

COURSE OUTCOMES

At the end of the course students will be able to

1. Solve the problems easily by using Short-cut method with time management which will be helpful to them to clear the competitive exams for better job opportunity.
2. Analyze the Problems logically and approach the problems in a different manner.
3. Students will be able to apply mathematical analysis of data to make connections, draw conclusions and solve problems.
4. Students will learn a series of techniques through practical activities to develop presenting skills and enhance confidence to expand the potential of the individual.
5. Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity.
6. Students demonstrate an ability to target the resume to the presenting purpose
7. Demonstrate professional behavior(s) including preparedness, professional attire, and respectful presentation during interviews.

PART I: - QUANTITATIVE ABILITY

Unit 1: - 03 hrs

Speed Maths Calculation, Number Systems, Ratio & Proportion, Percentage

Unit 2: - 03 hrs

Profit – Loss & Discount, Simple Interest & Compound Interest, Simple Equation and Age's

Unit 3:- 03 hrs

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FOUNDATIONS OF CRYPTOGRAPHY

PROF. ASHISH CHOUDHURY
Department of Computer Science
IIIT Bangalore

TYPE OF COURSE : Rerun | Elective | UG/PG
COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 23 Apr 2022

PRE-REQUISITES : There are no pre-requisites for this course. However it is expected that the students who are interested to take this course have had some exposure to a basic course on discrete mathematics, algorithms, or theory of computation.

INTENDED AUDIENCE : Computer Science and Mathematics students

INDUSTRIES APPLICABLE TO : The course will be relevant for any IT related company

COURSE OUTLINE :
The course provides the basic paradigm and principles of modern cryptography. The focus of this course will be on definitions and constructions of various cryptographic objects. We will try to understand what security properties are desirable in such objects, how to formally define these properties, and how to design objects that satisfy the definitions. The aim is that at the end of this course, the students are able to understand a significant portion of current cryptography research papers and standards.

ABOUT INSTRUCTOR :
Prof. Ashish Choudhury is currently an Assistant Professor at IIIT Bangalore. He did his MS and PhD in Computer science from IIT Madras, followed by postdoc at ISI Kolkata and University of Bristol. His research work is focused on the foundation of cryptographic protocols for real-world problems. His current projects aim to design efficient protocols in the asynchronous network model which can be realized in practice.

COURSE PLAN :

Week 1: Course Overview, Symmetric-key Encryption, Historical Ciphers

Week 2: Computational Security, Semantic Security and Pseudorandom Generators (PRGs)

Week 3: Stream Ciphers, Provably-secure Instantiation of PRG, Practical Instantiation of PRG

Week 4: CPA-Secure Ciphers from PRF, Modes of Operations of Block Ciphers

Week 5: DES, AES and Message Authentication Codes (MAC)

Week 6: Information-theoretic Secure MAC, Cryptographic Hash Functions

Week 7: Birthday Attacks on Cryptographic Hash Functions, Applications of Hash Functions

Week 8: Generic Constructions of Authenticated Encryption Schemes

Week 9: Discrete-Logarithm Problem, Computational Diffie-Hellman Problem, Decisional Diffie-Hellman Problem, Elliptic-Curve Based Cryptography and Public-Key Encryption

Week 10: El Gamal Encryption Scheme, RSA Assumption

Week 11: CCA -secure Public-key Hybrid Ciphers Based on Diffie-Hellman Problems and RSA-assumption, Digital Signatures

Week 12: Schnorr Signature, Overview of TLS/SSL, Number Theory, Interactive Protocols and Farewell

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PRIVACY AND SECURITY IN ONLINE SOCIAL MEDIA

PROF. PONNURANGAM KUMARAGURU

Department of Computer Science and Engineering

IIIT Hyderabad

PRE-REQUISITES : Basic / Intermediate programming course. Understanding of Python will be necessary for the course. Should be able to quickly learn APIs, and to collect data from social networks.

INTENDED AUDIENCE : Interested stundents

INDUSTRIES APPLICABLE TO : Any company which is interested in social media / networks data will be interested in recruiting the students finishing the course.

COURSE OUTLINE :

With increase in the usage of the Internet, there has been an exponential increase in the use of online social media and networks on the Internet. Websites like Facebook, YouTube, LinkedIn, Twitter, Flickr, Instagram, Google+, FourSquare, Pinterest, Tinder, and the likes have changed the way the Internet is being used. However, widely used, there is a lack of understanding of privacy and security issues on online social media. Privacy and security of online social media need to be investigated, studied and characterized from various perspectives (computational, cultural, psychological, etc.). Student completing the course will be able to appreciate various privacy and security concerns (spam, phishing, fraud nodes, identity theft) on Online Social Media and Student will be able to clearly articulate one or two concerns comprehensively on one Online Social Media, this will be achieved by homework.

ABOUT INSTRUCTOR :

Prof.Ponnurangam Kumaraguru ("PK") is a Professor of Computer Science at IIIT-Hyderabad. He is a Visiting Faculty at IIT Kanpur and an Adjunct faculty at IIIT Delhi. PK is an ACM India Council Member, and Chair of the Publicity & Membership Committee of ACM India. PK is a TEDx and an ACM Distinguished & ACM India Eminent Speaker. PK received his Ph.D. from the School of Computer Science at Carnegie Mellon University (CMU). His Ph.D. thesis work on anti-phishing research at CMU contributed in creating an award-winning startup - Wombat Security Technologies, wombatsecurity.com. Wombat was acquired in March 2018 for USD 225 Million. PK was listed in the World's 2% Scientists by Stanford University in Nov 2020. He is a senate member of IIIT Una, and is on various Board of Studies / Academic Council of different institutes across the country. PK has been teaching on NPTEL for the last 5 years, with great feedback from students. He has co-authored research papers in the field of Privacy and Security in Online Social Media, Cyber Security, Computational Social Science, Social Computing, Data Science for Social Good, amongst others. PK's research work regularly gets featured on news media, including print, online, and TV within India and across the world; to list a few, BBC, CBC, CBS, CNN, Doordarshan, Economic Times, Indian Express, NBC, New Scientist, NewYorker, Reuters, Times of India, USA Today, Washington Post, and many more. PK Spear heads ACM India's programs on improving the quality of PhD students in Computing in India -- PhDClinic & Anveshan Setu Fellowship. In his Dean's role at IITD, he managed a team of 15 faculty members and 10+ admin staff, including Associate Dean of Student Affairs, overseeing hostel, sports centre, health centre, student {well-being, clubs, mentorship program}, technical & cultural fests. He was the Founding Head of Cybersecurity Education and Research Centre (CERC) at IIIT-Delhi. PK started and successfully manages PreCog (precog.iiitd.edu.in), a research group at IIIT-Delhi and IIIT Hyderabad. In addition to his contributions to academia, PK is on advisory role on various government organizations, government committees, including a 8 member committee on Non-Personal Data by Government of India, chaired by Mr. Kris Gopalakrishnan.

COURSE PLAN :

Week 1: What is Online Social Networks, data collection from social networks, challenges, opportunities, and pitfalls in online social networks, APIs
Week 2: Collecting data from Online Social Media.
Week 3: Trust, credibility, and reputations in social systems
Week 4: Trust, credibility, and reputations in social systems, cont'd
Week 5: Online social Media and Policing
Week 6: Information privacy disclosure, revelation and its effects in OSM and online social networks
Week 7: Phishing in OSM & Identifying fraudulent entities in online social networks
Week 8: Refresher for all topics
Week 9 to 12 : Research paper discussion

Chairman
BOS (IT)
JDCOEM, Nagpur

DATA ANALYTICS WITH PYTHON

PROF. A RAMESH
Department of Management Studies
IIT Roorkee

TYPE OF COURSE : Rerun | Elective | UG/PG
COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 23 Apr 2022

INTENDED AUDIENCE : Management, Industrial Engineering and Computer Science Engineering Students
INDUSTRIES APPLICABLE TO : Any analytics company

COURSE OUTLINE :
This course includes examples of analytics in a wide variety of industries, and we hope that students will learn how one can use analytics in their career and life. One of the most important aspects of this course is that hands-on experience creating analytics models will be shared.

ABOUT INSTRUCTOR :
Prof. Ramesh Anbanandam graduated in Production Engineering from Madras University, Chennai. He did his post-graduation from National Institute of Technology, Trichy. He later earned his Ph.D. in Supply Chain Management from Indian Institute of Technology Delhi. His professional interest includes Humanitarian Supply Chain Management, Operations Management, Operations Research, Healthcare Waste Management, Sustainable Multi-model and Freight Transportation, Transportation Asset Management and Advanced Data Analytics using Python and R-programming. He has published various research articles in reputed journals. He was also awarded Emerald Literati Award for Excellence under "Highly Commended Research Paper in the Year 2011 and 2016" in the field of Supply Chain Management.

COURSE PLAN :

Week 1: Introduction to data analytics and Python fundamentals

Week 2: Introduction to probability

Week 3: Sampling and sampling distributions

Week 4: Hypothesis testing

Week 5: Two sample testing and introduction to ANOVA

Week 6: Two way ANOVA and linear regression

Week 7: Linear regression and multiple regression

Week 8: Concepts of MLE and Logistic regression

Week 9: ROC and Regression Analysis Model Building

Week 10: c^2 Test and introduction to cluster analysis

Week 11: Clustering analysis

Week 12: Classification and Regression Trees (CART)

Chairman
BOS (IT)
COEM, Nagpur

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VISION

To be a recognized as an Excellent Innovative Engineering Department through Academic Programme which develops leaders in Education and Research in Computer Science."

MISSION

1. To create self-learning environment by facilitating leadership qualities, team-spirit and ethical responsibilities.
2. To Strengthen department-industry collaboration and interaction with professional society through technical knowledge and internship program.
3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

Date: 19/07/2023

Details of MOUs

Sr. No.	Name of Industry	Name of the contact person	Address	Mobile No.
1	Atulya Shiksha Foundation	Mr. Shrirang Pande, Director	Behind Janki Tawkis, Mouje Square, Sitaburdi, Nagpur.440012	8275299182 pandeyleena2014@gmail.com
2	Risewell Cyber Security Solutions Pvt. Ltd	Mrs. Leena Pandey, Manager, Narayana IAS Academy, Nagpur.	Plot No. 14, Flat No. 202, Shantikunj Niwas, Next to Pariwar Cilty Collection, Ring zroad, Trimurti Nagar, Nagpur-440022	9405168986, 7020299872 Risewellcyber@rediffmail.com
3	Tars Technologies Pvt. Ltd, Nagpur	Mr. Amol Rangari, Center Head	181, Gotmare Complex, Giripeth, Near Venus Book Depo, Dharampeth, Nagpur, Maharashtra 440010	8975474788, 9112117415 info@tarstechnologies.com
4	Vasinev Gaming Solutions Pvt. Ltd.	Dr. Shrividhya Srinivasan	766, Shakthi Tower 1 Anna Salai, thousand lights, Chennai, TN 600002	8939375523 ssividhya@vasinevgaming.com

Dr. Supriya S. Sawwashere
HOD CSE, JDCOEM

HOD
Computer Science & Engineering
JDCOEM, Nagpur

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।।ज्ञानम् सर्वार्थ साधनम्।।

MINUTES OF MEETING FOR 7TH BOARD OF STUDIES (EE) MEETING NO. BOS/EE/07/2022-23 — 23/12/2022

Venue: Classroom VS-003

The 7th meeting of the Board of Studies (Electrical) was held on **22nd December 2022** at **11:00 a.m.** in classroom VS-003. Following members of the Board of Studies were present in the meeting.

Sr.No	Name of the member
1	Dr. V.S. Dhok (Chairperson)
2	Er.Ashok Kale (External Expert)
3	Dr.Nitin Ghawghawe (Internal Expert)
4	Dr.Vinod Chandrakar (External Expert)
5	Dr. S.R.Vaishnav
6	Prof. P.P. Panchbhai
7	Prof. A.V. Joshi(Member Secretary)
8	Prof. P.V. Ambade
9	Prof. M.S.Isasare
10	Prof.Tuba Khan
11	Prof.A.W.Male
12	Prof.P.P.Barekar

Item No. 1	**Confirmation of the previous BOS meeting, Inclusion and Confirmation of new members**

The Member Secretary welcomed the Chairperson of Board of Studies Dr.V.S.Dhok, External Expert Mr.Ashok Kale, Internal Expert Dr. N.D. Ghawghawe & all members of BOS. The Secretary presented Agenda of the meeting and requested the Chairman to convene the meeting.

The Chairman summarized the MOM of previous BOS meeting held on 23/03/2022 and confirmation on it was taken. Few old BOS members were removed and new BOS members were included.

Item No. 2	Presentation of Action Taken report for last previous meeting held on 23/03/2022

The Secretary of BOS presented the Action taken report for the previous meeting held on 23/03/2022 and discussed it in front of the members.

Item No. 3	Revision of Scheme & Revision of the syllabus for Open Elective Subject-Electrical AUTOCAD

Scheme of was revised with minor changes and approved in BOS. Syllabus of open Elective subject 'Electrical AUTOCAD' offered by EE department was revised and approved. Following were the suggestions by experts:

1. Mr.Ashok Kale sir suggested that the syllabus of Power Electronics Lab should include topics like heat dissipation of MOSFET which can give practical exposure of subject to students.
2. Mr.Ashok Kale sir suggested that the subject related to Graph study and analysis should be taught in the curriculum.
3. Dr.N.D.Ghawghawe sir suggested that the subject Electrical AutoCAD should be renamed as Basic AutoCAD.

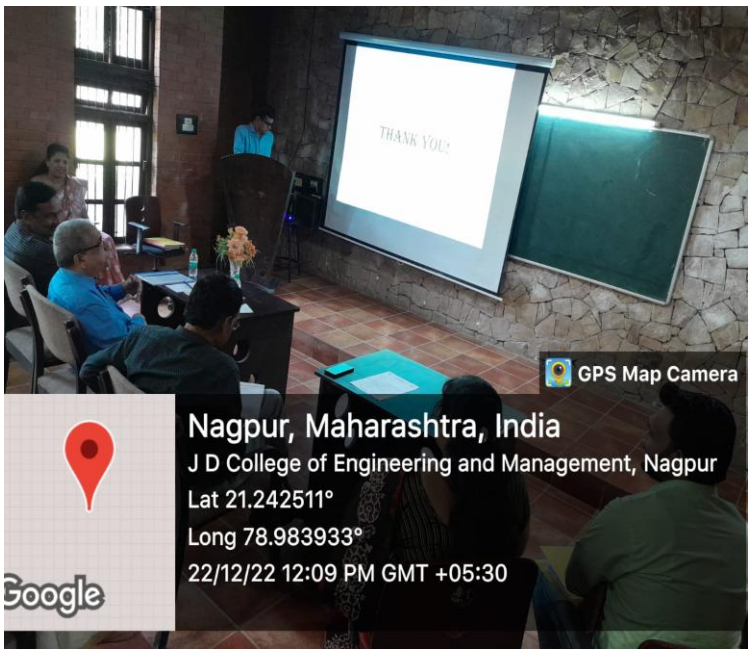
Item No. 4	MOOC Guidelines & Inclusion of MOOC in 4^{th} and 8^{th} Sem & Discussion on 8^{th} Sem Internship

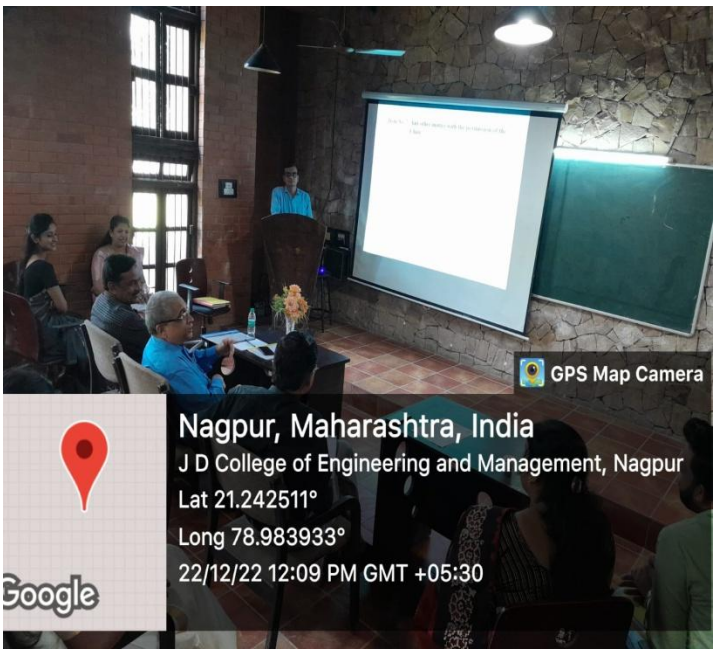
MOOC Guidelines were discussed, their inclusion in 4^{th} and 8^{th} sem was approved by BoS and valuable suggestions of experts on 8^{th} sem internship were taken. Following were the suggestions by experts:

1. Mr.Ashok Kale sir suggested that student should be classified as
    - Going for PSU with valid gate score.
    - Software and IT Companies
    - Core Companies
    - Going for start ups and should be train according to that.
2. Mr.Ashok Kale sir suggested that the companies selected for internship should not have turn over more than 3-4 crores.

Item No. 5	Any other matter with the permission of the Chair.

The meeting Concluded with the vote of thanks by Prof.Ankita Male.





Mr. A.V.Joshi,
Member Secretary, Board of Studies,
Dept. of Electrical. Engg.
JDCOEM, Nagpur.

Dr. V.S.Dhok
Chairperson, Board of Studies
Dept. of Electrical. Engg.
JDCOEM, Nagpur

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AY-2022-23

VISION	MISSION
"To develop competent and committed Electrical Engineers to serve the society"	1. To impart quality education in the field of Electrical Engineering. 2. To be excellent learning center through research and industry interaction.

Action Taken Report

Sr.no	Item	Suggestion	Action Taken
01	**Revision of Scheme & Revision of the syllabus for Open Elective Subject-Electrical AUTOCAD**	Mr.Ashok Kale sir suggested that the syllabus of Power Electronics Lab should include topics like heat dissipation of MOSFET which can give practical exposure of subject to students.	The syllabus of Power Electronics includes the topics like heat dissipation in Switching devices.
		Mr.Ashok Kale sir suggested that the subject related to Graph study and analysis should be taught in the curriculum.	The subject Numerical methods and probability already includes Graph study and analysis.
		Dr.N.D.Ghawghawe sir suggested that the subject Electrical AutoCAD should be renamed as Basic AutoCAD.	Subject Electrical AutoCAD was renamed as Basic AutoCAD.
02	**MOOC Guidelines & Inclusion of MOOC in 4th and 8th Sem & Discussion on 8th Sem Internship**	Mr.Ashok Kale sir suggested that student should be classified as • Going for PSU with valid gate score. • Software and IT Companies • Core Companies • Going for start ups and they should be train according to that.	Students were bifurcated as per suggestion by the expert & they are provided training and internship according to their choice.
		Mr.Ashok Kale sir suggested that the companies selected for internship should not have turn over more than 3-4 crores.	As per suggestion by the expert the mentioned criteria is being considered by the department for sending students for internship.

Prof. A. V.Joshi
Member Secretary
Board of Studies, EE Dept

Dr.V.S.Dhok
Chairperson
Board of Studies, EE Dept

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REVISED SYLLABUS

EE5T001	Power Electronics	3 Credit

PRE REQUISITES: Electronic Devices And Circuits

COURSE OBJECTIVES:

1 .To review principle of construction, operation and characteristics of basic

Semiconductor devices.

2. To understand and analyze performance of controlled and uncontrolled converters.

3. To understand and analyze performance of DC to DC converters. Dc to AC converters.

4 .To understand and analyze performance of AC voltage controllers.

COURSE OUTCOME:

CO1: To remember the principle of operation of various basic semiconductor devices

CO2: To understand the characteristics of various types of semiconductor device and its working as converters.

CO3: To make use of various semiconductor device for the converters operation under various load types.

CO4: Examine the performance of various types of converters.

CO5: Compare various types of converters based on performance parameter.

CO6: Todesign the converters based on real time industrial applications.

SYLLABUS:

Unit I: Power semiconductor devices & their characteristics (6 Hrs)

SCR, TRIAC, DIAC-construction, characteristics & applications, turning ON-OFF SCR, turn ON mechanism, different methods of turning ON-OFF SCR, series and parallel connections of SCRs, Protection of SCR gate circuit protection

Unit II : Turn on and Turn off circuits for power semiconductor devices (6Hrs)

Introduction to GTO, power MOSFET & IGBT & their construction &characteristics. Triggering circuits and optocouplers and Pulse transformer. Heat dissipation in Switching Devices.

Introduction to types of power electronic circuits: diode rectifiers, AC-DC converters, AC-AC converters, DC-DC converters, DC-AC converters

Unit III: Diode Rectifiers and AC-DC converters (7Hrs)

Diode Rectifiers: Single phase half wave, full wave rectifiers with R and RL load, Three phase bridge rectifier with R and RL load.

Controlled Rectifiers: Principle of phase controlled rectification, single phase semi and full converter with R and RL load, power factor improvement in controlled rectifiers, three phase semi and full converter with R and RL load. (Only descriptive approach)

Unit IV: DC-AC converters(6 Hrs)

Classification , series inverter, improved series inverteroutput voltagecontrol, principle of operation for three phase bridge inverter in 120 deg. and 180 deg. mode, single phase bridge inverter.

Unit V: DC-DC converters (7Hrs)

Basic principles of chopper, time ratio control and current limit control techniques, voltage commutated chopper ckt, step-up chopper, step-down chopper

Unit VI: AC voltage controllers (AC-AC converters) (7Hrs)

Principle of on-off control, principle of phase control in single phase and three phase circuits, Cycloconverters: single phase cycloconverter operation, three phase cycloconverter operation.

Text Books

1. Rashid M. H – Power Electronics circuits, devices and applications-(New Delhi Pearson

Education).

Reference Books

1. Murthi.V. R- Power Electonics Devices, circuits and Industrial Applications.(Oxford).

2. Bimbhra.P. S- Power Electronics.(Khanna Publication).

Prof. A. V.Joshi
Member Secretary
Board of Studies, EE Dept

Dr.V.S.Dhok
Chairperson
Board of Studies, EE Dept

EE4T002	Numerical method and probability	Credit 3

Course Outcome

1. Define approximation and errors in numerical differentiation and Integration.
2. Evaluate the roots of the equation using Bracketing methods: Bisection methods, Open methods: Newton Raphson method
3. Apply the Cramer's rule, Gauss- Elimination Method, pivoting, scaling, Heun's method, Runge–Kutta Method,to engineering problem.
4. Analyze the question Newton's Cotes Integration Formulas: Trapezoidal Rule, Simpson's rule, engineering applications Numerical differentiation using Finite divide Difference method.
5. Compute the linear and non linear equation, regression, Interpolation and ordinary differential equation using MATLAB programming
6. Develop computer program for linear and non linear equation.

Course Contents:

Unit 1: Error Analysis [08 Hours]

Significant figures, round-off, precision and accuracy, approximate and true error, truncation error and Taylor series, machine epsilon, data uncertainties, error propagation, importance of errors in computer programming.

Unit 2: Roots of Equations [06 Hours]

Motivation, Bracketing methods: Bisection methods, Open methods: Newton Raphson method, Engineering applications.

Unit 3: Numerical Solution of Algebraic Equations [07 Hours] :

Cramer's rule, Gauss- Elimination Method, pivoting, scaling, engineering applications, Heun's method, Runge–Kutta Method, engineering applications.

Unit 4: Numerical Integration and Differentiation [06 Hours]

Motivation, Newton's Cotes Integration Formulas: Trapezoidal Rule, Simpson's rule, engineering applications Numerical differentiation using Finite divide Difference method

Unit 5: Curve Fitting and Interpolation [08 Hours]

Motivation, Least Square Regression: Linear Regression, Polynomial regression. Interpolation: Newton's Divide Difference interpolation, engineering applications.Motivation, Euler's and Modified Euler's Method.

Unit 6: Introduction to MATLAB Programming : [07 Hours]

Array operations ,Loops and execution control lecture ,working with file: Scripts and function ,Plotting and program output. Overview of programming language, Algorithms and Flowchart of method based on each unit,Development of at least one computer program based on each unit.

Texts:

1. Steven C Chapra, Reymond P. Canale, "Numerical Methods for Engineers", TataMcGraw Hill Publications, 2010.
2. E.Balagurusamy, "Numerical Methods", TataMcGraw Hill Publications,1999.

References:

1. V. Rajaraman, "Fundamental of Computers", Prentice Hall of India,NewDelhi,2003.
2. S. S. Sastri,"IntroductoryMethodsofNumericalMethods",PrenticeHallofIndia,NewDelhi, 3 rdedition,2003. 3. K. E. Atkinson, "An Introduction to Numerical Analysis",Wiley,1978.
4. M.J. Maron, "Numerical Analysis: A Practical Approach", Macmillan, New York, 1982

Prof. A. V.Joshi
Member Secretary
Board of Studies, EE Dept

Dr.V.S.Dhok
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Board of Studies, EE Dept

EE6O002	Open Elective II-Basic AutoCAD	4 Credit

PRE REQUISITES: A working knowledge of the AutoCAD® software and electrical terminology**.**

COURSE OBJECTIVES:

The objective of the course is to prepare the students:

1. Learn the basic commands necessary to utilize the AutoCAD software.
2. Learn the basic symbols for the creation of electrical drawings, consistent with industry standards and codes.
3. Create computer generated schematics and electrical drawings.

COURSE OUTCOME:

At the completion of this course, students will be able to:

- Understand the concept and techniques of Engineering drawing and become familiar with the AutoCAD user interface.
- Apply basic CAD concepts to develop and construct accurate 2D geometry through creation of basic geometric constructions.
- Create advanced drafting and modifying tools in AutoCAD
- Apply elements of drafting such as layers, dimensions, hatching, annotation, drawing formats, and 2D figures in projects with a focus on ANSI industry standards.
- Create blocks and attributes in AutoCAD

UNIT I An introduction to Engineering Drawings and AutoCAD (10 hrs)

- Introduction to Engineering Drawing
- Various types of Engineering Drawing used in Electrical Industry
- Introduction to AutoCAD
- Exploring GUI
- Workspaces
- Coordinate System
- Display Control
- File Management
- Tutorials

UNIT 2 Drafting Basic Geometry Shapes in AUTOCAD (10 hrs)

- Basic Geometry Shapes
- Setting the standards

- Drafting setting
- Drawing tools for basic geometry
- Modify tools
- Object Properties
- Tutorials

Unit 3 Advanced Drafting and Modifying Tools in AutoCAD (12 hrs)

- Drawing Tools
- Advanced Modification Tools
- Project and View
- Tutorials

Unit 4 Layer Management, Hatching and Annotations (12 hrs)

- About Layers
- Introduction to Hatching
- Isometric Drawing
- Introduction to Dimensions
- Various Dimensions creation and Editing Methods
- Other Commands related to dimensioning
- Leader
- Text Annotations
- Dimension Style Manager
- Tutorials

Unit 5 Application of Blocks and Attributes (12 hrs)

- Introduction to Blocks
- Dynamic Blocks
- Attributes
- Tutorials on creating blocks

Text Books

1. AutoCAD: A Visual Approach 2D Basics, Steven Foster, Autodesk Press, 1997.
2. Concurrent Engineering Design: Three-Dimensional Modeling, Analysis, and
3. Manufacturing Workshop for Lower Division College Faculty, Ronald Barr and DavorJurisic, University of Texas Press, 1996.

Reference Books

1. Engineering Drawing and Graphic Technology, T. French, C. Vierck, and R. Foster,McGraw-Hill, Inc., 1993.
2. Technical Drafting, C. Sshumann, Harper and Bros, Inc., New York, 1961.

3. AutoCAD 14 for Engineering Drawing by P. NageshwaraRao, Tata McGraw Hill Publication.

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AUTONOMOUS SYLLABUS SCHEME

VII Semester

Sr. No.	Subject Category	Subject Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
				L	T	P	CA	MSE	ESE	TOTAL	
1	PCC-EE	EE7T001	Switch gear and protection	3	0	0	20	20	60	100	3
2	PCC-EE	EE7T002	High Voltage Engineering	3	0	0	20	20	60	100	3
3	PEC-EE	EE7E005	**Elective V**	3	0	0	20	20	60	100	3
4	OEC-EE	EE7O003	**Open Elective III**	4	0	0	20	20	60	100	4
5	PCC-EE	EE7L001	Switch gear and protection Lab	0	0	2	60	0	40	100	1
6	PCC-EE	EE7L002	High Voltage Engineering Lab	0	0	2	60	0	40	100	1
7	PROJ-EE	EE7P006	Project-I	0	0	10	0	0	50	50	5
8	MC	EE7T003	Intellectual Property Rights	2	0	0	10	15	25	50	Audit
				15	**0**	**14**	**210**	**95**	**395**	**700**	
								Total Credits			**20**

VIII Semester

Sr. No.	Subject Category	Subject Code	Course Title	Teaching Scheme			Evaluation Scheme				Credits
				L	T	P	CA	MSE	ESE	TOTAL	
1	PEC-EE	EE8E006	Elective VI	3	0	0	20	20	60	100	3
	OEC-EE	EE8O004	Open Elective IV	4	0	0	20	20	60	100	4
	PROJ-EE	EE8P007	Project-II	0	0	6	0	0	100	100	3
OR											
2	PROJ-EE	EE8P008	Internship(6 months)	0	0	0	0	0	0	20	10
				7	**0**	**6**	**40**	**40**	**220**	**320**	
								Total Credits			**10**

Professional Electives

Elective V	A.Advance Concepts in solar Cells	B.FACTS	C.Utilization of electrical energy and traction	D.Power system dynamics and control
Elective VI	A.Introduction to Green Energy	B.Digital Signal Processing	C.Electrical Vehicles	D.Power Quality

Open Electives

Open Elective III	A.Wind and Hydro Power Systems	B.Industrial Electrical Systems
Open Elective IV	A.Automation with PLC	B.Solar PV Systems Engineering

EE7T001	Switch Gear And Protection	3 Credit

COURSE OBJECTIVES:

1. To become aware with the theory and applications of the main components used in power system protection..
2. Understand principles of protective relaying and circuit breaker
3. Understand the protection systems used for electric machines, transformers, bus bars, transmission lines..
4. To design the feasible protection systems needed for each main part of a power system.

COURSE OUTCOMES:

Students should be able to

CO1: Remember basic features of protection system and its components.

CO2: Select the different components of protection system such as CT, PT, circuit breakers, relays etc.

CO3: Apply principles of overcurrent relaying and achieve relay coordination for low and medium voltage distribution feeders.

CO4:Apply distance relaying techniques to High Voltage Transmission lines.

CO5:Design protection schemes for equipment such as transformers, generators, motors etc.

CO6:Solve different problems related to relay, circuit breaker and equipment protection.

Unit I: Fundamentals of Protection System and Protective Relaying (7Hrs)

Need of protection, protection principles,desirable attributes of protection,Faults, Primary & backup protection, Instrument transformers, basic trip circuit.

Classification of relays, Review of electromechanical relays, induction relays, Setting characteristics of over current; directional, differential, percentage differential and distance (impedance, reactance, mho) relays, numerical, introduction to static relays, advantages & disadvantages.

Unit II: Over Current Protection and Fault Analysis (7Hrs)

Review of calculation of fault currents, C. B. selection, fuse protection, over current protection, PSM and TMS setting, phase relay coordination, earth fault protection using over current relays, introduction to directional over-current relays.,Numerical overcurrent relays.

Unit III: Transmission Line Protection (7Hrs)

Over current relaying, directional- over current relay, Protective zones, Distance protection,setting and coordination of distance relays,pilot protection with distance relays,Numerical distance relays,carrier distance Schemes, Unit carrier schemes.

Unit IV: Equipment Protection (6 Hrs)

Protection of generator, transformer and bus Bars by differential relaying and other relays,restricted earth fault protection, incipient faults, Buchholz relay,Protection of Induction Motors against overloads, short circuits, thermal relays.

Unit V: Circuit Breakers **(6 Hrs)**

arc voltage, arc interruption, resistance switching, interruption of capacitive and inductive current, transient recovery voltage (TRV), circuit breaker ratings, classification of C.B.s - air break, air blast, vacuum, minimum oil and bulk oil, SF6 C.B. L.T. switchgear: - MCB, MCCB, HRC fuses, type construction and application.

Text Books

1. Fundamentals of power system protection by Y. G. Paithankar, S. R. Bhide., Prentice hall, India, second edition, 2010.".
2. Power System Protection and Switchgear- Badri Ram, Vishwakarma, McGraw Hill
3. Power System Protection and Switchgear-B. Ravindranath and M Chander,Wiley Eastern Ltd, New Delhi.

Reference Books

1. Switchgear protection and power system by Sunil S. Rao, Khanna Publishers, 13th edition, 2008..
2. Power System Relaying: Stanley H Horowitz, A G Phadke; Willey

EE7L001	**Switch Gear And Protection Lab**	**1 Credit**

List of Practical:-

1. To study different types of relay
2. To study and plot magnetisation characteristics of CT
3. To study various types of fuses and plot inverse time characteristic of HRC and Kit-Kat fuse.
4. To demonstrate the operation of various MCBs, ELCBs, MCCBs and plot inverse time characteristics of MCBs
5. To study and plot inverse, very inverse and definite time characteristics of over current relay.
6. To study and plot characteristics of impedance relay.
7. To study operation of static definite under voltage and over voltage relay
8. To study differential relay.
9. To study operation of static definite reverse power relay.
10. To Perform the Protection of Three Phase Induction Motor.
11. To study different circuit breaker.
12.

EE7T002	**High Voltage Engineering**	**3 Credit**

COURSE OBJECTIVES:

The objective of the course is to prepare the students:
1. To make students understand the breakdown mechanisms in dielectrics.
2. To make students know about overvoltage phenomenon in the power system, their protection insulation coordination.
3. To introduce students with the high voltage and high current generation and measurement techniques for testing purpose.

4. To familiarize students with the non destructive and high voltage testing of electrical equipment.

COURSE OUTCOME:

Upon the completion of this course, students will be able to understand:

1. The proper insulating medium / system; based on the insulation strength of the material for applying to high voltage systems.
2. Over voltage phenomenon in power system with protection and insulation coordination.
3. Generation & measurement techniques of high voltage and current for testing purpose.
4. HV tests carry out on various equipments e. g. Cables, CBs, Insulators etc, using relevant testing IS and be able to give analysis of the test results.

Unit - I

Breakdown in Gases: (06 hrs)

Breakdown in Uniform gap, non-uniform gaps, Ionization processes in gaseous dielectrics, Townsend's criterion for break-down, break-down in electro-negative gases, time lag for break-down, Streamer theory of break-down in gases, Paschen's law, break-down in non-uniform fields, practical considerations in using gases for insulation purpose; break-down in vacuum, Corona discharge

Unit II (06 hrs)

Breakdown in liquid and solid Insulating materials:

Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

Unit – III (07 hrs)

Lightning and Switching Over Voltages : Lightning mechanism, types of lightning strokes, parameter and characteristics of lightning strokes, protection of power system against lightning over voltages, types of lightning arresters, surge absorbers; types of switching over voltages and their causes, protection against switching over voltages; Insulation coordination, BIL and SIL.

Unit – IV (07 hrs)

Generation of High Voltage and Currents : Generation of high D.C. voltage by rectifier, voltage doublers and multiplier circuit, generation of high AC voltage by cascade transformers, resonant transformer; generation of high frequency AC high voltage; impulse waveform, generation of impulse voltage, tripping and control of impulse generator; generation of switching surges; generation of impulse current.

Unit – V (07 hrs)

Measurement of High Voltage and Current : Measurement of high AC and DC voltages by micro ammeter, generating voltmeters, resistance and capacitance potential divider, series impedance voltmeter, CVT, magnetic type potential transformers, electrostatic voltmeter, peak reading AC voltmeters, sphere gap arrangement; measurement of impulse voltage by potential dividers and peak reading voltmeters; measurement of high AC, DC and impulse currents.

Unit – VI (07 hrs)

Non-destructive Testing: Significance of non-destructive testing, measurement of DC resistivity, measurement of dielectric constant and loss-factor, partial discharge phenomenon and measurement, discharge detection in power cables.

High Voltage Testing of Electrical Apparatus : Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators, bushings, isolators, circuit breakers, cables, transformers, lightning arresters and power capacitors.

Text Books

1. High Voltage Engineering by M. S. Naidu, V. Kamaraju, Tata McGraw Hill Publication Co. Ltd New Delhi, 2013, ISBN-978-1-25-906289-6
2. High Voltage Engineering by C. L. Wadhwa, New Age International Publishers Ltd.
3. High Voltage Engineering by Prof. D. V. Razevig Translated from Russian by Dr.M. P. Chourasia Khanna Publishers, New Delhi.

Reference Books

1. High Voltage Engineering Fundamentals by E. Kuffel, W. S. Zaengl, J. Kuffel Newnes Publication, ISBN-0-7506-3634-3
2. High Voltage and Electrical Insulation Engineering by Ravindra Arora, Wolf Gang Mosch New Age International Publishers Ltd. Wiley Eastern Ltd., ISBN-978-0-470-60961-3
3. Various IS standards for HV Laboratory Techniques and Testing
4. Fundamentals of High Voltage Engineering: S. K. Singh, Dhanpatrai & Co.

EE7L002	High Voltage Engineering Lab	1 Credit

List of Practical:-

1. Study of Faraday Cage for HV labs.
2. To study standard HV Laboratory layout.
3. To study the use of Sphere gap as a Voltmeter for measurement of High Voltages.
4. To measure the dielectric Strength of transformer oil.
5. To measure the breakdown strength of various solid dielectrics.
6. To perform High voltage withstand test on Cables/ Safety gloves/ Safety shoes etc.
7. To study Horn-gap and Rod Gap surge diverter.
8. To study Impulse generator.
9. Measurement audible and visible corona inception and extinction voltage.
10. Study of Effect of EHV field on Human, Animals & Plants

(Minimum ten experiments out of the above mentioned list to be performed)

EE7E005(A)	Advance Concepts in solar Cells	3 Credit

PRE REQUISITES: (If required)

COURSE OBJECTIVES:

The course focuses on Advance Concepts in solar Cells

COURSE OUTCOME:

CO1. To remember a basics of solar power generation from PV panels and
CO2. To understand the exposure to different cell technologies
CO3. To utilize knowledge of manufacturing processes of various types of solar cell.
CO4. Analyse Solar module manufacturing process in detail
CO5. Explain an exposure to advanced cell technology and usage of different materials.

Unit - I **(7Hrs)**

Introduction : Basics of solar cell; Intrinsic, extrinsic and compound semiconductor; Energy levels; Electrical conductivity; Determination of Fermi energy level; Probability of occupation of allowed states; Dynamics of energy density of allowed states; Density of electrons and holes. Carrier transport: Drift, diffusion, continuity equations; Absorption of light; Recombination process; Basic equations of semiconductor devices physics.

Unit – II **(8 Hrs)**

Solar Cell Physics: pn junction: homo and hetro junctions, Metal semiconductor interface; Dark and illumination characteristics; Figure of merits of solar cell; Variation of efficiency with band-gap and temperature; Spectral response of solar cell, parasitic resistance effect, Working and Efficiency limits: Thermodynamic limit and detailed balance limit of solar cell.

Unit – III **(8Hrs)**

Silicon; Physical and chemical properties relevant to photovoltaic. Preparation of Metallurgical; Refining, Casting and crushing. Preparation of semiconductor grade silicon (Polysilicon); Siemens process, Union Carbide Process. Solar grade Silicon; Crystallization, Simplification and Polysilicon method. Growth of single crystal Silicon: Czokralski (CZ) and Float Zone (FZ) method, Multicrystalline Silicon; Ingot fabrication, Doping, Crystal defect, Impurities. Wafering; Multiwire and microscopic process, Saw damage, Description and manufacturing technology.

Unit – IV **(8Hrs)**

Solar PV Cell and modules: Cell structure, Front and back surface, optical properties of solar Cell, Different losses and mitigation, Anti reflective coating; properties and materials, Surface passivation with back surface, Passivation with Hydrogen, Optical confinement. The layers of PV modules, Cell matrix, Lamination and curing, Encapsulation and framing, Testing, Electrical and thermal properties, Module mismatching, Shading and hot-spot formation, Environmental effect on PV module performance.

Unit – V **(8Hrs)**

High efficiency III-V, II-VI multi-junction solar cell; Photo conversion efficiency, Theoretical limits, spectral splitting, Cell configuration; Four-terminal, three terminal voltage-matched interconnections, two terminal series-connected. Current and voltage characteristics, efficiency and band gap. Deposition of GaAs, GaInP, Ge cells. Amorphous Silicon-based solar cell; fabrication techniques and material properties. Staebler- Wronski effect. Module manufacturing; Using different substrate, safety and cost.

Dye-sensitized solar cells; Introduction, fabrication and development..

Text Books

1 Solar Photovoltaics: Fundamentals, Technologies and Applications, C. S. Solanki, Prentice Hall of India, 2011.
2. S. P. Sukhatme "Solar Energy,-Principles of Thermal Collection & Storage", TMHPublishing Co., New Delhi.

EE7E005(B)	Flexible AC Transmission Systems	3 Credit

PRE REQUISITES: (If required)

COURSE OBJECTIVES:

1. To understand the importance of FACTS controllers
2. To understand the application of FACTS devices.
3. To investigate the key concepts of FACTS devices.
4. To enable students solve problems in the power system using FACTS controllers.

COURSE OUTCOME:

Upon completion of this course ,student should be able to

1. Remember basic principles of operation of various types of compensators used for VAR generation in the power systems.
2. Understand the problems and constraints related with stability of large interconnected systems and to study their solutions using different FACTS controllers
3. To identify the different issues related to the stability, active and reactive power control in power systems..
4. Analyse the operation, characteristics and working of different FACTS controllers.
5. Evaluate the operation, characteristics and working of different FACTS controllers.
6. Solve the different problems related to controlling the various parameters of transmission lines using different types of FACTS controllers.

Unit I: FACTS concept and general system consideration: (7 Hrs)

Transmission interconnection, flow of power in an AC System, factors affecting the loading capacity, power flow and dynamic stability consideration of transmission interconnection, relative importance of controllable parameters, facts controller.

Unit II: Static shunt compensators: SVC And STATCOM: (6 Hrs)

Objective of shunt compensation, midpoint voltage regulation voltage instability prevention, improvement of transient stability. Power oscillation damping methods of controllable Var Generation, static Var compensators SVC And STATCOM,Comparison between STATCOM and SVC,Static VAR System

Unit III: Static Series Compensators: GCS, TSSC,TCSC and SSSC (7 Hrs)

Objective of series compensation, improvement of transient stability, power oscillation damping, Variable impedance type series compensators, Switching Converter type series Compensators (only SSSC) , external (System) control for series reactive compensators. Application of SSSC in load Flow and transient stability studies.

Unit IV: Static Voltage and phase angle regulators: TCVR and TCPAR (6 Hrs)

Objective of voltage and phase angle regulators, approaches to thyristor controlled voltage and phase angle regulators (TCVR and TCPARs),switching converter-based,voltage and phase angle regulator, hybrid phase angle regulators.

Unit V: Combined Compensators (UPFC,IPFC) and special purpose Facts controllers (6 Hrs)

The UPFC, operating principal V-I characteristics UPFC principal of operation modes of operation application.NGH-SSR damping scheme,Thyristor –controlled braking Resistor(TCBR).

Text Books

1. Understanding FACTS, Naryan G. Hingorani and Laszlo Gyugyi (Standard Publishers).
2. Flexible AC Transmission System (FACTS) by K.R.Padiyar(New Age Publications)

Reference Books

1. Flexible AC Transmission System (FACTS)'Yong Hua Song and Johns (IEEE Publishers).
2. Thyristor Based FACTS controllers for Electrical Transmission System R. Mohan Mathur and Rajiv K. Verma (IEEE Press)

EE7E005(C)	**Utilization of Electrical Energy and Traction**	**3 Credit**

COURSE OBJECTIVES:

1. To understand the basic principle of electrical heating, welding,
2. To understand the concepts of illumination, fans and pumps
3. To understand the concepts of compressors and DG sets
4. To understand the basic principle of electrical traction

COURSE OUTCOME:

CO1: Remember the types of electrical heating and welding processes
CO2: Understand concepts of illumination in indoor and factory lighting systems
CO3: Apply energy saving measures in pumping systems and DG sets
CO4: Analyze the characteristics of DC and AC traction motor
CO5: Evaluate the performance of lighting systems and compressors
CO6: Discuss methods of control and braking in electric traction

Unit I : Electric Heating (6Hrs)

i) Electric Heating : Types and methods of electrical heating, advantages of electrically produced heat, types & application of electric heating equipments, transfer of heat. ii) Resistance Ovens : General constructions, design of heating elements, efficiency & losses, radiant heating. iii) Induction heating: Core type & core less induction furnace, indirect induction oven, medium and high frequency eddy - current heating. iv) Dielectric heating: Principle and application. v) Arc furnace : Direct & indirect arc furnace, power supply, characteristics & control.

Unit II : Electric Welding (6 hrs)

i) Importance, Advantages & Disadvantages of welding, classification of welding processes. ii) Resistance welding, Butt welding, Spot welding, Projection welding, Seam welding. iii) Electric arc welding: Carbon arc welding, metal arc welding, submerged arc welding, Stainless Steel welding iv) Ultrasonic welding, electron beam welding, laser beam welding.

Unit III : Illumination (7 hrs)

Nature of light, terms used in illumination, solid angle, laws of illumination, polar curves, Colour Rendering Index (CRI), Design of illumination systems, indoor lighting systems, factory lighting, outdoor lighting design, flood lighting, street lighting, energy saving in lighting systems.

Unit IV : Fans and Pumps (7 hrs)

Fans and Blowers: Fan types, fan performance evaluation & efficient system operation, fan design & selection criteria, flow control strategies, fan performance assessment, energy saving

opportunities. Pumps: Pump types, system characteristics. Pump curves, factors affecting pump performance, efficient pumping system operation, flow control strategies, energy conservation opportunities in pumping system.

Unit V : Compressors and DG sets (7 hrs)

Compressors: Compressor types, Compressor efficiency, Compressed air system components. Diesel Generating Systems: Introduction, selection and installation factors, operational factors, energy performance assessment in DG sets, energy saving measures for DG sets.

Unit VI : Electrical Traction (7 hrs)

System of traction, System of Track electrification, Running Characteristics of DC and AC traction motor. Control of motor: Tapped field control, Rheostatic control, Series parallel control, Metadyne control. Braking : Regenerative Braking, Braking with 1-phase series motor, Magnetic Braking. Speed- Time curve for train movement, crest speed, average speed and schedule speed, simplified speed-time curve.

Text Books

- Utilization of Electric Power & Electric Traction by J. B. Gupta, Kataria& Sons
- Utilization of Electrical Power by R. K. Rajput, Laxmi Publications Pvt. Ltd.

Reference Books

- Utilization of Electrical Power by Dr. N. Suryanarayan, Wiley Eastern Ltd, Age International
- Utilization of Electrical Energy by E.Openshaw Taylor, Orient Longman

EE7E005(D)	Power system dynamics and control	3 Credit

COURSE OUTCOME:

Student should be able to

CO1. To remember basic concepts of power system stability,operationand control

CO2. To understand concepts of power system stability, operation andcontrol

CO3. To apply knowledge of active and reactive power control, synchronous machine modeling, excitation system in any power system CO4. To examine power system stability and control its variables underdifferent operating conditions.

CO5. To justify about system stability and its controlling operations

CO6. To modify any system for its stable operation

Unit - I (6 Hrs)

Concept of Power system stability, Types of stability, Classical model of single machine connected to infinite bus and a multi machine system, mathematical modeling of power system elements for stability studies.

Unit - II (7 Hrs)

Small Signal Analysis, Fundamental concepts of Stability of Dynamic Systems, Small Signal Stability of Single Machine Infinite Bus(SMlB) System, Effects on Excitation system,Block diagram representation with exciter and AVR, Power System Stabiliser (PSS), State matrix including PSS, Small Signal Stability of Multi Machine Systems.

Unit – III (7 Hrs)

Rotor angle stability, classical method of rotor angle stability, equal area criteria for SMIB system, two machine systems, Numerical solution of swing equation, Multi-machine stability, factor affecting transient stability.

Unit - IV (7 Hrs)

Voltage stability & Voltage Collapse, Reactive power and voltage control, Voltage stability analysis, different criteria for voltage stability.

Unit – V **(7 Hrs)**

Unit Commitment Constraints in unit commitment – Spinning reserve – Thermal unit constraints – Other constraints – Solution using Priority List method, Dynamic programming method - Forward DP approach Lagrangian relaxation method – adjusting .

Unit VI **(6 Hrs)**

Economic Dispatch Control Incremental cost curve- co-ordination equations with loss included (No derivation of Bmn coefficient) solution of co- ordination equations using Bmn co-efficient by iteration method Base point & participation factors.

Textbooks:

1. Power System Stability and Control by P.Kundur , EPRI Publications, California
2. Power System Operation and Control by A.J Wood and B.F Wollenberg, John Wiley and Sons

Reference Books:

1. Power System Dynamics: K R Padiyar, B.S. Publishers, 2003, 2nd Edition.
2. Power system Stability and Control: P Kundur, , McGraw-Hill Inc., 1994
3. Power System Dynamics and Stability: P W Sauer & M A Pai, Pearson, 2003

EE7T003	Intellectual Property Rights	Audit

Course Objectives:

1. To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
2. To disseminate knowledge on patents, patent regime in India and abroad and registration Aspects
3. To disseminate knowledge on copyrights and its related rights and registration aspects
4. To aware about current trends in IPR and Govt. steps in fostering IPR

Course Outcome:

CO1: To provide an understanding of the law relating to Intellectual Property and Competition in India.
CO2: To understand the concept of Intellectual Property and Intellectual Property Rights with special reference to India.
CO3: To appreciate the significance of Intellectual Property in modern times, in the light of its international legal regime.
CO4: To study the important Agreements, Treaties and Conventions relating to Intellectual Property Rights.
CO5: To understand the intricacies of grant of Patent, Patentability, Licensing and Revocation at National and International levels.

Course Contents:

UNIT1: Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad Function of IPR. Public good, Incentive theory, different forms of IPR, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.
UNIT 2: Practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad .Introduction to competition Law, Anti-competitive agreements, Abuse of dominance, Regulation of combinations,

UNIT3: International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT 4: The relationship and Interaction between IPR and competition law The economics of US Anti trust law, IP and competition issues, Technology transfer agreements. The EU experience with IP and Competition Law

UNIT5: Market allocation, Horizontal agreements, Vertical agreements, licensing issues. Indian Competition Act and IPR protection. Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

Text Books:

1. Fundamentals ofIP for Engineers: K.Bansl & P.Bansal
2. Intellectual property right, Deborah, E. BoDcboux, Cengage leam'ng.
3. Inrelletul property right - Unleasbing the knowledgeconomy, Pmbuddha Ganguli, Tata Mccraw HiU Publishing Company Ltd.

Reference Books:

1. Eleclronic resource guide ERc published online by the American Society of Intellectual Propery Rights md Develolment Policy: Repod of rhe
2. Commission on Inrellectual Prcperty Ridls, London Sepiedber 2002

EE8E006(A)	Introduction to Green Energy	3 Credit

COURSE OBJECTIVES:

1. To understand the basic principle of solar photovoltaic cells
2. To understand the concepts of green composites
3. To understand the concepts of wind energy conversion systems
4. To understand the basic principle nuclear fission and geothermal energy

COURSE OUTCOME:

CO1: Remember the types of solar cells and geothermal energy sites
CO2: Understand concepts of wind energy conversion system
CO3: Apply green building measures for energy management
CO4: Analyze the characteristics of wind energy conversion systems
CO5: Evaluate the energy demand and renewable energy potential
CO6: Discuss concepts of energy generation using hydro power and geothermal energy.

Unit I **(8 Hrs)**

Energy sources: Introduction to nexus between Energy, Environment and Sustainable Development; Energy transformation from source to services; Energy sources, sun as the sourceof energy; biological processes; photosynthesis; food chains, classification of energy sources,quality and concentration of energy sources; fossil fuel reserves - estimates, duration; theory ofrenewability, renewable resources; overview of global/ India's energy scenario.

Unit II **(8 Hrs)**

Solar Energy:

Basic theory of flat plate collectors, solar heating of buildings, solar still, solar water heaters, solar driers; conversion of heat energy in to mechanical energy, solar thermal power generation systems. Solar Photovoltaic: Principle of photovoltaic conversion of solar energy, types of solar cells. Roof top solar PV systems.

Wind Energy: Atmospheric circulations, classification, factors influencing wind, wind shear, turbulence, wind speed monitoring, Betz limit, WECS: classification, characteristics, and applications.

Unit III **(8 Hrs)**

Ocean Energy: Ocean energy resources-ocean energy routes - Principles of ocean thermal energy conversion systems- ocean thermal power plants- Principles of ocean wave energy conversion and tidal energy conversion.

Other Sources: Hydropower, Nuclear fission and fusion-Geothermal energy: Origin, types ofgeothermal energy sites, site selection, geothermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

Unit IV **(6 Hrs)**

Green Buildings :Environmental implications of buildings energy, carbon emissions, water use, waste disposal;Building materials: sources, methods of production and environmental Implications. EmbodiedEnergy in Building Materials: Transporation Energy for Building Materials; Maintenance Energyfor Buildings. Green Composites for buildings: Concepts of

Green Composites. Water Utilisation in Buildings, Management of Solid Wastes.Urban Environment and Green Buildings. Green Cover and Built Environment.

Unit V **(6 Hrs)**

Policy Issues: The United Nations Framework Convention on Climate Change (UNFCCC). The Intergovernmental Panel on climate change (IPCC), the Kyoto Protocol. Energy Demand: Global and Indian trends - Determinants of energy demand; energy productivity and management of energy demand - Policy toward Electricity in India: pricing, implications of state subsidies, case for and against privatization in electricity generation and distribution; relevance to India of California experience in privatization of electricity distribution - Potential for renewable energy use in India (solar and wind energy)

Text Books

1. Energy and the Environment, 2nd Edition, John Wiley, 2006, Authors: Ristinen, RobertA. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A., Publisher: Wiley, Location: New York, 2006.
2. Fundamentals of Solar Cells: PV Solar Energy Conversion, Alan L Fahrenbruch and Richard H Bube Academic Press, New York , 1983
3. Wind and Solar Power Systems , Mukund R. Patel, CRC Press; (1999)

Reference Books

1. Jerry Yudelson Green building Through Integrated Design. McGraw Hill, 2009.
2. Fundamentals of Integrated Design for Sustainable Building By Marian Keeler, Bill Burke

EE8E006	**Digital Signal Processing**	**3 Credit**

COURSE OBJECTIVES:

1.To aware with the different types of signals and systems with their representations.

2.To familiarize the relationships between continuous-time and discrete-time signals and systems

3.To understand the different transform for the discrete time signals.

4.To introduce with representation and designing of the digital filter.

COURSE OUTCOME:

Student should be able to

CO1: Remember different types of signals and systems.

CO2: Understands signals mathematically in continuous and discrete-time, and in the frequency domain.

CO3: Analyze discrete-time systems using z-transform.

CO4:Solve DFT using various FFT algorithms.

CO5:Represent and design digital filters for various application.

CO6:Apply digital signal processing for the analysis of real-life signals.

Unit I: Introduction to Digital Signal Processing **(7Hrs)**

Frequency domain description of signals & systems, Advantages of Digital over Analog Signal Processing, Classification of signal and systems:Linearity, causality, stability, static dynamic, Time Invariance Time variance. Linear convolution, circular convolution, Analog-to-Digital and Digital-to-Analog Conversion.

Unit II: Discrete-Time Signals And Systems (7 Hrs)

Discrete time signals and systems: Sequences; representation of signals on orthogonal basis; Representation of discrete systems using difference equations, Sampling and reconstruction of signals - aliasing; Sampling theorem and Nyquist rate, Discrete-Time Systems Described by Difference Equations.Solutions of linear difference equations.

Unit III: The Z –Transform And Its Applications (6 Hrs)

Definition. Properties of the region of convergence for the Z- transformer, Z - transform properties, Inverse Z - transform using contour integration, partial fraction expansion, Parseval's theorem,Interpretation of stability in z-domainSolutions of difference equations.

Unit IV: Discrete Fourier Transform (7Hrs)

Frequency Domain Analysis, Discrete Fourier Transform (DFT), Properties of DFT, Convolution of signals, Fast Fourier Transform Algorithm, Implementation of Discrete Time Systems.

Unit V: Filter Design Techniques (7Hrs)

Design of discrete time IIR filters from continuous time filters. Frequency transformations of low pass IIR filters, Direct form I, Direct form II, Cascade and parallel structure for IIR and FIR Filter, Design of FIR filters by windowing method, FIR filter design by Fourier series method method.

Text Books

1.Digital signal processing Theory & Applications: N.G.Palan, Tech Max Publication, Prows and Manolakis, PHI Ltd, 3rd Edition.
2.Digital Signal Processing, P Ramesh Babu,SCITECH Publications, Chennai, 4th edition,2010
3.Digital Signal Processing- A computer based approach: S. K. Mitra, McGraw Hill, 2011.

Reference Books

3. Theory and Application of Digital Signal Processing: L. R. Rabiner and B. Gold, Prentice Hall, 1992.
4. Digital Signal Processing: S Salivahanan, AVallavaraj, Mc. Graw Hill Publication. 2nd Edition 2. Discrete time signal processing.
5. Introduction to Digital Signal Processing: J. R. Johnson, Prentice Hall, 1992.
6. S.K.Mitra, "Digital Signal Processing", TMH Pub.

EE8E006(C)	**Electrical Vehicle**	3 Credit

COURSE OBJECTIVES:

The course focuses on architecture and component of EV based on the requirements to power flow management, power conversion and thus to vehicle dynamics and energy/fuel efficiency

COURSE OUTCOME:

CO1. To remember the basics of electric vehicles, and fundamentals
CO2.To Understand the models and architecture, technologies to describe electric vehicles
CO3:To apply the basic concepts to describe electric vehicles and their performance.
CO4. To Analyze the different possible ways of energy storage
CO5 To Compare the different strategies related to energy storage systems.

Unit - I **(7Hrs)**

Introduction : Conventional Vehicles: Basics of vehicle performance, vehicle power source Characterization, transmission characteristic.

Unit – II **(8 Hrs)**

Hybrid and Electric Vehicle: Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies, Hybrid Electric Drive-trains: Basic concept of hybrid traction,introduction to various hybrid drive train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Unit – III **(8Hrs)**

Electric Trains : Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives

Unit – IV **(8Hrs)**

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis

Unit – V **(8Hrs)**

Energy Management Strategies: Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

Text Books

1. Hybrid Electric Vehicles - Principles and Applications with Practical Perspectives: C. Mi, M. A.Masrur and D. W. Gao, John Wiley & Sons, 2011.
2. Hybrid Electric Vehicles - Energy Management Strategies: S. Onori, L. Serrao and G. Rizzoni,Springer, 2015.
3. Modern Electric, Hybrid Electric, and Fuel Cell Vehicles - Fundamentals, Theory, and Design: M.Ehsani, Y. Gao, S. E. Gay and A. Emadi, CRC Press, 2004.
4. Electric and Hybrid Vehicles: T. Denton, Routledge, 2016

EE8E006(D)	**Power Quality**	**3 Credit**

PRE REQUISITES: Power sytems

COURSE OBJECTIVES:

1. To understand the importance of Power quality
2. To understand the application of FACTS devices.
3. To investigate the key concepts of various terms of Power quality.
4. To enable students solve power quality problems in the power systems.

COURSE OUTCOME:

Upon completion of this course ,student should be able to

1. Remember the basic principles related to Power quality.
2. Understand the problems and constraints related with quality of power in large interconnected power systems.
3. To identify the different issues related to the power quality in power systems.
4. Analyse the characteristics of different power quality problems.
5. Evaluate the operation, and working of different mitigation methods for power quality problems.
6. Solve the different problems related to different power quality issues by controlling the various parameters in distribution systems.

Unit – I **(6Hrs)**

Introduction to Electric Power Quality, Power Quality standards, Different Power Quality terms and definitions.

Unit – II **(7Hrs)**

Voltage Sag and Interruptions, Sources of Voltage sag and interruptions, type and characteristics of voltage sag and interruptions, Factors affecting characteristics of voltage sag and interruptions, behavior of different equipments during voltage sag, concept of area of vulnerability, CBEMA and ITI Curves .

Unit – III **(7Hrs)**

Voltage Swell and transient over voltage, sources of over voltage like capacitor switching, load switching, lighting etc, various causes of voltage flicker and their effects. Short term and long term flickers, various means to reduce flickers, Transient over voltages, sources, impulsive transients, switching transients, Effect of surge impedance and line termination, control of transient voltages.

Unit –IV **(7Hrs)**

Harmonic distortions, voltage and current harmonics, THD, sources of harmonics, ill effects of harmonics, interharmonics, harmonics filters, IEEE 519-1992 definitions, reactive power under harmonics, K-rated transformer.

Unit – V **(7Hrs)**

Voltage Unbalance, Impact on equipment performance, other power quality related issues like EMI, noise, notching, DC offset , Typical wiring and grounding problems causing poor power quality,solution to wiring and grounding problems.

Unit – VI **(6 Hrs)**

Need of power quality monitoring and approaches followed in power quality monitoring. Power quality monitoring objectives and requirements. Initial site survey. Power quality Instrumentation. Selection of power quality monitors, selection of monitoring location and period. System wide and discrete power quality monitoring. Setting thresholds on monitors, data collection and analysis. Selection of transducers. Harmonic monitoring, Transient monitoring, event recording and flicker monitoring, Mitigation techniques at different environments.

Text Books

1. Electrical power system quality – R. C. Dugan, Mark F. McGranghan, Surya santoso, H. Wayne Beaty, Second edition, McGraw Hill.
2. Understanding power quality problems, voltage sag and interruptions - M. H.J. Bollen, IEEE press, 2000, series on power engineering
3. Power Quality: C.Sankaran, CRC Press

Reference Books

1. IEEE std 519-1992/ IEEE std 1159 IEEE recommended practices and requirements for harmonics control in electrical power system.

2. Power system quality assessment: J. Arrillaga, M.R. Watson, S. Chan, John Wiley and sons.

Prof. A. V.Joshi
Member Secretary
Board of Studies, EE Dept

Dr.V.S.Dhok
Chairperson
Board of Studies, EE Dept

Education to Eternity

MINUTES OF 7TH BOARD OF STUDIES MEETING NO. BOS/ETC/07/2022-23 — 23/12/2022

Venue: Department of Electronics & Telecommunication Engineering

The 7th meeting of the Board of Studies was held on 23rd **December, 2022** at **11.00 A.M.** Following members were present for this meeting.

Sr. No.	Name of the Faculty	Designation
1.	Mrs. Gayatri Bhoyar	Chairman
2.	Dr. M.M.Khanapurkar	Member (Academician), GHRCE, Nagpur
3.	Dr. K. M. Bhurchandi	Member (VC Nominated), VNIT, Nagpur
4.	Mr. Ashish Khachane	Member (Industry)
5.	Mr.Amit Bhattacharya	Member (Alumni)
6.	Mr. Mohammad Hassan	Secretary
7.	Dr. Sanjay Haridas	Member
8.	Mr. Avinash Ikhar	Member
9.	Mr. Firoz Akthar	Member
10.	Ms. Pranali Langde	Member
11.	Mrs. Kiran Khandare	Member
12.	Mrs. Akanksha Sontakke	Member
13.	Ms. Ashwini Mate	Member
14	Mr. Tushar Joshi	Member
15	Mr. Pravin Lakhe	Member

The Secretary Mr. Mohammad Hassan are welcomed the members of the Board of Studies and the Chairman Mrs. Gayatri Bhoyar introduced the new member(External) experts Dr. M. M. Khanapurkar Mr. Ashish Khachne, Mr. Amit Bhattacharya, M. Bhurchandi to the forum. With the permission of chair the discussion started as per the agenda. Following points were discussed.

Item No. 1	To confirm the minutes of 6th BoS meeting

The 6th BoS meeting was held on **24rd March, 2022**. The new members in the Board of Studies were introduced, finalization of the syllabus for open elective course and finalization of the syllabus of B. Tech 7th & 8th Semester scheme were done.

Item No. 2	To bring on table the action taken report of 6th meeting of BoS held on 24th March 2022

The Secretary presented the Minutes of 6thBoS BOS/ETC/06/2022-23, to all the members and action taken on it. Following points were presented under this item.

Item No.	Item	Action Taken
01	Inclusion and confirmation of new member	**Prof. Gayatri Bhoyar** was introduced and included as the Chairman of the Board.
02	Finalization of the syllabus of B. Tech 7th & 8th Semester	All the suggested changes/modifications were incorporated in the respective subject syllabus of B.Tech 7th & 8th Semester and the syllabus is finalized. The final draft of syllabus of B.Tech 7th and 8th semester was sent to all members.
03	Finalization of the syllabus for open elective courses	All the suggested changes/modifications were incorporated in the respective open elective courses and the syllabus is finalized. The final draft of syllabus was sent to all members.

Item No. 3	Inclusion and Confirmation of new members

Inclusion and Confirmation of new (External) members Dr. M. M. Khanapurkar, Mr. Amit Bhattacharya and Mr. Ashish Khachne with Inclusion of (Internal) members Prof. Mohammad Hassan (Secretary) , Assistant Professor, Prof. Kiran Kahndare Assistant Professor, Prof. Akansha Sontakke Assistant Professor, Prof. Ashwini Mate Assistant Professor, Prof. Tushar Joshi Assistant Professor, Prof. Pravin Lakhe Assistant Professor of ETC Department, JDCOEM, Nagpur which was accepted by the forum.

Item No. 4	To finalize the minor corrections in the Scheme of UG

Discussion on finalization of minor corrections in the scheme of UG was done and accepted by the forum. Following changes were made in the existing UG scheme

Sr. No.	Semester	Existing Subject	To be Replaced with
1	III	Electronic Devices and Circuits-I	Electronic Devices and Circuits
2	III	Electronic Devices and Circuits-I Lab	Electronic Devices and Circuits Lab
3	IV	Electronic Devices and Circuits-II	Microcontroller and Applications
4	IV	Electrical Machines and Instruments Lab	Microcontroller and Application Lab

5	IV	Electronic Devices and Circuits-II Lab	Basics of Python Programming Lab
6	IV		NPTEL Course

Item No. 5	To finalize the syllabus of B. Tech 3rd & 4th semester

Discussion on finalization of the syllabus of B. Tech 3rd & 4th semester was done and accepted by the forum. As per the discussion following changes are proposed in the syllabus.

In 4th semester syllabus most of the subject's syllabus were accepted by the forum. Some minor changes were proposed like In 3rd semester syllabus according to the EDC Syllabus six unit consist of CMOS technology topics. The introduction or basic requirement for studying CMOS should be included in previous unit i.e. 3rd unit.

Application part like Power amplifier should be added after CMOS topic and check out the syllabus should not be bulky.

Remove the experiment no. 8, 9 and 14 from Python Programming Lab. Instead of that include program of experiment based on Flash Module. Also instructed to add experiment based on PIP installations of various modules.

Reimbursement for NPTEL conferences and copyright should be provided to students and provide them financially.

Finalize the lower limit of attendance for detention of students, decide lower threshold limit of attendance. Students having zero % attendance should not be allowed for 1 mark according to the rubrics.

Students should allowed to do MOOC courses of 4 weeks, 8 weeks and 12 Weeks for all the mentioned courses and two credits should be award to the students.

Change the rubrics of mega projects and allow them for to do the training in the reputed institute and provide them incentives accordingly.

Achievements of department or departmental faculty from last BoS meeting should be added in last PPT of BoS meeting.

Item No. 8	Any other matter with the permission of the Chair.

No other matter is discussed. Finally the meeting was concluded by the vote of thanks proposed by the chairman and secretary of the board.

Mr. Mohammad Hassan
Secretary BOS
ETC Board

Mrs. Gayatri Bhoyar
Chairman BOS
ETC board

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ET3T002	Electronics Devices and Circuits	4 Credit

Prerequisites: Basic knowledge of Semiconductor Physics (FYT106 and FYT110)

Course Objectives:

1. To understand properties, characteristics and behaviour of basic solid state devices such as PN junction diode/BJT/JFET/MOSFET
2. To know and analyse different amplifier configurations.
3. To introduce concepts of feedback in electronic circuits
4. To design Electronic circuits using diodes and transistors

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Explain the working principle, operation and characteristics of basic solid state devices such as PN junction diode, BJT and JFET.
2. Apply the concept of biasing techniques and feedback to improve stability of circuits.
3. Categorize amplifiers and oscillators based on feedback topology.
4. Analyse different amplifier configurations and DC bias circuitry of BJT.
5. Interpret BJT circuits for small signal at low and high frequencies.
6. Design Electronic circuits using diodes and transistors.

Course Contents:

Module-1: Semiconductor Theory and PN Junction Devices [5 Hrs]

Energy bands in silicon, intrinsic and extrinsic silicon, Carrier transport in silicon diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. P-N junction diode theory, Zener diode, Zener as a Voltage regulator, Tunnel diode, LED, Schottky diode, Varactor Diode operation, characteristics and applications such as Rectifiers, Filters

Module-2: Bipolar Junction Transistors [5 Hrs]

BJT Structure, Operation, Input and Output Characteristics in CE, CB and CC configuration, Comparison of transistor configurations, Ebers-Moll model, BJT biasing techniques, Load line concept, Thermal Runaway, Stability factor, Stabilization Techniques, Ratings and specifications of BJT from data sheet.

Module-3: JFET AND MOSFET [5 Hrs]

JFET:-Structure, Symbol, Basic Operation, Drain and Transfer Characteristics, Biasing arrangements for JFET, Biasing against device variation, biasing for zero current drift.

Universal JFET bias curve.

MOSFET: Structure, Symbol, Construction of n-channel E-MOSFET, MOS Transistor operation, EMOSFET Characteristics & parameters, non-ideal voltage current characteristics viz. Finite output resistance, body effect, sub-threshold conduction, breakdown effects and temperature effects, N-MOS, P-MOS and CMOS devices.

Module-4: Single Stage Amplifiers [5 Hrs]

BJT small signal model – Analysis of CE, CB, CC amplifiers, Concept of frequency response, Miller's theorem, Effect of coupling, bypass, junction and stray capacitance on frequency response of BJT amplifiers

Module-5: Power Amplifiers [5 Hrs]

Classes of Power amplifiers – Class A, Class B, Class AB, Class C and Class D amplifiers, Analysis of Class A, Class B, Class AB amplifiers, Distortions in amplifiers, concept of Total Harmonic Distortion, Comparison of power amplifiers

Module-6: Feedback Amplifiers and Oscillators [5 Hrs]

Feedback Concept, Classification of amplifiers based on feedback topology, (Voltage, Current, Transconductance and Transresistance amplifiers), Effect of negative feedback on various performance parameters of an amplifier, Analysis of one circuit for each feedback topology. Oscillators: Condition for oscillations, Phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators

Text Books:

1. Millman & Halkies, “Electronic Devices and Circuits”, Second Edition, Tata McGraw Hill.

2. Boylestead & Nashelsky, “Electronic devices and Circuits Theory” Eighth edition, PHI

3. S. Salivahanan, N.Suresh Kumar,“Electronic devices and Circuits”, Fourth Edition ,McGraw Hill Education (India) Private Ltd

4. Donald Neaman, “Electronic Circuit Analysis and Design”, Third Edition, Tata McGraw Hill

Reference Books.

1. MillmanHalkies, “Integrated Electronics”, Seventh edition,Tata McGraw Hill.

2. David A. Bell,“Electronic Device and Circuits”, Fourth Edition, PHI.

3. Gupta.J.B, “Electron Devices and Circuits”, Second Edition,S.K.Kataria& Sons,

4. Floyd,“Electronic Devices”, Seventh Edition, Pearson.

5. Sedra and Smith, “Microelectronic Circuits”, Oxford University Press, 2004.

6. Ben G. Streetman “Solid State Electronic Devices”, Sixth Edition ,Pearson

E-Resources:

1. https://nptel.ac.in/courses/122/106/122106025/
2. https://onionesquereality.wordpress.com/.../more-video-lectures-iit-open
3. http://www.nesoacademy.org/electronics-engineering/analog-electronics/analog
4. http://www.electronics-tutorials.ws/transistor/tran_1.html
5. http://www.allaboutcircuits.com/textbook/semiconductors/chpt-1/active-versus-passivedevices/

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ET4T005	Signal and System	3 Credit

Prerequisites:

1. Basic Idea of Transform and its mathematical descriptions (Laplace, Fourier and Z-Transform)
2. Differential equations and Integrals (advanced level)
3. Ordinary differential equations
4. Series and expansions
5. Fourier analysis and complex Fourier Series/transform
6. Applications of Fourier series, Fourier Transform to circuits.

Course Objectives:

1. To develop a strong foundation of continuous and discrete time signal and system.
2. Introduce ideas for analysis of various types of continuous & discrete time system.
3. Learn fundamental concepts and transforms as relevant to time and frequency domain Signals.
4. Understand the process of sampling and interpolation in real time signal transmission.

Course Outcomes:

1. Understand different types of signals & systems.
2. Familiar with the properties of LTI (Linear Time Invariant System) system and process involved in analysis of signals before transmission.
3. Solve various complex mathematical problems for signal analysis and conversion of signals from one domain to another.
4. Apply knowledge of sampling and interpolation to sample and reconstruct signals during real time signal transmission and reception.
5. Analyze continuous and discrete systems in time and frequency domain.
6. Design Various Mathematical models to Investigate stability of the system.

Course Contents:

Module-1: Basics of signals and system [6 Hrs]

Introduction and Classification of signals, Definition of signal, Continuous time and discrete time signal, Classification of signals as even, odd, periodic and non-periodic, Deterministic and non-deterministic, energy and power, elementary signals used for testing, Exponential, sine, impulse, step and its properties, ramp, rectangular, triangular, signum, sinc, Operations on signals, Amplitude scaling, addition, multiplication, differentiation, integration, time scaling, time shifting and time folding, Systems Definition, Classification, linear and non-linear, timevariant and invariant, causal and non-causal, static and dynamic, stable and unstable.

Module-2: Fourier Transform Analysis 6 Hrs

The Continuous-Time Fourier Transform, Representation of Aperiodic Signals, The Fourier Transform for Periodic Signals, Properties of the Continuous-Time Fourier Transform, Systems Characterized by Linear Constant-Coefficient Differential Equation.

Module-3: Fourier Series Analysis [6 Hrs]

The Response of LTI Systems to Complex Exponentials, Fourier Series Representation of Continuous-Time Periodic Signals, Types of Fourier Series, Convergence of the Fourier Series, Properties of Continuous-Time Fourier Series, Fourier Series of various Signals, Fourier Series Representation of Discrete-Time Periodic Signals.

Module-4: Probability and Random Signals [6 Hrs]

Probability: Experiment, sample space, event, probability, conditional probability and statistical independence, Bayes theorem, Random variables: Continuous and Discrete random variables, cumulative distributive function, Probability density function, properties of CDF and PDF. Definitions: Statistical averages, mean, moments and expectations, standard deviation and variance, Introduction to Correlation: Autocorrelation, Cross correlation, and their properties.

Module-6: Time Response Analysis [6 Hrs]

Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Continuous-Time and Discrete-Time Systems, Basic System Properties, Discrete-Time LTI (Linear Time Invariant System) Systems, the Convolution Sum, Continuous-Time LTI Systems, the Convolution Integral, Properties of Linear Time-Invariant Systems.

Module-6: Frequency Response Analysis [6 Hrs]

The Magnitude-Phase Representation of the Frequency Response of LTI Systems, Concept of Frequency Response, Group Delay, Phase Delay, Time-Domain Properties of Ideal Frequency-Selective Filters, Time- Domain and Frequency-Domain Aspects of Non ideal Filters, Discrete-Time System, Representation of a Continuous-Time Signal by its Samples, the Sampling theorem, Reconstruction of a Signal from Its Samples Using Interpolation, Aliasing effect, Discrete-Time Processing of Continuous-Time Signals.

Text Books:

1. Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia), Private Limited,

2. B. P. Lathi, “Linear Systems and Signals”, OXFORD University Press.

3. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.

4. “Signals and Systems”, A. Nagoor Kanni, 2nd Edition, McGraw Hill.

Reference Books:

1. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi,2001.

2. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB",TMH, 2003.

3. Signals Systems and Transforms, 3rd Edition, 2004, C. L. Philips, J.M.Parr and EveA.Riskin ,Pearson education.

4. S.S. Soliman & M.D. Srinath, “Continuous and Discrete Signals and Systems”, Prentice-Hall, 1990.

5. Shaila Dinkar Apte “Signals and Systems” Principles and Applications”, Cambridge University Press.

E-Resources:

1. NPTEL link principal of signals and system.
https://www.youtube.com/watch?v=xrVWB9VYZ64&list=PLq-Gm0yRYwTjwxaqapPsSAHzs4_nkQLVr

2. E-BOOK Signal and Systems Simon Haykin Wiley
https://www.academia.edu/38588821/Signal_and_Systems_Simon_Haykin_Wiley

3. E-BOOK B. P. Lathi, “Linear Systems and Signals”,
https://india.oup.com/productPage/5591038/7421214/9780198062271

ET3L001	Python Programming- Lab	1 Credit

Prerequisites: Basic knowledge of Python and Programming knowledge about the practical.

Course Objectives:

1. To be able to introduce core programming basics and various Operators of Python programming language

2. To demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries

3.To understand about Functions, Modules and Regular Expressions in Python Programming.

Course Outcomes:

At the end of the laboratory work, students will able to:

1. Student should be able to understand the basic concepts of scripting and the contributions of scripting language.
2. Ability to explore python data structures like Lists, Tuples, Sets and dictionaries

3. Ability to create practical and contemporary applications using Functions, Modules and Regular Expressions.

List of Experiments:

1.Introduction to IDLE software and Basic Python programming.

2. Demonstrate the following Operators in Python with suitable examples.
   i) Arithmetic Operators ii) Relational Operators
   iii) Assignment Operator iv) Logical Operators
   v) Bit wise Operators vi) Ternary Operator
   vii) Membership Operators viii) Identity Operators

3. Write Python programs to demonstrate the following:
   i) input( ) ii) print( )
   iii) 'sep' attribute iv) 'end' attribute
   v) replacement Operator ({ })

4.Develop a Python Program as pizza calculator for billing purpose.

5.Develop a python program using turtle graphics to draw spiral.

6. Develop a python program to draw smiley face using turtle graphics.

7.Develop a python program to find all prime number within a given range.

8. Write a GUI program using Entry widget to convert lower case text into upper case.

9. Write a GUI program using Text widget.

10. Write a python program to handle exception using Try and Except block.

11. Write a python program by user defined exception method.

12. Develop a python program using class composition method.

13. Develop a python program using class overriding method.

14. Develop a python program using multithreading.

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Scheme for B. Tech in Electronics and Telecommunication Engineering (w.e.f. 2022-23)

B. Tech Seventh Semester

Sr. No.	Category of Course	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PCC	ET7T001	Digital Communication	3	0	0	20	20	60	100	3
2	PEC	ET7E002	Professional Elective Course-III	3	0	0	20	20	60	100	3
3	PEC	ET7E003	Professional Elective Course-IV	3	0	0	20	20	60	100	3
4	PEC	ET7E004	Professional Elective Course-V	3	0	0	20	20	60	100	3
5	OEC	ET7O003	OPEN Elective Course-III	4	0	0	20	20	60	100	4
6	ESC	ET7L005	Basic Electronic Simulation Lab	0	0	2	60	0	40	100	1
7	PCC	ET7L001	Digital Communication Lab	0	0	2	60	0	40	100	1
8	Project	ET7P002	Major Project Part-1	0	0	6	50	0	50	100	3
9	MC	ET7T006	Intellectual Property Rights	2	0	0	10	15	25	50	Audit

Total	**18**	**0**	**10**	**280**	**115**	**455**	**850**	**21**

B. Tech Eighth Semester

Sr. No.	Category of Course	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PEC	ET8E001	Professional Elective Course-VI	3	0	0	20	20	60	100	3
2	OEC	ET8O004	OPEN Elective Course-IV	4	0	0	20	20	60	100	4
3	Project	ET8P001	Major Project Part-2	0	0	12	75	0	75	150	5
4			NPTEL Course	2	0	0	25	0	25	50	2
Total				**7**	**0**	**12**	**140**	**40**	**220**	**400**	**14**

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7T001	Digital Communication	3	0	0	3

Prerequisites for the course	
1	Basic knowledge of communicating transmitter and receiver.

Prior Reading Material / useful links	
1	https://www.researchgate.net/publication/268508509_Types_of_E-Resources_and_its_utilities_in_Library
2	https://www.ojcmt.net/article/digital-communication-in-educational-process-development-trends-and-new-opportunities-7928
3	https://journals.ala.org/index.php/lrts/article/view/5158/6260

Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	**Understand** knowledge about various techniques of digital communication Systems.
2	CO2	**Explain** the knowledge of theory and practice related to Digital communication.
3	CO3	**Identify** and solve engineering problems related to Mobile communication system
4	CO4	**Analyze** the spectral characteristics of band pass signaling schemes and their noise performance
5	CO5	**Design** error control coding schemes

Syllabus:

Course Contents	
Unit I	**Information Theory** [5 Hours] Discrete Memoryless source, Information, Entropy, Mutual Information - Discrete Memory less channels – Binary Symmetric Channel, Channel Capacity - Hartley - Shannon law - Source coding theorem - Shannon – Fano & Huffman codes.
Unit II	**Waveform Coding & Representation** [6 Hours] Prediction filtering and DPCM - Delta Modulation - ADPCM & ADM principles- Linear Predictive Coding- Properties of Line codes- Power Spectral Density of Unipolar / Polar RZ & NRZ – Bipolar NRZ – Manchester
Unit III	**Baseband Transmission & Reception** [6 Hours] ISI – Nyquist criterion for distortion less transmission – Pulse shaping – Correlative coding - Eye pattern – Receiving Filters- Matched Filter, Correlation receiver, Adaptive Equalization
Unit IV	**Digital Modulation Scheme** [7 Hours] Geometric Representation of signals - Generation, detection, PSD & BER of Coherent BPSK, BFSK & QPSK - QAM - Carrier Synchronization - Structure of Non-coherent Receivers - Principle of DPSK.
Unit V	**Error Control Coding** [7 Hours] Channel coding theorem - Linear Block codes - Hamming codes - Cyclic codes - Convolutional codes - Viterbi Decoder.
Unit VI	**Mobile Communication** Cellular Telephone systems: Digital cellular telephone, Mobile communication system, Role of mobile communication, mobile hotspot and mobile applications related to rural development, GPS.
Text Books	
1	S. Haykin, ―Digital Communications‖, John Wiley, 2015
2	B.P. Lathi and Z. Ding, "Modern Digital and Analog Communication Systems," 4th Ed., Oxford University Press, 2009
Reference Books	
1	T. M. Cover and J. A. Thomas, "Elements of Information Theory," Wiley Student Edition, 1999, Reprint 2009
2	J.G Proakis, ―Digital Communication‖, 4th Edition, Tata McGraw Hill Company, 2001.
Useful links	
1	https://www.researchgate.net/publication/268508509_Types_of_E-Resources_and_its_utilities_in_Library
2	https://www.ojcmt.net/article/digital-communication-in-educational-process-development-trends-and-new-opportunities-7928
3	https://journals.ala.org/index.php/lrts/article/view/5158/6260

Contributions for syllabus designing:

Sr. No	Name of the Person	Designation	Organization
1.	Dr. Raghvendra B.Deshmukh	BoS Member (Academician)	VNIT, Nagpur
2.	Dr. Kishor M.Bhurchundi	BoS Member (VC Nominated)	VNIT, Nagpur
3.	Mr. Sandeep Darwhekar	BoS Member (Industry)	Beta Computronics Pvt. Ltd
4.	Dr. Sanjay L.Haridas	Dean Academics & BoS Member	JDCOEM, Nagpur
5.	Prof. Neetu Gyanchandani	Chairman , BoS	JDCOEM, Nagpur
6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7	Prof. Mohammad Hassan	Course Coordinator	JDCOEM, Nagpur

Secretary **BOS**

Chairman **BOS**

Chairman **Acd.Council**

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7E002A	Introduction to IOT	3	0	0	3

Prerequisites for the course	
1	Fundamentals of computer networks, Network Security, internet technology.

Prior Reading Material / useful links	
1	https://www.willward1.com/arduino-wifi-tutorial/
2	https://www.makeuseof.com/tag/pi-overdose-heres-5-raspberry-pi-alternatives/
3	https://www.electronicshub.org/arduino-project-ideas

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	Understand general concepts of Internet of Things (IoT).
2	CO2	Recognize various devices, sensors and applications.
3	CO3	Apply design concept to IoT solutions.
4	CO4	Analyze various M2M and IoT architectures.
5	CO5	Evaluate design issues in IoT applications.
6	CO6	Create IoT solutions using sensors, actuators and Devices.

Syllabus:

Course Contents	
Unit I	**Introduction to IoT Components** [6 Hours] Sensing, Actuation, Networking basics, Communication Protocols, Sensor Networks, Machine-to-Machine Communications, IoT Definition, Characteristics. IoT Functional Blocks, Physical design of IoT, Logical design of IoT, Communication models & APIs.
Unit II	**M2M to IoT** [7 Hours] The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics. Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT
Unit III	**M2M vs IoT an Architectural Overview** [7 Hours] Building architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. Reference Architecture and Reference Model of IoT.
Unit IV	**IoT Reference Architecture** [6 Hours] Getting Familiar with IoT Architecture, Various architectural views of IoT such as Functional, Information, Operational and Deployment. Constraints affecting design in IoT world- Introduction, Technical design Constraints.
Unit V	**Domain Specific Applications of IoT** [5 Hours] Home automation, Industry applications, Surveillance applications, Other IoT application.
Unit VI	**Developing IoT Solutions** [7 Hours] Introduction to Python, Introduction to different IoT tools, Introduction to Arduino and Raspberry Pi Implementation of IoT with Arduino and Raspberry, Cloud Computing, Fog Computing, Connected Vehicles, Data Aggregation for the IoT in Smart Cities, Privacy and Security Issues in IoT
Text Books	
1	Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Aves and, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2	Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on Approach)", 1st Edition, VPT, 2014.
Reference Books	
1	Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
2	CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493- 9357-1
3	
Useful links	
1	https://www.udemy.com/course/internet-of-things-iot-for-beginners-getting-started/
2	https://playground.arduino.cc/Projects/Ideas/
3	https://www.megunolink.com/articles/arduino-garage-door-opener/
4	https://runtimeprojects.com/

Contributions for syllabus designing:

Sr. No	Name of the Person	Designation	Organization
1.	Dr. Raghvendra B.Deshmukh	BoS Member	VNIT, Nagpur

		(Academician)	
2.	Dr. Kishor M.Bhurchundi	BoS Member (VC Nominated)	VNIT, Nagpur
3.	Mr. Sandeep Darwhekar	BoS Member (Industry)	Beta Computronics Pvt. Ltd
4.	Dr. Sanjay L.Haridas	Dean Academics & BoS Member	JDCOEM, Nagpur
5.	Prof. Neetu Gyanchandani	Chairman , BoS	JDCOEM, Nagpur
6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7	Prof. Neeta Thune	Course Coordinator	JDCOEM, Nagpur

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Department of Electronics and Telecommunication Engineering
"Rectifying Ideas, Amplifying Knowledge"

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7E002BC	Optical Communication Networks	3	0	0	3

Prerequisites for the course	
1	Basic knowledge of communication engineering

Prior Reading Material / useful links	
1	https://nptel.ac.in/courses/108/106/108106167/
2	https://nptel.ac.in/courses/117101054

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	Explain the principles of operation of various optical fiber communication systems.
2	CO2	Analyze the performance of various digital and analogue optical fiber systems.
3	CO3	Calculate various key parameters of optical fiber systems. These include the system optical power budget and system rise time budget, receiver noise power, Q factor, bit error rate and maximum usable bit rate of a digital optical fiber system.
4	CO4	Explain/compare the factors affecting the performance of different optical fibre communication systems.
5	CO5	Communicate laboratory findings through written reports

Syllabus:

Course Contents	
Unit I	**Overview of Optical Fiber Wave Guides** [6 Hours] General system, transmission link, advantage of optical fiber communication, basic structure of optical fiber waveguide, ray theory transmission, optical fiber modes and configuration, step index & graded index fiber, single mode fiber , fiber materials , fiber fabrication
Unit II	**Signal Degradation in Optical Fiber** [7 Hours] Introduction, attenuation, intrinsic & extrinsic absorption losses, linear & nonlinear scattering losses, bending losses, distortion in optical wave guide, intramodal and intermodal dispersion. Power launching and coupling Source to fiber power launching, power calculation, lensing schemes, fiber to fiber joints, fiber splicing technique, fiber connectors.
Unit III	**Optical Sources** [6 Hours] LASER: Basic concepts of laser, Optical emission from semiconductors, Semiconductor injection laser (ILD), Injection laser characteristics.LED: power and efficiency, LED structures, LED characteristics.Optical detectors: p-n photodiodes, P-I-N photodiodes, Avalanche photodiodes, Quantum efficiency, speed of response, Phototransistor.
Unit IV	**Optical Receiver** [5 Hours] Receiver operation, digital receiver noise, shot noise, pre-amplifier types, Digital receiver performance, introduction to analog receivers.
Unit V	**Digital Transmission Systems** [7 Hours] Point to point links, system considerations, link power budget, rise time budget, modulation formats for analog communication system, introduction to WDM concepts, Introduction to advanced multiplexing strategies.
Unit VI	**Optical Networks** [6 Hours] Basic networks-SONET/ SDH-wavelength routed networks, nonlinear effects on network performance, performance of various systems (WDM, DWDM + SOA).
TextBooks	
1	G.Keiser: Optical Fiber Communication – MGH
2	Jenkins & White: Fundamentals of Optics – MGH.
ReferenceBooks	
1	Bhattacharya, Pallab / "Semiconductor Optoelectronics Devices" / Pearson Education.
2	Singh, Jasprit / "Optoelectronics An Introduction to Materials and Devices"/ McGraw-Hill
3	Khare, R.P. / "Fiber Optics & Optoelectronics" / Oxford University Press
Useful links	
1	https://nptel.ac.in/courses/108/106/108106167/
2	https://nptel.ac.in/courses/117101054

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6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7	Prof. Gayatri Bhoyar	Course Coordinator	JDCOEM, Nagpur

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7E002C	Advanced Cellular Communication	3	0	0	3

Prerequisites for the course	
1	Basic knowledge of Digital and wireless Communication System.

Prior Reading Material / useful links	
1	https://crln.acrl.org/index.php/crlnews/article/view/8545/8878
2	https://eudl.eu/journal/mca
3	https://www.researchgate.net/publication/286455750_mobile_technology_in_libraries_for_discovering_e-resources_and_services

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	Know the concept of cellular wireless communication system
2	CO2	Understand emerging technologies required for fourth and fifth generation mobile systems such as SDR, MIMO etc
3	CO3	Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations
4	CO4	Apply frequency-reuse concept in mobile communications, and to analyze its effects on interference, system capacity, handoff techniques
5	CO5	Analyze various methodologies to improve the cellular capacity
6	CO6	Compare and explain various radio access technologies for 5G networks

Syllabus:

Course Contents	
Unit I	**Introduction to Wireless communication** (4 Hours) Wireless communication systems, Applications of wireless communication systems, Types of wireless communication systems, trends in mobile communication systems
Unit II	**Cellular Mobile Systems** [6 Hours] Basic cellular systems, Performance criteria, Uniqueness of mobile radio environment, Operation of cellular systems, analog & digital cellular systems.
Unit III	**Elements of Cellular Radio System Design** (6 Hours) Concept of frequency reuse channels, Co-channel interference reduction factor, Desired C/I from a normal case in an omnidirectional antenna system, Handoff mechanism, Cell splitting.
Unit IV	**Interference in Cellular Mobile System** [7 Hours] Co-channel interference, Design of an omnidirectional antenna system in the worst case, Design of a directional antenna system, Lowering the antenna height, Power control, Reduction in CI by tilting antenna, umbrella pattern effect Adjacent-channel interference, Near-end – far-end interference, Effect on near-end mobile units
Unit V	**Frequency Management, Channel Assignment and Handoffs** [7 Hours] Frequency management, Frequency-spectrum utilization, Set-up channels, Fixed channel assignment schemes, Non-fixed channel assignment schemes, Concept of handoff, Initiation of a hard handoff, Delaying a handoff, Forced handoffs, Queuing of handoffs, Power difference handoffs, Mobile assisted handoff, Soft handoffs, Cell-site handoff, Intersystem handoff, dropout calls.
Unit VI	**GSM System Overview Over Wireless Networks And 5G Technology** (8 Hours) GSM system architecture, GSM radio subsystem, GSM channel types, Frame structure for GSM, Signal processing in GSM, GPRS and EDGE. Overview of Wi-Fi, Wi-MAX and Bluetooth technology (Basic features and physical specifications).5G architecture, D2D: from 4G to 5G – Radio Resource Management for Mobile Broadband D2D –5G radio access technologies.
TextBooks	
1	Mobile Cellular Telecommunications: Analog and Digital Systems by William C. Y. Lee; Tata McGraw Hill Publication.
2	H. Labiod, H. Afifi, C. De Santis: WI-FI, BLUETOOTH , ZIGBEE and WIMAX-Springer2007
ReferenceBooks	
1	Asif Oseiran, Jose F.Monserrat and Patrick Marsch, “5G Mobile and Wireless Communications Technology”, Cambridge University Press, 2016.
2	Jonathan Rodriquez, “Fundamentals of 5G Mobile Networks”, Wiley, 2015
3	Patrick Marsch, Omer Bulakci, Olav Queseth and Mauro Boldi, “5G System Design – Architectural and Functional Considerations and Long Term Research”, Wiley, 2018arson
Useful links	
1	https://crln.acrl.org/index.php/crlnews/article/view/8545/8878
2	https://eudl.eu/journal/mc
3	https://www.researchgate.net/publication/286455750_mobile_technology_in_libraries_for_discovering_e-resources_and_services

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5.	Prof. Neetu Gyanchandani	Chairman , BoS	JDCOEM, Nagpur
6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7	Prof. Tushar Muratkar	Course Coordinator	JDCOEM, Nagpur

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7E003A	Verilog HDL	3	0	0	3

Prerequisites for the course	
1	Basic knowledge of Digital Circuits, Microprocessor and Microcontroller.

Prior Reading Material / useful links	
1	https://onlinecourses.nptel.ac.in/noc19_cs73
2	https://www.classcentral.com/course/swayam-synthesis-of-digital-systems-10067

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	**Relate** VHDL and Verilog
2	CO2	**Understand** the Digital Design with Verilog HDL
3	CO3	**Identify** the various modules and ports in Digital Design with Verilog HDL.
4	CO4	**Compare** the task and functions and make use of useful modeling techniques
5	CO5	**Analyze** the gate level, data flow and behavioral modeling of Digital Design with Verilog HDL.
6	CO6	**Design** digital systems with various constraints.

Syllabus:

Course Contents	
Unit I	**Overview of Digital Design with Verilog HDL** [6 Hours] Evolution of CAD, emergence of HDLs, typical HDL-based design flow, why Verilog HDL?, trends in HDLs. **Hierarchical Modeling Concepts** Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block.
Unit II	**Modules and Ports** [5 Hours] Lexical conventions, data types, system tasks, compiler directives, Module definition, port declaration, connecting ports, hierarchical name referencing.
Unit III	**Gate-Level Modeling** [7 Hours] Modeling using basic Verilog gate primitives, description of and/or and buf/not type gates, rise, fall and turn-off delays, min, max, and typical delays.
Unit IV	**Dataflow Modeling** [6 Hours] Continuous assignments, delay specification, expressions, operators, operands, operator types.
Unit V	**Behavioral Modeling** [6 Hours] Structured procedures, initial and always, blocking and nonblocking statements, delay control, generate statement, event control, conditional statements, multiway branching, loops, sequential and parallel blocks.
Unit VI	**Tasks, Functions & Useful Modeling Techniques** [7 Hours] Differences between tasks and functions, declaration, invocation, automatic tasks and functions. Procedural continuous assignments, overriding parameters, conditional compilation and execution, useful system tasks.
Text Books	
1	Verilog HDL: A Guide to Digital Design and Synthesis, Second Edition, Samir Palnitkar, Prentice Hall PTR, February 21, 2003
Reference Books	
1	Steve Kilts, "Advanced FPGA Design: Architecture, Implementation and Optimization", J.Wiley and Sons, 2007.
2	Seetharaman Ramachandran, "Digital VLSI Systems Design", Springer Verlag, 2012.
3	Peter J. Ashenden, "The designer's guide top VHDL", Morgan Kaufmann, 2008.
4	Charles H. Roth Jr., "Digital Systems Design using VHDL", Cengage Learning, 2014.
5	Digital System Design–John Wakerley, McGraw Hill Publications.
Useful links	
1	https://onlinecourses.nptel.ac.in/noc19_cs73
2	https://www.classcentral.com/course/swayam-synthesis-of-digital-systems-10067

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6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7	Prof. Amol Dhankar	Course Coordinator	JDCOEM, Nagpur

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7E003B	UHF & Microwave Engineering	3	0	0	3

Prerequisites for the course	
1	Basic knowledge of Electromagnetic field and Antenna & Wave Propagation.

Prior Reading Material / useful links	
1	
2	
3	

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	Describe the use of active and passive microwave devices.
2	CO2	Demonstrate the use of different Klystrons, magnetron devices.
3	CO3	Analyze different UHF components with the help of scattering parameter.
4	CO4	Describe micro strip lines.
5	CO5	Analyze the different power distribution Tees.
6	CO6	Describe the transmission and waveguide structures and how they are used as elements in impedance matching and filter circuits.

Syllabus:

Course Contents	
Unit I	**Microwave Active Devices (O-type)** [6 Hours] Interaction of electron beam with electromagnetic field, power transfer condition. Principles of working of two cavity and Reflex Klystrons, arrival time curve and oscillation conditions in Reflex klystrons, mode-frequency characteristics, Effect of repeller voltage variation on power and frequency of output. Slow wave structures, Principle and working of TWT amplifier & BWO Oscillator.
Unit II	**Microwave Active Devices (M-type)** [7 Hours] Principle of working of M-type TWT, Magnetrons, Electron dynamics in planar and cylindrical Magnetrons, Cutoff magnetic field, phase focusing effect, mode operation, Mode separation techniques, Tuning of magnetron.
Unit III	**Transmission Line** [6 Hours] Input impedance, Standing wave distribution, Quarter Wave and Stub Matching using Smith chart, losses in Transmission lines, Planar Transmission line types, Introduction - Types of MICs and their technology, Fabrication process of MMIC, Hybrid MICs.
Unit IV	**Microwave Networks and Passive Components** (8 Hours) Transmission line ports of microwave network, Scattering matrix, Properties of scattering matrix of reciprocal, nonreciprocal, loss-less, Passive networks, Examples of two, three and four port networks, wave guide components like attenuator. Principle of operation and properties of E-plane, H-plane Tee junctions of wave guides, Hybrid T, Directional couplers, Microwave resonators-rectangular, Excitation of wave guide and resonators .Principles of operation of non-reciprocal devices, properties of ferrites, Gyrators, Isolators ,Circulator and phase shifters.
Unit V	**Microwave Measurements** [6 Hours] Function of Tuning Probes, Detector mounts and Detector diode, Slotted line section and VSWR meter, Measurement of wave-guide impedance at load port by slotted line, Measurement of scattering matrix parameters, High, Medium and low-level power measurement techniques, Characteristics of bolometer, bolometer mounts, Power measurement bridges, Calorimetric method, Microwave frequency measurement techniques, calibrated resonators (transmission and absorption type), Network Analyzer and its use in measurements.
Unit VI	**Microwave Solid State Devices and Application** [6 Hours] PIN diodes-Properties and applications, Microwave detector diodes-detection characteristics, Varactor diodes, Parametric amplifier fundamentals-Manley-Rowe Power relation, MASERS, Transferred electron devices, Gunn effect, Various modes of operation of Gunn oscillator, IMPATT, TRAPATT and BARITT.
TextBooks	
1	Samuel Y. Liao, 'Microwave Devices and Circuits', Pearson Education, 5th Edition.
ReferenceBooks	
1	Manojit Mitra, 'Microwave engineering', 3rd edition, DhanpatRai& Company.
2	Peter A. Rizzi, 'Microwave Engineering Passive Circuits', PHI, 1999.
3	Annapurna Das, Sisir Das, 'Microwave Engineering', April 1987, Tata McGraw Hill Publication.
4	Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss , 'Microwave Principles',4th edition, 1998.
5	G. S. Raghuvanshi, 'Microwave Engineering', CENGAGE Learning
Useful links	
1	
2	

3	
4	

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7E004A	Machine Learning	3	0	0	3

Prerequisites for the course	
1	Basic knowledge of programming
2	Basic knowledge of probability theory and linear algebra

Prior Reading Material / useful links	
1	https://onlinecourses.nptel.ac.in/noc22_cs29/preview
2	https://nptel.ac.in/courses/106106139

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	Understand a very broad collection of machine learning algorithms and problems.
2	CO2	Appreciate the importance of visualization in the data analytics solution.
3	CO3	Apply structured thinking to unstructured problems.
4	CO4	Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory.
5	CO5	Develop an appreciation for what is involved in learning from data.

Syllabus:

Course Contents	
Unit I	**Introduction** [5 Hours] Learning Problems, Perspectives and Issues, Concept Learning, Version Spaces and Candidate Eliminations, Inductive bias, Decision Tree learning, Representation, Algorithm, Heuristic Space Search.
Unit II	**Neural Networks and Genetic Algorithms** [7 Hours] Neural Network Representation, Problems, Perceptrons, Multilayer Networks and Back Propagation Algorithms, Advanced Topics, Genetic Algorithms, Hypothesis Space Search, Genetic Programming, Models of Evaluation and Learning.
Unit III	**Bayesian and Computational Learning** [7 Hours] Bayes Theorem, Concept Learning, Maximum Likelihood, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, Bayesian Belief Network, EM Algorithm, Probability Learning, Sample Complexity, Finite and Infinite Hypothesis Spaces, Mistake Bound Model.
Unit IV	**Instant Based Learning** [6 Hours] K- Nearest Neighbour Learning, Locally weighted Regression, Radial Bases Functions, and Case Based Learning.
Unit V	**Advanced Learning** [7 Hours] Learning Sets of Rules, Sequential Covering Algorithm, Learning Rule Set, First Order Rules, Sets of First Order Rules, Induction on Inverted Deduction, Inverting Resolution, Analytical Learning, Perfect Domain Theories, Explanation Base Learning, FOCL Algorithm, Reinforcement Learning, Task, Q-Learning, Temporal Difference Learning. "Current Streams of Thought".
Unit VI	**Introduction to Cluster Analysis & Clustering Methods** [6 Hours] The Clustering Task and the Requirements for Cluster Analysis, Overview of Some Basic Clustering Methods, Hierarchical Methods: Agglomerate versus Divisive Hierarchical Clustering, Distance Measures, Probabilistic Hierarchical Clustering, Multiphase Hierarchical Clustering Using Clustering
Text Books	
1	Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
2	Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
Reference Books	
1	Machine Learning Engineering, Andriy Burkov, ISBN-10 : 1999579577, True Positive Inc. (8 September 2020)
2	Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
3	Bishop, C., Pattern Recognition and Machine Learning. Berlin: Springer-Verilog.
Useful links	
1	https://onlinecourses.nptel.ac.in/noc22_cs29/preview
2	https://nptel.ac.in/courses/106106139

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7E004B	Digital Image Processing	3	0	0	3

Prerequisites for the course	
1	
2	
3	

Prior Reading Material / useful links	
1	https://nptel.ac.in/courses/117105079
2	https://onlinecourses.nptel.ac.in/noc19_ee55/preview
3	https://nptel.ac.in/courses/117105135

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	**Recall** the fundamental concepts of a digital image processing system.
2	CO2	**Understand** images in the frequency domain using various transforms.
3	CO3	**Apply** various techniques for image enhancement and image restoration.
4	CO4	**Analyze** various compression techniques
5	CO5	**Interpret** Image compression standards.

Syllabus:

Course Contents	
Unit I	**Introduction and Digital Image Fundamentals** [6 Hours] Digital Image Fundamentals, Need for DIP, Fundamental steps in DIP, Human visual system, Image representation – Gray scale and Color images,Types of neighborhoods, Basic relationships between pixels, Distance Measures,
Unit II	**Basic operations on Images and Color Fundamentals.** [6 Hours] Image addition, subtraction, logical operations, scaling, translation, rotation, Image Histogram, Color fundamentals & models – RGB, HSI YIQ, image sampling and quantization.
Unit III	**Image Enhancement and Restoration** (8 Hours) Spatial domain enhancement: Point operations-Log transformation, Power-law transformation, Piecewise linear transformations, Histogram equalization. Filtering operations- Image smoothing, Image sharpening.Basic gray level Transformations, Low pass filtering, High pass filtering, Noise Models, Noise Reduction, Inverse Filtering, MMSE (Wiener) Filtering,
Unit IV	**Image Compression** (4 Hours) Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG Compression standard.
Unit V	**Image Segmentation and Morphological Operations** (8 Hours) Image Segmentation: Point Detections, Line detection, Edge Detection-First order derivative –Prewitt and Sobel, Second order derivative – LoG, DoG, Canny, Edge linking, Hough Transform, Region Growing, Region Splitting and Merging,Dilation, Erosion, Opening, Closing, Hitor-Miss transform, Boundary Detection, Thinning, Thickening, Skeleton.
Unit VI	**Representation and Description** [6 Hours] Representation – Chain codes, Polygonal approximation, Signatures. Boundary Descriptors – Shape numbers, Fourier Descriptors.
Text Books	
1	Gonzalez & Woods, ―Digital Image Processing, 3rd ed., Pearson education, 2008
Reference Books	
1	Milan Sonka, Vaclav Hlavav, Roger Boyle, ―Image Processing, Analysis and Machine Vision‖, 2nd ed., Thomson Learning, 2001
2	Rangaraj M. Rangayyan, ―Biomedical Image Analysis‖, CRC Press, 2005
3	Pratt W.K, ―Digital Image Processing‖, 3rd ed., John Wiley & Sons, 2007
	Jain Anil K., ―Fundamentals Digital Image Processing‖, Prentice Hall India, 2010
Useful links	
1	https://nptel.ac.in/courses/117105079
2	https://onlinecourses.nptel.ac.in/noc19_ee55/preview
3	https://nptel.ac.in/courses/117105135

Contributions for syllabus designing:

Sr. No	Name of the Person	Designation	Organization
1.	Dr. Raghvendra B.Deshmukh	BoS Member (Academician)	VNIT, Nagpur
2.	Dr. Kishor M.Bhurchundi	BoS Member (VC Nominated)	VNIT, Nagpur
3.	Mr. Sandeep Darwhekar	BoS Member (Industry)	Beta Computronics Pvt. Ltd
4.	Dr. Sanjay L.Haridas	Dean Academics &	JDCOEM, Nagpur

		BoS Member	
5.	Prof. Neetu Gyanchandani	Chairman , BoS	JDCOEM, Nagpur
6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7	Prof.Pranali Langde	Course Coordinator	JDCOEM, Nagpur

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7E004C	Advanced Digital Signal Processing	3	0	0	3

Prerequisites for the course	
1	Signals and Systems, Digital Signal Processing.

Prior Reading Material / useful links	
1	https://nptel.ac.in/courses/117101001
2	https://onlinecourses.nptel.ac.in/noc21_ee20/preview

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	**Represent** discrete-time signals analytically and visualize them in the time domain.
2	CO2	**Summarize** the requirement of theoretical and practical aspects of DSP with regard to sampling and reconstruction.
3	CO3	**Apply** various techniques of filter designs for various applications.
4	CO4	**Analyze** Multi Rate Signal Processing and describe how to apply it for the wavelet transform.
5	CO5	**Comprehend** the Finite word length effects in Fixed point DSP Systems
6	CO6	**Estimate** the power spectral estimation methods.

Syllabus:

Course Contents	
Unit I	**Multirate Digital Signal Processing** [6 Hours] Introduction, Review of Decimation and Interpolation, Sampling Rate Conversion by a Rational Factor I/D, Filter Design and Implementation for sampling rate Conversion Multirate Digital Signal Processing Multistage, Implementation of Sampling Rate Conversion.
Unit II	**Applications of Multirate Digital Signal Processing** [4 Hours] Applications of Multirate Signal Processing, Sampling Rate Conversion of Bandpass Signals Linear Prediction and Optimum Linear
Unit III	**Filters** [7 Hours] Innovations Representation of a Stationary Random Process, Forward and Backward Linear Prediction, Solution of the Normal Equations, Properties of linear prediction - Error Filter, AR Lattice and ARMA Lattice-Ladder Filters.
Unit IV	**Power Spectral Estimation** [6 Hours] Estimation of Spectra from Finite Duration Observations of a signal, the Periodogram, Use DFT in power Spectral Estimation, Bartlett, Welch and Blackman, Tukey Methods, Comparison of performance of Non-Parametric Power Spectrum Estimation Methods
Unit V	**Parametric Method of Power Spectrum Estimation** [7 Hours] Parametric Methods for power spectrum estimation, Relationship between Auto-Correlation and Model Parameters, AR (Auto-Regressive) Process and Linear Prediction, Moving Average(MA) and ARMA Models Minimum Variance Method.
Unit VI	**Wavelet Transform** [6 Hours] Window Selection, Wavelet Transform, STFT to Wavelet conversion, Basic Wavelet, Discrete time orthogonal Wavelet, Continuous Time Orthogonal Wavelets.
TextBooks	
1	J. G. Proakis & D. G. Manolokis, "Digital Signal Processing – Principles, Algorithms Applications", PHI.
ReferenceBooks	
1	S. M .Kay, "Modern spectral Estimation techniques", PHI, 1997.Emmanuel C. Ifeacher Barrie. W. Jervis, "DSP – A Practical Approach", Pearson Education.
2	Oppenheim, Alan V. Discrete-time signal processing. Pearson Education India, 1999.
3	Mitra, Sanjit Kumar, and Yonghong Kuo. Digital signal processing: a computer-based approach. Vol. 2. New York: McGraw-Hill Higher Education, 2006.
Useful links	
1	https://nptel.ac.in/courses/117101001
2	https://onlinecourses.nptel.ac.in/noc21_ee20/preview

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2.	Dr. Kishor M.Bhurchundi	BoS Member (VC Nominated)	VNIT, Nagpur
3.	Mr. Sandeep Darwhekar	BoS Member (Industry)	Beta Computronics Pvt. Ltd
4.	Dr. Sanjay L.Haridas	Dean Academics & BoS Member	JDCOEM, Nagpur
5.	Prof. Neetu Gyanchandani	Chairman , BoS	JDCOEM, Nagpur
6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7	Prof. Pranali Langde	Course Coordinator	JDCOEM, Nagpur

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7L005	Basic Electronic Simulation Lab	0	0	2	1

Prerequisites for the course	
1	Knowledge of Electronic Components and instruments

Prior Reading Material / useful links	
1	
2	
3	

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	**Develop** the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.
2	CO2	**Describe** sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms.
3	CO3	**Synthesize** Combinational and Sequential circuits on programmable ICs and test the hardware
4	CO4	**Interface** the hardware to the programmable chips and obtain the required output

Syllabus:

List of Experiments	
PART A	
1	Develop a Verilog program for 2 to 4 decoder.
2	Develop a Verilog program for 8 to 3 encoder (without priority & with priority).
3	Develop a Verilog program for 8 to 1 multiplexer
4	Design 4 bit binary to gray converter in Verilog
5	Model in Verilog for a full adder and add functionality to perform logical operations of XOR, XNOR, AND and OR gates.
6	Write a Verilog code to model 32 bit ALU.
7	Write Verilog code for SR, D and JK and verify the flip flop.
8	Write Verilog code for 4-bit BCD synchronous counter.
9	Write Verilog code for counter with given input clock and check whether it works as clock divider performing division of clock by 2, 4, 8 and 16. Verify the functionality of the code.
PART-B	
1	Develop a Verilog code to design a clock divider circuit that generates 1/2, 1/3rd and 1/4thclock from a given input clock. Port the design to FPGA and validate the functionality through oscilloscope.
2	Interface a DC motor to FPGA and write Verilog code to change its speed and direction.
3	Interface a Stepper motor to FPGA and write Verilog code to control the Stepper motor rotation which in turn may control a Robotic Arm. External switches to be used for different controls like rotate the Stepper motor (i) +N steps if Switch no.1 of a Dip switch is closed (ii) +N/2 steps if Switch no. 2 of a Dip switch is closed (iii) –N steps if Switch no. 3 of a Dip switch is closed etc.
4	Interface a DAC to FPGA and write Verilog code to generate Sine wave of frequency F KHz (eg. 200 KHz) frequency. Modify the code to down sample the frequency to F/2 KHz. Display the Original and Down sampled signals by connecting them to an oscilloscope.
5	Write Verilog code using FSM to simulate elevator operation.
6	Write Verilog code to convert an analog input of a sensor to digital form and to display the same on a suitable display like set of simple LEDs, 7-segment display digits or LCD display.

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5.	Prof. Neetu Gyanchandani	Chairman , BoS	JDCOEM, Nagpur
6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7	Prof. Dharmaveer Choudhari	Course Coordinator	JDCOEM, Nagpur

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Program: B.Tech in Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET7L001	Digital Communication Lab	0	0	2	1

Prerequisites for the course	
1	Communication System Engineering, Digital Communications, Signals and Systems.

Prior Reading Material / useful links	
1	
2	
3	

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	Evaluate the performance of PCM, DPCM and Delta modulation schemes.
2	CO2	Implement different digital modulation schemes like FSK, PSK, and DPSK.
3	CO3	Analyze source/channel encoding & decoding methods.
4	CO4	Simulate Pulse Digital Modulation & demodulation using MATLAB.
5	CO5	Simulate digital communication techniques like ASK, FSK & PSK.

Syllabus:

List of Experiments:	
Trainer Kit Based Experiments	
1	Generation and Detection of Pulse Code Modulation for both A.C and D.C signals
2	Generation and Detection of Differential Pulse Code Modulation
3	Generation and Detection of Delta Modulation
4	Generation and Detection of PSK.
5	Generation and Detection of FSK.
6	Generation and Detection of DPSK.
7	Generation and Detection of QPSK.
8	Linear Block code-Encoder and Decoder
9	Convolution code-Encoder and Decoder
10	To study the Spectrum Analyzer
Simulation Based Experiments (Open Source/Matlab/Multisim)	
1	Amplitude Shift Keying
2	Phase Shift keying
3	Time Division Multiplexing
4	Pulse Code Modulation

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4.	Dr. Sanjay L.Haridas	Dean Academics & BoS Member	JDCOEM, Nagpur
5.	Prof. Neetu Gyanchandani	Chairman , BoS	JDCOEM, Nagpur
6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7	Prof. Mohammad Hassan	Course Coordinator	JDCOEM, Nagpur

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Program: B.Tech Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET8E001A	5G Wireless Networks	3	0	0	3

Prerequisites for the course	
1	Basic knowledge of wireless communication

Prior Reading Material/useful links	
1	https://www.qualcomm.com/5g/what-is-5g#:~:text=A%3A%205G%20is%20based%20on,sub%2D6%20GHz%20and%20mmWave.
2	https://www.techtarget.com/searchnetworking/feature/Understand-the-basics-of-5G-wireless-networks

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	Understand the objectives of 5G
2	CO2	Compare 5G Architecture with 4G Architecture.
3	CO3	Analyze the principles of Softwarization in5G.
4	CO4	Explain the concept of MEC and Fog computing.
5	CO5	Evaluate physical layer design in 5G.
6	CO6	Characterize and analyze network security aspect in 5G.

Syllabus:

Course Contents	
UnitI	**Introduction** 5GPP & NGMN, 5G Design Objective Part 1, 5G Design Objective Part 2, ITU-R IMT-2020 vision for 5G, 5G Spectrum Requirements, Globally Harmonised 5G Spectrum, 5G Industry Progress, 5G Network Perspectives **[6 Hours]**
UnitII	**Architecture** 5G Scenarios, 5G RAN, 5G Mobile Core and Operating System, 5G Architecture View, 5G Network Slicing, 5G Architecture Plane Part 1, 5G Architecture Plane Part 2, Logical and Functional 5G Architecture, Dynamic CRAN, 5G NR Logical Architecture **[7 Hours]**
UnitIII	**Programmability and Softwarization** Network Programmability and Softwarization, Network Programmability. **[5 Hours]**
Unit IV	**Mobile Edge Computing and FOG Computing** MEC Introduction**,** MEC Concept, MEC Architecture, MEC Benefits, Fog Computing. **[6 Hours]**
UnitV	**Radio Access Technologies** Millimeter Wave Propagation, Flexible Physical Layer Design Part 1, Flexible Physical Layer Design Part 2, Distributed Massive MIMO Principles, Energy Transfer for Massive MIMO **[7 Hours]**
UnitVI	**Network Security** 5G Security, 5G Security Goals, 5G New Trust Model, Diversified Identity Management, User Privacy Protection Requirement, 5G Core Security, 5G Radio Network Security. **[7 Hours]**
Text Books	
1	R. Vannithamby and S. Talwar, Towards 5G: Applications, Requirements and Candidate Technologies. John Willey & Sons, West Sussex, 2017.
2	Manish, M., Devendra, G., Pattanayak, P., Ha, N., 5G and Beyond Wireless Systems PHY Layer Perspective, Springer Series in Wireless Technology.
Reference Books	
1	T. S. Rappaport, R. W. Heath Jr., R. C. Daniels, and J. M. Murdock,, Millimeter Wave Wireless Communication., Pearson Education, 2015.
2	M. Vaezi, Z. Ding, and H. V. Poor,, Multiple Access techniques for 5G Wireless Networks and Beyond., Springer Nature, Switzerland, 2019
Useful links	
1	https://onlinecourses.nptel.ac.in/noc21_ee12/preview
2	https://5g.systemsapproach.org/intro.html

Contributionsforsyllabusdesigning:

Sr.No	Name of the person	Designation	Organization
1.	Dr. Raghvendra B.Deshmukh	BoS Member (Academician)	VNIT, Nagpur
2.	Dr. Kishor M.Bhurchundi	BoS Member (VC Nominated)	VNIT, Nagpur
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5.	Prof. Neetu Gyanchandani	Chairman , BoS	JDCOEM, Nagpur
6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7.	Prof. Kiran Khandare	Course Coordinator	JDCOEM, Nagpur

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Program: B.Tech Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET8E001B	Modern Digital Communication System	3	0	0	3

Prerequisites for the course	
1	Basic knowledge of Digital communication.
2	Basic knowledge about communication techniques.

Prior Reading Material/useful links	
1	https://www.youtube.com/watch?v=hTAlcrqjNps
2	https://www.egr.msu.edu/~tongli/teaching/ece865/Introduction

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	Understand the principles and theories required to design reliable communication link
2	CO2	Compare different digital communication techniques and judge their applicability and performance in different application scenarios.
3	CO3	Evaluate mathematical modeling to solve problems in wire line and wireless digital communications, and explain how this is used to analyze and synthesize methods and algorithms within the relevant communication standards
4	CO4	Develop skillset to choose and optimize design parameters [e.g.,

		power distribution, modulation, redundancy, speed] in advanced communication technologies used in the telecommunication industry.
5	CO5	Improve fundamental grounding and sophistication needed to explore topics in Advanced and Emerging wireless communication standards like 4G, 5G and different WLAN that include MIMO, mmWave communication

Syllabus:

Course Contents	
UnitI	**Introduction** Introduction to Digital Communication, Elements of Digital Communication, Mathematical Models for Communication Channels and their characteristics, Review system designing and performance aspects, Networks aspects of digital interface, Historical background and developments in modern digital communication. **[5 Hours]**
UnitII	**Mathematical Preliminaries** Signals, LTI system, The Nyquist Sampling theorem, Complex envelope representation, the spectrum of bandpass signal, low pass equivalent of bandpass signal, Energy considerations, low pass equivalent of a bandpass system. Signal space representation of waveforms: Vector space concepts, Signal space concepts, Orthogonal expansions of signals, Gram-Schmidt procedure. **[6 Hours]**
UnitIII	**Digital Modulation Schemes and Optimum Receivers for AWGN Channels** Representation of digitally modulated signals, Multidimensional Signaling, Signaling Schemes with Memory: CPFSK, CPM. Spectral properties of various modulation schemes and their comparison, The Nyquist criterion for ISI avoidance, Optimum Receivers for AWGN Channels: Waveform and Vector Channel models, Optimum reception in AWGN, error probability of band-limited and power limited signaling, detection non-coherent detection. **[8 Hours]**
Unit IV	**Carrier and symbol Synchronization** Receiver design requirements, Signal Parameter estimation: Carrier recovery and symbol synchronization in signal demodulation, Carrier Phase estimation, Symbol timing estimation, Joint estimation of Carrier Phase and Symbol timing, Performance characteristics of ML estimators. **[7 Hours]**
UnitV	**Information-Theoretic Limits and Channel Coding** The capacity of AWGN Channel: modeling and geometry, Shannon theory basics: entropy, mutual information, and divergence, channel coding theorem, the capacity of standard constellations, parallel Gaussian channels and water filling Channel codes: Binary convolution codes, Turbo codes and iterative coding, LDPC codes, bandwidth-efficient coded modulation. **[7 Hours]**

UnitVI	**Digital Modulation for Wireless Communication** Physical modeling for wireless channels, Fading and diversity, OFDM, CDMA, MIMO- linear array, Beam-steering, MIMO-OFDM, Spatial Multiplexing, Space-time coding. **[6 Hours]**
Text Books	
1	John. G. Proakis, Digital Communications, McGraw Hill
2	Upamanyu Madhow, Fundamentals of Digital Communication, Cambridge University Press, 2012
Reference Books	
1	B. P. Lathi, Modern Digital and Analog Communication Systems, Oxford University Press, 4th Ed., 2009
2	J. R. Barry, E. A. Lee, and D. G. Messerschmitt, Digital Communication, Kluwer Academic Publishers, 2004
3	Simon Haykin, "Communication Systems," John Wiley & Sons, 5th Ed., 2009.
Useful links	
1	**https://eng.uok.ac.ir/mohammadkhani/courses/AdvDigitalComm_94_2.html**
2	**https://www.psa.gov.in/technology-frontiers/advanced-communication-technologies/758**

Contributions for syllabus designing:

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1.	Dr. Raghvendra B.Deshmukh	BoS Member (Academician)	VNIT, Nagpur
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6.	Prof. Shailesh Sakhare	Secretary, BoS & Course Coordinator	JDCOEM, Nagpur
7.	Prof. Md.Hassan	Course Coordinator	JDCOEM, Nagpur

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Program: B.Tech Electronics and Telecommunication Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
VII	ET8O004	Advanced Processors & Controllers	4	0	0	4

Prerequisites for the course	
1	Basic knowledge of digital circuits
2	Basic Idea about microprocessors & Microcontrollers.

Prior Reading Material/useful links	
1	https://www.elprocus.com/what-is-digital-circuit-design-and-its-applications/
2	https://www.agner.org/digital/digital_electronics_agner_fog.pdf

Course Outcomes:

Sr.No	Course outcome number	CO statement
1	CO1	Understand basic concepts of microprocessor 8085.
2	CO2	Explain the hardware architecture of 8051.
3	CO3	Discuss the ARM microprocessor architectures and its features.
4	CO4	Analyse Arduino Boards and Components.
5	CO5	Develop simple assembly language programs.
6	CO6	Elaborate practical applications of different processors.

Syllabus:

Course Contents	
UnitI	**Introduction to 8085** Microprocessor systems with bus organization, Microprocessor Architecture & Operations, Memory, I/O Device, Memory and I/O Operations, Introduction to 8085 assembly language programming, 8085 Microprocessor Architecture and its operation, Address, Data And Control Buses, Pin Functions, De-multiplexing of Buses, Generation Of Control Signals. Assembly Language Programming Basics, Introduction to 8085 instructions, Addressing Modes, Writing, Assembling & Executing a Program. **[10 Hours]**
UnitII	**Introduction to 8051** Microcontrollers: Microprocessors and Micro- controllers, 8051 controller, Block Diagram &Architecture. 8051 Instruction Set, Addressing modes & introduction to programming. 8051 Timers, Serial I/O, Interrupts. **[8 Hours]**
UnitIII	**ARM Processors** ARM Micro-controllers – overview; features, ARM 7 – architecture, Thumb, Register Model, Addressing modes. The RISC design philosophy, ARM design philosophy, embedded system hardware- AMBA bus protocol, Registers, CPSR-Processor modes, Banked registers. Pipeline- Characteristics. Fundamentals of ARM instructions, Barrel shifter. Advantages & Disadvantages of ARM processors. **[8 Hours]**
Unit IV	**ARDUINO** Introduction to Arduino, Architecture, Advantages, Versions of Arduino, Characteristics and layout of UNO,Introduction to Arduino IDE software, Introduction to sensors and actuators. Case study example. **[7 Hours]**
UnitV	**Introduction to Raspberry Pi** Introduction toRaspberry Pi ,OS for Raspberry Pi, Raspberry Pi processor, Versions of Raspberry pi models, Hardware components of Raspberry Pi 3,Case study of IoT Applications based onRaspberry Pi**.** **[8 Hours]**
UnitVI	**Applications of 8085 & 8051** Case study: Traffic Controller using 8085 Microprocessor,Temperature Control Using 8051 Microcontroller, ARM Cortex [STM32] based Solar Street Light,Arduino Based Home Automation System, Quadcopter usingRaspberry Pi. **[7 Hours]**
Text Books	
1	Steve Heath, "Embedded System Design" Butterworth Helnemann.
2	Kenneth J. Ayala "The 8051 Micro-controller
3	Architecture, Programming & Applications", Second Edition, Penram International & Thomson Asia.
4	John B. Peatman, "Design with PIC Micro- controllers", Low Price Edition, Pearson Education
5	Microprocessor Architecture, Programming & Applications, by Goankar, 6th Edition 2013
6	Fundamentals of Microprocessor and Microcontrollers, by B.Ram, Dhanpat Rai Publications, 9th edition 2019.

7	Simon Monk, “Programming the Raspberry Pi: Getting Started with Python”, January 2012, McGraw Hill Professional
Reference Books	
1	ARM System Developer’s guide –Andrew N. SLOSS, ELSEVIER Publications, ISBN 978-81-8147- 646-3, 2016
2	ARM Assembly Language – William Hohl, CRC Press, ISBN:978-81-89643-04-1
3	ARM System-on-chip Architecture by Steve Furber, Pearson Education, ISBN978-81- 317-0840-8, 2E,2012
4	LPC 2148 USER MANUAL
5	In Side R’s Guide To Philips Arm7 Based Microcontrollershitex.Co.Uk
6	ARM Programming Techniques – from ARM website
7	Embedded Systems: A Contemporary Design Tool- James K. Peckol ISBN: 978-0-471- 72180-2 October 2007, ©2008
8	Eben Upton and Gareth Halfacree, “Raspberry Pi User Guide”, August 2016, 4th edition, John Wiley & Sons
9	Alex Bradbury and Ben Everard, “Learning Python with Raspberry Pi”, Feb 2014, JohnWiley & Sons
10	Michael Margolis, “Arduino Cookbook”, First Edition, March 2011, O'Reilly Media, Inc
Useful links	
1	https://www.raspberrypi.org/magpiissues/Projects_Book_v1.pdf
2	https://www.sim8085.com/
3	http://www.edsim51.com/
4	https://nptel.ac.in/courses/117104072
5	https://archive.nptel.ac.in/content/storage2/courses/106108100/pdf/Lecture_Notes/LNm1.pdf
6	https://ict.iitk.ac.in/courses/learn-iot-through-arduino-and-raspberry-pi/

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Sr.No	Name of the person	Designation	Organization
1.	Dr. Raghvendra B.Deshmukh	BoS Member (Academician)	VNIT, Nagpur
2.	Dr. Kishor M.Bhurchundi	BoS Member (VC Nominated)	VNIT, Nagpur
3.	Mr. Sandeep Darwhekar	BoS Member (Industry)	Beta Computronics Pvt. Ltd
4.	Dr. Sanjay L.Haridas	Dean Academics & BoS Member	JDCOEM, Nagpur
5.	Prof. Neetu Gyanchandani	Chairman , BoS	JDCOEM, Nagpur
6.	Prof. Shailesh Sakhare	Secretary, BoS	JDCOEM, Nagpur
7.	Prof.Tushar Joshi	Course Coordinator	JDCOEM, Nagpur

Secretary **BOS**

Chairman **BOS**

Chairman **Acd.Council**

J D COLLEGE OF ENGINEERING & MANAGEMENT

An Autonomous College, Affiliated to DBATU, Lonere

At: Khandala, Post- Valni, Kalmeshwar Road, Near Petri, Nagpur

6th BOARD OF STUDIES MEETING NO. BOS/IT/06/2021-22 **22/03/2022**

Venue: VS-208 , Department of Information Technology, J. D College of Engineering & Management, Nagpur.

The 6th Meeting of the Board of Studies are held on Tuesday, 22nd March , 2022 at 2:00 P.M. in Department of Information Technology, JDCOEM. The mode of conduction of the meeting will be online through **Google Meet due to the outbreak of COVID-19.** All the members of the Board of Studies are requested to attend the meeting.

The following members are:

Sr.No.	Name of faculty	Designation
1	Mr. M. M. Baig	Chairman
2	Dr.Latesh Malik	Member (Academician)
3	Prof. Durgesh Sharma	Member(Alumni)
4	Mrs. Bhagyashree Madan	Secretary
5	Ms. Jolly Nikhade	Member
6	Mr. Manoj Lade	Member
7	Mrs. Khushboo Bisen	Member

B O S (Information Technology) Agenda

06/07/2021

Following will be the Agenda of Meeting

1. To confirm the minutes of 5th BOS meeting.
2. To bring on table the action taken report of 5th Meeting of BOS held on 06.07.2021.
3. To Finalize the Fourth Year Information Technology Syllabus
4. To finalize the new Elective subjects and the syllabus of the Elective subjects
5. To finalize the new Open Elective subjects and the syllabus of the Elective subjects
6. Any other matter with the permission of the Chair.

HOD
Information Technology
JDCOEM, Nagpur

Mr.Mirza Moiz Baig
Chairman,Board of Studies
Asstt. Professor
JDCOEM,Nagpur

J D COLLEGE OF ENGINEERING & MANAGEMENT.

An Autonomous College, Affiliated to DBATU, Lonere

At: Khandala, Post- Valni, Kalmeshwar Road, Near Fetri, Nagpur

6TH BOARD OF STUDIES MEETING NO. JDCOE/BOS/IT/06/2021-22

22/03/2022

Venue: Lab 1 , Department of Information Technology, J. D College of Engineering & Management, Nagpur.

The 6th Meeting of the Board of Studies was held on Tuesday, 22nd March, 2022 at 2:00 P.M. in Department of Information Technology, JDCOEM. The mode of conduction of the meeting was online through **Google Meet App due to an outbreak of COVID-19.**

The following members were present in the meeting:

Sr.No.	Name of faculty	Designation
1	Mr. M. M. Baig	Chairman
2	Dr. Latesh Malik	(Member, Academician)
3	Prof. Durgesh Sharma	Member (Alumni)
4	Ms. Bhagyashree Madan	Secretary
5	Mr. Manoj Lade	Member
6	Ms. Jolly Nikhade	Member

Minutes of Meeting

1) Meeting started on 22nd March 2022 at 2.00 P.M. by welcoming Dr. Latesh Malik (HOD of CSE ,Government College of Engineering, Nagpur) and Prof. Durgesh Sharma (Asst. Prof., GHRCE, Nagpur) and all members of BOS Committee by Ms. Bhagyashree Madan(Secretary, BoS IT)
2) Ms. Bhagyashree Madan explained the action report on 6th Meeting of BOS & overview the agenda of Current Meeting.

Item No. 1 Confirmation of the previous BoS meeting,

The previous meeting (5th BOS Meeting) was held on 06/07/2021 for discussion on the finalization of scheme and syllabus of Third year B.Tech under Autonomous scheme.

Item No. 2 Action Taken Report of the previous BoS meeting.

The secretary presented the minutes of BOS/IT/06/2020-21, to all the members and action taken on it. Following points were presented under this item.

Item No.	Item	Action Taken
01	• Approval to UG Syllabus • Suggestion by Dr. Latesh Malik (Member,	All the suggested changes/modifications were incorporated in the respective subjects. The changes were made in the theory as well as in practical's as

	Academician) and Mr.Durgesh Sharma (Member, Alumni)	suggested and the syllabus is finalized. The final draft of syllabus of 5th and 6th semester is ready.

Item No. 3	To Check Status of online course for 7th Semester & planning for 8th semester

1) In VII semester, under autonomous scheme, 20 % courses are considered to be studied by the students in self study mode through NPTEL/Swayam Portal. The subject "Design and Analysis of Algorithm " has been completed under 20% category.
2) In VI semester, the subject "Cloud Computing", has been taken as 20 % online in self study mode

Item No. 4	To discuss B. Tech. (Honors) Major & Minor domain specialization.

The concept "Major and Minors at B.Tech. level" is introduced to enhance learning skills of the students, acquisition of additional knowledge, in domains other than the disciplines being pursued by the students through Online mode, to make the students better employable with additional knowledge and encourage students to pursue cross discipline research.

The experts appreciated the scheme of different domains of major in IT and minors in cross discipline.

Item No. 5	Review of 4th Year Syllabi.

In the review of Fourth Year Syllabus
1) The expert has suggested to include one more text book for the subject "**Data Science**"(VII SEM IT).

2) Experts have suggested to split the 1st unit into two and remove the 4th unit i.e expert system in the syllabus of **AI & Cognitive Robotics** (VII SEM IT).

3) Dr. Latesh Malik suggested to verify all the contents are in book or not for **Computer Forensic** subject (VII SEM).

4) Add one unit related to programming in **Robotics & Automation** (VII SEM IT), also add reference book related to it.

5) Add the topic Sentimental Analysis to the subject **NLP** (VII SEM)

6) Include content related to AI in **AI in Digital Forensic** subject. (VII SEM)

7) Ensure that availability of Textbook and Reference Books in College Library.

8) Experts suggested to include NPTL Related software in **Middleware Technologies (Lab)** (VII Sem)

9) Merge the topic CSS & HTML. Include Database and MYSQL in **Full Stack Development subject.** (VII SEM)

Item No. 6	Question paper setting and moderation for various subjects.

BoS Chairman, expert and members decided to continue the current pattern for Question paper setting and moderation for various subjects for the academic year and no further modification required.

Item No. 7	Any other matter with the permission of the Chair.

No other matter is discussed.

The meeting was concluded with vote of thanks.

HOD
Information Technolog.
JDCOEM, Nagpu

Prof. Mirza M.Baig
Chairman, Board of Studies,
JDCOEM, Nagpur

Sr. No.	Name of the Faculty	Sign
1.	Mr. M.M.Baig	
2.	Ms. Bhagyashree Madan	
3.	Ms. Jolly Nikhade	
4.	Mr. Manoj Lade	
External Member		
1	Dr.Latesh Malik	
2	Mr.Durgesh Sharma	

AGENDA FOR 07TH BOARD OF STUDIES MEETING NO. BOS/IT/07/2022-23 | 22/12/2022

Venue: VS-109
Information Technology Department,
J. D College of Engineering & Management, Nagpur

The 07th meeting of the Board of Studies will be held on 22th **December, 2022** at **12:00 P.M.** The mode of conduction of the meeting will offline. All the members of the Board of Studies are requested to attend the meeting. The agenda for the meeting will be as below.

Item No. 1	Confirmation of the Previous BoS meeting.

The last meeting was held on 22nd March 2022, and discussion related to the scheme for all the semester was done.

Item No. 2	Action taken report for last meeting minutes.

Feedback and action taken for the previous meetings to be discussed.

Item No. 3	Scheme Revision for 2nd ,3rd and 4th Year

Discussion and finalization of UG scheme, activity based subjects and corresponding activities to be designed for each subject.

Item No. 4	Syllabus Revision for 2nd Year

Discussion and finalization of UG Syllabus, activity based subjects and corresponding activities to be designed for each subject

Item No. 5	Rubrics of CA evaluation

Discussion and finalization of Rubrics for Continuous Evaluation in theory subjects and labs, session for 2022-23

Item No. 6	Inclusion of MOOC in 4th & 8th Sem

Discussion and finalization of Two Massive Online Open Courses to become eligible for the award of B.Tech. degree.

Item No. 7	Achievement of Staff and Students

Discussion of Paper Publications, Patents, Copyrights and other matters.

Item No. 8	Any other matter with the permission of the Chair.

No other matter is discussed.

HOD
Information Technolog
JDCOEM, Nagpu

Mr. M.M.Baig
Secretary BOS,
Information Technology Board
JDCOEM, Nagpur

Board of Studies, Department of Information Technology

Sr. No.	Name of the Faculty	Sign
1.	Mr. M. M. Baig	
2.	Mr. Milind Tote	
3.	Mrs. Supriya Sawwashere	
4.	Mr. Chetan Padole	
5.	Mrs. Aparna Bondade	
6.	Mr. Girish Umratkar	
External Member		
1.	Dr Vilas Mahatme	
2.	Mr. Ram Samdekar	
3.	Mrs Vaishali Y. Bhajbhuje	

JAIDEV EDUCATION SOCIETY'S

J D COLLEGE OF ENGINEERING & MANAGEMENT

POST : VALNI, AT : KHANDALA , KATOL ROAD, NAGPUR - 441 501

NOTICE

Date: 05/12/2022

Board of Studies as on 22/12/2022 for Information Technology Department

Sr No	Category	Name of the Member	Organization	Contact Details: Mail id and Phone No
	Chairman	Prof. Mirza Moiz Baig	JDCOEM Nagpur	mirzammb@gmail.com 9881837868
	Specialization faculties	Prof. Mirza Moiz Baig (Cloud Computing and Machine Learning)	JDCOEM Nagpur	mirzammb@gmail.com 9881837868
		Dr. S.V. Sonekar (Wireless Communication and Computing)	JDCOEM Nagpur	srikantsonekar@gmail.com 7720039691 ,9823583089
		Prof. Supriya Sawwashere (Digital Image Processing)	JDCOEM Nagpur	@gmail.com
		Prof. Bhagyashree Madan (Cryptography and Security)	JDCOEM Nagpur	bhagyashreemadan26@gmail.com
		Prof. Chetan Padole (Python ,Machine Learning)	JDCOEM Nagpur	chetanppadole@gmail.com
		Prof. Aparna Bondade (OOPs,Java)	JDCOEM Nagpur	aparnabondade@gmail.com @gmail.com
	Subject Expert from outside university nominated by academic council	Dr. Vilas Mahatme (Artificial Intelligence, Data mining & warehousing, Soft computing and System software)	KITS College of Engineering, Ramtek	**E-mail: -** mahatme.vilas@gmail.com 9420410660
	Subject Expert: VC Nominee	Dr/Mr/Mrs. Chittaranjan Hota	Bits-Pilani,Hyderabad	hota@hyderabad.bits-pilani.ac.in
	Expert for special courses	Mrs Vaishali Y. Bhajbhuje	Senior Software Developer CloudTaru Pvt. Ltd. Hyderabad	vbhajbhuje72@gmail.com 9049660884
	Graduate Alumni	Mr. Ram Samdekar	Tavant Technology Software Engineer	samdekar.ram@gmail.com 9503833173

		Madhapur, Hyderabad	
All the staff members	Dr. S.V. Sonekar Prof. Umesh Samarath Prof. Chetan Padole Prof. Aparna Bondade Prof. Milind Tote Prof. Bhagyashree Madan Prof. Girish Umratkar	JDCOEM Nagpur	srikantsonekar@gmail.com 7720039691 umesh.s.samarth@gmail.com 9049660884 chetanppadole@gmail.com 9730973840 aparnabondade@gmail.com 7020534797 milindtote26@gmail.com 8275555881 bhagyashreemadan26@gmail.com 7000215565
Member Secretary (Senior faculty member)	Prof. Bhagyashree Madan	JDCOEM Nagpur	bhagyashreemadan26@gmail.com

Education to Eternity

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere
Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.in
An Autonomous Institute, with NAAC "A" Grade

VISION

To be a center of excellence imparting professional education satisfying societal and global needs.

MISSION

1. Transforming students into lifelong learners through, quality teaching, training and exposure to concurrent technologies.
2. Fostering conducive atmosphere for research and development through well equipped laboratories and qualified personnel in collaboration with global organizations.

JDCOEM/AC /2022-23/07

Date: 23/03/2023

NOTICE

This is to inform all the concerned that the 7th meeting of the Academic Council has been scheduled on 24/03/2023 as per the following details:

Venue: Online through Google-meet (link will be shared in due course of time)

Date: 24/03/2023

Time: 2 pm

The following agenda will be transacted during the meeting.

1. To Confirm the Minutes of 6th meeting of Academic Council.
2. To bring on table the action taken report of 6th Meeting of Academic Council held on 10/05/2022.
3. To welcome newly nominated members on Academic council.
4. To note the nominee of DBATU on Various Board of Studies.
5. To approve the new course B. Tech. in Computer Science & Engineering (Data Science) from the session 2022-23 and to take on record the reduction of intake for Mechanical Engg.
6. To approve the syllabus, inclusion of subjects "Problem Solving using C (HU1T003)", "Principle of Data Science(DS1T010)" and "Statistical Analysis (DS2T011)" in First year common scheme for B. Tech. in Computer Science & Engineering (Data Science).
7. To approve the increase in intake of MBA from 60 to 120 from the session 2022-23.
8. To approve the syllabus of subjects of VII and VIII - Semesters of AI.
9. To update the syllabus of M-III of CSE, AI, IT.
10. To update the syllabus of subjects in different BOS.
11. Amendment in Ordinance of JDCOEM under various clauses.
12. Amendment in Exam manual of JDCOEM under clause "1.3 Examination Cell".
13. To extend the term of controller of Examination COE.
14. To approve the Academic Calendar for the session 2022-23 Even Sem.
15. To approve the Result of 2022-23 ODD sem.
16. To approve the guidelines for Valuer.
17. To approve the Internship policy.
18. To approve the Continuous Assessment Rubrics from the session 2022-23.
19. To approve the guideline for MOOC.
20. To approve the merging of Diploma program into J D College of Engineering & Management.

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21. To consent for going to NBA for diploma course.
22. Achievement of JDCOEM in 2022-23.
23. Any other matter with the permission of the Chair.

Dr. S.V. Sonekar
Offtg. Principal
JDCOEM, Nagpur

Principal
College of Engineering & Management
Khandala, Katol Road
Nagpur-441 001

Copy for kind information:

- Hon. Director, JES for kind information please
- Expert Academicians with a request to attend the meeting
- University Nominees with a request to attend the meeting
- Member Secretary for NA
- Internal Members of Council for NA

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AGENDA FOR THE ACADEMIC COUNCIL MEETING NO. JDCOEM/07/2022-23 — **24/03/2023**

Venue: Online through Google Meet

J. D. College of Engineering & Management, Nagpur

The 7th Meeting of Academic Council will be held on 24th March 2023 at 2 pm on online through Google Meet. All the members of Academic Council are requested to attend the meeting. The following agenda will be transacted in the meeting:

Item No. 1 **To Confirm the Minutes of 6th meeting of Academic Council:**

The Meeting of 6th Academic Council was held on 10th May 2022 and minutes were sent to the University and all members for information. The Minutes of Meeting has been tabled before the house (Annexure-I).

Item No. 2 **To bring on table the action taken report of 6th Meeting of Academic Council held on 10/05/2022.**

The item wise Action Taken Report on the minutes of 6th meeting of the Academic Council held on 10th May 2022 has been tabled before the house for information (Annexure-II).

Item No. 3 **To welcome newly nominated members on Academic council.**

Our autonomy started from 2019-20. According to ordinance of JDCOEM the term of nominated members on academic council is of three years. As per the regulation of UGC minimum four experts from outside the college and three members are to be nominated on Academic Council from the affiliated University. Following are the new members of Academic council.

1. Dr. R. P. Borkar, Principal GCOE, Nagpur
2. Dr. R. Pande, Principal RCOEM, Nagpur
3. Dr. M. M. Raghuvanshi, Symboisys, Nagpur
4. Mr. Amol Raghushe, TCS, Nagpur
5. Dr. M. Sadaih, DBATU, Lonere
6. Dr. B. F. Jogi, DBATU, Lonere

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7. Dr. L. D. Netak, DBATU Lonere

It is for information & acceptance of the house (Annexure-III).

Item No. 4	**To note the nominee of DBATU on Various Board of Studies.**

As per the regulation of UGC one member is to be nominated on BOS from the affiliated University. The college has received letter from DBATU, about the nominee wide letter no. DBATU/AFFIL/1002/2023/447 dated 10th February 2023. DBATU has nominated Prof. U. Deshpande of VNIT & Prof. Latesh Malik of GCOE as an academician on BOS of AI & CSE (DS) respectively. This is for information and acceptance of the house (Annexure-IV).

Item No. 5	**To approve the new course B. Tech. in Computer Science & Engineering (Data Science) from the session 2022-23 and to take on record the reduction of intake for Mechanical Engg.**

College has applied for B. Tech. in Computer Science & Engineering (Data Science) for 1st division (60 students) with reduction in intake of Mechanical Engineering from 120 to 60 (Annexure-V). This new course has been approved by AICTE from 2022-23 onwards (Annexure-V).

The house is requested to ratify the additional course "Computer Science & Engineering (Data Science)" along with the scheme (Annexure-VI) of it and admit the reduction in intake of Mechanical Engineering.

Item No. 6	**To approve the syllabus, inclusion of subjects "Problem Solving using C (HU1T003)", "Principle of Data Science(DS1T010)" and "Statistical Analysis (DS2T011)" in First year common scheme for B. Tech. in Computer Science & Engineering (Data Science).**

It has been suggested by Board of Studies to keep "Problem Solving using C (Theory & Practical)", "Principle of Data Science" subjects in 1st semester and "Statistical Analysis" subject in 2nd semester subjects in place of "Introduction to programming, Basic of Electrical & Electronics Engineering & Basic of Civil & Mechanical Engineering" respectively. The issue has been placed in front of house for approval (Annexure-VII).

Item No. 7	**To approve the increase in intake of MBA from 60 to 120 from the session 2022-23.**

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College has applied for increase in intake of MBA from 60 to 120. It has been approved by AICTE from 2022-23 onwards (Annexure-V).

The house is requested to admit the increase in intake of MBA.

Item No. 8 | To approve the syllabus of subjects of VII and VIII - Semesters of AI.

The scheme of AI has already been approved in 3rd meeting of the house. The syllabi of First, Second and Third year were also approved in the consecutive meetings. Now Board of Studies of AI has finalized the syllabus of 4th year (VII & VIII - Sem) and forwarded to the house for approval (Annexure-VIII).

Item No. 9 | To update the syllabus of M-III of CSE, AI, IT.

Looking into execution and requirement updating was done in the syllabus of M-III of CSE, AI & IT. This is for information & approval of the house (Annexure-IX).

Item No. 10 | To update the syllabus of subjects in different BOS.

Looking into execution and requirement updating was done in the syllabus of following subjects by different BOS. This is for information & approval of the house.

1. EE BOS : Autocad (Annexure-X)
2. CE BOS : Concrete Technology, Design of RC structure, Structural Analysis (Annexure-XI)
3. ETC BOS : EDC, S&S (Annexure-XII)

Item No. 11 | Amendment in Ordinance of JDCOEM under various clauses.

1. In Introduction; under departments, table which was amended in 5th meeting of the house include following row (Annexure-XIII)

17	Computer Science & Engineering (Data Science)	CSE (DS)

2. Under program Offered and under graduate programs, table was amended in 5th meeting of house include following row

VISION

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MISSION

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8	Computer Science & Engineering (Data Science)	CSE (DS)	8	Eligibility Criteria as laid down by the competent authority from time to time

Item No. 12	**Amendment in Exam manual of JDCOEM under clause "1.3 Examination Cell".**

Presently in Exam manual of JDCOEM under clause 1.3 Examination Cell mentioned that "In accordance with the guidelines of the University Grants Commission to autonomous Colleges, there will be an examination cell headed by the Controller of Examinations (COE) who will be a permanent faculty appointed by the Principal on the basis of the potential of the person and in accordance with statutory norms if any".

Now it is read as "In accordance with the guidelines of the University Grants Commission to autonomous Colleges, there will be an examination cell headed by the Controller of Examinations (COE) who will be a full time regular faculty nominated by the Principal on the basis of the potential of the person and in accordance with statutory norms if any" (Annexure-XIV).

Item No. 13	**To extend the term of controller of Examination COE**

Our autonomy was started from 2019-20 and as per the Exam manual of JDCOEM the term of controller of examination COE is of three years. So the first term of COE is ended in 2022-23. College wants to extend his tenure & giving one more term of three years to COE, Mr. S. R. Gupta. It is for approval of house (Annexure-XV).

Item No. 14	**To approve the Academic Calendar for the session 2022-23 Even Sem.**

Academic Calendars are prepared for all semester (4^{th}, 6^{th} & 8^{th} sem). It is for information and approval for the house (Annexure-XVI).

Item No. 15	**To approve the Result of 2022-23 ODD sem.**

3^{rd}, 5^{th} & 7^{th} semester exams of 2022-23 were conducted & result of 5^{th} & 7^{th} sem are declared. The result is for information & approval of house (Annexure-XVII, XVIII).

VISION

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Item No. 16 To approve the guidelines for Valuer.

For valuation of answer sheets guidelines are prepared for the Valuer. It is for information & approval of house (Annexure-XIX).

Item No. 17 To approve the Internship policy.

BOS of ME, CE & EE suggested internship for B. Tech. students in 8th sem., accordingly scheme has been modified and all students of these programs are doing internship at various industries. So we prepare a guideline for execution & valuation of this internship. It is for information & approval of the house (Annexure-XX).

Item No. 18 To approve the Continuous Assessment Rubrics from the session 2022-23.

College follows the activity based learning; to promote it we modified our continuous assessment rubrics. It is for information & approval of the house (Annexure-XXI).

Item No. 19 To approve the guideline for MOOC.

To promote online learning college has decided that students should complete at-least two MOOC courses during his/her B. Tech. duration. It will be a credit course. Credit will be considered in 4th sem & 8th sem. For successful implementation guideline is prepared. This is for information & approval of the house (Annexure-XXII).

Item No. 20 To approve the merging of Diploma program into J D College of Engineering & Management.

The Jaidev Education Society has two colleges; Engineering & Polytechnic. Now the Polytechnic College is merged in Engineering College hence both college is under "J D College of Engineering & Management". The house is requested to admit this merging (Annexure-V).

Item No. 21 To consent for going to NBA for diploma course.

According to pre-qualifier for NBA we are eligible for ME, CO, ETC and EE hence college has decided to go for NBA for these programs. This is for information to the house and consent for the same (Annexure-XXIII).

Item No. 22 Achievement of JDCOEM in 2022-23.

Following activities are conducted during 2022-23.

1. Five faculties awarded with Ph. D. (Annexure-XXIV).

VISION

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MISSION

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2. Organized International conference on "Advance in Materials: Engineering & Technology" in association with RTMNU, Nagpur and in collaboration with Luminescence Society of India (Annexure XXV).
3. ETC department has organized FDP on "AI/ML for Computer Vision Applications" in collaboration with NIT, Warangal (Annexure XXVI).
4. Other departments will organize FDPs in April 2023.
5. On 28-29 March 2023 Industry-Academia convention and Student summit is planned (Annexure-XXVII & XXVIII).
6. Tech-fest for students "Brainwaves" was conducted on 01-02 March 2023 (Annexure-XXIX).
7. Student & faculties (Teaching & non teaching) were felicitating in various categories (Annexure-XXX).

Item No. 23	**Any other matter with the permission of the Chair.**

Chairman
Academic Council
JDCOEM, Nagpur.

Principal
College of Engineering & Management
Khandala, Katol Road
Nagpur-441501

Education to Eternity

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch: Information Technology **Branch code: IT**

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics-I	3	1	0	20	20	60	100	4
3	BSC	CS1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	CS1T006	Energy and Environment	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	CS1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	CS1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**18**

2nd Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	60	0	40	100	2
2	BSC	MA2T001	Engineering Mathematics-II	3	1	0	20	20	60	100	4
3	BSC	CS2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	CS2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	CS2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	CS2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field	Report submission						50	1
9	ESC	CS2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**17**

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3rd Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	HSMC	IT3T001	Organization Behavior	2	0	0	20	20	60	100	2
2	HSMC	IT3T002	Universal Human Values	2	1	0	20	20	60	100	3
3	BSC	IT3T003	Mathematics-III	2	1	0	20	20	60	100	3
5	PCC	IT3T004	Digital Electronics and Computer Organsization	3	0	0	20	20	60	100	3
6	PCC	IT3T005	Data structure usihg OOPs	2	1	0	20	20	60	100	3
7	PCC	IT3T006	Computer Graphics Algorithms	3	0	0	20	20	60	100	3
8	PCC	IT3T007	Data structure using OOPs(Lab)	0	0	2	60	0	40	100	1
9	ESC	IT3T008	Python Programming (Lab)	0	0	2	60	0	40	100	1
10	PCC	IT3T009	Computer Graphics (Lab)	0	0	2	60	0	40	100	1
				14	**3**	**6**	**300**	**120**	**480**	**900**	**20**

4th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PCC	IT4T001	Theory of Computation	2	1	0	20	20	60	100	3
2	PCC	IT4T002	Java Programming	3	0	0	20	20	60	100	3
3	PCC	IT4T003	Operating System	3	0	0	20	20	60	100	3
4	PCC	IT4T004	Computer Networks	2	1	0	20	20	60	100	3
5	PCC	IT4T005	DBMS	3	0	0	20	20	60	100	3
6	PCC	IT4T006	Discrete Mathematics & Graph Theory	3	0	0	20	20	60	100	3
7	PCC	IT4L007	DBMS(Lab)	0	0	2	60	0	40	100	1
8	PCC	IT4L008	Computer Networks(Lab)	0	0	2	60	0	40	100	1
9	PCC	IT4L009	Java Programming(Lab)	0	0	2	60	0	40	100	1
10	MC	IT4L010	Consumer Affairs	2	0	0	15	10	25	50	Audit
11	PROJECT	IT4P011	Field Training/ Industrial Visit	0	0	2	30	0	20	50	1
12	PCC	IT4T012	NPTEL Course				25		25	50	2
				18	**2**	**8**	**370**	**130**	**550**	**1050**	**24**

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5th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	ESC	IT5T001	Embedded System & IoT	3	0	0	20	20	60	100	3
2	PCC	IT5T002	Cyber Security & Cryptography	2	1	0	20	20	60	100	3
3	PCC	IT5T003	Design and Analysis of Algorithm	2	1	0	20	20	60	100	3
4	OEC	IT5O001	Open Elective-1	3	1	0	20	20	60	100	4
5	PEC	IT5TE01	Elective -I	3	0	0	20	20	60	100	3
6	ESC	IT5L004	Embedded System & IoT (Lab)	0	0	2	60	20	40	100	1
7	PCC	IT5L005	Cyber Security & Cryptography (Lab)	0	0	2	60	0	40	100	1
8	PCC	IT5L006	Design and Analysis of Algorithm (Lab)	0	0	2	60	0	40	100	1
9	PROJECT	IT5P007	Mini Project	0	0	2	30	0	20	50	1
10	PROJECT	IT5P008	Field Training/ Industrial Visit	0	0	2	30	0	20	50	1
11	MC	IT5T009	Innovation and Enterpreneurship Development	2	0	0	15	10	25	50	Audit
				15	3	12	355	130	485	950	21

Open Elective-1 : Web Development & Design

6th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	ESC	IT6T001	Adhoc Wireless Networks	3	0	0	20	20	60	100	3
2	PCC	IT6T002	Machine Learning	2	1	0	20	20	60	100	3
3	PEC	IT6TE02	Elective -II	3	0	0	20	20	60	100	3
4	PEC	IT6TE03	Elective-III	3	0	0	20	20	60	100	3
5	OEC	IT6O002	Open Elective 2	3	1	0	20	20	60	100	4
6	ESC	IT6L003	Adhoc Wireless Networks (Lab)	0	0	2	60	0	40	100	1
7	PCC	IT6L004	Machine Learning (Lab)	0	0	2	60	0	40	100	1
8	PCC	IT6L005	Multimedia (Lab)	0	0	2	60	0	40	100	1
9	PROJECT	IT6P006	Mini Project	0	0	4	30	0	20	50	1
10	PROJECT	IT6P007	CRT(Campus Recruitment Training)	0	0	2	50	0	0	50	1
11	PROJECT	IT6P008	Skill Development	0	0	2	15	0	35	50	1
12	MC	IT6T009	Intellectual Property Rights	2	0	0	15	10	25	50	Audit
				16	2	14	390	110	500	1000	22

Open Elective-2: SQL Programming

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7th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	ESC	IT7T001	Data Science	2	1	0	20	20	60	100	3
2	PCC	IT7T002	Artificial Intelligence & Cognitive Robotics	3	0	0	20	20	60	100	3
2	PEC	IT7TE04	Elective-IV	2	1	0	20	20	60	100	3
3	PEC	IT7TE05	Elective -V	2	1	0	20	20	60	100	3
5	OEC	IT7O003	OPEN Elective -III	3	0	0	20	20	60	100	4
6	ESC	IT7L002	Data Science using R (Lab)	0	0	2	60	0	40	100	1
7	PEC	IT7L003	Middleware Technolgies(Lab)	0	0	2	60	0	40	100	1
8	PROJECT	IT7P004	Project Phase I	0	0	6	50	0	50	100	3
9	MC	IT7T005	Research Methodology	2	0	0	15	10	25	50	Audit
				14	**3**	**10**	**285**	**110**	**455**	**850**	**21**

Open Elective-3 : Cloud Computing & Storage Management

8th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PEC	IT8TE06	Elective –VI	3	0	0	20	20	60	100	3
2	OEC	IT8O004	OPEN Elective -IV	3	1	0	60	20	40	100	4
3	PROJECT	IT8P001	Project Phase II	0	0	6	75	0	75	150	5
4	PCC	IT8T002	NPTEL Courses	0	0	0	25		25	50	2
				6	**1**	**6**	**180**	**40**	**200**	**400**	**14**

Open Elective-4 : Big Data Analytics

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch: Information Technology **Branch code: IT**

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics-I	3	1	0	20	20	60	100	4
3	BSC	CS1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	CS1T006	Energy and Environment	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	CS1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	CS1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**				750	**18**

2nd Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	60	0	40	100	2
2	BSC	MA2T001	Engineering Mathematics-II	3	1	0	20	20	60	100	4
3	BSC	CS2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	CS2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	CS2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	CS2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field	Report submission						50	1
9	ESC	CS2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**				800	**17**

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3rd Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	HSMC	IT3T001	Organization Behavior	2	0	0	20	20	60	100	2
2	HSMC	IT3T002	Universal Human Values	2	0	0	20	20	60	100	2
3	BSC	IT3T003	Mathematics-III	2	1	0	20	20	60	100	3
4	ESC	IT3T004	Digital Electronics & Fundamentals of Microprocessor	3	0	0	20	20	60	100	3
5	PCC	IT3T005	Computer Arhcitecture & Organsization	3	0	0	20	20	60	100	3
6	PCC	IT3T005	Data structure using OOPs	2	1	0	20	20	60	100	3
7	PCC	IT3T006	Computer Graphics Algorithms	3	0	0	20	20	60	100	3
8	PCC	IT3L007	Data structure using OOPs(Lab)	0	0	2	60	0	40	100	1
9	ESC	IT3T008	Digital Electronics & Fundamentals of Microprocessor (Lab) Python Programming Lab	0	0	2	60	0	40	100	1
10	PCC	IT3L009	Computer Graphics (Lab)	0	0	2	60	0	40	100	1
				17	2	6	320	140	540	1000	23 20

4th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PCC	IT4T001	Theory of Computation	2	1	0	20	20	60	100	3
2	PCC	IT4T002	Java Programming	3	0	0	20	20	60	100	3
3	PCC	IT4T003	Operating System	3	0	0	20	20	60	100	3
4	PCC	IT4T004	Computer Networks	2	1	0	20	20	60	100	3
5	PCC	IT4T005	DBMS	3	0	0	20	20	60	100	3
6	PCC	IT4T006	Discrete Mathematics & Graph Theory	3	0	0	20	20	60	100	3
7	PCC	IT4L007	DBMS(Lab)	0	0	2	60	0	40	100	1
8	PCC	IT4L008	Computer Networks(Lab)	0	0	2	60	0	40	100	1
9	PCC	IT4L009	Java Programming(Lab)	0	0	2	60	0	40	100	1
10	MC	IT4L010	Consumer Affairs	2	0	0	15	10	25	50	Audit
11	PROJECT	IT4P011	Field Training/ Industrial Visit	0	0	0	30	0	20	50	1
12	PCC	IT4T12	NPTEL Course								2
				18	2	6	345	130	525	1000	24

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5th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	ESC	IT5T001	Embedded System & IoT	3	0	0	20	20	60	100	3
2	PCC	IT5T002	Cyber Security & Cryptography	2	1	0	20	20	60	100	3
3	PCC	IT5T003	Design and Analysis of Algorithm	2	1	0	20	20	60	100	3
4	PCC	IT5O001	Open Elective-1	3	1	0	20	20	60	100	4
5	PEC	IT5TE01	Elective -I	3	0	0	20	20	60	100	3
6	ESC	IT5L004	Embedded System & IoT (Lab)	0	0	2	60	20	40	100	1
7	PCC	IT5L005	Cyber Security & Cryptography (Lab)	0	0	2	60	0	40	100	1
8	PCC	IT5L006	Design and Analysis of Algorithm (Lab)	0	0	2	60	0	40	100	1
9	PROJECT	IT5P007	Mini Project	0	0	2	30	0	20	50	1
10	PROJECT	IT5P008	Field Training/ Industrial Visit	0	0	0	30	0	20	50	1
11	MC	IT5T009	Innovation and Enterpreneurship Development	2	0	0	15	10	25	50	Audit
				15	3	8	355	130	485	950	21

Open Elective-1 : Web Development & Design

6th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	ESC	IT6T001	Adhoc Wireless Networks	3	0	0	20	20	60	100	3
2	PCC	IT6T002	Machine Learning	2	1	0	20	20	60	100	3
3	PEC	IT6TE02	Elective -II	3	0	0	20	20	60	100	3
4	PEC	IT6TE03	Elective-III	3	0	0	20	20	60	100	3
5	OEC	IT6O002	Open Elective 2	3	1	0	20	20	60	100	4
6	ESC	IT6L003	Adhoc Wireless Networks (Lab)	0	0	2	60	0	40	100	1
7	PCC	IT6L004	Machine Learning (Lab)	0	0	2	60	0	40	100	1
8	PCC	IT6L005	Multimedia (Lab)	0	0	2	60	0	40	100	1
9	PROJECT	IT6P006	Mini Project	0	0	4	30	0	20	50	1
10	PROJECT	IT6P007	CRT(Campus Recruitment Training)	0	0	2	50	0	0	50	1
11	PROJECT	IT6P008	Skill Development	0	0	2	15	0	35	50	1
12	MC	IT6T009	Intellectual Property Rights	2	0	0	15	10	25	50	Audit
				16	2	14	390	110	500	1000	22

Open Elective-2: SQL Programming

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7th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	ESC	IT7T001	Data Science	2	1	0	20	20	60	100	3
2	PCC	IT7T002	Artificial Intelligence & Cognitive Robotics	3	0	0	20	20	60	100	3
2	PEC	IT7TE04	Elective-IV	2	1	0	20	20	60	100	3
3	PEC	IT7TE05	Elective -V	2	1	0	20	20	60	100	3
5	OEC	IT7O003	OPEN Elective -III	3	0	0	20	20	60	100	4
6	ESC	IT7L002	Data Science using R (Lab)	0	0	2	60	0	40	100	1
7	PEC	IT7L003	Middleware Technolgies(Lab)	0	0	2	60	0	40	100	1
8	PROJECT	IT7P004	Project Phase-I	0	0	6	50	0	50	100	3
9	MC	IT7T005	Research Methodology	2	0	0	15	10	25	50	Audit
				14	3	10	285	110	455	850	21

Open Elective-3 : Cloud Computing & Storage Management

8th Semester Information Technology

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PEC	IT8TE06	Elective –VI	3	0	0	20	20	60	100	3
2	OEC	IT8O004	OPEN Elective -IV	3	1	0	60	20	40	100	4
3	PROJECT	IT8P001	Major Project Phase-II	0	0	6	75	0	75	150	5
4	NPTEL		NPTEL Courses	0	0	0					2
				6	1	6	155	40	175	350	12

Open Elective-4 : Big Data Analytics

750
800
1000
1000
950
1000
850
350
6700

PROFESSIONAL ELECTIVE COURSES		
Code	**Subject**	**Elective**
IT5TE01A	Semantic Web	I
IT5TE02B	Quantum Computing	I
IT5TE03C	Biomedical Informatics	I
IT6TE02A	Cloud Computing & Storage Mana	II
IT6TE02B	Expert Systems	II
IT6TE02C	Block Chain	II
IT6TE02D	Big Data Analytic Technique	II
IT6TE03A	Graph Analytic for Big Data	III
IT6TE03B	Smart Sensors For Robotics	III
IT6TE03C	Human Computing	III
IT6TE03D	Machine Learning with Big Data	III
IT7TE04A	Computational Intelligence	IV
IT7TE04B	Computer Forensic	IV
IT7TE04C	Robotics and Automation	IV
IT7TE04D	Natural Language Processing	IV
[illegible]TE05A	Advanced Computer Vision	V
IT[illegible]E05B	AI In Digital Forensic	V
IT7TE05C	Brain Machine Interface and Interaction	V
IT7TE05D	Virtual Reality	V
IT8TE06A	Bitcoin and CryptoCurrencies	VI
IT8TE06B	Full Stack Development	VI
IT8TE06C	Advanced Tools for Software Testing	VI
IT8TE06D	Advanced Distributed Database System	VI

Total Credits:		
	I sem	18
	II sem	17
	III sem	~~22~~ 20
	IV sem	24
	V sem	21
	VI sem	22
	VII sem	21
	VIII sem	~~12~~ 14
	Total	**157**

OPEN ELECTIVE COURSES (OEC)	
Course Code	**Subject**
1	Finance for Engineers
2	Engineering Economics
3	Legislative Procedure
4	Labour Law
5	Communication skills
6	Fitness Management Yoga
7	English language Proficiency
8	Quantative Aptitude & Logical Resoning
9	Personal Psychology
10	Classical Singing
11	Dancing
12	Drama
13	Physics of Engineering Materials
14	Nanotechnology
15	Biology for Engineers
16	Life and Career Skills with Interactive Learning
17	Human Resource Development and Organizational Behavior
18	Probality of Random Variable
19	Advanced Controller & Aplications
20	Internet Technologies
21	Internet of Things
22	Broadband Communication
23	PLC, SCADA
24	Mechatronics
25	MEMS
26	RF Circuit Design
27	Automotive Embedded System
28	Digital Designing with Coral Draw
29	Vehicle Maintenance & Garage Practice
30	Advanced JAVA Programing
31	.Net
32	Open Source Operating Sytem
33	Web Developmet & Design
34	SQL Programming
35	Software Engineering
36	Android App Development
37	Ethical Hacking
38	Ethics in IT
39	Big Data Analysis
40	Application of Artificial Intelligence in Finance
41	QIEQ (Quantitative intelligence and learning Quickness)
42	Remote sencing and GIS
43	Highway Pavements
44	Traffic Engineering
45	Air pollution and Noise Pollution
46	Waste Water Management

JAIDEV EDUCATION SOCIETY'S

J D COLLEGE OF ENGINEERING AND MANAGEMENT

An Autonomous Institute, with NAAC "A" Grade

At: Khandala, Post- Valni, Kalmeshwar Road, Nagpur

Department of Information Technology

"Progress Beyond Excellence"

Session: 20220-23

Course Structure and Syllabus (Autonomous)

For

B. Tech. Information Technology Programme

Course Structure and Syllabus

For

B. Tech. Information Technology Programme

Curriculum for Semester- VII [Fourth Year]

7th Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	ESC	IT7T001	Data Science	2	1	0	20	20	60	100	3
2	PCC	IT7T002	Artificial Intelligence & Cognitive Robotics	3	0	0	20	20	60	100	3
2	PEC	IT7TE04	Elective-IV	2	1	0	20	20	60	100	3
3	PEC	IT7TE05	Elective -V	2	1	0	20	20	60	100	3
5	OEC	IT7O003	OPEN Elective -III	3	0	0	20	20	60	100	4
6	ESC	IT7L002	Data Science using R (Lab)	0	0	2	60	0	40	100	1
7	PEC	IT7L003	Middleware Technolgies(Lab)	0	0	2	60	0	40	100	1
8	PROJECT	IT7P004	Project Phase I	0	0	6	50	0	50	100	3
9	MC	IT7T005	Research Methodology	2	0	0	15	10	25	50	Audit
				14	**3**	**10**	**285**	**110**	**455**	**850**	**21**

Open Elective-3 : Cloud Computing & Storage Management

IT7T002 Artificial Intelligence and Cognitive Robotics 3 Credit

Course Objective:

1. Learn about knowledge for the design of robotics.
2. Understand robot kinematics and robot programming.
3. Understand application of Robots.
4. Learn about force and torque sensing.
5. To learn about application of robot.

Course Outcomes:

Upon Completion of this course the student will be able to:

1. List the objectives and functions of modern Artificial Intelligence.
2. Categorize an AI problem based on its characteristics and its constraints.
3. Have a glance at machine learning algorithms and extracting knowledge models from data.
4. Learn different logic formalisms and decision taking in planning problems.
5. Learn how to analyze the complexity of a given problem and come with suitable optimizations.

Unit -I: Introduction to Artificial Intelligence ,Features of AI , Agents and Environments, structure of agents, problem solving agents, problem formulation, AI techniques- search knowledge.
[7 Hrs]

Unit- II: Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

[7 Hrs]

Unit -III: Knowledge Representation& Learning, Uncertainty, probabilistic reasoning-Bayesian Network, probabilistic reasoning over time-Inference in temporal Model, Hidden Markov models-Kalman filters, Dynamic Bayesian Network, speech recognition **[8 Hrs]**

Unit IV: Learning: Concept of learning, learning automation, genetic algorithm, learning by

inductions, neural nets. Programming Language: Introduction to programming Language. Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic

[7 Hrs]

Unit -V: AI in Cognitive Robotics: Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics. Case study of AI in robotics. **[7 Hrs]**

References:

1. Stuart Russell, Peter Norvig, Artificial Intelligence: A modern approach, Pearson Education, India.

2. Negnevitsky, M, Artificial Intelligence: A guide to Intelligent Systems,. Harlow: Addison-Wesley,2002.

3. E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed..

4. Nilsson, N. J. (1986). Principles of artificial intelligence. Morgan Kaufmann.

5. Craig, J. J. (2009). Introduction to robotics: mechanics and control, 3/E. Pearson Education India.

6. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.

7. Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.

8. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach",

IT7TE04B	Computer Forensics	3 Credit

Course Objectives:

• To study the fundamentals of Computer Forensics

• To learn, analyze and validate Forensics Data

Course Outcomes:

Upon completion of the course students would be able to:

1. Conduct a computer forensics investigation, including the concept of the chain of evidence.
2. Report findings from digital forensic investigations.
3. Perform recovery of digital evidence from various digital devices using a variety of software utilities.
4. To explain the tools and tactics associated with Cyber Forensics

Unit-1 **[7 Hrs]**

Digital forensic Computer forensics and investigations as a profession, Understanding computer forensics, computer forensics versus other related disciplines, History of computer Forensics, Understanding case laws, Developing computer forensics resources, Preparing for computer investigations, Understanding law enforcement agency investigations and legal process, Understanding corporate investigations, Establishing company policies, Displaying warning Banners.

UNIT – 2 **[7 Hrs]**

Windows Systems and artifacts Windows Systems and Artifacts: Introduction, Windows File Systems, File Allocation Table, New Technology File System, File System Summary, Registry, Event Logs, Prefetch Files, Shortcut Files, Windows Executables.

UNIT – 3 **[7 Hrs]**

Linux Systems and artifacts Linux Systems and Artifacts: Introduction, Linux File Systems, File System Layer, File Name Layer , Metadata Layer, Data Unit Layer, Journal Tools, Deleted Data, Linux Logical Volume Manager, Linux Boot Process and Services, System V , BSD, Linux System Organization and Artifacts, Partitioning, File system Hierarchy, Ownership and Permissions, File Attributes, Hidden Files, User Accounts , Home Directories.

UNIT – 4 **[7 Hrs]**

Current Computer Forensics Tools Evaluating Computer Forensics Tool Needs, Types of Computer Forensics Tools, Tasks Performed by Computer Forensics Tools, Tool Comparisons, Command-Line Forensics Tools, UNIX/Linux Forensics Tools, Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations, Write-Blocker, Cyber forensics tools and case studies.

Unit-5 **[8 Hrs]**

Identification of data: Timekeeping, Forensic Identification and Analysis of Technical Surveillance Devices, Reconstructing Past Events: Digital Detective, Types of File Formats, Converting Files, Investigating Network Intrusions and Cyber Crime, Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks ,Router Forensics.

Text book:

Davis, Philipp, and Cowen, Hacking Exposed: Computer Forensics, McGraw-Hill Education

References:

1. Cory Altheide, Harlan Carvey, Digital Forensics with Open Source Tools, Syngress imprint of Elsevier.

2. Bill Nelson, Amelia Phillips, Christopher Steuart, “Guide to Computer Forensics and Investigations”, Fourth Edition, Course Technology.

3. Angus M.Marshall, “Digital forensics: Digital evidence in criminal investigation”, John – Wiley and Sons, 2008.

IT7TE04C	Robotics & Automation	3 Credit

Course Learning Objectives:

The students will be able to
1. Understand the concepts of robotics and automation.
2. Impart the knowledge of robotic programming and robotic operation control
3. Selection and analysis of robot configuration and kinematics
4. Importance of automation manufacturing techniques and processing industries
5. Development of automation system for manufacturing and processing industries

Course Outcomes:

After completing the course, the students will be able to
CO1: Understand the characteristics and working principle of robots.
CO2: Apply the related mathematical model to formulate the kinematics and trajectory planning of industrial robot.

CO3: Analyse the machine vision for effective Flexible Manufacturing Systems.
CO4: Develop model and integrate drives for industrial robots and automation systems.
CO5: Understand distributed data processing in FSM.
CO6: Work on the robotic automation.

Unit 1 **[6Hrs]**

Introduction:
Basics of kinematics, Anatomy of robot, Robot configuration, Robot joints, Sensors and drive system, Control modes, Specification of robots, Robot programming methods.

Unit 2 **[7Hrs]**

Robot-Kinematics :
Position and orientation of objects, Objects coordinate frame, Rotation matrix, Euler angles roll, pitch and yaw angles coordinate transformations, Joint variables and position of end effector, Homogeneous transformation. D-H parameters and conventions, D-H matrix, Direct kinematic and inverse analysis of planar and 3 DoF robots.

Unit 3 **[8Hrs]**

Trajectory planning:
Introduction, Path versus trajectory, Joint-space versus Cartesian-space descriptions, Basics of trajectory planning, Joint-space trajectory planning, Third-order and Fifth-order polynomial trajectory planning.
Automation in Production Systems - Manufacturing support systems, Automation principles and strategies, Levels of Automation, Production Concepts and Mathematical models, Numericals

Unit 4 **[8Hrs]**

Machine Vision:
Object recognition by features, Basic features used for object identification, Moments, Template matching,Discrete Fourier descriptors, Computed Tomography (CT), Depth measurement with vision systems, Scene analysis versus mapping, Range detection and Depth analysis, Stereo imaging, Scene analysis with shading and sizes, Specialized lighting, Image data compression, Intraframe spatial domain techniques, Interframe coding, Compression techniques, Colour images, Heuristics, Applications of vision systems.

Unit 5 **[7 Hrs]**

Robotics Hands on :- Design of Robotics Arm in proteus using Arduino programming , Line following robot using Arduino in proteus with Arduino code, Design of robotic car using Proteus.

Text Books:
1 Mohsen Shahinpoor, “A Robot Engineering Textbook”, Harper & Row Publishers, 3rd Edition, New York, ISBN:006045931X
2 John J. Craig, “Introduction to Robotics”, Pearson Education International, 3rd Edition, ISBN:109876543, 1-13-123629-6

Reference-Books:

1. Mikell P Groover, "Automation, Production Systems, and Computer-integrated Manufacturing", Pearson Publishing, 3rd Edition, 2014, ISBN 978 81 203 3418 2
2. Joseph Talavage, "Flexible Manufacturing Systems in Practice Design: Analysis and Simulation", CRC Press, 1987, ISBN 978082477718

IT7TE04D	Natural Language Processing	3 Credit

Course Learning Objectives:

1. To familiarize the concepts and techniques of Natural language Processing for analyzing words based on Morphology and CORPUS.
2. To relate mathematical foundations, Probability theory with Linguistic essentials such as syntactic and semantic analysis of text.
3. To apply the Statistical learning methods and cutting-edge research models from deep learning.

Course Outcomes:

After completing the course, the students will be able to

1. Apply the principles and Process of Human Languages such as English and other Indian Languages using computers.
2. Realize semantics and pragmatics of English language for text processing.
3. Create CORPUS linguistics based on digestive approach (Text Corpus method)
4. Check a current methods for statistical approaches to machine translation.
5. Perform POS tagging for a given natural language and Select a suitable language modelling technique based on the structure of the language.
6. Demonstrate the state-of-the-art algorithms and techniques for text-based processing of natural language with respect to morphology

Unit 1: Introduction to NLP **[7 Hrs]**

Introduction to NLP - Various stages of NLP –The Ambiguity of Language: Why NLP Is DifficultParts of Speech: Nouns and Pronouns, Words: Determiners and adjectives, verbs, Phrase Structure. Statistics Essential Information Theory : Entropy, perplexity, The relation to language, Cross entropy.

Unit 2: Text Preprocessing and Morphology **[7 Hrs]**

Character Encoding, Word Segmentation, Sentence Segmentation, Introduction to Corpora, Corpora Analysis. Inflectional and Derivation Morphology, Morphological analysis and generation using Finite State Automata and Finite State transducer.

Unit 3: Language Modelling **[7 Hrs]**

N gram models, Smoothing, Part of speech tagging, Hidden Markov models, Viterbi algorithm, Forward - backward algorithm, EM training, Models for Named Entity Recognition, Neural Language Models - Recurrent Neural Networks and Long Short term Memory networks

Unit 4: Word Sense Disambiguation **[8 Hrs]**

Methodological Preliminaries, Supervised Disambiguation: Bayesian classification, An informationtheoretic approach, Dictionary-Based Disambiguation: Disambiguation based on sense, Thesaurusbased disambiguation, Disambiguation based on translations in a second-language corpus, senitimental analytics.

Unit 5: Markov Model and POS Tagging **[7 Hrs]**

Markov Model: Hidden Markov model, Fundamentals, Probability of properties, Parameter estimation, Variants, Multiple input observation. The Information Sources in Tagging: Markov model taggers, Viterbi algorithm, Applying HMMs to POS tagging, Applications of Tagging

Text Books:

1. Christopher D. Manning and Hinrich Schutze, " Foundations of Natural Language Processing" , 6 th Edition, The MIT Press Cambridge, Massachusetts London, England, 2003
2. Daniel Jurafsky and James H. Martin "Speech and Language Processing", 3rd edition, Prentice Hall, 2009.

References:

1. NitinIndurkhya, Fred J. Damerau "Handbook of Natural Language Processing", Second Edition, CRC Press, 2010.
2. James Allen "Natural Language Understanding", Pearson Publication 8th Edition. 2012..
3. Chris Manning and HinrichSchütze, "Foundations of Statistical Natural Language Processing", 2nd edition, MITPress Cambridge, MA, 2003.
4. Hobson lane, Cole Howard, Hannes Hapke, "Natural language processing in action" MANNING Publications, 2019.

IT7TE05B	AI in Digital Forensic	3 Credit

Course Objective:

On completion of the course, Students will be able to–

1. Understand the basic digital forensics concepts and techniques for conducting the forensic examination on different digital devices.
2. Understand how to examine digital evidences gathered through such as the data acquisition, identification analysis.
3. Understand the basics of Computer forensics and cyber forensics, mobile phone forensics, network forensics, Email forensics and web forensics etc.

Course Outcomes: Student will be able to

1. Describe digital forensics and relate it to an investigative process.
2. Explain the legal issues of preparing for and performing digital forensic analysis based on the investigator's position and duty.
3. Perform basic digital forensics.
4. Demonstrate use of digital forensics tools.

5. Guide a digital forensics exercise.
6. Recognize the state of the practice and the gaps in technology, policy, and legal issues.

Unit I **[7 hrs]**

Basic Definitions and terminology of AI:, Foundation and History of AI, Overview of AI problems, Evolution of AI,- Applications of AI, Classification/Types of AI. Artificial Intelligence vs Machine learning. Intelligent Agent: Types of AI Agent, Concept of Rationality, nature of environment, structure of agents. Turing Test in AI.

Unit II **[7 hrs]**

Search Algorithms in Artificial Intelligence: Terminologies, Properties of search Algorithms, Types of search algorithms: uninformed search and informed search, State Space search Heuristic Search Techniques: Generate-and-Test; Hill Climbing; Properties of A* algorithm, Best-first Search; Problem Reduction. Constraint Satisfaction problem: Interference in CSPs; Back tracking search for CSPs; Local Search for CSPs; structure of CSP Problem.

Unit III **[8 hrs]**

Knowledge-Based Agent in Artificial intelligence: Architecture, Approaches to designing a knowledge- based agent, knowledge representation: Techniques of knowledge representation, Propositional logic, Fundamentals of Digital Forensics Foundations of Digital Forensic: Digital evidence, Awareness, Principles of Digital Forensic, Challenging aspects of digital evidence, Cybertrail. Language of Computer Crime Investigation: Role of Computers in crime, Cybercrime law, offenses, jurisdiction. Traffic analysis, Fraud, IT Act.

Unit IV **[7 hrs]**

Processing Computer Crime : Introduction to Crime Scenes, Seizing and storing digital evidence at scene, Documenting the Scene and the Evidence , Dealing with Live Systems and Dead Systems, Using Hashing to Verify the Integrity of Evidence

Unit V **[7 hrs]**

Data Acquisition and Data Recovery - Understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools Data Recovery : Data Backup and Recovery, The Role of Backup in Data Recovery, The Data-Recovery Solution Hiding and Recovering Hidden Data , Data Handling tools

Textbooks:

1. Digital Evidence Computer Crime – Forensic science, Computers & The Internet', Eoghan Casey, 3rd edition
2. 'Computer Forensics Computer Crime scene investigation', 2nd edition, Johm R. Vacca
3. Russell, S. and Norvig, P. 2015. Artificial Intelligence - A Modern Approach, 3rd edition, Prentice Hall

Reference Books:

1. 'Computer Forensics Investigating Network Intrusions & Cybercrime', EC–Council press, Cengage Learning
2. Guide to Computer Forensics & Investigations, 4th edition, Bill Nelson, Amelia Phillips & Christopher Steuart, Cengage Learning

3. Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI., 2010 2. S Kaushik, Artificial Intelligence, Cengage Learning, 1st ed.2011.

IT7L003	Middleware Technolgies(Lab)	1 Credit

Course Outcomes:

1. To study how to create distributed server
2. To understand how to create a Java Bean.
3. To understand how to develop an enterprise.
4. To study how to develop a component.
5. To understand how to create a control.

Syllabus:

Program 1: Create a distributed name server (like DNS) RMI.

Program 2: Create a Java Bean to draw various graphical shapes and display it using or without using BDK.

Program 3: Develop an Enterprise Java Bean for student Information System.

Program 4: Develop an Enterprise Java Bean for Library operations.

Program 5: Create an Active-X control for Timetable.

Program 6: Develop a component for converting the currency values using COM / .NET

Program 7: Develop a component for browsing CD catalogue using COM / .NET

Program 8: Develop a component for retrieving information from message box using DCOM/.NET

Program 9: Develop a middleware component for retrieving Stock Market Exchange information using CORBA

Program 10: Develop a middleware component for retrieving Bank Balance using CORBA.

IT8TE06B	Full Stack Development	3 Credit

Course Learning Objectives:

1. Use their learned skills, knowledge and abilities to develop web sites for the internet.
2. Apply basic design principles to present ideas, information, products, and services on Websites.
3. Apply basic programming principles to the construction of websites.

4. Effectively manage website projects using available resources.
5. Create visualizations in accordance with UI/UX theories.
6. Develop a fully functioning website and deploy on a web server.

Course Outcomes: After completing the course, the students will be able to

CO1: Understand the formalistic (aesthetic) aspects of design and visual communication.

CO2: Develope cross-platform (web, mobile, broadcast, print) storytelling skills.

CO3: Become familiar with graphic design and/or game theory and be able to apply this theory to real world projects.

CO4:Develop and understand information design and usability as it applies to interactive media projects.

CO5: Utilize coding and software tools to analyze and present data in a professional manner that could be translated to web-based or app-based media.

Unit 1 **[7 Hrs]**

Basic HTML, Advanced HTML :

HTML-Introduction , HTML-Basic Formatting Tags , HTML-Grouping Using Div Span, HTML-Lists , HTML-Images , HTML-Hyperlink , HTML-Table, HTML-Iframe , HTML-Form, Adding audio, Drag & drop, User location: geolocation, Saving ,information - localStorage, Saving information - sessionStorage.

Unit 2 **[8 Hrs]**

CSS

What Is CSS? How to write CSS: syntax, Using style sheets, Using external style sheets, Identities and classes, Style entire elements, CSS Comments, Change background colors, Setting background images, Change text color, Text formatting using CSS, Font Properties, Text Properties, Styling hyperlinks using CSS, Styling lists using CSS, Setting element width and height, Adding borders, Spacing: margin & padding, Change the mouse type: cursor, Hide, show and display elements,

What to do with overflowing content.

CSS Advanced: Grouping & Nesting, Maximum & Minimum Dimensions, Move an element from its default position, Relative location & layering, Floating, Clear, Pseudos, Alignment Sprites: the most efficient way to load images, Make elements translucent: opacity, Different media types, Style elements based on their attributes, Browser prefixes.

Unit 3 **[7 Hrs]**

Javascript Basics

JavaScript Essentials, What is JavaScript?, JavaScript: Internal vs. External, JavaScript comments, document.write(); Display info from the browser: alert & confirm, Prompting the user for Information, Programming fundamentals: Variables, Add two sentences together: concatenation,

Basic math in JavaScript, Redirecting users and opening ne6w windows, creating empty hyperlinks, String Manipulation, Comparing variables and values, Programming fundamentals: If...Else Statements, Else...If Statements, Switch Statements, Functions; JavaScript Events, Selecting HTML Elements using getElementById(), Escaping content, Programming fundamentals: Arrays, For Loops, While Loops, Breaking Out Of Loops, Skipping A Loop Cycle.

Unit 4 **[7 Hrs]**

ReactJS

Introduction , Templating using JSX ,Components, State and Props , Lifecycle of Components ,Components, State and Props , Lifecycle of Components ,Rendering List and Portals ,Error Handling ,Routers , Redux and Redux Saga , Immutable.js , Service Side Rendering ,Unit Testing , Webpack .

Unit 5 **[7 Hrs]**

PHP

Overview Of PHP, Basic Scripting and Looping Constructs Conditional Constructs, Modularity through Include Files, PHP Operators, PHP Functions, New Features, Arrays in PHP,Basic OOP in PHP,Writing OOP PHP

Text Books:

1. Web Development for beginners: Learn HTML/CSS/Javascript step by step with this Coding uide, Programming Guide for beginners, Website development, White Belt Mastery, ISBN 9781667003771.
2. The Road to React: Your journey to master React.js in JavaScript (2021 Edition), Kindle Edition.
3. Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5, Publisher Shroff Publishers & Distributers, ISBN-13 978-9352130153

ReferenceBooks:

1.Mastering Html, Css & Javascript Web Publishing , BPB Publications , ISBN-13 978-8183335157

2. A Complete Overview On: Web-development, Notion Press, ISBN-13978-1685098407.

AGENDA FOR 1ST BOARD OF STUDIES MEETING NO. BOS/CSE(DS)/01/2023 — 15/03/2023

Venue: VS-209

Computer Science & Engineering(Data Science) Department,

J. D College of Engineering & Management, Nagpur

The 1st meeting of the Board of Studies will be held on 15th March, **2023** at **1:00 P.M.** The mode of conduction of the meeting will be online. All the members of the Board of Studies are requested to attend the meeting. The agenda for the meeting will be as below.

Item No. 1 **To finalize the scheme of CSE (Data Science).**

In the First semester we have to finalize the scheme of CSE(Data Science
And the subjects are Problem Solving using C and Principle of Data Science and Problem Solving using C(Lab).In second Semester Statistical Analysis (Audit) Subject

Item No. 2 **To discuss B.Tech (Honors) Major and Minor domain specialization**

Discussion on the Major Minor list of MOOCs Subjects

Item No. 4 **Inclusion of MOOC in 4th & 8th Sem**

Discussion and finalization of Two Massive Online Open Courses to become eligible for the award of B.Tech. degree.

Item No. 5 **To finalize the 20% online courses in each semester.**

Discussion and finalization of 20% MOOCs Online Course in each semester

Item No. 6 **To finalize the rubrics for continuous assessment for theory and practical.**

Discussion and finalization of Rubrics for Continuous Evaluation in theory subjects and labs, session for 2022-23

Item No. 7 **Achievement of Staff and Students**

Discussion of Paper Publications, Patents, Copyrights and other matters.

Item No. 8 **Any other matter with the permission of the Chair.**

No other matter is discussed.

Mr. Umesh Samarth
Secretary BOS,
Computer Science &Engineering(Data Science) Board
JDCOEM, Nagpur

Chairman
BOS CSE (DATA SCIENCE)
JDCOEM, Nagpur

Board of Studies, Department of CSE(DS)

Sr. No.	Name of the Faculty	Sign
1.	Mr. Umesh Samarth	
2.	Mrs Nisha Dable	
3.	Mr. M. M. Baig	
4.	Mrs Bhagyashree Madan	
5.	Mr. Chetan Padole	
6.	Mrs. Aparna Bondade	
7	Mr. Girish Umratkar	
External Member		
1.	Dr Manoj B. Chandak	Online Meeting
2.	Mr. Animesh Kumar	
3.	Mr. Amol Mankar	

ACTION TAKEN REPORT OF 1ST BOARD OF STUDIES MEETING NO. BOS/CSE(DS)/01/2023

15/03/2023

The 1st meeting of the Board of Studies will be held on 15th March ,2023 at **1:00 P.M.** The mode of conduction of the meeting will be offline. All the members of the Board of Studies are requested to attend the meeting. The agenda for the meeting will be as below.

Item No.	Item	Action Taken
01	• Approval to UG Scheme • Suggestion by Dr. Manoj B. Chandak ,Subject Expert and Mr.Animesh Kumar,Industry Expert	All the suggested changes/modifications were incorporated in the respective subjects. The changes were made in the practicals as suggested and the syllabus is finalized. The final draft of syllabus of 1st and 2nd semester is ready.

Mr. Umesh Samarth
Chairman BOS,
Computer Science &Engineering(Data Science) Board
JDCOEM, Nagpur

Chairman
BOS CSE (DATA SCIENCE)
JDCOEM, Nagpur

Board of Studies, Department of CSE(DS)

Sr. No.	Name of the Faculty	Sign
1.	Mr. Umesh Samarth	
2.	Mrs Nisha Dable	
3.	Mr. M. M. Baig	
4.	Mrs Bhagyashree Madan	
5.	Mr. Chetan Padole	
6.	Mrs. Aparna Bondade	

7	Mr. Girish Umratkar	G Umratkar
External Member		
1.	Dr Manoj B. Chandak	
2.	Dr. Latesh Malik	
3.	Mr. Animesh Kumar	
4.	Mr. Amol Mankar	

online mode.

Course Structure and Syllabus

For

B.Tech. CSE(Data Science)

Curriculum for Semester-I[First Year]

1st Semester (CSE-DS)

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	HSMC	DS1T001	Problem Solving Using C	2	0	0	20	20	60	100	2
2	BSC	DS1T002	Statistics & Difference Calculus	3	1	0	20	20	60	100	4
3	BSC	DS1T003	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	DS1T004	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	DS1L005	Problem Solving Using C Lab	0	0	4	60	0	40	100	2
6	ESC	DS1L006	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	DS1L007	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	**3 Weeks**							
9	ESC	DS1T008	Principles of Data Science	2	0	0	10	15	25	50	Audit
				13	**2**	**10**				**750**	**18**

Course Structure and Syllabus

For

B.Tech. CSE(Data Science)

Curriculum for Semester-I[First Year]

2nd Semester (CSE-DS)

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	HSMC	DS2T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	DS2T002	Vector Calculus & Probability	3	1	0	20	20	60	100	4
3	BSC	DS2T003	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	DS2T004	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	DS2L005	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	DS2L006	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	DS2L007	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8	PROJECT	DS2P008	Societal Internship/ Field Training	Report submission						50	1
9	ESC	DS2T009	Statistical Analysis	2	0	0	10	15	25	50	Audit
				11	**2**	**10**				800	**17**

Branch: CSE (DATA SCIENCE)

Semester I

DS1T001	Problem Solving Using C	(Credit 02)

Course Objective:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of C programming language.
4. To learn the usage of structured programming approach in solving problems.

Course Outcome:

1. To write algorithms and to draw flowcharts for solving problems.
2. To convert the algorithms/flowcharts to C programs.
3. To code and test a given logic in C programming language.
4. To decompose a problem into functions and to develop modular reusable code.
5. To use arrays, pointers, strings and structures to write C programs

[Unit 1]: **8 Hrs**

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.), Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.From algorithms to programs; source code, variables (with data types) variables and memorylocations, Syntax and Logical Errors in compilation, object and executable code

[Unit 2] **6 Hrs**

Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops

[Unit 3] **6 Hrs**

Arrays (1-D, 2-D), Character arrays and Strings, Searching, Basic Sorting Algorithms (Bubble,

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Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

[Unit 4] **6 Hrs**

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

[Unit 5] **6 Hrs**

Structures, Defining structures and Array of Structures, Pointers,Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice

2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)

3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.

4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

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DS1T008	Principles of Data Science ✓	(Audit)

Course Objectives:

1. Understand the basics python libraries, and its operation over datasets.
2. Analyze, reading and manipulating csv files, and the NumPy library.
3. Identify data manipulation and cleaning techniques using the popular python Pandas data Science library.
4. Understand the underlying core concepts and emerging technologies in data science

Course Outcomes:

Upon successful completion of this course, student will be able to:

CO1: Explore the fundamental concepts of data science.

CO2: Understand the basic concept of data science using python

CO3: Demonstrate the use of Statistical concept on python code

CO4: Experiment a model based on train & test data

CO5: Visualize and present the inference using various tools.

[Unit I] **[8 Hrs]**

Introduction to Data Science: Overview of Data Science, How Data Science Works, Data Science Components, Data Science Process, Data Science Toolkit, Types of Data, Challenges of Data Science Technology, Applications of Data Science

[Unit II] **[6 Hrs]**

Getting started with raw data: The worlds of arrays with NumPy, creating an array, mathematical operation, indexing and slicing, the data structure of Pandas, series data frame and Panel, reading files, exploratory data analysis, Data preparation and preprocessing inserting and exploring data CSV, XLS, JSON.

[Unit III] **[7 Hrs]**

Statistical Inference: Introduction to data analysis using python, dealing with missing values in python, exploratory data analysis, analysis of variance, correlation, correlation statistics, Various forms of distribution, one tailed and two tailed test, Z test Vs T tests, F distribution, chi square distribution.

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[Unit IV] **[8 Hrs]**

Data visualization: Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, mapping variables to encodings, Technologies for visualization, various visualization techniques.

[Unit V] **[6 Hrs]**

Working with excel files & PDF: Getting Started with Parsing PDF & converting PDF to text- Parsing PDF using PDF miner Acquiring & storing data-databases. A brief introduction- Relational Databases: My SQL

Text Books:

1. Introduction to linear algebra-by Gilbert Strang
2. Applied statistics and probability for engineers–by Douglas Montgomery
3. Python for Data Analysis-by WMc Kinney
4. MYSQL Database, For Beginners, Quick Start Guide-by Ray Yao, Dart R. Swift, Pandas C

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Branch: CSE (DATA SCIENCE)

Semester II

DS2T009	Statistical Analysis	(Audit)

Course Objective:

1. To give basic knowledge of mathematical statistics and probability distribution.
2. To impart the general knowledge of various distributions methods in statistics and their applications.
3. To deal with various regression models and their interpretations.
4. To introduce the basic Bayesian statistics methods and computations techniques.

Course Outcomes:

CO1: To demonstrate properties of statistical models in common use.

CO2: To identify applications of measure theory to probability theory.

CO3: To identify the applications of Distribution functions and random variables in practical situations.

CO4: To solve problems related to linear and neural regression models using its properties.

CO5: To specify and run Bayesian modelling procedures using regression models for sampling of data.

[Unit 1] **[6 Hrs]**

General introductory course on mathematical statistics. Summary statistics and statistical inference. Histograms, frequency polygon and sample statistics, various types of charts and diagrams.

[Unit II] **[6 Hrs]**

Probability and probability distributions. Detailed coverage of Gaussian (normal) distribution and the lognormal distribution. Sampling distributions and tests of significance, Limit theorems.

[Unit III] **[8 Hrs]**

Random sampling, stratified random sampling, More sampling distributions. Point estimation. Analysis of variance. Multiple variables with emphasis on the bivariate case, Consistency of sample covariance. Confidence intervals.

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[Unit IV] **[8 Hrs]**

Linear and neural regression, Correlation and regression, Multiple regression. Multicollinearity diagnostics. Neural classifiers, Statistical process control, Logistic and multinomial regression.

[Unit V] **[7 Hrs]**

Bayesian statistics, Bayes' theorem, Hierarchical Bayes and Gibbs samplers. Gy's sampling theory for the sampling of particulate materials, Analysis for proportions.

Text Books:

1. Mendenhall, W., and Sincich, T., Statistics for Engineering and the Sciences,6th edition, CRC Press, 2016.
2. Hogg, R. V., Tanis, E. A., and Zimmerman, D., Probability and Statistical Inference, 10th edition, Prentice Hall, 2019.
3. Efron, B., Hastie, T., Computer Age Statistical Inference: Algorithms, Evidence, and Data Science, Cambridge University Press, 2016.
4. Carlin, B. P., and Louis, T. A., Bayesian Methods for Data Analysis, 3rd edition, CRC Press, 2009.
5. Arnold, T., Kane, M., Lewis, B., A Computational Approach to Statistical Learning, CRC Press, 2019.

Chairman
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JDCOEM, Nagpur

JDCOLLEGEOFENGINEERING&MANAGEMENT

AnAutonomousCollege,AffiliatedtoDBATU,Lonere

At:Khandala,Post-Valni,KalmeshwarRoad,NearPetri,Nagpur

MINUTES OFMEETING FOR07TH BOARDOFSTUDIESMEETINGNO.BOS/ME/07/2022-23 **15/12/2022**

Venue:TS-205,DOME,JDCOEM

The 7thMeeting of the Board of Studies was held on Thursday, 15th December, 2022 at 2:30 P.M. Three Experts and Departmental BoS Members and Faculties are present physically.

Thefollowingmemberswerepresent:

1.	Mr.SuhasA.Rewatkar, MechanicalDepartment	Chairman
2.	Mr.PravinM.Gupta,AssistantProfessor,DOME	Member
3.	Mr.AmirR.Sayed,AssistantProfessor,DOME	Member
4.	Mr.DharmeshAgrawal, AssistantProfessor,DOME	Secretary
5.	Mr.SidharthGhosh,AssistantProfessor,DOME	Member
6.	Mr.RohitSharma,AssistantProfessor,DOME	Member
7.	Mr.DineshYelure,AssistantProfessor,DOME	Member
8.	Mr.Rakesh Bandana,AssistantProfessor,DOME	Member
9.	Mr.Rajendra Dhandre,AssistantProfessor,DOME	Member

ThefollowingExperts wereinvitedto attendthe meeting:

1.	Dr. S. A.Ambade,Academic Expert,YCC,Nagpur	Invitee
2.	Mr.Imranul Haque, IndustryExpert,IGTR,GOI,Nagpur	Invitee
3.	Ms.Sakshi Ingole, Alumni 2021-22,JDCOEM, Nagpur.	Invitee

The following members were Absent in the meeting-

1. Mr.VinodSaboo – CEO Saboo plastics Pvt.Ltd,Nagpur - Invitee Expert
2. Prof.PrafulUlhe – Faculty Member-DOME
3.Prof,GauravGohane-Faculty Member-DOME

Mr.VinodSaboo was unavailable due to busy schedule in his Industry while Prof.PrafulUlhe&Prof,GauravGohane was on leave with prior permission from head office

ItemNo. 1& 2.	**Reviewof thePreviousMeeting.**

The Secretary welcomed the Chairman of Board of Studies, Subject Expert Dr. S. A.Ambade, Professor, YCC, Nagpur,Industry Expert Mr.Imranul Haque, Ms. Sakshi Ingole,AlumniMechanical Department and all members of BoS and faculties ofdepartment. Prof. S.S. Ghosh presented agenda of the meeting through power point presentation.Further, the Action taken report from the previous meeting were presented and discussed one byonepoint in thepresenceof themembers.Followingarethe points:

Sr. No.	6thBoSMeetings	ActionTakenReport
1.	AlumnitobeincludedinBoSMeeting here onwards –Mr. Saboo Sir.	Ms. Sakshi Ingole from session 2021-22 has become part of BOS now.
2.	Gauges Design should be added in precise manner in course content. *Suggested by Dr. A. B. Deoghare.*	The content has been added in the subject MQC and will be further discussed in BOS meeting.
3.	Some part of Thermodynamics syllabus from unit 3 can be skipped. *Suggested by Saboo Sir.*	Contents has been modified accordingly, is under review and will be discussed in BOS meeting.
4.	Smart Manufacturing should be part of Manufacturing syllabus. *Suggested by Imran Sir.*	Content has been added in AMT subject 5th Semester and is under review and will be discussed in BOS.

ItemNo. 3	**Updation in scheme of 2nd ,3rd and Final Year.**

Chairman Sir begin the main agenda of the meeting i.e. Updation in Schemeof all semester Mechanical Engineering. Later he asked experts for any suggestions in the Scheme.Following were the suggestions given by the experts.

1. In**4th semester** scheme, Category of subject and course code were asked to add for **MOOCS I** byImran Sir
2. Imran Sir again suggested that in 5th semester scheme name of newly added lab name should be changed from 'Python' to 'Basics of python and SQL'.
3. Same corrections for MOOCS-II should be reflected in 8th semester scheme suggested by Imran Sir.

ItemNo. 4	Updation in the syllabus of 2nd ,3rd and Final Year.

Chairman requested the concerned subject teachers those have updated their respective subject syllabus to present in front of experts. Total updation in six subjects were discussed.

Following are the key highlightsofthe agenda:

1. Prof. Rohit Sharma presented the syllabus of **EngineeringThermodynamics** of 3rd semester, as per the previous BOS suggestions some part of the syllabus were skipped. Experts were satisfied with the updated syllabus.

2. Prof. SuhasRewatkar presented the syllabus of **Strength of material** of 4th semester, as per the previous BOS suggestions some part of the syllabus were skipped. Experts were satisfied with the updated syllabus.

3. Prof. Rajendra Dhandre presented the syllabus of **Material Science** of 3rd semester. Our experts, Dr. SachinAmbade, suggested some changes in the syllabus as follows

- Critical temperature in iron carbon diagram should be added.
- Plasma hardening should be removed.
- Some part of the syllabus can be skipped in place of which Powder metallurgy should be added in unit IV.

4. Prof. Siddharth Ghosh presented the syllabus of **Metrology & Quality Control** of 5th semester, as per the previous BOS suggestions some part of the syllabus were skipped. Experts were satisfied with the updated syllabus.

5. Prof. Dinesh Yelure presented the syllabus of Open elective subject **Automobile Engineering** of 5th semester, as per the previous BOS suggestions some part of the syllabus were skipped. Experts were satisfied with the updated syllabus.

6. Prof. Siddharth Ghosh presented the syllabus of Professional elective subject Siddharth Ghosh Siddharth Ghosh Advance Manufacturing Technology of 5th semester, as per the previous BOS suggestions- advance manufacturing part is been added in the last unit. Experts were satisfied with the updated syllabus.

ItemNo.5	Rubrics of CA Evaluation.

Chairman of BOS presented rubrics of CA evaluation and discussed all nine activities involved in Continuous Assessment for students. Later Prof. Dinesh Yelure presented rubrics for mini and major projects.
Experts were satisfied with the all rubrics finalized by higher authorities of JDCOEM.

ItemNo.6	Internship Guidelines for 8 Semester Students

Prof. Pravin Gupta presented the **Internship Guidelines for 8 Semester Students**.
Experts were satisfied with the Internship Guidelines.

ItemNo.7 & 8	Revised Guidelines regarding MOOCS&Award of Major Degree to the Student

Prof. Rohit Sharma discussed the revised Guidelines regarding MOOCS&Major Degree criteria. He also declared that one student from mechanical department name Vaibhav Dhuvare is now eligible for the award of major degree.

Experts appreciated the effort taken by the management authorities and faculty members.

ItemNo.9	Anyother matterwiththepermission oftheChair.

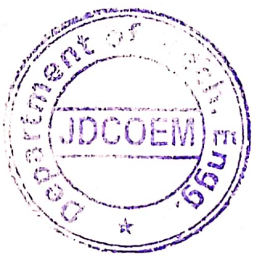
Chairman asked all the experts for their kind suggestions. Ms Sakshi Ingole suggested that Mock interviews of the students should be regular practice in the department.
Nootherissuewasraisedbyanymembersthemeetingwasconcludedwithvoteofthanks.

Sr.No.	Nameofthe BoSMembers	Designation	Sign
1.	Mr.DharmeshAgrawal, AssistantProfessor,DOME	Secretary	
2.	Mr.DineshYelure,AssistantProfessor,DOME	Faculty	
3.	Mr.RohitSharma,AssistantProfessor,DOME	Faculty	
4.	Mr.HemantBaitule,AssistantProfessor,DOME	Faculty	
5.	Mr.SidharthGhosh,AssistantProfessor,DOME	Member	
6.	Mr.AamirR.Sayed,AssistantProfessor,DOME	Member	
7.	Mr.PravinM.Gupta,AssistantProfessor,DOME	Member	
8.	Ms.SakshiIngole,DOME	Alumni DOME	
9.	Mr.ImranulKhan, IGTR,Nagpur	IndustryExpert	
10.	Dr.SachinBagde,AssistantProfessor,YCCE,Nagpur	SubjectExpert	
11.	Mr.SuhasA.Rewatkar ,HoD, Mechanical Department	Chairman	

Followingmemberscould notattend themeetingas leaveof absencewasgranted tothem.

Sr.No.	Nameofthe BoSMembers	Designation
1.	Mr.VinodSaboo – CEO Saboo plastics Pvt.Ltd,Nagpur	Industry Expert

CC:
Hon'Directors,JES
Respected Principal,JDCOEM
RespectedVice-Principal&DeanAdmin
Dean(Academics/Student/CapacityBuilding/Development,A&P)
Allconcernedfacultymembers.



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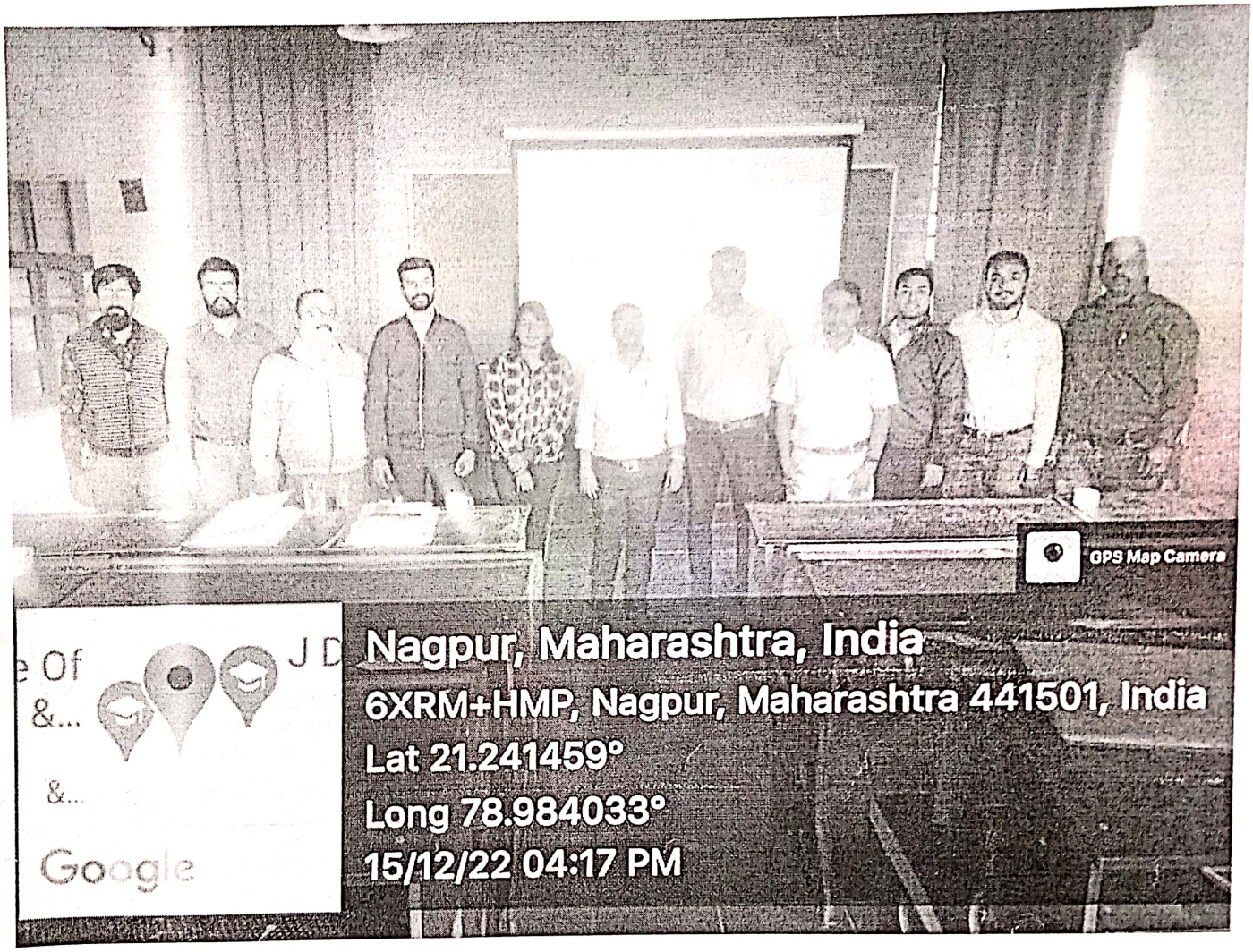
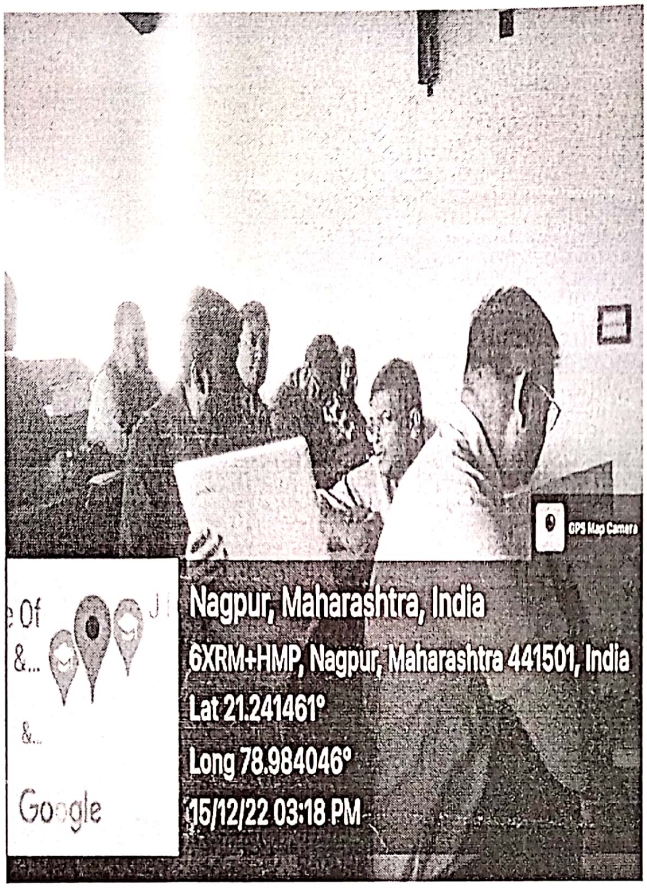
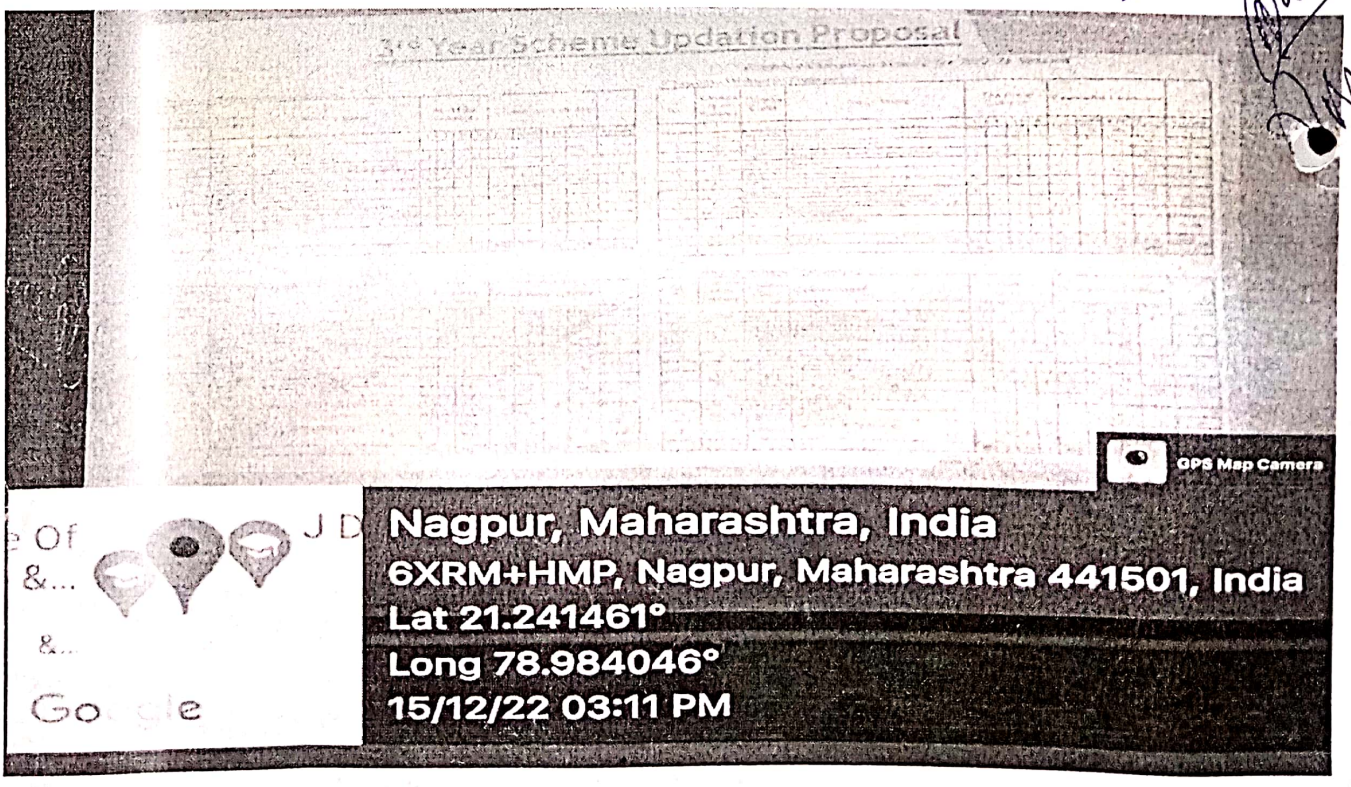






Education to Eternity

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
An Autonomous Institute, with NAAC "A" Grade
KATOL ROAD, NAGPUR
SESSION 2022-23

Final Scheme After 7th BOS. (15/12/22). To Be implimented on Batch 22-23 in First year.

3rd Semester Mechanical Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				
				L	T	P	CA	MSE	ESE	Total	Credit
1	BSC	ME3T001	Applied Maths-III	3	1	0	20	20	60	100	4
2	ESC	ME3T002	Rigid Body Mechanics	3	0	0	20	20	60	100	3
3	PCC	ME3T003	Material Science	3	0	0	20	20	60	100	3
4	PCC	ME3T004	Engineering Thermodynamics	3	0	0	20	20	60	100	3
5	PCC	ME3T005	Theory Of Machines-I	3	0	0	20	20	60	100	3
6	PCC	ME3T006	Manufacturing Engineering-I	3	0	0	20	20	60	100	3
7	PCC	ME3L003	Material Science Lab	0	0	2	60	0	40	100	1
8	PCC	ME3L006	Manufacturing Engineering-I Lab	0	0	2	60	0	40	100	1
9	ESC	ME3L007	Machine Drawing and Computer Graphics	1	0	2	60	0	40	100	2
10	HSMC	ME3T008	Universal Human Value	3	0	0	20	20	60	100	3
				22	2	6	320	140	540	1000	26

4th Semester Mechanical Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				
				L	T	P	CA	MSE	ESE	Total	Credit
1	BSC	ME4T001	Numerical Method	3	1	0	20	20	60	100	4
2	ESC	ME4T002	Basic Electronic Engineering	3	1	0	20	20	60	100	3
3	ESC	ME4T003	Product Design and Development	2	0	0	20	20	60	100	2
4	PCC	ME4T004	Manufacturing Engineering-II	3	0	0	20	20	60	100	3
5	PCC	ME4T005	Strength Of Materials	3	0	0	20	20	60	100	4
6	PCC	ME4T006	Fluid Mechanics & Fluid Machines	3	0	0	20	20	60	100	3
7	PCC	ME4L004	Manufacturing Engineering Lab	0	0	2	60	0	40	100	1
8	PCC	ME4L005	Strength Of Materials Lab	0	0	2	60	0	40	100	1
9	PCC	ME4L006	Fluid Mechanics & Fluid Machines Lab	0	0	2	60	0	40	100	1
10	PROJECT	ME4F007	Industrial visit	0	0	0	0	0	50	50	1
11	MC	ME4T008	Innovation and Entrepreneurship Development	2	0	0	10	15	25	50	Audit
12	MC	ME4T009	MOOCS I							50	2
				19	2	6	310	135	555	1050	25

5th Semester Mechanical Engineering

Sr. N	Category of Subject	Course Code	Course Name	Teaching Scheme				Evaluation Scheme				
				L	T	P	A	CA	MSE	ESE	Total	Credit
1	PCC	ME5T001	Heat Transfer	2	1	0	1	20	20	60	100	3
2	PCC	ME5T002	Theory Of Machines-II	2	1	0	1	20	20	60	100	3
3	PCC	ME5T003	Measurement and Quality Control	2	1	0	1	20	20	60	100	3
4	PEC	ME5TE01	Elective-I	3	0	0	1	20	20	60	100	3
5	OEC	ME5O001	Open elective I	3	1	0	1	20	20	60	100	4
6	PCC	ME5L001	Heat Transfer Lab	0	0	2	0	60	0	40	100	1
7	PCC	ME5L002	Theory Of Machines-II Lab	0	0	2	0	60	0	40	100	1
8	PCC	ME5L003	Measurement and Quality Control Lab	0	0	2	0	60	0	40	100	1
9	PROJECT	ME5P004	Mini Project	0	0	0	0	0	0	50	50	1
10	MC	ME5T005	Consumer Affair	2	0	0	0	10	15	25	50	Audit
11	PCC	ME5L004	Basics of python & SQL			2		60		40	100	1
				14	4	8	5	350	115	535	1000	21

6th Semester Mechanical Engineering

Sr. N	Category of Subject	Course Code	Course Name	Teaching Scheme				Evaluation Scheme				
				L	T	P	A	CA	MSE	ESE	Total	Credit
1	HSMC	ME6T001	Operation Research	3	0	0	1	20	20	60	100	3
2	PCC	ME6T002	Applied Thermodynamics	2	1	0	1	20	20	60	100	3
3	PCC	ME6T003	Design of Machine Element	2	1	0	1	20	20	60	100	3
4	PEC	ME6TE01	Elective-II	3	0	0	1	20	20	60	100	3
5	OEC	ME6O002	Open elective II	3	1	0	1	20	20	60	100	4
6	PCC	ME6L002	Applied Thermodynamics Lab	0	0	2	0	60	0	40	100	1
7	PCC	ME6L003	Design of Machine Element Lab	0	0	2	0	60	0	40	100	1
8	ESC	ME6L004	Computer Graphics Lab	1	0	2	0	60	0	40	100	2
9	PROJECT	ME6P005	Campus Recruitment Training	0	0	2	0	50	0	0	50	1
10	PROJECT	ME6P006	Skill Development	0	0	2	0	15	0	35	50	1
11	PROJECT	ME6P007	Mini Project	0	0	0	0	30	0	20	50	1
12	MC	ME6T008	Research Methodology	2	0	0	0	10	15	25	50	Audit
				16	3	10	5	385	115	500	1000	23

7th Semester Mechanical Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				
				L	T	P	CA	MSE	ESE	Total	Credit
1	PEC	ME7TE01	Elective-III	3	0	0	20	20	60	100	3
2	PEC	ME7TE02	Elective IV	3	0	0	20	20	60	100	3
4	OEC	ME7O003	Open Elective III	4	0	0	20	20	60	100	4
5	PCC	ME7L001	Mechanical Engineering Lab	0	0	2	60	0	40	100	1
6	PROJECT	ME7F007	Industrial Visit	0	0	0	0	0	50	50	1
7	PROJECT	ME7P003	Project Phase-I	0	0	4	75	0	75	150	5
8	MC	ME7T004	Intellectual property rights	2	0	0	10	15	25	50	Audit
				12	**0**	**6**	**205**	**75**	**370**	**650**	**17**

8th Semester Mechanical Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				
				L	T	P	CA	MSE	ESE	Total	Credit
1	PEC	ME8TE01	Elective V	3	0	0	20	20	60	100	3
2	OEC	ME8O004	Open Elective IV	4	0	0	20	20	60	100	4
3	PROJECT	ME8P001	Project Phase-II	0	0	3	50	0	50	100	3
4	MC	ME8T001	MOOCS -II							50	2
				7	0	3	90	40	170	350	12
OR											
1	PROJECT	ME8P002	Six month Industry Internship	0	0	0	150		150	300	10
	MC	ME8T001	MOOCS -II							50	2
											10

350 | 12

Agreed

Agreed to implement

Head of Department
Mechanical Engineering
J D College of Engineering & Management
Nagpur

ME3T004	Engineering Thermodynamics	3 Credit

Course Objectives:

1. The objective of this course is to develop the necessary thermodynamic tools for calculating the thermodynamic properties of pure fluids and mixtures, phase equilibrium and chemical reaction equilibrium.
2. To present a comprehensive and rigorous treatment of classical thermodynamics while retaining an engineering perspective.
3. To lay the groundwork for subsequent studies in such fields as fluid mechanics, heat transfer and to prepare the students to effectively use thermodynamics in the practice of engineering.
4. To develop an intuitive understanding of thermodynamics by emphasizing the physics and physical arguments. To present a wealth of real world engineering examples to give students a feel for how thermodynamics is applied in engineering practice.

Course Outcomes:

At the end of this course, the students should be able to,

1. Define the four basic laws viz. zeroth law, first law, second law and third law ofthermodynamics and basic concepts, properties of substances.
2. Illustrate basic concepts, properties of substances and Laws of thermodynamics.
3. Apply the Laws of Thermodynamics for various thermodynamic processes / cycles.

4. Categorize different thermodynamic processes for heat and work transfer.
5. Evaluate knowledge of thermodynamics to suggest solutions for problems.
6. Design the system using basic laws of thermodynamic.

Course Contents:

UNIT I **[07 Hours]**

Introduction to thermodynamics: Zeroth law of thermodynamics, heat and work transfer, First law of thermodynamics for a closed system undergoing a cycle and change of state, Energy, different forms of energy, Enthalpy, PMM-I control volume. Application of first law of steady flow processes (nozzle, turbine, compressor pump, boiler, throttle valve etc.)

UNIT II **[07 Hours]**

Second law of thermodynamics: Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump. Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence, PMM of Second kind, reversibility and irreversibility, causes of irreversibility, Carnot cycle, Carnot theorem, Absolute thermodynamic temperature scale.
Entropy: Clasius theorem, the property of entropy, the inequality of Clausius, Entropy principle and its applications, Entropy change during different thermodynamic processes.

UNIT III **[07 Hours]**

Availability and Irreversibility: Available energy, availability of a closed system, availability function of a closed system availability of steady flow system, availability function of open system , Helmholtz function , Gibbs functions, Irreversibility for closed and open system, Second law efficiency.

Thermodynamic Relationships: Maxwell's equations, T-ds equations, difference in heat capacities, coefficient of Volume expansion and isothermal compressibility, adiabatic compressibility, ratio of specific heat, energy equations, Joule-Kelvin effect, Clausius-Clapeyran equation

UNIT IV **[07 Hours]**

Equation of state: Ideal gas equation of state, deviation of Real gas from ideal gas, van der waal's equation of state, correction for the intermolecular attractions, correction for finite size of molecules, evaluation of constants a and b, virial expansions, limitations of the van der waal's equation, Reduced coordinates, compressibility factor, the law of corresponding states as per van der waal's principle.

Mixture of perfect gases: Mass Fraction, Mole fraction , Dalton's Law of additive pressure, Amagat-Leduc of additive volumes , Properties of mixture of ideal non-reactive gases –gas constant, molecular weight, specific heat, internal energy, enthalpy and entropy.

UNIT V **[07 Hours]**

Properties of Pure substances: Thermodynamic properties of pure substances in solid, liquid and vapour phases, Phase Transformations, dryness fraction, Triple point, critical state, p-v, p-T, T-s, h-s diagrams, P-V-T surfaces,– Properties and processes in ideal vapour, use of steam tables and Mollier's diagram in determination of steam properties, energy interaction and entropy calculations.

UNIT VI **[07Hours]**

Vapor and Gas Power Cycles: Carnot cycle, ideal Rankine cycle, Reheat and Regeneration, Stirling cycle, Joule-Brayton cycle. Calculation of thermal efficiency, specific steam/fuel consumption, work ratio for above cycles.

Text Books:

1. Thermodynamics- An Engineering Approach – Cengal& Boles – McGraw Hill
2. Engineering Thermodynamics – P.K. Nag – TMH Publishers
3. Thermodynamics – C.P. Arora – TMH Pub.
4. Thermodynamics & Thermal Engineering – J. SelwinRajadurai – New Age, Delhi

Reference Books:

1. Fundamental of engineering thermodynamics- R. Yadav , CPH, Allahabad
2. Thermal Science & Engineering – D.S. Kumar – S.K. Kataria& Sons
3. Fundamental of Thermodynamic- Claus Borgnakke, Richard E. Sonntag, Wiley, Delhi

ME3T003	Material science	3 Credit

Course Objectives:

1. To develop fundamental concepts of metallography, phase transformation, equilibrium diagrams, classification of ferrous and non-ferrous alloys.
2. To acquire the knowledge for selecting and applying the heat treatment process
3. To understand the destructive and non-destructive testing for different types of the alloys, scope of advanced and smart material.

Course Outcomes:

1. Define various structure of materials, their properties, testing methodologies, equilibrium diagrams, heat treatment processes.
2. Classify the various materials on the basis of characterization and behavior, heat treatment process with respect to property requirement, nondestructive testing methods.
3. Demonstration of the various phase transformation equilibrium diagrams, destructive and nondestructive testing, specimen preparation and metallography.
4. Analyze heat treatment process for required mechanical properties.
5. Evaluate samples of different materials for metallography.
6. Estimate mechanical properties, phase diagrams and metallographic samples.

Course Content:

Unit 1: Engineering Materials and Equilibrium Diagrams **[7Hrs]**

Introduction to engineering materials & classification, Crystal structures & Imperfections, Equilibrium Diagram, Solid Solutions, Gibb's rule, Lever rule, Invariant Reactions, Iron-Iron Carbide Equilibrium Diagram, TTT & CCT Diagram, Transformation products of austenite.

Unit 2: Ferrous and Non-ferrous Alloys **[7Hrs]**

Introduction to ferrous and non-ferrous alloys & applications, Ferrous alloy: Plain carbon steel, Stainless steel, Tool steel, High speed steel, Bearing steel, White cast iron, Grey cast iron, Nodular

cast iron, Malleable cast iron, Specification system for steel – EN, SAE and AISI, Non-ferrous alloy: Cu-based alloys and Al-based alloys.

Unit 3: Heat Treatment **[7Hrs]**

Introduction and importance of heat treatment process, Heat treatment process: Annealing, Normalizing, Hardening, Tempering, Austempering, Martempering, Patenting, Isoforming, Surface hardening: Carburizing, Nitriding, Cyaniding, Carbonitriding, Flame and Induction hardening,Vacuum and plasma hardening.

Unit 4: Destructive and Non-destructive Testing **[7Hrs]**

Destructive testing: Engineering stress-strain curve, True stress-strain curve, Tensile test, Compression test, Bend test, Torsion test, Formability, Hardness testing, Different hardness tests-Vickers, Rockwell, Brinnel, Impact test, fatigue test, creep test, Non-destructive testing: Magnetic particle inspection, Dye penetrant inspection, Ultrasonic inspection, Radiography.

Unit 5: Metallography **[7Hrs]**

Microscopy, specimen preparation, polishing abrasives and cloths, specimen mounting, electrolytic polishing, etching procedure and reagents, electrolytic etching, optical metallurgical microscope, macroscopy, sulphur printing, flow line observations, examination of fractures, spark test, electron microscope.

Unit 6: Advanced & Smart Material **[7Hrs]**

Composites: Processing of composites, types of composites, advantages and their applications, Nano-Materials: Synthesis of nano-materials, types of nano-material, method of characterization, and nano-material applications, Smart materials: Need of smart material, properties of smart material, types and applications of smart material.

Text books:

1. V. D. Kodgire, S. V. Kodgire, "Material Science and Metallurgy for Engineers", Everest Publishing House, Pune, 24thedition, 2008.

ME4T005	Strength of Material	3 Credit

COURSE OBJECTIVES

1. Students should identify, understand different material properties.
2. To make students capable to select and categorize different engineering materials as per their applications.
3. To make the students able to identify stress conditions and to analyze failure behavior.

COURSE OUTCOMES

At the end of the course students will be able to

1.Define the basic definitions of axial load, eccentric load, different types of stresses and strain in different conditions, elastic properties of materials and different theories of failure.

2. Explain the stress state (tension, compression, bending, shear, etc.) and calculate the value of stress developed in the component of axial, eccentric, static and impact load cases.

3.Solve problems on uniaxial, multiaxial stress situation, principal stresses, stresses on oblique plane, shear force-bending moment and deflection in case of different beam conditions.

4. Analyse given beam for calculations of SF and BM, slope and deflection at a point on cantilever, simply supported beam using different methods such as double integration, Macaulay's, Area-moment and superposition.

5.Evaluate materials, sizes and sections for various applications such as beams, shafts, pressure vessels, columns, etc. and justify the selection.

6. Design basic elements of structures like beams, shafts, key etc.

Unit 1: Stress, Strain and Deformation of Solids **[07 Hours]**

Simple Stresses and strains – Elastic constants – Relationship between elastic constants – Stress Strain Diagram – Ultimate Stress – Yield Stress – hoop stress, analysis of tapered rod and composite section, Thermal Stress- Volumetric strain

Unit 2: Shear Force and Bending Moment [07 Hours]

Relation between load, shear force and bending moment, Shear force and bending moment diagrams for different types of beams subjected to different types of loads, point of contra flexure

Unit 3: Deflection of Beams [07 Hours]

Concept and definition, relation between B.M., slope and deflection slope and deflection by double integration method (McCauley's method), Slope and Deflection in determinate beams by Moment Area method

Unit 4: Stresses in Beams and Columns[07 Hours]

Combined axial and flexural loads, middle third rule, Kernel of section; load applied off the symmetry pure bending, theory of simple bending with assumption and expression for bending stresses, derivation of bending equation, bending stresses in symmetrical sections, section modulus for various shapes of beam sections.

Unit 5: Principle Stresses and Strain [07 Hours]

Deformation of axially loaded member, Composite Bars, State of stress in two dimensions, Stresses on inclined planes, Principal Stresses and Principal Planes, Maximum shear stress, Mohr's circle method.

Theories of Failure

Maximum principal stress theory, maximum shear stress theory, Total strain energy theory, shear strain energy theory, graphical representation and derivation of equation for each and their application to problems relating to two dimensional stress systems only

Unit 6: Torsion of Circular Shaft[07 Hours]

Theory of torsion of shafts of circular, cross section. Assumptions, Derivation of torsion formulae. stresses strains and deformation in determinate and indeterminate shafts of hollow,

solid, homogeneous circular cross section subjected to twisting moments, stresses due to combine torsion & bending

Axially Loaded Columns

Concept of critical load and buckling, derivation of Euler's formulae for buckling load with hinged ends, concept of equivalent length for various end conditions, Rankine's formulae, safe load on column, Limitations of Euler's formulae

Text Books

1) Strength of Materials by S. Ramamrutham & R Narayanan, Dhanpat Rai publication, New Delhi.

2) Strength of Materials by S.S. Rattan, McGraw-Hills Education (India) Publication, India

3) Strength of Materials by S.S. Bhavikatti, Vikas Publishing house, Noida, India.

Reference Books

1) Mechanics of materials by Timoshenko and Gere, CBS Publisher

2) Strength of Materials by F. L. Singer, Harper and row Publication

3) Mechanics of Materials by Hibbeler R.C., Pearson publisher

ME5T003	Measurement & Quality Control	3 Credit

COURSE OBJECTIVES

1. To understand the importance of measurement tools & techniques.
2. To understand quality concepts.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe various types and sources of errors, parallelism, concepts of interferometer, quality, and variance analysis.
2. Explain Tolerance, Indian standards, cost of quality, seven quality tools, Line standard and wavelength standard.
3. Compute Flatness, Surface texture, process capability, gear errors, plastic deformation.
4. Apply sampling inspection, codification system, limits, fits and tolerance, brain storming.
5. Create check sheets, cause-effect diagrams, scatter diagrams, control charts for variables and attributes.
6. Recommend suitable sampling methods, quality tools, measurement methods.

Unit 1: Measurement Standards [06 Hours]

Measurement Standard, Principles of Engineering Metrology, Line end, wavelength, Traceability of Standards. Types and Sources of error, Alignment, Temperature, Plastic deformation, Slip gauges and gauge block, Linear and Angular Measurement (Sine bar, Sine center, Autocollimator, Angle Décor and Dividing head), Calibration.

Unit 2: Comparators & Interferometry [07 Hours]

Comparator: Mechanical, Pneumatic, Optical, Electronic (Inductive), Electrical (LVDT).Principle, NPL Interferometer, Flatness measuring of slip gauges, Parallelism, Laser Interferometer, Surface Finish Measurement: Surface Texture, Measuring Surface Finish by Stylus probe, Tomlinson and Talysurf, Analysis of Surface Traces: Methods.

Unit 3: Design of Gauges [07 Hours]

Design of Gauges: Types of Gauges, Limits, Fits, Tolerance; Terminology for limits and Fits. Indian Standard (IS 919-1963) Taylor"s Principle.

Unit 4: Gear Metrology **[07 Hours]**

Gear Metrology: Gear error, Gear measurement, Gear Tooth Vernier; Profile Projector, Tool marker's microscope. Advancements in Metrology: Co-ordinate Measuring Machine, Universal Measuring Machine, Laser in Metrology.

Unit 5: Introduction to Quality **[08 Hours]**

Quality Statements, Cost of Quality and Value of Quality, Quality of Design, Quality of Conformance, Quality of Performance.

Unit 6: Statistical Quality Control **[08 Hours]**

Statistical Quality Control: statistical concept, Frequency diagram, Concept of Variance analysis, Control chart for variable & attribute, Process Capability.

Acceptance Sampling: Sampling Inspection, OC curve and its characteristics, sampling methods.

Text Books

1) I. C. Gupta, "Engineering Metrology", Dhanpatand Rai Publications, New Delhi, India.

2) M. S. Mahajan, "Statistical Quality Control", Dhanpat and Rai Publications.

Reference Books

1) R. K. Jain, "Engineering Metrology", Khanna Publications, 17th edition, 1975.

2) K. J. Hume, "Engineering Metrology", McDonald Publications, 1st edition, 1950.

3) A. W. Judge, "Engineering Precision Measurements", Chapman and Hall, London, 1957.

4) K. L. Narayana, "Engineering Metrology", Scitech Publications, 2nd edition.

5) J. F. Galyer, C. R. Shotbolt, "Metrology for Engineers", Little-hampton Book Services Ltd., 5th edition, 1969.

6) V. A. Kulkarni, A. K. Bewoor, "Metrology & Measurements", Tata McGraw Hill Co. Ltd., 1st edition, 2009.

7) Amitavam Mitra, "Fundamental of Quality Control and Improvement", Wiley Publication.

8) V. A. Kulkarni, A. K. Bewoor, "Quality Control", Wiley India Publication, 01st August, 2009.

9) Richard S. Figliola, D. E. Beasley, "Theory and Design for Mechanical Measurements", Wiley India Publication.

10) E. L. Grant, "Statistical Quality Control", Tata McGraw Hill Publications.

11) J. M. Juran, "Quality Planning and Analysis", Tata McGraw Hill Publications.

ME6TE02B	Automobile Engineering	3 Credit

COURSE OBJECTIVES

1. To understand the basic concepts of automobile and its components.

COURSE OUTCOMES

At the end of the course students will be able to

1.Describe the the vehicle, its components and recent advances in automobiles.

2. Illustrate the concept of different chassis, frame, power plant, clutch, gear box, transmission system, brakes, steering systems, wheels, tyres, suspension systems and electrical systems used in automobile.

UNIT – I **[6 Hours]**

Introduction, Automobile history and development. Chassis and Frame: Layout of chassis & its main components. Types of frames, conventional frames and unitized chassis, articulated, rigid vehicles, prime movers, hybrid car & electric car. Power Plant: Constructional features of different types of engines used in automobiles. Fuel supply systems, cooling systems, lubrication systems.

UNIT – II **[6 Hours]**

Clutch: Necessity, requirements of a clutch system. Types of Clutches, centrifugal clutch, single & multi plate clutch, fluid clutch. Gear Box: Necessity of transmission, principle, types of transmission, sliding mesh, constant mesh, synchromesh, transfer gear box, gear selector mechanism, lubrication and control. Torque converter, semiautomatic & automatic transmission.

UNIT – III **[6 Hours]**

Transmission system: Propeller shaft, universal joint, Hotchkiss drive, torque tube drive. Differential – Need and types. Rear axles and Front axles. Brakes: Need & types, mechanical, hydraulic & pneumatic brakes, electrical brakes, engine exhaust brakes, drum and disc brakes, comparison and details of components. Brake adjustment.

UNIT – IV **[6 Hours]**

Steering systems: principle of steering, center point steering, steering linkages, steering geometry and wheel alignment, power steering. Suspension systems: Function of spring and shock absorber, conventional and Independent suspension system, Telescopic shock absorber, linked suspension systems, rubber, plastic, hydro & pneumatic suspension system.

UNIT – V **[6 Hours.]**

Electrical systems: Battery construction, maintenance, testing and charging, cutout, lighting circuit, horn, side indicator, wiper and panel board instruments. Battery, magneto and electronic ignition systems. Automobile air-conditioning. Wheels and Tyres: Types of wheels, wheel dimensions, tyre, desirable tyre properties, types of tyres, comparison of radial and bias-ply tyres, tyre construction, tyre materials, factor affecting tyre life, precautions regarding the tyres and wheel balancing.

UNIT – VI

[6 Hours]

Body and Safety Considerations and Modern Developments in Automobiles: Requirements automobile body, materials for body work, safety considerations, crash worthiness. Recent advan in automobiles such as ABS, electronic power steering, Active suspension, collision avoidan intelligent lighting, navigational aids and electronic brake distribution system.

Text Books

1. Automobile Engineering Vol. I & II, Kirpal Singh, Standard Publishers.
2. Automotive Mechanics, Joseph Heitner, East West Press.
3. Automobile Engineering, R.K.Rajput, Laxmi Publications.
4. Automobile Engineering R.B. Gupta, SatyaPrakashan New Delhi
5. Course in Automobile Engineering, Sharma R. P, Dhanpat Rai and Sons.
6. Automobile Engineering, Ramakrishna, PHI Learning Pvt. Ltd.

Reference Books

1. Automobile Mechanics, Crause, W.H., Tata McGraw Hill.
2. Vehicle and Engine Technology, Heinz Heisler, Arnold London.
3. Automotive Engines, Srinivasan S., Tata McGraw Hill.
4. Motor Vehicle Technology, J.A. Dolan, Heinemann Educational Books.
5. Automobile Engineering Vol. I, II & III, P. S. Gill, Kataria and Sons.
6. Automobile Engineering, K.K. Jain, R.B. Asthana, Tata McGraw Hill.

ME5TE01A Renewable Energy Sources	3 Credit

COURSE OBJECTIVES

This course will provide an exposure regarding aspects and utilization of renewable energy systems towards sustainable development of the society.

COURSE OUTCOMES

At the end of the course students will be able to,

1. List the primary renewable energy sources, their feasibility and challenges.
2. Explain the various renewable energy systems such as solar energy collectors, wind turbine, geothermal systems, MHD, ocean thermal electric conversion system, biogas and biomass system.
3. Apply mathematical treatment related to solar energy collectors and wind power generation
4. Analyze the performance of renewable energy system such as solar energy collectors and wind power generation.
5. Choose the suitable renewable energy system for the desired application.

Unit 1: Introduction to renewable energy sources and solar energy [07 Hours]

Introduction to renewable energy sources: Global energy scenario, conventional and non-conventional sources of energy, merits and challenges.

Solar Energy: Introduction, spectral distribution of solar radiation, beam and diffused radiations, measurement of solar radiation,solar radiation geometry, estimation of daily average solar radiations on horizontal and tilted surfaces and estimation of hourly solar radiation.

Unit 2:Solar flat plate collectors [07 Hours]

Liquid flat plate collector & their analysis, collector efficiency factor and heat removal factor, collector efficiency, concept of selective surfaces, some novel designs of solar collectors, solar air heaters and their analysis

Unit 3:Applications of solar energy and concentrators [06 Hours]

Applications of solar energy: Water heating, space heating, drying, refrigeration, distillation, cooking, PV systems, Thermal Energy Storage (sensible, latent and thermochemical) and solar pond

Concentrators: Cylindrical parabolic collectors, compound parabolic collectors, their construction and principle of operation, advantages and drawbacks, tracking systems, and central receiver concept of power generations.

Unit 4:Geothermal and MHD power generation **[06 Hours]**

Geothermal energy: Introduction, classification of geothermal systems vapour dominated, liquid dominated system, total flow concept, petro-thermal systems, magma resources, applications of geothermal operational & environmental problems.

Magneto Hydro Dynamic power generation: Introduction, principles of MHD, power generation, MHD open and closed systems, power output from MHD generators, design problems of MHD generation, gas conductivity, seeding.

Unit 5:Wind and Ocean **[06 Hours]**

Wind & Ocean Energy: Power in wind, basic principles of wind power generation and its numericals, basic components of WEC Systems, site selection Savonius and Darrieus rotors, application of wind energy, wind energy potential and installation in India.

Ocean energy: Introduction, Ocean Thermal Electric Conversion (OTEC), open and closed cycle of OTEC, hybrid cycle, energy from tides, generation components of tidal power plants, single and double basin design arrangement, estimation of tidal power and energy.

Unit 6:Bio-Energy **[07 Hours]**

Bio-Gas: Introduction to biogas generation, fixed dome & floating drum biogas plants, their constructional details, raw material for biogas production, factors affecting generation of biogas, utilization of biogas.

Biomass: Introduction, methods of obtaining energy from biomass,Incineration, thermal gasification. Up draft and down draft gasifiers, their constructional details, applications of producer gas.

Text Books

1. G. N. Tiwari and M. K. Ghoshal, Renewable Energy Sources Basic Principles And Applications, Narosa Publishing House, New Delhi.

2. S.P. Sukhatme, Solar Energy: Principles of Thermal Collection And Storage, Tata Mcgraw-Hill

Reference Books

1. John Twidell , Tony Weir , Renewable Energy Resources, Taylor & Francis; 2nd edition, 2005

2. Duffie, J. A. & W. A. Beckman. Solar Engineering of Thermal Processes, 3rd ed. John Wiley &

ME5TE01B	Analysis and Synthesis of Mechanism	3 Credit

COURSE OBJECTIVES

1.To study the kinematic analysis and design of mechanisms

2. To apply kinematic theories to synthesize the real-world mechanisms

COURSE OUTCOMES

At the end of the course students will be able to

1.**Identify**degree of freedom, equivalent linkages, transmission angle, Type Synthesis, Number Synthesis, Dimensional Synthesis, coupler curve equation, Roberts-Chebyshev theorem, Force Analysis of Planar Mechanisms, and Analytical synthesis of Planar Mechanisms.

2. **Explain** degree of freedom, methods of kinematic analysis, concept of mechanism synthesis and types, Type synthesis, Number synthesis, Dimensional synthesis, Static force analysis, constraint and applied forces, static equilibrium, dynamic force analysis of planar mechanisms, coupler curve equation, double points and symmetry,. Roberts-Chebyshev theorem, Force Analysis of Planar Mechanisms, and Analytical synthesis of Planar Mechanisms.

3. **Compute**mechanical advantage and transmission angle, Dimensional synthesis, Accuracy points, coupler curve equation, constraint and applied forces, and errors in linkages

4. **Analyze**four bar linkage, static and dynamic forces for planar mechanism, mechanisms using Kineto-static analysis by matrix method, elastic linkage model, four-bar function generator and slider-crank mechanism.

5. **Decide** appropriate method forforce analysis of planar mechanisms and equation for synthesis of Planar Mechanisms

Unit 1:Introduction **[07 Hours]**

Basic definitions, criterions, degree of freedom, construction of mechanisms, applied mechanisms and equivalent linkages. Mechanical advantage and transmission angle. Review the methods of kinematic analysis. Concept of mechanism synthesis and types.

Unit 2:Type Synthesis, Number Synthesis, Dimensional Synthesis **[07 Hours]**

Type synthesis, Number synthesis, Dimensional synthesis, Accuracy points, Spacing of of accuracy points, Chebyshev polynomials.

Unit 3:Synthesis of four Bar Mechanisms **[08 Hours]**

Four bar linkage, coupler curve, coupler curve equation, double point cuts of a coupler curve, Harding's Notations, Class I and Class II four bar chain, two positions synthesis, synthesis of crank rocker and time ratio, transmission angle ,synthesis for optimum angle linkage bear combinations for large output angle of oscillations, overlays methods for coordinated crack position.

Unit 4: Force Analysis of Planar Mechanisms **[08 Hours]**

Static force analysis, constraint and applied forces, static equilibrium. Dynamic force analysis of planar mechanisms, inertia forces linkages, Kineto-static analysis of mechanisms by matrix method. Analysis of elastic mechanisms, elastic linkage model, equations of motions.

Unit 5:Analytical synthesis of Planar Mechanisms **[08 Hours]**

Type, number and dimensional synthesis, function generation, path generation and rigid body guidance, accuracy (precision) points, Chebychev Spacing, Freudenstein's equation, displacement, velocity and acceleration equations. Synthesis of , Complex number method of synthesis. Four and five accuracy point synthesis, errors in linkages.

Text Books

1) Theory of Machines and Mechanisms, A. Ghosh and A. K. Mallik, Affiliated East West Press
2) Theory of Machines and Mechanisms, J. E. Shigleyand J. J. Uicker, 2nd Ed., McGraw-Hill

Reference Books

1) Kinematic Synthesis of Linkages, R. S. Hartenberg and J. Denavit, McGraw-Hill
2) Mechanism Design - Analysis and Synthesis (Vol.1and 2), A. G. Erdman and G. N. Sandor, Prentice Hall of India
3) Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines, Robert L. Norton, Tata McGraw-Hill, 3rd Edition.

ME5TE01C ADVANCED MANUFACTURING TECHNOLOGY 3 Credit

COURSE OBJECTIVES

1. To understand the importance of advanced machining and joining processes in manufacturing sector
2. To understand the significance of non-metallic material's processing in manufacturing sector

COURSE OUTCOMES

At the end of the course students will be able to

1. Define different advanced machining, joining, plastic, glass, ceramic and rapid prototyping processes
2. Classify the various advanced machining processes, joining process, plastic processes, glass, ceramic and rapid prototyping process on the basis of their applications
3. Identify working principles and applications of various advanced manufacturing processes
4. Select different job using different operations performed in advanced machining, joining, plastic, glass, ceramic and rapid prototyping processes

Unit 1: Advanced Machining Processes **[07 Hours]**

Introduction of advanced machining - Ultrasonic machining (USM), Abrasive water jet machining (AWJM), Electrochemical machining (ECM), Electro discharge machining (EDM), Electron beam machining (EBM), Laser beam machining (LBM)

Unit 2: Advanced Joining Processes **[07 Hours]**

Introduction of advanced joining process - Electron beam welding (EBW), Laser beam welding (LBW), Ultrasonic welding (USW), Explosive welding, Underwater welding, Spray welding, Laser cladding

Unit 3: Plastic Processing **[07 Hours]**

Production of Polymer and types of structures, Thermosets and thermoforming plastic, Extrusion Processes, Injection Moulding, Blow Moulding, Rotational Moulding, Thermoforming; Compression Moulding, Transfer Moulding, Foam Moulding, Cold Forming and Solid-phase Forming, Processing Elastomers

Unit 4: Glass and Ceramic Processing **[07 Hours]**

Introduction, Shaping Ceramics: Casting, Plastic Forming, Pressing, Drying and Firing, FinishingOperations, Forming and Shaping of Glass: Flat-sheet and Plate Glass, Tubing and Rods, Discrete Glass Products, Glass Fibers

Unit 5: Rapid Prototyping **[07 Hours]**

Rapid Prototyping operations: subtractive and additive processes, FDM, Stereo lithography, Selective laser sintering, 3D printing, Laminated object manufacturing, Rapid tooling, Applications, Advantages, Limitations.

Text Books

1) Serope Kalpakjian and Steven R. Schmid, "Manufacturing Engineering and Technology", Addison Wesley Longman (Singapore) India Ltd., 6thedition, 2009.

2) Geoffrey Boothroyd, Winston Knight, "Fundamentals of Machining and Machine Tools", Taylor and Francis, 3rd edition, 2006.

Reference Books

1) Milkell P. Groover, "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", John Wiley and Sons, New Jersey, 4th edition, 2010.

2) Paul De Garmo, J. T. Black, Ronald A. Kohser, "Materials and Processes in Manufacturing", Wiley, 10th edition, 2007

MEOEC 1A	Automobile Vehicle Maintenance	4 Credit

COURSE OBJECTIVES

To introduce the students about basic working principals of 2 and 4-wheeler.

To know the students about power generating transmitting and controlling devices.

To understand the generalized maintenance procedure.

COURSE OUTCOMES

At the end of the course students will be able to

1. Identify various type of 2 and 4 wheelers.
2. Select most appropriate equipment for a target workshop.
3. Operate all auto workshop equipment.
4. Prepare a plan for vehicle maintenance.
5. Learn the maintenance of the vehicle.
6. Detect faults and the methods to rectify the faults.

Unit 1:Two wheeler maintenance (IC engine and electric) **[06 Hours]**Introduction to 2-wheeler, working principles of power generating devices, power transmitting devices, controlling devices and automotive electrical equipment's. Regular periodic and break down maintenance of automobile.

Unit 2:Four-wheeler maintenance (IC engine and electric) **[06 Hours]**

Introduction to 4-wheeler, working principles of power generating devices, power transmitting devices, controlling devices and automotive electrical equipment's. Regular periodic and break down maintenance of automobile.

Unit 3: Introduction to Automobile Workshop **[06 Hours]**

Garage, service station and specialist repair shop, activities of auto w/s servicing, repairs, retailing, and workshop safety.

Unit 4:General Auto workshop equipment **[06 Hours]**

Hand tools-Screwdrivers, Pliers, Hammers, Wrenches. Torque wrench. Files. Chisels, Taps & Dies, and Drills.

Lifting equipment – Ramp, Floor jacks, Vehicle hoist, Axle safety stands, engine crane.

Washing equipment and Lubrication equipments.

Unit 5: Special equipment for a service station [06 Hours]

Pneumatic structure – Air Compressor, pneumatic line, end equipment, tools.

Press- hydraulic press, arbor press. Wheel balancing.

Measuring instruments

Unit 6: Engine related workshop equipment[06 Hours]

Engine analyzer, scanner. Exhaust gas analyser, Fuel injection pump test bench (phasing and calibration tests), Fuel injector testing, Compression gauge, timing light, battery charger, Multimeter

Text Books

1. Workshop Practice, Bawa, Tata McGraw-Hill Education, 2nd Edition, 2009
2. Motor Automotive Technology, Anthony E. Schwalle, Delmar Publisher Inc., 2nd Edition, 1993
3. Automobile Engineering, R.B. Gupta, Satya Prakashan, New Delhi, 2015
4. Vehicle Maintenance and Garage Practice, Jigar A. Doshi, Dhruv U. Panchal, Jayesh P. Maniar, PHI Learning Private Ltd, 2014

Reference Books

1. Basic Automobile, Engineering, Nakra Cp, Dhanpat Rai Publishing Company (P) Limited, 2009
2. Workshop Practice, R.K. Rajput, Laxmi Publications, 2009
3. Automotive Mechanics, William H. Crouse, William Harry Crouse –Tata Mcgraw-Hill Education, 1982

MEOEC 1B **Product Development4 Credit**

COURSE OBJECTIVES

To introduce the students to basic parameters of product development and creative methodology with focus on the front end processes.

COURSE OUTCOMES

At the end of the course students will be able to

7. Demonstrate an understanding of the overview of all the product development processes.
8. Gain knowledge about market research and related aspects.
9. Know about life cycle assessment.
10. Gain knowledge of concept generation, testing, pilot production and related aspects.

Unit 1: **[08 Hours]**

Process of design, methodology, identifying problem area, divergent, lateral thinking, sources of information, convergent thinking, imposition of controlling factors, specifications, models, sketches, concepts, strengths, consolidation of workable solutions.

Unit 2: **[08 Hours]**

Society and products, market research, understanding market pressure, policies, ecology concerns, economic climate, raw material availability.

Unit 3: [08 Hours]

Life cycle assessment for feasibility, marketability, manufacturing, reliability, maintenance, safety, operations, etc.

Unit 4:[08 Hours]

Process of product development, investigation in identifying the product to be designed, generating problem statement, formulating design brief, design specification, sales specification, performance, material and system specification.

Unit 5: **[08 Hours]**

Concept development, product engineering, assembly drawing, evaluation, product testing, re engineering, redetailing, pilot production, vender development.

Text Books

5. Rader. Melvin, Ed, A Modern Book of esthetics, Holt Rinehart & Winston, New York, 1973
6. Nievel. B.W, and Dray Production, Design and Process Engineering, Mc Graw-Hill

ME6TE02A	Power plant engineering	3 Credit

COURSE OBJECTIVES

1. To acquaint students with both steam generation and electricity production and to presentsome of the engineering calculations encountered in practice

COURSE OUTCOMES

At the end of the course students will be able to

1. Analyze and understand the design of the major systems of conventional fossil-fuel steam-cycle power plants.
2. Thorough knowledge of the basic design principles of nuclear, gas turbine, combined cycle, and alternate power plants.
3. Understand the economic, environmental, and regulatory issues related to power generation.
4. Compute the cost of power generation and tariffs for various power plants.

Unit 1: Energy scenario and basic operation **[06 Hours]**

The energy scenario, steam power plants, fuel handling, ash handling, chimney draught, Fossil fuel steam generators, high pressure boilers, performance of boilers, fuels and combustion,

Unit 2: Steam power plant **[07 Hours]**

Steam Turbines: Details of construction, accessories, governing, turbine blades, power calculations, arrangement of turbines, industrial turbines. Condensers and Cooling Towers: Performance, heat transfer design, calculations, efficiencies, detail construction, cooling water circuit, environmental aspects

Unit 3: Hydro electric power plant **[06 Hours]**

Hydro Electric Plant: Hydrology, rainfall measurement hydrographs, flow duration curves, site selection, classification of hydro stations, capacity of hydro stations, selection of prime movers, governing of water turbines, operation of different components of hydro station reservoirs, dam, spillway, canals, penstock, water hammer surge tank, Draft-tubes, specific speeds of turbines, Advantages of hydro station.

Unit 4: Gas turbine power plant **[08 Hours]**

Gas Turbine Power Plant: General features and characteristics and their application power plants, Analysis of different cycles, components of gas turbine power plants, governing system of gas turbine plant, advantages of G. T. plant, Gas and steam turbines, combined cycles – Thermodynamic analysis for optimum design, advantages and performance of combined cycles, economics of combined cycle.

Unit 5: Non conventional energy generation **[08 Hours]**

Solar thermal energy, direct energy conversion, wind energy, geothermal energy, energy from Oceans

Unit 6: Energy storage and economics **[08 Hours]**

Energy storage, economies of power generation, environmental aspect of powergeneration, problem solving.

Text Books

1. Power Plant Engineering, P. K. Nag, Mc Graw Hill

2. Power Plant Engineering Technology, M.M. Wakil, Mc Graw Hill

Reference Books

1. Steam Plant Operation, E. B. Woodruff Lammers, T.F. Lammers, Mc Graw Hill

2. Standard Hand Book of Power Plant Engineering,Thomas C. Elliott, Kao Chen, Robert C. Swame kamp, McGraw Hill.

3. Power Plant Engineering ,V.M. Domkundwar, Dhanpat Rai & sons.

ME6TE02B	Automobile Engineering	3 Credit

COURSE OBJECTIVES

1. To understand the basic concepts of automobile and its components.

COURSE OUTCOMES

At the end of the course students will be able to

1.Describe the the vehicle, its components and recent advances in automobiles.

2. Illustrate the concept of different chassis, frame, power plant, clutch, gear box, transmission system, brakes, steering systems, wheels, tyres, suspension systems and electrical systems used in automobile.

UNIT – I **[6 Hours]**

Introduction, Automobile history and development. Chassis and Frame: Layout of chassis & its main components. Types of frames, conventional frames and unitized chassis, articulated, rigid vehicles, prime movers, hybrid car & electric car. Power Plant: Constructional features of different types of engines used in automobiles. Fuel supply systems, cooling systems, lubrication systems.

UNIT – II **[6 Hours]**

Clutch: Necessity, requirements of a clutch system. Types of Clutches, centrifugal clutch, single & multi plate clutch, fluid clutch. Gear Box: Necessity of transmission, principle, types of transmission, sliding mesh, constant mesh, synchromesh, transfer gear box, gear selector mechanism, lubrication and control. Torque converter, semiautomatic & automatic transmission.

UNIT – III **[6 Hours]**

Transmission system: Propeller shaft, universal joint, Hotchkiss drive, torque tube drive. Differential – Need and types. Rear axles and Front axles. Brakes: Need & types, mechanical, hydraulic & pneumatic brakes, electrical brakes, engine exhaust brakes, drum and disc brakes, comparison and details of components. Brake adjustment.

UNIT – IV **[6 Hours]**

Steering systems: principle of steering, center point steering, steering linkages, steering geometry and wheel alignment, power steering. Suspension systems: Function of spring and shock absorber, conventional and Independent suspension system, Telescopic shock absorber, linked suspension systems, rubber, plastic, hydro & pneumatic suspension system.

UNIT – V **[6 Hours.]**

Electrical systems: Battery construction, maintenance, testing and charging, cutout, lighting circuit, horn, side indicator, wiper and panel board instruments. Battery, magneto and electronic ignition systems. Automobile air-conditioning. Wheels and Tyres: Types of wheels, wheel dimensions, tyre, desirable tyre properties, types of tyres, comparison of radial and bias-ply tyres, tyre construction, tyre materials, factor affecting tyre life, precautions regarding the tyres and wheel balancing.

UNIT – VI **[6 Hours]**

Body and Safety Considerations and Modern Developments in Automobiles: Requirements of automobile body, materials for body work, safety considerations, crash worthiness. Recent advances in automobiles such as ABS, electronic power steering, Active suspension, collision avoidance, intelligent lighting, navigational aids and electronic brake distribution system.

Text Books

1. Automobile Engineering Vol. I & II, Kirpal Singh, Standard Publishers.
2. Automotive Mechanics, Joseph Heitner, East West Press.
3. Automobile Engineering, R.K.Rajput, Laxmi Publications.
4. Automobile Engineering R.B. Gupta, SatyaPrakashan New Delhi
5. Course in Automobile Engineering, Sharma R. P, Dhanpat Rai and Sons.
6. Automobile Engineering, Ramakrishna, PHI Learning Pvt. Ltd.

Reference Books

1. Automobile Mechanics, Crause, W.H., Tata McGraw Hill.
2. Vehicle and Engine Technology, Heinz Heisler, Arnold London.
3. Automotive Engines, Srinivasan S., Tata McGraw Hill.
4. Motor Vehicle Technology, J.A. Dolan, Heinemann Educational Books.
5. Automobile Engineering Vol. I, II & III, P. S. Gill, Kataria and Sons.
6. Automobile Engineering, K.K. Jain, R.B. Asthana, Tata McGraw Hill.

ME6TE02C Industrial Engineering 3 Credit

COURSE OBJECTIVES

1. To understand the Importance study of the Industrial Engineering.
2. To understand the Importance of the role as an Industrial Engineer.

COURSE OUTCOMES

At the end of the course students will be able to

1.Describe the concept productivity, work study, method study and work measurement.

2. Illustrate the concept of Ergonomics, Value Engineering, Reverse Engineering and Supply Chain Management.

3. Solve the given Engineering problem using Process charts, flow diagram, string diagram, motion study, micro motion study, SIMO Chart and work measurement numerical techniques.

4. Recognize the fundamental knowledge and skill sets required in the Industrial Engineering domain.

Unit 1: Industrial Engineering & Productivity **[06 Hours]**

Industrial Engineering: Scope, objectives, application and role in organisations

Productivity: Introduction, importance of productivity improvement, Types of productivity, Numericals based on Productivity, Benefits of higher productivity.

Unit 2: Work Study and Method Study **[06 Hours]**

Work Study: Definition and objectives, Basic Procedures, human factor in the application of work study.

Method Study: Introduction, Definition and objectives, basic procedure of method study. Process charts, flow diagram, string diagram, motion study, micro motión study, SIMO Chart.

Unit 3: Work Measurement **[06 Hours]**

Definition, Objective and concept of work measurement, work measurement techniques, time study, time study equipment, Principle steps in conducting time study and Numericals.

Unit 4: Value Engineering & Ergonomics **[06 Hours]**

Value Engineering: Concepts - Value, Types and Need, Value Engineering Methodology, FAST Diagramming.

Ergonomics: Objectives and Basic principles of ergonomics, Productivity correlation, System concepts, Human machine System.

Unit 5: Reverse Engineering and Supply Chain Management **[06 Hours]**

Reverse Engineering: Definition, Importance, Applications, Process and 3D Scanning Process.

Supply Chain Management: Objectives, Decision Phases, Process View of Supply Chain.

Text Books

1. Industrial Engineering & Production Management, Martand Telsang, S. Chand & co.
2. Maynard H.B.: Industrial Engineering Handbook, McGraw Hill.

ME6O002A	Solar Technologies	4 Credit

COURSE OBJECTIVES

Following completion of this course, you should be able to:

- Explain the ideas that underlie the ability of various natural occurrences to produce solar energy.
- Describe the technology utilised to harness the power of solar energy.
- Discuss the advantages and disadvantages of solar energy in terms of natural and human environmental components.

COURSE OUTCOMES

At the end of the course, students will be able to:

CO 1. **Define** the basics of solar energy.

CO 2. **Describe** the various applications utilising the solar thermal system.

CO 3. **Compute** the dimensions for the solar energy system.

CO 4. **Apply** fundamentals of solar energy to modern-day applications.

Unit 1. Basics of solar energy **[08 Hrs]**

Energy Scenario, what is solar energy, Generation of solar energy, physics of propagation of solar radiation from the sun to earth, heat to electricity conversion.

Unit 2. Solar thermal systems **[08 Hrs]**

- Fundamentals of solar collectors, Liquid flat plate collectors and concentrating collectors. Solar cookers, Solar Air heaters. Solar thermal power generation. Solar pond. Solar refrigeration, Passive architecture, solar distillation, and emerging technologies.

Unit 3. Solar Photovoltaic system **[08 Hrs]**

- Fundamentals of solar PV cells, principles and performance analysis, modules, arrays, theoretical maximum power generation from PV cells. Solar water pumping, Satellite. Solar Street lights, Solar mobile chargers. Solar rechargeable lamps. PV based farming applications.

Unit 4. Solar-electric vehicles **[08 Hrs]**

- Solar cars. Solar buses. Single-track vehicles. Auxiliary power. Personal rapid transit. Rail. They manned solar aircraft.

Textbooks:

1. Sukhatme, S. P., & Nayak, J. K. (2017). Solar energy. McGraw-Hill Education.
2. Rai, G. D. (2011). A Textbook of Non-conventional energy sources.
3. Garg, H. P. (2000). Solar energy: fundamentals and applications. Tata McGraw-Hill Education.
4. Tyagi, H., Agarwal, A. K., Chakraborty, P. R., &Powar, S. (2018). Introduction to applications of solar energy. In Applications of Solar Energy (pp. 3-10). Springer, Singapore.

Reference books:

1. Reinders, A., Verlinden, P., van Sark, W. (2017). Photovoltaic Solar Energy: From Fundamentals to Applications. United Kingdom: Wiley.

2. Boxwell, M. (2010). Solar Electricity Handbook: A Simple, Practical Guide to Solar Energy - Designing and Installing Photovoltaic Solar Electric Systems. United Kingdom: Greenstream Publishing.

Head of Department
Mechanical Engineering
JD College of Engineering & Management
Nagpur

Department of Mech. Engg.
JDCOEM

ME7TE03A	Elective-III: Gas Turbine and Jet Propulsion	3 Credit

COURSE OBJECTIVES

1. To teach the fundamentals of Gas Turbine and Jet Propulsion to explore the students' knowledge as a Thermal Power Plant Engineer.
2. To acquire understanding on design and efficiency calculation of gas turbines.

COURSE OUTCOMES

At the end of the course students will be able to

1. Determine and Differentiate the Gas Turbine and Jet Propulsion and Operating Parameters
2. Determine the Gas Turbine Thermal Efficiency, Work Ratio and Optimum Pressure Ratio.
3. Design and select the Proper Compressor and Combustion Chamber for Gas Turbine System.
4. Determine the performance parameters of Jet Propulsion and rocket engines. Various types of Jet propulsion Engines.

Unit No 1: Gas Turbine [8 Hours]

Introduction to Gas Turbines, Development, Classification and Application of Gas Turbines, Simple open cycle Gas Turbine (Constant Pressure Heat Addition) or Air Standard Brayton Cycle and Actual Brayton Cycle, Closed Cycle Gas Turbine. Thermal Efficiency, Work Ratio, Specific Fuel Consumption, Optimum Pressure Ratio. Advantage and Disadvantage of Closed Cycle over Open Cycle Gas Turbine. Advantage and Disadvantage of Gas Turbine over Steam turbine, Advantage and Disadvantage of Gas Turbine over Diesel or Petrol Engine.

Unit No 2: Combine Cycle and Co-generation [8 Hours]

Methods to improving Efficiency and Specific Output. Inter cooling, Reheating, Regeneration, Combined cycle, and Cogeneration (Numerical Expected), Effect of operating variables on thermal efficiency.

Unit No 3: Compressor and Combustion Chamber [8 Hours]

Centrifugal Compressor and Axial Flow Compressor, Losses in dynamic compressors, surging and stalling.

Requirement of Combustion Chamber, Type of Combustion Chamber, Factors affecting Combustion Chamber. Gas turbine Emission, Methods for Reducing Emissions.

Gas Turbine Starting and Ignition System, Lubrication System, Fuel System and Controls.

Unit No 4: Jet Propulsion **[8 Hours]**

Classification of Jet Propulsion Engines, Turbojet Engine, Turbofan Engine, Turboprop Engine, Ram Jet Engine. Pulse Jet Engine. Jet Propulsion working Cycle, Thrust, Thrust Power, Propulsive Efficiency and Thermal Efficiency. Advantage and Disadvantage of Jet Propulsion over the Other System. Rocket Engine, Basic theory of operation of Rocket Engine, Solid and Liquid Propellant Rockets.

Text Books :

1. Steam & Gas Turbine and Power Plant Engineering By Dr. R. Yadav.
2. Gas turbines by Ganesan

Reference Books :

1. Gas Turbine Theory/ HIH Saravanamuttoo, Cohen, Rogers/ Pearson
2. Aircraft propulsion and Gas turbine engines , Ahmed F El- Sayed

ME7TE03BElective-III: Computer Aided Design & Manufacturing3 Credit

COURSE OBJECTIVES

1. To teach the fundamentals of Computer Aided Design & Analysis to explore the students' knowledge as a Design Engineer.
2. To provide hands on practice on CNC programming and make students aware of recent trends in the field of manufacturing.

COURSE OUTCOMES

At the end of the course students will be able to

1. Understand the basic concept of computer aided design, its scope, application and relationship among different domain like CAD, CAM and design Analysis. Able to develop the algorithm to generate the line and circle as well as to realize the importance of 2-D transformation to manipulate a geometrical entity.
2. Develop CNC programming for different machining operation on different machine components
3. Differentiate among different FMS layout and prepare proper layout as per requirement
4. Comprehend the concept of 3-D transformation and various techniques of modelling.
5. Learn the basic concept and applications of FEM to analyse the 1-D bar and 2-D trusses.
6. Relate optimisation technique in the field of manufacturing.

Unit 1: Introduction to CAD [8 Hours]

Introduction of CAD, Difference between Conventional & CAD design, Hardware required for CAD: Interactive input output devices, Graphics software: Product life cycle, 2D curves like Line, Circle, etc and their algorithms, Bezier Curve, B spline curve, CSG, B-Rep

Unit 2: 2D & 3D Transformation [8 Hours]

2D transformation: Translation, Scaling, Rotation, Reflection & Shear, Concept of homogeneous representation & concatenation. Inverse Transformation (enumeration of entity on graph paper) 3D Transformation ; Translation, Scaling, Rotation, Reflection etc.

Unit 3: Computer Aided Manufacturing (CAM) [6 Hours]

Numerical Control, Elements of a NC system, Steps in NC based manufacturing, Point to point, straight line and contouring control, Manual and Computer Assisted Part Programming, NC and APT programming, Adaptive control, Distributed Numerical Control

Unit 4: Flexible manufacturing System & Robotics: [6 Hours]

Flexible manufacturing System & Robotics: Introduction, Components of FMS, Group Technology, Part classification and families, Composite part, Types of FMS layouts, Advantages of FMS Robotics: Robot configurations, Drives for robots, Sensors used in robotics, Programming technique, Programming languages, Applications, Latest development in robotics

Unit 5: Optimisation in Design [8 Hours]

Objectives of optimum design, adequate and optimum design, Johnson's Method of optimum design, primary design equation, subsidiary design equations and limit equations, optimum design with normal and redundant specifications of simple machine elements like: tension bar, transmission shaft and helical spring.

Text Books:

1) CAD/CAM, Theory & Practice: Ibrahim Zeid (McGraw Hill)
2) Introduction to Finite Elements in Engineering: Chandrupatla & A.D. Belegundu (PHI)
3) Text book of Finite Element Analysis, Chanakasava Alavala, PHI Learning Private Ltd.
4) Finite Element Method with Application in Engineering, Y.M.Desai, T.I.Eldho, A.H. Shah, Pearson publication.
5) Procedural elements for computer Graphics: D Rogers (McGraw Hill)
6) First Course in the Finite Element Method, Daryl Logan, Cengage Learning

Reference Books:

1) Computer Graphics: D. Hearn & M.P. Baker (Pearson Education)
2) Mathematical Elements for Computer Graphics Dravid F Rogers, J. Alan Adams (McGraw Hill)
3) Schaum's Outline Series: Theory & Problems of Computer Graphics Roy A. Plastock, Gordon Kalley
4) Finite Element Analysis, Theory and Application with Ansys, S. Moaveni, Pearson.The Finite Element Method. Zienkiewicz O. C., Taylor R. I., Butterworth-Heinemann.

ME7TE03C **Elective-III: LEAN PRODUCTION SYSTEM** **3 Credit**

COURSE OBJECTIVES

1. To understand the importance of the lean Manufacturing systems
2. To analyse, and optimize such systems.

COURSE OUTCOMES

At the end of this course the student will demonstrate ability to

1. Measure production performance and how defects and waste degrade performance.
2. Recognize the Just in time production system and its applications.
3. Understand the concept of KANBAN, TPM and OEE System to improve the production system.
4. Compute the standard time and explore the SMED technique.
5. Apply elements of Lean production including Heijunka, Jidoka, and Poka Yoke.
6. Apply the 5S methodology for establishing and sustaining a productive work environment.

Unit 1: Introduction to Lean Production[06 Hours]

Review the history of Lean Production, focusing on Japan's Toyota Production System as an alternative to mass production, Waste impacts productivity.

Unit 2: JIT Production System **[06 Hours]**

Just in time production system. JIT Logic –Pull system Japanese approach to production elimination of waste – JIT implementation requirements JIT application for job shops

Unit 3: Quality Techniques **[06 Hours]**

The important concepts of cycle time and tact time. Understand the relationship between inventories, Kanban System: Kanban rules, supplier Kanban and sequence schedule used by supplier, Monthly information & daily information, Concept of Total Productive Maintenance and Overall Equipment Efficiency.

Unit 4: Quality Techniques **[06 Hours]**

Concept of Poka-Yoke for fool-proof our processes and learn how to structure and concept of Kaizen for rapid improvement opportunities for problem-solving and process improvements, elements of Lean production including Heijunka, Jidoka.

Unit 5: Concept of Workplace **[06 Hours]**

Introduction to the concepts of Workplace Visualization and Organization and 5S for improving and maintaining continuous flow in Lean Production, Value Stream Mapping- Understanding the current

Text Books

1) 1. Industrial Engineering and Production Management by Martand Telsang, S.Chand & Company Ltd. 2. Lean Production Simplified by DENNIS, CRC Press, 2016.

Reference Books

1) The Toyota Way: 14 Management Principles From The World's Greatest Manufacturer By Jeffrey K. Liker

ME7TE04A	**Elective-IV: Refrigeration & Cryogenics**	**3 Credit**

COURSE OBJECTIVES

1. To understand the applications of refrigerator & Cryogenics.
2. To understand the difference between VCRS & VARS

COURSE OUTCOMES

At the end of the course students will be able to

1.Define air refrigeration, vapour compression refrigeration, different type of refrigerants, vapour absorption and Cryogenics.

2. Explain the working of single stage, multistage and cascade refrigeration.
3. Analysis of Standard Vapour compression Refrigeration System.
4. Identify various natural and artificial methods of refrigeration.
5. Evaluate different expansion and control devices.

Unit 1: Introduction to Refrigeration **[08 Hours]**

Introduction, History, Unit of Refrigeration, Methods of producing cooling, Difference Between Heat Engine, Refrigerator & Heat Pump. Reversed Carnot cycle, bell-Coleman cycle, Open Air refrigeration cycle, Closed or Dense air refrigeration cycle, Air refrigeration system, Methods of Air refrigeration system.

Unit 2: Vapour Compression& Vapour Absorption Refrigeration System **[08 Hours]**

Vapor Compression Refrigeration system: Introduction to refrigeration, applications of refrigeration, development of simple saturated Vapour compression refrigeration cycle, effect of

change in evaporator and condenser pressure, effect of pressure drops, polytropic compression, methods of improvement in the performance of the cycle like sub cooling, superheating, use of heat exchanger, flash chamber and flash inter-cooler.

Vapour Absorption System: Aqua-ammonia system, lithium bromide-water system, Electrolux refrigerator, comparison with vapour compression cycle.

Unit 3: Refrigerants & Components of VCRS **[06 Hours]**

Refrigerant for Vapour Compression System: Desirable Properties, Selection, Zeotrops and Azeotropes. Necessity for replacement of CFC refrigerants, natural refrigerants.

Components of Vapor compression system: Classification, construction and application of various components like compressors, condensers, evaporators, expansion devices, controls, cooling towers etc.

Unit 4: Multistage Refrigeration System **[07 Hours]**

Multistage Vapour Compression Refrigeration Systems: Multiple compressors & multiple evaporator systems, cascade refrigeration system, vortex tube, steam jet and thermoelectric refrigeration systems.

Unit 5: Cryogenics **[07 Hours]**

Introduction and applications of cryogenics, Joules Thomson effect, methods of air liquification, Linde's and Claude's cycle, adiabatic demagnetization, cryogenic insulation.

Text Books

1. C.P.Arora, "Refrigeration and Air-conditioning", Tata McGraw-Hill, 2017
2. Stoecker& Jones, "Refrigeration and Air-conditioning", McGraw Hill Book Company, New York, 1983.
3. R.J.Dossat, "Principles of Refrigeration", Pearson Education Asia, 2014.

Reference Books

1. J.L.Threlkeld, "Thermal Environmental Engineering", Prentice Hall, 1970.
2. P.C.Koelet,"Industrial Refrigeration: Principles, Design and Applications Macmillan, 1992.
3. ASHRAE HANDBOOKS four volume Index 2014-2017.

ME7TE04B Elective-IV: Design of Mechanical Drives3Credit

COURSE OBJECTIVES

3. This course is aimed to make the students conversant with design principles & design procedure of mechanical drives like coupling,belt drive, chain drive, gear drive, wire rope etc.
4. Design of journal bearing, gears, IC engine components & selection of antifriction bearings and gears is also included. At the end of this course, student will be ableto select and design appropriate mechanical drives.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe the concept of Mechanical Drives with applications, design, formulation and basics of subject required to analyze the system under mechanics and stress analysis study.
2. Illustrate the concept of drive mechanism, machine components, dimensions, types of stresses induces, modes of failure.
3. Solve the given Engineering problem on coupling, bearing, belt drives, chain drives, gear drives and ICE components.
4. Analyze the question on mechanical drives and accordingly calculate the dimensions of components based load and stress criteria.
5. Develop the drive system, fulfilling the load, stress and failure criteria.

Unit 1: Design of Coupling and Bearing **[8 Hours]**

Design of Coupling: Types of shaft coupling, design of flange coupling, flexible bush coupling.Design of Bearings: Lubrication, Types of Lubrication, oil seals, design of hydrodynamic journalbearings for radial loads, selection of ball and roller bearing for radial and thrust loads. Failures ofantifriction bearing, bearing housing.

Unit 2: Design of Belt and Chain Drive **[7 Hours]**

Design of Flat belt drive: Types of belts & belt material, analysis of belt tension, condition fortransmitting maximum power, design of flat belt, flat belt pulley.

Design of V belt drive: Types of V-belt, analysis of V-belt tension, design of V belt & pulley.

Design of Roller chain drive: Velocity ratio and length of chain, design of chain, dimensions of tooth profile, design of sprocket.

Unit 3: Design of Helical and Bevel Gear Drive [8 Hours]

Design of Gears: Review of kinematics of gears & terminology, interference, tooth profiles,formative number of teeth etc. Design of Spur Gear drive, Helical Gear drive.

Design of Bevel Gear Drive: Types of bevel gear, proportions of bevel gear, force analysis of bevelgear drive, design of bevel gear drive.

Unit 4: Design of Worm Gear Drive & ICE Components [7 Hours]

Design of Worm Gear Drive: Worm Gearing—AGMA Equation; Worm-Gear force analysis, Designing a Worm-Gear Mesh; Buckingham Wear Load.

Design of I. C. Engine components, Introduction to selection of material for I. C. enginecomponents, Design of cylinder and cylinder head, design of piston and piston-pins, piston rings.

Text Books:

7) Machine Design, Maleev& Hartman, CBS publishers.
8) Machine Design, P.H. Black, TMH.
9) Mechanical Engg. Design, Shigley, TMH.
10) Design of Machine Elements, V. B. Bhandari., McGraw Hill education
11) Design Data book, B.D. Shiwalkar, Central Techno publications.

Reference Books:

5) Hand book of Machine Design, Shigley & Mischke, McGraw Hill.
6) Mechanical Engineering Hand book Vol 1 & 2, Kent, John Willey & Sons.
7) Machine Tool Design Data Book, CMTI.
8) Engineering Design, Dieter G E., McGraw Hill education.
9) Machine Design, Robert L. Norton, Pearson. Finite Element Analysis, Theory and Practice, Fagan M. J., Pearson Education Limited.

ME7TE04C	Elective-IV: World Class Manufacturing	3 Credit

COURSE OBJECTIVES

1. To teach the fundamentals of World class manufacturingwith emphasize on the underlying theory, assumption.
2. To know the use of various tool used for various world class manufacturing.

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Define challenges in world class manufacturing

CO2: Study various world class manufacturing strategies.

CO3: Understand quality and employee involvement in manufacturing.

CO4: Discuss different world class information system for change management.

CO5: Identify various methods and processes for WCM using brain storming.

CO6: Describe method to monitor performance in WCM

Unit 1: Historical Perspective **[8 Hours]**

Historical Perspective World class excellent organizations – Models for manufacturing excellence: Schonberger, Halls, Gunn and Maskell models, Business Excellence

Unit 2: Benchmark, Bottlenecks and Best Practices **[7 Hours]**

Benchmark, Bottlenecks and Best Practices, Concepts of benchmarking, Bottleneck and best practices, Best performers – Gaining competitive edge through world class manufacturing – Value added manufacturing -Value Stream mapping – Eliminating waste -Toyota Production System - Example

Unit 3: System & tools for world class manufacturing **[8 Hours]**

System & tools for world class manufacturing: Improving Product & Process Design – SQC, 5-S ,3 M, use of IT ,Product Mix , Optimizing .

Unit 4: Human Resource Management in WCM **[7 Hours]**

Human Resource Management in WCM: Adding value to the organization- Organizational learning - techniques of removing Root cause of problems-People as problem solvers-New organizational structures. Associates-Facilitators- Teamsmanship-Motivation and reward in the age of continuous improvement.

Unit 5: Typical Characteristics of WCM **[6 Hours]**

Typical Characteristics of WCM Companies Performance indicators like POP, TOPP and AMBITE systems-what is world class Performance -Six Sigma philosophy.

Text Books:

1. World Class Manufacturing-Strategic Perspective Sahay B.S., Saxena KBC. and Ashish Kumar Mac Milan Publications New Delhi
2. Just In Time Manufacturing Korgaonkar M.G MacMilan Publications

Reference Books:

1. Making Common Sense Common Practice – Models for manufacturing excellence-Ron Moore (Butter worth Heinmann)
2. The Toyota Way - Jeffrey K.Liker – (Tata Macgraw Hill)
3. Operations Management for Competitive Advantage – Chase
4. Making Common Sense Common Practice – Moore
5. Managing Technology & Innovation for Competitive Advantage – Narayanan
6. Just In Time Manufacturing – M.G. Korgaonkar

MEOEC3	Open Elective-III: Power Generation Engineering	4 Credit

COURSE OBJECTIVES

1. The main objective of the syllabus to understand basic knowledge about power generation systems which are used in the regular power plants.
2. The modernization in power sectors is also included to understand recent trend in the field.

COURSE OUTCOMES

At the end of the course students will be able to

1) Student will be able to describe basics of power generations systems.

2) Student will be able to analyze various conventional & non-conventional power plants.

3) Student will be able to analyze and examine combined operations of different power plants.

4) Student will be able to evaluate and describe Hydroelectric power plant nuclear power plant

Unit 1:THERMAL POWER PLANT- I

[8 Hours]

Introduction to thermal power plants and power plant layouts. Site selection. Fuel characteristics, handling, storage, preparation & firing methods. Ash & dust collection and handling. Boiler: classification, general arrangement, details of different components and system like draught system, steam turbine systems, condenser, cooling towers

Unit 2: THERMAL POWER PLANT- II

[7 Hours]

Gas Turbine Power Plant: -Introduction, power plant layouts, Open cycle, close cycle power plants. Various components and systems. Methods to improve efficiency. Reheat and Regeneration cycle and their combinations Diesel Electric Power Plant: - Introduction, Outline, type of engines, different components. performance, plant layout. Comparison with other power plant. (visit to nearby power plant shall be arrange for the students)

Unit 3: HYDROELECTRIC POWER PLANT

[8 Hours]

Hydrology: - Rainfall, Runoff, Hydro graph, flow duration curve, mass curve. Hydroelectric power plant: - Site selection, classification of hydroelectric power plant, general arrangement, details of different components, turbine selection.Governing. Comparison with other power plant.

Unit 4: NUCLEAR POWER PLANT

[6 Hours]

Introduction to Nuclear Engineering, Global scenario, prominent installations worldwide, present & proposed nuclear plant in India. Operational requirements and difficulties, site selection for location of a nuclear power station Nuclear Waste Disposal. Comparison with other power plant.

NON CONVENTIONAL POWER GENERATION SYSTEMS

Introduction to Non Conventional power Generation Systems, Geo-Thermal Power Plant, Tidal Power Plant, Wind Power Plant, Solar Power Plant.

Text Books:

1. Power Plant Engineering 2002 Domkundwar. Dhanpat Rai& Co.
2. Power Plant Engineering 2007 Vopal & Slortzki

Reference Books:

1. Power Plant Engineering 2010 P K Nag

MEOEC3	Open Elective-III: Project Evaluation & Management	4 Credit

COURSE OBJECTIVES

The course focuses on developing complete understanding of formulating a problem/project and finding possible solutions against the given constraints. The overall learning shall resolve project identification evaluating its technical and economic feasibility and developing skills for its planning, and establishing controls. Relevant techniques, writing skills and monitoring methods shall be dealt with in details.

COURSE OUTCOMES

At the end of the course students will be able to

1) To apply the concepts of monitoring and evaluation, appraise

2) To analyse the best monitoring methods, appreciate evaluation in the context of developmental project work

3) To perform problem analysis, determine relevant indicators and data necessary for evaluation,

4) Implement a monitoring and evaluation process, establish baselines and targets.

Unit 1:Project Identification **[8 Hours]**

Considering objectives and SWOT analysis, Screening of Project Ideas, Technical, Market, Financial, Socioeconomic and Ecological Appraisal of a project demand forecasting, secondary data, accuracy, confidence level, uncertainty

Unit 2: Technical feasibility **[7 Hours]**

Process selection, Level of automation, plant capacity, acquiring technology, Appropriate technology plant location, Equipment selection & procurement, Govt. policies. Value analysis and project evaluation:

Unit 3: Economic feasibility **[8 Hours]**

Cost of Project, working capital analysis, fixed cost, means of finance, estimation of sales & production price analysis, Breakeven point, Projected cash flow statements, projected balance sheet, projected profit & loss statement, projected cash flow, rate of return, Discounted payback period, cost benefit analysis, return after taxes.

Unit 4: Project report **[6 Hours]**

Preparation of project report, risk analysis, sensitivity analysis, methods of raisingCapital Initial review, performance analysis, ratio analysis, sickness, project revival, Project Monitoring with PERT/Cost. Organizational aspects, Computer packages and Project Completion environmental & social aspects.

Text Books:

1. Projects 7th Edition 2007 Prasannachandra Tata mc graw Hill publishing company Ltd.
2. CPM & PERT L. S. Srinath East West publisher
3. Engineering Economy 5th edition H. G Thuesen, W J Fabricky, G,J, Thuersen Prentice-Hall

ME7TE03A	**Elective-III: Gas Turbine and Jet Propulsion**	**3 Credit**

COURSE OBJECTIVES

1. To teach the fundamentals of Gas Turbine and Jet Propulsion to explore the students' knowledge as a Thermal Power Plant Engineer.
2. To acquire understanding on design and efficiency calculation of gas turbines.

COURSE OUTCOMES

At the end of the course students will be able to

1. Determine and Differentiate the Gas Turbine and Jet Propulsion and Operating Parameters
2. Determine the Gas Turbine Thermal Efficiency, Work Ratio and Optimum Pressure Ratio.
3. Design and select the Proper Compressor and Combustion Chamber for Gas Turbine System.
4. Determine the performance parameters of Jet Propulsion and rocket engines. Various types of Jet propulsion Engines.

Unit No 1: Gas Turbine [8 Hours]

Introduction to Gas Turbines, Development, Classification and Application of Gas Turbines, Simple open cycle Gas Turbine (Constant Pressure Heat Addition) or Air Standard Brayton Cycle and Actual Brayton Cycle, Closed Cycle Gas Turbine. Thermal Efficiency, Work Ratio, Specific Fuel Consumption, Optimum Pressure Ratio. Advantage and Disadvantage of Closed Cycle over Open Cycle Gas Turbine. Advantage and Disadvantage of Gas Turbine over Steam turbine, Advantage and Disadvantage of Gas Turbine over Diesel or Petrol Engine.

Unit No 2: Combine Cycle and Co-generation [8 Hours]

Methods to improving Efficiency and Specific Output. Inter cooling, Reheating, Regeneration, Combined cycle, and Cogeneration (Numerical Expected), Effect of operating variables on thermal efficiency.

Unit No 3: Compressor and Combustion Chamber [8 Hours]

Centrifugal Compressor and Axial Flow Compressor, Losses in dynamic compressors, surging and stalling.

Requirement of Combustion Chamber, Type of Combustion Chamber, Factors affecting Combustion Chamber. Gas turbine Emission, Methods for Reducing Emissions.

Gas Turbine Starting and Ignition System, Lubrication System, Fuel System and Controls.

Unit No 4: Jet Propulsion [8 Hours]

Classification of Jet Propulsion Engines, Turbojet Engine, Turbofan Engine, Turboprop Engine, Ram Jet Engine, Pulse Jet Engine. Jet Propulsion working Cycle, Thrust, Thrust Power, Propulsive Efficiency and Thermal Efficiency. Advantage and Disadvantage of Jet Propulsion over the Other System. Rocket Engine, Basic theory of operation of Rocket Engine, Solid and Liquid Propellant Rockets.

Text Books :

1. Steam & Gas Turbine and Power Plant Engineering By Dr. R. Yadav.
2. Gas turbines by Ganesan

Reference Books :

1. Gas Turbine Theory/ HIH Saravanamuttoo, Cohen, Rogers/ Pearson
2. Aircraft propulsion and Gas turbine engines , Ahmed F El- Sayed

ME7TE03B	**Elective-III: Computer Aided Design & Manufacturing**	**3 Credit**

COURSE OBJECTIVES

1. To teach the fundamentals of Computer Aided Design & Analysis to explore the students' knowledge as a Design Engineer.
2. To provide hands on practice on CNC programming and make students aware of recent trends in the field of manufacturing.

COURSE OUTCOMES

At the end of the course students will be able to

1. Understand the basic concept of computer aided design, its scope, application and relationship among different domain like CAD, CAM and design Analysis. Able to develop the algorithm to generate the line and circle as well as to realize the importance of 2-D transformation to manipulate a geometrical entity.
2. Develop CNC programming for different machining operation on different machine components
3. Differentiate among different FMS layout and prepare proper layout as per requirement
4. Comprehend the concept of 3-D transformation and various techniques of modelling.
5. Learn the basic concept and applications of FEM to analyse the 1-D bar and 2-D trusses.
6. Relate optimisation technique in the field of manufacturing.

Unit 1: Introduction to CAD **[8 Hours]**

Introduction of CAD, Difference between Conventional & CAD design, Hardware required for CAD: Interactive input output devices, Graphics software: Product life cycle, 2D curves like Line, Circle, etc and their algorithms, Bezier Curve, B spline curve, CSG, B-Rep

Unit 2: 2D & 3D Transformation **[8 Hours]**

2D transformation: Translation, Scaling, Rotation, Reflection & Shear, Concept of homogeneous representation & concatenation. Inverse Transformation (enumeration of entity on graph paper) 3D Transformation ; Translation, Scaling, Rotation, Reflection etc.

Unit 3: Computer Aided Manufacturing (CAM) **[6 Hours]**

Numerical Control, Elements of a NC system, Steps in NC based manufacturing, Point to point, straight line and contouring control, Manual and Computer Assisted Part Programming, NC and APT programming, Adaptive control, Distributed Numerical Control

Unit 4: Flexible manufacturing System & Robotics: [6 Hours]

Flexible manufacturing System & Robotics: Introduction, Components of FMS, Group Technology, Part classification and families, Composite part, Types of FMS layouts, Advantages of FMS Robotics: Robot configurations, Drives for robots, Sensors used in robotics, Programming technique, Programming languages, Applications, Latest development in robotics

Unit 5: Optimisation in Design [8 Hours]

Objectives of optimum design, adequate and optimum design, Johnson's Method of optimum design, primary design equation, subsidiary design equations and limit equations, optimum design with normal and redundant specifications of simple machine elements like: tension bar, transmission shaft and helical spring.

Text Books:

1) CAD/CAM, Theory & Practice: Ibrahim Zeid (McGraw Hill)
2) Introduction to Finite Elements in Engineering: Chandrupatla & A.D. Belegundu(PHI)
3) Text book of Finite Element Analysis, Chanakasava Alavala, PHI Learning Private Ltd.
4) Finite Element Method with Application in Engineering, Y.M.Desai, T.I.Eldho, A.H. Shah, Pearson publication.
5) Procedural elements for computer Graphics: D Rogers (McGraw Hill)
6) First Course in the Finite Element Method, Daryl Logan, Cengage Learning

Reference Books:

1) Computer Graphics: D. Hearn & M.P. Baker (Pearson Education)
2) Mathematical Elements for Computer Graphics Dravid F Rogers, J. Alan Adams (McGraw Hill)
3) Schaum's Outline Series: Theory & Problems of Computer Graphics Roy A. Plastock, Gordon Kalley
4) Finite Element Analysis, Theory and Application with Ansys, S. Moaveni, Pearson. The Finite Element Method, Zienkiewicz O. C., Taylor R. I., Butterworth-Heinemann.

ME7TE03C	**Elective-III: LEAN PRODUCTION SYSTEM**	**3 Credit**

COURSE OBJECTIVES

1. To understand the importance of the lean Manufacturing systems
2. To analyse, and optimize such systems.

COURSE OUTCOMES

At the end of this course the student will demonstrate ability to

1. Measure production performance and how defects and waste degrade performance.
2. Recognize the Just in time production system and its applications.
3. Understand the concept of KANBAN, TPM and OEE System to improve the production system.
4. Compute the standard time and explore the SMED technique.
5. Apply elements of Lean production including Heijunka, Jidoka, and Poka Yoke.
6. Apply the 5S methodology for establishing and sustaining a productive work environment.

Unit 1: Introduction to Lean Production **[06 Hours]**

Review the history of Lean Production, focusing on Japan's Toyota Production System as an alternative to mass production, Waste impacts productivity.

Unit 2: JIT Production System **[06 Hours]**

Just in time production system. JIT Logic –Pull system Japanese approach to production elimination of waste – JIT implementation requirements JIT application for job shops

Unit 3: Quality Techniques **[06 Hours]**

The important concepts of cycle time and tact time. Understand the relationship between inventories, Kanban System: Kanban rules, supplier Kanban and sequence schedule used by supplier, Monthly information & daily information, Concept of Total Productive Maintenance and Overall Equipment Efficiency.

Unit 4: Quality Techniques **[06 Hours]**

Concept of Poka-Yoke for fool-proof our processes and learn how to structure and concept of Kaizen for rapid improvement opportunities for problem-solving and process improvements, elements of Lean production including Heijunka, Jidoka.

Unit 5: Concept of Workplace **[06 Hours]**

Introduction to the concepts of Workplace Visualization and Organization and 5S for improving and maintaining continuous flow in Lean Production, Value Stream Mapping- Understanding the current state and designing the future state managing lean enterprise.

Text Books

1) 1. Industrial Engineering and Production Management by Martand Telsang, S.Chand & Company Ltd. 2. Lean Production Simplified by DENNIS, CRC Press, 2016.

Reference Books

1) The Toyota Way: 14 Management Principles From The World's Greatest Manufacturer By Jeffrey K. Liker

ME7TE04A	**Elective-IV: Refrigeration & Cryogenics**	**3 Credit**

COURSE OBJECTIVES

1. To understand the applications of refrigerator & Cryogenics.
2. To understand the difference between VCRS & VARS

COURSE OUTCOMES

At the end of the course students will be able to

1. Define air refrigeration, vapour compression refrigeration, different type of refrigerants, vapour absorption and Cryogenics.
2. Explain the working of single stage, multistage and cascade refrigeration.
3. Analysis of Standard Vapour compression Refrigeration System.
4. Identify various natural and artificial methods of refrigeration.
5. Evaluate different expansion and control devices.

Unit 1: Introduction to Refrigeration [08 Hours]

Introduction, History, Unit of Refrigeration, Methods of producing cooling, Difference Between Heat Engine, Refrigerator & Heat Pump. Reversed Carnot cycle, bell-Coleman cycle, Open Air refrigeration cycle, Closed or Dense air refrigeration cycle, Air refrigeration system, Methods of Air refrigeration system.

Unit 2: Vapour Compression & Vapour Absorption Refrigeration System [08 Hours]

Vapor Compression Refrigeration system: Introduction to refrigeration, applications of refrigeration, development of simple saturated Vapour compression refrigeration cycle, effect of change in evaporator and condenser pressure, effect of pressure drops, polytropic compression, methods of improvement in the performance of the cycle like sub cooling, superheating, use of heat exchanger, flash chamber and flash inter-cooler.

Vapour Absorption System: Aqua-ammonia system, lithium bromide-water system, Electrolux refrigerator, comparison with vapour compression cycle.

Unit 3: Refrigerants & Components of VCRS [06 Hours]

Refrigerant for Vapour Compression System: Desirable Properties, Selection, Zeotrops and Azeotropes, Necessity for replacement of CFC refrigerants, natural refrigerants.

Components of Vapor compression system: Classification, construction and application of various components like compressors, condensers, evaporators, expansion devices, controls, cooling towers

etc.

Unit 4: Multistage Refrigeration System **[07 Hours]**

Multistage Vapour Compression Refrigeration Systems: Multiple compressors & multiple evaporator systems, cascade refrigeration system. vortex tube, steam jet and thermoelectric refrigeration systems.

Unit 5: Cryogenics **[07 Hours]**

Introduction and applications of cryogenics, Joules Thomson effect, methods of air liquification, Linde's and Claude's cycle, adiabatic demagnetization, cryogenic insulation.

Text Books

1. C.P.Arora, "Refrigeration and Air-conditioning", Tata McGraw-Hill, 2017
2. Stoecker & Jones, "Refrigeration and Air-conditioning", McGraw Hill Book Company, New York, 1983.
3. R.J.Dossat, "Principles of Refrigeration", Pearson Education Asia, 2014.

Reference Books

1. J.L.Threlkeld, "Thermal Environmental Engineering", Prentice Hall, 1970.
2. P.C.Koelet,"Industrial Refrigeration: Principles, Design and Applications Macmillan, 1992.
3. ASHRAE HANDBOOKS four volume Index 2014-2017.

ME7TE04B	**Elective-IV: Design of Mechanical Drives**	**3 Credit**

COURSE OBJECTIVES

3. This course is aimed to make the students conversant with design principles & design procedure of mechanical drives like coupling, belt drive, chain drive, gear drive, wire rope etc.
4. Design of journal bearing, gears, IC engine components & selection of antifriction bearings and gears is also included. At the end of this course, student will be able to select and design appropriate mechanical drives.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe the concept of Mechanical Drives with applications, design, formulation and basics of subject required to analyze the system under mechanics and stress analysis study.
2. Illustrate the concept of drive mechanism, machine components, dimensions, types of stresses induces, modes of failure.
3. Solve the given Engineering problem on coupling, bearing, belt drives, chain drives, gear drives and ICE components.
4. Analyze the question on mechanical drives and accordingly calculate the dimensions of components based load and stress criteria.
5. Develop the drive system, fulfilling the load, stress and failure criteria.

Unit 1: Design of Coupling and Bearing [8 Hours]

Design of Coupling: Types of shaft coupling, design of flange coupling, flexible bush coupling. Design of Bearings: Lubrication, Types of Lubrication, oil seals, design of hydrodynamic journal bearings for radial loads, selection of ball and roller bearing for radial and thrust loads. Failures of antifriction bearing, bearing housing.

Unit 2: Design of Belt and Chain Drive [7 Hours]

Design of Flat belt drive: Types of belts & belt material, analysis of belt tension, condition for transmitting maximum power, design of flat belt, flat belt pulley.

Design of V belt drive: Types of V-belt, analysis of V-belt tension, design of V belt & pulley.

Design of Roller chain drive: Velocity ratio and length of chain, design of chain, dimensions of tooth profile, design of sprocket.

Unit 3: Design of Helical and Bevel Gear Drive [8 Hours]

Design of Gears: Review of kinematics of gears & terminology, interference, tooth profiles, formative number of teeth etc. Design of Spur Gear drive, Helical Gear drive.

Design of Bevel Gear Drive: Types of bevel gear, proportions of bevel gear, force analysis of bevel gear drive, design of bevel gear drive.

Unit 4: Design of Worm Gear Drive & ICE Components [7 Hours]

Design of Worm Gear Drive: Worm Gearing—AGMA Equation; Worm-Gear force analysis, Designing a Worm-Gear Mesh; Buckingham Wear Load.

Design of I. C. Engine components, Introduction to selection of material for I. C. engine components, Design of cylinder and cylinder head, design of piston and piston-pins, piston rings.

Text Books:

7) Machine Design, Maleev & Hartman, CBS publishers.
8) Machine Design, P.H. Black, TMH.
9) Mechanical Engg. Design, Shigley, TMH.
10) Design of Machine Elements, V. B. Bhandari., McGraw Hill education
11) Design Data book, B.D. Shiwalkar, Central Techno publications.

Reference Books:

5) Hand book of Machine Design, Shigley & Mischke, McGraw Hill.
6) Mechanical Engineering Hand book Vol 1 & 2, Kent, John Willey & Sons.
7) Machine Tool Design Data Book, CMTI.
8) Engineering Design, Dieter G E., McGraw Hill education.
9) Machine Design, Robert L.Norton, Pearson. Finite Element Analysis, Theory and Practice, Fagan M. J., Pearson Education Limited.

ME7TE04C	**Elective-IV: World Class Manufacturing**	**3 Credit**

COURSE OBJECTIVES

1. To teach the fundamentals of World class manufacturing with emphasize on the underlying theory, assumption.
2. To know the use of various tool used for various world class manufacturing.

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Define challenges in world class manufacturing

CO2: Study various world class manufacturing strategies.

CO3: Understand quality and employee involvement in manufacturing.

CO4: Discuss different world class information system for change management.

CO5: Identify various methods and processes for WCM using brain storming.

CO6: Describe method to monitor performance in WCM

Unit 1: Historical Perspective [8 Hours]

Historical Perspective World class excellent organizations – Models for manufacturing excellence: Schonberger, Halls, Gunn and Maskell models, Business Excellence

Unit 2: Benchmark, Bottlenecks and Best Practices [7 Hours]

Benchmark, Bottlenecks and Best Practices, Concepts of benchmarking, Bottleneck and best practices, Best performers – Gaining competitive edge through world class manufacturing – Value added manufacturing -Value Stream mapping – Eliminating waste -Toyota Production System - Example

Unit 3: System & tools for world class manufacturing [8 Hours]

System & tools for world class manufacturing: Improving Product & Process Design – SQC, 5-S , 3 M, use of IT , Product Mix , Optimizing .

Unit 4: Human Resource Management in WCM [7 Hours]

Human Resource Management in WCM: Adding value to the organization- Organizational learning - techniques of removing Root cause of problems-People as problem solvers-New organizational structures. Associates-Facilitators- Teamsmanship-Motivation and reward in the age of continuous improvement.

Unit 5: Typical Characteristics of WCM **[6 Hours]**

Typical Characteristics of WCM Companies Performance indicators like POP, TOPP and AMBITE systems-what is world class Performance -Six Sigma philosophy.

Text Books:

1. World Class Manufacturing-Strategic Perspective Sahay B.S., Saxena KBC. and Ashish Kumar Mac Milan Publications New Delhi
2. Just In Time Manufacturing Korgaonkar M.G MacMilan Publications

Reference Books:

1. Making Common Sense Common Practice – Models for manufacturing excellence-Ron Moore (Butter worth Heinmann)
2. The Toyota Way - Jeffrey K.Liker – (Tata Macgraw Hill)
3. Operations Management for Competitive Advantage – Chase
4. Making Common Sense Common Practice – Moore
5. Managing Technology & Innovation for Competitive Advantage – Narayanan
6. Just In Time Manufacturing – M.G.Korgaonkar

MEOEC3	Open Elective-III: Power Generation Engineering	4 Credit

COURSE OBJECTIVES

1. The main objective of the syllabus to understand basic knowledge about power generation systems which are used in the regular power plants.
2. The modernization in power sectors is also included to understand recent trend in the field.

COURSE OUTCOMES

At the end of the course students will be able to

1) Student will be able to describe basics of power generations systems.

2) Student will be able to analyze various conventional & non-conventional power plants.

3) Student will be able to analyze and examine combined operations of different power plants.

4) Student will be able to evaluate and describe Hydroelectric power plant nuclear power plant

Unit 1:THERMAL POWER PLANT- I

[8 Hours]

Introduction to thermal power plants and power plant layouts. Site selection. Fuel characteristics, handling, storage, preparation & firing methods. Ash & dust collection and handling. Boiler: classification, general arrangement, details of different components and system like draught system, steam turbine systems, condenser, cooling towers

Unit 2: THERMAL POWER PLANT- II

[7 Hours]

Gas Turbine Power Plant: -Introduction, power plant layouts, Open cycle, close cycle power plants. Various components and systems. Methods to improve efficiency. Reheat and Regeneration cycle and their combinations Diesel Electric Power Plant: - Introduction, Outline, type of engines, different components, performance, plant layout. Comparison with other power plant. (visit to nearby power plant shall be arrange for the students)

Unit 3: HYDROELECTRIC POWER PLANT

[8 Hours]

Hydrology: - Rainfall, Runoff, Hydro graph, flow duration curve, mass curve. Hydroelectric power plant: - Site selection, classification of hydroelectric power plant, general arrangement, details of different components, turbine selection. Governing. Comparison with other power plant.

Unit 4: NUCLEAR POWER PLANT

[6 Hours]

Introduction to Nuclear Engineering, Global scenario, prominent installations worldwide, present & proposed nuclear plant in India. Operational requirements and difficulties, site selection for location of a nuclear power station Nuclear Waste Disposal. Comparison with other power plant.

NON CONVENTIONAL POWER GENERATION SYSTEMS

Introduction to Non Conventional power Generation Systems, Geo-Thermal Power Plant, Tidal Power Plant, Wind Power Plant, Solar Power Plant.

Text Books:

1. Power Plant Engineering 2002 Domkundwar. Dhanpat Rai & Co.
2. Power Plant Engineering 2007 Vopal & Slortzki

Reference Books:

1. Power Plant Engineering 2010 P K Nag

MEOEC3	Open Elective-III: Project Evaluation & Management	4 Credit

COURSE OBJECTIVES

The course focuses on developing complete understanding of formulating a problem/project and finding possible solutions against the given constraints. The overall learning shall resolve project identification evaluating its technical and economic feasibility and developing skills for its planning, and establishing controls. Relevant techniques, writing skills and monitoring methods shall be dealt with in details.

COURSE OUTCOMES

At the end of the course students will be able to

1) To apply the concepts of monitoring and evaluation, appraise

2) To analyse the best monitoring methods, appreciate evaluation in the context of developmental project work

3) To perform problem analysis, determine relevant indicators and data necessary for evaluation,

4) Implement a monitoring and evaluation process, establish baselines and targets.

Unit 1:Project Identification [8 Hours]

Considering objectives and SWOT analysis, Screening of Project Ideas, Technical, Market, Financial, Socioeconomic and Ecological Appraisal of a project demand forecasting, secondary data, accuracy, confidence level, uncertainty

Unit 2: Technical feasibility [7 Hours]

Process selection, Level of automation, plant capacity, acquiring technology, Appropriate technology plant location, Equipment selection & procurement, Govt. policies. Value analysis and project evaluation:

Unit 3: Economic feasibility [8 Hours]

Cost of Project, working capital analysis, fixed cost, means of finance, estimation of sales & production price analysis, Breakeven point, Projected cash flow statements, projected balance sheet, projected profit & loss statement, projected cash flow, rate of return, Discounted payback period, cost benefit analysis, return after taxes.

Unit 4: Project report **[6 Hours]**

Preparation of project report, risk analysis, sensitivity analysis, methods of raising Capital Initial review, performance analysis, ratio analysis, sickness, project revival, Project Monitoring with PERT/Cost, Organizational aspects, Computer packages and Project Completion environmental & social aspects.

Text Books:

1. Projects 7th Edition 2007 Prasannachandra Tata mc graw Hill publishing company Ltd.
2. CPM & PERT L. S. Srinath East West publisher
3. Engineering Economy 5th edition H. G Thuesen, W J Fabricky, G,J, Thuersen Prentice-Hall

Reference Books:

1. Finance series 'Project management' , Vol-I1 and Vol-III 2009 ICFAI ICFAI,Press Hyderabad
2. Finance Management 6th Edition 2010 M.Y.Khan Tata McGraw hill
3. Financial Management 4th Edition Chandra, Prasanna Tata McGraw-Hill Education, 1997
4. Engineering Economics 8th Edition G. J. Thuesen, Wolter J. Fabrycky Prentice Hall, 1993

ME8TE05A	**Elective-IV: Introduction to CFD**	**3 Credit**

COURSE OBJECTIVES

5. To teach the fundamentals of computational fulid dynamicswith emphasize on the underlying theory, assumption, and modeling issues.
6. To provide hands on experience using CFD for modeling & analyzing fluid flow and heat transfer problems.

COURSE OUTCOMES

At the end of the course students will be able to

1. The students will be able to assess the quality of numerical results and the efficiency of numerical methods for basic fluid flow model problems.

2. Student will be able to classify the basic equations of fluid dynamics. - Basic space and time discretization methods. - Numerical solution of advection, diffusion and stationary problems.

3. Student will be able to choose appropriate boundary conditions for model problems.

4. Student will be able to provide Numerical solution of model problems in fluid dynamics. - Checking and assessing basic numerical methods for fluid flow problems.

Unit 1: Governing Equations of Fluid Dynamics and Heat Transfer [8 Hours]

Governing conservations equations of fluid flow and classification of system of partial differential equations (PDEs). Methods for approximate solution of PDEs: brief overview of finite difference, finite volume and finite element approaches

Unit 2: Partial Differential Equations [7 Hours]

Taylor table approach for constructing finite difference schemes of arbitrary orders of accuracy, implementation of schemes near boundaries. Numerical solution of steady state heat conduction (Elliptic PDE) using various explicit and implicit schemes, implementation of boundary conditions, mesh dependence and convergence of solution

Unit 3: Basics of Numerical Approximation [8 Hours]

Numerical solution of unsteady heat conduction (Parabolic PDE) using various schemes, implementing initial and boundary conditions, stability analysis, multi-dimensional implementation. Numerical solution of linear wave equation (Hyperbolic PDE) using various schemes, artificial viscosity, diffusion and dispersion error, stability analysis

Unit 4:Application to Model Equations [7 Hours]

Numerical solution of one dimensional convection-diffusion equation. Numerical solution of two dimensional incompressible Navier Stokes equations

Unit 5: Unsteady and Steady Problems of Fluid Flows [6 Hours]

Numerical solution of one dimensional Euler equation for shock tube problem. Basics of interface capturing methods for application in multiphase flow

Text Books:

12) Introduction to Finite Elements in Engineering, Chandrupatla T. R. and Belegunda D., Prentice Hall.
13) Computational Fluid Dynamics, K. A. Hoffmann and S. T. Chiang, Engineering Education System, 2000

14) Numerical Computation of Internal and External Flows: The Fundamentals of Computational Fluid Dynamics, Charles Hirsch,Butterworth-Heinemann, 2nd edition, 2007
15) A First Course in Aerodynamics: A. Roy, Ventus Publishing, Denmark, 2012 (https://bookboon.com/en/a-first-course-on-aerodynamics-ebook)

Reference Books:

10) Computational Fluid Dynamics Anderson
11) Computational fluid dynamics in practice, Norman Rhodes, John Wiley and Sons Inc.
12) Ferziger, Joel H., and Milovan Peric. Computational Methods for Fluid Dynamics. 3rd ed. Springer, 2013. ISBN: 9783540420743.
13) Finite Element Analysis, Theory and Application with Ansys, S. Moaveni, Pearson. The Finite Element Method, Zienkiewicz O. C., Taylor R. I., Butterworth-Heinemann.

ME8TE05B	**Elective-IV: Design Practice**	**3 Credit**

COURSE OBJECTIVES

Design practice focuses on developing conceptual designs in response to a brief. Knowledge of design practice includes understanding that designers identify the qualities and potential of design ideas in terms of the broad principles of design (aesthetics and function) and sustainability, and that they are influenced by societal, environmental, historical and technological factors.

COURSE OUTCOMES

At the end of the course students will be able to

1. Define methods, models, stages of Concurrent Engg. and geometric transformation model.
2. Understand design principles and processes, and the work of influential designers
3. Demonstrate understanding of approaches to design practice and the nature of designedly thinking.
4. Apply various design tools for any suitable idea
5. Validate the Design ideas as per need of stake holders..

Unit 1: Introduction to Design/Product design [8 Hours]

Introduction to Design/Product design, Stanford model of Design thinking/ Stages of engineering design of products

Unit 2: Introduction to Concurrent engineering [7 Hours]

Introduction to Concurrent engineering, Concurrent engineering in Practice

Unit 3: Product embodiment design [8 Hours]

Product embodiment design (robustness of design/FMEA techniques), House of quality, Specifications (Fits and Tolerances), Axiomatic Design, Introduction to Group Technology, Creating forms and shapes.

Unit 4: Geometric transformation models [7 Hours]

Geometric transformation models, Introduction to electronics Material selection process in design, Applied Ergonomics (work systems design, Introduction to bio-mechanics)

Text Books:

14) Prashant Kumar, Product Design: Creativity, Concepts and Usability, Prentice Hall India Learning Private Limited, ISBN-10 : 9788120344273
15) Karl T. Ulrich , Product Design and Development, 7th Edition, McGraw Hill, ISBN-10 : 9390113237

Reference Books:

1) W. Green, Patrick W. Jordan, Human Factors in Product Design Current Practice and Future Trends, CRC Press, ISBN 9781498702096.
2) C.S. Syan, Concurrent Engineering: Concepts, implementation and practice, Springer, ISBN-10 : 9401045666.
3) Michael E. Mortenson, Geometric Transformations for 3D Modelling, Publisher : Industrial Press Inc.,U.S, ISBN-10 : 0831133384.

NPTEL Course Details Link: https://nptel.ac.in/courses/112104228

ME8TE05C	**Elective-IV: Manufacturing Quality Design & Control**	**3 Credit**

COURSE OBJECTIVES

1. To introduce basic concepts and statistical methods employed for assurance of quality in products, processes and systems in an industrial environment (manufacturing and service organizations), such as Management and Control of Quality and Quality System.
2. To introduce the utility of Statistical Process Control, Process Capability Analysis, Acceptance Sampling, Process Capability Analysis, Design for Reliability, Robust Design and Taguchi Method for Quality Improvement.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe the concept of Quality Control and various tools for Quality Management.
2. Illustrate the concept of quality inspection, quality control, quality assurance, and TQM.
3. Maintain Quality using Stastical Quality Control Tools.

4. Perform the suitable sampling technique to ensure optimum quality.
5. Design Experimentation using Taguchi Technique.

Unit 1: Introduction to Quality Control and Management [8 Hours]

History and Evolution of Quality Control and Management, Quality assurance ,Quality circles and quality improvement teams, Customer needs and market share, Benefits of quality control and the total quality system, Quality and reliability, Quality improvement, Quality costs, Management of Quality-I

Unit 2: Management of Quality [7 Hours]

Management practices, Quality function deployment, Benchmarking and performance evaluation, Health care analytics, Tools for continuous quality improvement, International Standards ISO 9000 and other derivatives, Management of Quality-I, Management of Quality-II

Unit 3: Stastical Process Control [8 Hours]

Population and sample, Parameter and statistic, Probability, Descriptive statistics: describing product or process characteristics, Probability distributions, Inferential statistics: drawing conclusions on product and process quality, Stastical Process Control – I, Stastical Process Control – II, Process Capability Analysis.

Unit 4: Acceptance Sampling [7 Hours]

Advantages and disadvantages of sampling, Producer and consumer risks, Operating characteristic curve, Types of sampling plans, Lot-by-lot attribute sampling plans, Other attribute sampling plans, Sampling plans for variables, Variable sampling plans for a process parameter, Variable sampling plans for estimating the lot proportion nonconforming, Acceptance Sampling – I, Acceptance Sampling - II

Unit 5: Robust Design & Taguchi Method [6 Hours]

Experimental design fundamentals, Some experimental designs, The Taguchi method, The Taguchi philosophy, Loss functions, Signal-to-noise ratio and performance measures, Critique of S/N ratios, Experimental design in the Taguchi method, Parameter design in the Taguchi method, Critique of experimental design and the Taguchi method, Quality by Experimental Design, Robust Design and Taguchi Method

Text Books:

1. Mitra, A. Fundamentals of Quality Control and Improvement, Prentice-Hall, 2nd Edn .(1998), ISBN: 0-13-645086-5.
2. Dukkipati, R V and Pradip K Ray, Product and Process Design for Quality, Economy and Reliability, New Age International. 1st Edn. (2010), ISBN: 978-81-224-2661-8

Reference Books:

1. Statistical Quality Control, Dhanpat Rai & Sons, Manohar Mahajan
2. Juran's Quality. Handbook. The Complete Guide to. Performance Excellence. Joseph M. Juran. Joseph A. De Feo. Sixth Edition. New York Chicago San Francisco

ME8O004A	**Open Elective-IV: Robotics and Subtractive Manufacturing**	**4 Credit**

COURSE OBJECTIVES

1) Gain knowledge of Robotics and automation.
2) Understand the working methodology of robotics and automation.
3) Write the program for robot for various applications
4) To understand subtractive manufacturing
5) To implement CNC programs

COURSE OUTCOMES

At the end of the course students will be able to

1) Understand working of subtractive manufacturing
2) Implement CNC programs for various product manufacturing

3) have knowledge of Robotics, automation, robotics motion, sensors, robotic programming and roles of robots in industry
4) Understand the working methodology of robotics and automation, motion and control, machine vision and programming, application of robots in industry.

Unit 1:Introduction of CNC

[8 Hours]

Concepts of NC, CNC, DNC. Classification of CNC machines, MCU architecture and functionality, Machine Configurations, Types of control, CNC controller's architecture and characteristics, Interpolators.

Unit 2: CNC programming

[7 Hours]

Positioning system, Cutter offset compensation, Word address format, Introduction to G and M codes Manual part programming for CNC turning, milling and drilling.

Unit 3: Tooling System

[8 Hours]

Tooling system for Machining center and Turning center, work holding devices, of CNC Machines. APT part programming, CAD/CAM programming, Simulation and Verification of CNC programs, Adaptive CNC control techniques. Integration of CNC machines for CIM.

Unit 4: Fundamentals Of Robot **[7 Hours]**

Robot – Definition – Robot anatomy – Co-ordinate systems, work envelope, types and classification– Specifications – Pitch, yaw, roll, joint notations, speed of motion and pay load – Robot parts and their functions – Need for robots – Different applications.

Text Books:

1. Robot Engineering An Intergrated approach 2004 Klafter R.D., Chmielewski T.A. and Negin M Springer
2. Industrial Robotics: Technology, Programming and Applications, 2012 Mikell P. Groover, Mitchel Weiss, Roger N. Nagel, Nicholas G. Odrey and Ashish Dutta 2nd Edition, Tata McGraw Hill, 2012.
3. Automation in Production system 2002 Mikell P. Groover Prentice-Hall of India Pvt. Ltd., New Delhi, 2002

Reference Books:

1. CNC Technology and Programming 2003 Krar, S., and Gill Industrial Press Inc
2. An Introduction to CNC Machining 1991 Gibbs, D. Industrial Press
3. Computer Numerical Control Concepts and Programming 1991 Seames, W.S. Thomson Learning EMEA, Limited
4. Computer Numerical Control for Machining 1993 Lynch, M McGraw-Hill
5. Computer Control of Manufacturing Systems 2005 Koren Y Tata McGraw-Hill Education
6. Robotics control, sensing, vision, and intelligence 2004 Fu K.S., Gonzalez R.C., and Lee C.S.G. Tata McGraw-Hill Education
7. *Robotics Technology and Flexible Automation* 2001 *Deb S.R* Tata McGraw-Hill Education
8. Introduction to Robotics Mechanics and Control 2008 Craig J.J Pearson Education India

ME8O004B	**Open Elective-IV: Value Engineering**	**4 Credit**

COURSE OBJECTIVES

1. To explain students what is a value engineering
2. To make student understand various definitions and theoretical concepts related to value engineering UG and PG level students.
3. To explain student the value engineering strategies and subsequent steps to manifest conceptualised problems in value engineering.

Unit 1: **[8 Hours]**

Introduction, Value, Function – Types of functions, Level of function, Function identification, method of finding the function of a product, case history /case study

Unit 2: **[7 Hours]**

Cost, cost and price, elements of cost, need to calculate cost, Cost evaluation, case study methods of determining the cost

Unit 3: **[8 Hours]**

Worth, Evaluation of worth, guidelines to find out worth, Importance of worth in the value engineering, metrology, discussion on worth.

Unit 4: **[7 Hours]**

Techniques – Brainstorming, The Gordon technique, Feasibility Ranking, the morphological analysis technique, ABC Analysis, probabilistic approach, Make or buy technique

Unit 5: **[6 Hours]**

Special techniques, function- cost- worth Analysis, function analysis system techniques, Weighted Evaluation method, evolution matrix, Break even analysis, Life cycle cost Applications

Unit 6: **[6 Hours]**

Team dynamics, team structure, team building, job plan, orientation phase, information phase, function phase creative phase, evaluation phase, recommendation phase, implementation phase, case study- detail case short case

Text Books:

1. Value Engineering, Anil K. Mukhopadhyaya SAGE Publications Inc, Ist Edition, 2003, IVth printing 2013.
2. Value Engineering: Theory and Practice in Industry Thomas R. King, Publisher: CVS Lawrence D. Miles Foundation, ISBN: 0-9679217-1-6, 2000 edition.

Reference Books:

1. Value Engineering: Analysis and Methodology Del Younker, Publisher: CCC/CVS, Winter Springs, Florida, USA ISBN: 9780824706968 Publication Date: May 14, 2003

J D COLLEGE OF ENGINEERING & MANAGEMENT

An Autonomous College, Affiliated to DBATU, Lonere

At: Khandala, Post- Valni, Kalmeshwar Road, Near Fetri, Nagpur

MINUTES OF 06TH BOARD OF STUDIES MEETING NO. BOS/FY/ 06/2021-22 | 22/03/2022

Venue: Takshashila Building, JDCOEM
Department of Basic Science and Humanities

The 6th Meeting of the Board of Studies was held on Tuesday, 22th March, 2022 at 1:15 P.M. The following members were present:

S. No.	Name of Faculty	Designation
1	Dr. A. N. Gupta	Chairman
2	Dr. N. V. Pradnyakar	Member
3	Dr. M. V. Takarkhede	Member
4	Dr. U. V. Rathod	Member
5	Mr. S. S. Kathalkar	Member
6	Dr. B. P.Ilamkar	Member
7	Ms. Sana Anjum	Member
8	Ms. L.M. Bhoyar	Member
9	Mr. R.M. Patne	Member
10	Dr. Asha Dave	Member
11	Mr. Imran khan	Member
12	Ms. Meenakshi Paunikar	Member
13	Mr. S.H.Hedau	Member

14	Ms. P. M. Parkhi	Secretary

The following persons were invited to attend the meeting:

1.	Dr. Atul Wankhade	Invitee
2.	Dr. Mayoordhwaj Meshram	Invitee

Item No. 1	**To confirm the minutes of 5th BOS meeting**

The Secretary welcomed the Chairman of the Board of Studies and all members of BoS. The Secretary presented the agenda of the meeting. Further, the minutes of 5th BOS meeting was presented and discussed one by one point wise in the presence of the members. Following are the points:

1. To confirm new members and to replace the nomination of old members.
2. Review of First Year Syllabus.
3. Implementation of one theory subject through online for first Year.
4. To decide about the Teaching and evaluation of the courses for the first year students for Session 2020-2021.
5. Question paper setting and moderation for various subjects.

Item No. 2	**To bring on table the action taken report of 5th Meeting of BOS held on 9th July, 2021.**

Further, the Action taken report from the previous meeting was presented and discussed one by one point in the presence of the members. Following are the points:

1. To confirm new members and to replace the nomination of old members.
2. Review of First Year Syllabus.
3. Implementation of one theory subject through online for first Year.
4. To decide about the Teaching and evaluation of the courses for the first year students for Session 2020-2021.
5. Question paper setting and moderation for various subjects

Item No. 3	**To confirm new members and to replace the nomination of old members.**

Confirmation of new members Ms. P. D. Trivedi, Mr. S. H. Hedau and Ms. M. S. Paunikar to replace nomination of Dr. Sushil Girhe and Ms.Mayuri Rodage.

Item No. 4	**To update the syllabus of First Year.**

The changes in the syllabus of subjects "Communication Skills" and "Basic Electrical and Electronics Engineering" was approved in the meeting.

Item No. 5	**Introducing skill development Subject**

The new skill development subjects "Probability and Data Science with R Software" and "Enhancing Professional Communication Skills" has been passed in front of BOS members.

Item No. 6	**Introducing the Subject "Universal Human Values"**

The Subject "Universal Human Values" will be introduced to higher semesters as per the AICTE guidelines.

Item No. 7	Updating in scheme.

Changes in the scheme for the subject "Communication Skills" has been approved in the BOS.

Item No. 8	Any other points with the permission of the Chair.

No other point was raised, so the meeting was concluded with a vote of thanks.

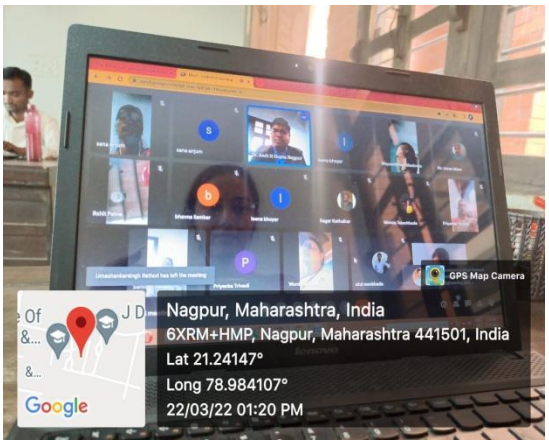
List of members of BOS:

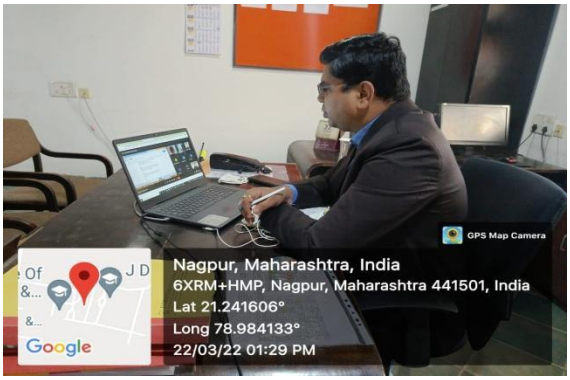
Sr.No.	Category	Name of the Member	Organization
1	Chairman	Dr.A.N.Gupta	JDCOEM
2	Specialization faculties	Dr.N.V.Pradnyakar(physics)	JDCOEM
3		Dr. A.Dave(English)	JDCOEM
4		Mr.S.S.Kathalkar(Mathematics)	JDCOEM
5	Subject Expert from outside university nominated by academic council	Dr. Atul Wankhade	VNIT
		Dr. Mayoordhwaj Meshram	LIT
6	All the staff members	Dr.M.V.Takarkhede(physics)	JDCOEM
		Mr. U.V.Rathod(physics)	JDCOEM
		Dr. B.P.Ilamkar(physics)	JDCOEM
		Ms. Priyanka D. Trivedi (Chemistry)	JDCOEM
		Ms. Sana Anjum(Mathematics)	JDCOEM
		Mr. R.M.Patne(Mathematics)	JDCOEM
		Ms. L.M.Bhoyar(Mathematics)	JDCOEM
		Mr. S.H.Hedau (Mathematics)	JDCOEM
		Mr. Imran S. Khan (English)	JDCOEM
		Ms. Meenakshi paunikar (English)	JDCOEM
7	Secretary	Ms. P.M.Parkhi	JDCOEM

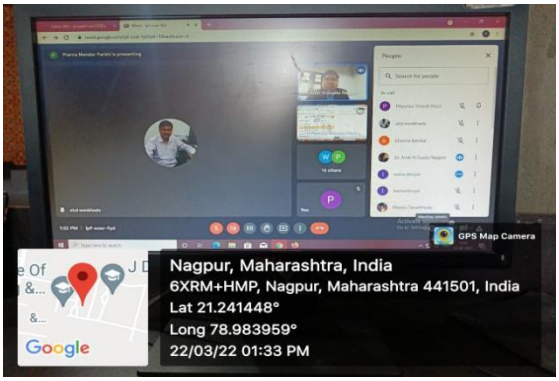
Dr. A. N. Gupta
Chairman, Board of Studies,
Dept. Of Basic Science & humanities,
JDCOEM, Nagpur.

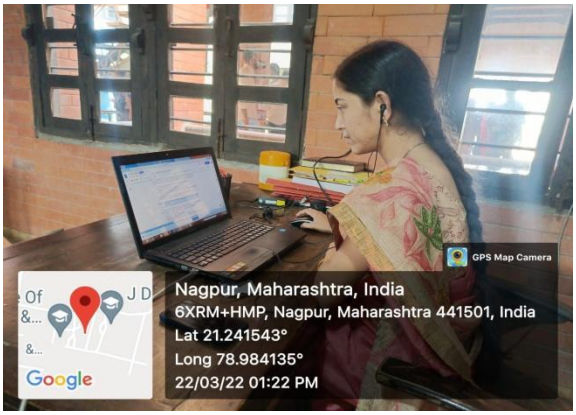
CC:
Hon' Directors, JES
Respected Principal, JDCOEM
Respected Vice- Principal & Dean Admin
Dean (Academics /Student/Capacity Building/Development, A&P)
All concerned faculty members.

Pictures from Meeting:









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JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch:Mechanical Engineering		Branch Code: ME

1ST Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/Ext.Pra.	Total	
1	HSMC	HU1T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	ME1T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	ME1T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU1L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	ME1L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	ME1L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Induction Programme	3 Weeks							
9	ESC	ME1T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**16**

2nd Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/Ext. Pra.	Total	

1	HSMC	HU2T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	ME2T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	ME2T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	ESC	WS2L001	Workshop Practices	0	0	4	60	0	40	100	2
6	HSMC	HU2L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
7	BSC	ME2L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	ME2T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**19**
				25							

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch:Civil Engineering **Branch Code: CE**

1ST Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra	Total	
1	HSMC	HU1T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	CE1T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	CE1T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU1L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	CE1L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	CE1L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Induction Programme	3 Weeks							
9	ESC	CE1T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**16**

2nd Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra	Total	

1	HSMC	HU2T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	CE2T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	CE2T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU2L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS2L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	CE2L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	CE2T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**19**
				25							

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J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching Scheme

Branch code: EE

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	EE2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	EE2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	EE2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	EE2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Induction Programme	3 Weeks							
9	ESC	EE2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**16**

2nd Semester

Sr.	Category	Course		Teaching Scheme	Evaluation Scheme	

Sl. No.	of Subject	Course Code	Course Name	L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	Credit
1	HSMC	HU1T002	Introduction to Computer	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	EE1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	EE1T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	EE1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	EE1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**19**
				25							

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch code: CS

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics-I	3	1	0	20	20	60	100	4
3	BSC	CS1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	CS1T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	CS1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	CS1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**18**

2nd Semester

Sr.	Category of	Course	Course Name	Teaching Scheme	Evaluation Scheme	Credit

No.	Subject	Code		L	T	P	CA	MSE	ESE/ Ext.	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics-II	3	1	0	20	20	60	100	4
3	BSC	CS2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	CS2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	CS2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	CS2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	CS2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**17**
				23							

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JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch code: IT

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	IT1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	IT1T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	IT1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	IT1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**18**

2nd Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics-II	3	1	0	20	20	60	100	4
3	BSC	IT2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	IT2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	IL2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	IT2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	IT2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**17**
				23							

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching Scheme

Branch Code:ET

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	ET1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	ET1T006	Energy and Environment	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	ET1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	ET1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**18**

2nd Semester

Sr.	Category	Course		Teaching Scheme	Evaluation Scheme	

Sr. No.	of Subject	Course Code	Course Name	L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	Credit
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	ET2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	ET2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	EL2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	ET2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	ET2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**17**
				23							

Education to Eternity

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch:Artificial Intelligence	Branch Code: AI

1st Semester (AI)

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	AI1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	AI1T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	AI1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	AI1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	AI1T008	Introduction to AI and its Application	2	0	0	10	15	25	50	Audit
				13	2	10					18

2nd Semester (AI)

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2

2	BSC	MA2T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	AI2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	AI2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	AI2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	AI2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	AI2T009	Introduction to Drones	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**17**
				23							

Probability and Data Science with R Software

No. Of Credit: 3

Lecture Hrs: NPTEL Essentials Of Data Science With R Software - 1: Probability And Statistical Inference.

Course Objective:

To use data with the popular and freely available R statistical software

To understand the correct statistical inferences

Course Outcome: After studying this subject, the students will be able to:

1. Remember the basic concepts of statistics
2. Understand the need of R statistical software in data science.
3. Apply various tools of R statistical software in data handling.
4. Analyse real world problems.
5. Develop ability to deal with professional experiences.
6. To acquire the skill execution of R statistical software.

Unit 1:
Introduction to data science, basic calculations with R Software and probability theory Probability theory and random variables

Unit 2:
Random variables and Discrete probability distributions, Continuous probability distributions, Sampling distributions and Functions of random variables

Unit 3 :
Convergence of random variables, Central limit theorems and Law of large numbers, Statistical inference and point estimation

Unit 4:
Methods of point estimation of parameters, Point and confidence interval estimation

Unit 5:
Confidence interval estimation and test of hypothesis**,** Test of hypothesis, Test of hypothesis for attributes and other tests

Books and references

1. Introduction to Statistics and Data Analysis With Exercises, Solutions and Applications in R Authors: Heumann, Christian, Schomaker, Michael, Shalabh, Publisher" Springer 2016
2. Applied Statistics and Probability for Engineers, Douglas C. Montgomery, George C. Runger, 2018, Wiley (Low price edition available)

3. Introduction to. Mathematical. Statistics. Robert V. Hogg. Allen T. Craig,, Low price Indian edition by Pearson Education
4. Probability and Statistics for Engineers. Richard A. Johnson, Irwin Miller, John Freund
5. Mathematical Statistics with Applications. Irwin Miller, Marylees Miller, Pearson Education
6. The R Software-Fundamentals of Programming and Statistical Analysis -Pierre Lafaye de Micheaux, Rémy Drouilhet, Benoit Liquet, Springer 2013
7. A Beginner's Guide to R (Use R) By Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters, Springer 2009

Links for professional skills.

1 https://nptel.ac.in/courses/111/104/111104146/

2 https://nptel.ac.in/content/storage2/111/104/111104146/MP4/mod02lec08.mp4

3 https://nptel.ac.in/content/storage2/111/104/111104146/MP4/mod03lec15.mp4

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR

B.Tech. First Year (2021-22)
Branch: CSE/IT/ETC/ME/CIVIL/EE
SEMESTER-I&II

Course Title : Basics of Electrical and Electronics Engineering **Semester : I &II**
Course Code : CS1T007/ME2T007 **Course Type : Compulsory**
Pre-requisite : Basic of Electrical and Electronics **L – T – P : 2-0-0**
Stream : Theory Subject **Credits : 0(Audit)**

COURSE OBJECTIVES

1. To provide a basic information and use of electrical and electronics components.
2. To understand and study the materials used for the preparation of electrical and electronics components.
3. To provide basic knowledge of operation and functionality of electrical and electronics components.

COURSE OUTCOMES:

CO1: Define fundamentals of electrical system and choose measuring instruments for measurement of electrical quantities & describe the concept PN junction diode and its characteristics.
CO2: Classify wiring system and compare energy resources for electrical energy generation & elaborate the transistor configuration in CE, CB & CC mode.
CO3: Plan and organize the utilization of energy resources of electrical system & apply transistor characteristics to construct Amplifier devices.
CO4: Compare different sources of electrical system & distinguish various logic gates and simplify the Boolean's equations.
CO5: Justify the utilization of various electrical and electronics components into electrical and electronics circuitries.
CO6: Construct various circuits using Resistors, capacitors, inductors, PN junction diode, Zener diode, transformers, transistors and logic gates.

Unit 1 **(6 Lectures)**

Elementary Electrical Concepts and Circuit Components:

Fundamental of Electrical system: Basic definition of electrical quantities, Potential difference, Ohm's law, Effect of temperature on resister, resistance temperature coefficient. **Electrical wiring system**: Types of various wiring system, types of electric wiring materials. **Resistors:** color code, type of resistors, material used for resistors, resistance wires etc. **Capacitors:** Types of Capacitors, Capacitor application, Loss angle and power factor of capacitors, factor affecting on capacitor. **Inductors:**Types of Inductor**,** mutual inductance, self-inductance, variable inductance, inductors for high and low frequency work, frequency errors in inductors.

Unit:-2 **(6 Lectures)**

Introduction to diodes, diode circuit and its Basic applications:

The P-N Junction Diode, V-I characteristics, Diode as Rectifier, specifications of Rectifier Diodes, Half Wave, Full wave, Bridge rectifiers, Equations for I_{DC} V_{DC} V_{RMS}, I_{RMS}, Efficiency and Ripple Factor for each configuration. Zener Diode, Characteristics, Specifications, Zener diode as Voltage Regulator.

Unit:-3 **(5 Lectures)**

Measurement Of Electrical Quantities, Measuring Instruments & Energy Resources

Measurement of Voltage, Current, and Power (1ph and 3ph), Introduction to PMMC instrument, Ammeter, Voltmeter, Ohmmeter, galvanometer, Study of circuit breakers (MCB & Fuse). **Energy Resources and Utilization**: Conventional and nonconventional energy resources; Introduction to electrical energy generation from different resources, transmission, distribution and utilization.

Unit 4 **(5 Lectures)**

Semiconductor Devices and Applications:

Transistors: Introduction, Classification, CE, CB, and CC configurations, α, β, concept of gain and bandwidth. Operation of **BJT** in cut-off, saturation and active regions (DC analysis). BJT as an amplifier. **Introduction to Digital Electronics**: Number System, Basic logic Gates, Universal Gates, Construction of various gate using NAND and NOR gate, Boolean Postulates, De-Morgan Theorems.

Reference/Text Books:

1. V. N. Mittal and Arvind Mittal, Basic Electrical Engineering, McGraw-Hill Publication.
2. BrijeshIyer and S. L. Nalbalwar, A Text book of Basic Electronics, Synergy Knowledgeware Mumbai, 2017. ISBN:978-93-8335-246-3
3. Vincent DelToro, Electrical engineering Fundamentals, PHI Publication, 2nd Edition, 2011.
4. A Textbook of Basic Electrical and Electronics Engineering, J.B.Gupta, Katson Publication.
5. A Textbook of Basic Electrical Engineering by S.B. Bodkhe, N.M.Deskar, Professional Publishing House Pvt. Ltd
6. D. P. Kothari and Nagrath, Theory and Problems in Electrical Engineering, PHI Publication, 2011.
7. B. L. Theraja, Basic Electronics, S. Chand Limited, 2007.
8. MillmanHalkias, Integrated Electronics-Analog and Digital Circuits and Systems, McGraw-Hill Publication, 2000.
9. Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition.
10. Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition.
11. Printed Circuit Boards Design & Technology, Walter C. Bosshart, McGraw-Hill Publication.
12. Principal of Electronics, V.K.Mehata, S.Chand Publications

Note: Students are advised to use internet resources whenever required

Dr.U.V.Rathod,
Subject Teacher, BEEE

Enhancing Professional Communication Skills

(2 CREDIT COURSE – 30 hours)

After studying this subject, the students will be able to:

1. Understand and appreciate the importance of Professional Communication Skills.
2. Apply techniques to develop personality.
3. Develop Professional Communication skills
4. Improve the presentation skills.
5. Realise the concept of Professionalism.

Course Outcomes:

1. Remember the basic concepts of Professional skills and career development.
2. Understand; The fundamentals of Professionalism.
3. Apply : Apply the knowledge of Professional Skills.
4. Analyze : Professional inputs and outputs.
5. Develop awareness and develop ways to face Professional challenges.
6. Create. A conducive atmosphere for Professional Skill development..

1 Development of Proficiency in English:

• Practice Oral and spoken communication skill & testing – voice & accent, voice clarity, voice modulation & intonation , word stress etc. • Feedback and questioning Technique • Objectiveness in Argument • Development etiquettes and manners • Study of different pictorial expression of non-verbal communication and its analysis Concepts of effective communication:

2 Written Communication Skill Practice for:

• Correction of errors • Making of Sentences • Paragraph Writing • Leave Application and simple letter writing Grammatical use: • Punctuation • Meaning & opposites • Real Life conversations • Vocabulary building Understanding the Audience, Need analysis through pre presentation feedback.

3 Presentation Skill practice

• Preparing in presentation • Delivery of presentation Concept and method for presentation • Preparation & introduction • Presentation • Evaluation / feedback • Summarization / Conclusion Team Building games, Together Everyone Achieves Miracle(TEAM) , issues when there is no teamwork, Leadership emerging through team, How to identify team players

4 Team Building / Coordination Skills

• Team Building Practices through group exercises , team task / role play • Ability to mixing & accommodation • Ability to work together Concept of • Group • Group Dynamics • Team building

5 Telecommunication Skills.

• Tele – etiquette • Receiving Calls • Transferring calls • Taking Message/ Voice Mails • Making Outgoing Calls • Receiving Fax • Working principle of Mini exchange and its features and facilities.

6. Self Management

• Self Evaluation • Self Discipline • Self Criticism • Recognition of one's own limits and deficiencies • Independency etc. • Thoughtful & Responsible • Self Awareness Self Management • Identifying one's strengths and weaknesses • Planning & Goal setting • Managing self – emotions, ego, pride.

References :

1. Soft skills Training – A workbook to develop skills for employment by Fredrick H. Wentz
2. Personality Development and Soft skills , Oxford University Press by Barun K. Mitra
3.The Time Trap : the Classic book on Time Management by R. Alec Mackenzie

NOTE: Suggestion is to open a common film club for all the departments, where the movie can be displayed

Life and Career Skills Through Interactive Teaching.

No of credits 4

Life skills are essentially individual abilities that help in promoting mental well-being and competence in people to deal with the various situations in life. This book presents various aspects of life skills, including communication, self-analysis, self-development and study habits. These are crucial elements in determining one's personal and professional growth.

Course Objectives:

After studying this subject, the students will be able to:

1. Understand and appreciate importance of life skills.

2. Use self-analysis and apply techniques to develop personality.

3. Develop leadership skills

4. Improve the presentation skills.

5. Realise the concept of Career Planning.

Course Outcomes:

1. Remember the basic concepts of Life skills and career development.
2. Understand; understanding into the fundamentals of life skills.
3. Apply: to be able to apply various methods for idea development as well as have knowledge about self and work environment.
4. Analyze: Self and set Career goals.
5. Develop awareness and develops ways to face challenges of life.
6. Create. To acquire the skill of designing, execution and evaluation of life skills training program.

Unit I: Introduction 5 hrs

Definition and Importance of Life Skills, Livelihood Skills, Life Skills Education, SELF ANALYISIS Need of Self Analysis SELF DEVELOPMENT set primary goals using SMART parameters.

Unit II : Professional Skills 5hrs

Resume Skills, Interview Skills, Presentation Skills, Brainstorming Time Management - Importance, prioritization of work, time matrix, time savers, and time wasters. Team building.

Unit III: Leader ship and Management Skills 4hrs

Leadership Characteristics of Leadership Components of Leadership , Leadership Outcomes, Entrepreneurship ,Innovative, Leadership and Design Thinking, Ethics and Integrity

Unit IV: Interview Skills 5hrs

Interview Skills: Preparation and Presentation Meaning of Interview ,Types of Interview, STAR Approach for Facing an Interview, Interview Procedure, Do's and Don'ts, Important Questions Generally Asked in a Job Interview, Interview Questions for Assessing Your Strengths and Weaknesses,. Demonstrate an Ideal Interview

Unit V: Introduction to Career Planning 5 hrs

Vocational Guidance, Career Planning Today, Some Definitions, Roe's Formula, Information Processing Pyramid, Decision Making , Decision-Making Process, CASVE Cycle, Self Analysis, Improving Decision-Making Skills.

Prescribed Books: .

1Delors, Jacques (1997).Learning: The Treasure Within, UNESCO, Paris..
2Nair .V. Rajasenan, (2010).Life Skills, Personality and Leadership, Rajiv Gandhi National Institute of Youth Development, TamilNadu.
3.UNESCO (1997).Adult Education: The Hamburg Declaration, UNESCO, Paris..

4UNESCO (2005).Quality Education and Life Skills: Darkar Goals,UNESCO, Paris..

5WHO (1999).Partners in Life Skills Education: Conclusions from a United Nations Inter-Agency Meeting, WHO, Geneva.

.6Nair. A. Radhakrishnan, (2010). Life Skills Training for Positive Behaviour, Rajiv Gandhi National Institute of Youth Development, Tamil Nadu..

7Santrock W.John

References:

1.Dakar Framework for Action,(2000).Education for All: Meeting our Collective Commitments, Dakar, Senegal.

2.Life Skills Resource Manual, Schools Total Health Program, (2006).Health Education and Promotion International Inc., Chennai.

3.Kumar .J. Keval, (2008).Mass Communication in India, JAICOPublication India Pvt. Ltd

4.Morgan and King,(1993).Introductionto Psychology, TataMcGraw-Hill Publishing Company Ltd,New Delhi.

5.Rao P.L. (2008).EnrichingHuman Capital throughTraining and Development, Excel Books, Delhi.

6.Singh Madhu, (2003).Understanding Life Skills, Background paper prepared for Education for All:The Leap to Equality

7.UNESCO and Indian National Commission for Co-operation with UNESCO(2001).Life Skills in Non-formal Education: A Review8.YUVA School Life Skills Programme: Handbook for Teachers, Vol. I –IV, (2008), Department of Education and State P.L. (2008).EnrichingHuman Capital throughTraining and Development, Excel Books, Delhi.6.Singh Madhu, (2003).

Journal:1.Indian Journal of Life Skills Education, Rajiv Gandhi National Institute of Youth Development, Tamil Nadu.

Course Title : Communication Skills

Course Objectives:

The main objective of the subject is to enhance the employability skills of engineering students as well as communication skills at workplace.

The sub-objectives are:

1) To develop students' reading skills and pronunciation.
2) To develop technical communication skills through drafting, letter writing, and précis writing.
3) To develop literary skills through essay writing.
4) To develop public speaking skills of the students.
5) To expose the students to the ethics of English language by teaching grammar

Unit 1: Communication and Communication Processes (06 hrs)

Introduction to Communication, Types and functions of Communication, Barriers to Communication and overcoming them, Role of Communication Skills in Society

Reading: Introduction to Reading, Barriers to Reading, Types of Reading: Skimming, Scanning, Intensive and Extensive, Strategies for Reading Comprehension.

Listening : Importance of Listening, Types of Listening, Barriers to Listening.

Unit 2: English Grammar (06 hrs)

Grammar: Forms of Tenses, Articles, Prepositions, Use of Auxiliaries and Modal Auxiliaries, Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Common Errors. Misplaced modifiers.

Unit 3: Professional Verbal Communication (06 hrs)

Components of an effective talk, Idea of space and time in public speaking, Tone of voice, Body language, Timing and duration of speech, Audio-Visual Aids in speech. Presentation Skills, Group Discussion and Job Interviews

Unit 4: Developing Business Writing Skills, Styles and Practice (06 hrs)

Writing Emails, Report Writing: Format, Structure and Types, Letter Writing**:** Types, Parts, Layouts, Writing Job Application Letter and Resume.

Nature and Style of sensible Writing and Practice: Describing, Defining, Classifying, Providing examples or evidence, writing introduction and conclusion, Writing Practices: Comprehension, Précis Writing, Essay Writing

Unit 5: Study of Sounds in English and Vocabulary Building (06 hrs)

Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script, Articulation of Different Sounds in English.

Vocabulary Building: The concept of Word Formation, Root words from foreign languages and their use in English, Use of prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms, and words syllables.

Text book:

Mohd. Ashraf Rizvi, Communication Skills for Engineers, Tata McGraw Hill

Reference Books:

1) Sanjay Kumar, Pushp Lata, Communication Skills, Oxford University Press, 2016

2) Meenakshi Raman, Sangeeta Sharma, Communication Skills, Oxford University Press, 2017

3) Teri Kwal Gamble, Michael Gamble, Communication Works, Tata McGraw Hill Education, 2010

4) Anderson, Kenneth. Joan Maclean and Tossny Lynch. Study Speaking: A Course in Spoken English for Academic Purposes. Cambridge: CUP, 2004.

5) Aswalthapa, K. Organisational Behaviour, Himalayan Publication, Mumbai (1991).

6) Atreya N and Guha, Effective Credit Management, MMC School of Management, Mumbai (1994).

7) Balan,K.R. and Rayudu C.S., Effective Communication, Beacon New Delhi (1996).

8) Bellare, Nirmala. Reading Strategies. Vols. 1 and 2. New Delhi. Oxford University Press, 1998.

9) Bhasker, W. W. S & Prabhu, N. S.: English through Reading, Vols. 1 and 2. Macmillan, 1975.

10) Black, Sam. Practical Public Relations, E.L.B.S. London (1972).

11) Blass, Laurie, Kathy Block and Hannah Friesan. Creating Meaning. Oxford: OUP, 2007.

12) Bovee Courtland,L and Thrill, John V. Business Communication, Today McGraw Hill, New York, Taxman Publication (1989).

Course Title : Communication Skills-Lab

List of Practical Sessions (Any 6 practical sessions can be conducted):

1) Pronunciation, Intonation, Stress and Rhythm(02 hrs)
2) Introduction to Phonemic symbols (02 hrs)
3) Articulation of sounds in English with proper manner (02 hrs)
4) Practice and exercises on articulation of sounds (02 hrs)
5) Read Pronunciations/transcriptions from the dictionary (02 hrs)
6) Practice and exercises on pronunciations of words (02 hrs)
7) Introduce yourself (02 hrs)
8) Importance of Business Communication with the help of a case study.(02hrs)
9) Listening Skills/ Comprehension(02 hrs)
10) Common Everyday Situations: Conversations and Dialogues(02 hrs)
11) Communication at Workplace(02 hrs)
12) Rapid reading sessions (02 hrs)
13) Draft Email(02 hrs)
14) Resume Writing(02hrs)
15) Drafting Business Letter(02 hrs)
16) Preparing technical paper using IEEE format(02 hrs)
17) Extempore (02 hrs)
18) Elocution (02 hrs)
19) Group discussion (02 hrs)
20) Participating in a debate (02 hrs)
21) Presentation techniques (02 hrs)
22) Interview techniques – Job Interviews, Telephonic Interviews (02hrs)
23) Mock interviews and practice sessions (02 hrs)

J D COLLEGE OF ENGINEERING & MANAGEMENT

An Autonomous College, Affiliated to DBATU, Lonere

At: Khandala, Post- Valni, Kalmeshwar Road, Near Fetri, Nagpur

MINUTES OF 07TH BOARD OF STUDIES MEETING NO. BOS/FY/ 07/2022-23	28/12/2022

Venue: Takshashila Building, JDCOEM
Department of Basic Science and Humanities

The 7th Meeting of the Board of Studies was held on 28th **December, 2022** at **12.30 P.M.** Chemistry lab. The following members were present:

S. No.	Name of Faculty	Designation
1	Dr. A. N. Gupta	Chairman
2	Dr. M.V.Takarkhede	Member
3	Dr. U. V. Rathod	Member
4	Mr. S.S.Kathalkar	Member
5	Dr. B. P.Ilamkar	Member
6	Ms. L.M. Bhoyar	Member
7	Mr. R.M. Patne	Member
8	Ms. S.Anjum	Member
9	Ms. P.K.Deoghare	Member
10	Mrs. P.D. Trivedi	Member
11	Mr. S. H.Hedau	Member
12	Mrs. S. Dive	Member
13	Ms. P. M. Parkhi	Secretary

The following persons were invited to attend the meeting:

1.	Dr. Seema Raut	Invitee
2.	Mr. Gopal Jadhao	Invitee

Item No. 1	**To confirm the minutes of 6th BOS meeting**

The Secretary welcomed the Chairman of the Board of Studies and all members of BoS. The Secretary presented the agenda of the meeting. Further, the minutes of 6th BOS meeting was presented and discussed one by one point wise in the presence of the members. Following are the points:

1. To confirm new members and to replace the nomination of old members.
2. Review of First Year Syllabus.
3. Introducing skill development Subject
4. Introducing the Subject "Universal Human Values"
5. Updating in scheme.

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Item No. 2	**To bring on table the action taken report of 6th Meeting of BOS held on 22nd March, 2022**.

Further, the Action taken report from the previous meeting was presented and discussed one by one point in the presence of the members. Following are the points:

1. To confirm new members and to replace the nomination of old members.
2. Review of First Year Syllabus.
3. Introducing skill development Subject
4. Introducing the Subject "Universal Human Values"
5. Updating in scheme.

Item No. 3	**To confirm new members and to replace the nomination of old members.**

Confirmation of new members Dr. N.M.Patil, Dr. S. Raut, Dr. S. Zodape, Mr.Gopal Jadhao, Ms.P.K.Deoghare, Mrs. Sarika Dive, Ms. Veronica R.S. to replace Dr. R.Gedam, Dr. A.Wankhede, Dr. M.C.Meshram, Dr. S.Gurve, Dr. A.A.Dave, Ms.M.S.Paunikar.

Item No. 4	**To update the syllabus of First Year.**

The updated syllabus of subjects Engineering Physics, Engineering Chemistry and Engineering Mathematics was approved in the meeting.

Item No. 5	**Rubrics of CA evaluation**

The updation in rubrics of for CA evaluation was approved.

Item No. 6	**Updating in scheme.**

The discussion was takes place regarding changes in the scheme for the new branch Data Science has been done and will be implemented from this session. Also, credit for NPTEL subjects in the scheme was introduced and approved.

Item No. 7	**MOOC guideline.**

Discussion was held on implementation of MOOC guidelines and has been passed.

Item No. 8	Any other points with the permission of the Chair.

No other point was raised, so the meeting was concluded with a vote of thanks.

List of members of BOS:

Sr.No.	Category	Name of the Member	Organization
1	Chairman	Dr.A.N.Gupta	JDCOEM
2	Specialization faculties	Dr.N.V.Pradnyakar(physics)	JDCOEM
3		Dr. A.Dive(English)	JDCOEM
4		Mr.S.S.Kathalkar(Mathematics)	JDCOEM
5		Ms. Priyanka D. Trivedi (Chemistry)	JDCOEM
6	Subject Expert from outside university nominated by academic council	Mr.Gopal Jadhao	Capgemini
		Dr. Seema Raut	GHRC
7	All the staff members	Dr.M.V.Takarkhede(physics)	JDCOEM
		Mr. U.V.Rathod(physics)	JDCOEM
		Dr. B.P.Ilamkar(physics)	JDCOEM
		Ms. Pradhnya Deoghare (Chemistry)	JDCOEM
		Ms. Sana Anjum(Mathematics)	JDCOEM
		Mr. R.M.Patne(Mathematics)	JDCOEM
		Ms. L.M.Bhoyar(Mathematics)	JDCOEM
		Mr. S.H.Hedau (Mathematics)	JDCOEM
		Ms. Veronica R.S. (English)	JDCOEM
8	Secretary	Ms. P.M.Parkhi	JDCOEM

Dr. A. N. Gupta
Chairman, Board of Studies,
Dept. Of Basic Science & humanities,
JDCOEM, Nagpur.

CC:
Hon' Directors, JES
Respected Principal, JDCOEM
Respected Vice- Principal & Dean Admin
Dean (Academics /Student/Capacity Building/Development, A&P)
All concerned faculty members.

Pictures from Meeting:


GPS Map Camera
Nagpur, Maharashtra, India
6XRM+HMP, Nagpur, Maharashtra 441501, India
Lat 21.241547°
Long 78.984055°
28/12/22 12:35 PM
Google


GPS Map Camera
Nagpur, Maharashtra, India
6XRM+HMP, Nagpur, Maharashtra 441501, India
Lat 21.241604°
Long 78.983726°
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Google


GPS Map Camera
Nagpur, Maharashtra, India
6XRM+HMP, Nagpur, Maharashtra 441501, India
Lat 21.241538°
Long 78.984059°
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Google


GPS Map Camera
Nagpur, Maharashtra, India
6XRM+HMP, Nagpur, Maharashtra 441501, India
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Long 78.984084°
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Google

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JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch:Mechanical Engineering		Branch Code: ME

1ST Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/Ext.Pra.	Total	
1	HSMC	HU1T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	ME1T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	ME1T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU1L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	ME1L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	ME1L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Induction Programme	3 Weeks							
9	ESC	ME1T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**16**

2nd Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/Ext. Pra.	Total	

1	HSMC	HU2T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	ME2T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	ME2T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	ESC	WS2L001	Workshop Practices	0	0	4	60	0	40	100	2
6	HSMC	HU2L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
7	BSC	ME2L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	ME2T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**19**
				25							

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J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch:Civil Engineering **Branch Code: CE**

1ST Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra	Total	
1	HSMC	HU1T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	CE1T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	CE1T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU1L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	CE1L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	CE1L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Induction Programme	3 Weeks							
9	ESC	CE1T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**16**

2nd Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra	Total	

1	HSMC	HU2T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	CE2T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	CE2T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU2L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS2L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	CE2L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	CE2T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**19**
				25							

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KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching Scheme

Branch code: EE

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	EE2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	EE2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	EE2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	EE2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Induction Programme	3 Weeks							
9	ESC	EE2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**16**

2nd Semester

Sr.	Category	Course		Teaching Scheme	Evaluation Scheme	

Sl. No.	of Subject	Course Code	Course Name	L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	Credit
1	HSMC	HU1T002	Introduction to Computer	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	EE1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	EE1T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	EE1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	EE1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**19**
				25							

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch code: CS

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics-I	3	1	0	20	20	60	100	4
3	BSC	CS1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	CS1T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	CS1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	CS1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**18**

2nd Semester

Sr.	Category of	Course	Course Name	Teaching Scheme	Evaluation Scheme	Credit

No.	Subject	Code		L	T	P	CA	MSE	ESE/ Ext.	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics-II	3	1	0	20	20	60	100	4
3	BSC	CS2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	CS2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	CS2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	CS2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	CS2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**17**
				23							

JAIDEV EDUCATION SOCIETY'S
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KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch code: IT

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	IT1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	IT1T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	IT1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	IT1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**18**

2nd Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics-II	3	1	0	20	20	60	100	4
3	BSC	IT2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	IT2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	IL2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	IT2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	IT2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**17**
				23							

Education to Eternity

JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching Scheme

Branch Code:ET

1st Semester

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	ET1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	ET1T006	Energy and Environment	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	WS1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	ET1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	ET1T007	Basic Electrical and Electronics Engineering	2	0	0	10	15	25	50	Audit
				13	**2**	**10**					**18**

2nd Semester

Sr.	Category	Course		Teaching Scheme	Evaluation Scheme	

Sr. No.	of Subject	Course Code	Course Name	L	T	P	CA	MSE	ESE/ Ext. Pra.	Total	Credit
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2
2	BSC	MA2T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	ET2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	ET2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	EL2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	ET2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	ET2T004	Basic Civil and Mechanical Engineering	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**17**
				23							

Education to Eternity

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KATOL ROAD, NAGPUR
SESSION 2020-21

Teaching scheme

Branch:Artificial Intelligence	Branch Code: AI

1st Semester (AI)

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	HSMC	HU1T002	Introduction to Computer programming	2	0	0	20	20	60	100	2
2	BSC	MA1T001	Engineering Mathematics- I	3	1	0	20	20	60	100	4
3	BSC	AI1T005	Engineering Physics	3	1	0	20	20	60	100	4
4	ESC	AI1T006	Energy and Environment Engineering	3	0	0	20	20	60	100	3
5	HSMC	HU1L002	Introduction to Computer programming Lab	0	0	4	60	0	40	100	2
6	ESC	AI1L001	Workshop Practices	0	0	4	60	0	40	100	2
7	BSC	AI1L005	Engineering Physics Lab	0	0	2	60	0	40	100	1
8			Induction Programme	3 Weeks							
9	ESC	AI1T008	Introduction to AI and its Application	2	0	0	10	15	25	50	Audit
				13	2	10					18

2nd Semester (AI)

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	HSMC	HU2T001	Communication Skills	2	0	0	20	20	60	100	2

2	BSC	MA2T001	Engineering Mathematics- II	3	1	0	20	20	60	100	4
3	BSC	AI2T002	Engineering Chemistry	3	1	0	20	20	60	100	4
4	ESC	AI2T003	Engineering Graphics	1	0	0	20	20	60	100	1
5	HSMC	HU2L001	Communication Skills Lab.	0	0	4	60	0	40	100	2
6	BSC	AI2L002	Engineering Chemistry Lab	0	0	2	60	0	40	100	1
7	ESC	AI2L003	Engineering Graphics Lab	0	0	4	60	0	40	100	2
8			Societal Internship/ Field Training	Report submission						50	1
9	ESC	AI2T009	Introduction to Drones	2	0	0	10	15	25	50	Audit
				11	**2**	**10**					**17**
				23							

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Course Title	**: Statistics and Difference method**	**Semester**	**: I & II**
Course Code	**: MA1T002**	**Course Type**	**: Compulsory**
Pre-requisite	**: Basic of Mathematics**	**L – T – P**	**: 3-1-0**
Stream	**: Theory Subject**	**Credits**	**: 4 (Credit)**

Unit 1: Linear Algebra- Matrices **[09 Hours]**

Determinants & Matrix, Inverse of Matrix by adjoint method, Inverse by partitioning method ,solution of system of linear equations, Rank of Matrix, Consistency of linear system of equation

Unit 2: Ordinary Differential Equations of First Order and First Degree and Their Applications **[09 Hours]**

Linear equations; Reducible to linear equations (Bernoulli's equation); exact differential Equations; Equations reducible to exact equations; Applications to orthogonal Trajectories, Analytical systems.

Unit 3: Partial Differentiation **[09 Hours]**

Basic of image processing, Partial derivatives of first and higher orders; Homogeneous functions – Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables, Application of Partial Differentiation for Engineering.

Unit 4: Statistics **[09 Hours]**

Fitting of straight line $= a + bx$, parabola $y = a + bx + cx^2$ and Exponential curves by method of least squares, Line of regression and correlation, Rank correlation, application of Statistics for Engineering.

Unit 5: Difference method **[09 Hours]**

Operator E and Δ , Factorial notations, Lagrange's interpolation formula for unequal intervals, differences equations with constants coefficients.

Final Outcome of the Subject (Maximum 6 Outcome): At the end of the course students will be able to

CO1.Describe rank, Bernoulli's theorem, Euler's Theorem for functions containing two and three variables, Lagrange's theorem

CO2. Illustrate the examples of ordinary differential equation, partial differential equation, matrices and Statistics

CO3. Solve questions related to ordinary differential equation, partial differential equation, matrices.

CO4. Apply the knowledge of matrices, ordinary differential equation, partial differential equation, and Statistics to real world problems.

CO5. Interpret the results of matrices, ordinary differential equation, partial differential equation and Statistics and Finite differences.

CO6. Design a method or modal on matrices, ordinary differential equation, partial differential equation and Statistics and Finite differences.

Text Books

1) Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
2) Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
3)A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware,Mumbai.
4) A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune VidyarthiGrihaPrakashan,Pune.
5) Higher Engineering Mathematics by H. K. Das and Er. RajnishVerma, S. Chand & CO. Pvt.Ltd., New Delhi.

Reference Books

1) Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2) A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd. , Singapore.
3) Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., NewDelhi.

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Course Title	**: Vector Calculus and Probability**	**Semester**	**: I & II**
Course Code	**: MA2T002**	**Course Type**	**: Compulsory**
Pre-requisite	**: Basic of Mathematics**	**L – T – P**	**: 3-1-0**
Stream	**: Theory Subject**	**Credits**	**: 4 (Credit)**

Unit 1: Basics of Probability **[09 Hours]**

Sample space and events, probability of the events, Baye's theorem, random variable, probability function for discrete random variable, distribution function for discrete random variable, probability function for continuous random variable, distribution functions for continuous random variable.

Unit 2: Vector Differential Calculus **[09 Hours]**

General rules of vector Differentiation; Scalar and vector fields: Gradient, divergence and curl; Solenoid and irrotational vector fields; Vector identities.

Unit 3: Vector Integral Calculus **[09 Hours]**

Vector Integration: line integral, surface integral and volume integral; Green's lemma, Gauss' divergence theorem and Stokes' theorem (withoutproofs).

Unit 4: Distribution Theory **[09 Hours]**

Introduction, Type of variable, frequency distribution, cumulative frequency distribution, Graph of frequency distribution: Line frequency graph, histogram, frequency polygon, Frequency Curve, cumulative frequency curve or ogive.

Unit 5: Complex Numbers **[09 Hours]**

Definition and geometrical representation; De-Moivre's theorem (without proof) ; Roots of complex numbers by using De-Moivre's theorem; Circular functions of Complex variable – definition; Hyperbolic functions; Relations between circular And hyperbolic functions; Real and imaginary parts of circular and hyperbolic functions; Logarithm of Complex quantities.

Final Outcome of the Subject (Maximum 6 Outcome): At the end of the course students will be able to

CO1. Describe concept of complex numbers, integral calculus & multiple integrals, probability and distribution theory.
CO2. Illustrate the concept of complex numbers, integral calculus & multiple integrals, probability and distribution theory by using examples.
CO3. Apply the knowledge of complex numbers, integral calculus & multiple integrals, probability and distribution theory to solve the engineering problems.
CO4. Analyze the problems and results of complex numbers, integral calculus & multiple integrals, probability and distribution theory to solve the real world problems.
CO5. Evaluate the problems by usingcomplex numbers, integral calculus & multiple integrals, probability and distribution theory.
CO6. Create the methods or model by usingcomplex numbers, integral calculus & multiple

integrals, probability and distribution theory.

Text Books

1) Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
2) Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
3)A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware,Mumbai.
4) A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune VidyarthiGrihaPrakashan,Pune.
5) Higher Engineering Mathematics by H. K. Das and Er. RajnishVerma, S. Chand & CO. Pvt.Ltd., New Delhi.

Reference Books

1) Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2) A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd. , Singapore.
3) Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., NewDelhi.

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KATOL ROAD, NAGPUR
Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere
Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.in

Education to Eternity

ज्ञानम् सर्वार्थ साधनम्

An Autonomous Institute, with NAAC "A" Grade

VISION	MISSION
To be a center of excellence imparting professional education satisfying societal and global needs.	1. Transforming students into lifelong learners through, quality teaching, training and exposure to concurrent technologies. 2. Fostering conducive atmosphere for research and development through well equipped laboratories and qualified personnel in collaboration with global organizations.

B. Tech. First Year (2022-23)

Branch: ME/CE/EE/ETC/DS/CS/AI/IT

Course Title : Engineering Chemistry **Semester : I and II**

Course Code : ME1T002/CE1T002/EE1T002/ET1T002

DS2T002/CS2T002/AI2T002/IT2T002 **Course Type: Compulsory**

Pre-requisite : Basic knowledge of Chemistry **L – T – P : 3 – 1– 0**

Stream : Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Chemistry
2. To understand the application of Chemistry in engineering and in real life.
3. To investigate the key concepts of Chemistry knowledge
4. To enable students to analyze a Chemistry problem so that appropriate problem solving techniques may be applied

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe various properties of water ,Describe types of fuel, refining of Petroleum, orbitals ,electronic configuration , nanomaterials and polymers ,energy levels , spectroscopic technique ,
2. Interpret the various classification of fuel, various sources of water , refining of petroleum, classification of CNT, various properties of nanomaterials and polymers, ionization energies ,
3. Apply the Knowledge of characteristics of good fuel, Synthesis of nanomaterials, liquid crystal polymers, zeolite process, Ion exchange process, Hot Lime –Soda process, acid base concept, spectroscopic techniques
4. Analyze the question on Proximate and Ultimate analysis of coal, potential use of nanomaterials, phases of thermotropic polymers , analyze question on water characteristics

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5. Estimate a Modal on commercial grading of coal,synthesis of nanomaterials, advanced polymers, spectroscopic technique , doping

6. Organize coal, water as per quality ,energy level diagram of diatomic molecules , nanomaterials and polymers.

UNIT I :- Water Treatment **[7 Hr]**

Introduction, types of hardness; Industrial treatment of water , 1)lime soda process 2)Zeolite process 3) Ion-exchange process .Numerical based on lime-soda and Zeolite process. Boiler troubles: 1)sludge and scale formation 2) Caustic Embrittlement 3) Boiler Corrosion 4) Primming and Foaming . Conditioning of water :

1) Carbonate 2) Calgon 3) Phosphate . Domestic Treatment of drinking water .

UNIT II :-Nanomaterials **[5 Hr]**

General introduction to nanoscience . Methods of synthesis of nanomaterials: ' Top-Down' and 'Bottom-Up' , Carbon nanotubes: single-walled and multi-walled carbon nanotubes, their structures, properties and applications. use of nanomaterials in electronics, sensors, catalysis, environment

UNIT III :- Periodic Properties **[6 Hr]**

Effective nuclear charge, electronic configurations, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, hard soft acids and bases.

UNIT IV :- **[8 Hr]**

A) Atomic and molecular structure: Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbital. Energy level diagrams of diatomic(hydrogen and oxygen) Formation of wave function (hydrogen) , Benzene structure

B) Energy:- Introduction, classification of fuel ,characteristics of good fuel, Analysis of coal-Proximate analysis, liquid fuel-Refining of Crude oil and Gaseous fuel, Combustion Calculation

UNIT V :- **[6 Hr]**

A) Advanced Polymeric Materials :- Liquid crystals and liquid crystal polymers (thermotropic and lyotropic), phases of thermotropic polymers: nematic, smectic, cholesteric; advantages, disadvantages and applications

B) Spectroscopic Techniques and Applications:- Instrumentation , Number of signals (Equivaleny and Non-equivalent Protons) , Solvents used in NMR , Chemical shift , Application of NMR spectroscopy

Text Books:

1) A Text book of Engineering Chemistry, Dr. S. S. Dara, Dr. S. S. Umre,S. Chand and Company Ltd., Twelfth/ 2011

2) Nanomaterials, Nanotechnology and Design, Michael F. Ashby, Paulo J. Ferreira, Daniel L. Schodek, Elsevier, First/2013

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Reference Books:

1) Engineering Chemistry, P. C. Jain And Monika Jain, Dhanpatrai Publishing Company Ltd., 15th Ed/ 2009

2) Principles of Physical Chemistry, B. R. Puri, L. R. Sharma and Madan S. Pathania, Vishal Publishing Company, First/2002

3) Chemistry, John E McMurry and Robert C Fay, Pearson, First/2008,

4) Nanotechnology A gentle Introduction to the Next big Idea, Mark Ratner, Daniel Ratner, Pearson, First/2017

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Education to Eternity

||ज्ञानम् सर्वार्थ साधनम्||

An Autonomous Institute, with NAAC "A" Grade

VISION	MISSION
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Course Title : Engineering Chemistry
Course Code : ----
Prerequisite : Basics of Chemistry Practical
Stream : Theory subject

Semester : I/II
Course Type : Compulsory
L – T – P : 0 – 0– 2
Credits : 1

Course Objective:

Students will be able to

1. Students will explore new areas of research in both chemistry and allied fields of science andtechnology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing oursociety in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/basetitrations, UV/Visible spectroscopy.

Course Outcome

Students will be able to

1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision inmeasurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
5. Making judgments based on criteria and standards through checking and critiquing
6. Design and apply the practical knowledge of engineering chemistry in daily life.

List of Experiments: (Perform any 8– 10 Experiments)

1. Determination of Hardness of water sample by EDTA method.
2. Determination of flash point by Pensky Martin Apparatus
3. Determination of Dissolve Oxygen by Iodometric method.
4. Determination of percent purity of Bleaching Powder.
5. pH – metric Titration (any one type of Acid Base titration)
6. Conductometric Titration (any one type of Acid Base titration)

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7. Surface tension: Determination of relative surface tension of liquid with respect to water using dropnumber method.
8. Viscosity: Determination of relative viscosity of liquid with respect to water using Ostwald'sviscometer method.
9. To determine the normality in Normal term and Strength in gms/lit of HCl solution by titrating withNa2CO3 solution.
10. To find out Morality, Normality and Strength of the given KMnO4 solution by titrating against N/10Mohr's solution.
11. Determination of Acid value of an oil sample.
12. Determination of Saponification value of an oil sample.
13. Verification of Beer-Lambert Law
14. To determine the heat of neutralisation of strong acid by strong base.
15. To determine chemical parameters such as hardness, alkalinity, and chemical oxygen demand COD)of water samples.
16. Determination of Viscosity of Organic Solvents
17. To determine the amount of substance in a solution of unknown concentration using varioustitrimetric methods. (pH)
18. To determine the amount of substance in a solution of unknown concentration using varioustitrimetric methods. (Conductometer)

Reference Books:

1. Systematic experiments in Chemistry, A. Sethi, New Age International Publication, New Delhi.
2. Practical Inorganic Chemistry, A. I. Vogel, ELBS Pub.
Practical in Engineering Chemistry, S. S. Dara

B.Tech. First Year (2022-23)
Branch: CSE/IT/EE/ETC/ME/CE/EE/ETC
SEMESTER-I &II

Course Title	**: Engineering Physics**	**Semester**	**: I &II**
Course Code	**: CS/IT/AI/DS1T005 and ME/CE/EE/ET2T005**		
Course Type	**: Compulsory**		
Pre-requisite	**: Basic knowledge of Physics**	**L – T – P**	**: 3 – 1– 2**
Stream	**: Core**	**Credits**	**: 4**

COURSE OBJECTIVES

1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2. To understand and study the Physics principles behind the developments of Engineering materials.
3. To provide problem solving experience and learning of concepts through it in engineering physics, in both the classroom and the laboratory learning environment.

COURSE OUTCOMES

At the end of the course students will be able to

CO1. Describe the concept of LASER, optical fiber, types of semiconductors, PN junction diode characteristics, transistor action, wave optics, electron Ballistics, quantum mechanics, various crystal structure parameters &X-rays.

CO2. Elaborate the types of LASER, optical fiber, Semiconductors, crystalstucture, formation of Newton's ring, fringes in wedge shape thin film, effect of electric and magnetic field on motion of charge particle and significance of quantum mechanics. .

CO3. Apply the concept of three and four level in LASER production, TIR in Optical fibre, classify the type of material based on current conduction, Bragg's law and X-ray diffraction, of Interference for advanced application , illustrate the wave particle dualism of matter waves, motion and charged particle in E and B.

CO4. Analyze the behavior of PN junction diode in FB and RB, compare the different types of LASER and optical fiber, correlate the motion of charged particles in uniform electric and magnetic fields for e/m determination, the formation of fringes in thin film, behavior of wave function and the types of crystal.

CO5. Justify physical significance of wave function, HUP, Schroedinger's wave equations, application of Hall effect, LASER & Optical Fibre, Wave Optics, Electron Ballistics and interpret the various crystal structure.

CO6. Design devices by using the concept of Laser, optical fibre, Electron ballistics, Semiconductor, crystals structure, wave optics and quantum mechanics.

Syllabus

Unit-1: Laser & Optical Fibre **[07 Hrs]**

Interaction of radiation with matter, Population Inversion and Optical resonance cavity , Three and four level laser, Ruby laser, He-Ne laser, Properties and engineering applications of LASER

Optical fibers: Propagation by total internal reflection, structure and classification (based on material, refractive index and number of modes), Modes of propagation in fiber, Acceptance angle, Numerical aperture, Attenuation and dispersion. Applications of Optical fibre

Unit-2:Semiconductor Physics **[07Hrs]**

Band-theory based classification of solids into insulators, semiconductors and conductors, Fermi-Dirac distribution Function, Intrinsic & Extrinsic semiconductors, Fermi- energy, Typical energy band diagram of an intrinsic semi-conductor, Extrinsic semiconductors, Current conduction in semiconductors.

PN- junction diode; Unbiased, Forward baised & Reverse biased mode with Energy band diagram , Diode rectifier equation, Bipolar Transistor(NPN and PNP) and its configuration(CB and CE), Hall effect, Hall coefficient & Hall Angle, Application of Hall effect.

Unit-3: Wave Optics **[07Hrs]**

Interference in thin films, condition of optical path difference for reflected light, Interference in Wedge shape thin film, fringe width, wedge angle, Newton's rings and its application, Anti-reflection coating, advanced applications of interference in thin film.

Unit-4: Electron Ballistics and Quantum Mechanics: **[07Hrs]**

Motion of a charged particle in uniform electric and magnetic field, Cross field configuration, Measurement of 'e/m' by Thomson's method, Bainbridge mass spectrograph.

Wave-particle duality, Wave packet, Heisenberg's uncertainty principle, Schröedinger's time dependent and independent wave equations, physical significance of wave function.

Unit 5: Crystal Structure, X-rays: **[07 Hrs]**

Unit cell, Bravais lattice, cubic system, number of atoms per unit cell, coordination number, atomic radius, packing density, relation between lattice constant and density, lattice planes and Miller indices, Interplaner spacing for cubic system, Bragg's law, X-ray diffraction, Line and Continuous Spectrum of X-ray, Applications of X-ray.

Text books:

1. Engineering Physics M.N. Avadhanulu and P.G. Kshirsagar. S.Chand and Company LTD.
2. Engineering Physics – Dr. L. N. Singh. Synergy Knowledgeware-Mumbai.
3. Engineering Physics - R.K. Gaur and S. L. Gupta. Dhanpat Rai Publications Pvt. Ltd.-New Delhi.
4. Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.

5. M. Srivastava, C. Srinivasan, "Science of Engineering Materials and Carbon Nanotubes", New Age I International Publication, 3rd edition, 2010.
6. Engineering Physics-Hitendra K Malik, Ajay Kumar Singh, Tata McGraw Hill Education Private Limited, New Delhi.

Reference books:

1. Introduction to Electrodynamics –David R. Griffiths.
2. Concept of Modern Physics – Arthur Beizer. Tata McGraw-Hill Publishing Company Limited.
1. Optics – Ajoy Ghatak.MacGraw Hill Education (India) Pvt. Ltd.
2. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan. New Age International Pvt.Ltd.
3. Solid State Physics – A.J. Dekker. McMillan India –Limited.
4. The Feynman Lectures on Physics Vol I,II,III.
5. Introduction to solid state physics – Charles Kittel. John Willey and Sons

Syllabus of Laboratory

Course Title : Engineering Physics-Lab **Semester : I &II**

Course Code : CS/IT/AI/DS1L005 and ME/CE/EE/ET2L005
Course Type : Compulsory

Pre-requisite : Basics of Physics Practical **L – T – P : 0 – 0– 2**

Stream :Core subject **Credits : 1**

Course Objective:

Students will be able to

1. Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
2. Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques and graphical analysis to the experimental data
5. Develop the skills to identify various parts of the apparatus used in the experiment in laboratory.
6. Design and apply the practical knowledge of engineering physics in daily life

Course Outcome:

Students will be able to

1. Visualize and understand the concepts of various phenomenon of light, principle of LASER, Optical fiber and electric and magnetic field.
2. Understand the working principles of Semiconducting devices and their application.
3. Apply the theoretical concepts to demonstrate the ability to measure properties of a variety of electrical and optical systems
4. Analyze the different crystal structure with the help of crystal models.
5. Construct the various devices based on optical phenomenon.
6. Design the frame work of various electronic circuitries based on semiconducting materials.

List of Experiment

1. Newton's rings - Determination of radius of curvature of Plano convex lens / wavelength of light.
2. Wedge Shaped film - Determination of thickness of thin wire.
3. LASER - Determination of wavelength of He-Ne laser light.
4. Magnetron Tube - Determination of 'e/m' of electron.
5. Hall Effect - Determination of Hall Coefficient.
6. Measurement of Energy Band gap of Semiconductors.
7. Study of I-V characteristics of P-N junction diode.
8. Experiment on fibre optics.
9. Input, output and current transfer characteristics of PNP/NPN transistor in CB/CE mode.
10. To study various crystal Structure.
11. Study of Cathode Ray Oscilloscope.
12. To study Half wave and full wave rectifier.