



**JAIDEV EDUCATION SOCIETY'S  
J D COLLEGE OF ENGINEERING AND MANAGEMENT  
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  
Basic Science and Humanities Department**

VISION	MISSION
To lay a robust foundation for the institute to reach its zenith.	<ol style="list-style-type: none"><li>1. Achieving academic excellence through rigorous teaching, learning and evaluation practices.</li><li>2. To develop an ability to apply knowledge of basic science and mathematics to excel in the field of engineering.</li><li>3. To provide salutary environment for the betterment of faculty and students.</li></ol>

**Program: B. Tech in Basic Science and Humanities Department  
Numerical Method & Advance Calculus**

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I / Sem-II		Numerical Method & Advance Calculus	2	1	0	3

Pre requisites for the course	
1	Basic of Mathematics such as arithmetic, integration, derivative, sets, basics of probability and vectors

Prior Reading Material/useful links	
1	Mathematics and Statistics Part I standard 12 (Text book by Maharashtra state board)
2	<a href="https://www.youtube.com/watch?v=YLPDPglvePY">https://www.youtube.com/watch?v=YLPDPglvePY</a>
3	<a href="https://www.youtube.com/watch?v=_xeUyF_exNA">https://www.youtube.com/watch?v=_xeUyF_exNA</a>

**Course Outcomes:**

Sr. No	Course outcome number	CO statement
1	CO1	Describe concept of linear algebra, probability, logic, numerical method, distribution theory.
2	CO2	Illustrate the concept of linear algebra, probability, logic, numerical method, distribution theory by using examples.
3	CO3	Apply the knowledge of linear algebra, probability, logic,

		numerical method, distribution theory to solve the engineering problems.
4	CO4	Analyze the problems and results of linear algebra, probability, logic, numerical method, distribution theory to solve the real world problems.
5	CO5	Evaluate the problems by linear algebra, probability, logic, numerical method, distribution theory.
6	CO6	Create the methods or model by linear algebra, probability, logic, numerical method, distribution theory.

### Syllabus:

<b>Course Contents</b>	
Unit I	<b>Basics of Probability</b> Sample space and events, probability of the events, Baye's theorem, and random variable, probability function for discrete random variable, distribution function for DRV, probability function for continuous random variable and distribution functions for CRV. <b>[6Hrs]</b>
Unit II	<b>Numerical Integration and Differentiation</b> Newton's Cotes Integration Formulas: Trapezoidal Rule, Simpson's rule, engineering applications Numerical differentiation using Finite divide Difference method. <b>[6 Hrs]</b>
Unit III	<b>Vector Differential Calculus</b> General Rules of vector differentiation, Scalar & vector fields: Gradient, Divergence and curl, Solenoid and irrotational vector fields, vector identities. <b>[6Hrs]</b>
Unit IV	<b>Mathematical Logic and set theory</b> Propositions and Logical Operation, Quantifiers, Conditional Statements and Tautologies, Method of Proof, Principle of Mathematical Induction. Basic concept of set theory, Operations on sets, The power set. <b>[6 Hrs]</b>
Unit V	<b>Distribution Theory</b> 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. <b>[6 Hrs]</b>
<b>Text Books</b>	
1	Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2	Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
3	A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
4	A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5	Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S.

	Chand & CO. Pvt. Ltd., New Delhi.
<b>Reference Books</b>	
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., New Delhi.
<b>Useful links</b>	
1	<a href="https://nptel.ac.in/courses/111/108/111108098/#">https://nptel.ac.in/courses/111/108/111108098/#</a> (32.20 min)(0:00-20:00)
2	<a href="https://nptel.ac.in/courses/111/105/111105121/">https://nptel.ac.in/courses/111/105/111105121/</a> (28.17 min)(10:00-15:14)
3	<a href="https://nptel.ac.in/courses/111/107/111107111/">https://nptel.ac.in/courses/111/107/111107111/</a> (35.38 min)
4	<a href="https://nptel.ac.in/courses/111/107/111107111/">https://nptel.ac.in/courses/111/107/111107111/</a> (35.38 min)

**Contributions for syllabus designing:**

<b>Sr. No.</b>	<b>Name of the Person</b>	<b>Designation</b>	<b>Organization</b>
1	Mr. Sagar S Kathalkar	Assistant Professor	JDCOEM
2	Mrs. Purna Parkhi	Assistant Professor	JDCOEM
3	Mr. Santosh Hedau	Assistant Professor	JDCOEM
4	Mrs. Leena Bhoyar	Assistant Professor	JDCOEM
5	Mrs. Sana Anjum	Assistant Professor	JDCOEM
6	Dr. Rohit Patne	Assistant Professor	JDCOEM
7	Mr. Chaitanya Sahare	Alumni	JDCOEM

### Advanced Physics

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I/ Sem-II		Advanced Physics	2	1A	0	3

Prerequisites for the course	
1	Basic knowledge of Physics such as scalars, vector, capacitor, frequency resonance etc.

Prior Reading Material/useful links	
1	Concepts of Physics (Volume-1 and Volume-2) by H C Verma.
2	<a href="https://www.youtube.com/watch?v=wMAyk8Wn0y8">https://www.youtube.com/watch?v=wMAyk8Wn0y8</a>
3	<a href="https://www.youtube.com/watch?v=FWWhRpfU44mM">https://www.youtube.com/watch?v=FWWhRpfU44mM</a>

#### Course Outcomes:

Sr. No.	Course outcome number	CO Statement
1	CO1	Describe the concept of LASER, optical fiber, types of semiconductors, PN junction diode characteristics, wave optics, electron Ballistics, quantum mechanics, various crystal structure parameters & X-rays.
2	CO2	Elaborate the types of LASER, optical fiber, Semiconductors, crystal structure, 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.
3	CO3	Apply the concept of three and four level in LASER production, TIR in Optical fiber, classify the type of material based on current conduction, Bragg's law and X-ray diffraction, Interference for advanced application, illustrate the wave particle dualism of matter waves, motion and charged particle in E and B.
4	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 Bainbridge Mass spectrograph, the formation of fringes in thin film, behavior of wave function and the types of crystal.
5	CO5	Justify physical significance of wave function, HUP, Schrodinger's wave equations, application of Hall effect, LASER & Optical Fibre, Wave Optics, Electron Ballistics and interpret the various crystal structure.
6	CO6	Design devices by using the concept of Laser, optical fibre, Electron ballistics, Semiconductor, crystals structure, wave optics and quantum mechanics.

**Syllabus:**

<b>Course Contents</b>	
Unit-I	<p><b>LASER &amp; Optical Fibre:</b> 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.</p> <p>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. [6 Hrs ]</p>
Unit-II	<p><b>Semiconductor Physics:</b> Band-theory based classification of solid into insulators, semiconductors and conductors, Fermi-Dirac distribution Function, Intrinsic &amp; Extrinsic semiconductors, Fermi- energy, Typical energy band diagram of an intrinsic semiconductor, Extrinsic semiconductors, Current conduction in semiconductors, Hall effect, Hall coefficient &amp; Hall Angle, Application of Hall effect. [6 Hrs ]</p>
Unit-III	<p><b>Wave Optics:</b> 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. [6 Hrs ]</p>
Unit-IV	<p><b>Electron Ballistics and Quantum Mechanics:</b> Motion of a charged particle in uniform electric and magnetic field, Cross field configuration, Bainbridge mass spectro graphs.</p> <p>Wave-particle duality, Wave packet, Heisenberg's uncertainty principle, Schrödinger's time dependent and independent wave equations, physical significance of wave function. [6 Hrs ]</p>
Unit-V	<p><b>Crystal Structure &amp; X-rays:</b> 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 of X-ray diffraction, Applications of X-rays. [6 Hrs ]</p>
<b>Text Books</b>	
1	Engineering Physics M.N. Avadhanulu and P.G. Kshirsagar S. Chand and Company LTD.
2	Engineering Physics-R.K. Gaur and S. L. Gupta. Dhanp at Rai Publications Pvt. Ltd.-New Delhi.
3	Fundamental of Physics-Halliday and Resnik. Willey Eastern Limited
<b>Reference Books</b>	
1	Engineering Physics–Dr. L.N. Singh. Synergy Knowledge ware-Mumbai.
2	M. Srivastava, C. Srinivasan, “Science of Engineering Materials and Carbon Nanotubes”, New Age I International Publication, 3 <sup>rd</sup> edition, 2010.
3	Engineering Physics-Hitendra K Malik, Ajay Kumar Singh, Tata McGraw Hill

	Education Private Limited, New Delhi.
<b>Useful links</b>	
1	<a href="https://archive.nptel.ac.in/courses/115/102/115102124/">https://archive.nptel.ac.in/courses/115/102/115102124/</a>
2	<a href="https://archive.nptel.ac.in/courses/108/108/108108122/">https://archive.nptel.ac.in/courses/108/108/108108122/</a>
3	<a href="http://nittrc.edu.in/nptel/courses/video/115105120/L37.html">http://nittrc.edu.in/nptel/courses/video/115105120/L37.html</a>
4	<a href="https://www.youtube.com/watch?v=pQffvbq1nI">https://www.youtube.com/watch?v=pQffvbq1nI</a>
5	<a href="https://archive.nptel.ac.in/courses/122/106/122106034/">https://archive.nptel.ac.in/courses/122/106/122106034/</a>
6	<a href="https://www.youtube.com/watch?v=OTDVov_kw6A">https://www.youtube.com/watch?v=OTDVov_kw6A</a>

**Contributions for syllabus designing:**

<b>Sr. No.</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Dr. N.V. Pradnyakar	Associate Professor	JDCEM
2	Dr. U.V. Rathod	Asst Professor	JDCEM
3	Dr. B.P. Ilamkar	Asst Professor	JDCEM
4	Mr. Tushar Jaiswal	Alumni	JDCEM

### Advanced physics Lab

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I / Sem-II		Advanced Physics Lab	0	0	2	1

Prerequisites for the course	
1	Basic knowledge of Physics such as P-N Junction diode, Laser, Optical Fiber, Diffraction, Interference, Crystal Structure, frequency etc.

Prior Reading Material/useful links	
1	<a href="https://vlab.amrita.edu/?sub=1&amp;brch=282&amp;sim=370&amp;cnt=1">https://vlab.amrita.edu/?sub=1&amp;brch=282&amp;sim=370&amp;cnt=1</a>

#### Course Outcomes:

Sr. No.	Course outcome number	CO statement
1	CO 1	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.
2	CO 2	Elaborate the types of LASER, optical fiber, Semiconductors, crystal structure, 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.
3	CO 3	Apply the concept of three and four level in LASER production, TIR in Optical fiber, 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.
4	CO 4	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.
5	CO 5	Justify physical significance of wave function, HUP, Schrodinger's wave equations, application of Hall effect, LASER & Optical Fibre, Wave Optics, Electron Ballistics and interpret the various crystal structure.
6	CO 6	Design devices by using the concept of Laser, optical fibre, Electron ballistics, Semiconductor, crystals structure, wave optics and quantum mechanics.

#### List of Experiment:

Course Contents	
Exp-1	Study of I-V characteristics of P-N junction diode.

Exp-2	Determination of Energy Band gap of PN junction diode in reverse bias.
Exp-3	Laser - Determination of wavelength of He-Ne laser light.
Exp-4	Fiber Optics- Determination of numerical aperture and acceptance angle of optical fiber
Exp-5	Newton's rings - Determination of radius of curvature of Plano convex lens.
Exp-6	To determine the thickness of thin film using wedge shape arrangement
Exp-7	Hall Effect - Determination of Hall Coefficient
Exp-8	To Study Crystal Structure: Study of planes with the help of models related Miller Indices
Exp-9	Study of CRO and measurement of unknown frequency by CRO
Exp-10	Verification of truth table of AND, OR, NOT, NAND and NOR gate by logic gates.
<b>Text Books</b>	
1	Engineering Physics R.K GAUR & S.L. GUPTAS. Chand and Company LTD.
2	Engineering Physics, Dr. I.A. Shaikh, Tec knowledge Publication
<b>Reference Books</b>	
1	Engineering Physics: Theory and Practical, 2ed, A.K. Katiyar, C.K. Pandey, Wiley Publication
<b>Useful links</b>	
1	<a href="https://vlab.amrita.edu">https://vlab.amrita.edu</a> > ...
2	<a href="https://www.vlab.co.in/broad-area-physical-sciences">https://www.vlab.co.in/broad-area-physical-sciences</a>
3	<a href="https://vlab.amrita.edu/?sub=1&amp;brch=282&amp;sim=370&amp;cnt=1">https://vlab.amrita.edu/?sub=1&amp;brch=282&amp;sim=370&amp;cnt=1</a>

**Contributions for syllabus designing:**

Sr. No.	Name of the person	Designation	Organization
1	Dr. N.V. Pradnyakar	Associate Professor	JDCOEM
2	Dr. U.V. Rathod	Asst Professor	JDCOEM
3	Dr. B.P. Ilamkar	Asst Professor	JDCOEM
4	Mr. Tushar Jaiswal	Alumni	JDCOEM



## Basic Electrical and Electronics Engineering

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I / Sem-II		Basic Electrical and Electronics Engineering	2	0	0	2

### Prerequisites for the course

1	Basic of Electrical and Electronics Engineering such as PN junction diode, electrons, flow of current transistor etc.
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### Prior Reading Material/useful links

1	Basic Electrical and Electronics Engineering by S.K. Bhattacharya
2	<a href="https://www.youtube.com/watch?v=YEGWrhxZjlw">https://www.youtube.com/watch?v=YEGWrhxZjlw</a>
3	<a href="https://www.youtube.com/watch?v=q2L5s7i4FrI&amp;list=PL0s3O6GgLL5cLAfoALo36QVhy1oM5NZsP&amp;index=2">https://www.youtube.com/watch?v=q2L5s7i4FrI&amp;list=PL0s3O6GgLL5cLAfoALo36QVhy1oM5NZsP&amp;index=2</a>

### Course Outcomes:

Sr. No.	Course outcome number	CO statement
1	CO 1	Define fundamentals of electrical system and choose measuring instruments for measurement of electrical quantities & describe the concept PN junction diode and its characteristics.
2	CO 2	Classify wiring system and compare energy resources for electrical energy generation & elaborate the transistor configuration in CE, CB & CC mode.
3	CO 3	Plan and organize the utilization of energy resources of electrical system & apply transistor characteristics to construct Amplifier devices.
4	CO 4	Compare different sources of electrical system & distinguish various logic gates and simplify the Boolean's equations.
5	CO 5	Justify the utilization of various electrical and electronics components into electrical and electronics circuitries.
6	CO 6	Construct various circuits using Resistors, capacitors, inductors, PN junction diode, Zener diode, transformers, transistors and logic gates

### Syllabus:

#### Course Contents

Unit I	Fundamental of Electrical system: Potential difference, Ohm's law, Effect of temperature on resistor, resistance temperature coefficient, Electrical wiring system: Study of different wire gauges and their applications in domestic and industry. Resistors: color code, type of resistors, material used for resistors, resistance wires, resistance standards, frequency errors in resistors. Capacitors: Capacitance standards, variable capacitors, frequency errors in capacitors. Loss angle and power factor of capacitors. Inductors: standards of inductance, mutual inductance, self-inductance, variable inductance, inductors for high and low frequency work, frequency errors in inductors.
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	<b>[6 Hrs]</b>
Unit II	Measurement Of Electrical Quantities, Measuring Instruments & Energy Resources Measurement of Voltage, Current, and Power (1ph and 3ph), Introduction to PMMC instrument, Ohmmeter, galvanometer, potentiometers, power factor meter and frequency meters. Study of circuit breakers & Actuators (MCB & Fuse, Power Contactors & Aux contactors, Electro-Mechanical & Solid state Relays). Energy Resources and Utilization: Conventional and nonconventional energy resources; Introduction to electrical energy generation from different resources, transmission, distribution and utilization, Concept of Supply Demand, Power Factor, Need of unity factor. <b>[6 Hrs]</b>
Unit III	Introduction to diodes, diode circuit and Transducers The P-N Junction Diode, V-I characteristics, Diode as Rectifier, specifications of Rectifier Diodes, Half Wave, Full wave, Bridge rectifiers, Equations for IDC VDC VRMS, IRMS, Efficiency and Ripple Factor for each configuration. Zener Diode, Characteristics, Specifications, Zener Voltage Regulator, Types of Diodes: LED, Photodiode. Introduction to transducer, Classification of transducers, characteristics and choice of transducers. <b>[6 Hrs]</b>
Unit IV	Semiconductor Devices and Applications: Transistors: Introduction, Classification, CE, CB, and CC configurations, $\alpha$ , $\beta$ , concept of gain and bandwidth. Operation of BJT in cut-off, saturation and active regions (DC analysis). BJT as an amplifier, biasing techniques of BJT, BJT as a switch. Introduction to Digital Electronics: Number System, Basic logic Gates, Universal Gates, Boolean Postulates, De-Morgan Theorems <b>[6 Hrs]</b>
Unit V	Introduction to power system : Importance of power system, main parts of power system, single line diagram, types of transmission (primary transmission and secondary transmission), types of distribution system, substation and its types. <b>[6 Hrs]</b>
<b>Text Books</b>	
1	Anurag Kandya, "Elements of Electrical Engineering", Charotar Publishing, Anand
2	M. S. Palani Gamy, "Basic Electronics Engineering", Tata Mc-Graw Hill Publication
<b>Reference Books</b>	
1	K. Venugopal and V. Prabhu Raja, Basics of Engineering, New Age International (P) Ltd, 2008.
2	P. K. Nag "Engineering Thermodynamics", Tata McGraw Hill, New Delhi 3rd ed. 2005
<b>Useful links</b>	
1	<a href="https://nptel.ac.in/courses/11210409/1">https://nptel.ac.in/courses/11210409/1</a>
2	<a href="https://www.digimat.in/nptel/courses/video/105104101/L01.html">https://www.digimat.in/nptel/courses/video/105104101/L01.html</a>
3	<a href="https://www.youtube.com/watch?v=cErccoHui9g&amp;pbjreload=10">https://www.youtube.com/watch?v=cErccoHui9g&amp;pbjreload=10</a>

**Contributions for syllabus designing:**

<b>Sr. No.</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Dr. U.V. Rathod	Assistant Professor	JDCOEM
2	Mr. Tushar Jaiswal	Alumni	JDCOEM

## Workshop Practices

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I / Sem-II		Workshop Practices	0	0	4	2

Prerequisites for the course	
1	Basic knowledge of Physics such as current electricity, speed time distance, scalar, vector quantity, light & basic mathematics

Prior Reading Material/useful links	
1	Concepts of Physics (Volume-1 and Volume-2) by H C Verma.
2	<a href="https://www.youtube.com/watch?v=wMAyk8Wn0y8">https://www.youtube.com/watch?v=wMAyk8Wn0y8</a>
3	<a href="https://www.youtube.com/watch?v=FWhRpfU44mM">https://www.youtube.com/watch?v=FWhRpfU44mM</a>

### Course Outcomes:

Sr. No.	Course outcome number	CO statement
1	CO 1	Define the various terms used in workshop practices
2	CO 2	Explain the various types of tool used in workshop practices
3	CO 3	Identify the basics of tools and equipment used in fitting, carpentry, welding and machines.
4	CO 4	Classify the different tools and equipment used in fitting, carpentry, welding and machines.
5	CO 5	Compare the different tools tools and equipment used in fitting, carpentry, welding and machines.
6	CO 6	Make metal joints and carpentry job.

### Syllabus:

Course Contents	
Practical -I	<b>Carpentry:</b> Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions. Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint.
Practical -II	<b>Welding:</b> Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions. Exercise in Arc welding (MMAW) to make a square butt joint.
Practical -III	<b>Fitting:</b> Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation. A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping on M. S. plates.
Practical -IV	<b>Machine shop:</b> Lathe machine, types of lathes, major parts, cutting tool, turning operations (Demo), safety precautions. A demo job on turning of a

	Mild Steel cylindrical job using center lathe.
<b>Text Books</b>	
1	Elements Of Workshop Technology Vol-1, by Choudhury H S K, Media Promoters & publisher Pvt. Ltd.
2	Workshop Technology, RS Khurmi   JK Gupta , S. Chand Publishing, 2008

**Contributions for syllabus designing:**

<b>Sr. No.</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Prof. Rakesh Bandane	Assistant Professor, Workshop superintendent	JDCOEM

## Basics of Programming

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I / Sem-II		Basics of Programming	3	0	0	3

Prerequisites for the course	
1	Basics of Programming and Logic such as operators, keywords, flowcharts

Prior Reading Material/ useful links	
1	C Programming Absolute Beginner's Guide (3rd Edition)' by Greg Perry and Dean
2	Miller <a href="https://www.digimat.in/nptel/courses/video/105107176/L01.html">https://www.digimat.in/nptel/courses/video/105107176/L01.html</a>
3	<a href="https://www.youtube.com/watch?v=8mHTieXk1x8">https://www.youtube.com/watch?v=8mHTieXk1x8</a>

### Course Outcomes:

Sr. No.	Course outcome number	CO statement
1	CO 1	Understand basic Structure of the C-PROGRAMMING, declaration and usage of variables.
2	CO 2	Demonstrate an understanding of algorithms in the problem-solving process.
3	CO 3	Understand the arrays and strings and create programs using them.
4	CO 4	To Understand the basics of oops concepts.
5	CO 5	Make use of different data structure like Linear and Non-Linear.

### Syllabus:

Course Contents	
Unit I	<p><b>Overview of C Programming:</b> Introduction to C: History of 'C', General structure of a 'C' program, Flowchart, Algorithm, Header files, 'main' function. Data Concepts: Character set, tokens, keywords, Identifiers, Variables, Constants, data types, C operators, Arithmetic operators, Relational operators, Logical operators, Assignment operators, Bitwise operators, Increment/Decrement operators, Conditional operators and data type conversion. Basic Input output: Input and Output statements, using printf( ) and scanf( ), Formatted Input/Output statements. Basic structure of C program, Executing a 'C' program [6 Hrs]</p>
Unit II	<p><b>Control Structures:</b> Decision making and Branching: if statements, if else statements, nested if else statements, if-else ladder, The Switch statements. Looping: While loop, Do While loop, for loop, Go to statements, Use of break and continue statements [6 Hrs]</p>
Unit III	<p><b>Array, Structure and Function:</b> Arrays: One dimensional array, two-dimensional array, array declaration and initialization, accessing array. Array of characters, operation on array.</p>

	Introduction and Features of structures: Defining the structures, Declaring and Accessing Members of structures, Initialization of Structures. Array of Structures. Concept and need of functions: User defined functions, function declaration, function call, Library functions: Math functions, string handling functions. Storage Classes, Concept of Pointers: Declaring, initializing, accessing pointers. <b>[6 Hrs]</b>
Unit IV	<b>Basics of Object-Oriented Programming:</b> Introduction to C++, OOPs Concepts: Class & Object, Inheritance: Types of Inheritance, base class, derived class, Polymorphism, Encapsulation, Abstraction, Access Specifiers, Data types in C++, Structure of C++ Program, The standard Input/Output functions. <b>[6 Hrs]</b>
Unit V	<b>Introduction to Data Structures:</b> Concepts and need of Data Structure, Data Types- Primitive and Non-Primitive, Abstract Data Types, Types of Data Structures- Linear and Non-Linear Data structure, basic concept of Stack, Queue, Linked List, Tree, Graph, Sorting and Searching, Types of Sorting and Searching. <b>[6 Hrs]</b>
<b>Text Books</b>	
1	Let Us C solutions by Yashavant Kanetkar
2	Reema Thareja, - Data Structures Using C, Second Edition , Oxford University Press, 2011
<b>Reference Books</b>	
1	C Programming: A Modern Approach (2nd Edition) - K. N. King (2008). A good book for learning C..
2	Programming in C (4th Edition) - Stephen Kochan (2014). A good general introduction and tutorial
3	Ilis Horowitz, Sartaj Sahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C, Second Edition, University Press, 2008.
<b>Useful links</b>	
1	<a href="https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf">https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf</a>
2	<a href="http://www.lmpt.univ-tours.fr/~volkov/C++.pdf">http://www.lmpt.univ-tours.fr/~volkov/C++.pdf</a>

**Contributions for syllabus designing:**

Sr. No.	Name of the person	Designation	Organization
1	Mr. Yuvraj Suryavanshi	Assistant Professor	JDCOEM
2	Ms. Raksha Swami	Alumni	JDCOEM

## Basics of Programming Lab

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I / Sem-II		Basics of Programming Lab	0	0	2	1

Prerequisites for the course	
1	Basics of Programming and Logic such as operators, keywords, flowcharts.

### Course Outcomes:

**After completing this lab course, you will be able to:**

Sr. No.	CO statement
1	Understand the logic for a given problem.
2	Write the algorithm of a given problem.
3	Draw a flow chart of a given problem.
4	Recognize and understand the syntax and construction of C programming code.
5	Make use of different data-structures like arrays, pointers, structures and files.
6	Know the alternative ways of providing solution to a given problem.

### List of Practical:

Sr. No.	Name of Practical
1	Write a program to display a message "Hello World" on screen.
2	Write a Program to print addition, subtraction Multiplication and Division of a entered number.
3	Write a program to find the greatest among three Number.
4	Write a any menu driven program using if...else statement.
5	Write a any menu driven program using Switch case statement.
6	Write a program to find count of even no, count of odd number, sum of even no and sum of odd number between 1 to 50.
7	Write a program to check entered no is Armstrong no or not.
8	Write a Program to find multiplication of two matrix elements.
9	Develop a program to create a function to find GCD of given number. Call this function in a program.
10	Develop a program to demonstrate use of string handling functions.
11	Develop a program to print values of variables and their addresses using pointer
12	Write a program in C to create and store information in a text file.
13	Write a program in C++ to display "Hello World".
14	Write a program in C++ to swap Two numbers.
15	Write a program in C++ to check whether a character is Vowel or Consonant.
16	Write a program in C++ to calculate Sum of Naturals Numbers
17	Write a program in C++ to store and display information using structure.
18	Write a Program in C++ to print addition, subtraction Multiplication and Division of a entered number.
19	Write a program that implements the following sorting



	i) Bubble sort ii) Selection sort iii) Quick sort.
20	To search an element in the array using Linear Search.

**Contributions for syllabus designing:**

<b>Sr. No.</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Dr. Supriya Sawwashere	Assistant Professor	JDCOEM
2	Mr. Yuvraj Suryavanshi	Assistant Professor	JDCOEM

## Design Thinking

Semester	Course Code	Name of the course	L	T/A	P	Credits
B. Tech First Year/ Sem I/ II		Design Thinking	0	0	4	2

Prerequisites for the course	
1	There are no prerequisites to learn this design thinking course.

Prior Reading Material / usefullinks	
1	<a href="https://thinkibility.com/2018/12/01/engineering-vs-design-thinking/">https://thinkibility.com/2018/12/01/engineering-vs-design-thinking/</a>
2	<a href="https://www.coursera.org/learn/design-thinking-innovation">https://www.coursera.org/learn/design-thinking-innovation</a>

### Course Outcomes:

Sr. No	Course outcome	CO statement
1	CO1	Understand a problem, apply methods of Empathy on user groups
2	CO2	Describe and Define the problem specific to the user group
3	CO3	Apply Ideation tools to generate Ideas to solve the problem
4	CO4	Develop prototype
5	CO5	Test the ideas and demonstrate Story telling ability to present the Ideas

### Syllabus:

Course Contents	
Unit-I	<b>Introduction to Design Thinking:</b> A primer on design thinking- Traditional approach, The new design thinking approach. Mindset for design thinking. Design thinking for product and process innovation. Difference between engineering design and design thinking. Mindset for design thinking, Difference between Engineering design & design thinking. The Design Process:1- Define, 2- Research, 3-Ideate, 4 – Prototype, 5-Select, 6-Implement,7-Learn
Unit-II	<b>Methods and Tools for Prototype Phase:</b> Ideate-Brainstorming 2X2 matrix, 6-3-5 method, NABC method: Basic design direction, Themes of thinking, value, Inclusion sketching, presenting ideas.
Unit-III	<b>Methods and Tools for Prototype Phase:</b> Prototype-Types of prototypes –Methods of prototyping –Focused experiments, Exploration map, Minimum Viable Product: Developing design, Implementation: Format, materials finishing media scale, series/continuity
Activity	1. Identify an Opportunity and Scope of the Project
	2. Explore the possibilities and Prepare design brief
	3. Apply the methods of empathize and Define Phases
	4. Finalize the problem statement
	5. Apply the methods of ideate phase: Generate lots of Ideas
	6. Apply the methods of Prototype Phase: Create prototypes for selected ideas
	7. Collect feedback: iterate and improve the ideas
	8. Study design thinking concepts applicable to various scenarios

	9. Study & Product creative solutions for different ventures
	10. Develop innovative projects using design thinking
<b>Text Books</b>	
1	Tim Brown, Change BY Design: How Design Thinking Transforms Organizations and Inspires Innovation, Harper Collins e-books, 2009
2	Michael Lewrick, Patrick Link, Larry Leifer, The Design Thinking Tollbox, John Wiley & Sons, 2020.
3	Michael Lewrick, Patrick Link, Larry Leifer, The Design Thinking playbook, John Wiley & Sons, 2018
4	Kristin Fontichiaro, Design Thinking, Cherry Lake Publishing USA, 2015
<b>Reference Books</b>	
1	Walter Brenner, Falk Uebernickel, Design Thinking for Innovation- Research and Practice, Springer Series, 2016.
2	Gavin Ambrose, Paul Harris, Design Thinking, AVA Publishing, 2010.
3	Muhammad Mashhood Alam, Transforming an Idea into Business with Design Thinking, First Edition, Taylor and Francis Group, 2019.
4	S. Balaram, Thinking Design, Sage Publications, 2011.
<b>Useful links</b>	
1	<a href="https://designthinking.ideo.com/">https://designthinking.ideo.com/</a>
4	<a href="https://swayam.gov.in/nd1-noc20-mg38/preview">https://swayam.gov.in/nd1-noc20-mg38/preview</a>

**Contributions for syllabus designing:**

<b>Sr. No.</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Dr. Amit N Gupta	Assistant Professor	JDCOEM

## Communication & Soft Skills

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I / Sem-II		Communication & Soft Skills	1	1A	0	2

Prerequisites for the course	
1	Basic knowledge of English Grammar such as Idioms and Phrases, use of article, Prepositions, types of sentences.
2	To enhance the employability skills of the engineering students through soft skills with emphasis on interpersonal skills.

Prior Reading Material/useful links	
1	Textbook English Yuvakbharati for Standard XII
2	<a href="https://www.digimat.in/nptel/courses/video/109106129/L12.html">https://www.digimat.in/nptel/courses/video/109106129/L12.html</a>
3	<a href="https://nptel.ac.in/courses/109104090">https://nptel.ac.in/courses/109104090</a>

### Course Outcomes:

Sr. No.	Course outcome number	CO statement
1	CO1	Define communication, reading, listening and phonetics.
2	CO2	Classify different types and functions of communication, reading, listening, speech organs, and sounds in English, types of reports, letters.
3	CO3	Demonstrate ability to write/speak error free while making optimum use of business vocabulary, grammar, tone of voice, body language.
4	CO4	Distinguish among various levels of communication barriers while developing an understanding of analytical writing
5	CO5	Evaluate effective ways of conducting speech, presentation, group discussion and job interviews.
6	CO6	Organize their thoughts for effective presentation and writing.

### Syllabus:

Course Contents	
Unit I	Introduction to Communication, Types and functions of Communication, Barriers to Communication and overcoming them, Role of Communication Skills in Society Introduction to Reading, Barriers to Reading, Types of Reading: Barriers to Listening and reading, Strategies for Reading Comprehension, Importance of Listening, Types of Listening, <b>[6 Hrs]</b>
Unit II	Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script, Articulation of Different Sounds in English, 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. <b>[6 Hrs]</b>

Unit III	Subject-Verb Agreement, Idioms & Phrases, Common spoken Language errors, Direct- Indirect speech, Phrasal Verbs, Active Passive Voice, clauses. written Communication & Formal Correspondence Important Tips, Role of Power point presentation Notice Writing, Circular Writing, Technical Report Writing, Business Letters, Job Application e-mail etiquettes. [6 Hrs]
Unit IV	<b>Importance of Soft Skills:</b> , Differentiate between hard and soft skills, Discipline specific skills Vs soft skills, Employability skills and its types, Learning & core values. The confidence grid, The power of thoughts, How Thoughts work, Anxiety, Decoding Self confidence, Self confidence cycle, Techniques, Protecting self Confidence, Building positive self Image, Affirmations. Presentation Skills, Group Discussion, Job Interviews [6 Hrs]
Unit V	<b>Time Management</b> , Time, Time Management, Need for time management, Benefits of time management, Obstacle of Time management, What can we do, How to use Time effectively, Set goals, Prioritize Work, Organizing the work, When to say No, Identifying, celebrating success. <b>Presentation Skills:</b> Important Tips, Role of Power point presentation. written Communication & Formal Correspondence Important Tips, Role of Power point presentation Notice Writing, Circular Writing, Technical Report Writing, Business Letters, Job Application e-mail etiquettes. [6 Hrs]
<b>Text Books</b>	
1	Effective Technical Communication, M Ashraf Rizvi, Tata McGraw-Hill Education, Second Edition/2005
<b>Reference Books</b>	
1	Technical Communication Principles and Practice, Meenakshi Raman, Sangeeta Sharma Oxford University Press Third Edition/ 2015
2	Professional Communication Skills, S. Chand, Fifth Edition/ 2011
3	High School English Grammar and Composition, Wren & Martin, S Chand, 2008
4	How to Develop Self-Confidence & Influence People by Public Speaking, Dale Carnegie, Simon & Schuster, Inc. 1956
	Soft skills - Know yourself and know the world - Dr. K. Alex, 2009, S. Chand Publication.
<b>Useful links</b>	
1	<a href="https://www.youtube.com/watch?v=RtcXr0_201A">https://www.youtube.com/watch?v=RtcXr0_201A</a>
2	<a href="https://www.youtube.com/watch?v=4KDkHvvksAE">https://www.youtube.com/watch?v=4KDkHvvksAE</a>
3	Video: <a href="https://www.youtube.com/watch?v=4dr51N1jqRE">https://www.youtube.com/watch?v=4dr51N1jqRE</a>
4	Video: <a href="https://www.youtube.com/watch?v=bY5ChVDRLLus">https://www.youtube.com/watch?v=bY5ChVDRLLus</a>
5	Video: <a href="https://www.youtube.com/watch?v=bSx6Zg9Ibgw">https://www.youtube.com/watch?v=bSx6Zg9Ibgw</a>

### Contributions for syllabus designing:

Sr. No.	Name of the person	Designation	Organization
1	Prof. Veronica S.R.	Assistant Professor	JDCOEM
2	Prof. Sarika Dive	Assistant Professor	JDCOEM
3	Ms. Raksha Swami	Alumni	JDCOEM

## Sports and Physical Education

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I / Sem-II		Sports and Physical Education	0	2A	0	2

### Pre requisites for the course

1	Basic of Biology, Exercise Science, Health Promotion, Health Science, Kinesiology, Physical Education, Psychological Science or Social Work.
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### Prior Reading Material / useful links

1	ISPAD Clinical Practice Consensus Guidelines 2018: Exercise in children and adolescents with diabetes. Retrieved 11 25, 2020, from Wiley Online Library: <a href="https://onlinecourses.swayam2.ac.in/cec19_ed09/preview">https://onlinecourses.swayam2.ac.in/cec19_ed09/preview</a> <a href="https://onlinelibrary.wiley.com/doi/full/10.1111/pedi.12755">https://onlinelibrary.wiley.com/doi/full/10.1111/pedi.12755</a>
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### Course Outcomes:

Sr. No.	Course outcome number	CO statement
1	CO 1	Demonstrate basic skills associated with yoga activities including strength and flexibility, balance and coordination
2	CO 2	Apply physiological and biomechanical concepts related to skillful movement, movement patterns as per needs.
3	CO 3	Justify the need for physical activity, healthy foods, and sleep, as well as preventing illness and injury or managing chronic health conditions.
4	CO 4	Create relationships between diet and performance in sport, and between diet, exercise and health.

### Syllabus:

Course Contents	
Unit-I	<b>Yoga</b> Meaning and importance of Yoga, Introduction to Astanga Yoga, Yogic Kriyas (Shat Karma), Pranayama and its types, Active Lifestyle and stress management through Yoga [7 Hrs]
Unit-II	<b>Physical Education and Sports for Students with Special Needs</b> Concept of Disability and Disorder, Types of Disability, its causes & nature (Intellectual disability, Physical disability), Disability Etiquette, Aim and objectives of Adaptive Physical Education, Role of various professionals for students with special needs (Counselor, Occupational Therapist, Physiotherapist, Physical Education Teacher, Speech Therapist, and Special Educator) [7 Hrs]
Unit-III	<b>Physical Fitness, Wellness, and Lifestyle</b> Meaning & importance of Wellness, Health, and Physical Fitness, Components/Dimensions of Wellness, Health, and Physical Fitness, Traditional Sports & Regional Games for promoting wellness, Leadership

	through Physical Activity and Sports 5. Introduction to First Aid [8 Hrs]
Unit-IV	<b>Sports &amp; Nutrition</b> Concept of balanced diet and nutrition, Macro and Micro Nutrients: Food sources & functions, Nutritive & Non- Nutritive Components of Diet, Eating for Weight control – A Healthy Weight, The Pitfalls of Dieting, Food Intolerance, and Food Myths 5. Importance of Diet in Sports-Pre, During and Post competition Requirements [8 Hrs]
<b>Activities</b>	
1	Find out the following facts about your school and prepare a write-up. Periods allocated for physical education in your school? What do students do during physical education periods and How many students of a class actually participate in activities during such periods? What type of knowledge is provided by the teachers about the concerned games and sports related skills? What do the students do during these classes when they are left free?
2	Compare your write-up with the above objectives.
3	What will you do, if some of the objectives are not covered?
4	You must have observed some students not participating in physical education activities including sports in your College. Discuss with them and your peers how to ensure their participation in physical activities, individual and sports.
5	Prepare one Physical Education Card for any sport of choice in group.
6	Blog writing on recent trends in sports education.
7	Quiz Competition on adoption of new policies to enhance sports
8	PPT presentation on New emerging technologies used in sports.
9	Physical Fitness Test: SAI Khelo India Test, Brockport Physical Fitness Test (BPFT)
10	Proficiency in Games and Sports (Skill of any one IOA recognized Sport/Game of Choice)
11	Yogic Practices
12	Record File
13	Viva Voce (Health/ Games & Sports/ Yoga) Record File shall include:
	Practical-1: Fitness tests administration. (SAI Khelo India Test)
	Practical-2: Procedure for Asanas, Benefits & Contraindication for any two Asanas for each lifestyle disease.
	Practical-3: Any one IOA recognized Sport/Game of choice. Labelled diagram of Field & Equipment. Also, mention its Rules, Terminologies & Skills.
<b>Text Books</b>	
1	Kansal, D. (2008). Text Book of Applied Measurement & Evaluation & Sports. New Delhi: Sports & Spiritual Science Publications.
2	Chakraborty, S. (2007). Sports Management. Delhi: Prerna Prakashan.
3	Kamlesh, M. (2005). Methods in Physical Education. Delhi: Friends Publications
4	Shaw, D., & Kaushik, S. (2010). Lesson Planning – Teaching Methods and Management in Physical Education. Delhi: Khel Sahitya Kendra
5	Anspaugh, D., & Ezell, G. (2003). Teaching today's Health. USA: Allyn & Bacon
<b>Reference Books</b>	
1	Thompson, & Floyd. (2017). Manual of Structural Kinesiology. Mc Graw Hil.

2	Weinberg. R.S, Gould. D “Foundations of Sport and Exercise Psychology” Human Kinetics, Champaign. USA, 2003
3	Muller, J. (2007). Health, Exercise and Fitness. New Delhi: Sports Publication
<b>Useful links</b>	
1	<a href="https://onlinecourses.swayam2.ac.in/cec19_ed09/preview">https://onlinecourses.swayam2.ac.in/cec19_ed09/preview</a>
2	<a href="https://onlinelibrary.wiley.com/doi/full/10.1111/pedi.12755">https://onlinelibrary.wiley.com/doi/full/10.1111/pedi.12755</a>
3	<a href="https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/48">https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/48</a>

**Contributions for syllabus designing:**

<b>Sr. No.</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Dr. Namrata Pradnyakar	Associate Professor	JDCOEM
2	Prof. Mohammad Hassan	Asst Professor	JDCOEM



## Constitution of India

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year /Sem I/ Sem-II		Constitution of India	2	0	0	Audit

### Prerequisites for the course

1	To make the students aware of the Constitution of India. The students will be able to acknowledge the fundamental rights and fundamental duties of the citizens of India
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### Prior Reading Material/ useful links

1	<a href="https://archive.nptel.ac.in/courses/129/106/129106003/">https://archive.nptel.ac.in/courses/129/106/129106003/</a>
2	<a href="https://www.digimat.in/nptel/courses/video/129106003/L05.html">https://www.digimat.in/nptel/courses/video/129106003/L05.html</a>

### Course Outcomes:

Sr. No.	Course outcome number	CO statement
1	CO 1	Understand the role of constitution in democratic India.
2	CO 2	Know and understand their fundamental rights and duties
3	CO 3	Identify the democratic functions of the government of India
4	CO 4	Have a better understanding of system of governance for effective participation.
5	CO 5	To Understand the powers and functions of President.

### Syllabus:

Course Contents	
Unit I	Introduction to Constitution of India, Preamble to the Indian Constitution, Concept of State, Salient features and characteristics of the Constitution of India, <b>[6 Hrs]</b>
Unit II	Scheme of the Fundamental Rights and Duties, The Directive Principles of State Policy – Its importance and implementation, Federal structure and distribution of legislative and financial powers between the Union and the States. <b>[6 Hrs]</b>
Unit III	Parliamentary Form of Government in India – The constitution powers and status of the President of India, Legislature: composition and functions and powers, union list state list and concurrent list, Citizenship of India. <b>[6 Hrs]</b>
Unit IV	Judiciary: Structure, role with special reference to PIL, writ petitions, strengthening of democracy & social justice, <b>Bill</b> : procedure, types, Amendment of the Constitutional Powers and Procedure <b>[6Hrs]</b>
Unit V	Emergency Provisions: National Emergency, President Rule, Financial Emergency, Judiciary: Structure, role with special reference to PIL, writ

	petitions, strengthening of democracy & social justice [6 Hrs]
<b>Text Books</b>	
1	An Introduction to Constitution of India, Durga Das Basu, 22nd Edition, LexisNexis.
2	Indian Polity, M. Laxmikant, 5th Edition, McGraw Hill
<b>Reference Books</b>	
1	Constitutional Law of India, J.N Pande 51st Edition, Central Law Agency, Allahabad.
<b>Useful links</b>	
1	<a href="https://archive.nptel.ac.in/courses/129/106/129106003/">https://archive.nptel.ac.in/courses/129/106/129106003/</a>
2	<a href="https://www.digimat.in/nptel/courses/video/129106003/L05.html">https://www.digimat.in/nptel/courses/video/129106003/L05.html</a>

**Contributions for syllabus designing:**

Sr. No.	Name of the person	Designation	Organization
1	Mrs. Sarika Dive.	Assistant Professor	JDCEM
3	Ms. Raksha Swami	Alumni	JDCEM



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**Affiliated to DBATU, RTMNU & MSBTE Mumbai**  
**Basic Science and Humanities Department**



VISION	MISSION
To lay a robust foundation for the institute to reach its zenith.	<ol style="list-style-type: none"><li>1. Achieving academic excellence through rigorous teaching, learning and evaluation practices.</li><li>2. To develop an ability to apply knowledge of basic science and mathematics to excel in the field of engineering.</li><li>3. To provide salutary environment for the betterment of faculty and students.</li></ol>

### Linear Algebra & Complex Analysis

Semester	Course Code	Name of the course	L	T/A	P	Credits
B. Tech First Year/Sem-I		<b>Linear Algebra &amp; Complex Analysis</b>	2	1	0	3

Pre requisites for the course	
1	Basic of Mathematics such as arithmetic, integration, derivative, sets, basics of probability and vectors.

Prior Reading Material/useful links	
1	Mathematics and Statistics Part I standard 12 (Text book by Maharashtra state board)
2	<a href="https://onlinecourses.swayam2.ac.in/nce19_sc11">https://onlinecourses.swayam2.ac.in/nce19_sc11</a>
3	<a href="https://www.youtube.com/watch?v=XLWtqMFMJSw">https://www.youtube.com/watch?v=XLWtqMFMJSw</a>

#### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Describe concept of complex numbers, integral calculus & multiple integrals, probability and distribution theory.
2	CO2	Illustrate the concept of complex numbers, integral calculus & multiple integrals, probability and distribution theory by using examples.
3	CO3	Apply the knowledge of complex numbers, integral calculus & multiple integrals, probability and distribution theory to solve the engineering problems.
4	CO4	Analyze the problems and results of complex numbers, integral calculus & multiple integrals, probability and distribution theory to solve the real world problems.
5	CO5	Evaluate the problems by using complex numbers, integral calculus &

		multiple integrals, probability and distribution theory.
6	CO6	Create the methods or model by using complex numbers, integral calculus & multiple integrals, probability and distribution theory.

<b>Course Contents</b>	
Unit-I	<p><b>Advance Linear Algebra</b> Determinants &amp; Matrix, Rank of Matrix, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem, Reduction to Diagonal form. [6 Hrs]</p>
Unit-II	<p><b>Ordinary Differential Equations</b> Linear equations; Reducible to linear equations (Bernoulli's equation); exact differential Equations; Equations reducible to exact equations; [6 Hrs]</p>
Unit-III	<p><b>Statistics</b> Fitting of straight line <math>y = a + bx</math>, parabola <math>y = a + bx + cx^2</math> and Exponential curves by method of least squares, Line of regression and correlation, Rank correlation, application of Statistics for Engineering. [6Hrs]</p>
Unit-IV	<p><b>Complex Numbers</b> Definition and geometrical representation; Roots of complex numbers by using De-Moivre's theorem; Circular functions of Complex variable – definition; Hyperbolic functions; Relations between circular And hyperbolic functions; Logarithm of Complex quantities. [6Hrs]</p>
Unit-V	<p><b>Functions of complex variables</b> Analytic functions; Harmonic functions in Cartesian form; fundamental theorem of algebra; Cauchy's integral theorem; Cauchy's integral formula; Residues; Cauchy's residue theorem. [6 Hrs]</p>
<b>Text Books</b>	
1	Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2	Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
3	A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledge, Mumbai.
4	A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5	Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.
<b>Reference Books</b>	
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., New Delhi.

<b>Useful links</b>	
1	<a href="https://archive.nptel.ac.in/courses/111/105/111105122/">https://archive.nptel.ac.in/courses/111/105/111105122/</a>
2	<a href="https://nptel.ac.in/courses/111105122">https://nptel.ac.in/courses/111105122</a>
3	<a href="https://archive.nptel.ac.in/courses/111/105/111105090/">https://archive.nptel.ac.in/courses/111/105/111105090/</a>

**Contributions for syllabus designing:**

<b>Sr. No</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Mr. Sagar S Kathalkar	Assistant Professor	JDCOEM
2	Mrs. Prerna Parkhi	Assistant Professor	JDCOEM
3	Mr. Santosh Hedau	Assistant Professor	JDCOEM
4	Mrs. Leena Bhoyar	Assistant Professor	JDCOEM
5	Mrs. Sana Anjum	Assistant Professor	JDCOEM
6	Dr. Rohit Patne	Assistant Professor	JDCOEM
7	Mr. Sudhanshu Purushe	Alumni	JDCOEM

## Advanced Chemistry

Semester	Course Code	Name of the course	L	T/A	P	Credits
B. Tech First Year/Sem I/ Sem II		<b>Advanced Chemistry</b>	2	1A	0	3

### Pre requisites for the course

1	Basic of chemistry such as Ion exchange, atomic configurations, polymers
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### Prior Reading Material/useful links

1	Introduction to Polymer Science and Chemistry, A Problem-Solving Approach, Second Edition by Manas Chanda
2	<a href="https://www.youtube.com/watch?v=bka20Q9TN6M">https://www.youtube.com/watch?v=bka20Q9TN6M</a>
3	<a href="https://www.youtube.com/watch?v=k3rRrl9J2F4">https://www.youtube.com/watch?v=k3rRrl9J2F4</a>

### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Describe various properties of water, Describe types of fuel, refining of Petroleum, orbital, electronic configuration, nonmaterial and polymers ,energy levels, spectroscopic technique
2	CO2	Interpret the various classification of fuel, various sources of water, refining of petroleum, classification of CNT, various properties of nonmaterial and polymers, ionization energies
3	CO3	Apply the Knowledge of characteristics of good fuel, Synthesis of nonmaterial, liquid crystal polymers, zeolite process, Ion exchange process, Hot Lime –Soda process, acid base concept, spectroscopic techniques
4	CO4	Analyze the question on Proximate and Ultimate analysis of coal, potential use of nonmaterial, phases of thermotropic polymers , analyze question on water characteristics
5	CO5	Estimate a Modal on commercial grading of coal,synthesis of nonmaterial, advanced polymers, spectroscopic technique , doping
6	CO6	Organize coal, water as per quality ,energy level diagram of diatomic molecules ,nonmaterial and polymers.

### Syllabus:

Course Contents	
Unit-I	<b>Water Treatment</b> Introduction, types of hardness; Industrial treatment of water , 1) lime soda process 2) 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) Priming and Foaming. Conditioning of

	water :1) Carbonate 2) Calgon 3) Phosphate .Domestic Treatment of drinking water [6 Hrs]
Unit-II	<b>Nanomaterials</b> 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 [5 Hrs]
Unit-III	<b>Periodic Properties</b> 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 electro negativity, polarizability, oxidation states, hard soft acids and bases [6 Hrs]
Unit-IV	<b>A) Atomic and molecular structure:</b> Molecular orbitals of diatomic molecules and plots of the multi center orbitals. Equations for atomic and molecular orbital. Energy level diagrams of diatomic(hydrogen and oxygen) Formation of wave function ( hydrogen ) , Benzene structure <b>B) Energy:-</b> Introduction, Analysis of coal-Proximate analysis, liquid fuel-Refining of Crude oil and Gaseous fuel, Combustion Calculation [7 Hrs]
Unit-V	<b>A) Advanced Polymeric Materials :-</b> liquid crystal polymers (thermotropic and lyotropic), phases of thermotropic polymers: nematic, smectic, cholesteric; advantages, disadvantages and applications <b>B) Spectroscopic Techniques and Applications:-</b> UV spectroscopy :- Introduction, Beers Lamberts law, Types of transition, concept of auxochrome and chromophore NMR spectroscopy :- Instrumentation , Number of signals (Equivalence and Non - equivalent Protons) , Solvents used in NMR, Chemical shift, Application of NMR spectroscopy [6 Hrs]
<b>Text Books</b>	
1	Textbook 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, DanielL. Schodek, Elsevier, First/2013
<b>Reference Books</b>	
1	Engineering Chemistry, P.C.Jain And MonikaJain, Dhanpatrai Publishing Company Ltd., 15 <sup>th</sup> 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 Agent le Introduction to the Next big Idea,Mark Ratner, Daniel Ratner, Pearson, First/2017
<b>Useful links</b>	
1	<a href="https://nptel.ac.in/courses/105106119/">https://nptel.ac.in/courses/105106119/</a> (time : from 19.55 to 38.05)
2	<a href="https://nptel.ac.in/courses/103103026/pdf/mod4.pdf">https://nptel.ac.in/courses/103103026/pdf/mod4.pdf</a>

3	<a href="https://www.youtube.com/watch?v=EnKDEECa7Z4">https://www.youtube.com/watch?v=EnKDEECa7Z4</a> (time:from 0.43 to 9.50)
3	<a href="https://nptel.ac.in/courses/105/106/105106119/12">https://nptel.ac.in/courses/105/106/105106119/12</a> (time:from 5.45 to 11.39)
	<a href="https://www.youtube.com/watch?v=pJNmscxBe2U">https://www.youtube.com/watch?v=pJNmscxBe2U</a>

**Contributions for syllabus designing:**

<b>Sr. No</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Dr Amit N Gupta	Associate Professor	JDCEM
2	Miss Priyanka Trivedi	Assistant Professor	JDCEM
3	Ms. Raksha Swami	Alumni	JDCEM



### Advanced Chemistry Lab

Semester	Course Code	Name of the course	L	T/A	P	Credits
B. Tech First Year/ Sem I/Sem II		<b>Advanced Chemistry Lab</b>	0	0	2	1

Pre requisites for the course	
1	Basic of chemistry such as titration , concentration of solution , basic knowledge of solution preparation

Prior Reading Material/useful links	
1	Introduction to Engineering Chemistry Lab , By S. Chand publishing house
2	<a href="https://www.youtube.com/watch?v=bka20Q9TN6M">https://www.youtube.com/watch?v=bka20Q9TN6M</a>
3	<a href="https://www.youtube.com/watch?v=k3rRr19J2F4">https://www.youtube.com/watch?v=k3rRr19J2F4</a>

#### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Recall hardness of water, acid value, saponification number of oils
2	CO2	Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3	CO3	Enhance the comprehensibility of the practical concepts and their application.
4	CO4	Apply the analytical techniques to the experimental data
5	CO5	Making judgments based on criteria and standards through checking and critiquing
6	CO6	Design and apply the practical knowledge of engineering chemistry in daily life.

#### Syllabus:

Course Content	
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)
7	Surface tension: Determination of relative surface tension of liquid with respect to water using drop number method.
8	Viscosity: Determination of relative viscosity of liquid with respect to water using Ostwald's viscometer method.
7	To determine the normality in Normal term and Strength in gms/lit of HCl

	solution by titrating with Na <sub>2</sub> CO <sub>3</sub> solution.
8	To find out Normality, Normality and Strength of the given KMnO <sub>4</sub> solution by titrating against N/10 Mohr's solution.
9	Determination of Acid value of an oil sample.
10	Determination of Saponification value of an oil sample.
11	Verification of Beer-Lambert Law
12	To determine the heat of neutralisation of strong acid by strong base
13	To determine chemical parameters such as hardness, alkalinity, and chemical oxygen demand (COD) of water samples.
14	Determination of Viscosity of Organic Solvents
15	To determine the amount of substance in a solution of unknown concentration using various titrimetric methods. (pH)
16	To determine the amount of substance in a solution of unknown concentration using various titrimetric methods. (Conductometer)
<b>Reference Books</b>	
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>Usefull Links</b>	
1	<a href="https://nptel.ac.in/courses/105106119/">https://nptel.ac.in/courses/105106119/</a> (time:from 19.55 to 38.05)
2	<a href="https://nptel.ac.in/courses/103103026/pdf/mod4.pdf">https://nptel.ac.in/courses/103103026/pdf/mod4.pdf</a>
3	<a href="https://www.youtube.com/watch?v=EnKDEECa7Z4">https://www.youtube.com/watch?v=EnKDEECa7Z4</a> (time:from 0.43 to 9.50)
4	<a href="https://nptel.ac.in/courses/105/106/105106119/12">https://nptel.ac.in/courses/105/106/105106119/12</a> (time:from 5.45 to 11.39)
5	<a href="https://www.youtube.com/watch?v=pJNmscxBe2U">https://www.youtube.com/watch?v=pJNmscxBe2U</a>

**Contributions for syllabus designing:**

Sr. No	Name of the person	Designation	Organization
1	Dr Amit N Gupta	Associate Professor	JDCEM
2	Miss Priyanka Trivedi	Assistant Professor	JDCEM
3	Ms. Raksha Swami	Alumni	JDCEM

## Engineering Graphics & Design

Semester	Course Code	Name of the course	L	T/A	P	Credits
B. Tech First Year/ Sem I/Sem II		<b>Engineering Graphics &amp; Design</b>	1	0	0	1

### Pre requisites for the course

1	Basic of Drawing such as dimensions, scale, angle, projection
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### Prior Reading Material/useful links

1	Engineering Graphics, A. R. Bapat, Allied Publishers, 2004.
2	<a href="https://www.youtube.com/watch?v=z4xZmBpXIzQ">https://www.youtube.com/watch?v=z4xZmBpXIzQ</a>
3	<a href="https://www.youtube.com/watch?v=Dy98ueJJBW4">https://www.youtube.com/watch?v=Dy98ueJJBW4</a>

### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Define various concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient.
2	CO2	Interpret drawings of simple machine component in first and third angle of projection systems
3	CO3	Apply theory of projections in projection of lines, projection of planes and projection of solid.
4	CO4	Classify solid geometry in different positions.
5	CO5	Assess the two dimensional and three dimensional drawing in CAD software.

### Syllabus:

Course Contents	
Unit-I	Theory of CAD software, Demonstration knowledge, layout of the software, standard tool bar/menus and description of most commonly used tools bars, Navigational tools. Creation of 2D/3D environment. Commands and creation of co-ordinate points, lines, axes, polyline, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, offset, mirror, rotate, trim, extend, break, chamfer, fillet, zoom, pan, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, lettering. Line properties, 3D modeling & topology of engineering component. [3 Hrs]
Unit-II	Drawing standard SP: 46, type of lines, lettering, dimensioning. Basic geometrical construction, drawing of regular polygon, Theory of projection, introduction to orthographic projection, drawing of orthographic views of objects from their isometric views by using first angle method of projection. [3 Hrs]
Unit-III	Projection of point lying in four quadrants. Projections of lines parallel and perpendicular to one or both planes, projections of lines inclined to one or both

	reference planes. [3 Hrs]
Unit-IV	Projections of planes parallel and perpendicular to one or both planes, projection of planes inclined to one or both planes. Types of solids, Projection of solid when axis is perpendicular to one of the reference planes, when axis is inclined to one and parallel to other reference plane, when axis is inclined to both the reference planes [3 Hrs]
Unit-V	Isometric projections: Isometric scale, drawing of isometric projections from given orthographic views. [3 Hrs]
<b>Text Books</b>	
1	N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 46th Edition, 2003.
2	Dhananjay A. Jolhe, Engineering Drawing with an Introduction to AutoCAD, McGraw Hill Education, 2017
<b>Reference Books</b>	
1	K. V. Natarajan, A text book of Engineering Graphic, Dhanalakshmi Publishers, Chennai, 2006.
2	K. Venugopal and V. Prabhu Raja, Engineering Graphics, New Age International (P) Ltd, 2008.
3	Engineering Drawing, R. K. Dhawan, S. Chand Publication, 1998.
<b>Useful links</b>	
1	<a href="https://nptel.ac.in/courses/112103019/1">https://nptel.ac.in/courses/112103019/1</a>
2	<a href="https://nptel.ac.in/courses/112103019/3">https://nptel.ac.in/courses/112103019/3</a> <a href="https://www.youtube.com/watch?v=EnKDEECa7Z4">https://www.youtube.com/watch?v=EnKDEECa7Z4</a>
3	<a href="https://www.youtube.com/watch?v=cErccoHui9g&amp;pbjreload=10">https://www.youtube.com/watch?v=cErccoHui9g&amp;pbjreload=10</a>

**Contributions for syllabus designing:**

Sr. No	Name of the person	Designation	Organization
1	Dinesh Yelure	Assistant Professor	JDCOEM
2	Rejendra Dhandre	Assistant Professor	JDCOEM

## Engineering Graphics & Design Lab

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech.First Year /Sem I /Sem II		Engineering Graphics & Design Lab	0	0	4	2

### Pre requisites for the course

1	Basic of Drawing such as dimensions, scale, angle, projection
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### Prior Reading Material/useful links

1	Engineering Graphics, A. R. Bapat, Allied Publishers, 2004.
2	<a href="https://www.youtube.com/watch?v=z4xZmBpXIzQ">https://www.youtube.com/watch?v=z4xZmBpXIzQ</a>
3	<a href="https://www.youtube.com/watch?v=Dy98ueJJBW4">https://www.youtube.com/watch?v=Dy98ueJJBW4</a>

### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Define basic structure of CAD workstation, CAD commands, Memory types, input/output devices and display devices to become professionally efficient to operate CAD software.
2	CO2	Explain drawing of simple machine component in CAD software.
3	CO3	Acquire the knowledge of geometric modeling in CAD software.
4	CO4	Analyze the steps required in CAD software for 2-dimensional and 3-dimensional models.
5	CO5	Assess the two dimensional and three dimensional drawing in CAD software.

### Syllabus:

#### List of Practical

1	Introduction of CAD software and to study and practice basic draw commands exists in the CAD software.
2	Lines, lettering and dimensioning. (Drafting work) Identify the different types of Lines in the given object, draw lettering and give the Required dimensions in the given object.
3	Geometric Construction. (Drafting work)
4	Orthographic projections first sheet. (Using CAD software)
5	Orthographic projections second sheet. (Using CAD software)
6	Projections of straight lines. (Drafting work)
7	Projections of planes & solids. (Drafting work)
8	Isometric Projections first sheet. (Using CAD software)
9	Isometric Projections second sheet. (Using CAD software)
10	Design of basic hardware components using CAD Software.
11	Design of advance hardware components using CAD Software.
12	Design of assembly drawing using CAD Software.
13	Design of assembly drawing with animation and rendering using CAD Software.

<b>Text Books</b>	
1	N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 46th Edition, 2003.
2	Dhananjay A. Jolhe, Engineering Drawing with an Introduction to AutoCAD, McGraw Hill Education, 2017
<b>Reference Books</b>	
1	K. V. Natarajan, A text book of Engineering Graphic, Dhanalakshmi Publishers, Chennai, 2006.
2	K. Venugopal and V. Prabhu Raja, Engineering Graphics, New Age International (P) Ltd, 2008.
3	Engineering Drawing, R. K. Dhawan, S. Chand Publication, 1998.
<b>Useful links</b>	
1	<a href="https://nptel.ac.in/courses/112103019/1">https://nptel.ac.in/courses/112103019/1</a>
2	<a href="https://nptel.ac.in/courses/112103019/3">https://nptel.ac.in/courses/112103019/3</a> <a href="https://www.youtube.com/watch?v=EnKDEECa7Z4">https://www.youtube.com/watch?v=EnKDEECa7Z4</a>
3	<a href="https://www.youtube.com/watch?v=cErccoHui9g&amp;pbjreload=10">https://www.youtube.com/watch?v=cErccoHui9g&amp;pbjreload=10</a>

**Contributions for syllabus designing:**

Sr. No	Name of the person	Designation	Organization
1	Dinesh Yelure	Assistant Professor	JDCEM
2	Rejendra Dhandre	Assistant Professor	JDCEM

## Basic Civil and Mechanical Engineering

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech.First Year /Sem I /Sem II		Basic Civil and Mechanical Engineering	2	0	0	2

### Pre requisites for the course

1	Basic of civil and mechanical Engineering such as casting, designing and construction techniques
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### Prior Reading Material/useful links

1	Basics of Civil and Mechanical Engineering Paperback by Rajesh Kumar R, Binu <a href="https://www.iimtindia.net/Blog/civil-engineering-v-s-mechanical-engineering/">https://www.iimtindia.net/Blog/civil-engineering-v-s-mechanical-engineering/</a>
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### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Define basic stream of Mechanical & Civil Engineering.
2	CO2	Explain the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3	CO3	Apply Basic knowledge of Casting, Machining, Designing, Manufacturing & Civil Construction technique.
4	CO4	Analyzed the different mechanical system and properties of construction & surveying material.
5	CO5	Interpret the problem in mechanical system and civil structure.

### Syllabus:

Course Contents	
Unit-I	Introduction To Civil Engineering Various branches introduction to civil engineer in various construction activities basic engineer properties and various materials: earth bricks timber, stone, sand Aggregate cement moter steel bituminous glass FRP composite material <b>[4 Hrs]</b>
Unit-II	Building Component And Planning Material Foundation and superstructure function of foundation type of shallw and deep foundation suitability in different situation plinth wall lintels beam column slab roof staircase floor door window and study of building plans ventilation and basic plumbing and sanitation <b>[4 Hrs]</b>
Unit-III	Surveying Principal of surveying element of distance angular measurement plotting of area base line and off set introduction of plane table survey introduction to leveling concept of bench mark reduce level and counting <b>[4 Hrs]</b>
Unit-IV	Introduction to Mechanical Engineering, Introduction to Laws of Thermodynamics with simple examples pertaining to respective branches, IC Engines: Classification, Applications, Basic terminology, 2 and 4 stroke IC

	engine working principle, Power Plant: Types of Power plant; Gas power plant, Thermal power plant, Nuclear power plant, Automobiles: Basic definitions and objectives [6 Hrs]
Unit-V	Design Basics, Machine and Mechanisms, Factor of safety, Engineering Materials: types and applications, basics of fasteners, machining and machinability. Introduction to lathe machine, drilling machine, milling machine, basics of machining processes such as turning, drilling and milling. Introduction to casting [6 Hrs]
<b>Text Books</b>	
1	Anurag Kandy, "Elements of Civil Engineering", Charotar Publishing, Anand
2	M. S. Palani Gamy, "Basic Civil Engineering", Tata Mc-Graw Hill Publication
<b>Reference Books</b>	
1	M. G. Shah, C. M. Kale, and S. Y. Patki, "Building Drawing", Tata McGraw Hill
2	K. Venugopal and V. Prabhu Raja, Engineering Graphics, New Age International (P) Ltd, 2008.
3	P. K. Nag "Engineering Thermodynamics", Tata McGraw Hill, New Delhi 3rd ed. 2005
<b>Useful links</b>	
1	<a href="https://nptel.ac.in/courses/112103019/1">https://nptel.ac.in/courses/112103019/1</a>
2	<a href="https://www.digimat.in/nptel/courses/video/105104101/L01.html">https://www.digimat.in/nptel/courses/video/105104101/L01.html</a>
3	<a href="https://www.youtube.com/watch?v=cErccoHui9g&amp;pbjreload=10">https://www.youtube.com/watch?v=cErccoHui9g&amp;pbjreload=10</a>

**Contributions for syllabus designing:**

Sr. No	Name of the person	Designation	Organization
1	Mr. I. S. Khan	Assistant Professor	JDCEM
2	Mr. A. I. Kuddus	Assistant Professor	JDCEM
3	Mr. Chaitanya Sahare	Alumni	JDCEM



## Energy and Environment Engineering

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech. First Year / Sem I/Sem II		Energy and Environmental Engineering	2	1A	0	3

### Pre requisites for the Course

1	Basics of Science such as air pollution, water pollution, energy Conservation.
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### Prior Reading Material/ useful links

1	Textbook of Renewable Energy (Woodhead Publishing India in Energy). by S.C. Bhatia and R. K. Gupta
2	<a href="https://nptel.ac.in/courses/105107176">https://nptel.ac.in/courses/105107176</a>
3	<a href="https://www.digimat.in/nptel/courses/video/105107176/L01.html">https://www.digimat.in/nptel/courses/video/105107176/L01.html</a>

### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Describe different kind of pollution eg. Water pollution, air pollution, soil pollution etc.
2	CO2	Understand the importance of ecosystem for human beings.
3	CO3	Discover innovative method of power generation.
4	CO4	Correlate the cost of various method of power generation.
5	CO5	Judge the quality of air.

### Syllabus:

Course Contents	
Unit-I	Air Pollution: Environment and Human health - Air pollution, Particulate emission: sources- effects- control measures -, air quality standards, and measurement of air pollution. Disposal of solid wastes, Bio-medical wastes effects- control measures <b>[4 Hrs]</b>
Unit-II	Water Pollution and Conservation: Water pollution- types of pollutants, effects control measures, Water conservation and its methods, rainwater harvesting, methods of rainwater harvesting Surface runoff harvesting, Rooftop rainwater harvesting, Noise pollution –effects and control measures,-Thermal pollution Soil pollution –Nuclear hazard. <b>[4 Hrs]</b>
Unit-III	Conventional Power Generation: Steam power station, Nuclear power plant - Gas turbine power plant- Hydro power station: Schematic arrangement, advantages and disadvantages, Thermo electric and thermionic generators, Environmental aspects for selecting the sites and locations of power plants. <b>[4 Hrs]</b>
Unit-IV	Renewable Power Generation: Solar, Wind, Biogas and Biomass, Ocean Thermal energy conversion (OTEC), Tidal, Geothermal energy, Magneto Hydro Dynamics (MHD): Schematic arrangement, advantages and disadvantages.

	<b>[4 Hrs]</b>
Unit-V	Energy conservation: Scope for energy conservation and its benefits Energy conservation Principle – Maximum energy efficiency, Maximum cost effectiveness, Methods and techniques of energy conservation in ventilation and air conditioners, refrigerator, compressors, pumps, fans and blowers, Energy conservation in electric furnaces, ovens and boilers, lighting techniques. Triffs and economic aspects in power generation. <b>[4 Hrs]</b>
<b>Text Books</b>	
1	A Chakrabarti, M. L Soni, P. V. Gupta, U. S. Bhatnagar, A Text book of Power System Engineering, Dhanpat Rai Publication.
2	Rai. G. D., Non-Conventional Energy Sources, Khanna Publishers, Delhi, 2006.
<b>Reference Books</b>	
1	Rao S., Parulekar B.B., Energy Technology-Non conventional, Renewable And Conventional, Khanna Publishers, Delhi, 2005.
2	Glynn Henry J., Gary W. Heinke, Environmental Science and Engineering, Pearson Education, Inc, 2004.
3	J. M. Fowler, Energy and the Environment, McGraw-Hill, 2 nd Edition, 1984.
<b>Useful links</b>	
1	<a href="https://www.youtube.com/watch?v=kXCFFupDK0g">https://www.youtube.com/watch?v=kXCFFupDK0g</a>
2	<a href="https://www.youtube.com/watch?v=kXCFFupDK0g&amp;list=PLgzsL8klq6DIOpwb57vb_ha_IUyNKRUYs">https://www.youtube.com/watch?v=kXCFFupDK0g&amp;list=PLgzsL8klq6DIOpwb57vb_ha_IUyNKRUYs</a>

**Contributions for syllabus designing:**

<b>Sr. No</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Dr. B.P. Ilamkar	Assistant Professor	JDCOEM
2	Dr. U.V. Rathod	Assistant Professor	JDCOEM
3	Mr. Chaitanya Sahare	Alumni	JDCOEM

### Concept of Manufacturing (ME)

Semester	Course Code	Name of the course	L	T/A	P	Credits
II SEM		Concepts of Manufacturing	2	0	0	2

Pre requisites for the course	
1	Basic knowledge of material science.
2	Basic Knowledge of different manufacturing processes.

Prior Reading Material/useful links	
1	<a href="https://www.digimat.in/nptel/courses/video/113102080/L01.html">https://www.digimat.in/nptel/courses/video/113102080/L01.html</a>
2	<a href="https://www.digimat.in/nptel/courses/video/112107145/L01.html">https://www.digimat.in/nptel/courses/video/112107145/L01.html</a>

#### Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	<b>Define</b> various types of materials, their properties, heat treatment processes and powder metallurgy process.
2	CO2	<b>Identify</b> different castings, working principles and applications.
3	CO3	<b>Identify</b> different machine tool and it's working principles and applications.
4	CO4	<b>Classify</b> & describe different machine tool & it's processes.
5	CO5	<b>Able to know</b> advanced machining processes, various systems used in a manufacturing plant and their role in an Industry 4.0 world.

#### Syllabus:

Course Contents	
Unit-I	<b>Introduction to Engineering Materials</b> Introduction to engineering materials & classification, Crystal structures, Introduction to ferrous and non-ferrous alloys & applications, Classification of 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. Introduction to Heat treatment processes and its classifications, introduction to powder metallurgy process. <b>[6 Hours]</b>
Unit-II	<b>Introduction of Casting Process</b> What is manufacturing? Selection of manufacturing processes, Introduction to casting, Brief History, Advantages and Limitations, Applications. Pattern Making & Moulding, <b>[5 Hours]</b>
Unit-III	<b>Introduction to Machining Parameters</b> Introduction to Machining – Purpose, Principle and Definition; Introduction to Machine tool and its classification, cutting tool materials <b>[6 Hours]</b>

Unit-IV	<b>Introduction to Lathe, Milling, Shaper &amp; Planer</b> Lathes: Introduction, Types of Lathes, machine specifications, lathe Components, Introduction to milling, Milling and Milling Machines, Introduction Shaper & Planer: <b>[6 Hours]</b>
Unit-V	<b>Introduction to advanced machining processes</b> Non-conventional machining Processes: Introduction & classification, Introduction to Numerical Control (NC), Concept of Computer numerical control (CNC), Historical Development, DNC, Advantages & Limitations of CNC, Introduction to the various Industrial Revolutions, Industry 4.0: Globalization and Emerging Issues. <b>[7 Hours]</b>
<b>Text Books</b>	
1	V. D. Kodgire, S. V. Kodgire, "Material Science and Metallurgy for Engineers", Everest Publishing House, Pune, 24th edition, 2008.
2	V. Raghvan, "Material Science Engineering", Prentice Hall of India Ltd., 1992. Manufacturing Science – Ghosh & Malik.
3	Serope Kalpakjian and Steven R. Schmid, "Manufacturing Engineering and Technology", Addison Wesley Longman (Singapore) Pte. India Ltd., 6 <sup>th</sup> edition, 2009.

<b>Contributions for syllabus designing:</b>			
Sr. No	Name of the person	Designation	Organization
1	Dr. Sanjay L. Haridas	Dean Academics & BoS Member	JDCOEM, Nagpur
2	Prof. S. A. Rewatkar	Chairman, BoS	JDCOEM, Nagpur
3	Prof. R. P. Dhandre	BoS Member	JDCOEM, Nagpur

## Electrical Technology (EE)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Electrical Technology	2	0	0	2

### Pre requisites for the course

1	Basics of Electrical Engineering studied in First Semester in the subject BEEE such as current, voltage, power, etc.
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### Prior Reading Material/useful links

1	<a href="https://onlinecourses.nptel.ac.in/noc19_ee35/preview">https://onlinecourses.nptel.ac.in/noc19_ee35/preview</a>
2	Elements of Electrical sciences: P. Mukhopadhyay, N. Chand & Bros Roorkee (1989).

### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Remember the basic laws of electric and magnetic circuits also Define various A.C. and D.C Quantities
2	CO2	Understand and interpret the sinusoidal electrical quantities mathematically as well as graphically in the form of waveforms/phasors and illustrate the 1-phase/3-phase AC circuits.
3	CO3	Apply knowledge to calculate the power loss, voltage drop of electric and magnetic circuit also identify illumination required and the knowledge related with its need.
4	CO4	Analyze various electric, magnetic circuit and distinguish between properties
5	CO5	Evaluate lighting system, recommend various lighting as per requirement also able to Explain A.C. fundamentals.
6	CO6	Design lighting system and also able to give solutions on single phase and magnetic circuit unknown quantities.

**Syllabus:**

<b>Course Contents</b>	
Unit I	D. C. Circuits (Only Independent sources) Ohm's law, resistances in series and parallel, current and voltage division rules, Kirchhoff's law, ideal and practical voltage and current sources. Mesh and Nodal analysis (Super node and super Mesh excluded). Source transformation. Star delta transformation. <b>(6 Hours)</b>
Unit II	Electromagnetism Magnetic effect of electrical current, right hand thumb rule, Concepts of m.m.f, flux, flux density, reluctance, permeability and field strength Simple series and parallel magnetic circuits. , comparison between electrical and magnetic circuits , Faraday's law of electromagnetic induction, Fleming's right hand rule, statically and dynamically induced EMF's self and mutual inductance coefficient of coupling, energy stored in magnetic field. <b>(6 Hours)</b>
Unit III	A.C. Fundamentals Sinusoidal voltage and currents concept of cycle period, frequency, instantaneous, peak, average, r.m.s. values, peak factor , and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Study of A.C circuits of pure resistance, inductance and capacitance. <b>(6 Hours)</b>
Unit IV	Single phase A. C. circuits Single phase AC Circuits: Study of series and parallel R-L, R-C, R-L-C circuits, concept of impedance and admittance for different combinations, Concept of active, reactive, apparent, complex power and power factor, resonance in series and parallel RLC circuit. Q- factor and bandwidth. <b>(6 Hours)</b>
Unit V	Illumination and Electrical Energy Tariff Definitions of luminous flux, luminous intensity, candle power, illumination, luminance, Luminous efficiency (lumens/watt) of different types of lamps, working principle of Fluorescent/ Sodium Vapour/ Mercury vapour & CFL Lamps. Types of Tariff, One part (KWH based) tariff with smple numerical: (Students should be able to calculate the domestic electricity charges.) <b>(6 Hours)</b>
<b>Text Books</b>	
1	Electrical Technology: B. L. Thareja, S. Chand Publications.
2	Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P. P. H. Pvt. Ltd.
<b>Reference Books</b>	
1	V. N. Mittal and Arvind Mittal;, " Basic Electrical Engineering" McGraw Hill
2	Edward Hughes, " Electrical Technology, ", Pearson Education
<b>Useful links</b>	
1	<a href="https://onlinecourses.nptel.ac.in/noc19_ee35/preview">https://onlinecourses.nptel.ac.in/noc19_ee35/preview</a>

**Contributions for syllabus designing:**

Sr. No	Name of the person	Designation	Organization
1	Dr.V.S. Dhok	Assistant Prof.	JDCOEM, Nagpur
2	Mr.A.V. Joshi	Assistant Prof.	JDCOEM, Nagpur
3	Ms.S.V. Jethani	Assistant Prof.	JDCOEM, Nagpur

4	Mr. P. V. Ambade	Assistant Prof.	JDCOEM, Nagpur
5	Mr. J. S. Joshi	Professor (EE)	RKNEC, Nagpur
6	Dr. S. G. Tarnekar	Ex-Prof.	VNIT, Nagpur
7	Ms. Shreya Ramteke	Technical Recruiter	Collabera Pvt. Ltd. (Alumni batch JDCOEM, Nagpur )
8	Ms. Snehal Tembhurne	Business Development Executive	Byjus Pvt.Ltd. (Alumni JDCOEM, Nagpur )

## Digital Circuits & Microprocessor (ETC)

Semester	Course Code	Name of the course	L	T/A	P	Credits
II SEM		Digital Circuits & Microprocessor	2	-	-	2

Pre requisites for the course	
1	Basic Knowledge of logic gates and number system.

Prior Reading Material/useful links	
1	<a href="https://onlinecourses.nptel.ac.in/noc18_ec03/preview">https://onlinecourses.nptel.ac.in/noc18_ec03/preview</a>
2	<a href="https://www.youtube.com/watch?v=liRPtvj7bFU&amp;list=PL0E131A78ABFBFDD0">https://www.youtube.com/watch?v=liRPtvj7bFU&amp;list=PL0E131A78ABFBFDD0</a>

### Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	<b>Understand</b> the principles of Boolean algebra to manipulate, minimize logic circuits using logic gates and K-map.
2	CO2	<b>Construct</b> basic combinational circuits and verify their functionalities
3	CO3	<b>Apply</b> the design procedures to design basic sequential circuits
4	CO4	<b>Analyze</b> the interfacing concept of different programmable interfacing modules with microprocessors.
5	CO5	<b>Design</b> the assembly language program in microprocessors for simple arithmetic, logical, string and real time applications.

### Syllabus:

Course Contents	
Unit-I	Logic Simplification Logic Gates and Combinational Logic Optimization Techniques, Canonical forms of Boolean expression. Implementations of Boolean expressions using logic gate, Introduction to logic families & their characteristics such as Fan-In, Fan-out, Propagation delay, Power dissipation, Noise Margin <b>[6 Hours]</b>
Unit-II	Combinational Logic Design Comparators, Multiplexers, Demultiplexer, Encoder, Decoder, K-Map, half and full adders, Subtractors, Serial parallel adders, Barrel Shifter. <b>[5 Hours]</b>
Unit-III	Sequential Circuits Latches and flip-flops: SR-FF, D-FF, JK-FF, Master-Slave JK-FF & T-FF's, Excitation & Truth Table, Flip-flop conversions, Shift registers. Introduction to Synchronous Counters: Ring counter, Johnson counter. <b>[6 Hours]</b>
Unit-IV	Fundamentals of 8085 Microprocessor 8085 Microprocessor Architecture, Address, Data and Control Buses, 8085 Pin Functions, Demultiplexing of Buses, Generation of Control Signals, Instruction



	Cycle, Machine Cycles, T-States, Memory Interfacing. . [6 Hours]
Unit-V	Programming With 8085 Assembly Language Programming Basics, Classification of Instructions, Addressing Modes, 8085 Instruction Set, Instruction and Data Formats, Writing, Assembling, Executing & Debugging the Programs. [7 Hours]
<b>Text Books</b>	
1	An approach to digital Design: Morris Mano, Pearson Publications.
2	Microprocessor Architecture, Programming and Applications with the 8085: Ramesh Gaonkar, Penram International Publications.
3	Engineering Approach to Digital Design: W. Fletcher, PHI Publications
<b>Reference Books</b>	
1	Fundamentals of digital circuits: A. Anand Kumar, Prentice-Hall of India, 4 Edition.
2	Modern digital Electronics: R.P. Jain, Tata McGraw Hill, 4Edition.
3	Digital Electronic Principles: Malvino, PHI, 3Edition

**Contributions for syllabus designing:**

Sr. No	Name of the person	Designation	Organization
1	Dr.M. M.,Khanapurkar	BoS Member (Academician)	Cummins College of Engineering
2	Dr.K.M.Bhurchundi	BoS Member (VC Nominated)	VNIT, Nagpur
3	Mr.Ashish Khachane	BoS Member (Industry)	Intel India Pvt. Ltd. Bangalore
4	Mr.Amit Bhattacharya	Member (Alumni)	Evoluzn, India
5	Dr. Sanjay L.Haridas	Dean Academics &BoS Member	JDCOEM, Nagpur
6	Prof.Gayatri Bhoyar	Chairman, BoS	JDCOEM, Nagpur
7	Prof. M.Hassan	Secretary, BoS	JDCOEM, Nagpur
8	Prof.A.S.Sontakke	BoS Member	JDCOEM, Nagpur

### Basic Constructions Practices (CE)

Semester	Course Code	Name of the course	L	T/A	P	Credits
II		<b>Basic Construction Practices</b>	2	0	0	2

Pre-requisites 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	<a href="https://theconstructor.org/building/types-masonry-foundations-construction-uses/18989/">https://theconstructor.org/building/types-masonry-foundations-construction-uses/18989/</a>
2	<a href="https://civiljungle.com/building-components/">https://civiljungle.com/building-components/</a>
3	<a href="https://architectureideas.info/2013/07/stair-shapes/">https://architectureideas.info/2013/07/stair-shapes/</a>

Sr. No.	Course Outcome number	Course Outcome Statement
1	CO1	Understand the roles and responsibilities of construction professionals in the industry, including their involvement in project management, coordination, and quality control.
2	CO2	Demonstrate knowledge of the construction project life cycle, from site selection and evaluation to project completion, and understand the various stages and processes involved.
3	CO3	Develop proficiency in interpreting construction documentation and drawings, including architectural plans, engineering drawings, and specifications, to effectively communicate and execute construction projects.
4	CO4	Apply appropriate site preparation and excavation techniques, including site clearance, soil compaction, and stabilization methods, while considering surveying and leveling principles.
5	CO5	Identify and evaluate the properties and characteristics of common building materials, such as concrete, masonry, timber, steel, and composite materials, and make informed decisions regarding their selection and classification in construction projects.
6	CO6	Gain knowledge of construction techniques for foundations, framing systems, walls, roofing, flooring, and interior finishes, while understanding the importance of construction safety, sustainable practices, and environmental considerations throughout the construction process.

**Syllabus:**

<b>Course Content</b>	
Unit-I	<b>Introduction to Construction Practices</b> Overview of the construction industry, Roles and responsibilities of construction professionals, Construction project life cycle, Construction documentation and drawings, Construction safety and regulations.
Unit-II	<b>Site Preparation and Excavation</b> Site selection and evaluation, Site clearance and preparation, Excavation methods and techniques, Soil compaction and stabilization, Introduction to surveying and leveling
Unit-III	<b>Building Materials</b> Properties and characteristics of common construction materials, Classification and selection of building materials, Concrete and masonry materials, Timber, steel, and composite materials, Sustainable building materials.
Unit-IV	<b>Construction Techniques</b> Foundations and footings, Framing systems and structural elements, Wall construction techniques, Roofing and flooring systems, Finishing and interior works
Unit-V	<b>Construction Safety and Sustainable Practices</b> Construction site hazards and risk management, Personal protective equipment (PPE) and safety protocols, Environmental considerations in construction, Energy-efficient construction techniques, Waste management and recycling in construction.

<b>Text Books:</b>	
1	"Construction Management: Principles and Practice" by Chris March and Stephen J. Thomas
2	"Construction Materials, Methods and Techniques" by William P. Spence
3	"Building Construction: Principles, Materials, and Systems" by Madan Mehta, Walter Scarborough, and Diane Armpriest
4	Construction Drawings and Details for Interiors: Basic Skills" by Rosemary Kilmer and W. Otie Kilmer
5	Green Building: Principles and Practices in Residential Construction" by Abe Kruger and Carl Seville
<b>Reference Book:</b>	
1	Introduction to Surveying" by James M. Anderson and Edward M. Mikhail
2	Construction Safety and Health" by David L. Goetsch and William A. Hampton
3	Fundamentals of Building Construction: Materials and Methods" by Edward Allen and Joseph Iano
4	C.P.W.D.Schedule of Rates
5	Site Engineering for Landscape Architects" by Steven Strom and Kurt Nathan

**Contributions for syllabus designing:**

<b>Sr. No</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Ms. Atika Ingole	Asst.Prof.	JDCEM, Nagpur
2	Mr. N. Pal	Asst.Prof.	JDCEM, Nagpur
3	Ms.S. Navghare	Asst.Prof.	JDCEM, Nagpur

## Data Structure (CSE)

1	Basic knowledge of one programming language (C, C++).
2	Basic knowledge of common programming concepts, including loops, arrays, stacks, and recursion

Prerequisites for the course						
Semester	Course Code	Name of the course	L	T/A	P	Credits
II		Data Structure	2	0	0	2

Prior Reading Material/useful links	
1	<a href="https://www.tutorialspoint.com/data_structures_algorithms/index.htm">https://www.tutorialspoint.com/data_structures_algorithms/index.htm</a>
2	<a href="https://www.geeksforgeeks.org/data-structures/">https://www.geeksforgeeks.org/data-structures/</a>
3	<a href="https://www.javatpoint.com/data-structure-tutorial">https://www.javatpoint.com/data-structure-tutorial</a>

### Course Objectives:

1	To impart the basic concepts of data structures
2	Exploring basic data structures such as stacks queues.
3	To understand concepts about searching and sorting techniques.
4	To improve the logical ability.

### Course Outcomes:

Sr. No.	Course Outcome number	CO statement
1	CO1	To understand basic data structures, their implementation and some of their standard applications.
2	CO2	To describe basic data structures as arrays and array operation.
3	CO3	To analyze the types of data structures and its operations.
4	CO4	To apply linear data structures to various computing problems.
5	CO5	To develop programs for Sorting and Searching.

Course Contents	
Unit I	Introduction to Data Structure and Algorithms, Characteristics of algorithm, Need for Data Structures, Types of Data structures, Various Data structures operations, Time Complexity and Space Complexity, Applications of data structures. <b>[5 Hr]</b>
Unit II	Arrays: Introduction of Arrays, Linear arrays, Two dimensional Array, Multidimensional arrays, Representation array in memory, Operations on Array Data Structure. <b>[5 Hr]</b>

Unit III	Introduction to Stack, Definition, Stack Implementation, Operations of Stack, Applications of Stack: Polish Notation, Evaluation of postfix expression, Conversion of infix to postfix expression. [5 Hr]
Unit IV	Introduction to Queue, Types of queue, Queue Implementation, Operations of Queue, Applications of Queue [5 Hr]
Unit V	Searching and Sorting: Searching-linear and binary search methods Sorting-Selection sort, Bubble sort, Insertion sort comparison of sorting and searching methods. [5 Hr]

<b>Text Books</b>	
1	Mark Allen Weiss, —Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 1997.
2	Reema Thareja, —Data Structures Using C, Second Edition , Oxford University Press, 2011

<b>Reference Books</b>	
1	Langsam, M. J. Augenstein, A. M. Tanenbaum, Datab structures using C and C++, 2nd Edition, PHI Education, 2008.
2	Aho, Hopcroft and Ullman, —Data Structures and Algorithms, Pearson Education, 1983.
3	Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C, Second Edition, University Press, 2008.

**Contributions for syllabus designing:**

Sr. No.	Name of the person	Designation	Organization
1	Dr. Supriya Sawwashere	Assistant Professor	JDCEM
2	Mr. Yuvraj Suryavanshi	Assistant Professor	JDCEM

## Introduction to Artificial Intelligence (AI)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Introduction to Artificial Intelligence	2	0	0	2

### Prerequisites for the course

1	Basic knowledge of various mathematical concepts such as <b>probability, statistics, algebra, matrix, calculus, etc</b>
2	Basic knowledge of programming languages like <b>Python, R, LISP, Java, C++, Prolog, etc.</b>

### Prior Reading Material/useful links

1	<a href="https://www.javatpoint.com/artificial-intelligence-ai">https://www.javatpoint.com/artificial-intelligence-ai</a>
2	<a href="https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/">https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/</a>
3	<a href="https://www.simplilearn.com/tutorials/artificial-intelligence-tutorial">https://www.simplilearn.com/tutorials/artificial-intelligence-tutorial</a>

### Course Objectives

1	Gain a historical perspective of AI and its foundations.
2	Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
3	Investigate applications of AI techniques in intelligent agents, expert systems.
4	Explore the current scope, potential, limitations, and implications of intelligent systems.

### Syllabus:

Course Contents	
Unit I	Introduction, Definition, Future of Artificial Intelligence, Key components of AI, Types of AI, Characteristics of Intelligent Agents, Typical Intelligent Agents. <b>[5 Hr]</b>
Unit II	Problem solving Methods, Search Strategies-Uninformed, Informed, Heuristics, Local Search Algorithms and Optimization Problems, Searching with Partial Observations, Constraint Satisfaction Problems, Constraint Propagation. <b>[5 Hr]</b>
Unit III	Knowledge-Based Agent in Artificial intelligence, knowledge representation, Techniques of knowledge representation, Propositional logic, First-Order Logic, Forward Chaining, Backward Chaining. <b>[5 Hr]</b>
Unit IV	Software Agents Architecture for Intelligent Agents, Agent communication, Negotiation and Bargaining, Argumentation among Agents, Trust and Reputation in Multi-agent systems. <b>[5 Hr]</b>
Unit V	AI applications - Language Models, Information Retrieval, Information Extraction, Natural Language Processing, Machine Translation, Speech Recognition. <b>[5 Hr]</b>

<b>Text Books</b>	
1	S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach, Prentice Hall, Third Edition, 2009.
2	Artificial Intelligence: A Modern Approach, 4th Edition, Stuart Russell, peter Norvig University of California at Berkeley, Pearson education, 2020.

<b>Reference Books</b>	
1	M. Tim Jones, - Artificial Intelligence: A Systems Approach (Computer Science),
2	Nils J. Nilsson, - The Quest for Artificial Intelligence, Cambridge University Press, 2009.
3	David L. Poole and Alan K. Mackworth, - Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

<b>Useful Links</b>	
1	<a href="https://www.uc.edu/content/dam/uc/ce/docs/OLLI/Page%20Content/ARTIFICIAL%20INTELLIGENCEr.pdf">https://www.uc.edu/content/dam/uc/ce/docs/OLLI/Page%20Content/ARTIFICIAL%20INTELLIGENCEr.pdf</a>
2	<a href="https://nitsri.ac.in/Department/Computer%20Science%20&amp;%20Engineering/Introduction-To-AI(L-1).pdf">https://nitsri.ac.in/Department/Computer%20Science%20&amp;%20Engineering/Introduction-To-AI(L-1).pdf</a>
3	<a href="https://www.torontomu.ca/sciencerendezvous/SR2021/A_Brief_Introduction_To_AI.pdf">https://www.torontomu.ca/sciencerendezvous/SR2021/A_Brief_Introduction_To_AI.pdf</a>
4	<a href="https://www.cet.edu.in/noticefiles/271_AI%20Lect%20Notes.pdf">https://www.cet.edu.in/noticefiles/271_AI%20Lect%20Notes.pdf</a>



## R Programming CSE (DS)

Semester	Course Code	Name of the course	L	T	P	Credits
II		R Programming	2	0	0	2

Pre requisites for the course	
1.	Knowledge of C Programming and Data Structure

Prior Reading Material/useful links	
1	Tutorials Point (I) simply easy learning, Online Tutorial Library (2018), R Programming, Retrieved from <a href="https://www.tutorialspoint.com/r/r_tutorial.pdf">https://www.tutorialspoint.com/r/r_tutorial.pdf</a> .

### Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Understand the basics of Fundamentals of R.
2	CO2	Understands the loading, retrieval techniques of data.
3	CO3	Understand how data is analyzed and visualized using statistic functions.
4	CO4	Ability to deal with complex Objects
5	CO5	Demonstrate on basics statistical data analysis with examples.

### Syllabus :

Course Contents	
Unit I	Introduction to R:What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages inR: Installing a R Package, Few commands to get started: installed. Packages (), package Description (), help(), find. package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and–inf. [7Hrs]
Unit II	R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame – R - Variables: Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables – R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators - R Decision Making: if statement, if – else statement, if– else if statement, switch statement – R Loops: repeat loop, while loop, for loop – Loop control statement: break statement, next statement. [6Hrs]
Unit III	R-Function : function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a

	function without an argument, calling a function with argument values - R-Strings – Manipulating Text in Data: substr(),strsplit(), paste(), grep(), toupper(), tolower() - R Vectors – Sequence vector, rep function,vector access, vector names, vector math, vector recycling, vector element sorting - R List - Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector - R Matrices – Accessing Elements of a Matrix, Matrix Computations: Addition, subtraction, Multiplication and Division- R Arrays: Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements - R Factors –creating factors, generating factor levels gl(). <b>[7Hrs]</b>
Unit IV	Data Frames – Create Data Frame, Data Frame Access, Understanding Data in Data Frames:dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame, Expand Data Frame: Add Column, Add Row - Joining columns and rows in a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast().Loading and handling Data in R: Getting and Setting the Working Directory – getwd(),setwd(), dir() - R-CSV Files - Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() - Writing into a CSV File –R -Excel File – Reading the Excel file. <b>[7Hrs]</b>
Unit V	Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median: Mean Applying Trim Option, Applying NA Option, Median - Mode - Standard Deviation –Correlation - Spotting Problems in Data with Visualization: visually Checking Distributions for a single Variable - R – Pie Charts: Pie Chart title and Colors – Slice Percentages and Chart Legend, 3D Pie Chart – R Histograms – Density Plot - R – Bar Charts: Bar Chart Labels, Title and Colors. <b>[8 Hrs]</b>

<b>Text Books</b>	
1	Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017, ISBN: 978-93-5260-455-5.
2	Seema Acharya, Data Analytics using R, McGraw Hill Education (India), 2018, ISBN:978-93-5260-524-8.

<b>Reference Books</b>	
1	Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wileyand Sons, Inc, 2015, ISBN: 978-1-119-05580-8
<b>Useful Links</b>	
1	<a href="https://www.coursera.org/learn/r-programming">Coursera.org/learn/r-programming</a>
2	<a href="https://www.r-project.org/about.html">https://www.r-project.org/about.html</a>
3	<a href="https://www.programiz.com/r">https://www.programiz.com/r</a>

## Object-Oriented Programming (IT)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Object-Oriented Programming	2	0	0	2

Pre requisites for the course	
1	Knowledge of C Programming and Data Structure

Prior Reading Material/useful links	
1	Programmers looking for jobs
2	Programmers wanting to write efficient code
3	Computer Science students having Data Structures as part of their curriculum

### Course Outcomes

Sr. No	Course Outcome number	CO statement
1	CO1	Demonstrate an understanding of algorithms in problem solving process
2	CO2	Identify the necessary properties of good problem-solving techniques
3	CO3	Create and analyze algorithms
4	CO4	Use incremental program development to create test and debug
5	CO5	Apply techniques of structured decomposition to decompose problem in smaller pieces.

### Syllabus:

Course Contents	
Unit I	Object-Oriented Programming Concepts: Introduction, Comparison between procedural programming paradigm and object-oriented programming paradigm, Features of object-oriented programming: Encapsulation, Class, Object, Abstraction, Data hiding, polymorphism, and Inheritance. Introduction of object oriented design. <b>[7Hrs]</b>
Unit II	Data Types, Operators, and Control Structures: Basic data types, Derived data types, Keywords, Identifiers, Constants and variables, Type casting, Operators, and Operator precedence. Control Structures: if statement, switch-case, for, while and do-while loops, break and continue statement. <b>[6Hrs]</b>
Unit III	Classes and Objects: Implementation of a class, Creating class objects, Operations on objects, Relationship among objects, Accessing class members, Access specifiers, Constructor and destructor, Types of constructor, Static members, Empty classes, Nested classes, Local classes, Abstract classes, Container classes. <b>[7Hrs]</b>
Unit IV	Functions, Arrays, and String Handling: Function components, Default arguments,

	<p>Passing parameters, Function prototyping, Call by value, Call by reference, Return by reference, Inline functions, Friend functions, Static functions, Recursion, Array declaration, Types of arrays, Array of objects, String handling.</p> <p><b>[7Hrs]</b></p>
Unit V	<p>Operator overloading: unary operations. binary operators, . Explicit and Mutable, Concept of inheritance, Classes within classes, inheritance and program development., Polymorphism: Binding, Static binding, Dynamic binding, Static polymorphism: Function Overloading, Pointers, Pointers to Objects, this pointer, Pointer to Derived Classes, Virtual Function, friend function, Static function, Assignment and copy initialization, this pointer, dynamic type information, Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release</p> <p><b>[8 Hrs]</b></p>

<b>Text Books</b>	
1	Object Oriented Programming in C++ by Robert Lafore Techmedia Publication.
2	The complete reference C – by Herbert shieldt Tata McGraw Hill Publication.
3	Object Oriented Programming in C++ Saurav Sahay Oxford University Press.
4	Object Oriented Programming in C++ R Rajaram New Age International Publishers 2nd

<b>Reference Books</b>	
1	Big C++ - Wiley India
2	C++ and Object Oriented Programming – Jana, PHI Learning.
3	Mastering C++ - Venugopal, McGraw-Hill Education (India)

<b>Useful Links</b>	
1	<a href="https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/">https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/</a>
2	<a href="https://www.coursera.org/courses?query=object%20oriented%20programming">https://www.coursera.org/courses?query=object%20oriented%20programming</a>
3	<a href="https://www.freecodecamp.org/news/what-is-object-oriented-programming/">https://www.freecodecamp.org/news/what-is-object-oriented-programming/</a>

## Computer Aided Drafting (ME)

Semester	Course Code	Name of the course	L	T	P	Credits
II SEM		Computer Aided Drafting	1	0	0	1

Pre requisites for the course	
1	Basic Knowledge of Engineering Drawing
Prior Reading Material / useful links	
1	<a href="https://nptel.ac.in/courses/112102101">https://nptel.ac.in/courses/112102101</a>
2	<a href="https://www.youtube.com/watch?v=EgKc9L7cbKc">https://www.youtube.com/watch?v=EgKc9L7cbKc</a>

### Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	<b>Understand</b> the file management techniques in a CAD software.
2	CO2	<b>Construct</b> complex 2D geometric figures using a CAD software.
3	CO3	<b>Modify</b> complex 2D geometric figures using a CAD software
4	CO4	<b>Analyze</b> Use software to dimension and write text on existing 2D geometric entities.
5	CO5	<b>Design</b> a plot existing drawing with desired plot parameters.

Course Contents	
Unit-I	<p><b>Introduction to CAD Drawing</b>                      Fundamentals of Computer Aided Drafting (CAD) and its applications, Various Software for Computer Aided Drafting. CAD initial setting commands-Snap, grid, Ortho, Osnap. Limits.                      Units, Ltscale, Object Selection methods- picking. Window, last and previous. Opening, saving and closing a new and existing drawing/template  <b>[5 Hours]</b></p>
Unit-II	<p><b>Basic and Advance Commands in Auto Cad</b>                      Zoom Commands all previous out, in, extent, real time, dynamics window, pan. Formatting commands layers block line type line weight color. Draw command line arc circle, rectangle, polygon, ellipse, spline, block, hatch, Modify command erase, trim, extend, copy, move, mirror, offset, fillet, chamfer, rotate, scale, lengthen, stretch, measure, break, divide, explode, and align. Grip editing move, copy, stretch  <b>[5 Hours]</b></p>
Unit-III	<p><b>Dimensioning Text and Plot Commands and 2D Drawing</b>                      Dimensioning commands -Dimension styles, Dimensional Tolerances and Geometrical Tolerances, Modify dimension style. Text commands - dtext, mtextcommand. Plotting a drawing - paper space, model space, creating table, plot commands and 2D Drawing  <b>[6 Hours]</b></p>
Text Books	
1	Engineering Drawing Practice for Schools and Colleges 1S: SP-46 Bureau of Indian

	Standards BIS. GOI, Third Reprint, October 1998,ISBN: 81-7061-091-2
2	Engineering Drawing Bhatt, N.D.; Charotar Publishing House. Anand FEE Gujarat, 2010, ISBN:978-93- 80358- 17
3	Machine Drawing Bhatt, N.D, Panchal, V. M. Charotar Publishing House. Anand FEE Gujarat, 2010, ISBN:978-93- 80358- 17
<b>Reference Books</b>	
1	Engineering Graphics with AutoCAD Kulkarni D. M.:Rastogi A. P.:Sarkar A. K.PHI Learning. New Delhi (2010).ISBN: 978-8120337831
2	Essentials of Engineering Drawingand Graphics using AutoCAD Jeyapoovan T.Vikas Publishing House Pvt. Ltd. Noida.2011. ISBN: 978-8125953005
3	AutoCAD User Guide AutoCAD 2016 for Engineers and Designers Sham Tickoo Dreamtech Press; Galgotia Publication New Delhi. Twenty Second edition.2015. ISBN-13: 978-9351199113

**Contributions for syllabus designing:**

<b>Sr. No</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Prof. S. A. Rewatkar	BoS, Chairman , ME	JDCOEM, Nagpur
2	Prof. R. B. Sharma	BoS Member	JDCOEM, Nagpur
3	Prof. D. A. Yelure	BoS Member	JDCOEM, Nagpur

## Electrical Wiring & Accessories (EE)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Electrical Wiring & Accessories	1	0	0	1
<b>Pre requisites for the course</b>						
1	Basics Electrical concepts such as current, voltage, power, etc. studied in Higher secondary classes.					

Prior Reading Material/useful links	
1	<a href="https://onlinecourses.nptel.ac.in/noc19_ee35/preview">https://onlinecourses.nptel.ac.in/noc19_ee35/preview</a>
2	Elements of Electrical sciences: P. Mukhopadhyay, N. Chand & Bros Roorkee (1989).

### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Remember the basic wiring concepts, switches types, cables & their joining methods.
2	CO2	Understand the basic wiring concepts, operation of switches, cables & their joining methods
3	CO3	Apply knowledge of wiring techniques, operation of switches cables & their joining methods.
4	CO4	Analyze different wiring techniques, operation of switches cables & their joining methods.
5	CO5	Evaluate operation of switches cables & their joining techniques
6	CO6	Design different wiring systems, switches, cables & their joining.

### Syllabus:

Course Contents	
Unit I	Origin of Electricity , Basic Concept of Electricity ,Importance of Electricity, Various Effects of Electric Current, Electric Circuit , Concept of Electrical Power and Energy Concepts of Voltage, Current, Power, Linear Elements Generation of Electricity, Electrical Hazard , Fire Extinguisher , First Aid for Electrical Emergencies, Electrical Rescue Techniques <b>(5 Hours)</b>
Unit II	Importance of Earthing System , Types of Earthing , Advantages of Earthing, Earth Tester and Earth Resistance, tools and equipment, Fault Indicators and Protective Equipment Wiring materials , Miniature Circuit Breaker (MCB) , Conduit Wiring , Concealed Wiring, Colour Code, ICTP (Iron Clad Triple Pole) Switch, Distribution Board, Fixing Wiring Accessories on Board <b>(5 Hours)</b>
Unit III	Types of Cables, Junction Box, Cable Laying and Installation, Cable Laying and Installation, Underground Cables, Cable Trenches, Electrical Cable Jointing Methods. Electrical Cable Jointing Methods, Types of Cable Joints and Equipment, HV Cable Jointers Tools

	<b>(5 Hours)</b>
<b>Text Books</b>	
1	Electrical Technology: B. L. Thareja, S. Chand Publications.
2	Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P. P. H. Pvt. Ltd.
<b>Reference Books</b>	
1	V. N. Mittal and Arvind Mittal;, “ Basic Electrical Engineering” McGraw Hill
2	Edward Hughes, “ Electrical Technology,”, Pearson Education
<b>Useful links</b>	
1	<a href="https://onlinecourses.nptel.ac.in/noc19_ee35/preview">https://onlinecourses.nptel.ac.in/noc19_ee35/preview</a>



## PCB DESIGNING (ETC)

Semester	Course Code	Name of the course	L	T	P	Credits
II SEM		PCB Designing	1	0	0	1

### Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Understand the fabrication processes of printed circuit boards.
2	CO2	Apply advance techniques, skills and modern tools for designing and fabrication of PCBs.
3	CO3	Analyze the software and hardware for PCB Design.
4	CO4	Design and develop PCB for various Electronic Circuits.

### Pre requisites for the course

1	Basic knowledge of electronic components and circuits.
2	Ability to read and interpret circuit diagrams.

### Course Contents

Unit-I	<p><b>Introduction to Printed circuit board:</b> Fundamental of electronic components, basic electronic circuits, Basics of printed circuit board designing: Layout planning, general rules and parameters, ground conductor considerations, thermal issues, check and inspection of artwork. [4 Hours]</p>
Unit-II	<p><b>Electronic design automation(EDA) tools for PCB designing</b> Brief Introduction of various simulators, SPICE and PSpice Environment, Selecting the Components Footprints as per design, Making New Footprints, Assigning Footprint to components, Net listing, PCB Layout Designing, Auto routing and manual routing. [6 Hours]</p>
Unit-III	<p><b>Printed circuit board production techniques</b> Photo printing, film master production, reprographic camera, basic process for double sided PCBs photo resists, Screen printing process, plating, relative performance and quality control, Etching machines, Solders alloys, fluxes, soldering techniques, Mechanical operations. [5 Hours]</p>

### Text Books

1	Printed circuit board design, fabrication assembly and testing By R. S. Khandpur, Tata McGraw Hill 2006.
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### Reference Books

1	Printed Circuits Handbook, Sixth Edition, Clyde F. Coombs, Jr, Happy T. Holden, Publisher: McGraw-Hill Education Year: 2016
2	Printed circuit Board Design and technology, Walter C. Bosshart

3	Flexible Printed circuit board Design and manufacturing, By Robert torzwell.
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### Contributions for syllabus designing

Sr. No	Name of the person	Designation	Organization
1	Dr. M. M., Khanapurkar	BoS Member (Academician)	Cummins College of Engineering, Nagpur
2	Dr. K. M. Bhurchundi	BoS Member (VC Nominated)	VNIT, Nagpur
3	Mr. Ashish Khachane	BoS Member (Industry)	Intel India Pvt. Ltd. Bangalore
4	Mr. Amit Bhattacharya	Member (Alumni)	Evoluzn, India
5	Dr. Sanjay L.Haridas	Dean Academics & BoS Member	JDCOEM, Nagpur
6	Prof. Gayatri Bhoyar	Chairman, BoS	JDCOEM, Nagpur
7	Prof. M.Hassan	Secretary, BoS	JDCOEM, Nagpur
8	Prof. A. S. Sontakke	BoS Member	JDCOEM, Nagpur

## Road Transport System (CE)

Semester	Course Code	Name of the course	L	T	P	Credits
<b>II</b>		Road Transport System	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>Pre requisites for the Course</b>						
1	Basic knowledge of transportation concepts.					
2	Knowledge of Traffic Regulations and Safety					
3	Road Safety Awareness					

<b>Prior Reading Material/Useful Links</b>	
1	<a href="https://nptel.ac.in/courses/105107067">https://nptel.ac.in/courses/105107067</a>
2	<a href="https://archive.nptel.ac.in/courses/105/105/105105215/">https://archive.nptel.ac.in/courses/105/105/105105215/</a>
3	<a href="https://nptel.ac.in/courses/105105215">https://nptel.ac.in/courses/105105215</a>

### Course Objectives

1	Understand the fundamental concepts and historical development of road transportation, including its classification and significance in the overall transport system.
2	Analyse and apply the principles of road geometric design, encompassing alignment, gradient, cross-section, and intersection design, to ensure safe and efficient road infrastructure.
3	Evaluate the properties of road materials such as aggregates, bitumen, and concrete, and comprehend the design principles and methods for both flexible and rigid pavement types.
4	Identify the factors influencing pavement performance and develop strategies for the maintenance and rehabilitation of roads to prolong their service life and ensure optimal functionality.
5	Recognize the role of civil engineers in the design and management of road transport systems, incorporating road development planning, policies, and best practices to meet societal needs and safety standards.

### Course Outcomes

Sr. No	Course Outcome number	CO statement
1	CO1	Students will comprehend road transport, its history, road classification, and their significance in transportation.
2	CO2	Students will apply geometric design principles to create safe and efficient road infrastructure, integrating alignment, gradient, cross-section, and intersection design.
3	CO3	Students will possess the ability to analyse road materials, distinguish between flexible and rigid pavements, and apply pavement design principles effectively.
4	CO4	Students will be able to identify factors influencing pavement performance

		and develop strategies for long-term road maintenance and rehabilitation.
5	CO5	Students will gain insight into the pivotal role of civil engineers in designing and managing road transport systems to meet societal needs and safety standards.

## Syllabus

Course Contents	
Unit 1	<p><b>Introduction to Road Transport System</b>            Overview of Road Transport and its Importance, History and Evolution of Road Transportation, Classification of Roads: Expressways, Highways, Arterial Roads, and Local Roads, Road Development Planning and Policies, Role of Civil Engineers in Road Transport System Design and Management  <b>(5 hours)</b></p>
Unit 2	<p><b>Road Geometric Design</b>            Principles of Geometric Design of Roads, Design Elements: Alignment, Gradient, and Cross-Section, Sight Distance and Stopping Sight Distance, Horizontal and Vertical Curves Design, Intersection Design and Control.  <b>(5 hours)</b></p>
Unit 3	<p><b>Road Materials and Pavement Design</b>            Properties of Road Materials: Aggregates, Bitumen, and Concrete, Flexible and Rigid Pavement Types, Pavement Design Principles and Methods, Factors Affecting Pavement Performance, Maintenance and Rehabilitation of Roads.  <b>(5 hours)</b></p>

Text Books	
1	"Highway Engineering: Planning, Design, and Operations" by Daniel J. Findley, Bastian J. Schroeder, Christopher Cunningham, and Avery C. Huang.
2	"Principles of Highway Engineering and Traffic Analysis" by Fred L. Mannering, Scott S. Washburn, and Walter P. Kilareski.
3	"Materials for Civil and Construction Engineers" by Michael S. Mamlouk and John P. Zaniwski.

Reference Books	
1	"Highway Engineering" by Martin Rogers, Bernard Enright, and William A. Kitch.
2	"Principles and Practices of Highway Engineering" by Rangwala.
3	"Pavement Analysis and Design" by Yang H. Huang.

Useful Links	
1	<a href="https://nptel.ac.in/courses/105101087">https://nptel.ac.in/courses/105101087</a>
2	<a href="https://archive.nptel.ac.in/courses/105/107/105107220/">https://archive.nptel.ac.in/courses/105/107/105107220/</a>
3	<a href="https://nptel.ac.in/courses/105104098">https://nptel.ac.in/courses/105104098</a>

## Design of Internet of Things (AI)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Design of Internet of Things	1	0	0	01

Pre requisites for the course	
1	Computer networks
2	Sensors

Prior Reading Material/useful links	
1	<a href="https://www.youtube.com/watch?v=6mBO2vqLv38">https://www.youtube.com/watch?v=6mBO2vqLv38</a>
2	<a href="https://www.internetsociety.org/iot/">https://www.internetsociety.org/iot/</a>
3	<a href="https://www.forbes.com/sites/bernardmarr/2021/12/13/the-5-biggest-internet-of-things-iot-trends-in-2022/">https://www.forbes.com/sites/bernardmarr/2021/12/13/the-5-biggest-internet-of-things-iot-trends-in-2022/</a>

### Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Identify the different technology
2	CO2	Apply IoT to different applications.
3	CO3	Analysis and evaluate protocols used in IoT
4	CO4	Design and develop smart city in IoT
5	CO5	Evaluate the data received through sensors in IoT

### Syllabus:

Course Contents	
Unit I	<p><b>IoT Introduction:</b> Origin of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT challenges, Need of IoT, IoT features, Building blocks of IoT , IoT Network Architecture and Design, IoT Things : Sensors and Actuators, A Brief History of IoT Security, Common Challenges in IoT Security</p> <p><b>IoT Ecosystem:</b> Three layered architecture, five layer architecture, cloud computing, fog computing, IoT taxonomy. Comparing IoT Architectures, The Core IoT Functional Stack, IoT Data Management and Compute Stack. [7 Hrs]</p>
Unit II	<p><b>IoT Networking protocols:</b> MQTT, SMQTT. IoT Communication protocols: IEEE 802.15.4, Zigbee, Connectivity Terminology: IoT LAN, IoT WAN, IoT Node, IoT Gateway. [4 Hrs]</p>
Unit III	<p><b>Implementation of IoT with Arduino:</b> Introduction to Arduino, Integration of sensors and actuators with Arduino, IDE programming, Application of IOT. [4 Hrs]</p>

<b>Text Books</b>	
1	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1 <sup>st</sup> Edition, Pearson Education
2	Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017.
3	Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1 <sup>st</sup> Edition, VPT, 2014.

<b>Reference Books</b>	
1	Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017.
2	Analytics for the Internet of Things (IoT): Intelligent analytics for your intelligent devices", by Andrew Minter
3	"Internet of Things: Architectures, Protocols and Standards", by Simone Cirani, Gianluigi Ferrari, Marco Picone, and Luca Veltri

<b>Useful Links</b>	
1	<a href="https://www.techtarget.com/iotagenda/definition/Internet-of-Things-IoT">https://www.techtarget.com/iotagenda/definition/Internet-of-Things-IoT</a>
2	<a href="https://builtin.com/internet-things">https://builtin.com/internet-things</a>
3	<a href="https://www.simplilearn.com/iot-devices-article">https://www.simplilearn.com/iot-devices-article</a>

## Networking Tools & Techniques (CS)

Semester	Course Code	Name of the course	L	T	P	Credits
<b>II</b>		Networking Tools & Techniques	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>Pre requisites for the Course</b>						
1	Fundamental networking concepts and technologies.					
2	Basic concepts of TCP/IP and OSI Models.					
3	Fundament Computer Network, Models, Protocols.					

Prior Reading Material/Useful Links	
1	<a href="https://www.gatevidyalay.com/computer-networks/">https://www.gatevidyalay.com/computer-networks/</a>
2	<a href="https://www.vssut.ac.in/lecture_notes/lecture1428550521.pdf">https://www.vssut.ac.in/lecture_notes/lecture1428550521.pdf</a>
3	<a href="https://kanchiuniv.ac.in/coursematerials/VINODKUMAR_COMPUTER_NETWORK.pdf">https://kanchiuniv.ac.in/coursematerials/VINODKUMAR_COMPUTER_NETWORK.pdf</a>

### Course Objectives

1	Understand the basic concepts of computer networking, including network models, protocols, and topologies.
2	Explain the Fundamental of Network Access and Configure and manage Cisco routers and switches.
3	Implement basic security measures to protect networks from unauthorized access.
4	To understand the functioning of communication switching techniques and network management.
5	An overview of security issues related to data communication in networks and knowledge about different networking tools.

### Course Outcomes

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to identify the operation and functionality of computer networks and how they are used in modern business environments.
2	CO2	Students will able to Demonstrate proficiency in configuring, managing, and troubleshooting switches.
3	CO3	Students will able to apply the troubleshoot common network problems, including connectivity issues, routing problems, and security breaches.
4	CO4	Students will able to get an extensive knowledge of network management and communication switching techniques.
5	CO5	Students will able to implement practical and real time use of different network operating tools and identifying basic security threats.

## Syllabus

<b>Course Contents</b>	
Unit I	Introduction to Networking: Define Network, Computer Network, Goals and Applications of Networks, Organization of the Internet, ISP, Network Structure and Architecture (Layering Principles, Services, Protocols and Standards), The OSI reference model, TCP/IP Protocol Suite, Network Devices and Components. <b>[5 Hrs]</b>
Unit II	Network Access & Tools: Ethernet LANs and Switches, VLANs and Trunking, Wireless LANs, Network Access Control, Basic Device Configuration. Network Tools: OPNET, IPERF, JPERF, Wireshark, Dummy Net Emulator. <b>[5 Hrs]</b>
Unit III	Communication Networking Techniques: Circuit Switching, Packet Switching, Local Area Networks. Protocols, Layered Approach, System Network Architecture. <b>[5 Hrs]</b>

<b>Text Books</b>	
1	Data Communications and Networking, by Behrouz A. Forouzan, Mc Graw Hill , 2006
2	“Computer Networks”, Andrew Tanenbaum, Prentice Hall.
3	Network Fundamentals: CCNA Exploration Companion Guide (Cisco Networking Academy).
4	Computer Networks, A. S. Tanenbaum, PHI, 2002.

<b>Reference Books</b>	
1	Computer Networks: A Systems Approach, by Larry Peterson and Bruce Davie. Covers background networking material that students should already be familiar with.
2	Computer Networking: A Top-Down Approach Featuring the Internet, by James F. Kurose and Keith W. Ross. Covers similar material to Peterson and Davie.
3	TCP/IP Illustrated, Volume 1: The Protocols by W. Richard Stevens.
4	Unix Network Programming: Networking APIs: Sockets and XTI (Volume 1) by W. Richard Stevens.

<b>Useful Links</b>	
1	<a href="https://www.google.co.in/books/edition/Network_Management_Fundamentals/NvEVQmjScjYC?hl=en&amp;gbpv=1&amp;bsq=networking+tools+%26+techniques+syllabus&amp;dq=networking+tools+%26+techniques+syllabus&amp;printsec=frontcover">https://www.google.co.in/books/edition/Network_Management_Fundamentals/NvEVQmjScjYC?hl=en&amp;gbpv=1&amp;bsq=networking+tools+%26+techniques+syllabus&amp;dq=networking+tools+%26+techniques+syllabus&amp;printsec=frontcover</a>
2	<a href="https://www.google.co.in/books/edition/Computer_Networks/BvaFreun1W8C?hl=en&amp;gbpv=1&amp;dq=computer+networking&amp;printsec=frontcover">https://www.google.co.in/books/edition/Computer_Networks/BvaFreun1W8C?hl=en&amp;gbpv=1&amp;dq=computer+networking&amp;printsec=frontcover</a>



## Computer Hardware & Maintenance (IT)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Computer Hardware & Maintenance	1	0	0	1

### Pre requisites for the course

1	Most entry-level computer hardware engineers have a bachelor's degree in computer engineering
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### Prior Reading Material/useful links

1	<a href="https://www.kobo.com/in/en/ebooks/computer-hardware">https://www.kobo.com/in/en/ebooks/computer-hardware</a>
2	<a href="https://www.freebookcentre.net/special-books-download/The-Secret-Guide-to-Computers-(R.-Walter).html">https://www.freebookcentre.net/special-books-download/The-Secret-Guide-to-Computers-(R.-Walter).html</a>
3	<a href="https://www.mygreatlearning.com/computer-hardware/free-courses">https://www.mygreatlearning.com/computer-hardware/free-courses</a>
4	Upgrading Repairing PCs, 8th Edition

### Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Understand basic concept & structure of Computer Hardware & Networking Components
2	CO2	Apply their knowledge about computer peripherals to identify/rectify problems on board
3	CO3	Integrate the PC's into Local Area Network & re-install OS & various shipboard applications.
4	CO4	Perform routine maintenance, upgrades of virus definitions, set schedules etc
5	CO5	Analyze &/or troubleshoot communication problems related to Engine Room Automation & various Navigational Bridge Equipment

### Syllabus:

Course Contents	
Unit I	Components of Motherboard, memories in PC & their usage CPU, – address bus architecture, AGP bus, internal registers., Hyper Threading Technologies. Processor socket & slots. chipset architecture, Hub Architecture, types of RAM, Types of Cache memory, BIOS & CMOS Set Up, Hard Disk construction and working, Introduction to file system, Features of IDE, SCSI, PATA, SATA, Cables & Jumpers [5Hrs]
Unit II	CRT, LCD Architecture, Interfacing of CRT, LCD devices to PC.CRT, Characteristics of CRT Monitor :-DOT Pitch, Resolution, Horizontal Scanning frequency, Vertical scanning frequency, Interlaced Scanning, Non-Interfaced scanning, Aspect ratio. Touch Screen Display – The construction and working

	principle Plasma Display Technology: - Construction & working principle. Basic Block Diagram of Video Accelerator card, Keyboard: Types of key switches& Mouse, Scanner, Printer, Modem: Internal and External: Block diagram and specifications, Types of Printer and their Working. [5Hrs]
Unit III	Preventive maintenance of PC to understand the diagnostic tools of PC POST: POST sequence, Beep codes, visual display codes. Preventive maintenance: Active, Passive, periodic maintenance procedure. Diagnostic Tools: logic Analyzer, logic probe. Diagnostic software for trouble shooting PC.BGA workstation and its applications for rebelling of north bridge and south bridge [5Hrs]

<b>Text Books</b>	
1	Scott Muller Upgrading & Repairing PCs Pearson
2	Mark Minasi, The Complete PC Upgrade & Maintenance guide Wiley India
3	Barry Press and Maricia Press PC Upgrade and Repair Wiley India
4	Begelow Bigelow's Troubleshooting, Maintaining & Repairing PCs

<b>Reference Books</b>	
1	Mike Meyers Scott Jernigan Managing & Troubleshooting PCs Tata McGraw Hill
2	D. Balasubramanian Computer Installation & Servicing Tata McGraw Hill

<b>Useful Links</b>	
1	<a href="https://nptel.ac.in/courses/106106092">https://nptel.ac.in/courses/106106092</a>
2	<a href="https://www.coursera.org/learn/computer-hardware-software">https://www.coursera.org/learn/computer-hardware-software</a>
3	<a href="https://dgt.gov.in/sites/default/files/CHNM_CTS2.0_NSQF-3.pdf">https://dgt.gov.in/sites/default/files/CHNM_CTS2.0_NSQF-3.pdf</a>
4	<a href="https://www.nielit.gov.in/aurangabad/content/computer-hardware-maintenance-courses-course-curriculum">https://www.nielit.gov.in/aurangabad/content/computer-hardware-maintenance-courses-course-curriculum</a>

### Data Analytics using Excel CSE (DS)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Data Analytics using Excel	1	0	0	1

Pre requisites for the course	
1	Expected to have a good prior understanding of the basic features available in Microsoft Excel

Prior Reading Material/useful links	
1	<a href="https://www.tutorialspoint.com/excel_data_analysis/index.htm">https://www.tutorialspoint.com/excel_data_analysis/index.htm</a>
2	<a href="https://www.simplilearn.com/tutorials/excel-tutorial/data-analysis-excel">https://www.simplilearn.com/tutorials/excel-tutorial/data-analysis-excel</a>
3	<a href="https://www.edx.org/course/introduction-to-data-analysis-using-excel">https://www.edx.org/course/introduction-to-data-analysis-using-excel</a>
4	<a href="https://www.coursera.org/learn/excel-data-analysis">https://www.coursera.org/learn/excel-data-analysis</a>

#### Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Understand comprehensive set of tools for <b>transforming, linking, and analysing data.</b>
2	CO2	Create data models to effectively link data, and open the gateway to Power Business Intelligence.
3	CO3	Create aggregate reports using formula-based techniques
4	CO4	Ability to analyse data is a powerful skill that helps you make better decisions
5	CO5	Create aggregate reports using formula-based techniques

#### Syllabus:

Course Contents	
Unit I	Basic Formulas, Viewpoints, Functions, Functions Using Absolute and Relative References, Data Manipulation, Arithmetic Manipulation, Functionality Using Ranges. <b>[5Hrs]</b>
Unit II	Introduction to Data Quality, Importing File Data, Basics of Data Privacy, Viewpoints: Data Quality and Privacy, Removing Duplicated or Inaccurate Data and Empty Rows, Dealing with Inconsistencies in Data, More Excel Features for Cleaning Data, Viewpoints: Issues with Data Quality <b>[5Hrs]</b>
Unit III	VLOOKUP , HLOOKUP Function Across Worksheets, Data Filtering: Filtering and Sorting Data in Excel , Use of Pivot Tables, Pivot Table Options, Application of Pivot Tables to Numeric Data, Introduction to Filtering: Auto filters, Advanced Filter, Data Forms, Charts : Chart types, Chart Styles , Chart Layouts , Add

	Labels, Axis Options, Chart Title, Legends, Data Labels, Line Graphs ,Bar Graphs and Pie Charts, Pivot Charts, Scatter Plots, Histograms Part, Histograms , Advanced Graphing and Charting <b>[5Hrs]</b>
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<b>Text Books</b>	
1	M. Ballerini, A. Clerici, M. Debernardi, D. Del Corno, M. De Pra, Excel Workbook (third edition), Egea, 2021
2	“Excel 2016 Bible”, John Walkenbach
3	“Excel 2016 Power Programming with VBA”, Dick Kusleika and Michael Alexander
4	“Advanced Excel Essentials”, Jordan Goldmeier

<b>Reference Books</b>	
1	Data Analysis with Excel by Manisha Nigam, BPB Publications
2	statistical-analysis-with-excel-for-dummies by Joseph Schmuller

<b>Useful Links</b>	
1	<a href="https://www.myonlinetraininghub.com/microsoft-excel-online-training-syllabus">https://www.myonlinetraininghub.com/microsoft-excel-online-training-syllabus</a>
2	<a href="https://excelexposure.com/">https://excelexposure.com/</a>
3	<a href="https://corporatefinanceinstitute.com/resources/excel/study/basic-excel-formulas-beginners/">https://corporatefinanceinstitute.com/resources/excel/study/basic-excel-formulas-beginners/</a>
4	<a href="https://www.mygreatlearning.com/academy/learn-for-free/courses/data-analytics-using-excel">https://www.mygreatlearning.com/academy/learn-for-free/courses/data-analytics-using-excel</a>
5	<a href="https://www.coursera.org/specializations/excel-data-analytics-visualization">https://www.coursera.org/specializations/excel-data-analytics-visualization</a>

### Computer Aided Drafting LAB (ME)

Semester	Course Code	Name of the course	L	T	P	Credits
II SEM		Computer Aided Drafting Lab	0	0	2	1

Pre requisites for the course	
1	Basic Knowledge of Engineering Drawing

Prior Reading Material/use full inks	
1	<a href="https://nptel.ac.in/courses/112102101">https://nptel.ac.in/courses/112102101</a>
2	<a href="https://www.youtube.com/watch?v=EgKc9L7cbKc">https://www.youtube.com/watch?v=EgKc9L7cbKc</a>

#### Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	<b>Understand</b> the file management techniques in a CAD software.
2	CO2	<b>Apply</b> basic commands of edit and modify
3	CO3	<b>Construct</b> 2D geometric figures using a CAD software.
4	CO4	<b>Analyze</b> Use software to dimension and write text on existing 2D geometric entities.
5	CO5	<b>Generate</b> the drawing sheets on CAD software.

#### Syllabus:

Course Contents	
<b>Activity 1</b>	To draw 2D sketches manually on sheet
<b>Activity 2</b>	To Draw Basic polygonal geometries
<b>Activity 3</b>	To generate basic 3D Geometries like prism, cone, pyramid etc
<b>Activity 4</b>	To apply edit and modify commands on autocad
<b>Activity 5</b>	To apply advance commands like Trim, Fillete , Chamfer etc on 2D drawings
<b>Activity 6</b>	To apply different types of dimensioning commands
<b>Activity 7</b>	To apply appearance commands on 2D and 3D geometries.
<b>Activity 8</b>	To draw basic mechanical machine components like nut,bolt etc
<b>Activity 9</b>	To draw advance mechanical machine components like Knuckle joints , Cotter joints , Levers etc
<b>Activity 10</b>	To generate Drawing sheet of machine components on auto cad
Text Books	
1	Engineering Drawing Practice for Schools and Colleges 1S: SP-46Bureau of Indian Standards BIS. GOI, Third Reprint, October 1998,ISBN: 81-7061-091-2
2	Engineering Drawing Bhatt, N.D.;Charotar Publishing House. Anand FEE Gujarat, 2010, ISBN:978-93- 80358- 17
3	Machine Drawing Bhatt, N.D, Panchal, V. M. Charotar Publishing House. Anand FEE Gujarat, 2010, ISBN:978-93- 80358- 17
Reference Books	
1	Engineering Graphics with Auto CAD Kulkarni D. M.:Rastogi A. P.:Sarkar A.

	K.PHI Learning. New Delhi (2010).ISBN: 978-8120337831
2	Essentials of Engineering Drawing and Graphics using Auto CAD Jeyapoovan T.Vikas Publishing House Pvt. Ltd. Noida.2011. ISBN: 978-8125953005
3	AutoCAD User Guide AutoCAD 2016 for Engineers and Designers Sham Tickoo Dreamtech Press; Galgotia Publication New Delhi. Twenty Second edition.2015. ISBN-13: 978-9351199113

**Contributions for syllabus designing:**

<b>Sr. No</b>	<b>Name of the person</b>	<b>Designation</b>	<b>Organization</b>
1	Prof. S. A. Rewatkar	BoS, Chairman , ME	JDCOEM, Nagpur
2	Prof. R. B. Sharma	BoS Member	JDCOEM, Nagpur
3	Prof. D. A. Yelure	BoS Member	JDCOEM, Nagpur

### Electrical Wiring & Accessories lab (EE)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Electrical Wiring & Accessories Lab	0	0	2	1
<b>Pre requisites for the course</b>						
1	Basics Electrical concepts such as current, voltage, power, etc. studied in Higher secondary classes.					

<b>Prior Reading Material/useful links</b>	
1	<a href="https://onlinecourses.nptel.ac.in/noc19_ee35/preview">https://onlinecourses.nptel.ac.in/noc19_ee35/preview</a>
2	Elements of Electrical sciences: P. Mukhopadhyay, N. Chand & Bros Roorkee (1989).

#### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	Remember the basic wiring concepts, switches types, & connections
2	CO2	Understand the wiring concepts, operation of switches, cables & their joining methods
3	CO3	Apply knowledge of wiring techniques, switches, & cables
4	CO4	Analyze different concepts regarding connections of switches, & cable joining methods.
5	CO5	Evaluate operation of switches & various electrical components
6	CO6	Design different wiring systems, switches, cables & their joining.

## Syllabus:

### Course Contents

#### Activity 1

Make an electrical quiz board for list of source of electricity and their sharing percentage (%) in India

#### Objective

Students will be able to

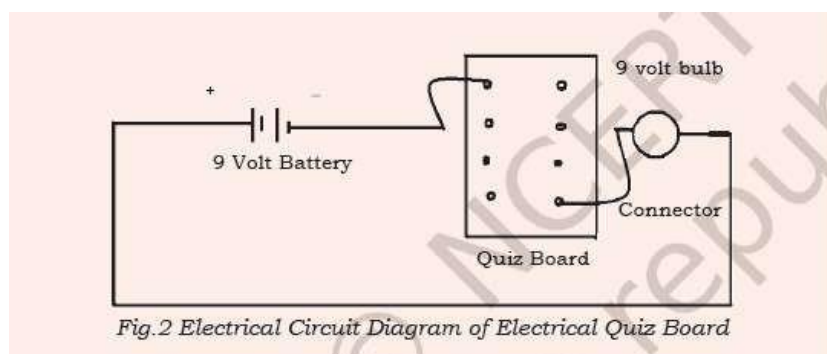
- Identify the sources of electrical energy in India,
- Define their sharing percentage (%) and
- Make basic circuit connection.

#### Material required

One card-board (45 cm × 15 cm), insulated copper wire, one 9-volt bulb with holder, one 9-volt battery, 10-connectors with socket.

#### Tools and Equipment

S. No.	Particular	Specification	Quantity
1	Screw Driver	6"	01
2	Combination Plier	6"	01
3	Wire Stripper	--	01
4	Phase Tester	--	01



#### Activity-2

Design the Electrical wiring circuit with single and two way Switch using Accessories like, switches, holders, sockets, etc. on the board or round block.

#### Tools and materials required

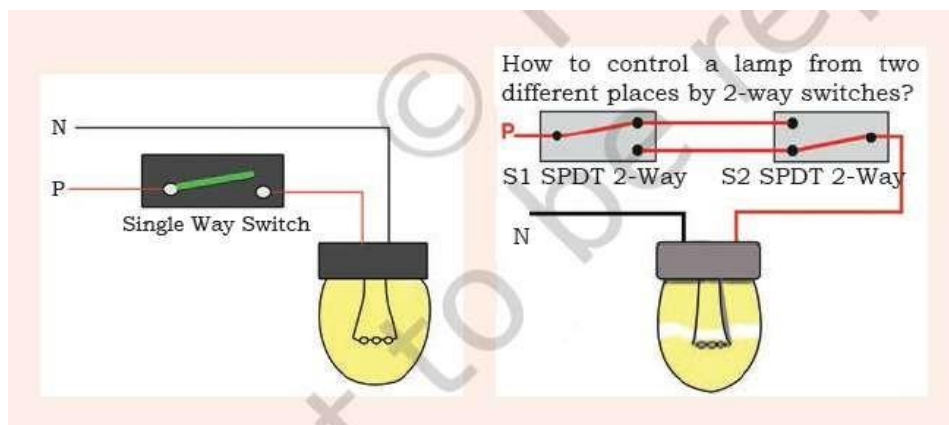
Tools



- Hand drilling machine with a drift bit of 5 centimeter
- Poker
- Screwdriver
- Connector screwdriver 8 cms
- Combination plier 15 cm
- Try square
- Firmer chisel 20 mm
- Electrician knife 10 cm

### Material

- Wooden round block/ PVC Round Block
- Wooden board/ Sun mica Board
- Single pole one-way switch 5 A, 250V
- PVC wire
- Pencil
- Chalk



### Activity 3

Aim: Identify and draw the figure of various wiring materials

### Procedure

See the different types of wiring materials as shown in the diagram as well as in classroom and draw the diagram.

### Activity 4

Aim: Identify and connect the accessories with the wires

### Tools and equipment required

- Multimeter for measuring the current and voltage.
- Tools like plier, screw driver will be required.

## Procedure

Accessories will be connected with the help of wires.

## Activity 5

Aim : To connect different types of components with wires in a junction box.

### Tools and equipment required

- Multimeter
- Tools like screw driver, plier.

## Procedure

1. Different types of components will be connected with the help of wires in a junction box

## Activity 6

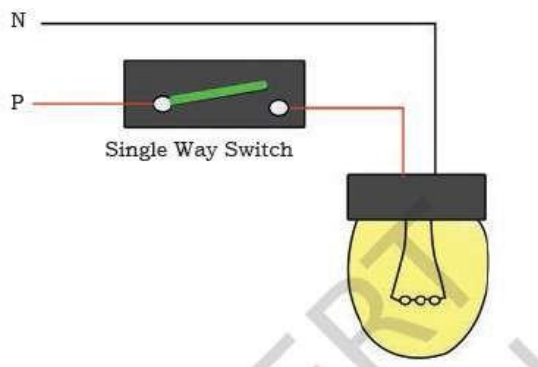
**Aim :** To familiarise the student with the electrical connection of a lamp to the supply mains.

To select the proper size of connecting wires and switch for a given load.

In a lamp, the electrical energy is converted into light. The function of the switch is to turn the lamp “ON” or “OFF” by making and breaking the electrical circuit respectively. The switch should be connected to the phase wire of the supply. It should be connected in series with the lamp. The function of the fuse is to protect an electrical circuit against over current which may be caused by a fault or overloading.

### Apparatus and material

- Lamp
- Switch
- Fuse
- Wooden batten/ PVC Batten
- Link clips
- Screws
- Nails
- Insulation tape
- Connecting wires
- Lamp holder
- Electricians common hand tools



## Activity 7

Aim: To check the connection of the lamp by one switch (series)

### **Apparatus**

Lamp 100W/220V, holder, one-way switch, PVC wire 1/18 SWG etc.

### **Tools and equipment**

<b>S. No.</b>	<b>Particular</b>	<b>Specification</b>	<b>Quantity</b>
1.	Plier	Slide cutting plier	1
		Combination plier	1
2.	Screwdriver	Screwdriver	1
3.	Phase tester	6"	1

### **Activity 8**

Aim: Check the connection of lamp by two switches (parallel)

### **Related information**

The circuit consists of one lamp and one pair of two way switches are connected.

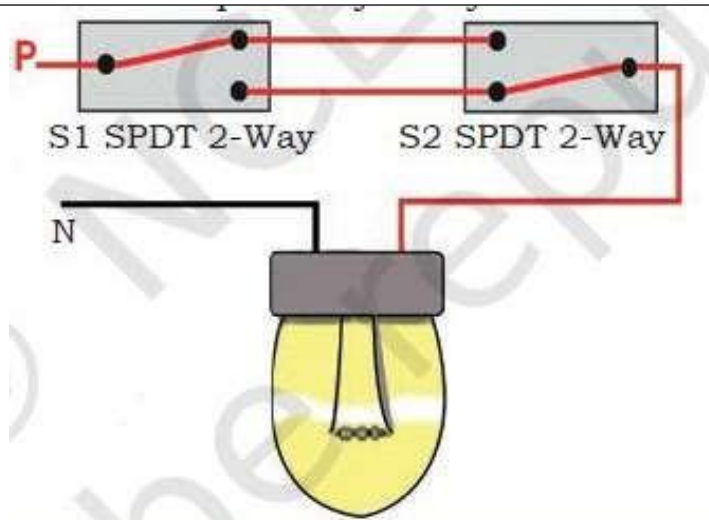
The common points in switches S1 and S2 are C1 and C2 respectively. The common point C2 is connected to position 2 of the switch S2. Now if the common C1 is connected to position 1 in switch S1, then the path of the electric circuit is not complete and, hence, the lamp will not glow. However, if C1 is connected to position 1, then the path of the current is completed through S1, S2 and the lamp. The lamp will glow.

### **Apparatus**

- One lamp holder, (pendent) 5 A, 250V.
- One lamp 40 Watts, 250V.
- Two two-way switch, 5A, 250V.
- Connecting wires
- Insulated plier
- Electricians knife
- Screw driver

### **Procedure**

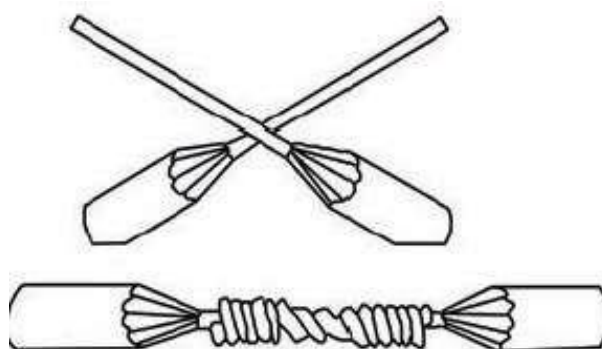
- Connect the lamp with the two switches S1 and S2
- Put the lamp in position in the holder
- Make the positions 1 and 1' on S1 and 2 and 2' on S2
- Operate switch S1 in position 1 and 1'
- For each position of S1 put switch S2 in position 2 and 2' respectively
- Observe the results



### Activity-9

To prepare 1. Western Union Splice Joint

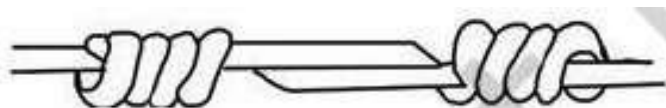
1. Fixture Joint



### Activity-10

To prepare 1. Knotted Tap Joint

1. Britannia Joint



## PCB DESIGNING LAB (ETC)

Semester	Course Code	Name of the course	L	T	P	Credits
II SEM		PCB Designing Lab	0	0	2	1

Pre requisites for the course	
1	Basic knowledge of electronic components and circuits.
2	Knowledge of analog and digital circuits.

Prior Reading Material/useful links	
1	<a href="http://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself">http://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself</a>
2	<a href="https://www.youtube.com/watch?v=mv7Y0A9YeUc">https://www.youtube.com/watch?v=mv7Y0A9YeUc,</a>
3	<a href="https://www.youtube.com/watch?v=imQTCW1yWkg">https://www.youtube.com/watch?v=imQTCW1yWkg</a>

### Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Understand the steps involved in schematic, layout, fabrication and assembly process of PCB design.
2	CO2	Determine appropriate components to make circuit.
3	CO3	Apply advance techniques, skills and modern tools for designing and fabrication of PCBs.
4	CO4	Design (schematic and layout) and fabricate PCB for simple circuits

Course Contents	
<b>Activity 1</b>	Develop PCB designing flowchart and introduce the materials required for the fabrication of PCB's
<b>Activity 2</b>	Schematic Creation and simulation of an electronic circuit.
<b>Activity 3</b>	Mapping Components of an electronic circuit and Setting Parameters for PCB Design.
<b>Activity 4</b>	Laying Tracks on PCB and Create PCB Layout of an Electronic Circuit
<b>Activity 5</b>	Create Device Model and simulation
<b>Activity 6</b>	Create PCB layout of an amplifier design
<b>Activity 7</b>	Printing on PCB
<b>Activity 8</b>	Etching, Drilling and Soldering of PCB
<b>Activity 9</b>	Testing of an electronic Circuit
<b>Activity 10</b>	Develop PCB for Simple Electronic Circuits.
Text Books	
1	Printed circuit board design, fabrication assembly and testing By R. S. Khandpur, Tata McGraw Hill 2006.
Reference Books	
1	Printed Circuit Board by RS Khandpur, Tata McGraw Hill Education Pvt Ltd., New Delhi
2	Electronic Product Design Volume-I by S D Mehta, S Chand Publications

3	Gupta.J.B, "Electronic Devices and Circuits", Second Edition,S. K. Kataria & Sons.
4	PCB Fabrication user guide page: <a href="http://www.wikihow.com/Create-Printed-Circuit-Boards">http://www.wikihow.com/Create-Printed-Circuit-Boards</a> .
	<b>Useful links</b>

## Road Transport System Lab (CE)

Semester	Course Code	Name of the course	L	T	P	Credits
<b>II</b>		Road Transport System Lab	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>
<b>Pre requisites for the Course</b>						
1	Basic knowledge of transportation concepts.					
2	Knowledge of Traffic Regulations and Safety					
3	Road Safety Awareness					

Prior Reading Material/Useful Links	
1	<a href="https://nptel.ac.in/courses/105107067">https://nptel.ac.in/courses/105107067</a>
2	<a href="https://archive.nptel.ac.in/courses/105/105/105105215/">https://archive.nptel.ac.in/courses/105/105/105105215/</a>
3	<a href="https://nptel.ac.in/courses/105105215">https://nptel.ac.in/courses/105105215</a>

### Course Objectives

1	Understand the fundamental concepts and historical development of road transportation, including its classification and significance in the overall transport system.
2	Analyse and apply the principles of road geometric design, encompassing alignment, gradient, cross-section, and intersection design, to ensure safe and efficient road infrastructure.
3	Evaluate the properties of road materials such as aggregates, bitumen, and concrete, and comprehend the design principles and methods for both flexible and rigid pavement types.
4	Identify the factors influencing pavement performance and develop strategies for the maintenance and rehabilitation of roads to prolong their service life and ensure optimal functionality.
5	Recognize the role of civil engineers in the design and management of road transport systems, incorporating road development planning, policies, and best practices to meet societal needs and safety standards.

### Course Outcomes

Sr. No	Course Outcome number	CO statement
1	CO1	Students will comprehend road transport, its history, road classification, and their significance in transportation.
2	CO2	Students will apply geometric design principles to create safe and efficient road infrastructure, integrating alignment, gradient, cross-section, and intersection design.
3	CO3	Students will possess the ability to analyse road materials, distinguish between flexible and rigid pavements, and apply pavement design principles effectively.
4	CO4	Students will be able to identify factors influencing pavement performance and develop strategies for long-term road maintenance and rehabilitation.

5	CO5	Students will gain insight into the pivotal role of civil engineers in designing and managing road transport systems to meet societal needs and safety standards.
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### Syllabus Activity

Sr. No.	Activity Name
1	Road Geometric Design activity.
2	Intersection Design Simulation
3	Field Visit to Road Construction Site
4	Road Safety Awareness Campaign
5	Pavement Material Testing
6	Traffic Flow Simulation Game
7	Case Study Analysis
8	Road Infrastructure Design Competition
9	Road Maintenance and Rehabilitation Exercise
10	Guest Lectures from Industry Experts

Text Books	
1	"Highway Engineering: Planning, Design, and Operations" by Daniel J. Findley, Bastian J. Schroeder, Christopher Cunningham, and Avery C. Huang.
2	"Principles of Highway Engineering and Traffic Analysis" by Fred L. Mannering, Scott S. Washburn, and Walter P. Kilareski.
3	"Materials for Civil and Construction Engineers" by Michael S. Mamlouk and John P. Zaniewski.

Reference Books	
1	"Highway Engineering" by Martin Rogers, Bernard Enright, and William A. Kitch.
2	"Principles and Practices of Highway Engineering" by Rangwala.
3	"Pavement Analysis and Design" by Yang H. Huang.

Useful Links	
1	<a href="https://nptel.ac.in/courses/105101087">https://nptel.ac.in/courses/105101087</a>
2	<a href="https://archive.nptel.ac.in/courses/105/107/105107220/">https://archive.nptel.ac.in/courses/105/107/105107220/</a>
3	<a href="https://nptel.ac.in/courses/105104098">https://nptel.ac.in/courses/105104098</a>



### Design of Internet of Things Lab (AI)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Design of Internet of Things Lab	0	0	02	01

Pre requisites for the course	
1	Computer networks
2	Sensors

Prior Reading Material/useful links	
1	<a href="https://www.youtube.com/watch?v=6mBO2vqLv38">https://www.youtube.com/watch?v=6mBO2vqLv38</a>
2	<a href="https://www.internetsociety.org/iot/">https://www.internetsociety.org/iot/</a>
3	<a href="https://www.forbes.com/sites/bernardmarr/2021/12/13/the-5-biggest-internet-of-things-iot-trends-in-2022/">https://www.forbes.com/sites/bernardmarr/2021/12/13/the-5-biggest-internet-of-things-iot-trends-in-2022/</a>

#### Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Identify the different technology
2	CO2	Apply IoT to different applications.
3	CO3	Analysis and evaluate protocols used in IoT
4	CO4	Design and develop smart city in IoT
5	CO5	Evaluate the data received through sensors in IoT

#### Syllabus: Activity

Sr. No.	Activity Topic
1	Design and implement 16 X 2 LCD Display using Ardiuno.
2	Design and implement RGB LED shades using Ardiuno.
3	Design and implement smoke detection system using MQ2 Gas sensor and Arduino
4	Design and implement Plant Communicator system using Sensors.
5	Design and implement DC motor starter system using Arduino.
6	Design and implement Humidity and temperature monitoring system using Arduino.
7	Design and implement ultrasonic security system using Arduino.
8	Design and implement heart rate measurement system with MAX30102 using Arduino.
9	Design and implement SpO2 measurement system with MAX30102 using Arduino.
10	Design and implement distance measurement system using Arduino and HC-SR04 ultrasonic sensor.

<b>Text Books</b>	
1	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1 st Edition, Pearson Education
2	Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017.
3	Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1 <sup>st</sup> Edition, VPT,2014.

<b>Reference Books</b>	
1	Raj Kamal, "Internet of Things: Architecture and Design Principles", 1 <sup>st</sup> Edition, McGraw Hill Education, 2017.
2	Analytics for the Internet of Things (IoT): Intelligent analytics for your intelligent devices", by Andrew Minter
3	"Internet of Things: Architectures, Protocols and Standards", by Simone Cirani, Gianluigi Ferrari, Marco Picone, and Luca Veltri

<b>Useful Links</b>	
1	<a href="https://www.techtarget.com/iotagenda/definition/Internet-of-Things-IoT">https://www.techtarget.com/iotagenda/definition/Internet-of-Things-IoT</a>
2	<a href="https://builtin.com/internet-things">https://builtin.com/internet-things</a>
3	<a href="https://www.simplilearn.com/iot-devices-article">https://www.simplilearn.com/iot-devices-article</a>

## Networking Tools & Techniques Lab (CS)

Semester	Course Code	Name of the course	L	T	P	Credits
<b>II</b>	-	Networking Tools & Techniques Lab	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>
<b>Pre requisites for the Course</b>						
1	Fundamental networking concepts and technologies.					
2	Basic concepts of TCP/IP and OSI Models.					
3	Fundament Computer Network, Models, Protocols.					

Prior Reading Material/Useful Links	
1	<a href="https://www.gatevidyalay.com/computer-networks/">https://www.gatevidyalay.com/computer-networks/</a>
2	<a href="https://www.vssut.ac.in/lecture_notes/lecture1428550521.pdf">https://www.vssut.ac.in/lecture_notes/lecture1428550521.pdf</a>
3	<a href="https://kanchiuniv.ac.in/coursematerials/VINODKUMAR_COMPUTER_NETWORK_S.pdf">https://kanchiuniv.ac.in/coursematerials/VINODKUMAR_COMPUTER_NETWORK_S.pdf</a>

### Course Objectives

1	Understand the basic concepts of computer networking, including network models, protocols, and topologies.
2	Explain the Fundamental of Network Access and Configure and manage Cisco routers and switches.
3	Implement basic security measures to protect networks from unauthorized access.
4	To understand the functioning of communication switching techniques and network management.
5	An overview of security issues related to data communication in networks and knowledge about different networking tools.

### Course Outcomes

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to identify the operation and functionality of computer networks and how they are used in modern business environments.
2	CO2	Students will able to Demonstrate proficiency in configuring, managing, and troubleshooting switches.
3	CO3	Students will able to apply the troubleshoot common network problems, including connectivity issues, routing problems, and security breaches.
4	CO4	Students will able to get an extensive knowledge of network management and communication switching techniques.
5	CO5	Students will able to implement practical and real time use of different network operating tools and identifying basic security threats.

## Syllabus: Activity

Sr. No.	Activity Topic
1	Step by Step Computer Installation and all Ports.
2	Familiarization with Transmission media and Tools Coaxial cable, Fibre Optic Cable, Twisted pair cable, Connectors etc
3	Preparing the UTP cable for cross and direct connection using Crimping Tools.
4	Connect computer to router with Ethernet cable.
5	How to connect three PCs in a LAN using a switch and Ethernet Cables.
6	Create LAN Network, Connecting Computer in Networking or share the resources.
7	How to Share Printer on Network (Share Printer in-between Computers)
8	Execution of Network Configuration Commands.
9	Installation and introduction of simulation tools packet tracer/GNS3 or Cisco Packet Tracer.
10	Demonstration of a star topology by using cisco packet tracer.

### Text Books

1	Data Communications and Networking, by Behrouz A. Forouzan, McGraw Hill , 2006
2	“Computer Networks”, Andrew Tanenbaum, Prentice Hall.
3	Network Fundamentals: CCNA Exploration Companion Guide (Cisco Networking Academy).
4	Computer Networks, A.S. Tanenbaum, PHI, 2002.

### Reference Books

1	Computer Networks: A Systems Approach, by Larry Peterson and Bruce Davie. Covers background networking material that students should already be familiar with.
2	Computer Networking: A Top-Down Approach Featuring the Internet, by James F. Kurose and Keith W. Ross. Covers similar material to Peterson and Davie.
3	TCP/IP Illustrated, Volume 1: The Protocols by W. Richard Stevens.
4	Unix Network Programming: Networking APIs: Sockets and XTI (Volume 1) by W. Richard Stevens.

### Useful Links

1	<a href="https://www.google.co.in/books/edition/Network_Management_Fundamentals/NvEVQmjScjYC?hl=en&amp;gbpv=1&amp;bsq=networking+tools+%26+techniques+syllabus&amp;dq=networking+tools+%26+techniques+syllabus&amp;printsec=frontcover">https://www.google.co.in/books/edition/Network_Management_Fundamentals/NvEVQmjScjYC?hl=en&amp;gbpv=1&amp;bsq=networking+tools+%26+techniques+syllabus&amp;dq=networking+tools+%26+techniques+syllabus&amp;printsec=frontcover</a>
2	<a href="https://www.google.co.in/books/edition/Computer_Networks/BvaFreun1W8C?hl=en&amp;gbpv=1&amp;dq=computer+networking&amp;printsec=frontcover">https://www.google.co.in/books/edition/Computer_Networks/BvaFreun1W8C?hl=en&amp;gbpv=1&amp;dq=computer+networking&amp;printsec=frontcover</a>

## Computer Hardware & Maintenance Lab (IT)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Computer Hardware & Maintenance Lab	0	0	2	1

Pre requisites for the course	
1	Basic electricity and digital electronics, basic knowledge about the computer systems

Prior Reading Material/useful links	
1	<a href="https://www.techtarget.com/searchnetworking/definition/hardware">https://www.techtarget.com/searchnetworking/definition/hardware</a>
2	<a href="https://www.mygreatlearning.com/academy/learn-for-free/courses/data-analytics-using-excel">https://www.mygreatlearning.com/academy/learn-for-free/courses/data-analytics-using-excel</a>

### Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Understand the fundamentals of Hardware, handling, testing & troubleshooting of personal computer problems
2	CO2	Able to diagnose the problem Desktop /Laptop etc. and repair
3	CO3	Identify of faults diagnosis based on different beeps.
4	CO4	Demonstrate different buses and the number of pins in the different slots corresponding to different buses.
5	CO5	Assembly and disassembly of different Desktop /Laptop /Mobile/ Note pad etc.

### Syllabus:

List of Experiments	
1	Identify and draw the motherboard layout of Intel i3 processor and understand connection and layout of chipset.
2	Perform Basic Input/output System (BIOS) setting and configuration setup using Complementary Metal Oxide Semiconductor (CMOS).
3	Format, partition and install a Hard Disk Drive (HDD) and format a pen drive.
4	Understand layout, characteristics and functions of different components of Hard Disk Drive (HDD) as a storage device.
5	Install Video Graphics Array (VGA) or Super Video Graphics Array (SVGA) display cards.
6	Install and understand the working of printer.
7	Install and understand the working of Input/output devices such as scanner and modem.
8	Connect Switched Mode Power Supply (SMPS) and identify different parts of SMPS..
9	Find faults related to Monitor, CPU, Hard disk, Printer and other peripherals
10	Understand the working of SMPS and Uninterrupted Power Supply (UPS).
11	Use diagnostic software to identify installed computer peripherals and test their working condition

12	Assemble PC and install an operating system.
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<b>Text Books</b>	
1	Mark Minasi, The Complete PC Upgrade & Maintenance guide Wiley India
2	Barry Press and Maricia Press PC Upgrade and Repair Wiley India

<b>Reference Books</b>	
1	D. Balasubramanian Computer Installation & Servicing Tata McGraw Hill

<b>Useful links</b>	
1	<a href="https://onlinecourses.swayam2.ac.in/cec20_cs11/preview">https://onlinecourses.swayam2.ac.in/cec20_cs11/preview</a>

### Data Analytics using Excel Lab CSE (DS)

Semester	Course Code	Name of the course	L	T	P	Credits
II		Data Analytics using Excel lab	0	0	2	1

Pre requisites for the course	
1	Expected to have a good prior understanding of the basic features available in Microsoft Excel

Prior Reading Material/useful links	
1	<a href="https://www.mygreatlearning.com/academy/learn-for-free/courses/data-analytics-using-excel">https://www.mygreatlearning.com/academy/learn-for-free/courses/data-analytics-using-excel</a>

#### Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Use advanced functions and productivity tools to assist in developing worksheets.
2	CO2	Manipulate data lists using Outline, Autofilter and Pivot Tables.
3	CO3	Use Consolidation to summarise and report results from multiple worksheets.
4	CO4	Reflect on the ethics of the questions asked of data, the methods of acquiring the data, the

#### Syllabus:

List of Experiments	
1	Creating a personal spending budget
2	Cleaning Data Containing Date Values
3	Import/Transform Data to Excel via Power Query
4	Utilize VLOOKUP
5	Managing Pivot tables options and calculations
6	Creating simple tools with Excel
7	Create data visualizations in Excel
8	Creating and managing Templates
9	Data Analytics using Statistics
10	Create a Tree Map

Text Books	
1	“Data Analytics using Microsoft Excel”, Joseph M. Manzo, Flatworld Publisher 2.0.
2	“Data Analysis with Excel”, Manisha Nigam, Paperback 2019.

Reference Books	
1	“Data Analysis using SQL and Excel”, Gordon S. Linof, Wiley 2.0.

## Essence of Indian Culture

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech.First Year /Sem I/ Sem II		Essence of Indian Culture	2	0	0	2

### Pre requisites for the course

1	To Enrich the students with the concepts of Indian traditional culture and to make them understand the Importance of roots of culture.
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### Prior Reading Material/ useful links

1	<a href="https://www.youtube.com/watch?v=fsaccGmjkc&amp;list=PLC8AjJuSbo5tR2SZINzkRBBGiyRMk9dAN">https://www.youtube.com/watch?v=fsaccGmjkc&amp;list=PLC8AjJuSbo5tR2SZINzkRBBGiyRMk9dAN</a>
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### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	<b>Understand:</b> Identify the concept of Traditional Culture and its importance
2	CO2	<b>Understand:</b> Explain the need and importance of protecting traditional Culture.
3	CO3	<b>Apply:</b> Illustrate the various enactments related to the protection of traditional culture.
4	CO4	<b>Apply:</b> Interpret the concepts of Intellectual property to protect the traditional culture.
5	CO5	<b>Understand:</b> Explain the importance of Traditional knowledge in elite fields.

### Syllabus

Course Contents	
Unit-I	<b>Unit I:Introduction to Indian Culture:</b> Define Cultural Knowledge, Nature and Characteristics, Scope and Importance, Kinds of Cultural Knowledge, Indigenous Knowledge (IK), Cultural Knowledge vis-a-vis Indigenous Knowledge, Cultural Knowledge Vs Western Knowledge. [6 Hrs]
Unit-II	<b>Unit II: Protection of Indian Culture:</b> The need for protecting Indian Culture, Significance of Indian Culture protection, Value of Indian Culture in global economy, Role of Government to harness Indian Culture, Legal framework and Indian Culture. [ 6 Hrs]
Unit-III	<b>Unit III:Indian Culture in domain of Culture:</b> Philosophy, Literature, Music, Dance, Sculpture, Architecture and others. [6 Hrs]
Unit-IV	<b>Unit IV: Indian Culture in domain of Spirituality and Religion:</b> Vedanta, Jainism, Buddhism, Sikhism and other spiritual traditions. [6 Hrs]



Unit-V	Unit V:Indian Culture in Different Sectors : Indian Culture in Engineering, Medicine, Agriculture, Astronomy, Mathematics and elite sectors.. [6 Hrs]
<b>Text Books</b>	
1	Traditional Knowledge System in India- Amit Jha, 2009, Atlantic publishers..
2	Essence of Indian Traditions - Khanna Publishers
<b>Reference Books</b>	
1	Indian Arts- Pramod Gupta, 3rd Edition, 2019, Howard University Press.
2	Arts of India- Krishna Chaitanya, 5th Edition, 2019, Abhinav Publications.
<b>Useful links</b>	
1	<a href="https://www.aec.edu.in/knowledge/">https://www.aec.edu.in/knowledge/</a>
2	<a href="https://oufastupdates.com/essence-of-indian-traditional-knowledgeeitk/">https://oufastupdates.com/essence-of-indian-traditional-knowledgeeitk/</a>

**Contributions for syllabus designing:**

Sr. No	Name of the person	Designation	Organization
1	Sarika Dive	Assistant Professor	JDCOEM
2	Mr. Chaitanya Sahare	Alumni	JDCOEM

## Social Justice

Semester	Course Code	Name of the course	L	T/A	P	Credits
B. Tech. First Year /Sem I /Sem II		Social Justice	0	2A	0	2

Pre requisites for the course	
1	Enhance your understanding and application of moral values and ethics in the engineering field.

Prior Reading Material/ useful links	
1	"Engineering Ethics: Balancing Cost, Schedule, and Risk - Lessons Learned from the Space Shuttle" by William L. Anderson and Vincent J. Schaefer.
2	Doing Ethics: Moral Reasoning and Contemporary Issues" by Lewis Vaughn.

### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	To cultivate the Moral values and ethics in students.
2	CO2	To develop professional codes and conducts.
3	CO3	Analysis the ethical dilemmas and potential resolutions.
4	CO4	Distinguish Current and Emerging Ethical Issues in Engineering.

### Syllabus:

Course Contents	
Unit-I	<b>Children, Women &amp; Elderly:</b> The Prohibition of Child Marriage, Care and Protection of Children, Central Adoption Resource Agency, Protection of Children from Sexual Offences, Immoral Traffic Prevention, Protection of Women from Domestic Violence Protection of Women at Workplace, Maintenance and Welfare of Parents and Senior Citizens [6 Hrs]
Unit-II	<b>Genre equality:</b> Introduction to Gender Justice- Notion and Significance, International and Constitutional Perspectives on Gender Equality, Intersecting Gender and Feminism, Transgenders, Genre blurring [6 Hrs]
Unit-III	<b>Disabled:</b> Equal Opportunities, Protection of Rights and Full Participation act, Mental Retardation and Multiple Disabilities act, The National Trust for Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities, Rights of the Persons with Disabilities. [6 Hrs]
Unit-IV	<b>SCs &amp; STs, minorities:</b> The Scheduled Castes and the Scheduled Tribes (Prevention of Atrocities), National Commission for Scheduled Castes, Scheduled Castes Sub Plan, Tribal Sub Plan, Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights), National Commission for Religious and Linguistic Minorities

	<b>[6 Hrs]</b>
Unit-V	<b>Health &amp; Education:</b> Indian Healthcare System, Health Infrastructure in India, National Health Policy, Measures to Ensure Good Health Outcomes, Government Initiatives. Status of Literacy in India, Education Structure in India, Challenges Faced by Education Sector in India, Education Structure in India Government <b>[6 Hrs]</b>

**Activities:**

1	Visit to orphanage
2	survey of orphan's issues
3	Visit to old age home
4	Ppt on the responsibility toward old age people
5	Extempore on Feminism, Gender equality
6	Presentation on Government schemes for Women
7	Presentation on Government schemes for disabled
8	Assignment on different acts for SC-ST
9	Visit to Government Hospitals
10	Government schemes in education sector

<b>Text Books</b>	
1	"Engineering Ethics: Concepts and Cases" by Charles E. Harris Jr., Michael S. Pritchard, and Michael J. Rabins.
2	"Moral Issues in Business" by William H. Shaw and Vincent Barry.
<b>Reference Books</b>	
1	"Ethics for Engineers: Ethics across the Curriculum" by J. Roland Jones and R. J. Holtzapple.
2	"Engineering Ethics: Peace, Justice, and the Earth" edited by Kenneth D. Pimple.
3	Professional Ethics and Human Values" by Jayakumar S. and Srividya R.
<b>Useful links</b>	
1	<a href="https://www.youtube.com/watch?v=-FgEwqKkJbM">https://www.youtube.com/watch?v=-FgEwqKkJbM</a>
2	<a href="https://www.youtube.com/watch?v=P0om0QDVrv4">https://www.youtube.com/watch?v=P0om0QDVrv4</a>

**Contributions for syllabus designing:**

Sr. No	Name of the person	Designation	Organization
1	Ms. N.V. Pradnyakar	Associate Professor	JDCOEM
2	Mr. Chaitanya Sahare	Alumni	JDCOEM

### Moral Values & Ethics

Semester	Course Code	Name of the course	L	T/A	P	Credits
B.Tech.First Year /Sem I/ Sem II		Moral Values And Ethics	2	0	0	Audit

#### Pre requisites for the course

1	Enhance your understanding and application of moral values and ethics in the engineering field.
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#### Prior Reading Material/ useful links

1	Engineering Ethics: Balancing Cost, Schedule, and Risk - Lessons Learned from the Space Shuttle" by William L. Anderson and Vincent J. Schaefer.
2	Doing Ethics: Moral Reasoning and Contemporary Issues" by Lewis Vaughn.

#### Course Outcomes:

Sr. No	Course outcome number	CO statement
1	CO1	To cultivate the Moral values and ethics in students.
2	CO2	To develop professional codes and conducts.
3	CO3	Analysis the ethical dilemmas and potential resolutions.
4	CO4	Distinguish Current and Emerging Ethical Issues in Engineering.

#### Syllabus:

#### Course Contents

Unit-I	<b>Introduction to Moral values and Ethics:</b> Importance of ethics in engineering. Historical and contemporary ethical challenges in engineering, Ethical theories and frameworks relevant to engineering ethics. Difference between Moral values and Ethics. <b>[6 Hrs]</b>
Unit-II	Professional Codes of Conduct Familiarization with professional codes of conduct specific to engineering disciplines, Analysis and discussion of specific clauses and principles within these codes. <b>[6 Hrs]</b>
Unit-III	Case Studies and Ethical Dilemmas,examination of real-world case studies involving ethical challenges faced by engineers, Analysis and discussion of ethical dilemmas and potential resolutions, Critical thinking exercises to enhance ethical decision-making skills.. <b>[6 Hrs]</b>
Unit-IV	Current and Emerging Ethical Issues in Engineering: Exploration of contemporary ethical challenges and debates in engineering, such as privacy, data ethics, and the responsible use of emerging technologies, Reflection and self-assessment of personal values, biases, and ethical development. <b>[6 Hrs]</b>
Unit-V	Ethical Responsibility in Design and Innovation:Understanding the ethical implications of design choices, including considerations of safety, privacy, and

	inclusivity, Ethical challenges in emerging fields such as artificial intelligence, biotechnology, and autonomous systems, Discussion of sustainable engineering practices and considerations for minimizing negative impacts [6 Hrs]
<b>Text Books</b>	
1	"Engineering Ethics: Concepts and Cases" by Charles E. Harris Jr., Michael S. Pritchard, and Michael J. Rabins.
2	"Moral Issues in Business" by William H. Shaw and Vincent Barry.
<b>Reference Books</b>	
1	"Ethics for Engineers: Ethics across the Curriculum" by J. Roland Jones and R. J. Holtzapple.
2	"Engineering Ethics: Peace, Justice, and the Earth" edited by Kenneth D. Pimple.
3	Professional Ethics and Human Values" by Jayakumar S. and Srividya R.
<b>Useful links</b>	
1	<a href="https://www.youtube.com/watch?v=-FgEwqKkJbM">https://www.youtube.com/watch?v=-FgEwqKkJbM</a>
2	<a href="https://www.youtube.com/watch?v=P0om0QDVrv4">https://www.youtube.com/watch?v=P0om0QDVrv4</a>

**Contributions for syllabus designing:**

Sr. No	Name of the person	Designation	Organization
1	Mrs. Sarika Dive	Assistant Professor	JDCEM