JAIDEV EDUCATION SOCIETY'S

J D COLLEGE OF ENGINEERING & MANAGEMENT

POST: VALNI, AT: KHANDALA, KATOL ROAD, NAGPUR – 441501

DEPARTMENT OF FIRST YEAR

SESSION 2018-19

TEACHING PLAN

NAME OF THE TEACHER :- **AKSHAY A. KAKDE**
SUBJECT :- **Basic Electrical and Electronics Engineering** SUBJECT CODE :- **ESC-105**
YR/SEM :- **First Year / Sem -I** SECTION :- **C**

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text / Reference Books (Page no)	URL's		Applications (R&D/ Industry)	Learning Outcomes
						NPTEL	OnlineMaterial/ PPt/Video)		
UNIT-I Elementary Electrical Concepts									
1	1	1.01	Fundamental of Electrical system Potential difference, Ohm's law, Effect of temperature on resister, resistance temperature coefficient, Electrical wiring system.	3/1/19 4/1/19	T/R7 (P1 - P10), T/R8 (P3 - P20)	1,4	1,2	P1	Students should able to understand the basics of electrical engineering and wiring system applicable in domestic and industrial applications.
2	2	1.2	Study of different wire gauges and their applications in domestic and industry. Energy Resources and Utilization: Conventional and nonconventional energy resources;	4/1/19 10/1/19 11/1/19	T/R8 (P855 - P864)	2	3,4	P1, P2	Students should able to understand the basics of electrical generation system and wiring system applicable in domestic and industrial applications.
3	3	1.3	Introduction to electrical energy generation from different resources, transmission, distribution and utilization, Advantages & Disadvantages of AC & DC transmission.	11/1/19 17/1/19 18/1/19	T/R8 (P855 - P864)	3	5	P2	Students should able to understand the basics of electrical power system.
4	4	1.4	Concept of Supply Demand, Power Factor, Need of unity factor.	18/1/19 31/1/19	T/R8 (P510 - P515)	2	6	P2	Students should able to understand the basics of performance parameters of electrical system.

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UNIT-II Measurement of Electrical Quantities									
5	5	2.1	Measurement of Voltage, Current, and Power; Measurement of 3 phase power; Study of Energy meters.	1/2/19 1/2/19	T/R6 (P523 - P598), T/R7 (P175 - P188)	2	7	P3	Students should able to understand the basics of measurement of various parameters of electrical system.
6	6	2.2	Study of Electrical Storage devices: Batteries such as Nickel-cadmium (NiCd), Lithiumion (Li-ion), Lithium Polymer (Li-pol.) batteries.	7/2/19 8/2/19 8/2/19	T/R7 (P76 - P84), (P339 - P374)	8	8,9	P4	Students should able to understand the concept of battery storage device.
7	7	2.3	Study of circuit breakers & Actuators (MCB & MPCB, Power Contactors & Aux contactors)	14/2/19 15/2/19	-	9	10, 11, 12	P5	Students should able to understand the basics of protection system and application of protection devices in power system.
8	8	2.4	Study of circuit breakers & Actuators (Electro-Mechanical & Solid state Relays)	21/2/19 22/2/19	-	9	11, 13	P5	Students should able to understand the basics of protection system and application of protection devices in power system.
UNIT-III Diodes and Circuits									
9	9	3.1	The P-N Junction Diode, V-I characteristics, Diode as Rectifier, specifications of Rectifier Diodes.	22/2/19 28/2/19	T/R8 (P177 - P211), T/R9 (P49 - P83)	1	11, 14	P6	Students should able to understand the basics of electronics devices and its application in electrical power system.
10	10	3.2	Half Wave, Full wave, Bridge rectifiers, Equations for I_{DC} V_{DC} V_{RMS}, I_{RMS}, Efficiency and Ripple Factor for each configuration.	1/3/19 1/3/19 7/3/19	T/R8 (P242 - P273), T/R9 (P87 - P114)	1,5	11, 15	P6	Students should able to understand the basics of electronics devices and its application in electrical power system.
11	11	3.3	Filters: Capacitor Filter, Choke Input Filter, Capacitor Input Filter(Π Filter)	8/3/19 8/3/19	T/R8 (P47 - P75)	10, 11	11, 16	P6	Students should able to understand the basics of electronics devices and its application in electrical power system.
12	12	3.4	Zener Diode, Characteristics, Specifications, Zener Voltage Regulator, Types of Diodes: LED, Photodiode	14/3/19 15/3/19	T/R9 (P212 - P231)	1,5	11, 17, 18, 19	P6	Students should able to understand the basics of electronics devices and its application in electrical power system.
UNIT-IV Semiconductor Devices and Applications									
13	13	4.1	Transistors: Introduction, Classification, CE, CB, and CC configurations, α, β, concept of gain and bandwidth.	15/3/19 21/3/19	T/R8 (P274 - P287)	4,5	11, 20	P7	Students should able to understand the basics of transistors family and its application in power system.

14	14	4.2	Operation of BJT in cut-off, saturation and active regions (DC analysis).	22/3/19 22/3/19 28/3/19	T/R8 (P288 - P299)	4,5	11, 21	P7	Students should able to understand the basics of BJT and its application in power system.
15	15	4.3	BJT as an amplifier, biasing techniques of BJT, BJT as a switch.	29/3/19 29/3/19 4/4/19	T/R8 (P300 - P314)	4,5,7	22	P7	Students should able to understand the basics of BJT and its application in power system.
16	16	4.4	Introduction to Digital Electronics: Number System, Basic logic Gates, Universal Gates, Boolean Postulates, De-Morgan Theorems	5/4/19 11/4/19 11/4/19	T/R8 (P528 - P547), (P616 - P624)	6	23, 24	P7	Students should able to understand the basics of digital electronics and its application in power system.

*T/R=Text Book/ Reference Book; C= Company name; R= Research Paper

Total number of lectures as per syllabus: - 16 Total number of lectures as per planned: - 39

Final Outcome of the Subject (Maximum 6 Outcome):

CO1. Students should able to understand the basics of electrical engineering and wiring system applicable in domestic and industrial applications.
CO2. Students should able to understand the basics of electrical power system.
CO3. Students should able to understand the basics of performance parameters, measurement, storage and protection of electrical system.
CO4. Students should able to understand the basics of electronics devices, electronic circuits and its application in electrical power system.
CO5. Students should able to understand the basics of digital electronics and its application in power system.

Text / Reference Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Basic Electrical Engineering	V. N. Mittal and Arvind Mittal	McGraw-Hill Publication	
T2	A Text book of Basic Electronics	Brijesh Iyer and S. L. Nalbalwar	Synergy Knowledgeware Mumbai	2017. ISBN:978-93-8335-246-3.
T3	Electrical engineering Fundamentals	Vincent DelToro	PHI Publication	2nd Edition, 2011.
T4	Electronics Devices and Circuits Theory	Boylstad	Pearson Education.	
T5	Electrical Technology	Edward Hughes	,Pearson Education	
T6	Theory and Problems in Electrical Engineering	D. P. Kothari and Nagrath	PHI Publication	2011.

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T7	Basic Electronics	B. L. Theraja	S. Chand Limited	2007.
T8	A TEXTBOOK OF ELECTRICAL TECHNOLOGY VOLUME I	B. L. Theraja	S. Chand Limited	2005.
T9	Integrated Electronics-Analog and Digital Circuits and Systems	Millman Halkias	McGraw-Hill Publication	2000.
T10	Electronic Circuit Analysis and Design	Donald Neaman	McGraw-Hill Publication	3rd Edition.
T11	Printed Circuit Boards Design & Technology	Walter C. Bosshart	McGraw-Hill Publication	
Note: Students are advised to use internet resources whenever required				

On Line Material

1. https://www.electronics-tutorials.ws/resistor/resistivity.html
2. https://www.electrical4u.com/system-of-wiring/
3. https://inspectapedia.com/electric/Electrical_SEC_Sizes_Amps.php
4. http://www.environmentalpollution.in/energy/sources-of-energy-conventional-and-nonconventional-sources-explained/292
5. https://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Basic%20Electrical%20Technology/pdf/L-02(TB)(ET)%20((EE)NPTEL).pdf
6. http://edistoelectric.com/understanding-power-factor-and-why-its-important-2/
7. https://www.electronicshub.org/dc-and-ac-electric-power-measurement/
8. https://batteryuniversity.com/learn/article/lithium_based_batteries
9. https://www.techopedia.com/definition/16329/nickel-cadmium-battery-nicd-or-nicad
10. https://thegrid.rexel.com/en-us/knowledge/product-faqs/w/wiki/885/motor-protection-circuit-breakers-mpcb-and-motor-circuit-protector-mcp
11. https://www.allaboutcircuits.com/textbook/
12. http://image.schrack.com/produktkataloge/w_k-alea-en9.pdf
13. https://www.electronics-tutorials.ws/io/io_5.html
14. https://www.electronics-tutorials.ws/diode/diode_3.html

15. http://www.circuitstoday.com/full-wave-bridge-rectifier

16. http://www.circuitstoday.com/filter-circuits

17. https://www.electronics-tutorials.ws/diode/diode_7.html

18. https://www.elprocus.com/photodiode-working-principle-applications/

19. https://www.polytechnichub.com/difference-led-photodiode/

20. https://www.elprocus.com/transistors-basics-types-baising-modes/

21. https://en.wikipedia.org/wiki/Bipolar_junction_transistor

22. https://www.allaboutcircuits.com/textbook/semiconductors/#chpt-4

23.http://ebooks.bharathuniv.ac.in/gdlc1/gdlc1/Engineering%20Merged%20Library%20v3.0/GDLC/Number%20Systems,%20Boolean%20Algebra%20and%20Logic%20Gates%20(7459)/Number%20Systems,%20Boolean%20Algebra%20and%20Logic%20Gates%20-%20GDLC.pdf

24. https://www.scribd.com/document/24898351/Number-System-Logic-Gates

NPTEL Course Name

1. https://nptel.ac.in/courses/122104013/

2. https://nptel.ac.in/courses/108108076/

3. https://nptel.ac.in/courses/108105058/

4. https://nptel.ac.in/courses/108102097/

5. https://nptel.ac.in/syllabus/syllabus.php?subjectId=108101091

6. https://nptel.ac.in/courses/108105113/

7. https://nptel.ac.in/courses/108105132/

8. https://nptel.ac.in/courses/108103009/32

9. https://nptel.ac.in/courses/108101039/

10. https://nptel.ac.in/courses/117108124/5

11. https://nptel.ac.in/courses/117108107/23

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Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	Nagpur Wires & Transformers	http://www.esuppliersindia.com/nagpur-wires-transformer/aboutus-p8813554-u6426311-swa.html	Nagpur Wires & Transformers is venerated manufacturer and supplier of a proven range of Industrial Transformers and wiring system in Nagpur, Maharashtra, India. The offered Industrial Transformers are manufactured by utilizing the advanced engineering.
C2	Devices Electrotechnica	http://www.deviceselectrotechnica.com/	Based at Nagpur, Maharashtra (India), **Devices Electrotechnica / Elektrokit** is counted amidst the renowned Manufacturers and Suppliers of the most accurately designed Latest Electronic Projects,Customized Electronic Project Designing, Educational Electronic Kits. Based on varied technological concepts, the layout and component designs of these kits are easily understandable. We make sure that that the designs and working are so simple that any user can perform the testing of the hardware without any complication. Moreover, our experts also render the cost-effective and reliable Consultancy Services to the users from industrial as well as educational sector regarding the working, assembly and use of these kits. Devices Electrotechnica / Elektrokit came into existence in the year 1990 at Nagpur, Maharashtra (India).

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	"Aggregation of Users in a Residential/Commercial Building Managed by a Building Energy Management System (BEMS)",	Luigi Martirano, Giuseppe Parise, Giacomo Greco, Matteo Manganelli, Ferdinando Massarella, Marta Cianfrini, Luigi Parise, Paolo di Laura Frattura, Emanuele Habib,	*Industry Applications IEEE Transactions*	https://doi.org/10.1109/IEEESTD.1991.101037	vol. 55, no. 1, pp. 26-34, 2019.
P2	Investigation and analysis on the combined operation of solar thermal power and conventional thermal power	D. Y. Liu ; J. Wang ; X. Q. Feng ; S. Guo ; C. Xu	2009 International Conference on Sustainable Power Generation and Supply	10.1109/SUPERGEN.2009.5348131	**Print ISSN:** 2156-9681 **Electronic ISSN:** 2156-969X
P3	P3001.8 /D8, Sep 2011 - IEEE Draft Recommended Practice for the Instrumentation and Metering of Industrial and Commercial Power Systems	--	**ICS Code:** 17.220.20 91.140.50 - Measurement of electrical and magnetic quantities Electricity supply system	https://ieeexplore.ieee.org/servlet/opac?punumber=6302156	**Electronic ISBN:** 978-0-7381-7337-5
P4	K"Battery energy storage technology for power systems-An overview", ,	. C. Divya, J. Ostergaard,	*Electr. Power Syst. Res.*	https://doi.org/10.1016/j.epsr.2008.09.017	vol. 79, pp. 511-520, Apr. 2009.

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P5	IS/IEC 60898-1: Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations, Part 1: Circuit-breakers for ac operation	--	Bureau of Indian Standards (BIS), Electrotechnical, Section Name: Low Voltage Switchgear and Controlgear (ETD 7)		**Equivalence:** IEC 60898-1:2002 **Superceding:** IS 8828:1996
P6	Investigation on operation of silicon power devices in the breakdown region of electrical characteristic",	V.V.N. Obreja	", *Proc. Intern. Semiconductor Conference (CAS 01)*	**DOI:** 10.1109/SMICND.2001.967511	**Print ISBN:** 0-7803-6666-2
P7	The evolution of transistors for power amplifiers: 1947 to today	Edward C. Niehenke	2015 IEEE MTT-S International Microwave Symposium	**DOI:** 10.1109/MWSYM.2015.7166768	**ISBN:** 978-1-4799-8275-2 **ISSN:** 0149-645X

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DEPARTMENT OF B.Tech First year

SESSION 2018-19

TEACHING PLAN

NAME OF THE TEACHER :- **Prof. Leena Bhoyar**
SUBJECT :- **Engineering Mathematics II** SUBJECT CODE :- **BTBS201**
YR/SEM :- **First year SEM II** SECTION :- **C**

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-I Drawing Standards & Geometrical Construction									
1	1	1.01	Definition and geometrical representation of complex numbers	4/1/2019	T1/475	R1/913-917	https://www.youtube.com/watch?v=Ll150uIknNo	P1	Students should be able to understand the geometric interpretation of complex numbers
2	2	1.2	De-Moivre's theorem	4/1/2019	T2/711	R1/969-970	https://www.youtube.com/watch?v=j7qs1XYVfUA	P2	Students should be able to know methods of finding the nth roots of complex numbers and the solutions of simple polynomial equations
3	3	1.3	Roots of complex numbers by using De-Moivre's theorem (Application of De-Moivre's theorem)	7/1/2019	T1/492	R1/971-972	https://www.youtube.com/watch?v=Rcic2zJpSVs	P2	
4	1	1.4	Circular functions of complex variable – definition; Hyperbolic functions	11/1/2019	T1/486-487	R1/918-920	https://www.youtube.com/watch?v=yEqhzxwwqEM https://www.youtube.com/watch?v=BByp3lWWwHM	P3	Students will able to understand Circular functions, Hyperbolic function of complex number and Relations

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5	2	1.5	Hyperbolic function	11/1/2019	T2/723-726		https://www.youtube.com/watch?v=G1C1Z5aTZSQ&vl=en https://www.youtube.com/watch?v=uMXcKY_w3w4	P3	between circular
6	1	1.6	Relations between circular and hyperbolic functions	12/1/2019	T2/727-729		https://www.youtube.com/watch?v=luHdVJWdjcU	P3	
7	2	1.7	Real and imaginary parts of circular and hyperbolic functions logarithm	12/1/2019	T1 and T2/497 and 730-732	R1/966-969	https://www.youtube.com/watch?v=Z1BlcU1d6Fg&vl=en	P3	Students will able to find real and imaginary part of comlex number
UNIT : II **ORDINARY DIFFERENTIAL EQUATION OF FIRST ORDER AND FIRST DEGREE**									
8	3	2.1	Linear Equation	14/1/2019	T1/135	R1/22-24	https://nptel.ac.in/courses/111106100/ https://nptel.ac.in/courses/111107111/1	P5	Recognize and solve a linear differential equation by use of an integrating factor.
9	1	2.1	Sums on Linear Differential Equation	18/1/2019	T1/135	R1/22-24	https://nptel.ac.in/courses/111106100/ https://nptel.ac.in/courses/111107111/1	P5	
10	2	2.2	Bernoulli's equation	18/1/2019	T2/476-478	R1/22-26	https://nptel.ac.in/courses/111106100	P5	Engineers can set the Bernoulli equation at one point equal to the Bernoulli equation at any other point on the streamline and solve for unknown properties
11	3	2.2	Sums on reducible differential equation	21/1/2019	T2/476-478		https://nptel.ac.in/courses/111106100	P5	
12	1	2.3	Exact differential equation	25/1/2019	T1/149	R1/27-30	https://nptel.ac.in/courses/111106100	P6	Will be able to solve first-order ordinary

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13	2	2.3	Sums on Exact differential equation	25/1/2019	T1/149	R1/27-30	https://nptel.ac.in/courses/111106100	P6	differential equations. And solves exact differential equations
14	3	2.4	equations reducible to exact equations	28/1/2019	T2/478-484	R1/31-32	https://nptel.ac.in/courses/111106100/8	P6	By the end of this learning unit students should be able to: • determine the exactness of a differential equation. • determine a solution of exact differential equation. • solve nearly exact differential equations.
15	1	2.5	Application to orthogonal trajectory	1/2/2019	T1/166-168	R1/53-55	https://www.youtube.com/watch?v=FMLTSDqwEIU	P7	
16	2	2.5	Examples on orthogonal trajectory	1/2/2019	T1/166-168	R1/55-57	https://www.youtube.com/watch?v=3sRj23qOdKU	P7	
17	3	2.6	Application to physical and electrical systems	4/2/2019	T2/504-510	R1/46-52	https://www.youtube.com/watch?v=e7p_VNRSSc4	P7	
UNIT: III **LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS**									
18	1	3.1	Introductory remarks - complementary function, particular integral	8/2/2019	T1/168-169	R1/73-74	https://nptel.ac.in/courses/111107098/3	P8	Students will be able to: Find the complete solution of a homogeneous differential equation with constant coefficients by examining the characteristic equation and its roots.
19	2	3.2	Particular integral	8/2/2019	T1/170	R1/75-76	https://nptel.ac.in/courses/111107098/4 https://nptel.ac.in/courses/111107098/6	P8	
20	1	3.3	Rules for finding complementary function	9/2/2019	T2/512-520	R1/73-74	https://nptel.ac.in/courses/111107098/14	P8	
21	2	3.4	Rules for finding particular integral	9/2/2019	T2/521-531	R1/75-76	https://nptel.ac.in/courses/111107098/15	P8	
22	3	3.5	Method of variation of parameter	11/2/2019	T1/186	R1/82-84	https://nptel.ac.in/courses/111107098/11	P9	Students will be able to: Find the complete

23	1	3.5	Sums on Method of variation of parameter	15/2/2019			https://nptel.ac.in/courses/111107098/11	P9	solution of a differential equation with constant coefficients by variation of parameters
24	2	3.6	Legendre's linear equations	15/2/2019	T3/205-206		https://www.youtube.com/watch?v=MFswwWZpyio	P9	The students will be able to: **perform** operations with Bessel, Hermite and Legendre differential equations along with the corresponding recurrence formulas of different functions.
25	3	3.7	Examples on Legendre's linear equations	18/2/2019	T4/4.45-4.47		https://www.youtube.com/watch?v=CVij36N7q4A	P9	
UNIT: IV **FOURIER SERIES**									
26	1	**4.1**	Euler's Formula	22/2/2019	T1/851		https://nptel.ac.in/courses/111106046/#	P10	Student will Understand the Euler's Formula of Fourier series
27	2	**4.2**	Conditions for Fourier series expansion - Dirichlet's conditions	22/2/2019	T2/435		https://nptel.ac.in/courses/111106046/#	P10	Demonstrate their understanding of the Dirichlet conditions by using them to evaluate infinite series.
28	1	4.3	Functions having points of discontinuity	23/2/2019	T2/436-444		https://nptel.ac.in/courses/111106046/#	P10	Student will able to Understand the concept of function

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									of discontinuty
29	2	4.4	Change of interval	23/2/2019	T2/439-443		https://www.youtube.com/watch?v=sEckOD35dqI	P10	Student will able to Understand the concept Change of interval
30	3	4.5	Odd and even function- expansions of odd periodic functions	25/2/2019	T1/861-863	R1/589-590	https://nptel.ac.in/courses/111106046/#	P11	Student will Understand Problems of Fourier series and Fourier transforms used odd periodic function in engineering applications
31	1	4.6	Odd and even function- expansions of even periodic functions	1/3/2019	T1/861-863	R1/591-593	https://nptel.ac.in/courses/111106046/#	P11	Student will Understand Problems of Fourier series and Fourier transforms used Even periodic function iin engineering applications
32	2	4.7	Half -range series	1/3/2019	T2/449-453	R1/609-613	https://nptel.ac.in/courses/111106046/#	P11	Student will able to Understand and solve Half -range series
UNIT: V **VECTOR CALCULUS**									
33	1	5.1	Differentiation of vectors – general rules of differentiation	8/3/2019	T1/372-401	R1/500	https://www.youtube.com/watch?v=1M4RzBUS73k	P12	Student will able to solve Differentiation of vectors

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34	2	5.2	Scalar and vector fields	8/3/2019	T2/351-362	R1/510	https://www.youtube.com/watch?v=Wpk1OSXLRY	P12	Students will be able to: Identify conservative vector fields. sketches of simple vector fields in the plane
35	3	5.3	Gradient	11/3/2019	T4/8.2	R1/510	https://www.youtube.com/watch?v=T8GGgDcX6Ns	P13	Apply gradient to solve problems involving normal vectors to level surfaces
36	1	5.4	divergence	15/3/2019	T4/8.4	R1/510	https://www.youtube.com/watch?v=T8GGgDcX6Ns	P13	Student will able to Memorize definitions of curl and divergence of vector field and compute them
37	2	5.4	Sums on Gradient, Divergence	15/3/2019	T4/8.4	R1/510	https://www.youtube.com/watch?v=T8GGgDcX6Ns	P13	
38	3	5.5	Curl	18/3/2019	T4/8.6	R1/511-512	https://www.youtube.com/watch?v=T8GGgDcX6Ns	P14	
39	1	5.6	Solonoidal irrotational vector fields	22/3/2019	T4/8.10	R1/512-515	https://www.youtube.com/watch?v=T8GGgDcX6Ns	P15	By the end of the course, students should be Recognise irrotational and solenoidal vector fields.
40	2	5.6	Sums on Solonoidal irrotational vector fields	22/3/2019	T4/8.10	R1/512-515	https://www.youtube.com/watch?v=T8GGgDcX6Ns	P15	By the end of the course, students should be Recognise irrotational and solenoidal vector fields.
41	3	5.7	Vector identities	25/3/2019	T3/414-421	R1/512-515	https://www.youtube.com/watch?v=ZfMj-bgi1bk	P15	Student will able to solve sums on Vector identities
42	1	5.7	Sums on Vector Identities	29/3/2019	T3/414-421	R1/512-515	https://www.youtube.com/watch?v=ZfMj-bgi1bk	P15	

*T=Text Book; R= Reference Book; C= Company name; R= Research Paper

Total number of lectures as per syllabus: - _42____ Total number of lectures as per planned: - _42____

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Final Outcome of the Subject (Maximum 6 Outcome):

CO1. Understand geometrically their representation on the Argand diagram, including the *n*th roots of unity, know the polar representation form and be able to apply it.

CO2. Classify differential equations according to certain features. Solve first order linear equations and nonlinear equations of certain types and interpret the solutions. Understand the conditions for the existence and uniqueness of solutions for linear differential equations

CO3. Solve second and higher order linear differential equations with constant coefficients and construct all solutions from the linearly independent solutions

CO4. Write given function in terms of sine and cosine terms in Fourier series and also to get knowledge in Fourier transforms

CO5. In preparation for that study, this unit is devoted to the mechanics of differentiation of vector-valued functions and scalar valued function

CO6. In preparation for that study, this unit is devoted to the mechanics of integration of vector-valued functions and scalar valued function

Text Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Advance Engineering mathematics,	H.K.Das	S.chand publication	19th edition
T2	Heigher Engineering Mathematics	Dr.B.S.Grewal,	Khanna publication	40th edition
T3	Advance Engineering mathematics	Erwin Kreyszing	Wiley Publication,	8th edition
T4	Engineering Mathematics II	Dr.N.S.Mujumdar	Niral Publication	1th edition

Reference Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	Advance Engineering mathematics	Peter V. O'Neil	Thomson publication	Sixth edition

Company/Industry:

Code	Company/Industry Name	Website	Detailed Information

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/ Page no/Year
P1	On the Dual Real Value nature of Complex Number	P.Harsha	International Journal if Scientific an Engineering Research volume3	ISSN2229-5518	December2012

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P2	de-moivre's formula for matrices of quaternions	mehdi jafari1,* , hamid mortazaasl2 and yusuf yayli3	JP Journal of Algebra, Number Theory and Applications		May 11, 2011 Volume 21, Number 1
P3	Some New Wilker-Type Inequalities for Circular and Hyperbolic Functions	Ferhan Atici	Abstract and Applied Analysis Hindawi	Article ID 485842	11 May 2009
P4	Convergent solutions of ordinary linear homogeneous differential equations in the neighborhood of an irregular singular point	H. L. Turrittin	Acta Mathematica	ISSN: 0001-5962 (Print) 1871-2509 (Online)	December 1955, Volume 93, Issue 1, pp 27–66
P5	First order ordinary differential equations with several periodic solutions	Jean Mawhin	Zeitschrift für angewandte Mathematik und Physik	ISSN: 0044-2275 (Print) 1420-9039 (Online)	March 1987, Volume 38, Issue 2, pp 257–265
P6	Exact solutions for nonlinear partial fractional differential equations	Khaled A. Gepreel[1]	*Chinese Physics B*	doi:10.1088/issn.1674-1056	Volume 21, Number 11
P7	Some Differential Properties of the Orthogonal Trajectories of a Congruence of Curves, with an Application to Curl and Divergence of Vectors	Reginald A. P. Rogers	Proceedings of the Royal Irish Academy. Section A: Mathematical and Physical Sciences	**ISSN:** 00358975	Vol. 29 (1911/1912), pp. 92-117
P8	Hypoelliptic second order differential equations	Lars Hörmander	Acta Mathematica	ISSN: 0001-5962 (Print) 1871-2509 (Online)	December 1967, Volume 119, Issue 1, pp 147–171
P9	The Legendre wavelet method for solving fractional differential equations	Mujeeb ur Rehma	Communications in Nonlinear Science and Numerical Simulation By Elsevier	ISSN **1007-5704**	Volume 16, Issue 11, November 2011, Pages 4163-4173

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P10	Fourier series expansion of the transfer equation in the atmosphere-ocean system	J.L. Deuzé	Elsevier/ Journal of Quantitative Spectroscopy and Radiative Transfer	ISSN: 0022-4073	Volume 41, Issue 6, June 1989, Pages 483-494
P11	On the Convergence Rate of Generalized Fourier Expansions	K. O. MEAD	*IMA Journal of Applied Mathematics*	Online ISSN 1464-3634 Print ISSN 0272-4960	Volume 12, Issue 3, 1 December 1973, Pages 247–259
P12	Scalar–tensor–vector gravity theory	J W Moffat	*ournal of Cosmology and Astroparticle Physics* (JCAP)	doi:10.1088/issn.1475-7516	March 2006
P13	Gradient vector flow	j.l.prince	a new external force for snakes	https://doi.org/10.1109/CVPR.1997.609299	17-19 June 1997
P14	Parametric investigation on the curling phenomenon in CONFORM process by three-dimensional finite element analysis	j.R.Cho	Journal of Materials Processing Technology	https://doi.org/10.1016/S0924-0136(00)00658-0	1 March 2001 Volume 110
P15	Computing solenoidal eigenmodes of the vector Helmholtz equation	D.A.White J.M.Koning	a novel approach	https://doi.org/10.1109/TMAG.2002.802734	Volume: 38 , Issue: 5 , Sept. 2002
P16	Analysis of Streptomyces avermitilis genes required for avermectin biosynthesis utilizing a novel integration vector	Tanya macneil	Gene	https://doi.org/10.1016/0378-1119(92)90603-M	Volume 111, Issue 1, 1 February 1992
P17	Nonnegative Matrix Factorization with	Nancy Bertin	Neural Computation	doi.org/10.1162/nec	Volume 21 | Issue 3 |

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	the Itakura-Saito Divergence: With Application to Music Analysis			o.2008.04-08-771	March 2009 p.793-830
P18	Formal numerical solutions of the Stokes transfer equations	Rees, D. E., Murphy, G. A., & Durrant, C. J.	Astrophysical Journal, Part 1 (ISSN 0004-637X)	(ISSN 0004-637X)	vol. 339, April 15, 1989

Prof. Leena Bhoyar
Subject Teacher

Prof. Mamta V. Takarkhede
Academic Incharge

Dr. Amit N. Gupta
Head of Department, First Year

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TEACHING PLAN

NAME OF THE TEACHER :- **Prof. Ritesh Tandekar**
SUBJECT :- **Surveying-1** SUBJECT CODE :- **BTCVC304**
YR/SEM :- **2nd/III** SECTION :- **A**

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-I Chain Surveying									
1	1	1.01	Definition, principles, classification, fields and office work	Day 1	(Pg:1.1-1.2)	(Pg:1)	**Video**: https://www.youtube.com/watch?v=chhuq_t40rY&list=PL20A0651466E8A776 IIT Kanpur	C1	Students should get the knowledge of Surveying.
2	2	1.02	scales, conventional signs,	Day 2	(Pg:1.3-1.5)	(Pg:4)	**Video**: https://www.youtube.com/watch?v=hISmKTEfgXc IIT Kanpur	C1,C2	Students should able to know the information of scales
3	3	1.03	survey instruments, their care and adjustment	Day 3	1.6	5	**Video**: https://www.youtube.com/watch?v=QDyQZv4yMJU	C1	Students should able to know the information of instrument use in Surveying

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4	4	1.04	ranging and chaining, reciprocal ranging	Day 4	(Pg:1.9)	(Pg:7)	**Video**: https://www.youtube.com/watch?v=DDspps1tdfg	C1	Students Should get the knowledge Ranging
5	5	1.05	setting perpendiculars, well-conditioned triangle	Day 5	(Pg:1.21)	(Pg:50)	**Video**: https://www.youtube.com/watch?v=tWNfq6XsP4Q	C1,C2	Student should get the knowledge of Well conditioned Triangle.
6	6	1.06	traversing, plotting , enlarging and reducing figures	Day 6	(Pg:1.22)	(Pg:79)	**Video**: https://www.youtube.com/watch?v=mbfayL-_AX4	C2	Students Should able to know how to plot travers.
Continue……									

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-II Compass Surveying									
7	7	2.01	Prismatic compass, surveyor's compass,	Day 7	2.1	83	**Video**: **https://www.youtube.com/watch?v=x9ZPMxrlS3U**	C1,C2	Student should get the knowledge about Prismatic compass
8	8	2.02	bearing systems and conversions,	Day 8	2.3	74	**Video**: https://www.youtube.com/watch?v=L_HqYnLx3sI	C2	Student should get the knowledge of bearing & there type.
9	9	2.03	local attraction,	Day 9	2.11	78	**Video**: https://www.youtube.com/watch?v=t1UFtxj1iOw	C2	Student should get the knowledge of local Attraction.

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10	10	2.04	magnetic declination	Day 10	2.16	77	**Video**: https://www.youtube.com/watch?v=jnWbOMj2hNk	C2	Student should get the knowledge of local declination & there type
11	11	2.05	dip traversing, adjustment of errors	Day 11	2.23	79	**Video**: https://www.youtube.com/watch?v=uhOoXJ9e-Vo	C2	Students Should get knowledge about dip traversing.
Continue……									

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-III Plane Table Surveying									
12	12	3.01	Plane table instruments and accessories	Day 12	3.1	115	**Video**: https://www.youtube.com/watch?v=rTZQAAN4ZFA	C1,C2	Students should able to know about plane table and there accessories
13	13	3.02	merits and demerits,	Day 13	3.2	116	**Video**: https://www.youtube.com/watch?v=ms0wR13XVCI	C1	Students should able to know merit & demerits of plane table
14	14	3.03	methods: radiation,	Day 14	3.4	121	**Video**: https://www.youtube.com/watch?v=jzJA_-lfLbY	C4	Students should able to know about Radiation method of Plane table surveying
15	15	3.04	intersection,	Day 15	3.5	122	**Video**:	C4	Students should able to know about

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							https://www.youtube.com/watch?v=rBN7ta9K5nM		Intersection method of Plane table surveying
16	16	3.05	resection, traversing	Day 16	3.6	123	**Video**: https://www.youtube.com/watch?v=ikmD75PtDNw	C4	Students should able to know about Resection method of Plane table surveying
Continue……									

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-IV Leveling & Application									
17	17	4.01	Level line - Horizontal line - Levels and Staves, Sprit level – Sensitiveness,	Day 17	4.1	132	**Video**: https://www.youtube.com/watch?v=rZzbNLFjNJg	C1,C2	Students should get the knowledge of level line
18	18	4.02	Bench marks - Temporary and permanent adjustments,	Day 18	4.2	133	**Video**: https://www.youtube.com/watch?v=0vQ22UbBz9Q	C1	Students should get the knowledge bench marks
19	19	4.03	Fly and Check leveling, Booking, reduction	Day 19	4.5	144	**Video**: https://www.youtube.com/watch?v=koLKTtJg1fc	C2	Students should able to know about Fly Levling

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20	20	4.04	Curvature and Refraction – reciprocal leveling - Longitudinal and cross sections	Day 20	4.7	155	**Video**: https://www.youtube.com/watch?v=wgtb40Tg1vY	C1	Students should able to know about Recipocal Levling
21	21	4.05	Plotting - Contouring - Methods -	Day 21	4.8	193	**Video**: .youtube.com/watch?v=YUs2JPnys2k	C2	Students should able to know about Contouring
22	22	4.06	Characteristics and uses of contours -	Day 22	4.10	194	**Video**:	C1	Students should able to know about Characteristics of Contouring
23	23	4.07	Earth work volume - Capacity of reservoirs	Day 23	4.30	-	**Video**:	P1	Students should able to know about How to calculate Earth work volume
24	24	4.08	Planimeter-Types, Theory, concept of zero circle, Study of Digital Planimeter, Computation of Areas and Volumes	Day 24	4.40	220	**Video**: https://www.youtube.com/watch?v=mxr4TQ09z_w	C1	Students should able to know about planimeter & there type,

Continue……..

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books	Reference Book	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes

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					(Page no)	(Page no)			
UNIT-V Theodolite Surveying									
25	25	5.01	Theodolite - Vernier and micro-optic - Description and uses	Day 25	5.1	256	**Video**: https://www.youtube.com/watch?v=CBlhQ76LAyI	C1,C2	Students should get the knowledge of Theodolite
26	26	5.02	temporary and permanent adjustments of vernier transit	Day 26	5.2	142	**Video**: https://www.youtube.com/watch?v=Hl8lyV0op1U	C1	Students should able to know about how to adjust the thodolite
27	27	5.03	Angles: Horizontal -	Day 27	5.6	268	**Video**: https://www.youtube.com/watch?v=v7P0yaewxpk	C1,C2	Students should able to know about how to determine horizontal angle
28	28	5.04	Vertical - Heights and Distances	Day 28	5.7	267	**Video**: https://www.youtube.com/watch?v=quaZ3rTHrvw	C1,C2	Students should able to know about how to determine vertical angle
29	29	5.05	Traversing - Closing error and distribution	Day 29	5.15	257	**Video**: https://www.youtube.com/watch?v=x5xilCqxJ0k	C1	Students should able to know about travsing
30	30	5.06	Gales's table - Omitted measurements	Day 30	5.17	286	**Video**: https://www.youtube.com/watch?v=fLNe6j8Keho	C2	Students should able to know about how to draw gales table

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UNIT-VI Engineering Surveying									
31	31	6.01	Reconnaissance, Preliminary and location surveys for engineering projects	Day 31	6.1		**Video**: https://www.youtube.com/watch?v=xvFXu-RZVtI	C1	Students should able to know about Reconnaissance & Preliminary Surveying
32	32	6.02	Layout, Setting out works, Route Surveys for highways, railways and waterways,	Day 32	6.6		**Video**: https://www.youtube.com/watch?v=w54jyUIzGy0	C2	Students should able to know about Route Surveys
33	33	6.03	Introduction to curve ranging,	Day 33	6.13		**Video**:	P2	Students should able to know about Curve Ranging.
34	34	6.04	Mine Surveying - Instruments – Tunnels: correlation of underground and	Day 34	6.19		**Video**: https://www.youtube.com/watch?v=C8knKG05lYA	P1	Students should able to know about Mine Surveying
35	35	6.05	Tunnels: correlation of underground	Day 35	6.20		**Video**:	P2	Students should able to know about Tunnel Surveying

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36	36	6.06	surface surveys, shaft	Day 36	6.21		**Video**:	P1	Students should able to know about Surface Surveying
Continue……..									

Total number of lectures as per syllabus: 36 Total number of lectures as per planned: -36

Text Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Surveying - I	By Phadke,Thorat	Niraly	Niraly Publications
T2	Surveying - I	Kumavat V. K., Pawar Pooja D., Patil Jaya	Tech-Max Publications	Tech-Max Publications

Reference Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	Surveying and Leveling	Kanetkar T.P. and Kulkarni S. V	Vidyarthi Gruh Prakashan	Ninth/2014
R2	Surveying", Vols. I, II and III,	Punmia B.C.	, Laxmi Publications	16th edition, 2016

Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	Abhay Tembhurne- Land Surveyors in Nagpur	https://avanigeotech.business.site/	They work all the surveying equipment

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C2	Alpha Engineering Equipments - A House of Surveying Instruments	http://www.alphaenggnagpur.com/	They work all the surveying equipment

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no. Issue/Volume/Page no/Year
P1	SURVEYINGANDLAND INFORMATION SCIENCE	Wesley Park	A Scientific and Technical Journal of the National Society of Professional Surveyors	Volume 66, Number 2, 2006
P2	Advanced Techniques used in Surveying: Total Station, GPS, GIS, DroneArial Survey	Nidhi P. Tiwar	International Journal for Research in Applied Science & Engineering Technology (IJRASET))	Volume 6 Issue III, March 2018

Subject Teacher **Academic In/charge** **HOD, (CE)**

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TEACHING PLAN

NAME OF THE TEACHER: -**Prof. Ritesh Tandekar**
SUBJECT: -**Elective III (Waste Water Treatment)** SUBJECT CODE: -**BTCV605A**
YR/SEM: -**3rd/VI** SECTION:-

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/Online Material/Ppt/Video)	Applications (R&D/ Industry)	Learning Outcome
UNIT-I WASTEWATER TREATMENT									
1	1	1.01	Introduction Of Wastewater, Its Types And Various Sources,	10/01/2020	1-2	408	**Video:** Https://Www.Youtube.Com/Watch?V=T1xu2a8itne	C1	Student Should able to know about the waste water, their type, sources and the treatment process.
2	2	1.02	Concept Of Sewage, Sullageand Storm Water, Necessity Of Treatment Of Waste Water	11/01/2020	5.28	411	**Video:** Https://Www.Youtube.Com/Watch?V=Bw5gxk-7xoa	C1	
3	3	1.03	Preliminary Treatment: Screening And Grit Removal Units, Oil And Grease Removal, Primary Treatment,	14/01/2020	5-80	276	**Video:** Https://Www.Youtube.Com/Watch?V=Ume-5LP4KJo	C1	
4	4	1.04	Secondary Treatment: Activated Sludge Process, Trickling Filter, Sludge Digestion, Drying Bed. Stabilization Pond, Septic Tank,	17/01/2020	5-90	280	**Video:** Https://Www.Youtube.Com/Watch?V=Pvkzlthedak	C1	

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5	5	1.05	Soakage System, Imhoff Tank, Recent Trends And Advanced Wastewater Treatment: Nutrient Removal, Solids Removal	21/01/2020	5-105	402	**Video:** Https://Www.Youtube.Com/Watch?V=Pkp34rjyqxm	C1,C2	
Continue…….									

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcome
UNIT-II LOW COST WASTEWATER TREATMENT METHODS									
7	7	2.01	Principles Of Waste Stabilization Pond,	22/01/2020		457	**Video**: Https://Www.Youtube.Com/Watch?V=Hqj4gcwqjji	C1	Student Should Able To Know About The How To Design The Low Cost Waste Water Treatment Plant.
8	8	2.02	Design And Operation Of Oxidation Pond, Aerobic & Anaerobic Lagoons,	21/01/2020		513	**Video**: Https://Www.Youtube.Com/Watch?V=Zw9A4hM0aQE	C1	
9	9	2.03	Self Purification, DO Sag Curve, Streeter Phelp' S Equation	25/01/2020		233	**Video**: Https://Www.Youtube.Com/Watch?V=A0dehu-Wd7k	C1	

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10	10	2.04	Stream Classification, Disposal On Land,	28/01/2020		245	**Video**: Https://Www.Youtube.Com/Watch?V=XO7_Rn079fk	C1	
11	11	2.05	Effluents Standards For Stream And Land Disposals	29/01/2020		246	**Video**: Https://Www.Youtube.Com/Watch?V=Uhooxj9e-Vo	C1	
Continue……									

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcome
UNIT-III INDUSTRIAL WASTE WATER TREATMENT MANAGEMENT									
12	12	3.01	**Sources Of Pollution:** Physical, Chemical, Organic And Biological Properties Of Industrial Wastes	31/01/2020		555	**Video**: Https://Www.Youtube.Com/Watch?V=Ic2rfecqvxy	C1	Student Should Able To Know About How To Manage The Industrial Waste Water.
13	13	3.02	Differences Between Industrial And Municipal Waste Waters	4/02/2020		555	**Video**: Https://Www.Youtube.Com/Watch?V=_Tfo6knpedm	C1	

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14	14	3.03	Effects Of Industrial Effluents On Sewers And Treatment Plants, Prevention Vs Control Of Industrial Pollution	5/02/2020		556	**Video**: Https://Www.Youtube.Com/Watch?V=Ozzxb7nxhru	C1	
15	15	3.04	**Pre And Primary Treatment:** Equalization, Proportioning, Neutralization, Oil Separation By Floatation	7/02/2020		557	**Video**: Https://Www.Youtube.Com/Watch?V=Zt2b2pcCMo0	C1	
16	16	3.05	Prevention V/S Control Of Industrial Pollution	8/02/2020		560	**Video**: Https://Www.Youtube.Com/Watch?V=Yuqwakhaizy	C1	

Continue……..

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcome
UNIT-IV WASTE WATER TREATMENT METHODS									
17	17	4.01	Nitrification And De-Nitrification –	11/02/2020		510	**Video**:	C1	Student Should Able

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							Https://Www.Youtube.Com/Watch?V=Z1hacc-D6-I		To Know About Various Method Of Waste Water Treatment.
18	18	4.02	Phosphorous Removal – Heavy Metal Removal	12/02/2020		512	**Video**: Https://Www.Youtube.Com/Watch?V=Um7sWf0-Xgu	C1	
19	19	4.03	Membrane Separation Process–Reverse Osmosis–	18/02/2020		513	**Video**: Https://Www.Youtube.Com/Watch?V=Rjkvaqtsw_Y&List=PL2E9_Tlqksgr6dweeio_Ln_Rg6WL4MpX2&Index=2	C1	
20	20	4.04	Chemical Oxidation–Ion Exchange	25/02/2020		520	**Video**: Https://Www.Youtube.Com/Watch?V=Bmpknjndxfe	C1	
21	21	4.05	Air Stripping And Absorption Processes –	28/20/2020		522	**Video**: Https://Www.Youtube.Com/Watch?V=Jgyqa-3SG0A	C1	
22	22	4.06	Special Treatment Methods – Disposal Of Treated Waste	29/02/2020		521	**Video**: Https://Www.Youtube.Com/Watch?V=XO7_Rn079fk&T=89s	C1	
23	23	4.07	Common Effluent Treatment Plants (Cetps): Need, Planning,	3/03/2020		523	**Video**: Https://Www.Youtube.Com/Watch?V=Rnuqeyfaene	C1	
24	24	4.08	Design, Operation & Maintenance Problems	4/03/2020		524	**Video**:	C1	

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							Https://Www.Youtube.Com/Watch?V=Rnuqeyfaene		

Continue……..

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcome
	UNIT-V ENVIRONMENTAL SANITATION								
25	25	5.01	Communicable Diseases, Methods Of Communication,	6/03/2020			**Video**: Https://Www.Youtube.Com/Watch?V=2stmdle9k8w	C1	Student Should Able To Know About Effect Of Waste Water On To The Environment And How To Control It.
26	26	5.02	Diseases Communicated By Discharges Of Intestines, Nose And Throat, Other Communicable Diseases And Their Control	11/03/2020			**Video**: Https://Www.Youtube.Com/Watch?V=2jwku3kjpq0	C1	
27	27	5.03	**Insects And Rodent Control-**Mosquitoes, Life	13/03/2020			**Video**:	C1	

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				Cycles, Factors Of Diseases Control Methods				Https://Www.Youtube.Com/Watch?V=M73q1pmbzty		
	28	28	5.04	Natural &Chemical, Fly Control Methods And Fly Breeding Prevention0	14/03/2020			**Video**: Https://Www.Youtube.Com/Watch?V=7zxflipw2tk	C1	
	29	29	5.05	Rodents And Public Health, Plague Control Methods,	18/03/2020			**Video**: Https://Www.Youtube.Com/Watch?V=Je2tO_4czvk	C1	
	30	30	5.06	Engineering And Bio-Control Methods	20/03/2020			**Video**: Https://Www.Youtube.Com/Watch?V=5d0f0f_Xc8q	C1	
	Continue……..									

r. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcome

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VISION

- To shape professional Leaders of Global Standards in Civil Engineering.

MISSION

- To provide quality Education and Excellent Learning Environment for the overall development of students.
- Making sustainable efforts for integrating academics with industry.

UNIT-VI RURAL SANITATION									
31	31	6.01	Rural areas, Population habits and environmental conditions,	20/03/2020			**Video**: https://www.youtube.com/watch?v=Z1Q9j-WiFtg	C1	Student Should able to know about the rural sanitation system and how to improve it.
32	32	6.01	Rural areas, Population habits and environmental conditions	24/03/2020			**Video**: https://www.youtube.com/watch?v=Z1Q9j-WiFtg	C1	
33	33	6.02	problems of water supply and sanitation aspects,	27/03/2020			**Video**: https://www.youtube.com/watch?v=QtsE6aPfGbU	C1	
34	34	6.02	problems of water supply and sanitation aspects	28/03/2020			**Video**: https://www.youtube.com/watch?v=QtsE6aPfGbU	C1	
35	35	6.03	low cost excreta disposal systems	1/04/2020			**Video**: https://www.youtube.com/watch?v=1agd0WrHEnQ	C1	
36	36	6.04	Rural sanitation improvement schemes	3/04/2020			**Video**: https://www.youtube.com/watch?v=7axtBJMpnKs	C1	
Continue……									

Total number of lectures as per syllabus: 36Total number of lectures as per planned: -36

Text Books:

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Education to Eternity

।।ज्ञानम् सर्वार्थ साधनम्।।

VISION	MISSION
❖ To shape professional Leaders of Global Standards in Civil Engineering.	❖ To provide quality Education and Excellent Learning Environment for the overall development of students. ❖ Making sustainable efforts for integrating academics with industry.

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Waste Water Engineering Treatment & Disposal"	Waste Water Engineering Treatment & Disposal"		

Reference Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	Environmental Pollution and Control,	Bhatia H. S.,	Laxmi	1st

Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	Waste Water Treatment Plant Bhandewadi Nagpur	https://avanigeotech.business.site/	They work all the surveying equipment

Subject Teacher **Academic In/charge** **HOD, (CE)**

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DEPARTMENT OF Computer Science & Engineering

SESSION 2018-19

TEACHING PLAN

NAME OF THE TEACHER :- **Prof. Swati B. Raut**

SUBJECT :- **Discrete Structure and Applications** SUBJECT CODE :- **CS403**

YR/SEM :- **2nd /4th Sem**

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Actual Teaching Date	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
			UNIT-I Mathematical Foundation **PREREQUISITES: The knowledge of elementary mathematics on the level of secondary school.**							
1	1	1.01	Introduction to Sets theory and its applications sets,	01/01/2019	01/01/2019	T1 Pg: 115-126,	R1 Pg;34	Video: https://nptel.ac.in/courses/106106183/46 (3 min) Prof S.R.S. Iyengar,IIT Ropar Notes: https://people.cs.pitt.edu/~milos/courses/cs441/lectures/Class7.pdf	P1	• Students should able to understand the basics of Set theory and its various operations along with the application of its in industry as well as in R&D work. In addition to this they will able to apply the knowledge of the same in Advance applications in Gaming Industries as well as electronic industries. • Student will also be able to knowledge of the concepts and methods of mathematical logic, set theory, relation calculus, and concepts concerning functions which are included in the fundamentals of various disciplines of mathematics
2	2	1.02	Set operations, Laws of set theory, Power sets	01/01/2019	01/01/2019	T1 Pg:127-132		https://nptel.ac.in/courses/111107058/(55 min) Prof S.R.S. Iyengar,IIT Ropar		
3	3	1.03	Partitions, Multi-sets, Cardinality,	02/01/2019	02/01/2019	T1 Pg:170				
4	4	1.04	Principle of inclusion and exclusion, Algebra of sets and duality,	02/01/2019	02/01/2019	T1Pg: 115,127	R1 Pg;75	Videos https://youtu.be/orxud8xaAK0 (57:53 min)(1.20 min- 21.00 min) Prof. A. Tripathi IIT PAL		
5	5	1.05	Applications of sets: Problems on set operations	03/01/2019	03/01/2019	T2 pg:107		https://www.youtube.com/watch?v=_7fzGD75RrE (20 min)		
6	6	1.06	Logics and proofs, Propositional logic, Propositional equivalences,	04/01/2019	04/01/2019	T1 Pg:1-25		Videos https://www.youtube.com/watch?v=xlUFkMKSB3Y(56 min) https://www.youtube.com/watch?v=0uTE24o3q-o&list=PL0862D1A947252D20&index=2(56 min)		
7	7	1.07	Propositional algebra, Basic logical operations De Morgan"s laws,	08/01/2019	08/01/2019	T1 pg: 811		Videos https://www.youtube.com/watch?v=a3jr-Kbr4og (1.30 min)		• Student will able to understand the role and importance of proof in

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								Ravindrababu Ravula		mathematics, as well as the concept of the
8	8	1.08	Predicates and quantifiers Nested quantifiers Rules of inference, Proof methods and strategy	09/01/2019	09/01/2019	T1Pg:36-57, 80-92	R1 Pg: 234	Videos https://www.youtube.com/watch?v=jNeISigUCo0&index=4&list=PL0862D1A947252D20 Prof. Kamal Krithivasan, IIT Madras Time: 57.17 mins		importance of assumptions in the proof • Will able to know the uses the propositional and predicate calculus;
9	9	1.10	Applications of logic:Translating English statements into propositions, Boolean searches in web pages, Bit operations	10/01/2019	10/01/2019	T1 Pg:16		https://www.youtube.com/watch?v=f5Iy1V3lgFs(6 min) https://www.youtube.com/watch?v=xrgefm5jwdw(6 min)		• able to correctly use quantifiers also in everyday language

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Actual Teaching Date	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-II Induction , Sequences and Functions										
1	10	2.01	Induction, Sequences and Summations: Induction and recursion: Mathematical induction, Strong induction, Recursive definitions, Re-cursive algorithms,	15/01/2019	16/01/2019	T1 Pg: 311-372 T2-23		Videos : https://www.youtube.com/watch?v=oU60TuGHxe0&t=15s (56 min) https://www.youtube.com/watch?v=rs5S0Ehp3s8 (43 min)	P2	• able to prove with the use of mathematical induction and to define functions and relations recursively • uses the language of set theory, interpreting issues in different areas of mathematics • Demonstrate an understanding of relations and functions and be able to determine their properties. 7. Determine when a function is 1-1 and "onto"
2	11	2.02	Applications: Proofs using mathematical induction, Program correctness, Well formed formula,	16/01/2019	17/01/2019	T1 Pg: 141		https://www.youtube.com/watch?v=WTwr1h7QOA4 Prof. Kamal Krithivasan, IIT Madras Time: 57.17 mins		
3	12	2.03	Functions, Sequences and summations, Definition and types of functions: Injective, subjective and bijective ,	17/01/2019	22/01/2019	T1-138 T1-156 T2-232	R2: 236	https://www.youtube.com/watch?v=nbcQ-DsAPUA&list=PL-VBs-MiT7rP6JZkwanZNBO2JDDmFjigA(57 min) https://www.youtube.com/watch?v=4d2XEn1j_q4 (58 min) Prof. Kamal Krithivasan, IIT Madras Time: 57.17 mins		
4	14	2.04	Composition, Identity and inverse of function, Re-cursively defined functions	22/01/2019	23/01/2019	T2-201		https://www.youtube.com/results?search_query=function+nptel+ (53.49 min) Prof. Kamal Krithivasan, IIT Madras		

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								Time: 57.17 mins		
5		2.05	Sequences and summations, Applications of functions, Sequences and summations:	23/01/2019	24/01/2019	T2-201		https://www.youtube.com/watch?v=5jwXThH6fg4 (4 min)		
6	15	2.06	Job scheduling problem Countability of rational numbers.	24/01/2019	29/01/2019	T2-201		https://www.youtube.com/watch?v=gl4OG-4J7Bo (3 min)		

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Actual Teaching Date	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
			UNIT-III Combinatorics							
1	16	3.01	Basic Counting Principles: Permutations, Combinations, Binomial coefficients	29/01/2019	30/01/2019	T1 Pg:385 T1 Pg:415		http://www.digimat.in/nptel/courses/video/106108051/L14.html Dr.L.N. Sunil Chandran, IIS Banglore Time: 58.26 mins		1. Students will be able to utilize mathematics and computer applications to solve practical problems in mathematics. This course will give students the combinatorial tools to model and analyze practical problems in various areas. 2.Students will able to apply the knowledge of pigeonhole principle. Counting techniques. Fundamental combinatorial objects (sets, permutations, combinations, partitions) in getting solution of real life problems. 3. Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.
2	17	3.02	Generalized permutations and combinations, Combinations and permutations with repetition	30/01/2019	31/01/2019	T1 Pg: 407		https://www.youtube.com/watch?v=Dsi7x-A89Mw Prof. Kamal Krithivasan, IIT Madras Time: 57.17 mins https://www.youtube.com/watch?v=88Dh6hgKZD0 Time: 9 mins	P3	
3	18	3.03	Generating permutations and combinations, Recurrence relation	31/01/2019	05/02/2019	T1 Pg: 423		https://www.youtube.com/watch?v=4d2XEn1j_q4&t=28s, Prof. Kamal Krithivasan, IIT Madras Time: 57.17 mins		
4	19	3.04	Solving linear recurrence relations with constant coefficients,	05/02/2019	06/02/2019	T1-434		https://www.youtube.com/watch?v=ImLM1Vsr35c Prof. Kamal Krithivasan, IIT Madras Time: 57.17 mins		
5	20	3.05	Applications of counting principles	06/02/2019	07/02/2019	T1 Pg:399		https://www.youtube.com/watch?v=mrCrjeqJv6U Prof. Prabha Sharma IIT, Kanpur Time 52.45 mins	P4	
6	21	3.06	Pigeonhole principle and its applications.	07/02/2019	08/02/2019	T1 Pg:399		https://www.youtube.com/watch?v=Eick163K5Eo Prof. Kamal Krithivasan, IIT Madras Time: 56.58mins		

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Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Actual Teaching Date	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
		UNIT-IV Relations								
1	22	4.01	Properties of binary relations.	12/02/2019	12/02/2019	T1 Pg:573-596		https://www.youtube.com/watch?v=_BIKq9Xo_5A Prof. Kamal Krithivasan, IIT Madras Time: 57.57mins	P5	1.Student will be able to understand the concept of relations. Students will be able to apply the knowlge of relation in Database.
2	23	4.02	Closure of relations	13/02/2019	13/02/2019	T1 Pg: 597-601		https://www.youtube.com/watch?v=xuhZSt4Rw0k Prof. Kamal Krithivasan, IIT Madras Time: 56.56mins		
3	24	4.03	Warshall"s algorithm, ,	14/02/2019	14/02/2019	T1 Pg:603-607		https://www.youtube.com/watch?v=Hu4pEt-TGJo Time: 13 mins https://www.youtube.com/watch?v=CmZzZsaof8g Time: 10.59mins	P6	
4	25	4.04	Equivalence relations and partitions	20/02/2019	14/02/2019			https://www.youtube.com/watch?v=Fk8nJjzohr8, Prof. Kamal Krithivasan, IIT Madras Time: 57.12mins		
5	26	4.05	Partial ordering relations and lattice application of relations	21/02/2019	21/02/2019	T1 Pg:618-628		https://www.youtube.com/watch?v=3u1AudDafXA, Dr Sugata Gangopadhyay IIT Roorkee	P7	
6	27	4.06	N-ary relations and their applications, Databases and relations.	26/02/2019	26/02/2019	T1 Pg: 583-590		https://www.youtube.com/watch?v=_BIKq9Xo_5A&t=40s Prof. Kamal Krithivasan, IIT Madras Time: 57.57mins		

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Actual Teaching Date	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
		UNIT-V Graph Theory								
1	28	5.01	Basic terminology, Multi graphs and weighted graphs, Paths and circuits, Shortest	27/02/2019	27/02/2019	T1 Pg:651-648		https://www.youtube.com/watch?v=CIWwdWowj8A(knowledge gate)		1.Student will be able to understand the concept and importance of of

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			path in weighted graph,			T1 Pg:707 -712		Time:12.46 mins https://www.youtube.com/watch?v=wVu5qN0E4ww Prof. Srinivasan Time:58.25 mins		graph theory
2	29	5.02	Hamiltonian and Euler paths and circuits, Factors of a graph	28/02/2019	05/03/2019	T1 Pg:693 -700		https://www.youtube.com/watch?v=28x7AGXJTa8 Dr. Sugata Gangopadhyay & Dr. Aditi Gangopadhyay, ,IIT Roorkee Time:42.08 mins	P8	. 2. Students will be able to apply the various shortest path techniques to get the real world solution of problems related to searching.
3	30	5.03	Shortest path algorithm, Traveling salesman problem,	05/03/2019	06/03/2019	T1 Pg:707 -712		https://www.youtube.com/watch?v=-cLsEHP0qt0 Prof. G.Srinivasan, IIT Madras Time:58.29 mins https://www.youtube.com/watch?v=wVu5qN0E4ww&t=19s Prof. G.Srinivasan, IIT Madras Time:58.29 mins	P9	
4	31	5.04	Transport networks, Special types of graphs and applications: Job assignment	06/03/2019	07/03/2019		R1 Pg:321	https://www.youtube.com/watch?v=jYcdfWVR4MA(GATE and NET Computer Science video-lec) Time:21.17 mins		
5	32	5.05	LAN, Interconnection networks for parallel computation	07/03/2019	12/03/2019			https://www.youtube.com/watch?v=Gnzf-3stEBs Time:25:23 mins		
6	33	5.06	Mesh networks, Graph coloring and applications.	12/03/2019	12/03/2019	T1 Pg:727		https://www.youtube.com/watch?v=y4RAYQjKb5Y Time:9.28 mins		

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Actual Teaching Date	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-VI Algebraic Structures:										
1	34	6.01	Algebraic systems, Groups, Semi groups, Monoid	13/03/2019	13/03/2019	T2 Pg:271-280		https://www.youtube.com/watch?v=7ifHq5J58cE (Knowledge Gate) Time: 10.19 mins	P10/C1	Students should able to understand the Educational and Industrial value algebraic structure and

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2	35	6.02	Subgroups, Permutation groups, Codes and group codes	14/03/2019	14/03/2019	T2 Pg:282-292	R3-131-138	https://www.youtube.com/watch?v=7ifHq5J58cE&list=PLmXKhU9FNesQrSgLxm6zx3XxH_M_8n3LA Knowledge Gate) Time: 10.19 mins		its types with the specific skills .
3	36	6.03	Isomorphism and automorphisms,	19/03/2019	19/03/2019		R3 Pg:109-113	https://www.youtube.com/watch?v=Mwelem43YWs(tutorialsspace) Time:9.08 mins		
4	37	6.04	Homomorphism, Fermat"s little theorem	20/03/2019	20/03/2019	T2 Pg-354-360		https://www.youtube.com/watch?v=XJriovTMqdY (Math Mentor) Time: 19.56 mins		Students will be able understand applications of groups.
5	38	6.05	Polynomial rings, Applications of groups.	26/03/2019	26/03/2019		R1-250-260	https://www.youtube.com/watch?v=BR-x96FXS9s (Math Mentor) Time: 20.00mins		

Total number of lectures as per syllabus: - 36 Total number of lectures as per planned: - 38

Final Outcome of the Subject (Maximum 6 Outcome):

After learning the course the students should be able:

CO1. To perform operations on various discrete structures such as sets functions, relations, and sequences

CO2. To solve problems using counting techniques, permutation and combination, recursion and generating functions

CO3. To construct and verify correctness of a Boolean expression using K-Maps and truth tables

CO4. To use graphs as tools to visualize and simplify Problems.

CO5. To solve problems using algebraic structures (Rings, Monoids and Groups)

- CO6. To understand the issues associated with different types of infinity and orders in sets

Text Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	*Discrete Mathematics and Its Applications*	K. H. Rosen	Tata McGraw Hill Publication	7th edition, 2012.
T2	*Discrete Mathematical Structures with Applications to Computer Science*	J. P. Tremblay, R. Manohar	Tata McGraw Hill Publication	1st edition, 2001.

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Reference Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	***Discrete Mathematical Structures***	. B. Kolman, R. Busby, S. Ross,	Pearson Education	6th edition, 2009.
R2	***Discrete Mathematics***	R. K. Bisht, H. S. Dhami,	Oxford University Press	2015
R3	***Discrete Mathematical Structures***	Somasundaran, Professor, Annamalai University	PHI learning PVT.d	2009

Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	Google	www.google.com	Search engine optimization purpose.

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	A novel type of fuzzy propositional logic	Shengli Zhang	2013 10th International Conference on Fuzzy Systems and Knowledge Discovery (FSKD)	10.1109/FSKD.2013.6816159	Electronic ISBN: 978-1-4673-5253-6
P2	Mathematical induction is a recursive technique	Robert L. Scot DrysdaleDartmouth College, Hanover, NH, USA	SIGCSE Symposium's 50th anniversary	10.1145/1953163.1953246	ISBN: 978-1-4503-0500- Pages 269-274
P3	Combinatorics of chromosomal rearrangements based on synteny blocks and synteny packs	Guénola Drillon ; Alessandra Carbone ; Gilles Fische	Journal of Logic and Computation	10.1093/logcom/exr047	Year: 2013 , Volume: 23 , Issue: 4
P4	An Algorithm for Computing Minimal Bidirectional Linear Recurrence Relation	Ana Salagean	: IEEE Transactions on Information Theory	10.1109/TIT.2009.2027520	(Volume: 55 , Issue: 10 , Oct. 2009)
P5	Definability of rough approximations for binary relations and cloud computing	Yu-Ru Syau	2016 IEEE International Conference on Cloud Computing and Big Data Analysis (ICCCBDA)	10.1109/ICCCBDA.2016.7529563	Print on Demand(PoD) ISBN 978-1-5090-2595-4
P6	Modification of Floyd-Warshall's algorithm for Shortest Path routing in wireless sensor networks	Pritam Khan	: 2014 Annual IEEE India Conference (INDICON)	10.1109/INDICON.2014.7030504	Electronic ISBN: 978-1-4799-5364-6 CD-ROM ISBN: 978-1-4799-5362-2
P7	Normal Forms for Characteristic Functions on n-ary Relations	Jan van Eijck	: Journal of Logic and Computation)	10.1093/logcom/exi003	(Volume: 15 , Issue: 2 , April 2005

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P8	An Euler path based technique for deadlock-free multicasting	N. Agrawal ; C.P. Ravikumar	Proceedings of the 1997 International Conference on Parallel Processing (Cat. No.97TB100162)	10.1109/ICPP.1997.622669	INSPEC Accession Number: 5698587
P9	A Shortest Path Planning Algorithm for PSO Base Firefighting Robots	D. Mihiraj Ranaweera ; K.T.M. Udayanga Hemapala ; A. G. Buddhika ; P. Jayasekara	2018 Fourth International Conference on Advances in Electrical, Electronics, Information, Communication and Bio-Informatics (AEEICB)	10.1109/AEEICB.2018.8480971	INSPEC Accession Number: 18133594
P10	Homomorphism Encryption Algorithm for Elementary Operations over Real Number Domain	Zhang Tong ; Wu Qi ; Liu Wen ; Chen Liang	2012 International Conference on Cyber-Enabled Distributed Computing and Knowledge Discovery	10.1109/CyberC.2012.35	INSPEC Accession Number: 13193683

Prof.Swati Raut
(Subject I/C)

Prof.Rohan Kokate
(DBATU Co-ordinator)

Prof.Swati Raut
(Academic I/C)

Prof.P.A.Lohe
(HOD CSE/IT)
HOD
Computer Science & Engineering
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DEPARTMENT OF Computer Science & Engineering

SESSION 2018-19

Teaching Plan

Course : B. Tech in Computer Science Engineering	**Year/Semester :** 2nd/3rd	
Name of the Teacher : Prof. Rohan Kokate	**Subject Code** :CS4T001	
Subject :CAO	**Section** :CSE	
Periods per Week (each 60 min)	**Lecture**	**3**
	Tutorial	**-**
	Practical	**-**

Course Objective	Course Outcomes
1. To identify components of a computer system, including CPU, memory, and input/output units. 2. To explain instruction types, its execution and interrupt mechanism. 3. To illustrate numerical and character representations in digital logic and floating point arithmetic. 4. To identify components of a computer system, including CPU, memory, and input/output units. 5. To explain instruction types, its execution and interrupt mechanism. 6. To illustrate numerical and character representations in digital logic and floating point arithmetic.	1. Remember Importance of Processor in any ES 2. Understand the basic concept of hardware architectural requirements in computer system. 3. Apply the ALP code knowledge in instruction programming. 4. Analyze the read write codec in CAO. 5. Evaluate the ALU Logical and arithmetic calculations. **6.** Design the arithmetic language programs with help of logical instructions

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	2	1	1	2	2	2	2	3	3	3	3	2	2
CO2	-	-	2	2	2	3	3	2	3	3	3	2	3	2	2

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CO3	1	1	2	1	2	2	3	3	3	3	3	2	3	1	2
CO4	1	2	2	2	2	2	2	2	3	3	3	3	3	-	-
CO5	1	1	2	1	2	2	2	2	3	3	3	2	3	2	3
CO6	1	1	2	2	3	2	2	3	3	3	3	2	3	3	3
Avg .	**0.67**	**0.83**	**2**	**1.5**	**2**	**2.16**	**2.33**	**2.33**	**2.83**	**3**	**3**	**2.33**	**3**	**1.66**	**2**

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Actual Teaching Date	Text Books (Page no) Reference Book (Page no)	URL's (NPTEL/OnlineMaterial /PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes	CO mapping
Unit I – Basic Structure of Computer										
1	1	1	Hardware & Software, Addressing Methods	19-06	20-06	Pg No. 150-151	https://youtu.be/G5EO8DbqH94	**C1,C2,C3**	Students should able to understand the basics of theory Basic structure of computers.	**CO1, CO2, CO5, CO6**
2	2	2	Program Sequencing	21-06	22-06	Pg No.160	www.youtube.com%2Fwatch%3Fv%3D38CXcE_Q1Ug&usg=AOvVaw3jEJt4Twu2LNyIDe1lU1OI	**C1,C2,C3**	Students should able to understand the basics theory of instruction sets in the machine of computers.	**CO1, CO2, CO3, CO4**
3	3	3	Concept of Memory Locations & Address	24-06	25-06	Pg No.165	https://youtu.be/jSrC-EWYIJQ	**C1,C2,C3**	Students should able to understand the basics of theory Memory Organization	**CO1, CO2**
4	4	4	Main Memory Operation, Instructions & Instruction Sequencing	26-06	27-06	Pg No.166	https://youtu.be/webOQVOuNSg	**C1,C2**	Students should able to understand the basics of theory addressfield, microinstruction and emulation.	**CO1, CO2**
5	5	5	Number representation, Design of Fast Adders	02-07	03-07	Pg No.169	https://youtu.be/webOQVOuNSg	**C1**	Students should able to understand the basics of theory Floating point arithmetic	**CO1, CO2**
6	6	6	Signed Addition and Subtraction. Multiplication of Positive numbers	4-07	05-07	Pg No.172	https://www.youtube.com/watch?v=mw_AWSv6OIc	**C1,C2**	Students should able to understand the basics of theory addressfield, microinstruction and emulation.	**CO1, CO2**
7	7	7	Floating-Point	5-07	9-07	Pg No.174	https://www.youtube.com/watch?v=mw_AWSv6OIc	**C1,C2**	Students should able to understand the basics of Characteristics, Types of	**CO1, CO2, CO5,**

			Numbers and related operations Basic I/O Operations, Stacks, Queues & Subroutines.						operands,	**CO6**
UNIT -2 Processing Unit										
8	8	8	Fundamental Concepts	10-07	11-07	Pg No.195	https://youtu.be/webOQVOuNSg	**C1,C2,C3**	Students should able to understand the basics ofFundamental Concepts	**CO1, CO2**
9	9	9	Execution of a Complete Instruction	12-07	13-07	Pg No.199	https://www.slideshare.net/InstaRemedy/consumer-rights-in-india-73526804	**C1,C2,C3**	Students should able to understand the basics of	**CO1, CO2**
10	10	10	Hardwired Control, Performance Consideration	16-07	17-07	Pg No.201	https://www.slideshare.net/maheswarijaikumar/consumer-protection-act-india	**C1,C2,C3**	Students should able to understand the basics of	**CO1, CO2**
11	11	11	Micro-programmed Control, Microinstructions	18-07	19-07	Pg No.203-204	https://www.youtube.com/watch?v=qV7F1RgUTAE	**C1,C2**	Students should able to understand the basics of theory Internal Memory: Semiconductor main memory	**CO1, CO2**
12	12	12	Micro-program Sequencing, Microinstruction Pre-fetching	23-07	24-07	Pg No.215	https://www.youtube.com/watch?v=iqePwXRnX-8\	**C1,C2**	Students should able to understand the basics of theory Error correction in signed operand multiplication, fast multiplication.	**CO1, CO2, CO5, CO6**
13	13	13	Emulation., Booth's Algorithm, Integer Division	25-07	26-07	Pg No.220	https://www.youtube.com/watch?v=BxmlxKdAZ5g https://www.youtube.com/watch?v=fYbLzYUdo68	**C1,C2**	Students should able to understand the basics of theory Advanced DRAM organization	**CO1, CO2, CO3, CO4**
			UNIT-3 I/O Organization							

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14	14	14	Accessing I/O Devices, Interrupts	30-07	31-07	Pg No.402	https://www.youtube.com/watch?v=fYbLzYUdo68	**C1,C2,C3**	Students should able to understand the basics of Accessing I/O Devices, Interrupts	**CO1, CO2, CO5, CO6**
15	15	15	Addressing Modes, Direct Memory Access	1-08	2-08	Pg No.415	https://www.youtube.com/watch?v=FtIhyf3jymE	**C1,C2**	Students should able to understand the basics of Addressing Modes, Direct Memory Access	**CO1, CO2, CO3, CO4**
16	16	16	Bus arbitration, I/O Hardware	2-08	6-08	Pg No.420	https://www.youtube.com/watch?v=g5dlH_PCI9k	**C1,C2**	Students should able to understand the basics of Bus arbitration, I/O Hardware	**CO1, CO2**
17	17	17	Processor Bus and Interfacing Circuits, Standard I/O Interfaces	07-08	07-08	Pg No.425-426	https://www.youtube.com/watch?v=0LkUpBUep2Y	**C1,C2**	Students should able to understand the basics of Processor Bus and Interfacing Circuits, Standard I/O Interfaces	**CO1, CO2**
18	18	18	SCSI Bus, Backplane Bus Standard	08-08	08-08 09-08	Pg No.450	https://www.youtube.com/watch?v=Tfcbgk2kKx4	**C1,C2,C3**	Students should able to understand the basics of SCSI Bus, Backplane Bus Standard	**CO1, CO2**
19	19	19	Basic Concepts, Semiconductor RAM Memories	09-08	13-08	Pg No.318	https://www.youtube.com/watch?v=MDNwVnA2lJM	**C1,C2**	Students should able to understand the basics of Basic Concepts, Semiconductor	**CO1, CO2, CO5, CO6**
20	20	20	Internal Organization, Static & Dynamic RAMs, ROMs, Speed, Size& Cost Considerations	13-08	14-08	Pg No.320	https://www.youtube.com/watch?v=M7t2Y5qplBw	**C1,C2,C3**	Students should able to understand the basics of Internal Organization, Static & Dynamic RAMs, ROMs, Speed, Size& Cost Considerations	**CO1, CO2, CO3, CO4**
21	21	21	Cache Memories: Performance considerations.	14-08	16-08	Pg No.325	https://www.youtube.com/watch?v=yALcUgV58cM\	**C1,C2**	Students should able to understand the basics of Cache Memories: Performance considerations	**CO1, CO2**
22	22	22	Virtual Memories, Address Translation	20-08	21-08	Pg No.356	https://www.youtube.com/watch?v=qV7F1RgUTAE	**C1,C2,C3**	Students should able to understand the basics of Virtual Memories,	**CO1, CO2**

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									Address Translation	
23	23	23	Memory Management Requirements	21-08	22-08	Pg No.360	https://www.youtube.com/watch?v=VRNKcrW0cuU	**C1,C2,C3**	Students should able to understand the basics of Memory Management Requirements	**CO1, CO2**
22	18	22	RISC philosophy, pipelining, basic concepts in pipelining	22-08	23-08	Pg No.391	https://www.youtube.com/watch?v=d3MmunWiuh0	**C1,C2,C3**	Students should able to understand the basics of RISC philosophy, pipelining, basic concepts in pipelining	**CO1, CO2, CO5, CO6**
23	19	23	delayed branch, branch prediction	23-08	24-08	Pg No.392	https://www.youtube.com/watch?v=Y3JibW_oNls	**C1,C2,C3**	Students should able to understand the basics ofdelayed branch, branch prediction	**CO1, CO2, CO3, CO4**
24	20	24	data dependency, influence of pipelining on instruction set design	03-09	04-09	Pg No.395	https://www.slideshare.net/GuptaPandiri/professional-ethics-amp-ht-ps-mm-case-studies-74720427	**C1,C2,C3**	Students should able to understand the basics of data dependency, influence of pipelining on instruction set design	**CO1, CO2**
25	21	25	multiple execution units, performance considerations	05-09	06-09 10-09	Pg No.397	https://www.youtube.com/watch?v=lbdU6rpuQRI	**C1,C2**	Students should able to understand the basics of multiple execution units, performance considerations	**CO1, CO2**
UNIT-6 Computer Peripherals										
26	22	26	Input-Output Devices like Video displays	11-09 12-09	13-09 14-09	Pg No.515	https://www.youtube.com/watch?v=MDNwVnA2lJM	**C1,C2,C3**	Students should able to understand the basics of Input-Output Devices like Video displays	**CO1, CO2**

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27	23	27	Video terminals, Graphics input devices, Printers	17-09 18-09	18-09 19-09	Pg No.519	https://www.youtube.com/watch?v=yALcUgV58cM	**C1,C2,C3**	Students should able to understand the basics of Video terminals, Graphics input devices, Printers	**CO1, CO2, CO5, CO6**
28	24	28	Online storage devices: Magnetic disks, Magnetic tape, Systems	19-09 20-09	24-09 25-09	Pg No.520	https://www.youtube.com/watch?v=MDNwVnA2lJM	**C1,C2**	Students should able to understand the basics ofMagnetic tape, Systems	**CO1, CO2, CO5, CO6**
29	25	29	CD-ROM systems. Communication devices: Modems	26-09 27-09	27-09 03-10	Pg No.524	https://www.youtube.com/watch?v=yALcUgV58cM	**C1,C2**	Students should able to understand the basics of CD-ROM systems. Communication devices: Modems	**CO1, CO2, CO3, CO4**

Assignment Plan

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Assignment 1	17/07/2019	20/07/2019	CO1, CO2,CO3
2	Assignment 2	20/09/2019	24/09/2019	CO3,CO4,CO5

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Text Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	***"Computer Organization and Architecture: Designing for Performance"***	**William Stalling**	Prentice Hall Publication, 2009	8th Edition
T2	***"Computer Architecture and Organization"***	Hayes	McGraw-Hill Publication, 2012.	3rd Edition
T3	***Computer Organization***	Zaky	McGraw-Hill Publication, 2011.	5th Edition

Reference Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	***Computer Architecture: A Quantitative Approach***	Morgan and Hennessy and Patterson	Kaufman Publication, 2007.	4th Edition,
R2	***Computer System Architecture***	Morris Mano	Pearson Education India, 2007	3rd Edition
R3	***Fundamentals of Computer Organization and Architecture***	Miles J. Murdocca, Vincent P. Heuring	Wiley Publication, 2007.	1st Edition

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	**Factors Affecting the Efficiency of Transferring Remote Sensed Data**	Qing Zhang	American Journal of Networks and Communications		2018; 7(3): 22-26
P2	Performance of Checksums and CRCs over Real Data	Jonathan Stone	BBN Technologies is a division of GTE Corporation. Craig's work was supported, in part, by the U.S. Department of Defens		DABT63-91-K-000
P3	Computer Network - IP Address & Subnetting	Rajesh Kumar, Pinky Ramchandra Shinde	International Journal of Engineering and Advanced Technology (IJEAT)		ISSN: 2249 – 8958, Volume-5, Issue-4, April 2016
P4	Review on Multiplexing Techniques in Bandwidth Utilization	N. Baharudin, R. Alsaqour, H. Shaker, 1	Middle-East Journal of Scientific Research 18	DOI: 10.5829/idosi.mejsr.2013.18.10.12422	ISSN 1990-9233 © IDOSI Publications, 2013
P5	The to know the basic history of computer Network &Underlying Technologies.	William Stallings	ACM International Conference On Distributed Event Based System and	DOI: https://doi.org/10.1016/j.comnet.2020.107575	ARPA:1960-1970

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			ICDCS-IEE International Conference on Distributed Computing Systems.		
P6	Instruction Sets	Christopher j.Wells		DOI: https://doi.org/10.1109/43.387728	Volume:2
P7	Computer Arithmetic	Guillaume Melquiond,, Sylvie Boldo ,Mostafa Abd-El-Barr and Hesham El-Rewini	The (IEEE) International Symposium on Computer Arithmetic	DOI: https://doi.org/10.1002/0471478326.ch4	12 November 2004 and no,of pages 326
P8	Memory Organization	Howard Eichenbaum	ICCOS 2020:14 International conference on memory organization strategies in paris,France. Conference code:20FR11ICCOS	DOI: https://doi.org/10.1109/54.922803	Volume-68:19-45
P9	Control Unit	John von Neumann		DOI: https://doi.org/10.1049/pi-b-1.1958.0267	Page 240-243 Volume:105 Issue:20
P10	Input/Output Organization	Gideon Frieder and T.A.EI-Ghazawi		DOI: https://doi.org/10.1002/0471478326.ch8	Page:874-879 January 2003

Prof.Rohan Kokate
(Subject I/C)

Prof.Rohan Kokate
(DBATU Co-ordinator)

Prof.Swati Raut
(Academic I/C)

Prof.P.A.Lohe
(HOD CSE/IT)

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Department Of Electrical Engineering

"Igniting minds to illuminate the world"

2018-19

TEACHING PLAN

Course :B. Tech in Electrical Engineering	**Year/Semester** : 6th Semester (3nd Year)	
Name of the Teacher :Pratiksha Panchbhai	**Subject Code** :BTEEC603	
Subject :Power Electronics	**Section** :A	
Periods per Week (each 60 min)	**Lecture**	**3**
	Tutorial	**1**
	Practical	**2**

Course Objective	Course Outcomes
1. Understand basic principles, construction, of semiconductor devices. 2. Understand the operation, performance and characteristics of semiconductor devices. 3. Understand the different issues related to the power electronic design at the system level and assess the performance. 4 Understand the performance indices of converters, inverters, choppers. 5. Understand to select suitable power electronic devices by assessing the requirements of application fields. 6. Understand the different problems related to operation, supplyconversion ofconverters ,inverters, choppers	1. Relate basic semiconductor physics to properties of power devices, and study the characteristics of linear and non linear devices. 2. Compare performance of various power semiconductor devices, passive components and switching circuits 3. Develop power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields. 4. Analyse a power electronic design at the system level and assess the performance. 5. Decide the critical areas in application levels and derive typical alternative solutions, select suitable power converters to control Electrical Motors 6. Discuss the role power electronics in the improvement of energy usage efficiency and the applications of power electronics in emerging areas.

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UNIT-I									
Sr. No	**Lec. No**	**Topic Code**	**Contents to be Covered**	**Planned Teaching Dates**	**Text Books (Page no) Reference Book (Page no)**	**URL's (NPTEL/OnlineMaterial/PPt/ Video)**	**Applications (R&D/Industry)**	**Learning Outcomes**	**Co mapping**
1	1	1.01	Characteristics and operation of power diodes	Day 1	T1 10-17	https://www.youtube.com/watch?v=-Nu25DImZ0c	P1	Able to understand diodes characteristics	CO1,CO3
		1.02	Characteristics and operation of Power Thyristors,	Day 2	16-21	https://www.youtube.com/watch?v=G4H1N_yXBiA	P1	Able to understand thyristor characteristics	CO1,CO2
		1.03	Characteristics and operation of MOSFET	Day 3	51-54	https://www.youtube.com/watch?v=RgGAMLRUH0E	P1	Able to understand MOSFET characteristics	CO1,CO2
		1.04	Characteristics and operation of IGBT	Day 4	60-75	https://www.youtube.com/watch?v=mctQWLVbQo0=6vOg-u7c1IE&list=PLeaemwcyW8jyOAU3E-hnynQRD_-S1nVFt	P1	Able to understand IGBT characteristics	CO1,CO2
		1.05	Characteristics and operation of SIT	Day 5	54-59	https://www.youtube.com/watch?v=_T1Au_P5bnQ	P1	Able to understand SIT characteristics	CO1,CO2
		1.06	Ratings of power semiconductor devices, typical applications of power semiconductor devices such as thyristor	Day 6	76-82	https://www.youtube.com/watch?v=_T1Au_P5bnQ	P1	Student should understand the importance of ratings of devices	CO1,CO2
		1.07	Ratings of power semiconductor devices, typical applications of power	Day 7	92-105	https://www.youtube.com/watch?v=DgsGk3C5OdM	CI	Able to understand Need of device ratings in practical application	CO1,CO2

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			semiconductor devices, MOSFET, IGBT						
		1.08	Introduction to types of power electronic circuits: diode rectifiers, AC-DC converters, AC-AC converters, DC-DC converters, DC-AC converters	Day 8	92-105	https://www.youtube.com/watch?v=G0mUf7j8Dk8	P1	Able to understand build the understanding about converters and their industrial applications	CO1,CO2
2		2.01	Turn on and Turn off circuits for power semiconductor devices Thyristor	Day 9	T2 27-31	https://www.youtube.com/watch?v	P1	Able to understand the dynamic behavior of device	CO1,CO2
		2.02	BJT base drive requirements and drive circuit	Day 10	32-41	https://www.youtube.com/watch?v=6vOg-u7c1IE&list=PLeaemwcyW8jyOAU3E-hnynQRD_-S1nVFt	P1	Able to understand Drive circuit design considerations and requirements	CO1,CO2
		2.03	MOSFET & IGBT gate drive circuits	Day 11	42	https://www.youtube.com/watch?v=rJ-eCF1GGko	P1	Able to understand Gate circuit design approach	CO1,CO4
		2.04	Isolation of gate/base drives: Pulse transformers	Day 12	45-47	https://www.youtube.com/watch?v=rJ-eCF1GGko	P1	Able to understand Importance of isolation between power and control circuit	CO1,CO2
		2.05	Opto couplers	Day 13	48	https://www.youtube.com/watch?v=DgsGk3C5OdM	P1	Able to understand Basic principal of optocoupler	CO1,CO5
		2.06	Gate drive ICs	Day 14	56	https://www.youtube.com/watch?v=UhGZRoUlr8U	P1	Able to understand The gate driven ICs used in practical application	CO1,CO3,CO4
		2.07	Thyristor firing schemes	Day 15		https://www.youtube.com/watch?v=UhGZRoUlr8U	P1	Able to understand The importance and principal behind the generation of firing circuit	CO1,CO6

3	3	3.01	Diode Rectifiers: Single phase half wave	Day 16	68-71	https://www.youtube.com/watch?v=YUrq1ftxh1c	P1	Able to understand Principal behind the half wave rectification	CO1,CO2
		3.02	full wave rectifiers with R and RL load,	Day 17	89-109	https://www.youtube.com/results?search_query=process+flow+diagram+tutorial	P1	Able to understand The variation of Load characteristics on the output of rectifier	CO2,CO6
		3.03	Three phase bridge rectifier with R and RL load, Effect of source inductance	Day 18	110-117	https://www.youtube.com/results?search_query=process+flow+diagram+tutorial	P1	Able to understand The working of three phase operation	CO2,CO4
		3.04	Three phase bridge rectifier with R and RL load, Effect of source inductance	Day 19	123-134	https://www.youtube.com/watch?v=eTtzE19CZVM	P2	Understanding the three phase operation with introduction of source inductance	CO3,CO2
		3.05	Principle of phase controlled rectification, single phase semi and full converter with R and RL load	Day 20	135-140	https://www.youtube.com/watch?v=eTtzE19CZVM	P2	Comparing the principle of full controlled and semi controlled converter	CO3,CO4
		3.06	power factor improvement in controlled rectifiers	Day 21	141	https://www.youtube.com/watch?v=IM1QLY2NP3I	P2	Able to understand Need of improvement of power factor	CO3,CO4
		3.07	three phase semi and full converter with R and RL load.	Day 22		https://www.youtube.com/watch?v=IM1QLY2NP3I	P2	Comparing the principle of full controlled and semi controlled converter	CO3,CO4
4	4	4.01	AC voltage controllers (AC-AC converters) : Principle of on-off control	Day 23	145-159	https://www.youtube.com/watch?v=cdzfisrUPxs	P2	Able to understand Principle of cycloconverter	CO1,CO2
		4.02	principle of phase control in single phase	Day 24	167	https://www.youtube.com/watch?v=cdzfisrUPxs	P2	Able to understand Single phase operation of cycloconverter	CO1,CO2,CO4
		4.03	principle of	Day 25	180	https://www.youtube.com/wat	P2	Able to understand	CO3,CO4

			phase control in three phase			ch?v=uwsoeLOvwrg		Three phase operation of cycloconverter	
		4.04	Cycloconverters: single phase cycloconverter operation	Day 26	181	https://www.youtube.com/watch?v=uwsoeLOvwrg	P2	Able to understand Principle of cycloconverter	CO3,CO4
		4.05	three phase cycloconverter operation.	Day 27	182	https://www.youtube.com/watch?v=DgsGk3C5OdM	P2	Principle of Principle of three phase cycloconverter	CO3,CO4
		4.06	three phase cycloconverter operation.	Day 28	185	https://www.youtube.com/watch?v=DgsGk3C5OdM	P2	Able to understand Principle of Principle of three phase cycloconverter	CO3,CO4,CO6
5	5	5.01	DC-DC converters	Day 29	185-189	https://www.youtube.com/watch?v=FS06qc-ks-0	P2	Able to understand Basic principle behind chopper	CO3,CO4,CO5
		5.02	Classification of DC-DC converters	Day 30	200	https://www.youtube.com/watch?v=FS06qc-ks-0	P2	Able to understand Types of choppers	CO3,CO4
		5.03	Buck converter,	Day 31	202	https://www.youtube.com/watch?v=IZnw2nzmt0U	P2	Able to understand Principle of step up and step down chopper	Co3,CO5
		5.04	Boost converter	Day 32	205	https://www.youtube.com/watch?v=IZnw2nzmt0U	P2	Able to understand Principle of Buck-Boost converter	CO5,CO6
		5.05	Buck-Boost converter	Day 33	218	https://www.youtube.com/watch?v=lP-2JuFO3DM	P2	Able to understand Principle of Buck-Boost converter	CO5,CO6
		5.06	Cuk converter	Day 34	221	https://www.youtube.com/watch?v=lP-2JuFO3DM	P2	P Able to understand rinciplecukverter	CO5,CO4
6	6	6.01	DC-AC converters : Principle of operation and performance parameters	Day 35	235-237	https://www.youtube.com/watch?v=DgsGk3C5OdM	P2	Principle of operation and performance parameters	CO3,CO64

		6.02	single phase bridge inverter	Day 36	237-240	https://www.youtube.com/watch?v=DgsGk3C5OdM	P2	Operation of single phase bridge inverter	CO3,CO4
		6.03	Three phase inverters	Day 37	242-247	https://www.youtube.com/watch?v=DgsGk3C5OdM	P2	Three phase inverter with 120 and 180 degree conduction mode to understand the concept behind multilevel inverter	CO3,CO4
		6.04	180 degree conduction modes	Day 38	252	https://www.youtube.com/watch?v=DgsGk3C5OdM	P2	Able to understand Principle of 180 degree conduction modes	CO3,CO4,CO5
		6.05	180 degree conduction modes	Day 39	255-260	https://www.youtube.com/watch?v=c9Da0h9ULLQ	P2	Principle of 180 degree conduction modes	CO1,CO2
		6.06	120 degree conduction modes	Day 40	264	https://www.youtube.com/watch?v=br3gkrXTmdY	P2	Able to understand Principle of 120 degree conduction modes	CO3,CO4,CO5
		6.07	120 degree conduction modes	Day 41	270	https://www.youtube.com/watch?v=br3gkrXTmdY	P2	Able to understand Principle of 120 degree conduction modes	CO1,CO4,CO5

*T=Text Book; R= Reference Book; C= Company name; R= Research Paper

Total number of lectures as per syllabus: - 41 Total number of lectures as per planned: -41

Tutorial Plan

Week	Topic	No. Of Problems	Mapped With CO
1	Numericals on SCR.	03	II
2	Numericals on uncontrolled converter	02	III
3	Numericals on controlled converter	02	IV

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Assignment Plan				
Assignment No.	**Topic**	**Given Date**	**Submission Date**	**Mapped With CO**
1	SCR, Mosfet, Igbt	2/01/2019	12/01/2019	I, II
2	Choppers ,Inverters	20/01/2019	5/02/2019	III, IV

Content Beyond Syllabus Topic – Planned			
Sr. No.	**Content Beyond Syllabus Topic**	**Date Given**	**Mapped with CO's**
1	Multilevel Inverters	6/01/2019	I, II, III, IV

TextBooks:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Power Electronics	Khanchandani	TERI	50th Edition, 2011
T2	Industrial power Electronics	Shingare	Wiley Inter Science Publication	Revised, 2014

Reference Books:

Code	Title of the Book	Author Name/Designation/ Organization	publisher	Edition/ Publication Year
	Power Electronics	Rashid	McGraw Hill, 1991	

Company/Industry:

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Code	Company/Industry Name	Website	Detailed Information
C1	**Siemens**	https://www.siemens.com/	This company is considered to be the best leading manufacturer and supplier of cost efficient ,safe and sustainable electrical infrastructure. It also supplies other devices like Electrical products.
C2	**ABB India**	https://www.new.abb.com/	This company is engaged in the production and supply of Power semiconductor based Drives,Low voltage Products etc.

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	Recent Advances in Power Electronics	ZiqiangWang ; Jie Wang	Conference: Industrial Electronics Society, 1990. IECON '90., 16th Annual Conference of IEEE	Doi: https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1109%2FIECON.1990.149248	Vol. 33, no. 4, pp. 2270-2280, Dec. 2018,
P2	**Power Converters in Power Electronics: Current Research Trends**	**Minh-Khai Nguyen**	*IEEE Transactions on Power Electronics*	https://doi.org/10.3390/electronics9040654	Vol. 42, no. 1, pp. 2870-2880, Dec. 2019,

Subject Teacher **Academic Incharge** **Head of Department**

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POST: VALNI, AT: KHANDALA, KATOL ROAD, NAGPUR – 441501
DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING
SESSION 2019-20

TEACHING PLAN

NAME OF THE TEACHER :- **Ms.Gayatri Padole**
SUBJECT :- **Electronic Devices and Circuits**
YR/SEM :- **2nd/3rd**

SUBJECT CODE :- **BTEXC303**
SECTION :- **A and B**

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Book (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-I: JFET									
1	1	1.1	Introduction to JFET	3/7/2019		R5 (364)	https://nptel.ac.in/courses/117103063/24	C1 to C16 and P1 to P25	Students will be able to demonstrate the construction and working principle of JFET
2		1.2	JFET Types				https://nptel.ac.in/courses/117107095/35		
3		1.3	JFET Construction			R5 (365-368)			
4		1.4	JFET Operation			R11 (197-200)			
5	2	2.1	Static Characteristics	8/7/2019		R1 (312) R5 (365-369)	https://nptel.ac.in/courses/122106025/40		Students will be able to explain the parameters such as Pinch off Voltage, drain resistance, mutual conductance and amplification factor
6		2.2	Pinch off voltage			R1 (314-315) R5 (366)			
7		2.3	FET Volt-Ampere characteristics			R1 (315) R2 (184)			
8	3	3.1	FET Configurations (CS/CD/CG)	9/7/2019		R5 (477,485,488) R2 (219,231,239)			Analyze various configurations through comparision
9		3.2	FET Configurations Comparison			R2 (243)			

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10	4	4.1	Biasing of FET (Self)	10/7/2019		R5 (411,477) R10 (435-436)			Explain need of biasing
11		4.2	Biasing of FET Numericals			R1 (336) R5 (481)			
12	5	5.1	FET as an amplifier and its analysis (CS)	15/7/2019		R5 (477) R9 (160) R10 (448)	https://nptel.ac.in/courses/117107095/39		Illustrate JFETs amplification action
13		5.2	FET amplifier's frequency response			R1 (333-341) R5 (560-575)			Determine the bandwidth of Amplifier
14	6	6.1	FET Small signal model	16/7/2019		R5 (468-474) R8 (302)			Analyze FET circuits for small signal at low and high frequencies
15	7	7.1	FET as High Impedance circuits	17/7/2019		R5 (510) R10 (456-463) R11 (205)	https://nptel.ac.in/courses/117107095/40		Apply acquired knowledge of amplification in circuit design
UNIT-II: MOSFET & ITS DC ANALYSIS									
16	8	8.1	Basics of MOS Transistor operation	22/7/2019		R5 (386-390)	https://nptel.ac.in/courses/117103063/17	C1 to C16 and P1 to P25	Students will be able to demonstrate construction and working principle of MOSFET
17		8.2	Construction of n-channel E-MOSFET			R2 (122-128) R13 (238-239)			
18	9	9.1	E-MOSFET characteristics and Parameters	23/7/2019		R6 (39-45) R13 (240-245)			Explain relation between various parameters of MOSFET
19	10	10.1	Non-ideal voltage current characteristics viz. Finite output resistance, body effect, sub-threshold conduction, breakdown effects and temperature effects	24/7/2019		R2 136-139 R6 51-58 R13 245-250	https://nptel.ac.in/courses/117106087/29		Explain secondary effects in MOFET and how it affects threshold voltage of MOSFET and related drain current
20	11	11.1	Common source circuit	29/7/2019		R2 (219) R5 (494-499)	https://nptel.ac.in/courses/117103063/20		Design amplifier which provides more stability
21		11.2	Load Line & Modes of operation			R2 (220-230)	https://nptel.ac.in/courses/108108111/12		

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22	12	12.1	MOSFET configurations: DC Analysis	30/7/2019		R2 (140-149, 151)	https://nptel.ac.in/courses/117103063/18 & https://nptel.ac.in/courses/117103063/19		Analyze DC behaviour of MOSFET
23		12.2	Constant current source biasing			R2 (154-159)			
24	13	13.1	MOSFET as switch	31/7/2019		R7 (113-120) R9 (158-160) R10 (493-495)	https://nptel.ac.in/courses/117106087/36	C1 to C16 and P1 , P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13	Demonstrate applications of MOSFET
25		13.2	MOSFET Diode/active resistor			R1 (339-340) R7 (124-126)			
26		13.3	Current sink and source			R7 (126-130)			
27	14	14.1	Current mirror	5/8/2019		R7 (134-137) R12 (135-142)			Apply acquired knowledge in circuit design
28		14.2	Voltage references			R7 (143-150)			
29		14.3	Basic principle of band gap reference			R7 (153-157) R12 (377-390)			
30	15	15.1	CMOS Inverter as amplifier: Active load, Current source, Push pull configurations.	6/8/2019		R7 (168-171) R7 (172-175) R7 (176-177)	https://nptel.ac.in/courses/117106087/29	C1 to C16 and P14, P15, P16, P17, P18	Compare and will judge circuit for full swing output Test the performance of the circuit
UNIT-III: ELECTRONIC AMPLIFIERS									
31	16	16.1	Basics and Classification of	7/8/2019		R1 (372)		C1 to C16 and P15, P17, P19, P22, P23, P24	Demonstrate applications of Amplifiers and Apply acquired knowledge in circuit design
32		16.2	Fundamentals of Low noise amplifiers			R7 (402-409)			
33		16.3	Fundamentals of Power amplifiers			R5 (671) R10 (378) R10 (385-412)			
34	17	17.1	Feedback amplifiers: Feedback concept and topologies	12/8/2019		R2 (849-859)	https://nptel.ac.in/courses/117103063/31	C1 to C16	Classify various topologies and demonstrate significance of feedback

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35	18	18.1	Effect of feedback on terminal	13/8/2019		R1 (413-424) R5 (744-747)		C1 to C16 and P20, P21	Illustrate Ri, Ro, and Gain parameter
36	19	19.1	Feedback amplifier analysis	14/8/2019		R1 (425-445) R2 (869-898) R10 (706-723)			Analyze various configurations through comparision
37	20	20.1	Cascade amplifiers	19/8/2019		R11 (353-363)	https://nptel.ac.in/courses/117103063/21, https://nptel.ac.in/courses/117103063/22, https://nptel.ac.in/courses/117106087/30	C1 to C16 and P25	Design amplifier with higher gain
38		20.2	DC Amplifiers			R11 (384)			Demonstate the DC amplifier usage
UNIT-IV: OSCILLATORS									
39	21	21.1	Barkhausen criterion	20/8/2019		R1 (484)		C1 to C16	Classify oscillators and illustrate condition of oscillation criterion
40		21.2	Stability with feedback			R1 (471-475)			
41		21.3	Classification of oscillators				https://nptel.ac.in/courses/117103063/31, https://nptel.ac.in/courses/122106025/35		
42	22	22.1	RC Oscillators: FET RC Phase Shift	21/8/2019		R1 (485-487) R5 (758-760)			Illustrate RC network to obtain phase shift
43	23	23.1	Wein bridge oscillator	26/8/2019		R10 (893-897)			Extend the bridge concept in the oscillator
44	24	24.1	LC Oscillators Basics	27/8/2019		R5 (760)			Illustrate usage of tank circuit
45		24.2	Hartley oscillators			R5 (764-765) R10 (906)			
46		24.3	Colpitts oscillators			R5 (763-764) R10(900-904)			
47	25	25.1	Crystal oscillators	28/8/2019		R1 (495-496) R5 (765-767) R10 (907-911)			Relate the piezoelectric effect and analyze its equivalent

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48	26	26.1	UJT Relaxation oscillator (Construction, Operation , V-I Charesteristics)	2/9/2019		R5 (768-769) R11 (584-587)			Demonstrate the operation of UJT
UNIT-V: MULTIVIBRATORS									
49	27	27.1	IC555 Block diagram	3/9/2019		R9 (691) R10 (914-916)	LM 555 Data sheet www.ti.com	C1 to C16	Explain working principle of Timer
50	28	28.1	Astable Multivibrator using FETs	4/9/2019		R5 (723-725) R10 (918-921)			Construct application using astable mode of operation
51	29	29.1	Monostable Multivibrator using FETs	9/9/2019		R5 (726-727) R10 (916-918)			Construct application using monostable and bistable mode of operation
52		29.2	Bistable Multivibrator using FETs			R9 (669)			
53	30	30.1	Operation of Multivibrators (Monostable) using IC555	10/9/2019		R14 (424-436)			Construct application using monostable mode of operation
54	31	31.1	Operation of Multivibrators (Astable) using IC555	11/9/2019		R14 (422-424)			Construct application using astable mode of operation
55	32	32.1	Applications of IC555 in Engineering	16/9/2019		R10 (923-929) R15 (518)			Apply acquired knowledge to build innovative circuits
UNIT-VI: VOLTAGE REGULATOR									
56	33	33.1	Block diagram of an adjustable three terminal positive regulators (317)	17/9/2019		R5 (793-795) R10 (969) R13 (715-716)	LM 317 Data Sheet http://www.ti.com/lit/ds/slvs044x/slvs044x.pdf	C9	Design adjustable positive voltage regulator using 317
57	34	34.1	Block diagram of an adjustable three terminal negative regulators (337)	18/9/2019		R15 (457-462)	LM137, LM337-N Data Sheet http://www.ti.com/lit/ds/symlink/lm137.pdf		Design adjustablenegative voltage regulator using 337
58	35	35.1	Current boosting	23/9/2019		R16 (279)			Demonstrate current boosting and low dropout voltage
59		35.2	Low drop out voltage						

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60	36	36.1	Introduction to Switch Mode Power supply	24/9/2019		R11 (654-655)			Explain working principle of SMPS
61		36.2	Block diagram of SMPS			R11 (655-656)			
62	37	37.1	Types of SMPS	25/9/2019		R11 (657-660)		P26, P27, P28	Classify SMPS in various types
63	38	38.1	Comparison of Linear Power supply and	30/9/2019		R11 (660-661)			Design Power supply

*T=Text Book; R= Reference Book; C= Company name; P= Research Paper

Total number of lectures as per syllabus: - 36 Total number of lectures as per planned: - 36

Final Outcome of the Subject (Maximum 6 Outcome):

CO1. Analyze FET and MOSFET Circuits for small signal at low and high frequencies
CO2. Test the Performance of the circuit
CO3. Analyze the effect of feedback on terminal characteristics of amplifier
CO4. Design different oscillator circuits for various frequencies
CO5. Apply knowledge of FET and IC555 for Various applications
CO6. Design an adjustable Voltage regulator circuit

Reference Books:

Code	Title of the Book	Author Name/Designation/	Publisher	Edition/ Publication Year
R1	Integrated Electronics-Analog and Digital Circuits and Systems	Millman Halkias	Tata McGraw Hill, 2000	2nd
R2	Electronic Circuit Analysis and Design	Donald Neaman	Tata McGraw Hill	3rd
R3	Electronics Devices & Circuits	Brijesh Iyer, S.L.Nalbalwar, R. Dudhe	Synergy Knowledgeware Mumbai, 2017. ISBN:9789383352616	1st
R4	Electronic Devices and Circuits	David A. Bell	Oxford Press	5th
R5	Electronic Devices and circuits Theory	R. L. Boylstad, L. Nashlesky	Prentice Hall of India, 2006.	9th
R6	CMOS VLSI Design	Neil H. Weste David Hariss Ayan Banerjee	Pearson	3rd

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R7	CMOS Analog Circuit Design	Phillip E. Allen Douglas R. Holberg	Oxfor University Pres	2nd
R8	Electronic Circuits Discrete and Integrated	Donald L. Schilling Charles Belove	Tata McGraw Hill	3rd
R9	Microelectronics	Jacob Millman Arvin Grabel	Tata McGraw Hill	2nd
R10	Electronic Principles	Albert Malvino David J. Bates	McGraw Hill	7th
R11	Electronic Devices and Circuits	S. Salivahanan N. S. Kumar	McGraw Hill	2nd
R12	Design of Analog CMOS Integrated Circuits	Behzad Razavi	Tata McGraw Hill	2002
R13	Electronic Devices and Circuits Principles and	N. P. Deshpande	Tata McGraw Hill	2004
R14	Electronic Devices and Circuits	I. J. Nagrath	PHI Learning Pvt. Ltd.	Eastern Economy Edition 2009
R15	OP-Amps and Linear Integrated Circuit	Ramakant Gaikwad	Pearson Prentice Hall	4th
R16	Linear Integrated Circuits	D Roy Choudhury S. B. Jain	New Age International	2nd

Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	Sibridge Technologies	sibridgetech.com	A provider of innovative value added solution for design, verification and embedded systems development to semiconductors and electronic product companies
C2	SmartPlay Technologies	smartplayin.com	A provider of digital, analog, wirelesssoftware and system design and an independent design house for design and customization of 3G smart phones
C3	Terminus Circuits	terminus Circuits.com	A solution provider for OEM (Original Equipments Manufacturer) through custom IPs
C4	Adroit IC Design	adroiticdesign.com	A fabless semiconductor company designing next generation IP in cutting edge process technology node
C5	Ineda Systems	inedasystems.com	A provider of low power SOC's for the use in both consumer and enterprise applications.
C6	Infineon Technologies India Pvt. Ltd.	infineon.com	A provider of semiconductors and system solutions for automative and industrial electronics and chip card and security applications
C7	Masamb Electronics Systems	masamb.com	A provider of semiconductor design services and Embedded Systems Design solutions.
C8	Saankhya Labs	saankhyalabs.com	A fabless semiconductor company designing software defined Universal demodulator IC for Digital and Analog TV reception.

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C9	Semtronics Micro Systems	semtronicsmicrosyst[illegible].com	A provider of IC and IC based power systems design and manufacturing of LED drivers
C10	ON Semiconductor	www.onsemi.com	A provider of innovative energy efficient power and signal management logic, discrete and custom semiconductors products.
C11	Texas Instruments	www.ti.com	A global semiconductor design and manufacturing company. Innovate with 80000+ analog Ics and Embedded processors, software & support
C12	National Instruments	www.ni.com	A global provider in automated Test and Measurement Systems
C13	AMD	www.amd.com	A global provider of Processor and Semicustom ICs and products
C14	Motorola	www.motorola.in	A company designing Android cell phones and modular smartphones.
C15	Xilinx	www.xilinx.com	Inventor of the FPGA, programmable SoCs, and ACAP. Provider of highly-flexible programmable silicon, enabled by a suite of advanced software and tools. Xilinx delivers the most dynamic processing technology in the industry, enabling rapid innovation with its adaptable, intelligent computing.
C16	Intel	www.intel.com	A company designing processors, manufactures motherboard chipsets, NI Controllers, Memory chips, embedded processors and semiconductor devices related to communication and computing.

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	Performance Analysis of Constant Current Source for Different Aspect Ratio	Gyan Prakash Pal	IEEE International Conference on Computational Intelligence & Communication Technology	10.1109/CICT.2015.14	2015
P2	Current source gate drive circuits with low power consumption for high frequency power converters	Ayato Sagehashi	9th International Conference on Power Electronics and ECCE Asia	10.1109/ICPE.2015.7167906	2015
P3	A high-voltage single-shot switch implemented with a MOSFET current source and avalanche diode	T.A. Baginski	IEEE Transactions on Industrial Electronics	10.1109/41.564154	Volume: 44 , Issue: 2 , Apr 1997
P4	Negative-resistance MOS transistor	M. Syrzycki	IEEE Transactions on Electron Devices	10.1109/16.119019	Volume: 38 , Issue: 8 , Aug 1991

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P5	A 10-A High-Precision DC Current Source With Stability Better Than 0.1 ppm/h	Nong Wang	School of Electrical Engineering and Automation, Harbin Institute of Technology, Harbin, China	10.1109/TIM.2014.2376114	2014
P6	Two new Schmitt trigger circuits based on current sink and current source inverters	Sk. Apsana Parveen ;	International Conference on Signal Processing and Communication	10.1109/SPACES.2015.7058233	2015
P7	Novel MOSFET-only bandgap voltage reference	Carlos Dualibe	IEEE International Symposium on Circuits and Systems	10.1109/ISCAS.2010.5537469	2010
P8	Design of low voltage bandgap reference circuit using subthreshold MOSFET	Sushma S Sangolli	5th Nirma University International Conference on Engineering (NUiCONE)	10.1109/NUICONE.2015.7449627	2015
P9	A low power programmable band gap reference circuit with subthreshold MOSFETs	S. Ramasamy	TENCON - IEEE Region 10 Conference	10.1109/TENCON.2008.4766816	2008
P10	A subthreshold MOSFET bandgap reference with ultra-low power supply voltage	Yilei Li	9th IEEE International Conference on ASIC	10.1109/ASICON.2011.6157341	2011
P11	A 0.9-V 33.7-ppm/°C 85-nW Sub-Bandgap Voltage Reference Consisting of Subthreshold MOSFETs and Single BJT	Lidan Wang	IEEE Transactions on Very Large Scale Integration (VLSI) Systems	10.1109/TVLSI.2018.2836331	Volume: 26 , Issue: 10 , Oct. 2018
P12	Design of 1 V bandgap reference without native MOS transistor in 0.18 µm CMOS technology	P Arivazhagan	Conference on Computing, Communication and Networking	10.1109/ICCCNT.2012.6396028	2012
P13	A new high performance bandgap reference	Chenyuan Zhao	Conference on Electronics, Communications and	10.1109/ICECC.2011.6067602	2011
P14	A CMOS Inverter-Like Class-D/E Power Amplifier with No RF-Choke and No Dead-Time Requirement	Gagan Deep Singh	IEEE International Symposium on Circuits and Systems (ISCAS)	10.1109/ISCAS.2018.8351789	2018

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P15	A 0.18µm CMOS switched-capacitor amplifier using current-starving inverter based op-amp for low-power biosensor applications	Ryan Selby	IEEE 4th Latin American Symposium on Circuits and Systems (LASCAS)	10.1109/LASCAS.2013.6519039	2013
P16	Design of CMOS inverter-based output buffers adapting the cherry-hooper broadbanding technique	Tomoaki Maekawa	European Conference on Circuit Theory and Design	10.1109/ECCTD.2009.5275025	2009
P17	A CMOS inverter-based class-AB pseudo differential amplifier for HF applications	Apirak Suadet	IEEE International Conference of Electron Devices and Solid-State Circuits (EDSSC)	10.1109/EDSSC.2010.5713694	2010
P18	Transconductance CMOS inverter based AC coupling amplifier	Hervé Barthélemy	IEEE 12th International New Circuits and Systems Conference (NEWCAS)	10.1109/NEWCAS.2014.6933972	2014
P19	A highly efficient 1.9-GHz Si high-power MOS amplifier	I. Yoshida	IEEE Transactions on Electron Devices	10.1109/16.662810	Volume: 45 , Issue: 4 , Apr 1998
P20	An MMAC C-band FET feedback power amplifier	A.K. Ezzeddine	IEEE Transactions on Microwave Theory and Techniques	10.1109/22.52574	Volume: 38 , Issue: 4 , Apr 1990
P21	Analysis and Design of Class-E Power Amplifier With MOSFET Parasitic Linear and Nonlinear Capacitances at Any Duty Ratio	Mohsen Hayati	IEEE Transactions on Power Electronics	10.1109/TPEL.2013.2247633	Volume: 28 , Issue: 11 , Nov. 2013
P22	Millimeter-wave CMOS power amplifiers in common-source MOSFETs	Sang-Hyun Hwang	International SoC Design Conference	10.1109/SOCDC.2008.4815657	2008
P23	Class D voltage-switching MOSFET power amplifier	M.K. Kazimierczuk	IEE Proceedings B - Electric Power Applications	10.1049/ip-b.1991.0035	Volume: 138 , Issue: 6 , Nov. 1991
P24	100 Watt Super Audio Amplifier Using New Mos Devices	Tohru Sampei	IEEE Transactions on Consumer Electronics	10.1109/TCE.1977.266916	Volume: CE-23 , Issue: 3 , Aug. 1977

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P25	The gain advantages of four cascaded single stage distributed amplifier configurations	[redacted] Banyamin	IEEE MTT-S International Microwave Symposium digest.	10.1109/MWSYM.2000.861764	IEEE MTT-S International Microwave Symposium3:1325 - 1328 vol.3 · February 2000
P26	Switched-mode power supply design guidelines for smartphones and tablets for reducing RF emissions	Yagnesh V. Waghela	International Conference on ElectroMagnetic Interference & Compatibility (INCEMIC)	10.1109/INCEMIC.2016.7921502	2016
P27	A Switch Mode Power Supply"	Michael G J Fry	INTELEC '82 - International Telecommunications Energy Conference	10.1109/INTLEC.1982.4793743	1982
P28	Multiple output SMPS with improved input power quality	Shikha Singh	5th International Conference on Industrial and Information Systems	10.1109/ICIINFS.2010.5578673	2010

Prof.G.V.Padole
Subject Teacher

Prof. V.P.Choudhari
Academic Incharge

Prof. N.V. Thakare
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DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

SESSION 2018-19

TEACHING PLAN

NAME OF THE TEACHER: Ms. T. N. Mohota
SUBJECT: Numerical Methods and Computer Programming
YR/SEM.: 2nd/4th

SUBJECT CODE: BTBSC 406
SECTION: A

Sr. No.	Lec. No.	Topic Code	Contents to be Covered	Planned Teaching Dates/ Days	Text Book (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-I: INTRODUCTION TO COMPUTATIONAL METHODS & ERRORS									
1	1	1.1	General principles, common ideas and concepts of computational techniques.	Day 1		R4 (2-12)	https://nptel.ac.in/courses/122102009/	C1 to C11 P1 to P27	Students will be able to demonstrate significance of Numerical methods
2		1.2	Various computational techniques.				https://nptel.ac.in/courses/122102009/		
3	2	2.1	Errors: Types and sources of errors	Day 2		R5 (43-60)	https://nptel.ac.in/courses/122102009/		Students will be able to differentiate between Normal algebraic and Computer mathematics
4		2.2	Concept in error estimation and Error propagation				https://nptel.ac.in/courses/122102009/		
5	3	3.1	Error due to floating point	Day 3		R5 (34-39)	https://nptel.ac.in/courses/122106033/		Students will be able to justify storage requirement of digital and its limitations
6		3.2	Representation of errors, Elementary uses of series in calculation of errors			R1 (7-17)	https://nptel.ac.in/courses/122106033/		

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UNIT-II: SOLUTION OF TRANSCENDENTAL/EQUATIONS & SYSTEM OF LINEAR EQUATION								
7	4	4.1	Finding root of polynomial equations deploying computational method Bisection.	Day 4	R1 (21-24), R4 (20-22), R2 (48-53)	https://nptel.ac.in/courses/122106033/21		Studentas will be able to find nearest approximate root for given polynomial equations
8	5	5.1	Finding root of polynomial equations deploying computational method Regula-falsi	Day 5	R1 (24-26), R4 (24-25), R2 (73-74)	https://nptel.ac.in/courses/122106033/21		Find nearest approximate root along with comparision with bisection method based on speed
9	6	6.1	Finding root of polynomial equations deploying computational method Newton-Raphson	Day 6	R1 (33-37), R4 (26-29), R2 (66-73)	https://nptel.ac.in/courses/122106033/22		Find nearest approximate root along with comparision with various other method based on speed
10	7	7.1	Finding root of polynomial equations deploying computational method Secant	Day 7	R1 (43-44), R4 (22-23), R3 (125-138)	https://nptel.ac.in/courses/122106033/22		Find nearest approximate root along with comparision with various other method based on speed
11	8	8.1	Finding root of polynomial equations deploying computational method Successive approximation.	Day 8	R1 (26-32)	https://nptel.ac.in/courses/122106033/23	C1 to C11 P1 to P27	Find nearest approximate root along with comparision with various other method based on speed
12	9	9.1	Solving linear equations deploying computational method Gauss elimination & Gauss Jordan	Day 9	R1 (257-265), R4 (114-120), R2 (357-368)	https://nptel.ac.in/courses/111101003/17		Students will be able to find solution of set of linear equations and give comparision of various methds used for it.

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13	10	10.1	Solving linear equations deploying computational method Partial pivoting & Matrix triangularisation (LU decomposition)	Day 10	R1 (265-270), R1 (259-260), R4 (120-127)	https://nptel.ac.in/courses/111101003/20 , https://nptel.ac.in/courses/111101003/18		Students will be able to find solution of set of linear equations and give comparision of various methds used for it.
14	11	11.1	Solving linear equations deploying computational method Cholesky	Day 11	R4 (127-131), R3 (325-326)	https://nptel.ac.in/courses/111101003/19		Students will be able to find solution of set of linear equations and give comparision of various methds used for it.
15	12	12.1	Solving linear equations deploying computational method Gauss Seidel and Jacobi methods.	Day 12	R4 (147-152), R5 (303-310)	https://nptel.ac.in/courses/111101003/29, https://nptel.ac.in/courses/111101003/28, https://nptel.ac.in/courses/111107105/4		Students will be able to find solution of set of linear equations and give comparision of various methds used for it.
UNIT-III: INTERPOLATION & POLYNOMIAL APPROXIMATION								
16	13	13.1	Least square approximation	Day 13	R1 (146-150), R3 (520-524), R5 (178-185)	https://nptel.ac.in/courses/122102009/30, https://nptel.ac.in/courses/122102009/31		Students will be able to demonstrate understanding of approximations
17		13.2	Orthogonal polynomials & Chebyshev polynomials		R1 (151-154), R1 (178-182), R2 (498-506), R2 (507-516),	https://nptel.ac.in/courses/122102009/31, https://nptel.ac.in/courses/122102009/33		
18	14	14.1	Finite difference operator and their relations, Forward, backward, central and divided difference	Day 14	R1 (65-72), R4 (229-235), R2 (122-130), R1 (100-105)	https://nptel.ac.in/courses/111107105/17, https://nptel.ac.in/courses/122102009/27, https://nptel.ac.in/courses/111106101/5, https://nptel.ac.in/courses/111106101/6		Students will be able to fit the data in a given set.
19	15	15.1	Newton's forward divided difference, Backward difference interpolation	Day 15	R1 (73-82), R4 (235-237), R1(100-105), R2 (122-130)	https://nptel.ac.in/courses/111107105/18, https://nptel.ac.in/courses/111106101/4	C1 to C11 P1 to P27	Students will be able to fit the data in a given set and find the generated error in calculation.

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20	16	16.1	Stirling interpolation	Day 16	R4 (237-242), R2 (129-130), R6 (241)			Students will be able to construct a polynomial which fit the data in a given set.
21	17	17.1	Lagrange"s interpolation polynomials	Day 17	R1 (91-97)	https://nptel.ac.in/courses/111107105/22, https://nptel.ac.in/courses/111106101/7		Students will be able to demonstrate its complexity compared to other methods
22	18	18.1	Spline interpolation	Day 18	R1 (108-121), R4(260-271)	https://nptel.ac.in/courses/122106033/12		Students will be able to demonstrate piecewise linear interpolation and its drawback.
UNIT-IV: NUMERICAL INTEGRATION & DIFFERENTIATION								
23	19	19.1	Methods based on interpolation such as Trapezoidal rule	Day 19	R1 (198-200), R4 (350-352)	https://nptel.ac.in/courses/111107105/32	C1 to C11 P1 to P27	Students will be able to estimate the area beneath a curve
24	20	20.1	Simsons 1/3 and 3/8 rules	Day 20	R1 (200-201)	https://nptel.ac.in/courses/111107105/33, https://nptel.ac.in/courses/111107105/34		Students will be able to apply it in integration where integrand may have some unexpected behavior
25	21	21.1	Euler's method, Modified Euler's method	Day 21	R1 (300-304)	https://nptel.ac.in/courses/111107105/37, https://nptel.ac.in/courses/111107105/38		Students will be able to find approximate values of the solutions to the initial-value problem
26	22	22.1	Runge Kutta 2ndand 4th order	Day 22	R1 (304-308)	https://nptel.ac.in/courses/111107105/39		Students will demonstrate imitation of Taylor series method without requiring analytical differentiation of the original differential equation.

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27	23	23.1	Taylor's series & Stability analysis of various integration and differentiarion methods	Day 23	R1 (296-298)	https://nptel.ac.in/courses/111107105/38		Students will be able to compre various methods based on their complexity
UNIT-V: OBJECT ORIENTED PROGRAMMING								
28	24	24.1	Basic concepts of object oriented programming	Day 24	R8 (6-12)	https://nptel.ac.in/courses/106105151/19	C1 to C12 P16	Students will understand significance of OOP concepts
29		24.2	Benefits of OOP, Object oriented languages, Applications of OOP					
30	25	25.1	Basic data types, User defined data types, Symbolic constants, Declaration of variables	Day 25	R8 (22-26)			Students will be able to identify correct use of variable while dealing with data
31	26	26.1	Dynamic initialization of variables, Reference variables	Day 26	R9 (185-188)	https://nptel.ac.in/courses/106105151/17, https://nptel.ac.in/courses/106105151/18		Students will be able to justify storage requirement of data
32	27	27.1	Scope resolution operator & Type cast operator	Day 27	R9 (236), R9 (58-60)	https://nptel.ac.in/courses/106105151/47, https://nptel.ac.in/courses/106105151/48, https://nptel.ac.in/courses/106105151/49		Students will be able to demonstrate casting requirement
33	28	28.1	Function prototyping & Inline functions	Day 28	R8 (20, 54), R9 (195-197), R8 (77-80)	https://nptel.ac.in/courses/106105151/8, https://nptel.ac.in/courses/106105151/9		Students will be able to efficiently code critical time parameter in programming
34	29	29.1	Function overloading	Day 29	R8 (55-65), R9 (188-193)	https://nptel.ac.in/courses/106105151/12, https://nptel.ac.in/courses/106105151/13, https://nptel.ac.in/courses/106105151/14		Students will be able to model various data types and related functionalities efficiently

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35	30	30.1	Friend and virtual functions	Day 30	R8(475-485), R8 (321-345), R9 (520-528), R9 (504-513)	https://nptel.ac.in/courses/106105151/32	Students will be able to use nonmember function with class using friend and demonstrate run time polymorphism through virtual function
36	31	31.1	Specifying a class, Defining members, C++ program with class	Day 31	R7 (90-94)		Students will be able to provide data security and understand data hiding.
37	32	32.1	Constructors, Multiple constructor in class	Day 32	R8 (93-95, 187-192), R9 (227-231)	s/106105151/23, https://nptel.ac.in/courses/106105151/24, https://nptel.ac.in/courses/106105151/25 ,https://nptel.ac.in/courses/106105151/26	Students will be able to provide default initial values to object associated members
38	33	33.1	Dynamic initialization of objects	Day 33	R9 (458-462), R8 (122-126)	https://nptel.ac.in/courses/106105151/17, https://nptel.ac.in/courses/106105151/18	Students will be able to demonstrate allocation and deallocation of memory efficiently
39		33.2	Dynamic constructor, Destructors.				
UNIT-VI: OPERATOR OVERLOADING & TYPE CONVERSIONS							
40	34	34.1	Defining operator overloading, Rules for overloading operators	Day 34	R8 (68-77)	https://nptel.ac.in/courses/106105151/15, https://nptel.ac.in/courses/106105151/16	Students will be able to justify use of operators for nonstandard data items
41	35	35.1	Overloading binary operators	Day 35	R9 (328-332)		
42	36	36.1	Overloading unary operators & Manipulation of strings operators	Day 36	R9 (320-328, 332-341)		
43	37	37.1	Defining derived classes, Single inheritance, multilevel inheritance	Day 37	R9 (373-375)	https://nptel.ac.in/course, s/106105151/36, https://nptel.ac.in/courses/106105151/37, https://nptel.ac.in/course	Students will be able to develop smart claases using inheritance concept.

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44	38	38.1	Multiple, Hierarchical & Hybrid inheritance	Day 38	R7 (518-527)	s/106105151/38, https://nptel.ac.in/courses/106105151/39, https://nptel.ac.in/courses/106105151/50, https://nptel.ac.in/courses/106105151/51 https://nptel.ac.in/courses/106105151/40	C1 to C12 P16	Students will be able to model praxctical world problems with extention of classes
45	39	39.1	Virtual Functions and Polymorphism, pure virtual functions	Day 39	R8 (321-329)	https://nptel.ac.in/courses/106105151/42, https://nptel.ac.in/courses/106105151/43, https://nptel.ac.in/courses/106105151/44, https://nptel.ac.in/courses/106105151/45, https://nptel.ac.in/courses/106105151/46		Students will be able to use pointers of base class efficiently in programming
46	40	40.1	Virtual base classes, Abstract classes	Day 40	R8 (357-361, 329), R9 (518-520, 510-511)			Students will be able to justify need of virtual base class
47	41	41.1	Managing Console I/O Operations, C++ Stream Classes	Day 41	R9 (568-577)			Students will learn how to manage input and visual effects with console
48	42	42.1	Unformatted I/O Operations, Managing output with manipulators.	Day 42	R9 (568-577)			Students will learn how to use manipulators in programming

*T=Text Book; R= Reference Book; C= Company name; P= Research Paper

Total number of lectures as per syllabus: - 36 Total number of lectures as per planned: - 42

Final Outcome of the Subject (Maximum 6 Outcome):

On completion of the course, students will be able to

CO1.	solve algebraic and transcendental equations by using numerical techniques and will be able to compare different numerical techniques used for this purpose and also will be able to choose a proper one as per the requirement of the problem.
CO2.	solve a system of linear equations with any number of variables using different direct and iterative numerical techniques.
CO3.	Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values.
CO4.	Prepare themselves to write computer programs for the numerical computational techniques.
CO5.	Understand application of the NMCP course in many engineering core subjects like signal processing, digital communication, numerical techniques in electromagnetics etc.
CO6.	Understand procedure-oriented and object oriented programming concepts and capable of writing C and C++ programs efficiently.

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Text/Reference Books:

Code	Title of the Book	Author Name/Designatio	Publisher	Edition/ Publication Year
R1	Introductory Methods of Numerical Analysis	S. S. Sastry	Prentice Hall of India, Private Limited, 2008.	4th
R2	Numerical Analysis	R. L. Burden, J. D. Faires	Thomson Brooks/Cole	7th
R3	Numerical Mathematics and Computing	Ward Cheney, David Kincaid	Thomson Brooks/Cole	5th
R4	Numerical Methods	M. K. Jain, S. R. K. Iyengar, R. K. Jain	New Age International	5th
R5	Elementary Numerical Analysis	K. Atkinson, W. Han	Wiley India	3rd
R6	Numerical Methods	P. Kandasamy, K. Thilagavathy, K. Gunavathi	S. Chand & Company Limited	1st
R7	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill	2nd
R8	Let us C++	Yeshwant Kanetkar	BPB	4th
R9	Object-Oriented Programming in C++	Robert Lafore	Techmedia	4th

Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	Bosch	www.bosch.in	Bosch is a leading suppiler of technology and services in the areas of Mobility solutions; industrial technology, consumer goods and energy and building technology.
C2	Mathworks	www.mathworks.com	It is the leading developer of mathematical computing software for engineers and scientists. Analyze data, develop algorithms and create mathematical models.
C3	Indian Space Research Organization	www.isro.gov.in	Harness space technology for national development, while pursuing Spaces science research and planetary exploration. Designs and develops of Launch vehicles and satellites and related technologies.

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C4	Defence Researc & Development Organization	www.drdo.gov.in	Designs, develops and lead to production statr-of-the-art sensors, weapon systems,platforms and allied equipment for defence services in India. Provides technology solutions to the servicesand build strong indigenous technology base.
C5	Hindustan Aeronautics Limited	www.hal-india.co.in	It is a significant global player in the aerospace industry. Achievs self reliance in design, development, manufacture, upgradeand maintenance of aerospace equipment diversifying into related areas.
C6	Mahindra Aerospace	www.mahindraaerospace.com	Manufactures a utility and versatile aircraft in its class.
C7	RajHamsa Ultralight Pvt. Ltd.	www.x-air.in	Manufactures Ultralight aircrafts.
C8	Arrow Electronics India Pvt. Ltd.	www.arrow.com	Arrow electronics guides innovation forward for leading technology manufacturers and service providers. Develops technology solutions that improve business and daily life
C9	Qualcomm	www.qualcomm.com	Invent mobile technology breakthroughs.
C10	Bharat Electronics Ltd.	www.bel-india.in	Indian state owned aerospace and defence company. Manufactures advanced electronic produts for the indian armed forces.
C11	Bharat Heavy Electricals Ltd.	www.bhel.com	BHEL is one of the largeat engineering and manufacturing company , engaged in design, engineering, construction, testing, commissioning and servicing of a wide range of products and services in the field of power, transmission, renewables, transportation, water etc.
C12	Infosys, Capgemini, IBM, Google etc. (IT Companies)	www.infosys.com www.capgemini.com	Global leader in next generation digital transformation, technology services and consulting.

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	Implementation of numerical method for solving electrostatic problem	Dmitry I. Volkhin	15th International Conference of Young Specialists on Micro/Nanotechnologies and Electron Devices (EDM)	DOI: 10.1109/EDM.2014.6882491	2014

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P2	Study on Numerical Analysis Methods of EM Field and the Radiated Fields from ESD	Xu Xiaoying	Conference on Electronic Measurement and Instruments	10.1109/ICEMI.2007.4350541	2007
P3	Tabulation of Methods for the Numerical Solution of the Hollow Waveguide Problem (Short Papers)	Fook Loy Ng	IEEE Transactions on Microwave Theory and Techniques	10.1109/TMTT.1974.1128217	Volume: 22 , Issue: 3 , Mar 1974
P4	A numerical method for design of PI controllers	H. Panagopoulos	International Conference on Control	10.1109/CCA.1997.627612	1997
P5	Review of Numerical Methods for the Analysis of Arbitrarily-Shaped Microwave and Optical Dielectric Waveguides	S.M. Saad	IEEE Transactions on Microwave Theory and Techniques	10.1109/TMTT.1985.1133147	Volume: 33 , Issue: 10 , Oct 1985
P6	Performance evaluation of numerical methods for the Maxwell-Liouville equations	Michael Riesch	Conference on Numerical Simulation of Optoelectronic Devices (NUSOD)	10.1109/NUSOD.2017.8010072	2017
P7	On the complexity of numerical analysis	E. Allender	Conference on Computational Complexity	10.1109/CCC.2006.30	2006
P8	Numerical analysis of electromagnetic fields induced in the biological tissues by the new radio systems using ultrawide band (UWB)	A. Pradier	IEEE Antennas and Propagation Society International Symposium	10.1109/APS.2005.1551885	2005
P9	On Numerical Methods for Second Order PDE	Yi-Min Tian	International Conference on Information	10.1109/ICIE.2010.186	2010
P10	Numerical solution of partial differential equations with help of fuzzy transform	M. Stepnicka	International Conference on Fuzzy Systems,	10.1109/FUZZY.2005.1452549	2005

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P11	Application of numerical methods in electromagnetic wave well-logging problems	Shen Xiaoyang	Antenna Technology and Applied Electromagnetics	Print ISBN: 978-0-9692563-1-1	1988
P12	Survey of numerical methods in field calculations	T. Tortschanoff	IEEE Transactions on Magnetics	10.1109/TMAG.1984.1063472	Volume: 20 , Issue: 5 , Sep 1984
P13	Numerical analysis and optimization of anechoic chambers for EMC testing	C. Bornkessel	on Electromagnetic Compatibility	10.1109/15.536082	Volume: 38 , Issue: 3 , Aug 1996
P14	Numerical methods for semiconductor device simulation	R.E. Bank	Transactions on Electron Devices	10.1109/T-ED.1983.21257	Volume: 30 , Issue: 9 , Sep 1983
P15	A Numerical Method Based on the Discretization of Maxwell Equations in Integral Form (Short Papers)	M. Albani	IEEE Transactions on Microwave Theory and Techniques	10.1109/TMTT.1974.1128246	Volume: 22 , Issue: 4 , Apr 1974
P16	Numerical Solution of Cloud Servicing Models	Vasil Georgiev	International Conference on Mathematics and Computers in Sciences and in Industry	10.1109/MCSI.2014.49	2014
P17	Numerical Methods for H2 Related Problems	E. Feron	American Control Conference	10.23919/ACC.1992.4792678	1992
P18	On the application of numerical methods to Hallen's equation	G. Fikioris	IEEE Transactions on Antennas and Propagation	10.1109/8.918612	Volume: 49 , Issue: 3 , Mar 2001
P19	Numerical solutions of fractional differential equations by using fractional Taylor basis	Vidhya Saraswathy	IEEE/CAA Journal of Automatica Sinica	10.1109/JAS.2017.7510337	Volume: 4 , Issue: 1 , Jan. 2017
P20	Visual Teaching of Numerical Analysis Based on MATLAB	Yu Bai	First International Conference on Information Science and Engineering	10.1109/ICISE.2009.1341	2009

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P21	Numerical Methods for Solving the Optimal Problem of Contrast Enhancement	Jian Yang	TRANSACTIONS ON GEOSCIENCE AND REMOTE		VOL. 38, NO. 2, MARCH 2000
P22	A high-order numerical algorithm for two-dimensional time–space tempered fractional diffusion-wave equation	Hengfei Ding	Elsevier Journal Applied Numerical Mathematics	https://doi.org/10.1016/j.apnum.2018.08.005	Volume 135, January 2019, Pages 30-46
P23	L2(H1γ)Finite Element Convergence for Degenerate Isotropic Hamilton–Jacobi–Bellman Equations	Annalisa Buffa	IMA Journal of Numerical Analysis	10.1093/imanum/drw035	Volume: 37 , Issue: 3 , July 2017
P24	Refinable spaces and local approximation estimates for hierarchical splines	Annalisa Buffa	IMA Journal of Numerical Analysis	10.1093/imanum/drw055	Volume: 37 , Issue: 3 , July 2017
P25	Fast and accurate computation of Chebyshev coefficients in the complex plane	Haiyong Wang	IMA Journal of Numerical Analysis	10.1093/imanum/drw039	Volume: 37 , Issue: 3 , July 2017
P26	On the numerical stability of the second barycentric formula for trigonometric interpolation in shifted equispaced points	Anthony P. Austin	IMA Journal of Numerical Analysis	10.1093/imanum/drw038	Volume: 37 , Issue: 3 , July 2017
P27	Convergence rates of finite difference schemes for the linear advection and wave equation with rough coefficient	Franziska Weber	IMA Journal of Numerical Analysis	10.1093/imanum/drw046	Volume: 37 , Issue: 3 , July 2017

Ms. T. N. Mohota

Subject Teacher

Mr. V. P. Chaudhari

Academic Incharge

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POST: VALNI, AT: KHANDALA, KATOL ROAD, NAGPUR – 441501
DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING
SESSION 2018-19

TEACHING PLAN

NAME OF THE TEACHER :- Prof. S.S.Sharma
SUBJECT :- Computer Architecture **SUBJECT CODE :- BTETC503**
YR/SEM :- 3rd/5th **SECTION :- A and B**

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Book (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
UNIT-I: Basics of Computers									
1	1	1.1	Basic Structure of Computers	Lecture-1		R5 (1)	https://nptel.ac.in/courses/106102062/1		Students will be able to learn how computers work
2		1.2	History of Computer			R5 (19-21) R 6(12-34)	https://nptel.ac.in/courses/106102062/2		
3		1.3	Types of computer			R5 (2-3)	https://nptel.ac.in/courses/106102062/7		
4	2	2.1	Functional Unit	Lecture-2		R5 (3)	https://nptel.ac.in/courses/106102062/8		Students know basic principles of computer's working
5		2.2	Input Unit			R5 (4)	https://nptel.ac.in/courses		
6		2.3	Memory Unit			R5 (4)	https://nptel.ac.in/courses/106102062/8		

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7		2.4	Arithmetic & Logic Unit			R5 (5)	https://nptel.ac.in/courses/106102062/11		
8		2.5	Output Unit			R5 (6)	https://nptel.ac.in/courses/106102062/8		
9		2.6	Control Unit			R5 (6)	https://nptel.ac.in/courses		
10	3	3.1	Software	Lecture-3		R5 (10)	https://nptel.ac.in/courses/106105163/4		Analyze various Softwares of Computer
11	4	4.1	Performance Issues Software	Lecture-4		R5 (13)	https://nptel.ac.in/courses/106102062/9	C2 to C6 and P1 to P6	Students will be able to analyze Performance of Computer
12		4.2	Processor Clock			R5 (14)			
13		4.3	Basic Performance Equation			R5 (14)	https://nptel.ac.in/courses/106102062/9		
14		4.4	Pipelining & Superscalar Operation			R5 (15)	https://nptel.ac.in/courses/106105163/55		
15		4.5	Clock Rate			R5 (16)			
16		4.6	Compiler			R5 (17)			
17		4.7	Performance Measurement			R5 (17)	https://nptel.ac.in/courses/106102062/10		
18	5	5.1	Machine Instruction & Progarams	Lecture-5		R5 (25-33)	https://nptel.ac.in/courses/106105163/9		Apply acqired knowledge of Pipelining by Programming
19		5.2	Machine Instructions			R5 (58)	https://nptel.ac.in/courses/106105163/5		
20		5.3	Machine Program			R5 (62)	https://nptel.ac.in/courses/106105163/10		

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21	6	6.1	Types of Instruction	Lecture-6		R5 (16)	https://nptel.ac.in/courses/106105163/5		Students will be able to learn to differentiate different types of instructions
22		6.2	CISC			R 7(535) R5 (16)	https://nptel.ac.in/courses/106105163/8		
23		6.3	RISC			R 7(498) R5 (16)	https://nptel.ac.in/courses/106105163/9		
24	7	7.1	Instruction Sets	Lecture-7		R 6(178) R7 (366-392)	https://nptel.ac.in/courses/106105163/7		Demonstrate the related parameters of JFET
25		7.2	Instruction Formats			R7 (439)	https://nptel.ac.in/courses/106105163/6		
26	8	8.1	Assembly Language	Lecture-8		R7 (444) R 5 (58)	https://nptel.ac.in/courses/106102157/5		Apply acqired knowledge of Pipelining by Programming
27		8.2	Assembly Directives			R 5 (59)	https://nptel.ac.in/courses/106102157/6		
28		8.3	Assembly & Execution of Program			R 5 (62)	https://nptel.ac.in/courses/106105163/5		
29		8.4	Number Notation			R 5 (64)	https://nptel.ac.in/courses/106105163/6		
30	9	9.1	Stacks	Lecture-9		R 5 (68)			Students will be able to learn Subprogramming in Processor
31	10	10.1	Stack Frame	Lecture-10		R 5 (75)			Students will be able to learn Subprogramming in Processor
32	11	11.1	Queues	Lecture-11		R 5 (68)	https://nptel.ac.in/courses/106105163/46		Students will be able to learn Subprogramming in Processor
33		12.1	Subroutine			R 5 (72)	https://nptel.ac.in/courses/106105163/47		

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34	12	12.2	Subroutine Nesting & the Processor	Lecture-12		R 5 (73)	https://nptel.ac.in/courses/106105163/46		Students will be able to learn Subprogramming in Processor
35		12.3	Parameter Passing			R 5 (74)			
UNIT-II: Processor organization									
36	13	13.1	Processor organization	Lecture-13		R 6(137)	https://nptel.ac.in/courses/106103068/18	C1 to C16 and P1 to P25	Analyze various configurations through comparision
37		13.2	CPU Organization			R 6(137-147)	https://nptel.ac.in/courses/106106092/16		
38		13.3	Fundamentals of Processor Organization			R 6(137)	https://nptel.ac.in/courses/106103068/18		
39		13.4	Additional Features			R 6(147)	https://nptel.ac.in/courses/106102062/11		
40	14	14.1	Information Respresentation	Lecture-14		R 6(160)	https://nptel.ac.in/courses/106105163/7		Will able to represent Numbers in various format
41		14.2	Basic Formats			R 6(160-166)	https://nptel.ac.in/courses/106105163/6		
42		14.3	Fixed- Point number			R 6 (173-178)	https://nptel.ac.in/courses/106105163/7		
43		14.4	Floating- Point number			R 6(173-178) R7 (345-352)	https://nptel.ac.in/courses/106102062/16		
44		15.1	Number Formats			R 5 (64) R 6(160-178)	https://nptel.ac.in/courses/106105163/6		

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45	15	15.2	Integer Formats	Lecture-15		R 7 (325)	https://nptel.ac.in/courses/106105163/7		Analyze various formats of Numbers
46		15.3	Integer Arithmetic			R 7 (340)	https://nptel.ac.in/courses/106102062/11		
47		15.4	Floating- Point Presentation			R 7 (345)	https://nptel.ac.in/courses/106105163/38		
48		15.5	Floating- Point Arithmetic			R 7 (352)	https://nptel.ac.in/courses/106102062/16		
UNIT-III: ALU design									
49	16	16.1	ALU Design	Lecture-16		R 7 (324)	https://nptel.ac.in/courses/106102062/12		Students will be able to demonstrate understanding of Arithmetic Logic Unit
50		16.2	Addition & Substraction of Signed No.			R 5 (368)	https://nptel.ac.in/courses/106102062/11		
51	17	17.1	Multiplication of Positive number	Lecture-17		R5 (376) R 5 (86)	https://nptel.ac.in/courses/106102062/13		Explains Various Operations of different types of Number
52		17.2	Signed- Operand multiplication			R5 (380)	https://nptel.ac.in/courses/106102062/15		
53		17.3	Fast Multiplication			R5 (383)	https://nptel.ac.in/courses/106102062/15		
54		17.4	Integer Division			R5 (86) R 5(390	https://nptel.ac.in/courses/106102062/14		
55	18	18.1	Floating Point Number & Operation	Lecture-18		R 5 (393) R 6 (160)	https://nptel.ac.in/courses/106102062/16		Illustrate Various Operations of different types of Number
56		18.2	Arithmetic Operation on Floating Point number			R5 (398)	https://nptel.ac.in/courses/106102062/15		

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57		18.3	Guard Bits & Trucation			R 5 (399)			
58	19	19.1	IEEE 754 Floating Point format	Lecture-19		R5 (394)	https://nptel.ac.in/courses/106102062/16		Implementaion of Operations
59		19.2	Instruction Sequencing			R 5 (400) R 6 (178)	https://nptel.ac.in/courses/106103068/14		
60		19.3	Interpretation			R5 (401) R 6 (94)	https://nptel.ac.in/courses/106103068/14		
61		19.4	Hard Wired Control			R5 (402)			
62		19.5	Design Methods			R 6 (354)			
63		19.6	CPU Control Unit			R 6 (137)	https://nptel.ac.in/courses/106105163/18		
UNIT-IV: Memory organization									
64	20	20.1	Memory Organization	Lecture-20		R 5 (292)	https://nptel.ac.in/courses/106102062/28	C1 to C16	Understand Basics of Memories
65		20.2	Basic concept			R 5 (292) R 6(400)	https://nptel.ac.in/courses/106105163/3		
66	21	21.1	Device Characteristics	Lecture-21		R 5 (313)	https://nptel.ac.in/courses/106102062/29		Illustrate Performance of Memory
67		21.2	Speed			R 5 (313)	https://nptel.ac.in/courses/106102062/9		
68		21.3	Size			R 5 (313)	https://nptel.ac.in/courses/106102062/10		
69		21.4	Cost			R 5 (313)	https://nptel.ac.in/courses/106102062/11		
70		22.1	Semiconductor RAM Memory			R5 (295)	https://nptel.ac.in/courses/106103183/19		

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71		22.2	Internal Organization of memory chips			R5 (295)	https://nptel.ac.in/courses/106105163/27		Understand Heirarchy of Memories
72	22	22.3	Static Memories	Lecture-22		R5 (297) R6 (407)	https://nptel.ac.in/courses/106103183/19		
73		22.4	Asynchronous DRAMs			R5 (299) R6 (410)	https://nptel.ac.in/courses/106105163/25		
74		22.5	Synchronous DRAMs			R5 (302) R6 (413)	https://nptel.ac.in/courses/106105163/26		
75		23.1	Structure of larger memories			R5 (305)	https://nptel.ac.in/courses/106105163/29		Extend the concept of Memory
76	23	23.2	Memory System considerations	Lecture-23		R5 (307)	https://nptel.ac.in/courses/106105163/27		
77		23.3	Rambus Memory			R5 (308)	https://nptel.ac.in/courses/106103183/19		
78		24.1	Read Only Memories			R5 (309)	https://nptel.ac.in/courses/106105163/28		Illustrate usage of Secondary Memory
79		24.2	PROM			R5 (310)	https://nptel.ac.in/courses/106105163/28		
80	24	24.3	EPROM	Lecture-24		R5 (311)	https://nptel.ac.in/courses/106105163/29		
81		24.4	EEPROM			R5 (311)	https://nptel.ac.in/courses/106105163/30		
82		24.5	Flash memory			R5 (312)	https://nptel.ac.in/courses/106103183/19		
83		25.1	Concept of Cache & Associative memories			R5 (314) R6 (452) R7 (128)	https://nptel.ac.in/courses/106102062/29		Relate the speed of Access of Primary and Secondary Memory
84		25.2	Mapping Function			R5 (316)	https://nptel.ac.in/courses/106102062/30		
85	25	25.3	Replacement Algorithm	Lecture-25		R5 (320)	https://nptel.ac.in/courses/106102062/31		

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86		25.4	Example of Mapping Techniques			R5 (327)	https://nptel.ac.in/courses/106102062/32		
87		25.5	Example of Cache in commercial processors			R5 (325)	https://nptel.ac.in/courses/106102062/29	C1 to C16	
88	26	26.1	Virtual Memories	Lecture-26		R5 (337)	https://nptel.ac.in/courses/106102062/31		will learn to access memory
89		26.2	Address Translation			R5 (339)	https://nptel.ac.in/courses/106102062/32		
UNIT-V: System Organization									
90	27	27.1	System Organization	Lecture-27		R5 (203)	https://nptel.ac.in/courses/106102062/33		Explain working principle of System
91	28	28.1	Input Outpt Systems	Lecture-28		R6 (241) R7 (504)	https://nptel.ac.in/courses/106102062/36		Will learn to System and I/O Interfacing
92		28.2	I/O Modules			R7 (240)	https://nptel.ac.in/courses/106102062/33		
93		28.3	Programmed I/O			R7 (242)	https://nptel.ac.in/courses/106102062/36		
94		28.4	Accessing I/O Devices			R5 (204)	https://nptel.ac.in/courses/106102062/37	C9	
95	29	29.1	Interrupt	Lecture-29		R5 (208) R6(515) R7 (246)	https://nptel.ac.in/courses/106105163/46		Understand concept of interrupt
96		29.2	Interrupt Hardware			R5 (210)	s/106105163/47		
97		29.3	Enabling & Disabling Interrupts			R5 (211)	https://nptel.ac.in/courses/106105163/48		

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98		29.4	Use of Interrupt in OS			R5 (220)	https://nptel.ac.in/courses/106105163/47		
99	30	30.1	DMA	Lecture-30		R5 (234) R6(511) R7 (254)	https://nptel.ac.in/courses/106105163/48		Classify various types of BUS
100		30.2	Bus Arbiration			R11 (657-660)	https://nptel.ac.in/courses/106105163/51	P26, P27, P28	
101	31	31.1	Standard I/O Interfaces	Lecture-31		R5 (259)	https://nptel.ac.in/courses/106102062/34		Explain connection of system and I/O Interfacing through BUS
102		31.2	Peripheral Component Interconnect			R5 (261)	https://nptel.ac.in/courses/106102062/35		
103		31.3	SCSI BUS			R5 (266)	https://nptel.ac.in/courses/106106092/31		
104		31.4	Universal Serial Bus(USB)			R5 (272)	https://nptel.ac.in/courses/106102062/36		
UNIT-VI: Parallel processing									
105	32	32.1	Concept of Parallel Processing	Lecture-32		R6 (504) R7 (646)	https://nptel.ac.in/courses/106102062/24		Understand working principle of Parallel Processing
106		32.2	Forms of Parallel Processing			R5 (621)	https://nptel.ac.in/courses/106102062/27		
107		32.3	Classification of Parallel Structures			R5 (619)	https://nptel.ac.in/courses/106102062/25		
108	33	33.1	Pipelining & Superscalar Operation	Lecture-33		R6 (275-292) R5 (453)	https://nptel.ac.in/courses/106102062/25		

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109		33.2	Instruction Pipelines			R6 (364)	https://nptel.ac.in/courses/106106134/3	C9	Parallel Processing
110	34	34.1	Pipeline Performance	Lecture-34		R6 (370)	https://nptel.ac.in/courses/106102062/26		Evaluation of Processing
111		34.2	Superscalar Processing			R6 (381)	https://nptel.ac.in/courses/106103183/4		
112	35	35.1	Processor-Level Paralism	Lecture-35		R6 (540)			Will able to understand concept of Multiprocessor
113		35.2	Multiprocessors			R6 (552)	https://nptel.ac.in/courses/106104024/21		
114		35.3	Fault Tolerance			R6 (564)			
115	36	36.1	Interconnect Network	Lecture-36		R11 (657-660)	https://nptel.ac.in/courses/106104024/37	P26, P27, P28	Understand connection of Multiprocessor by interconnect
116		36.2	Single Bus				https://nptel.ac.in/courses/106106092/31		
117		36.3	Network			R11 (660-661)			

*T=Text Book; R= Reference Book; C= Company name; P= Research Paper

Total number of lectures as per syllabus: - 36 Total number of lectures as per planned: - 36

Final Outcome of the Subject (Maximum 6 Outcome):

CO1.	learn how computers work
CO2.	know basic principles of computer's working
CO3.	Analyze the performance of computers
CO4.	Know how computers are designed and built
CO5.	Understand issues affecting modern processors (caches, pipelines etc.).

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JAIDEV EDUCATION SOCIETY'S

J D COLLEGE OF ENGINEERING & MANAGEMENT

POST: VALNI, AT: KHANDALA, KATOL ROAD, NAGPUR – 441501

DEPARTMENT OF INFORMATION TECHNOLOGY

SESSION 2018-19

TEACHING PLAN

NAME OF THE TEACHER:-**Prof. Mirza Moiz Baig**
SUBJECT:-**Product Design Engineering** SUBJECT CODE :- **BTITC503**
YR/SEM :-**2nd Year / 4th Sem**

Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no)	Reference Book(Page no)	URL's (NPTEL/Online Material/PPt/Video)	Applications (R&D/Industry)	Learning Outcomes
UNIT-I:- Product Design Engineering									
1	1	1.1	Introduction to Engineering Product Design	1/7/19	T1 (Pg:4-5)	R2 (Pg:2)	https://www.youtube.com/watch?v=HN9GtL21rb4&list=PLSGws_74K018yZOnbSaqWJZ837QyBB7vu	C3 & P1	To know about PDE
2	2	1.2	Problem solving approach for Product Design	2/7/19	T1 (Pg:6-11)	R2 (Pg:4)	https://www.youtube.com/watch?v=LsR9qOTSz4g&list=PLSGws_74K018yZOnbSaqWJZ837QyBB7vu&index=4	C4 & P2	To know the benefits of PDE and its applications in various fields
3	3	1.3	Creating Simple Products and Modules	4/7/19	T1 (Pg:20-21)	R2 (Pg:7)	https://www.youtube.com/watch?v=LsR9qOTSz4g&list=PLSGws_74K018yZOnbSaqWJZ837QyBB7vu&index=4	C5 & P1	To Know how development of Layers of PDE and its Process taken place.

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4	4	1.4	Sketching of components, identifying materials and their processing for final product	8/7/19	T1 (Pg:12-15)	R2 (Pg:12)	https://www.youtube.com/watch?v=g8O5fVmvPgU	C1 & P2	To Know the Sketching of components, identifying materials and their processing for final product
5	5	1.5	Case studies of product failures	9/7/19	T1 (Pg:23-28)	R2 (Pg:67, 105)	https://www.youtube.com/watch?v=E0bhdr84FNU&list=RDCMUCiMwMz3RMbW5mbx0iDcRQ2g&start_radio=1&rv=E0bhdr84FNU&t=5	C6 & P2	To know the basic structure of product failures paradigm.
6	6	1.6	Case studies of product successful	11/7/19	T1 (Pg:28-30)	R3 (Pg:34-35)	https://www.youtube.com/watch?v=E0bhdr84FNU	C4 & P1	To know more about how the product becomes more succussful.
UNIT-II:-Requirement Engineering									
11	11	2.1	Document Creation and Knowledge Sharing	26/7/19	T1 (Pg:256-262)	R3 (Pg:36-44	https://www.youtube.com/watch?v=0ByAnvgcRV8	C4 & P4	To understand the document Creation and Knowledge Sharing
12	12	2.2	Designing of components	30/7/19	T1 (Pg:263-265)	R3 (Pg:45-49)	https://www.youtube.com/watch?v=6wMzp8fZj18	C5 & P3	To know the importance of expression and array in engineering process
13		2.3	Computer operation principles and image editing through a graphical Composition	31/7/19	T1 (Pg:280-285)	R2 (Pg:279-280)	https://www.youtube.com/watch?v=JggRToFXsQE&list=RDCMUCiMwMz3RMbW5mbx0iDcRQ2g&index=4	C2 & P1	
14	14	2.4	Public/Societys perception of products, and its input into product design.	01/08/19	T1 (Pg:274-282)	R1 (Pg:136-144)	https://www.youtube.com/watch?v=7riGolu7BpA&list=RDCMUCiMwMz3RMbW5mbx0iDcRQ2g&index=3	C5 & P1	To know the need of perception of products
UNIT-III:- Self and Work Management									
18	18	3.1	Self and Work Management	7/8/19	T1 (Pg:336-338)	R2 (Pg:509, 751)	https://www.youtube.com/watch?v=DHrP1MunhFw	C4 & P2	To know the importance and use of Self and Work Management
19		3.2	Create a basic shape objects sphere, box cylinders	8/8/19	T1 (Pg:338-352)	R3 (Pg:119-121)	https://www.youtube.com/watch?v=DHrP1MunhFw	C5 & P1	

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17		3.3	Begin developing a thought process for using digital sketching.	13/8/19	T1 (Pg:411-423)	R3 (Pg:221-241)	https://www.youtube.com/shorts/GflE-0c6UxU	C1 & P2	
20	20	3.4	General understanding of shading for adding depth to objects	14/8/19	T1 (Pg:466-495)	R3 (Pg:259-271)	https://www.youtube.com/watch?v=Ha6Ph8siaNc&list=PLrOFa8sDv6jfKx9poMArMUV2MGbZoXrCT&index=2	C2 & P1	To know about understanding of shading for adding depth to objects
UNIT-IV:- Team Work and Communication									
32	32	4.1	Team Work and Communication	3/9/19	T1 (Pg:478-483)	R2 (Pg:483)	**https://www.youtube.com/watch?v=vEUPl_JBH88**	C8,C9 & P1	To know about the Team Work and Communication
33		4.2	Product market and Product Specification Sheet	4/9/19	T1 (Pg:483-485)	R2 (Pg:491)	**https://www.youtube.com/watch?v=L9D9JWS29h4**	C5 & P1	
34	34	4.3	Data Sheet	4/9/19	T1 (Pg:486-495)	R2 (Pg:501)	**https://www.youtube.com/watch?v=47d6nsfS-o8**	C1 & P2	To know about the Simple mechanical designs
35		4.4	Simple mechanical designs	5/9/19	T1 (Pg:495-496)	R2 (Pg:523-571)	https://www.youtube.com/watch?v=iVy0qGqmKFU	C3 & P1	
UNIT-V:- Health and Safety									
48	48	5.1	Managing Health and Safety	24/9/19	T1 (Pg:769-771)	R2 (Pg:518-519)	**https://www.youtube.com/shorts/GflE-0c6UxU**	C1 & C5	To know about Managing Health and Safety
49	49	5.2	Workshop safety	25/9/19	T1 (Pg:774-778)	R2 (Pg:438)	**https://www.youtube.com/watch?v=MhZ3TP4k5Pc&list=PLrOFa8sDv6jfKx9poMArMUV2MGbZoXrCT&index=5**	C2 & C11	To know about Workshop safety and its issues
50		5.3	Health issues	25/9/19	T2 (Pg:332)	R2 (Pg:333)	**https://www.youtube.com/watch?v=UvY4laqJZPM**	C1 & P2	
UNIT VI: Data and Information Management									
55	55	6.1	Data and Information Management	3/10/19	T2 (Pg:340)	R2 (Pg:442-445)	https://www.youtube.com/watch?v=NGx-Jsc1x_E	C3 & P1	To know about the basics of project management
56	56	6.2	Documentation for the product	8/10/19	T2 (Pg:345)	R3 (Pg:451-454)	https://www.youtube.com/watch?v=qq8SO9tMI8k	C5 & P3	To know details about the types and

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									Documentation for the product
57	57	6.3	Detail Engineering drawings of components.	9/10/19	T2 (Pg:355)	R3 (Pg:531-532)	https://www.youtube.com/watch?v=3uEtdDvK6Xo	P1 & P2	To know information and working of estimating the drawing of components paradigm.

*T=Text Book; R= Reference Book; C= Company name; R= Research Paper

Total number of lectures as per syllabus: - 36Total number of lectures as per planned: - 40

Final Outcome of the Subject (Maximum 6 Outcome):

CO1: Create simple mechanical or other designs
CO2: Create design documents for knowledge sharing
CO3: Manage own work to meet design requirements
Co4: Work effectively with colleagues.

Reference Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	Model Curriculum for "Product Design Engineer		NASSCOM	(Ref. ID: SSC/Q4201, Version 1.0, NSQF Level: 7)
R2	Product design and development	Eppinger, S., & Ulrich, K.	. McGraw-Hill Higher Education	(2015).
R3	Human factors in product design: current practice and future trends.	Green, W., & Jordan, P. W. (Eds.)	CRC Press	(1999)
R4	Human factors in engineering and design.	Sanders, M. S., & McCormick, E. J.	McGRAW-HILL book company.	1993).

Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	Boldare	https://www.boldare.com/	Boldare is an agile-powered company with 17 years of experience in the international software development market.Boldare helps companies at each stage of the product development cycle

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C2	Mangosoft	https://mangosoft.tech/	Mangosoft is a software engineering company that delivers business-transforming solutions with a focus on the functionality, innovativeness and best industry practices.
C3	PKG Brand Design	https://www.pkgbranding.com/	PKG delivers best-in-class package designs attracting shoppers to buy your products! PKG Brand Design is an award-winning package design agency for national and global consumer package goods
C4	Robosoft Technologies	https://www.robosoftin.com/	Robosoft is a full-service digital transformation company, with a vision to Simplify Lives. We offer end-to-end solutions in product advisory, design, engineering and analytics.
C5	Hexagon IT Solutions	https://hexagonitsolutions.com/	Build Custom Software Solutions, Mobile Apps, Content Management Systems, Document Management Systems, Customer Relationship Management Systems (CRM), Enterprise Resource Planning (ERP)

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	Product Design and Development: Phases and Approach	Hemant M. Patil1, Saurabh S. Sirsikar2	INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY	Doi.org/10.1186/s40411-018-0060-6	Pageno 13-23/2018
P2	Product development and design with a combination of design for manufacturing or assembly and quality function deployment: A literature review	Rosnani Ginting	Published by AIP Publishing.	https://doi.org/10.1063/5.0000739	2020 Author(s).
P3	Advances in Simulation, Product Design and Development	M. Kanthababu	Springer	DOI.org/10.1016/j.js.2019.110396	Vol 157,Nov 2019,110396
P4	Modelling and Simulation of Deep Drawing Process of Circular Cup on AL1200 Using Finite Element Analysis	Y. K. Sahu	Springer	DOI.org/10.1145/3241743	Vol 27.Issue 3/Oct-2018

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DEPARTMENT OF MECHANICAL ENGINEERING (DOME)

SESSION 2018-19

Education to Eternity

TEACHING PLAN

NAME OF THE TEACHER :-Prof. R.G.Deshmukh
SUBJECT :-Theory Of Machine- I
YR/SEM :-SECOND YEAR/ SEM IV

SUBJECT CODE :- BT-MEC 402
SECTION :-B

Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Completion date	Text Books (Page no)	Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPt/Video)	Applications (R&D/Industry)	Learning Outcomes	Sign
UNIT –I - Introduction to Theory of Machine										
1	1.01	Definition of link, pair kinematics chain, inversions, inversions of single slider crank chain	13/01/2020		T1 (Pg: 1,3,4 ,27)	R1 (Pg 2-3) R2 (7-8)	**Video:** https://nptel.ac.in/courses/112104121/	P1	Students should know basic about link , joint	
2	1.02	inversions of double slider crank chain , kinematic diagrams of mechanisms	15/01/2020		T1 (Pg:27-30)	R1 (Pg 5-7) R2 (9-10)	**Video** https://nptel.ac.in/courses/112104121/	P2	Students should aware about Inversion and its application	
3	1.03	equivalent linkage of mechanism and Degree of Freedom	17/01/2020		T1 (Pg:5-8)	R1 (Pg 5-7) R2 (11-13)	**Video:** https://nptel.ac.in/courses/112104121/	P4	Students should understand about mechanism	
4	1.04	Degree of Freedom	20/01/2020		T1 (Pg:5-8)	R1 (Pg 8) R2 (14-15)	**Video:** https://nptel.ac.in/courses/112104121/4	P4	Students should know basic about link Degree of Freedom	
5	1.05	Study of various mechanisms such as straight line mechanisms, pantograph, Geneva mechanism,	22/01/2020		T1 (Pg:8-10)	R1 (Pg 9-10,125-128) R2 (45-50)	**Video:** https://nptel.ac.in/courses/112104121/5	P3,P6,P7	Students should get brief about straight line mechanisms and Geneva mechanism	

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6	1.06	steering gear mechanisms and Hooke's joint	24/01/2020		T1 (Pg:8-10)	R1 (Pg 10-11.121-122,135)	**Video:** https://nptel.ac.in/courses/112104121/5	P5	Students should aware about application of steering and Hooke's joint.	
7	1.07	Instantaneous centre of rotation, body and space centrodes and their applications Kennedy's theorem and its applications	27/01/2020		T1 (Pg:64,65)	R1 (Pg 78-79, 80-81) R2 (243-248)	**Video:** https://nptel.ac.in/courses/112104121/11	P8	Students should interpret about Instantaneous centre of rotation and Kennedy's theorem and its applications	
8	1.08	Question and answer session depend on students doubt	29/01/2020		NA	NA			Student will able to clarify their doubts.	
UNIT –II – Velocity and Acceleration Analysis										
9	2.01	Velocity and acceleration analysis and its purpose	31/01/2020		T1 (Pg:43)	R1 (Pg 68-69) R2 (266)	Video: https://nptel.ac.in/courses/112105236/21		Students should know basic about Velocity and acceleration analysis	
10	2.02	velocity and acceleration diagrams using relative velocity method	3/02/2020		T1 (Pg:80-85)	R1 (Pg 84-85) R2 (277)	Video: https://nptel.ac.in/courses/112105236/21		Students should aware about velocity and acceleration diagrams using relative velocity method	
11	2.03	velocity and acceleration diagrams using relative velocity method	5/02/2020		T1 (Pg:80-85)	R1 (Pg 85-86)	Video: https://nptel.ac.in/courses/112105236/21		Students get the knowledge about velocity and acceleration diagrams using relative velocity method	
12	2.04	velocity and acceleration diagrams using Corioli's component of acceleration	7/02/2020		T1 (Pg: 97)	R1 (Pg 87-88) R2 (pg 299)	https://nptel.ac.in/courses/105106116/30	P9	Students should know basic about velocity and acceleration diagrams using Corioli's component of acceleration	
13	2.05	velocity and acceleration analysis by Vector method coordinate system	10/02/2020		T1 (Pg:100)	R1 (Pg 89-90)	https://www.youtube.com/watch?v=R5Xkl9nDRxA		Students should aware about Vector method coordinate system	

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	2.06	Chase Solution velocity and acceleration by vector and complex algebra.	11/02/2020		T1 (Pg:110)	R1 (Pg 91-92)	https://nptel.ac.in/courses/112104121/16		Students get the knowledge about Chase Solution velocity and acceleration by vector and complex algebra.	
15	2.08	Velocity and acceleration of slider crank mechanism by Klein's Construction	14/02/2020		T1 (Pg:112)	R1 (Pg 94-95)	https://www.youtube.com/watch?v=YMgZ4nHr5EY		Students should aware about Velocity and acceleration of slider crank mechanism by Klein's Construction	
16	2.09	Question and answer session depend on students doubt	24/02/2020		NA	NA			Student will able to clarify their doubts.	
UNIT –III – Friction and Lubrication										
17	3.01	Dry friction, friction between nut and screw with different types of threads	26/02/2020		T1 (Pg:250-252)	R1 (Pg 177-178)	https://www.youtube.com/watch?v=na90uKzc9JY	P10	Students should know basic about friction between nut and screw	
18	3.02	Dry friction, friction between nut and screw with different types of threads. Uniform wear theory and uniform pressure theory,	28/02/2020		T1 (Pg:250-252,255)	R1 (Pg 187-189-191)	**Video:** https://nptel.ac.in/courses/112102014/3	P11	Students should aware about friction between nut and screw. get the knowledge about Uniform wear theory and uniform pressure theory and its application	
19	3.04	Friction at pivot and collars, Friction in turning pair	2/03/2020		T1 (Pg:256)	R1 (Pg 190-191)	**Video:** https://nptel.ac.in/courses/122104015/7		Students should know basic about friction between various turning pair.	
20	3.05	Friction circle and friction axis, Friction in mechanisms	4/03/2020		T1 (Pg:253)	R1 (Pg 197-198)	**Video:** https://nptel.ac.in/courses/122104015/7	P15	Students should aware about Friction in mechanisms	
21	3.06	Lubrication, Viscosity, Viscous flow,	6/03/2020		T1 (Pg:255)	R1 (Pg 202-203)	https://nptel.ac.in/courses/112102014/12	P14,P21,P22	Students get the knowledge about Lubrication, Viscosity, Viscous flow	

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22	3.07	Boundary lubrication, Thick film lubrication	9/03/2020		T1 (Pg:708)	R1 (Pg 204-205)	https://nptel.ac.in/courses/112102014/12	P17,P18,P19	Students should know basic about Boundary lubrication, Thick film lubrication	
23	3.08	Hydrostatic and hydrodynamic lubrications.	11/03/2020		T1 (Pg:700)	R1 (Pg206-208)	https://nptel.ac.in/courses/112102014/14	P12,P13,P20	Students should know basic about Hydrostatic and hydrodynamic lubrications	
24	3.09	Question and answer session depend on students doubt	13/03/2020		NA	NA			Student will able to clarify their doubts.	
UNIT –IV – Clutch , Brakes and Dynamometer										
25	4.01	Friction Clutches: Single plate and multi-plate clutch	16/03/2020		T1 (Pg:276-278)	R1 (Pg 194-195)	https://www.youtube.com/watch?v=2nRqTPbuv8I	P16,P23 C1 & C2	Students should aware about Single plate and multi-plate clutch	
26	4.02	Cone clutch, Centrifugal clutch	18/03/2020		T1 (Pg:279-281)		https://www.youtube.com/watch?v=2nRqTPbuv8I	P25,P26,P28 C1 & C2	Students get the knowledge about Cone clutch, Centrifugal clutch	
27	4.03	Torque transmitting capacity, Clutch operating mechanism.	20/03/2020		T1 (Pg:280-284)		Video: https://www.youtube.com/watch?v=ZldkigrDplc	P24,P27 C1 & C2	Students should know basic about Clutch operating mechanism	
28	4.04	Brakes: Shoe brake, Internal and external shoe brakes SYSTEM	2303/2020		T1 (Pg:530-532)	R1 (Pg 248-249)	Video: https://nptel.ac.in/courses/112105124/39	P29 C1 & C2	Students should know basic about brakes and its application	
29	4.06	Band and block brakesBraking torque	25/03/2020		T1 (Pg:545-547)	R1 (Pg 256-258)	https://www.youtube.com/watch?v=WOTDbCPukoM	P32	Students get the knowledge about Braking torque	
30	4.07	Different types of absorption and transmission type dynamometers	27/03/2020		T1 (Pg:549-550)	R1 (Pg 265-268)	https://www.youtube.com/watch?v=CRSZwR-axzM	P33	Students should aware about types of dynamometers	

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	4.08	Construction and working of eddy current dynamometer, Torque measurement.	30/03/2020		T1 (Pg:550-553)	R1 (Pg 270-278)	https://www.youtube.com/watch?v=_OnGXJA7oX8	C1 & C2	Students should know basic about eddy current dynamometer, Torque measurement.	
32	4.09	Question and answer session depend on students doubt	01/04/2020		NA	NA			Student will able to clarify their doubts.	
UNIT –V – Cam and Follower										
33	5.01	Types of cams and followers	03/04/2020		T1 (Pg:209-212)	R1 (Pg 281-282) R2(335)	https://nptel.ac.in/courses/112104121/28	P34	Students should aware about Types of cams and followers	
34	5.02	Analysis of motion	06/04/2020		T1 (Pg:212-215)	R1 (Pg 283-284) R2(Pg.336)	https://nptel.ac.in/courses/112104121/29	P35	Students get the knowledge about Types of cams and followers with its application	
35	5.04	Jump and ramp of cam	08/04/2020		T1 (Pg:220-222)	R2(pg.360-366)	https://nptel.ac.in/courses/112104121/30		Students should aware about cam profiles	
36	5.05	Determination of cam profiles for a given follower motion	10/04/2020		T1 (Pg:228-232)	R1 (Pg 287-288) R2 (347-348)	https://nptel.ac.in/courses/112104121/28	P36	Students get the knowledge about cam profiles with different shapes	
37	5.06	Determination of cam profiles for a given follower motion	13/04/2020		T1 (Pg:233-235)	R1 (Pg 289-292)	https://nptel.ac.in/courses/112104121/28	P37	Students should know basic about cam profiles with different motion	
38	5.07	Circular arc cam	15/04/2020		T1 (Pg:233-246)	R1 (Pg 294-298) R2 (348-392)	https://www.youtube.com/watch?v=1gDmNDJ9SHc		Students should aware about Circular arc cam	
39	5.08	Tangent cam, Cycloidal cam.	17/04/2020		T1 (Pg:233-247)	R1 (Pg 302-305)	https://www.youtube.com/watch?v=1gDmNDJ9SHc	P38	Students get the knowledge about Tangent cam, Cycloidal cam.	
40	5.09	Question and answer session depend on students doubt	20/04/2020		NA	NA			Student will able to clarify their doubts.	
UNIT –VI - Balancing										

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41	6.01	Balancing of rotating masses in one and several planes	22/04/2020		T1 (Pg:477-481)	R1 (Pg 489-491)	https://www.youtube.com/watch?v=HKVvJWArgg8	P39	Students should know basic about Balancing of rotating masses	
42	6.02	Balancing of reciprocating, masses in single engine	24/04/2020		T1 (Pg:480-485)	R1 (Pg 492-495)	https://www.youtube.com/watch?v=HKVvJWArgg8	P40	Students should aware about Balancing of reciprocating	
43	6.03	Balancing of reciprocating, masses in Multi engine	27/04/2020		T1 (Pg:490-497)	R1 (Pg 495-505)	https://www.youtube.com/watch?v=aRulDXMuNDc	P41	Students get the knowledge about Balancing of reciprocating, masses in Multi engine	
44	6.04	Primary and secondary balancing analysis	29/04/2020		T1 (Pg:490-497)	R1 (Pg 501-507)	https://www.youtube.com/watch?v=aRulDXMuNDc	C1 & C2	Students should know basic about Primary and secondary balancing analysis	
45	6.05	Concept of direct and reverse cranks	01/05/2020		T1 (Pg:490-500)	R1 (Pg 508-510)	https://www.youtube.com/watch?v=YoZgk1xlIW4		Students should aware about Concept of direct and reverse cranks	
46	6.06	Balancing of locomotive engines	04/05/2020		T1 (Pg:492-496)	R1 (Pg 511-515)	https://www.youtube.com/watch?v=YoZgk1xlIW4	P42	Students get the knowledge about Balancing of locomotive engines	
47	6.07	Effect of partial balancing, Static and dynamic balancing	06/05/2020		T1 (Pg:477-481)	R1 (Pg 516-517)	https://nptel.ac.in/courses/116102012/160		Students should know basic about partial balancing, Static and dynamic balancing	
48	6.08	Effect of partial balancing, Static and dynamic balancing	08/05/2020		T1 (Pg:477-481)	R1 (Pg 518-519)	https://nptel.ac.in/courses/116102012/160		Students should aware about partial balancing, Static and dynamic balancing	

*T=Text Book; R= Reference Book; C= Company name; P= Research Paper

Total number of lectures as per syllabus: 48 Total number of lectures as per planned: 48

TextBooks:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Theory of Machine	S.S Rattan	McGraw Hill	Third Edition2012

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erence Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	Theory of Machine	Thomas Bevan	Pearson	Third Edition 2010
R2	Kinematics and Dynamics of Machinery	Charles E. Wilson	Perason	Third Edition 2008

Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	Bajaj Auto TVS Motor	https://www.bajajauto.com/ https://www.tvsmotor.com/	**Bajaj Auto** Limited is a global two-wheeler and three-wheeler manufacturing company **TVS Motor** Company is a multinational motorcycle company headquartered at Chennai, India.
C2	Maruti Suzuki Hero MotoCorp Ltd Tata Motors Mahindra & Mahindra Ltd	*https://www.marutisuzuki.com/* https://www.heromotocorp.com/en-in https://www.tatamotors.com/ https://www.mahindra.com/	**Maruti Suzuki**is the 56.21% owned subsidiary of Japanese's Car and motorcycle of Suzuki motor corporation **Hero** largest two wheeler manufacture in the world **Tata Motors is the multinational automotive manufacturing company** **Mahindra & Mahindra Ltd**was rank 21 in India for Fortune India 500

Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	A microcantilever system with slider-crank actuation mechanism	Xing Chena	Elsevier Sensors and Actuators A: Physical	http://dx.doi.org/10.1016/j.sna.2015.02.029	Sensors and Actuators A 226 (2015) 59–68
P2	Design of planar slider-rocker mechanisms for imposed limitpositions, with transmission angle and uniformmotion controls	P.A. Simionescu	Elsevier Mechanism and Machine Theory	http://dx.doi.org/10.1016/j.mechmachtheory.2015.10.008	Mechanism and Machine Theory 97 (2016) 85–99
P3	Sliding–crawling parallelogram mechanism	Yaobin Tian	Elsevier Mechanism and Machine Theory	http://dx.doi.org/10.1016/j.mechmachtheory.2014.03.013	Mechanism and Machine Theory 78 (2014) 201–228
P4	Design of a single DOF gripper based on four-bar and slider-crank mechanism for educational purposes	Alaa Hassan	ScienceDirect	10.1016/j.procir.2014.02.062	Procedia CIRP 21 (2014) 379 – 384
P5	Double nut ball screw with improved operating characteristics	A. Verl	Elsevier CIRP Annals - Manufacturing Technology	http://dx.doi.org/10.1016/j.cirp.2014.03.128	2014.03.128
P6	The pure-rolling cam-equivalent of the Geneva mechanism	Giorgio Figliolini	Elsevier Mechanism and Machine Theory	doi:10.1016/j.mechmachtheory.2006.01.002	41 (2006) 1320–1335
P7	Synthesis of conjugate Geneva mechanisms with curved slots	Giorgio Figliolini	Elsevier Mechanism and Machine Theory		37 (2002) 1043–1061
P8	Instantaneous centre of rotation based motion	Lionel Clavien,	Elsevier	https://doi.org/10.1016/j.	6 March 2018

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	BiFeO3 film				
P21	Investigations of the static and dynamic characteristics of water-lubricated hydrodynamic journal bearing considering turbulent, thermohydrodynamic and misaligned effects	Huihui Feng	Elsevier Tribology International	https://doi.org/10.1016/j.triboint.2018.09.007	Volume 130, February 2019, Pages 245-260
P22	Analytical modeling of hydrodynamic lubrication in a multiple-reduction drawing die	James Lowrie	Elsevier Journal of Manufacturing Processes	https://doi.org/10.1016/j.jmapro.2017.05.003	Volume 27, June 2017, Pages 291-303
P23	Design and validation of clutch-to-clutch shift actuator using dual-wedge mechanism	Chen Li	Elsevier Mechatronics	https://doi.org/10.1016/j.mechatronics.2017.01.004	Volume 42, April 2017, Pages 81-95
P24	A survey on modeling and engagement control for automotive dry clutch	AntonioDella Gatta	Elsevier Mechatronics	https://doi.org/10.1016/j.mechatronics.2018.08.002	Volume 55, November 2018, Pages 63-75
P25	Design and Finite Element Analysis of an Automotive Clutch Assembly	Rajesh Purohit	Elsevier Procedia Materials Science	https://doi.org/10.1016/j.mspro.2014.07.063	Volume 6, 2014, Pages 490-502
P26	Optimization of Multi Plate Friction Clutch for Maximum Torque Transmitting Capacity Using Uniform Wear Theory	AnimeshAgrawal	Elsevier Procedia Engineering	https://doi.org/10.1016/j.proeng.2014.12.387	Volume 97, 2014, Pages 1089-1096
P27	Fatigue analysis of Diaphragm spring in double dry clutch including manufacturing process	KarthikKrishnasamy	Elsevier Procedia Engineering	https://doi.org/10.1016/j.proeng.2018.02.056	Volume 213, 2018, Pages 606-612
P28	Studies on centrifugal clutch judder behavior and the design of frictional lining materials	Tse-Chang Li	Elsevier Mechanical Systems and Signal Processing	https://doi.org/10.1016/j.ymssp.2015.06.010	Volumes 66–67, January 2016, Pages 811-828
P29	Downshift decision and process optimal control of dual clutch transmission for hybrid electric	ZhiguoZhao	Elsevier	https://doi.org/10.1016/j.ymssp.2018.07.012	Volume 116, 1 February 2019,

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	vehicles under rapid braking condition		Mechanical Systems and Signal Processing		Pages 943-962
P30	On the influence of car brake system parameters on particulate matter emissions	Mattia Alemani	Elsevier Wear	https://doi.org/10.1016/j.wear.2017.11.011	Volumes 396–397, 15 February 2018, Pages 67-74
P31	Study on braking tribological behaviors of brake shoe material under the wet condition	F.Wang	Elsevier Wear	https://doi.org/10.1016/j.wear.2015.09.003	Volumes 342–343, 15 November 2015, Pages 262-269
P32	Using a chassis dynamometer to determine the influencing factors for the emissions of Euro VI vehicles	LinChen	Elsevier Transportation Research Part D: Transport and Environment	https://doi.org/10.1016/j.trd.2018.09.022	Volume 65, December 2018, Pages 564-573
P33	Accurate measurement of micromachining forces through dynamic compensation of dynamometers	EmrullahKorkmaz	Elsevier Precision Engineering	https://doi.org/10.1016/j.precisioneng.2017.03.006	Volume 49, July 2017, Pages 365-376
P34	Experimental and simulation investigation of nonlinear dynamic behavior of a polydyne cam and roller follower mechanism	Louay S.Yousuf	Elsevier Mechanical Systems and Signal Processing	https://doi.org/10.1016/j.ymssp.2018.06.028	Volume 116, 1 February 2019, Pages 293-309
P35	On the running-in behavior of cam-follower mechanism	AmirTorabi	Elsevier Tribology International	https://doi.org/10.1016/j.triboint.2017.09.034	Volume 118, February 2018, Pages 301-313
P36	Design of cams with negative radius follower using Bézier curves	M.Hidalgo-Martínez	Elsevier Mechanism and Machine Theory	https://doi.org/10.1016/j.mechmachtheory.2014.08.001	Volume 82, December 2014, Pages 87-96
P37	On the direct control of follower vibrations in cam–follower mechanisms	GianlucaGatti	Elsevier Mechanism and Machine Theory	https://doi.org/10.1016/j.mechmachtheory.2009.07.010	Volume 45, Issue 1, January 2010, Pages 23-35

P38	Stability of motion of the cam–follower system	LivijaCveticanin	Elsevier Mechanism and Machine Theory	https://doi.org/10.1016/j.mechmachtheory.2006.08.004	Volume 42, Issue 9, September 2007, Pages 1238-1250
P39	Human balancing on rolling balance board in the frontal plane	Csenge A.Molnar	IFAC-PapersOnLine	https://doi.org/10.1016/j.ifacol.2018.07.240	Volume 51, Issue 14, 2018, Pages 300-305
P40	Optimum Balancing of Slider-crank Mechanism Using Equimomental System of Point-masses	KailashChaudhary	Elsevier Procedia Technology	https://doi.org/10.1016/j.protcy.2014.08.006	Volume 14, 2014, Pages 35-42
P41	Dynamic balancing of super-critical rotating structures using slow-speed data via parametric excitation	ShacharTresser	Elsevier Journal of Sound and Vibration	https://doi.org/10.1016/j.jsv.2017.11.029	Volume 415, 17 February 2018, Pages 59-77
P42	Vibration reduction of a single cylinder reciprocating compressor based on multi-stage balancing	N.Levecque	Elsevier Mechanism and Machine Theory	https://doi.org/10.1016/j.mechmachtheory.2010.09.004	Volume 46, Issue 1, January 2011, Pages 1-9

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VISION	MISSION
To be a center of excellence imparting professional education satisfying societal and global needs.	1. Transforming students into lifelong learners through, quality teaching, training and exposure to concurrent technologies. 2. Fostering conducive atmosphere for research and development through well-equipped laboratories and qualified personnel in collaboration with global organizations.

Teaching Plan

Course : MBA	**Year/Semester** : 1st Semester (1st Year)	
Name of the Teacher : Dr. Manoj Rao	**Subject Code : 1T2**	
Subject : Managerial Economics	**Section** : A	
Periods per Week (each 60 min)	**Lecture**	3
	Tutorial	1
	Practical	0

Course Objective	Course Outcomes
1. Students will able to understand basic economic terms used in business decision making. 2. Given the details regarding price and quantity, student will be able to calculate and interpret price elasticity, income elasticity and cross-price elasticity of demand and will also be able examine the uses and abuses of demand forecasting techniques 3. Given the information about scale of production, Student will be able to analyze various aspects of empirical production functions and also will be able to comprehend the difference sources of economies and diseconomies of scale. The future manager will also be able to determine the optimal price and output for firms under different market structures. 4. Given the circular flow model of an economy, Student will be able to interpret the role and importance of each component with regard to factor market and product market and will also be able to comment on the implications and control of inflation. 5. Given the information regarding expenses and income in an economy,	1. Define the key terms in economics 2. Explain the key concepts in economics from a managerial perspective. 3. Apply economic principles to management decisions like calculating elasticity of demand, national income using different approaches and determining the optimal price and output for firms under different market structures. 4. Compare and contrast Demand-Pull and Cost-Push Inflation, CPI and WPI, analyze various aspects of empirical production functions and also will be able to comprehend the difference sources of economies and diseconomies of scale. **5.** Comment on the choice of demand forecasting methods, implications and control of inflation, implications of different phases of business cycle on the economic activity in the country

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the student will be able to calculate and explicate the gross domestic product using expenditure and income approaches and given the details about a phase of the business cycle, the future manager will be able to depict the symptoms, causes and effects on economic activities of a nation. The student will also able to identify the most suitable method of demand forecasting under different market conditions.	

Sr. No	Lec . No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no) Reference Book (Page no)	URL's (NPTEL/OnlineMaterial /PPt/Video)	Applications (R&D/ Industry)	Learning Outcomes
Unit I – Basics of Managerial Economics								
1	1	1	Briefing of Course Outcomes, Program Outcomes, Program Specific Outcomes, course scheme, teaching assessment and evaluation techniques / methodologies and also discussion on the teaching plan.	Day 1		https://www.youtube.com/watch?v=JlYY1NxGTQI		Briefing of Course Outcomes, Program Outcomes, Program Specific Outcomes, course scheme, teaching assessment and evaluation techniques / methodologies and also discussion on the teaching plan.
2	2	2	Introduction; **Demand Analysis:** The Consumer, Demand Concepts,	Day 2	R1 Ch 4,5,6,7	https://sendpulse.com/support/glossary/demand-analysis	C1-C4	Student will be able to explain the concept of Demand
3	3	3	Price Elasticity of Demand,	Day 3	R1 Ch 4,5,6,7	https://www.investopedia.com/terms/d/demand_theory.asp	C1-C4	Student will be able to explain the elasticity of demand
4	4	4	Income Elasticity of Demand,	Day 4	R1 Ch 4,5,6,7	https://www.investopedia.com/terms/d/demand_theory.asp	C1-C4	Student will be able to explain the income elasticity of demand

5	5	5	Cross-Price Elasticity of Demand.	Day 5	R1 Ch 4,5,6,7	https://www.investopedia.com/terms/d/demand_theory.asp	C1-C4	Student will be able to explain the cross price elasticity of demand
6	6	6	Substitution and Income Effects.	Day 6	R1 Ch 4,5,6,7	https://byjus.com/commerce/difference-between-substitution- effect-and-income-effect/	C1-C4	Student will be able to describe Substitution and Income Effects.
7	7	7	Normal and Inferior Goods. Indifference	Day 7	R1 Ch 4,5,6,7	https://www.youtube.com/watch?v=NGy-UxwNNP4	C1-C4	Student will be able to describe the indifference curve
Unit 2: Demand Analysis & Supply								
8	8	8	The Law of Supply, Theory of Production	Day 8	R1 Ch 10,11	https://www.vedantu.com/commerce/theory-of-supply	C1-C4	Student will be able to explain law of supply and theory of production
9	9	9	Factors affecting production, production function, short run analysis	Day 9	R1 Ch 10,11	https://monroeengineering.com/blog/short-run-vs-long-run- production-whats-the-difference/	C1-C4	Student will be able to state Factors affecting production
10	10	10	Law of variable proportions	Day 10	R1 Ch 10,11	https://byjus.com/commerce/law-of-variable-proportion/	C1-C4	Student will be able to discuss concept of variable proportions
11	11	11	Isoquant Curves	Day 11	R1 Ch 10,11	https://businessjargons.com/iso-quant-curve.html	C1-C4	Student will be able to describe Isoquant Curves
12	12	12	Long run production function	Day 12	R1 Ch 10,11	https://www.economicsdiscussion.net/production/long-run- production-function-with-diagram/3655	C1-C4	Student will be able to determine Long run production function
13	13	13	Cobb-Douglas production function	Day 13	R1 Ch 10,11	https://byjus.com/commerce	C1-C4	Student will be able to explain Cobb-Douglas production

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14	14	14	Cost-Output Function, Economies	Day 14	R1 Ch 10,11	https://theintactone.com/2019/10/01/me-u3-topic-2-cost- output-relationship-in-short-run-long-run-cost-curves/	C1-C4	Student will be able to explain Cost-Output Function,
15	15	15	Diseconomies of Scale	Day 15	R1 Ch 10,11		C1-C4	Student will be able to economies and Diseconomies of Scale
Unit 3: Production Decisions And Cost Analysis								
16	16	16	Introduction; **Analysis of Market Structures:** Factors That Determine Market Structure. **Perfect Competition:** Demand-supply Analysis in Perfectly Competitive	Day 16	R3 Ch 8 R4 Ch 13	https://www.simplilearn.com/market-structures-rar188-article	C1-C4	Student will be able to explain demand ,supply,competition
17	17	17	Optimal Price and Output in Perfectly Competitive Markets. **Monopolistic Competition:** Demand-Supply	Day 17	R3 Ch 8 R4 Ch 13	https://www.investopedia.com/ask/answers/040915/what- difference-between-monopolistic-market-and-perfect-competition.asp	C1-C4	Student will be able to monopolistic competition
18	18	18	Analysis in Monopolistically Competitive Markets,. Optimal Price	Day 18	R3 Ch 8 R4 Ch 13	https://pressbooks.bccampus.ca/uvicecon103/chapter/8-3- monopolistic-competition/	C1-C4	Student will be able to explain optimal price
19	19	19	Output in Monopolistically Competitive Markets,	Day 19	R3 Ch 8 R4 Ch 13	https://pressbooks.bccampus.ca/uvicecon103/chap	C1-C4	Student will be able to explain competitive market

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20	20	20	Factors Affecting Long-Run Equilibrium in Monopolistically Competitive Markets.	Day 20	R3 Ch 8 R4 Ch 13	https://analystprep.com/cfa-level-1-exam/economics/factors-affecting-long-run-equilibrium-under-each-market-structure/	C1-C4	Student will be able to explain Factors Affecting Long-Run Equilibrium in Monopolistically
21	21	21	**Oligopoly:** Demand-Supply Analysis and Pricing Strategies in Oligopoly Markets, Optimal Price and	Day 21	R3 Ch 8 R4 Ch 13	https://www.investopedia.com/terms/o/oligopoly.asp	C1-C4	Student will be able to justify Pricing Strategies in Oligopoly Markets
22	22	22	Output in Oligopoly Markets, Factors Affecting Long-Run Equilibrium in Oligopoly Markets	Day 22	R3 Ch 8 R4 Ch 13	https://www.investopedia.com/terms/o/oligopoly.asp	C1-C4	Student will be able to get Factors Affecting ong-Run Equilibrium in Oligopoly
23	23	23	**Monopoly:** Demand-Supply Analysis in Monopoly Markets; Optimal Price and Output in Monopoly Markets, Price Discrimination.	Day 23	R3 Ch 8 R4 Ch13	https://saylordotorg.github.io/text_introduction-to-economic-analysis/s16-monopoly.html		Student will be able to understand Monopoly
Unit 4: Economic Fundamentals And Market Structure								
24	24	24	**MACRO ECONOMIC FUNDAMENTALS:** Macro Economics – Meaning .	Day 24	R4 Ch 23, 24,25 & 26	https://www.investopedia.com/terms/m/macroeconomics.asp	C1-C4	Student will be able to explain concept of Macro Economic

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25	25	25	Macro Economics – Meaning .	Day 25	R4 Ch 23, 24,25 & 26	https://www.investopedia.com/terms/m/macroeconomics.asp	C1-C4	Student will be able to design & develop macro economic fundamental concepts
26	26	26	Nature and Scope	Day 26	R4 Ch 23, 24,25 & 26	https://www.investopedia.com/terms/m/macroeconomics.asp	C1-C4	Student will be able to understand nature and scope of economics
27	27	27	Circular Flow Model of Economy	Day 27	R4 Ch 23, 24,25 & 26	https://corporatefinanceinstitute.com/resources/economics/circul ar-flow-model/	C1-C4	Student will be able to Circular Flow Model of Economy
28	28	28	**Inflation:** Demand-Pull and Cost-Push Inflation	Day 28	R4 Ch 23, 24,25 & 26	https://www.investopedia.com/terms/c/costpushinflation.asp	C1-C4	Student will be able to explain **Inflation**Demand -Pull and Cost- Push Inflation
29	29	29	CPI vs. WPI, Causes, Effects and Remedies of Inflation	Day 29	R4 Ch 23,24,25 &26	https://www.investopedia.com/articles/05/012005.asp	C1-C4	Student will be able to explain cpi and wpi
30	30	30	Theories of Inflation	Day 30	R4 Ch 23, 24,25 & 26	https://www.economicsdiscussion.net/inflation/top-3-theories-of- inflation-with-diagram/4071	C1-C4	Student will be able to explain Theories of Inflation
31	31	31	Policy measures to control inflation	Day 31		https://www.economicsdiscussion.net/inflation/top-3-theories-of- inflation-with-diagram/4071		Student will be able to tell Policy measures to control inflation
Unit 5: National Income And Business Cycle								
32	32	32	National Income & Business Cycle:National Income – Concept .	Day 32	R1 Ch 20, 21 & 26	https://gacbe.ac.in/pdf/ematerial/18MCO12C-U5.pdf	C1-C4	Student will be able to National Income Concept

33	33	33	National Income – Concept	Day 33	R1 Ch 20, 21 & 26	https://gacbe.ac.in/pdf/ematerial/18MCO12C-U5.pdf	C1-C4	Student will be able to National Income Concept
34	34	34	Measurement, Theory of National Income	Day 34	R1 Ch 20, 21 & 26	https://gacbe.ac.in/pdf/ematerial/18MCO12C-U5.pdf	C1-C4	Student will be able to explain theory of National Income
35	35	35	Measurement, Theory of National Income	Day 35	R1 Ch 20, 21 & 26	https://gacbe.ac.in/pdf/ematerial/18MCO12C-U5.pdf	C1-C4	Student will be able to explain theory of National Income
36	36	36	Determination – Multiplier and Accelerator Theories	Day 36	R1 Ch 20, 21 & 26	https://www.investopedia.com/terms/a/acceleratortheory.asp	C1-C4	Student will be able to outline Multiplier and Accelerator Theories
37	37	37	Determination – Multiplier and Accelerator Theories	Day 37	R1 Ch 20, 21 & 26	https://www.investopedia.com/terms/a/acceleratortheory.asp	C1-C4	Student will be able to outline Multiplier and Accelerator • Theories
38	38	38	Overview of the Business Cycle: Phases of the Business Cycle	Day 38	R1 Ch 20, 21 & 26	https://gacbe.ac.in/pdf/ematerial/18MCO12C-U5.pdf	C1-C4	Student will be able to outline Business Cycle
39	39	39	Factors causing swings in business activity and measures to control business cycles.	Day 39	R1 Ch 20, 21 & 26	https://gacbe.ac.in/pdf/ematerial/18MCO12C-U5.pdf	C1-C4	Student will be able to explain Factors causing swings in business activity and measures to control business cycles.
40	40	40	Demand Forecasting: Need, Techniques and Procedures	Day 40	R1 Ch 4,5,6,7	https://theintactone.com/2019/06/27/be-u2-topic-15-demand-forecasting-need-objectives-and-methods/	C1-C4	Student will be able to explain demand forecasting techniques

Total number of lectures as per syllabus: - 40 Total number of lectures as per planned: - 40

Assignment Plan			
Topic	**Given Date**	**Submission Date**	**Mapped With CO**
Application of economics in business decision making	12/10/2018	22/10/2018	
Elasticity of demand.	12/10/2018	22/10/2018	

Text Books / Reference Books:

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Managerial Economics	Ritika Sinha	SBPD Publishing House	3rd Revised Edition
T2	Managerial Economics: Principles and Worldwide Applications	Dominick Salvatore and Ravikesh Shrivastava	Oxford Publications	7th Edition
T3	Managerial Economics: Analysis, Problems and Cases	P.L. Mehta	S. Chand & Co. Ltd.	13th Edition
T4	Managerial Economics	D. N Dwivedi	Vikas Publications	7th Edition

Subject Teacher **Academic In-charge** **HOD (MBA)**

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