



JAIDEV EDUCATION SOCIETY'S  
**J D COLLEGE OF ENGINEERING AND MANAGEMENT**  
KATOL ROAD, NAGPUR  
Website: [www.jdcoem.ac.in](http://www.jdcoem.ac.in) E-mail: [info@jdcoem.ac.in](mailto:info@jdcoem.ac.in)  
An Autonomous Institute, with NAAC "A" Grade  
Basic Science and Humanities Department  
2021-22 (Odd Sem)



**VISION**

To lay a robust foundation for the institute to reach its zenith.

**MISSION**

The department is making its paramount efforts,  
1. Achieving academic excellence through rigorous teaching, learning and evaluation practices.  
2. To develop an ability to apply knowledge of basic science and mathematics to excel in the field of engineering.  
3. To provide salutary environment for the betterment of faculty and students.

### Teaching Plan

<b>Course:</b> B. Tech. all branches	<b>Year/Semester :</b> First Year/Sem I	
<b>Name of the Teacher :</b> Mr.S.S.Kathalkar	<b>Subject Code :</b> MA1T001	
<b>Subject :</b> Engineering Mathematics I	<b>Section :</b> ME/Civil/CSE/IT/EE/ETC/AI	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	<b>3</b>
	<b>Tutorial</b>	<b>1</b>
	<b>Practical</b>	<b>-</b>

<b>Course Objective</b>	<b>Course Outcomes</b>
1. To understand the application and importance of Mathematics in engineering and in real life. 2. To know and apply the concept of ordinary derivative, partial derivatives and their applications to Maxima/Minima.	At the end of the course students will be able to 1. Describe rank, Bernoulli's theorem, Taylor's and McLaren's theorems for functions of two variables, – Euler's Theorem for functions containing two and three variables, Cauchy's equation, Lagrange's theorem. 2. Illustrate the examples of first and higher order ordinary differential equation, Taylor's and

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3. To understand Computation of Jacobin of functions of several variables and their applications to engineering problems	<p>McLaren's series, matrices, total derivative.</p> <p>3. Apply the matrix technique (Linear algebra) to find solutions of system of linear equations, ordinary and partial differential equation to mechanical and electrical systems arising in many engineering problem.</p> <p>4. Analyze questions related to exact differential equation, Jacobin of function of several variable, consistency of equations, change of variable and their applications.</p> <p>5. Interpret rank of matrices, solution of first and higher order differential equations with constant and variable coefficients, homogeneous functions and Jacobin.</p> <p>6. Design a method or modal on matrices, ordinary differential equation and partial differential equation and their applications.</p>
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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	CO Mapping
<b>UNIT-I - Linear Algebra- Matrices</b>										
1	1	1.1	Introduction of Determinants: Definitions, properties of determinant, finding determinant	Day 1	T1/475	R1/913-917	<a href="https://nptel.ac.in/courses/111/108/111108098/#">https://nptel.ac.in/courses/111/108/111108098/#</a> (32.20 min)(0:00-20:00)	P1	<b>Students should be able to</b> understand the concept of Determinant	CO2
2	2	1.2	Introduction of Matrices: Definition, properties, history, applications	Day2	T2/711	R1/969-970	<a href="https://nptel.ac.in/courses/111/105/111105121/">https://nptel.ac.in/courses/111/105/111105121/</a> (28.17 min)(10:00-15:14)	P2	Understand the concept of Matrices	CO2
3	3	1.3	Inverse of Matrix by adjoint method:	Day 3	T1/49	R1/971-972	<a href="https://www.youtube.com/watch?v=Rcic2">https://www.youtube.com/watch?v=Rcic2</a>	P2	Find inverse of matrix by adjoint method	CO3

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			Meaning of inverse, adjoint method, examples		2		<a href="#">zJpSVs</a> (6.11 min)			
4	4	1.4	Inverse by partitioning method: Partition of matrix, condition for partitioning, partitioning method	Day 4	T1/48 6-487	R1/918- 920	<a href="https://www.youtube.com/watch?v=g8HevtIgG2A">https://www.youtube.com/watch?v=g8HevtIgG2A</a> (11.45 min)	P3	Find inverse of matrix by adjoint method	CO3
5	5	1.5	Examples of inverse of matrix by partition method	Day 5	T2/72 3-726		<a href="https://www.youtube.com/watch?v=g8HevtIgG2A">https://www.youtube.com/watch?v=g8HevtIgG2A</a> (11.45 min)	P3	Solve inverse of matrix	CO3
6	6	1.6	solution of system of linear equations: Classification , method to find the solution of linear equations, examples	Day 6	T2/72 7-729		<a href="https://nptel.ac.in/courses/111/105/111105121/">https://nptel.ac.in/courses/111/105/111105121/</a> (28.17 min)(0:00-15:00)	P3	Classify linear and nonlinear equations Solve system of linear equations	CO4
7	7	1.7	Rank of Matrix: Definition, meaning, reduction method	Day 7	T1 and T2/49 7 and 730- 732	R1/966- 969	<a href="https://nptel.ac.in/courses/111/105/111105121/">https://nptel.ac.in/courses/111/105/111105121/</a> (28.17 min)(10:00 - 25:00)	P3	Understand rank of matrix	CO2
8	8	1.8	examples of Rank of Matrix	Day 8	T1 and T2/49 7 and 730- 732		<a href="https://nptel.ac.in/courses/111/105/111105121/">https://nptel.ac.in/courses/111/105/111105121/</a> (28.17 min)	P3/C5	Evaluate rank of matrix	CO5

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9	9	1.9	Consistency of linear system of equation: Definition, method to find solution, examples	Day 9	T1 and T2/49 7 and 730-732		<a href="https://nptel.ac.in/courses/111/105/111105121/">https://nptel.ac.in/courses/111/105/111105121/</a> (28.17 min)	P3	to apply reduction method to system of equations	CO3
<b>UNIT : II</b>										
<b>Ordinary Differential Equations of First Order and First Degree and Their Applications</b>										
10	10	2.1	Linear Equation: Definition, Integrating factor, method, examples	Day 10	T1/13 5	R1/22-24	<a href="https://nptel.ac.in/courses/111/107/111107111/">https://nptel.ac.in/courses/111/107/111107111/</a> (35.38 min)	P5	Recall linear equation Solve linear equation	CO1, CO3
11	11	2.2	Bernoulli's equation: Integrating factor method	Day 11	T2/47 6-478	R1/22-26	<a href="https://nptel.ac.in/courses/111106100">https://nptel.ac.in/courses/111106100</a> (24.30 min)	P5	Identify Bernoulli's equation	CO3
12	12	2.3	Solve Problems of Bernoulli's equation	Day 12	T2/47 6-478	R1/22-26	<a href="https://nptel.ac.in/courses/111106100">https://nptel.ac.in/courses/111106100</a> (24.30 min)	P5	Evaluate Bernoulli's equation	CO5
13	13	2.4	Exact differential equation: definition, necessary condition, integrating factor	Day 13	T1/14 9	R1/27-30	<a href="https://nptel.ac.in/courses/111106100">https://nptel.ac.in/courses/111106100</a> (24.30 min)(0:00 to 15:00)	P6	Identify exact differential equation	CO3
14	14	2.5	problems Exact differential equation	Day 14	T1/14 9	R1/27-30	<a href="https://nptel.ac.in/courses/111106100">https://nptel.ac.in/courses/111106100</a> (24.30 min)	P6	Determine solution of exact differential equation	CO3
15	15	2.6	equations reducible to exact equations: Case I, Case II, Case III, case IV, case V	Day 15	T2/47 8-484	R1/31-32	<a href="https://nptel.ac.in/courses/111106100/8">https://nptel.ac.in/courses/111106100/8</a> (24.30 min)	P6	Distinguish between the cases and evaluate accordingly	CO3

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16	16	2.7	Application to orthogonal trajectory: Center of mass, gravity	Day 16	T1/16 6-168	R1/53-55	<a href="https://www.youtube.com/watch?v=FMLTSDqwEIU">https://www.youtube.com/watch?v=FMLTSDqwEIU</a> (8.36 min)	P7	Explain orthogonal trajectory	CO2
17	17	2.8	Examples on orthogonal trajectory	Day 17	T1/16 6-168	R1/55-57	<a href="https://www.youtube.com/watch?v=3sRj23qOdKU">https://www.youtube.com/watch?v=3sRj23qOdKU</a> (0.58 min)	P7	Apply the knowledge of differential equation to orthogonal trajectory	CO3
18	18	2.9	Application to physical and electrical systems: Eclectic circuit, Kirchhoff's law, Newton's law of cooling	Day 18	T2/50 4-510	R1/46-52	<a href="https://www.youtube.com/watch?v=e7pVNRSSc4">https://www.youtube.com/watch?v=e7pVNRSSc4</a> (7.16 min)	P7/C1	Apply the knowledge of differential equation to physical and electrical system	CO3
<b>UNIT: III</b>										
<b>LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS</b>										
19	19	3.1	Introductory remark: Definition, degree, order	Day 19	T1/16 8-169	R1/73-74	<a href="https://nptel.ac.in/courses/111107098/3">https://nptel.ac.in/courses/111107098/3</a> (28.17 min)(0:00-21:00)	P8	Find order and degree of given equation	CO3
20	20	3.2	Complementary function, Particular integral	Day 20	T1/17 0	R1/75-76	<a href="https://nptel.ac.in/courses/111107098/4">https://nptel.ac.in/courses/111107098/4</a> (28.17 min) <a href="https://nptel.ac.in/courses/111107098/6">https://nptel.ac.in/courses/111107098/6</a> (28.17 min)	P8	Define C.F. and P.I.	CO1
21	21	3.3	Rules for finding	Day 21	T2/51	R1/73-74	<a href="https://nptel.ac.in/co">https://nptel.ac.in/co</a>	P8	Classify the cases of	CO4

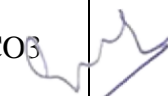


			complementary function: Case I to Case IV		2-520		<a href="https://nptel.ac.in/courses/111107098/14">urses/111107098/14</a> (28.17 min)		C.F	
22	22	3.4	Rules for finding particular integral	Day 22	T2/52 1-531	R1/75-76	<a href="https://nptel.ac.in/courses/111107098/15">https://nptel.ac.in/courses/111107098/15</a> (28.17 min)(0:00-10:00)	P8	Classify the cases of P.I.	CO2
23	23	3.5	Examples Solve Rules for finding particular integral	Day 23	T2/52 1-531	R1/75-76	<a href="https://nptel.ac.in/courses/111107098/15">https://nptel.ac.in/courses/111107098/15</a> (28.17 min)	P8	Illustrate the examples	CO2
24	24	3.6	Method of variation of parameter: integrating factor	Day 24	T1/18 6	R1/82-84	<a href="https://nptel.ac.in/courses/111107098/11">https://nptel.ac.in/courses/111107098/11</a> (28.17 min)(05:00-15:00)	P9/C2	Explain method of variation of parameter	CO2
25	25	3.7	Solve problems Method of variation of parameter	Day 25	T1/18 6	R1/82-84	<a href="https://nptel.ac.in/courses/111107098/11">https://nptel.ac.in/courses/111107098/11</a> (28.17 min)	P9	Find the complete solution of a differential equation with constant coefficients by variation of parameters	CO3
26	26	3.8	Legendre's linear equations : Standard form of equation, method	Day 26	T3/20 5-206		<a href="https://www.youtube.com/watch?v=MFswwWZpyio">https://www.youtube.com/watch?v=MFswwWZpyio</a> (5.00 min)	P9	Explain Legendre's equation	CO2

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27	27	3.9	Examples on Legendre's linear equations	Day 27	T4/4.4 5-4.47		<a href="https://www.youtube.com/watch?v=CVij36N7q4A">https://www.youtube.com/watch?v=CVij36N7q4A</a> (18.06 min)	P9/C3	Illustrate examples on Legendre's linear equation	CO3
<b>UNIT-IV PARTIAL DIFFERENTIATION EQUATION</b>										
28	28	4.1	Partial derivatives of first orders: Definition, examples	Day 28	T1/85 1	R1/589	<a href="https://youtu.be/AWVCi5kgovM">https://youtu.be/AWVCi5kgovM</a> (58.37 min)(0:00 - 12:10)	P10	Understand the Partial derivatives of first orders	CO2
29	29	4.2	Partial derivatives of Higher orders: definition, examples	Day 29	T2/43 5	R1/589	<a href="https://youtu.be/FU-7xJLpoWg">https://youtu.be/FU-7xJLpoWg</a> (42.24 min)(0:00- 13:00)	P10	Understand the Partial derivatives of Higher orders	CO2
30	30	4.3	Examples of Partial derivatives of first and higher orders	Day 30	T2/43 6-444	R1/589- 590	<a href="https://youtu.be/FU-7xJLpoWg">https://youtu.be/FU-7xJLpoWg</a> (42.24 min)(13:00- 42.24)	P10/C2	solve examples on partial derivatives	CO3
31	31	4.4	Introduction of Homogeneous functions	Day 31	T2/43 9-443	R1/589- 590	<a href="https://youtu.be/uSvaMdZjgd8">https://youtu.be/uSvaMdZjgd8</a> (7.58 min)		Understand the concept of Homogeneous functions	CO2
32	32	4.5	Homogeneous functions – Euler's Theorem for functions containing two and three variables	Day 32	T1/86 1-863	R1/589- 590	<a href="https://youtu.be/RK5zs0OzS4M">https://youtu.be/RK5zs0OzS4M</a> (12.38 min)	P11	Identify homogeneous function	CO3

  
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33	33	4.6	Total derivatives	Day 33	T1/86 1-863	R1/591- 593	<a href="https://youtu.be/Kdd9h1IFTA8">https://youtu.be/Kdd9h1IFTA8</a> (14.46 min)	P11/C3	Understand Total derivatives	CO2
34	34	4.7	Examples on Total derivatives	Day 34	T2/44 9-453	R1/609- 613	<a href="https://youtu.be/jAUGXLWOyKM">https://youtu.be/jAUGXLWOyKM</a> (7.45 min)	P11/C4	Simplify examples on total derivatives	CO4
35	35	4.8	Change of variables	Day 35	T2/44 9-453	R1/609- 613	<a href="https://youtu.be/wtY5fx6VMGQ">https://youtu.be/wtY5fx6VMGQ</a> (26.58 min)	P11	Understand Change of variables	CO2
36	36	4.9	Examples on Change of variables	Day 36	T2/44 9-455	R1/609- 613	<a href="https://youtu.be/wtY5fx6VMGQ">https://youtu.be/wtY5fx6VMGQ</a> (26.58 min)	P11	solve Change of variables	CO3
<b>UNIT: V</b> <b>Applications of Partial differentiation</b>										
37	37	5.1	Introduction of Jacobins: definition, basic concept, formula	Day 37	T1/37 2-401	R1/500	<a href="https://www.youtube.com/watch?v=1M4RzBUS73k">https://www.youtube.com/watch?v=1M4RzBUS73k</a> (4.30 min)	P10	understand Jacobins	CO2
38	38	5.2	Properties of Jacobins: three portieres, meaning, use in examples	Day 38	T2/35 1-362	R1/510	<a href="https://youtu.be/Z_NUUsbybZU">https://youtu.be/Z_NUUsbybZU</a> (15.22 min)	P10	Identify properties of Jacobins	CO3
39	39	5.3	Introduction of Taylor's theorems (without proofs) for	Day 39	T4/8.2	R1/510	<a href="https://youtu.be/wMd4YRyBmjA">https://youtu.be/wMd4YRyBmjA</a> (50.12 min)(0:00-	P10	Understand Taylor's theorems for functions of two	CO2 PRINCIPAL



			functions of two variables: statement, history, meaning				25:00)		variables	
40	40	5.4	McLaurin's theorems (without proofs) for functions of two variables: statement, meaning, history	Day 40	T4/8.4	R1/510	<a href="https://youtu.be/wMd4YRyBmjA">https://youtu.be/wMd4YRyBmjA</a> (50.12 min)(25:00-50:12)	P11	Understand McLaren's theorems for functions of two variables and solving problems	CO2
41	41	5.5	Solving Problems of Taylor's and McLaurin's theorems (without proofs) for functions of two variables	Day 41	T4/8.6	R1/511-512	<a href="https://youtu.be/4Z0DjTdVXxg">https://youtu.be/4Z0DjTdVXxg</a> (11.47 min)	P11/C4	Apply Taylor's and McLaren's theorem for solving examples	CO3
42	42	5.6	Introduction of Maxima and minima of functions of two variables: maxima, minima, physical interpretation	Day 42	T4/8.10	R1/512-515	<a href="https://youtu.be/Em5EUstK8Rw">https://youtu.be/Em5EUstK8Rw</a> (27.27 min)	P11	understand Maxima and minima of a function	CO2
43	43	5.7	Solving Problems Maxima and minima of functions of two variables	Day 43	T3/414-421		<a href="https://youtu.be/NpR91wexqHA">https://youtu.be/NpR91wexqHA</a> (24.59 min)	P11	Find Maxima and minima function	CO3
44	44	5.8	Introduction of Lagrange's method of undetermined multipliers.: Multi[tiers, Lagrange's	Day 44	T3/421-423		<a href="https://youtu.be/xjUcaH6dCN0">https://youtu.be/xjUcaH6dCN0</a> (50.2 min)(0:00-15:00)	P11	Understand concept of Lagrange's method of undetermined multipliers	CO2

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			multipliers, formula, method						
45	45	5.9	Solving Problems Lagrange's method of undetermined multipliers	Day 45	T3/42 1-423	<a href="https://youtu.be/xjUc aH6dCN0">https://youtu.be/xjUc aH6dCN0</a> (15:00-50.2) (50.2 min)	P11	Illustrate Lagrange's method of undetermined multipliers and solve problems.	CO3

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

Total number of lectures as per syllabus: - 45

Total number of lectures as per planned: - 45

Tutorial Plan			
Week	Topic	No. Of Problems	Mapped With CO
1	Inverse of Matrix by adjoint method	02	II
2	Solutions of system of linear equations	03	III
3	first order ordinary differential equation	04	II
4	Equations reducible to exact equations	04	IV
5	Variation of parameter	03	II
6	Partial derivatives of first and higher orders	03	II
7	Taylor's and McLaurin's theorems for functions of two variables	03	I

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8	Change of variable	05	IV
9	Jacobin of function of several variable	02	IV
10	Total derivative	04	II
11	Lagrange's theorem	03	I

**Assignment Plan**

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Rank of Matrix			V
2	Application to physical and electrical system			III

**Content Beyond Syllabus Topic – Planned**

Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP
1	Application of matrices in Engineering problem		I,III
2	Lagrange's Method of Multiplier		I, II, III

**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	19 <sup>th</sup> edition
T2	Higher Engineering Mathematics	Dr.B.S.Grewal,	Khanna publication	40 <sup>th</sup> edition
T3	Advance Engineering mathematics	Erwin Kreyszing	Wiley Publication,	8 <sup>th</sup> edition
T4	Engineering Mathematics I	Dr.N.S.Mujumdar	Niral Publication	1 <sup>th</sup> edition

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**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
C1	Intel	www.intel.in	It is the world's largest and highest valued semiconductor chip manufacturer based on revenue, and is the inventor of the x86 series of microprocessors, the processors found in most personal computers (PCs).
C2	Kotak Mahindra bank Ltd.	www.kotak.com	It is bank in India. Kotak Mahindra Bank offers high interest rate savings account, low interest rate personal loan and credit cards with attractive offers. The business analyst uses the differential equation.
C3	NASA	www.nasa.gov	The National Aeronautics and Space Administration is an independent agency of the U.S. Federal Government responsible for the civilian space program, as well as aeronautics and space research. They use mathematics like differentiation and integration in many of their projects.
C4	National Commodity and Derivatives Exchange (N CDEX)	www.ncdex.com	A commodity market is a market that trades in the primary economic sector rather than manufactured products, such as cocoa, fruit and sugar. Hard commodities are mined, such as gold and oil. Work in derivatives pricing in the energy and commodity markets at India.
C5	Global logic	www.globallogic.com	Global Logic is a Digital Product Engineering Services company that was founded in 2000 and is headquartered in San Jose, California. This IT company also uses matrices as data structures to track user





			information, perform search queries, and manage databases.
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**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
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. Turriffin	<u>Acta Mathematica</u>	ISSN: 0001-5962 (Print) 1871-2509 (Online)	December 1955, Volume 93, <u>Issue 1</u> , p p 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, <u>Issue 2</u> , p p 257–265
P6	Exact solutions for nonlinear partial fractional differential equations	Khaled A. Gepreel <sup>1</sup>	<i>Chinese Physics B</i>	doi:10.1088/issn.1674-1056	<u>Volume 21</u> , <u>Number 11</u>

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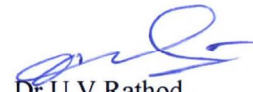




P7	Some Differential Properties of the Orthogonal Trajectories of a Congruence of Curves, with an Application to Curl and Divergence of Vectors	Reginald A. P. Rogers	Proceedings of the Royal Irish Academy. Section A: Mathematical and Physical Sciences	ISSN: 00358975	Vol. 29 (1911/1912), pp. 92-117
P8	Hypoelliptic second order differential equations	Lars Hörmander	<u>Acta Mathematica</u>	ISSN: 0001-5962 (Print) 1871-2509 (Online)	December 1967, Volume 119, <u>Issue 1</u> , 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: <b>1007-5704</b>	Volume 16, <u>Issue 11</u> , November 2011, Pages 4163-4173
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, <u>Issue 6</u> , June 1989, Pages 483-494
P11	On the Convergence Rate of Generalized Fourier Expansions	K. O. MEAD	<i>IMA Journal of Applied Mathematics</i>	Online ISSN 1464-3634 Print ISSN 0272-4960	Volume 12, Issue 3, 1 December 1973, Pages 247-259



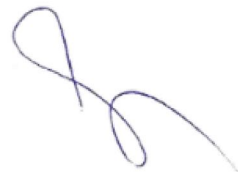
Mr.S.S.Kathalkar  
Subject Teacher



Dr.U.V.Rathod  
Academic Incharge



Dr. A.N.Gupta  
Head of Department, FY



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**An Autonomous Institute, with NAAC "A" Grade  
Basic Science and Humanities Department  
2021-22 (Even Sem)**




<u>VISION</u>	<u>MISSION</u>
To lay a robust foundation for the institute to reach its zenith.	The department is making its paramount efforts, 1. Achieving academic excellence through rigorous teaching, learning and evaluation practices. 2. To develop an ability to apply knowledge of basic science and mathematics to excel in the field of engineering. 3. To provide salutary environment for the betterment of faculty and students.

### Teaching Plan

<b>Course :</b> B. Tech in CSE/IT/ETC	<b>Year/Semester :</b> II <sup>nd</sup> Semester (1st Year)	
<b>Name of the Teacher :</b> Dr. U.V.RATHOD	<b>Subject Code :</b> CS2T007/IT2T007/ET2T007	
<b>Subject :</b> BEEE	<b>Section :</b> CSE/IT/ETC	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	<b>2</b>
	<b>Tutorial</b>	..
	<b>Practical</b>	..

Course Objective	Course Outcomes
1. To provide a basic information and use of electrical and electronics components. 2. To understand and study the materials used for the preparation of electrical and electronics components. 3. To provide basic knowledge of operation and functionality of electrical and electronics components.	Students should be able to: CO1: Define fundamentals of electrical system and choose measuring instruments for measurement of electrical quantities & describe the concept PN junction diode and its characteristics. CO2: Classify wiring system and compare energy resources for electrical energy generation & elaborate the transistor configuration in CE, CB & CC mode. CO3: Plan and organize the utilization of energy resources of electrical system & apply transistor characteristics to construct Amplifier devices. CO4: Compare different sources of electrical system & distinguish various logic gates and simplify the Boolean's equations. CO5: Justify the utilization of various electrical and electronics components into electrical and electronics circuitries. CO6: Construct various circuits using Resistors, capacitors, inductors, PN junction diode, Zener diode, transformers, transistors and logic gates.

  
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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	CO mapping
<b>Unit-I:Elementary Electrical Concepts and Circuit Components:</b>									
1	1	1.01	Potential difference, Ohm's law, Effect of temperature on resistor,	Day-1	Pg. No. 1-5, T1	<a href="https://www.slideshare.net/CanerGkselSonuzun/power-systems-introduction">https://www.slideshare.net/CanerGkselSonuzun/power-systems-introduction</a>	<b>P1, P2</b>	Students will be able to ** recognize the basic concept of electrical system	CO1, CO2
2	2	1.02	Resistance temperature coefficient	Day-2	Pg. no.2 to 7,T1	<a href="https://www.slideshare.net/ayushikesarvani/basic-electrical-circuits-fundamentals-of-electrical-engineering">https://www.slideshare.net/ayushikesarvani/basic-electrical-circuits-fundamentals-of-electrical-engineering</a>		*terms related to electrical system	CO1
3	3	1.03	Study of different wire gauges and their applications in domestic and industry.	Day-3	Pg.No.421-433, T4	<a href="https://nptel.ac.in/courses/108105053/">https://nptel.ac.in/courses/108105053/</a>		*able to recognize wiring system	CO2
4	4	1.04	color code, type of resistors, material used for resistors, resistance wires,	Day-4	Pg. No.433-446,T4.	<a href="https://www.slideshare.net/shwetasaeni23/electrical-wiring-system">https://www.slideshare.net/shwetasaeni23/electrical-wiring-system</a>		*able to compare different types of wirings	CO2, CO5
5	5	1.05	resistance standards, frequency errors in resistors.	Day-5	Pg no. 1,T2	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/122106025/lec3.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/122106025/lec3.pdf</a>		*understood concept and use of resistors	CO5
6	6	1.06	Capacitors: Capacitance standards, variable capacitors, frequency errors in capacitors. Loss angle and power factor of capacitors.	Day-6	Pg.No.1-2, T2	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108102097/lec5.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108102097/lec5.pdf</a>		*distinguish between different resistor types	CO1, CO4
7	7	1.07	Inductors: standards of inductance, mutual inductance, self-inductance, variable inductance,	Day-7	Pg.No.5-6, T2	<a href="http://www.elna.co.jp/en/capacitor/pdf/catalog_13_14_e.pdf">http://www.elna.co.jp/en/capacitor/pdf/catalog_13_14_e.pdf</a>		*understood concept and uses of capacitors	CO1, CO4, CO5
8	8	1.08	inductors for high and low frequency work, frequency errors in inductors.	Day-8	Pg.No.3-4, T3	<a href="http://users.wfu.edu/ecarlson/phy114/lectures/inductance.ppt">http://users.wfu.edu/ecarlson/phy114/lectures/inductance.ppt</a>		*able to understand standard of inductance in electrical system	CO5, CO6

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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	CO mapping
<b>Unit-II: Measurement Of Electrical Quantities, Measuring Instruments &amp; Energy Resources</b>									
9	9	2.01	Measurement of Voltage, Current, and Power (1ph and 3ph), Introduction to PMMC instrument,	Day-9	Pg.No.351-362,T4	<a href="https://www.slideshare.net/pakidoctors/measuring-instruments-ppt">https://www.slideshare.net/pakidoctors/measuring-instruments-ppt</a>	P3	*able to understand different measuring instruments	CO1, CO2
10	10	2.02	Ohmmeter, galvanometer, potentiometers, power factor meter and frequency meters.	Day-10	Pg.No.362-379, T4	<a href="https://www.slideshare.net/MissCivil/basic-electrical-quantities">https://www.slideshare.net/MissCivil/basic-electrical-quantities</a>		*able to measure electrical quantities	CO3, CO4
11	11	2.03	Study of circuit breakers & Actuators (MCB & Fuse, Power Contactors & Aux contactors,	Day-11	Pg.No.379-405,T4	<a href="https://www.slideshare.net/pratikguptateddy/dr-33685553">https://www.slideshare.net/pratikguptateddy/dr-33685553</a>		*recognize uses of circuit breakers and actuators	CO3, CO4
12	12	2.04	Electro-Mechanical & Solid state Relays).	Day-12	Pg.No.406-410,T4	<a href="https://www.elprocus.com/different-types-of-relays-used-in-protection-system-and-their-workings/">https://www.elprocus.com/different-types-of-relays-used-in-protection-system-and-their-workings/</a>		*differentiate different types of relays	CO2. CO3.CO4
13	13	2.05	Energy Resources and Utilization: Conventional and nonconventional energy resources;	Day-13	Pg no.16,T2	<a href="https://nptel.ac.in/courses/121106014/">https://nptel.ac.in/courses/121106014/</a>		*understood different sources of energy	CO3, CO4, CO5
14	14	2.06	Introduction to electrical energy generation from different resources, transmission, distribution and utilization,	Day-14	Pg.No.134-162, T3	<a href="https://nptel.ac.in/courses/108/105/108105058/">https://nptel.ac.in/courses/108/105/108105058/</a>		*able to understand applications of energy resources	CO1, CO2, CO3,
15	15	2.07	Concept of Supply Demand, Power Factor, Need of unity factor.	Day-15	pg no.13,T3	<a href="https://www.smartzworld.com/notes/utilization-of-electrical-energy-pdf-notes-uee-pdf-notes/">https://www.smartzworld.com/notes/utilization-of-electrical-energy-pdf-notes-uee-pdf-notes/</a>		*utilization of energy resources	CO4, CO5, CO6

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Unit 3: Introduction to diodes, diode circuit and Transducers									
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)	Application s (R&D/ Industry)	Learning Outcomes	CO mapping
16	16	3.01	The P-N Junction Diode, V-I characteristics, Diode as Rectifier	Day-16	5.15 to 5.20 page no.67 to 73, T5	<a href="https://www.electronics-tutorials.ws/diode/diode_3">https://www.electronics-tutorials.ws/diode/diode_3</a> <a href="https://nptel.ac.in/courses">https://nptel.ac.in/courses</a>	P4	Students will be able to * recognize the basic concept of P-N-junction diode. *Explain its V-I characteristics of	CO1,CO2
17	17	3.02	Specifications of Rectifier Diodes, Half Wave, Full wave, Bridge rectifiers	Day-17	6.8 to 6.13 page no.87 to 99,, T5	<a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec19">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec19</a>		*compare various diodes based on their specifications. * utilize diode as rectifier.	CO2, CO3
18	18	3.03	Equations for $I_{DC}$ $V_{DC}$ $V_{RMS}$ , $I_{RMS}$	Day-18	3.5 to 3.9, T6, R1	<a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec46">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec46</a>		*measure various electrical parameters related to diode.	CO3,CO4
19	19	3.04	Efficiency and Ripple Factor for each configuration.	Day-19	6.18 to 6.22 page no.101 to 106, T5	<a href="https://nptel.ac.in/storage2/courses/PDF/L-12(DK)(PE)((EE)NPTEL)">https://nptel.ac.in/storage2/courses/PDF/L-12(DK)(PE)((EE)NPTEL)</a>		*compare efficiency and ripple of rectifier circuits.	CO3
20	20	3.05	Zener Diode, Characteristics, Specifications,	Day-20	6.25 to 6.26 page no.107 to 110, T5, T6	<a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec9">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec9</a>		*Explain the concept of Zener diode and its characteristics.	CO2, CO3
21	21	3.06	Zener Voltage Regulator,	Day-21	6.27 to 6.28 page no.110 to 118, T5			Utilize the the concept of Zener diode in voltage regulator fabrication.	CO3,CO4
22	22	3.07	Types of Diodes: LED, Photodiode.	Day-22	7.2 to 7.10 page no.126 to 133, T5	<a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec6">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec6</a>		Distinguish between various diodes.	CO3
23	23	3.08	Introduction to transducer, Classification of transducers, characteristics and choice of transducers.	Day-23	6.3 to 6.10 page no.185 to 189, T7	<a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec21">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec21</a> <a href="http://www.gvpcew.ac.in">www.gvpcew.ac.in</a>		*Elaborate the concept of transducers and classify the various transducers.	CO2,CO3
<b>Unit 4: Semiconductor Devices and Applications</b>									
24	24	4.01	Introduction to transistor, Classification, CE, CB, and CC configurations	Day-24	8.9 to 8.13 page no.115 to 162, T5, R2	<a href="https://nptel.ac.in/content/storage2/courses/Lec13">https://nptel.ac.in/content/storage2/courses/Lec13</a> <a href="https://www.brainkart.com/article/Configuration-of-Transistor-Circuit-CB,-CE,-CC-configuration-Input-and-Output-Characteristics_12528/">https://www.brainkart.com/article/Configuration-of-Transistor-Circuit-CB,-CE,-CC-configuration-Input-and-Output-Characteristics_12528/</a>	P5	Students will be able to *understand the working of transistor and its characteristics.	CO3



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25	25	4.02	$\alpha$ , $\beta$ , concept of gain and bandwidth.	Day-25	8.9 to 8.12 page no.151 to 160, T5	<a href="https://nptel.ac.in/courses/downloads/noc19_ee04_Assignment7">https://nptel.ac.in/courses/downloads/noc19_ee04_Assignment7</a>		*Utilize the fundamental concept of current and voltage gain and its measurement.	CO3,CO4
26	26	4.03	Operation of <b>BJT</b> in cut-off, saturation and active regions (DC analysis).	Day-26	8.17 to 8.24 page 165 to 182, T5	<a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec23">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec23</a>		Conceptualize the BJT operation in basic operational regions.	CO5
27	27	4.04	BJT as an amplifier, biasing techniques of BJT, BJT as a switch.	Day-27	8.20 to 8.22 page 171 to 180; 9.2 to 9.14 page 195 to 224, T5, T6	<a href="https://nptel.ac.in/content/storage2/courses">https://nptel.ac.in/content/storage2/courses</a> <a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec11">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec11</a>		*utilize the BJT as amplifier and switch.	CO3,CO4
28	28	4.05	Number System,	Day-28	26.3 to 26.8 page 730 to 736, T5	<a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec3">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec3</a>	P6	*explain the use of various number system.	CO2,CO3, CO4
29	29	4.06	Basic logic Gates, Universal Gates	Day-29	26.10 to 26.17 page no.738 to 746, T5, R2	<a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec16">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec16</a> <a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec7">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec7</a>		*understand the performance of logic gates in electronics	CO2
30	30	4.07	Boolean Postulates, De-Morgan Theorems.	Day-30	26.20 to 26.28 page no.748 to 762, T5, R1	<a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec7">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec7</a> <a href="https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec39">https://nptel.ac.in/storage2/nptel_data3/html/mhrd/ict/text/lec39</a>		*utilize principle of logic gates for the construction of various electronics circuits.	O3,CO4,C O5

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

Total number of lectures as per syllabus: - 30

Total number of lectures as per planned: -30

**Text Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T4	Basic electrical engineering	S.B.Bodkhe	Professional publishing house	2008
T5	Circuit theory (Analysis and Synthesis)	A.Chakrabarti	Dhanpat Rai and co.	2006
T6	A course in electrical power	J.B.Gupta	Katson Publication	2006
T7	A course in electrical & Electronic measurement & Instrumentation	A.K.Sawney	Dhanpat Rai and co.	2007 PRINCIPAL
T1	Principal of electronics	V.K.Mehta, Rohit Mehta,	S.Chand Publication, New Delhi,	2008 Principal J D College of Engineering & Management Khandola, Katol Road Nagpur-441501






T2	Basic Electronics	B. L. Theraja	S. Chand Limited.	2007.
T3	A Textbook of Basic Electrical and Electronics Engineering,	J.B.Gupta,	Katson Publication	2006


**Reference Books:**


Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	A Text book of Basic Electronics,	Brijesh Iyer and S. L. Nalbalwar,	Synergy Knowledgeware Mumbai.	, 2017. ISBN:978-93-8335- 246-3
R2	Electronic Circuit Analysis and Design,	Donald Neaman,	McGraw-Hill Publication, 3 <sup>rd</sup> Edition.	2008


**Research Paper:**

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/P age no/Year
P1	Electrical wiring component and accessories	NCERT	<a href="https://ncert.nic.in/vocational/pdf/kvcj103.pdf">https://ncert.nic.in/vocational/pdf/kvcj103.pdf</a>	..	..
P2	<b>Review on Electrical Wiring (Types, Sizes and Installation)</b>	Mustafa T. Mohammed Alhashimi , Yousif Jawad Kadhim Nukhailawi , Ahmed Tahseen Ali	Journal of instrumentation Technology and innovation:	ISSN:2249-4731(Online), ISSN:2347-7261(Print)	Volume-9 Issue-3
P3	<b>Permanent Magnet Moving Coil Instrument (PMMC) – Working and Application</b>	Mr.Anish	Marine insight: <a href="https://www.marineinsight.com/marine-electrical/permanent-magnet-moving-coil-instrument-pmmc-working-and-application-on-ship/">https://www.marineinsight.com/marine-electrical/permanent-magnet-moving-coil-instrument-pmmc-working-and-application-on-ship/</a>	..	October 27, 2021
P4	PN DIODE AND ITS CHARACTERSTICS	Simran Singh Oberoi,	INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY	ISSN: 2349-6002	© 2015 IJIRT   Volume 1 Issue 12
P5	Transistor characteristics	H. M. Zeidler	IEEE, Transactions of the IRE Professional Group on Electron Devices	10.1109/IREPGED.1953.6811 059	Volume: PGED- 2 , Issue: 2 , Jan. 1953 )
P6	Number System	<u>Ajayi Olusola Olajide</u> <a href="mailto:ajayioo.ict@gmail.com">ajayioo.ict@gmail.com</a>	Research Gate <a href="https://www.researchgate.net/publication/320677641">https://www.researchgate.net/publication/320677641</a>	DOI: 10.13140/RG.2.2.18838.0416 7	27 October 2017 Page-1 to 7

  
**Dr. U.V..RATHOD**  
Subject Teacher

  
**Dr. U. V. Rathod**  
Academic Incharge

  
**Dr. Amit Gupta**  
HOD (BSHD)

  
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Department of Civil Engineering

“Building Better Development”

Session 2021-22



VISION

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

### Teaching Plan

<b>Course</b> : Department of Civil Engineering	<b>Year/Semester</b> : 3 <sup>th</sup> Semester (3rd Year)	
<b>Name of the Teacher</b> : Prof. Atul D Gautam	<b>Subject Code</b> : CE3T005	
<b>Subject</b> : BASIC GEOLOGY AND GEOTECHNICAL ENGINEERING	<b>Section</b> : CE	
<b>Periods per Week : (each 60 min)</b>	<b>Lecture</b>	<b>3</b>
	<b>Tutorial</b>	<b>1</b>
	<b>Practical</b>	<b>2</b>

Course Objective	Course Outcomes
1. To impart knowledge about origin and classification of soils.	CO1. Define geology, Index properties of soil, stress distribution, earth pressure theory, sub soil investigation, and types of Foundation as per suitability of soil characteristics.
2. To impart knowledge about index properties and their determination.	CO2. Describe the soil behavior under different types of loading for Effective foundation design.
3. To impart knowledge about engineering properties and their determination.	CO3. Choose the relevant foundation for various soil properties and Strength parameters to reduce the uncertainties in design.
4. To impart knowledge about stress distribution in soil mass.	CO4. Analyze the compaction, consolidation and stress distribution Parameters. CO5. Judge the modes of failure of foundation with respect to the Stability of slopes for different types of soil.
	CO6. Develop the knowledge of foundation engineering for Designing various types of foundation.

  
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SN	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
<b>Unit I Engineering Geology</b>									
1	01	1.01	Mineralogy: Classification and Physical Properties of Minerals	Day-1	T4	R3	<a href="https://www.youtube.com/watch?v=QNTCKd_nfkc">https://www.youtube.com/watch?v=QNTCKd_nfkc</a>	Mineral Analysis	Student will be able to understand the classification and properties of minerals.
2	02	1.02	Introduction To Common Rock-Forming Minerals	Day-2	T4	R3	<a href="https://www.youtube.com/watch?v=jlhVcGfLmvU">https://www.youtube.com/watch?v=jlhVcGfLmvU</a>	Rock Minerals	Student will be able to understand the rock forming minerals.
3	03	1.03	Petrology: Igneous Rocks (Definition, Formation & Classification)	Day-3	T4	R3	<a href="https://www.youtube.com/watch?v=17l2LrjZl9o">https://www.youtube.com/watch?v=17l2LrjZl9o</a>	Igneous Petrology	Student will be able to understand the rock formation and classification.

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4	04	1.04	Sedimentary Rocks And Metamorphic Rocks (Definition, Formation & Classification)	Day-4	T4	R3	<a href="https://www.youtube.com/watch?v=17l2LrjZi9o">https://www.youtube.com/watch?v=17l2LrjZi9o</a>	Rock Geology	Student will be able to understand the rock formation and classification.
5	05	1.05	Structural Geology: Introduction, Internal Structure Of Earth,	Day-5	T4	R3	<a href="https://www.youtube.com/watch?v=Hj3ihz_BFS0">https://www.youtube.com/watch?v=Hj3ihz_BFS0</a>	Earth Structure	Student will be able to understand the internal earth structure.
6	06	1.06	Dip and Strike of Beds, Folds	Day-6	T4	R3	<a href="https://www.youtube.com/watch?v=bslC-zRaFgQ">https://www.youtube.com/watch?v=bslC-zRaFgQ</a>	Structural Analysis	Student will be able to understand the dip and strike.
7	07	1.07	Joints, Faults, Unconformity	Day-7	T4	R3	<a href="https://www.youtube.com/watch?v=UlvosdkZBdQ">https://www.youtube.com/watch?v=UlvosdkZBdQ</a>	Structural Mapping	Student will be able to understand the joints, folds and



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8	08	1.08	Introduction to landslides.	Day-8	T4	R3	<a href="https://www.youtube.com/watch?v=krJLnXpemtQ">https://www.youtube.com/watch?v=krJLnXpemtQ</a>	Slope Stability	Student will be able to know and memorize basics of landslides.
<b>Unit II Overview of Geotechnical Engineering</b>									
9	09	2.01	Formation of Soil, Three Phase System, Physical Properties of Soil and its determination	Day-9	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105/105105168/6">https://nptel.ac.in/courses/105/105/105105168/6</a>	Soil Analysis	Student will be able to understand and memorize phase system of soil.
10	10	2.02	Index Properties of Soil and its determination	Day-10	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105/105105168/#3">https://nptel.ac.in/courses/105/105/105105168/#3</a>	Soil Testing	Student will be able to identify and calculate Index properties of soil.



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11	11	2.03	Consistency of Soil, Atterberg's Limits, Soil Classification System,	Day-11	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#3">https://nptel.ac.in/courses/105/105105168/#3</a>	Soil Classification	Student will be able to determine consistency limits of the soil.
12	12	2.04	Permeability: Darcy's Law, Determination of Coefficients of Permeability by Laboratory and Field Methods,	Day-12	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#8">https://nptel.ac.in/courses/105/105105168/#8</a>	Permeability Testing	Student will be able to understand and evaluate the permeability of soil.
13	13	2.05	One Dimensional Flow, Seepage through Soils, Flow Nets, Piping.	Day-13	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#9">https://nptel.ac.in/courses/105/105105168/#9</a>	Seepage Analysis	Student will be able to understand the seepage through soils and flow nets.



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14	14	2.06	Shear Strength: Introduction, Mohr Coulomb's Theory	Day-14	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#27">https://nptel.ac.in/courses/105/105105168/#27</a>	Strength Analysis	Student will be able to understand the shear strength theory of soil.
15	15	2.07	Measurement of Shear Strength by Direct Shear Test, Triaxial Test,	Day-15	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#28">https://nptel.ac.in/courses/105/105105168/#28</a>	Shear Testing	Student will be able to calculate shear strength parameters and apply the concept in engineering.
16	16	2.08	Unconfined Compression Test, Vane Shear Test, and Sensitivity.	Day-16	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#29">https://nptel.ac.in/courses/105/105105168/#29</a>	Strength Testing	Student will be able to understand and apply the knowledge of UCS of cohesive soil.

**Unit III Compaction and Consolidation**

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17	17	3.01	Compaction: Theory of Compaction, Factors Influencing Compaction	Day-17	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#14">https://nptel.ac.in/courses/105/105105168/#14</a>	Compaction Optimization	Student will be able to analyze Compaction, Factors Influencing Compaction.
18	18	3.02	Compacted Density, Laboratory Standard and Modified Compaction Test,	Day-18	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#14">https://nptel.ac.in/courses/105/105105168/#14</a>	Density Testing	Student will be able to calculate compaction parameters of the soil.
19	19	3.03	Method and Measurement of Field Compaction	Day-19	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#15">https://nptel.ac.in/courses/105/105105168/#15</a>	Field Compaction	Student will be able to measure the field compaction parameters.
20	20	3.04	Field Compaction Control, Compressibility.	Day-20	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#15">https://nptel.ac.in/courses/105/105105168/#15</a>	Compaction Monitoring	Student will be able to apply the knowledge of compaction theories in field.



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21	21	3.05	Consolidation: Terzaghi's Theory of One Dimensional Consolidation,	Day-21	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#37">https://nptel.ac.in/courses/105/105105168/#37</a>	Consolidation Analysis	Student will be able to understand the consolidation theory.
22	22	3.06	Consolidation Test, Primary and Secondary Consolidation	Day-22	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#38">https://nptel.ac.in/courses/105/105105168/#38</a>	Consolidation Testing	Student will be able to understand the consolidation theory.
23	23	3.07	Determination of Coefficient of Consolidation, Degree of Consolidation,	Day-23	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#39">https://nptel.ac.in/courses/105/105105168/#39</a>	Consolidation Analysis	Student will be able to calculate the consolidation parameters.
24	24	3.08	Relevance of One Dimensional Consolidation to Field Condition, Time Factor.	Day-24	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#40">https://nptel.ac.in/courses/105/105105168/#40</a>	Field Analysis	Student will be able to calculate the consolidation parameters.

**Unit IV Stress Distribution and Earth Pressure Theories**



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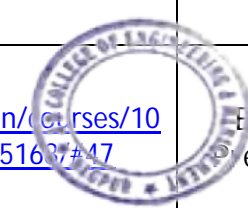
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25	25	4.01	Stress Distribution: Stress Distribution in Soil Mass,	Day-25	T1	R2	<a href="https://nptel.ac.in/courses/105/105105168/#19">https://nptel.ac.in/courses/105/105105168/#19</a>	Soil Stress	Student will be able to understand the stress distribution system.
26	26	4.02	Boussinesque Equation	Day-26	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#22">https://nptel.ac.in/courses/105/105105168/#22</a>	Stress Analysis	Student will be able to understand the Boussinesque Equation.
27	27	4.03	Westergaard's Theories.	Day-27	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#23">https://nptel.ac.in/courses/105/105105168/#23</a>	Stress Theory	Student will be able to understand Westergaard's Theories.
28	28	4.04	Rankine Earth Pressure Theories	Day-28	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#47">https://nptel.ac.in/courses/105/105105168/#47</a>	Earth Pressure	Student will be able to understand Rankine Earth Pressure Theories

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29	29	4.05	Coulomb Earth Pressure Theories	Day-29	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#48">https://nptel.ac.in/courses/105/105105168/#48</a>	Pressure Analysis	Student will be able to understand Coulomb Earth Pressure Theories.
30	30	4.06	Stability of Slopes - Finite Slopes,	Day-30	T1	R2	<a href="https://nptel.ac.in/courses/105/105105168/#55">https://nptel.ac.in/courses/105/105105168/#55</a>	Slope Stability	Student will be able to know Stability of Slopes.
31	31	4.07	Stability of Slopes - Infinite Slopes,	Day-31	T1	R2	<a href="https://nptel.ac.in/courses/105/105105168/#56">https://nptel.ac.in/courses/105/105105168/#56</a>	Slope Analysis	Student will be able to know Stability of Slopes.
32	32	4.08	Pressure Bulbs.	Day-32	T1, T2	R2	<a href="https://nptel.ac.in/courses/105/105105168/#57">https://nptel.ac.in/courses/105/105105168/#57</a>	Pressure Distribution	Student will be able to understand pressure bulbs.

**Unit V Sub-Surface Investigations and Foundation Engineering**

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33	33	5.01	Sub-Surface Investigations - Scope, Drilling Bore Holes, Sampling	Day-33	T1	R2	<a href="https://nptel.ac.in/courses/105/105105176/4">https://nptel.ac.in/courses/105/105105176/4</a>	Geotechnical Exploration	Student will be able to understand the concept of subsurface investigations and its applications.
34	34	5.02	Plate Load Test, Standard Penetration and Cone Penetration Tests	Day-34	T1	R2	<a href="https://nptel.ac.in/courses/105/105105176/6">https://nptel.ac.in/courses/105/105105176/6</a>	Field Testing	Student will be able to calculate the bearing capacity of soil by different field test.
35	35	5.03	Shallow foundations - Terzaghi's and Meyerhoff's Bearing Capacity Theories,	Day-35	T1, T3	R2	<a href="https://nptel.ac.in/courses/105/105105176/11">https://nptel.ac.in/courses/105/105105176/11</a>	Foundation Design	Student will be able to calculate bearing capacity parameters.



  
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36	36	5.04	Effect of Water Table, Contact Pressure	Day-36	T1	R2	<a href="https://nptel.ac.in/courses/105/105105176/12">https://nptel.ac.in/courses/105/105105176/12</a>	Water Influence	Student will be able to understand the effect of water table on foundation.
37	37	5.05	Settlement Analysis in Sands and Clays	Day-37	T1	R2	<a href="https://nptel.ac.in/courses/105/105105176/13">https://nptel.ac.in/courses/105/105105176/13</a>	Settlement Prediction	Student will be able to understand the settlement behavior of soil under application of load.
38	38	5.06	Deep foundations - Types of Piles	Day-38	T1, T3	R2	<a href="https://nptel.ac.in/courses/105/105105176/28">https://nptel.ac.in/courses/105/105105176/28</a>	Pile Engineering	Student will be able to understand the application of deep foundations.
39	39	5.07	Dynamic and Static Formulae, Load Capacity of Piles in Sands and Clays	Day-39	T1, T3	R2	<a href="https://nptel.ac.in/courses/105/105105176/29">https://nptel.ac.in/courses/105/105105176/29</a>	Pile Load	Student will be able to calculate the pile load capacity.



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40	40	5.08	Pile Load Test, Negative Skin Friction	Day-40	T1, T3	R2	<a href="https://nptel.ac.in/courses/105/105105176/30">https://nptel.ac.in/courses/105/105105176/30</a>	Load Testing	Student will able to calculate pile load capacity.
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\*T=Text Book; R= Reference Book; C= Company name; R= Research Paper

Total number of lectures as per syllabus: - 36

Total number of lectures as per planned: - 36

  
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**Tutorial Plan**

Week	Topic	No. Of Problems	Mapped With CO
1	Numerical based on Dip, strike and soil consistency.	03	I
2	Numericals based on permeability and shear strength.	02	II,III
3	Numerical based on compaction.	02	IV/V
4	Numerical based on consolidation.	03	V/III
5	Numerical based on stress distribution.	02	V/III
6	Numerical based on subsurface investigation and type of foundation.	04	V/IV

**Assignment Plan**

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Unit I	15/7/21	22/7/21	I



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2	Unit II,II & IV	16/8/21	17/8/21	II,III, IV
<b>Content Beyond Syllabus Topic – Planned</b>				
Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP	
1	Impact of industrial waste on soil mass		I, II, III, IV, V, VI	
2	Use of virtual lab		I & II	

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

**Text Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Soil Mechanics and Foundation Engineering	K.R. Arora	Standard publication	2009 <b>Principal</b>
T2	Soil Mechanics and Foundation Engineering	V. N. S. Murthy	CPS Press	2002 JD College of Engineering & Management Khandala, Katol Road Nagpur-441501
T3	Foundation Engineering	B.J. Kasamalkar	Pittsburg	Vintage Grand Prix
T4	Principals of Engineering Geology	K.M. Bangar		







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**Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	Soil Mechanics and Foundation Engineering	B. C. Punmia	Laxmi publication	
R2	Foundation Engineering	S.P. Brahma	Tata McGraw-Hill 5th Edition	
R3	Engineering Geology	Subinoy Gangopadhyay	Oxford University Press	Pap/Psc (18 de marzo de 2013)

**Company/Industry:**

Code	Company/Industry Name	Website	Detailed Information
C1	Ground engineering ltd	<a href="http://ground.in/">http://ground.in/</a>	Provide Complete Services In Foundation Engineering Including Land Surveying, Geotechnical Investigations And Pile Foundations All Over India.
C2	BPC India (P) Ltd.	<a href="https://www.bpci.pl.com/geotechnical-engineering-service.html">https://www.bpci.pl.com/geotechnical-engineering-service.html</a>	Perform for following factors: Index properties of soil, consistency limit of soil from short profile, triaxial compression test, direct shear test, permeability test, consolidation test.
C3	Cengrs	<a href="https://www.cengrs.com/">https://www.cengrs.com/</a>	Cengrs Is A Premier Organization specializing In Soil And Foundation Engineering Service.

**Research Paper:**



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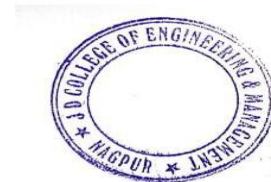
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- ❖ Making sustainable efforts for integrating academics with industry.

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	D.W.Taylor And The Foundations Of Modern Soil Mechanics	John T. Christian And Gregory B. Baecher	Journals of geotechnical and geo-environmental Engineering	10.1061/(ASCE)GT.1943-5606.0001249	ISSN:2755-4319/Vol.(3) (pp 51-58)(2015)
P2	A study on lateral earth pressure against strutted retaining wall in cohesion less soil deposit	Shubha Sankar Choudhary	International journals of geotechnical engineering	10.1080/19386362.2017.1326683	ISSN:2354-1947 (Online)Volume 4, Issue 4,May2017
P3	Influence of combined stabilization on the structural properties of subgrade soil	Saad I.Sarsam,Aamal A. Ai.Saidi,Afaq H.Al Taie	Journal of geotechnical engineering	10.37591/joge.v4i1.3735	Issn:2394-1987 (Online) Volume 4, Issue 1

**Subject Teacher**

**Academic In/charge**

**HOD, (CE)**



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Department of Civil Engineering  
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Session 2021-22



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To be a well known center for shaping professional leaders of Global Standards in Civil Engineering


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

### Teaching Plan

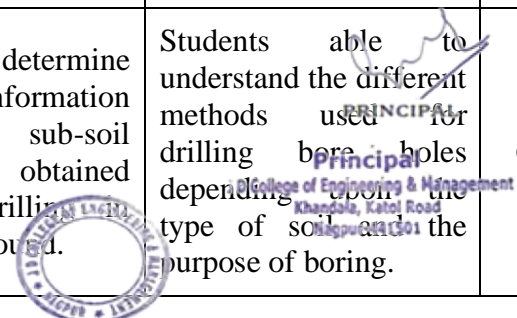
<b>Course</b> : Civil Engineering	<b>Year/Semester</b> : VI Semester	
<b>Name of the Teacher</b> : Ms.Tinu M.Khandale	<b>Subject Code</b> : BTCVC602	
<b>Subject</b> : Foundation Engineering	<b>Section</b> :	
<b>Periods per Week</b> : (each 60 m in)	<b>Lecture</b>	2
	<b>Tutorial</b>	1
	<b>Practical</b>	

Course Objective	Course Outcomes
1. To predict soil behavior under the application of loads and come up with appropriate solutions to foundation design queries. 2. Analyze the stability of slope by theoretical and graphical methods. 3. Analyze the results of in-situ tests and transform measurements and associated uncertainties into relevant design parameters. 4. Synthesize the concepts of allowable stress design, appropriate factors of safety, margin of safety, and reliability	1. State the various soil properties & its behavior under application of loads. 2. Explain the concept of performance of foundation failure modes, various design parameters and stability of slopes for various type of soil. 3. Apply the knowledge of foundation engineering for designing various types of foundation as per relevant IS codes. 4. Compare the different types of foundations design with respect to the soil stability conditions. 5. Justify the recommended foundation. 6. Develop new techniques and material to improve the soil bearing capacity and stability.



  
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S N	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	CO mapping
<b>Unit I Introduction Soil Exploration</b>										
1	1	1.01	Introduction, General requirements to be satisfied for satisfactory performance of foundations, exploration Soil Necessity	Day 1	415 (Dr. K.R.ARORA)	201 (MANOJ DATTA)	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	To investigate the safety of the existing Structures.	Students able to understand the selection of type and depth of foundation for a given structure.	CO1
			Soil exploration Planning.		416	202				
2	2	1.02	Exploration Methods.	Day 2	433	205	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	To determine the index and Engineering properties of soil.	Students able to understand the properties of the soils in natural state.	CO1
3	3	1.03	Soil Sampling - Disturbed and undisturbed.	Day 3	423	215	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	To determine engineering properties of the soil during subsurface exploration.	Students able to understand the Behavior of soil- when a soil is extracted from the ground, it causes change in stresses and disturbance.	CO1
4	4	1.04	Rock Drilling.	Day 4	420	207	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	To determine the information about sub-soil strata obtained by drilling the ground.	Students able to understand the different methods used for drilling bore holes depending upon the type of soil and the purpose of boring.	CO1



5	5	1.05	Core Barrels, Core Boxes, Core Recovery	Day 5	422	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	This method is used for advancing holes and for obtaining rock cores.	Students able to understand the basic components of a core drilling.	CO1
6	6	1.06	Field Tests for Bearing Capacity evaluation, Test Procedure & Limitations.	Day 6	427	220	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	This method is used to determine the soil bearing capacity for to design of a stable foundation.	Students able to understand the load carrying capacity and extent to which a soil undergoes settlement.	CO1
<b>Unit II Bearing Capacity Analysis</b>										
1	7	2.01	Failure Modes	Day 7	596	289	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	To Examine the performance of foundation in a failure modes.	Students able to understand the various design parameters and stability of slopes for various type of soil	CO2
			Terzaghi's Analysis, Specialization of Terzaghi's Equations.		593	296				
2	8	2.02	Skempton Values for Nc	Day 8	607	305	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	To determine the failure mechanisms for shallow and deep foundation.	Students able to understand the Meyerhof's equation for ultimate bearing capacity and the bearing capacity factors (Skempton Values) for Nc	CO2
			Meyerhof's Analysis.		602	306				
3	9	2.03	I.S. Code Method of Bearing Capacity Evaluation	Day 9	608	306	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Analyze the stability of slope by theoretical graphical methods.	Students able to understand the IS Code method for computing capacity of soil.	CO2


4	10	2.04	Effect of Water Table.	Day 10	600	382	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	To determine the effect of water table on bearing capacity of soil.	Students able to understand, Due to change of water table, the bearing capacity of soil goes on changing due to change in the density of soil.	CO2
5	11	2.05	Eccentricity of load.	Day 11	611	371	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	To determine the bearing capacity factors for eccentrically loaded footing.	Students able to understand behavior of soil due to Eccentricity of load	CO2
6	12	2.06	Safe Bearing Capacity, Allowable Bearing Pressure	Day 12	618	381	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	In order to keep structure safe, safe bearing capacity & Allowable Bearing Pressure of a soil is calculated on the field at different points and the selection of footing is done accordingly.	Students able to understand that the sizing of foundation and foundation type is determine based on the structure type, capacity and type of founding soil. It is hence necessary that the Safe Bearing Capacity, Allowable Bearing Pressure is estimated in every footing design to ensure safety.	CO2
7	13	2.07	Settlement Analysis- Immediate Settlement, Consolidation Sett, Differential Sett, Tolerable Sett, Angular distortion	Day 13	621	387	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	To determine the probable maximum and Differential Settlement in a soil.	Students able to understand to determine maximum and Differential Settlement in a soil.	CO2



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## Unit III Foundations for Difficult Soils

1	14	3.01	Guidelines for Weak and Compressible Soils	Day 14	875	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Soil Stability Analysis	Soil Compression Understanding	CO3
			Expansive soil, Parameters of Expansive Soils, Collapsible Soils and Corrosive Soils		876	---		Soil Engineering Solutions	Soil Property Understanding	CO3
2	15	3.02	Causes of Moisture changes in Soils, Effects of Swelling on Buildings, Preventative Measures for Expansive Soils	Day 15	879	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Building Stability Solutions	Moisture Impact Understanding	CO3
3	16	3.03	Modification of Expansive Soils, Design of Foundation on Swelling Soils	Day 16	881	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Soil Stabilization Techniques	Foundation Design Improvement	CO3
4	17	3.04	Ground Improvement Methods: for general considerations	Day 17	871	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Ground Strengthening Techniques	Improvement Methods Understanding	CO3
5	18	3.05	Ground Improvement Methods for Cohesive Soils, for Cohesionless Soils	Day 18	865	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Soil Strength Enhancement	Soil Improvement Techniques Understanding	CO3

  
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## Unit IV Shallow Foundations

1	19	4.01	Assumptions & Limitations of Rigid Design Analysis.	Day 19	640	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Structural Design Assessment	Analysis Assumptions Awareness	CO4
			Safe Bearing Pressure		618	---				
			Settlement of Footings		612	---				
2	20	4.02	Design of Isolated, Combined Footing	Day 20	645	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Foundation Design Solutions	Footing Design Understanding	CO4
3	21	4.03	Design of Strap Footing (Rigid analysis)	Day 21	648	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Structural Foundation Solutions	Strap Footing Design Understanding	CO4
4	22	4.04	Design of Raft Foundation (Elastic Analysis),	Day 22	653	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Structural Foundation Solutions	Raft Foundation Design Understanding	CO4
5	23	4.05	I. S. Code of Practice for Design of Raft Foundation	Day 23	716 (Dr. B.C.Punmia)	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Foundation Design Standards	Code Compliance Understanding	CO4

## Unit V Deep foundations

1	24	5.1.01	Pile Foundation: Classification	Day 24	672	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Foundation Support Solutions	Pile Classification Understanding	CO4
			Pile Driving		674	---				
			Load Carrying Capacity of Piles, Single Pile		677	---				

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			Capacity.							
			Dynamic Formulae		685	---				
			Static Formulae		730 (Dr. B.C.Punmia)	---				
2	25	5.1.02	Pile Load Tests	Day 25	688	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Foundation Design Enhancement	Negative Skin Friction Understanding	CO4
			Penetration Tests,		690	---				
			Negative skin Friction		684	---				
3	26	5.1.03	Under Reamed Piles	Day 26	750 (Dr. B.C.Punmia)	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Deep Foundation Solutions	Underreamed Pile Understanding	CO4
			Group Action of Piles		690	---				
4	27	5.2.01	<b>Caissons Foundations:</b> Box Caissons	Day 27	777 (Dr. B.C.Punmia)	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Well Construction Challenges	Practical Solutions Understanding	CO4
			Open Caissons		710	---				
			Pneumatic Caissons		714	---				
			Forces Grip Length		723	---				
			Well Sinking Practical Difficulties And Remedial Measures		742	---				
5	28	5.3.01	<b>Sheet Piles:</b> Classification, Design of Cantilever Sheet Pile in Cohesionless and Cohesive soil	Day 28	---	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Earth Retention Solutions	Sheet Pile Design Understanding	CO4
6	29	5.3.02	Design of Anchored Sheet Pile by Free Earth Support Method	Day 29	---	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Structural Retaining Systems	Anchored Sheet Pile Design	CO4
7	30	5.3.03	Cellular Cofferdams: Types, Cell Fill Stability Considerations	Day 30	---	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Waterfront Infrastructure Solutions	Cofferdam Design Understanding	CO4

### Unit VI Slope Stability

1	31	6.01	Different Definitions of Factors of Safety	Day 31	441	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Analyze the stability of slope by theoretical and graphical methods	Explain the concept of performance of foundation failure modes, various design parameters and stability of slope for various type of	CO2
			Types of Slope Failures		442	---				
			Stability of an Infinite Slope of Cohesionless Soils		444	327				
2	32	6.02	Stability Analysis of an Infinite Slope of Cohesive Soil	Day 32	446	327	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Analyze the stability of	Explain the concept of performance of	CO2

							185/	slope by theoretical and graphical methods	foundation failure modes, various design parameters and stability of slopes for various type of soil	
3	33	6.03	Stability of Finite Slopes Slip Circle Method	Day 33	455	336	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Analyze the stability of slope by theoretical and graphical methods	Explain the concept of performance of foundation failure modes, various design parameters and stability of slopes for various type of soil	CO2
4	34	6.04	Semi Graphical and Graphical Methods	Day 34	448	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Analyze the stability of slope by theoretical and graphical methods	Explain the concept of performance of foundation failure modes, various design parameters and stability of slopes for various type of soil	CO2
5	35	6.05	Friction Circle Method	Day 35	450	---	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Analyze the stability of slope by theoretical and graphical methods	Explain the concept of performance of foundation failure modes, various design parameters and stability of slopes for various type of soil	CO2
6	36	6.06	Stability Number: Concept and its use	Day 36	453	333	<a href="https://nptel.ac.in/courses/105/105/105105185/">https://nptel.ac.in/courses/105/105/105105185/</a>	Analyze the stability of slope by theoretical and graphical methods	Explain the concept of performance of foundation failure modes, various design parameters and stability of slopes for various type of soil	CO2

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

Total number of lectures as per syllabus: - 36

Total number of lectures as per planned: - 36

Tutorial Plan			
Week	Topic	No. Of Problems	Mapped With
1	Define and discuss the behavior of different soil properties when subjected to loads.	01	CO1



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2	Explain the failure modes in foundation performance and discuss the stability analysis of slopes in various soil types.	01	CO2
3	Utilizing relevant IS codes, design different types of foundations based on foundation engineering principles.	01	CO3
4	Compare and contrast various types of foundation designs concerning soil stability conditions.	01	CO4
5	Justify the selection of a particular foundation design based on soil characteristics and project requirements.	01	CO5
6	Propose innovative techniques and materials to enhance soil bearing capacity and stability in foundation engineering.	01	CO6

#### Assignment Plan

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO

#### Content Beyond Syllabus Topic – Planned

Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP
1	Analyze the significance of soil exploration and sampling methods in foundation engineering.		CO1, CO3
2	Evaluate the bearing capacity analysis methods, including Terzaghi's and Meyerhof's analysis, in foundation design		CO2, CO4
3	Discuss the influence of water table variations on foundation performance and bearing capacity.		CO2, CO5
4	Examine the design considerations and challenges for foundations in difficult soils, such as expansive and collapsible soils.		CO2, CO4
5	Investigate the application of ground improvement methods in cohesive and cohesionless soils for foundation enhancement.		CO6
6	Critically analyze the design principles and limitations of shallow foundations, including isolated and combined footings.		CO3, CO4

  
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**Text Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
BTCVC602	“ Soil Mechanics and Foundation Engineering”	Arora K.R.	Standard publication	2009
BTCVC602	“ Soil Mechanics And Foundation Engineering”	Punmia B. C.	Laxmi publication	16th 2017
BTCVC602	“ Soil Mechanics and Foundation Engineering” CRC Press 2002	Murthy V.N.S.	CRC Press 2002	2002

**Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
BTCVC602	“ Foundation Design”	Teng W.C	Prentice-Hall Inc	---
BTCVC602	“ Foundation Design & Construction”	Tomlinson M.J.,	Prentice-Hall	7th edition
BTCVC602	“ Sheet Piles”	Lee	Concrete Publication	1961
BTCVC602	IS 6403:1981, IS 1904:1986, IS 4091:1979			

**Company/Industry:**

Code	Company/Industry Name	Website	Detailed Information
BTCVC602	<a href="#">Pemac Projects Pvt. Ltd.</a>	<a href="https://www.indiamart.com/pemacprojectspvtltd/construction-and-foundation-service.html">https://www.indiamart.com/pemacprojectspvtltd/construction-and-foundation-service.html</a>	The <b>Silo Civil Structural Foundation</b> will be designed in a way that loads will be transferred uniformly to the contact surface. It should be designed to transmit the sum of dead load, live load and wind load to the ground. The net loading capacity coming into the soil should not exceed the bearing capacity of the soil. Differential settlements expected from the tower will be designed in such a way that they will be controlled and uniform for the complete structure to avoid damages/failure. The whole design of the foundation, superstructure, and characteristics of the ground should be studied to obtain benefits during construction work.
BTCVC602	Hitech Drilling Engineers	<a href="https://www.indiamart.com/proddetail/drilling-pile-foundation-12892768673.html">https://www.indiamart.com/proddetail/drilling-pile-foundation-12892768673.html</a>	Hitech drilling engineers have great pleasure in introducing ourselves as civil Engineers & contractors. Provide a wide range of piling services like a bored piling, foundation piling, concrete piling, precast piling, DMC pile, rotary pile and micro piling.
BTCVC602	<b>KB Structural Consultants</b>	<a href="https://www.indiamart.com/kb-structure-consultant/">https://www.indiamart.com/kb-structure-consultant/</a>	<b>KB Structural Consultants"</b> are a renowned organization engaging a wide array of Structure Designing Service Consultancy Services, Structural Steel Erection Service, etc



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BTCVC602	Sastha Soil Testing Services	<a href="https://www.indiamart.com/sastha-soiltesting/">https://www.indiamart.com/sastha-soiltesting/</a>	<b>Sastha Soil Testing Services</b> , are one of the trusted business organizations engaged in rendering <b>Construction and Soil Testing</b> related services.
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**Research Paper:**

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
BTCVC602	Foundation Engineering: Principles and Practices	John Smith	International Journal of Civil Engineering	10.1016/j.ijrmm s.2023.107716	Volume 45, Pages 78-89.
BTCVC602	Innovative Techniques for Soil Improvement in Foundation Engineering	Emily Johnson	Geotechnical Engineering Journal	10.5678/gej.202 4.12345	Volume 15, Issue 2, Pages 45-58



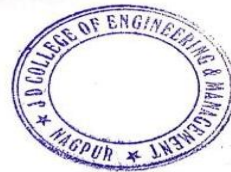
Subject Teacher



Academic In/charge



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Department of Computer Science & Engineering  
"A Place to Learn, A Chance to Grow"  
Session: 2021-22



VISION	MISSION
To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	<ol style="list-style-type: none"> <li>To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities.</li> <li>To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program.</li> <li>To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.</li> </ol>

## Teaching Plan

Semester/ Branch : - IV Sem/ CSE

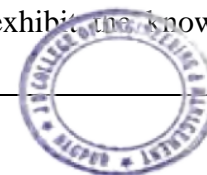
Subject code:- CS4T005

Subject Name : -Database Management System

In-charge: Prof. Anuja Ghasad

<b>Course</b> : B. Tech in Computer Science & Engineering	<b>Year/Semester:</b> 4 <sup>th</sup> Sem	
<b>Name of the Teacher</b> : Prof. Anuja Ghasad	<b>Subject Code:</b> CS4T005	
<b>Subject</b> : Database Management System	<b>Section</b> : CSE	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	-3
	<b>Tutorial</b>	-
	<b>Practical</b>	-

Course Objective	Course Outcomes
<ol style="list-style-type: none"> <li>To Eliminate redundant data.</li> <li>To Make access to the data easy for the user.</li> <li>To Provide for mass storage of relevant data.</li> <li>To Make the latest modifications to the data base available immediately.</li> <li>To Protect data from physical harm and un-authorized systems.</li> <li>To Allow multiple users to be active at one time.</li> </ol>	<ol style="list-style-type: none"> <li>Student shall be able to learn and understand fundamentals of database management system</li> <li>Student shall be able to exhibit the query development knowledge</li> <li>Student shall be able to learn modeling and normalization of databases.</li> <li>Student shall be able to learn query processing and optimization techniques.</li> <li>Students shall be able to exhibit to File Organization, Indexing, and Hashing</li> <li>Student shall be able to exhibit the knowledge of transaction concurrency control.</li> </ol>



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Website: [www.jdcoem.ac.in](http://www.jdcoem.ac.in) E-mail: [info@jdcoem.ac.in](mailto:info@jdcoem.ac.in)  
(An Autonomous Institute, with NAAC "A" Grade)  
Department of Computer Science & Engineering  
"A Place to Learn, A Chance to Grow"  
Session: 2021-22



VISION	MISSION
To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	<ol style="list-style-type: none"> <li>To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities.</li> <li>To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program.</li> <li>To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.</li> </ol>

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
<b>Unit I: Introduction to Database Systems</b>								
1	1	1	Significance and advantages, Types of Databases	Day 1	T1 (Pg. 4 to 5)	<a href="https://www.youtube.com/watch?v=vf5HAEQwD5g&amp;list=PLKml-gUJew0mPDIHMuuT06TuFfRF1WFBt">https://www.youtube.com/watch?v=vf5HAEQwD5g&amp;list=PLKml-gUJew0mPDIHMuuT06TuFfRF1WFBt</a>	P1-P9	Will be able to understand what are the significance and advantages of databases and types of database.
2	2	2	Limitations of File processing system, the DBMS Environment	Day 2	T1 (Pg. 6 to 8)	<a href="https://www.youtube.com/watch?v=rrG7azSlyWI&amp;list=PLIwC9bZ0rmjSkmlVRJROX4vP2YMI4Ebh&amp;index=4">https://www.youtube.com/watch?v=rrG7azSlyWI&amp;list=PLIwC9bZ0rmjSkmlVRJROX4vP2YMI4Ebh&amp;index=4</a>	P1-P9	Will be able to understand Limitations of File processing system, the DBMS Environment
3	3	3	Data Abstraction, Data Independence	Day 3	T2 (Pg. 45 to 48)	<a href="https://www.youtube.com/watch?v=2ie8fvgIsOU">https://www.youtube.com/watch?v=2ie8fvgIsOU</a>	P1-P9	Will be able to understand Data Abstraction, Data Independence
4	4	4	Data Definition Language (DDL), Data Manipulation Language (DML).	Day 4	T1 (Pg. 12 to 25)	<a href="https://www.youtube.com/watch?v=k6HKfdfAyuU">https://www.youtube.com/watch?v=k6HKfdfAyuU</a> <a href="https://www.youtube.com/watch?v=6CzfqZU2k0c">https://www.youtube.com/watch?v=6CzfqZU2k0c</a>	P1-P9	Will be able to understand what is DDL and DML
5	5	5	Evolution of Data Models, Entity-relationship model	Day 5	T2 (Pg. 35 to 45)	<a href="https://www.youtube.com/watch?v=tZOiC9KvsRs">https://www.youtube.com/watch?v=tZOiC9KvsRs</a>	P1-P9	Will be able to understand what is evolution of data model and entity relationship data
6	6	6	Relational integrity constraints, data manipulation operations.	Day 6	T1 (Pg. 68 to 75)	<a href="https://www.youtube.com/watch?v=uP0GPL2C0_8">https://www.youtube.com/watch?v=uP0GPL2C0_8</a>	P1-P9	Will be able to understand what is Relational Integrity constraints, data manipulation operations.



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**Unit II: Relational query languages**

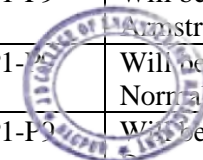
7	7	7	Relational algebra, Tuple and domain relational calculus	Day 7	R1 (Pg : 3 to 20)	<a href="https://www.youtube.com/watch?v=W2_Xp3V7tCg&amp;list=PLwZJjHGjgrZqJ9yQZ-WJb5gBJcKMr9iXP&amp;index=4">https://www.youtube.com/watch?v=W2_Xp3V7tCg&amp;list=PLwZJjHGjgrZqJ9yQZ-WJb5gBJcKMr9iXP&amp;index=4</a>	P1-P9	Will be able to understand what is Relational algebra, Tuple and domain relational calculus
8	8	8	SQL3, DDL constructs	Day 8	T2 (Pg. 45 to55)	<a href="https://www.youtube.com/watch?v=PcMr6xoundk">https://www.youtube.com/watch?v=PcMr6xoundk</a>	P1-P9	Will be able to understand what is SQL3, DDL constraints.
9	9	9	DML constructs	Day 9	T1 (Pg. 33 to40)	<a href="https://www.geeksforgeeks.org/sql-ddl-dql-dml-dcl-tcl-commands/">https://www.geeksforgeeks.org/sql-ddl-dql-dml-dcl-tcl-commands/</a>	P1-P9	Will be able to understand what is DML constructs.
10	10	10	Open source and Commercial DBMS- MYSQL	Day 10	R1 (Pg:26 to 35)	<a href="https://www.youtube.com/watch?v=p3eiiPVHGTE">https://www.youtube.com/watch?v=p3eiiPVHGTE</a>	P1-P9	Will be able to understand what is evaluation of conditions.
11	11	11	ORACLE	Day 11	R1 (Pg : 37to57)	<a href="https://docs.oracle.com/cd/E11882_01/server.112/e40540/intro.htm#CNCPT001">https://docs.oracle.com/cd/E11882_01/server.112/e40540/intro.htm#CNCPT001</a>	P1-P9	Will Be able to understand what is consequent branching Iteration and loops.
12	12	12	DB2, SQL server	Day 12	T2 (Pg.105 to 120)	<a href="https://www.ibm.com/docs/en/db2-for-zos/11?topic=db2-sql">https://www.ibm.com/docs/en/db2-for-zos/11?topic=db2-sql</a>	P1-P9	Will be able to understand what are DB2, SQL server.

**Unit III: Relational database design**

13	13	13	Normalization of Database Tables: Need and Significance	Day 13	R1 (Pg : 22 – 23)	<a href="https://www.youtube.com/watch?v=ABwD8IYByfk">https://www.youtube.com/watch?v=ABwD8IYByfk</a>	P1-P9	Will be able to understand what are Normalization of Database Tables
14	14	14	Domain and data dependency	Day 14	T1 (Pg.108 to 112)	<a href="https://www.youtube.com/watch?v=HCLPUTFPcnk">https://www.youtube.com/watch?v=HCLPUTFPcnk</a>	P1-P9	Will be able to understand what is Domain and data dependency
15	15	15	Armstrong's axioms	Day 15	T2 (Pg : 62 –67 )	<a href="https://www.youtube.com/watch?v=eIH7zRVelnw">https://www.youtube.com/watch?v=eIH7zRVelnw</a>	P1-P9	Will be able to understand what are Armstrong's axioms
16	16	16	Normal Forms	Day 16	T2 (Pg. 78 to 95)	<a href="https://www.youtube.com/watch?v=EGEwkad_1IA">https://www.youtube.com/watch?v=EGEwkad_1IA</a>	P1-P9	Will be able to understand what is Normal Forms
17	17	17	Dependency preservation	Day 17	T3 (Pg. 56 to 66)	<a href="https://www.youtube.com/watch?v=0oeap0QDs1Y">https://www.youtube.com/watch?v=0oeap0QDs1Y</a>	P1-P9	Will be able to understand what is Dependency preservation.

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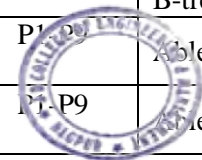


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18	18	18	Lossless design	Day 18	R1 (Pg.256 to 268)	<a href="https://www.youtube.com/watch?v=SaBwov_e2-M">https://www.youtube.com/watch?v=SaBwov_e2-M</a>	P1-P9	Will be able to understand what Dependency preservation.
<b>Unit IV: Query Processing</b>								
19	19	19	Evaluation of relational algebra expressions	Day 19	R1 (Pg : 112 –113)	<a href="https://www.youtube.com/watch?v=4YiEjknPrQ">https://www.youtube.com/watch?v=4YiEjknPrQ</a>	P1-P9	Will be able to understand what is Evaluation of relational algebra expressions
20	20	20	Query equivalence	Day 20	R1 (Pg :114 –123)	<a href="https://www.youtube.com/watch?v=oSXEQXXsIfw">https://www.youtube.com/watch?v=oSXEQXXsIfw</a>	P1-P9	Will be able to understand what is Query equivalence.
21	21	21	Query equivalence	Day 21	R1 (Pg :114 –123)	<a href="https://www.youtube.com/watch?v=oSXEQXXsIfw">https://www.youtube.com/watch?v=oSXEQXXsIfw</a>	P1-P9	Will be able to understand what is Query equivalence.
22	22	22	Join strategies	Day 22	R1 (Pg :145 –154 )	<a href="https://www.youtube.com/watch?v=rT4eL3p3tVk">https://www.youtube.com/watch?v=rT4eL3p3tVk</a>	P1-P9	Will be able to understand what is Join strategies.
23	23	23	Join strategies	Day 23	R1 (Pg :145 –154 )	<a href="https://www.youtube.com/watch?v=rT4eL3p3tVk">https://www.youtube.com/watch?v=rT4eL3p3tVk</a>	P1-P9	Will be able to understand what is Join strategies.
24	24	24	Join strategies	Day 24	R1 (Pg :145 –154 )	<a href="https://www.youtube.com/watch?v=rT4eL3p3tVk">https://www.youtube.com/watch?v=rT4eL3p3tVk</a>	P1-P9	Will be able to understand what is Join strategies.
<b>Unit V: File Organization and Indexing</b>								
25	25	25	File Organization and Indexing	Day 25	R1 (Pg :222 –225)	<a href="https://www.youtube.com/watch?v=E--yzX05_k8">https://www.youtube.com/watch?v=E--yzX05_k8</a>	P1-P9	Will be able to understand what is File Organization and Indexing.
26	26	26	Indices	Day 26	T1 (Pg : 269–273 )	<a href="https://www.youtube.com/watch?v=E--yzX05_k8">https://www.youtube.com/watch?v=E--yzX05_k8</a>	P1-P9	Will be able to understand what is Indices.
27	27	27	Indices	Day 27	T1 (Pg : 269–273 )	<a href="https://www.youtube.com/watch?v=E--yzX05_k8">https://www.youtube.com/watch?v=E--yzX05_k8</a>	P1-P9	Will be able to understand what is Indices.
28	28	28	B-trees	Day 28	T2 (Pg : 269 –271 )	<a href="https://www.youtube.com/watch?v=KcApkM5WYGw">https://www.youtube.com/watch?v=KcApkM5WYGw</a>	P1-P9	Will be able to understand what is B-trees.
29	29	29	Hashing	Day 29	R1 (Pg : 271 –273)	<a href="https://www.youtube.com/watch?v=W5q0xgxmRd8">https://www.youtube.com/watch?v=W5q0xgxmRd8</a>	P1-P9	Will be able to understand what is hashing.
30	30	30	Hashing	Day 30	R1 (Pg : 274 –286)	<a href="https://www.youtube.com/watch?v=W5q0xgxmRd8">https://www.youtube.com/watch?v=W5q0xgxmRd8</a>	P1-P9	Will be able to understand what is hashing.

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**Unit VI: Transaction processing**

31	31	31	Concurrency control	Day 31	R1 (Pg : 288-312)	<a href="https://www.tutorialspoint.com/what-is-concurrency-control-in-dbms#:~:text=Concurrency%20control%20concept%20comes%20under,occur%20in%20multi%20user%20systems.">https://www.tutorialspoint.com/what-is-concurrency-control-in-dbms#:~:text=Concurrency%20control%20concept%20comes%20under,occur%20in%20multi%20user%20systems.</a>	P1-P9	Will be able to understand what is Concurrency control
32	32	32	ACID property	Day 32	T2 (Pg: 313 - 316)	<a href="https://www.geeksforgeeks.org/acid-properties-in-dbms/">https://www.geeksforgeeks.org/acid-properties-in-dbms/</a>	P1-P9	Able to understand what are ACID property
33	33	33	Serializability of scheduling	Day 33	R1 (Pg : 288-312)	<a href="https://beginnersbook.com/2018/12/dbms-serializability/">https://beginnersbook.com/2018/12/dbms-serializability/</a>	P1-P9	Will be able to understand what is Serializability of scheduling.
34	34	34	Locking and timestamp based schedulers	Day 34	T3 (Pg: 316 - 317)	<a href="https://www.geeksforgeeks.org/types-of-schedules-in-dbms/">https://www.geeksforgeeks.org/types-of-schedules-in-dbms/</a>	P1-P9	Will be able to understand what is the Locking and timestamp based schedulers.
35	35	35	Multi-version and optimistic Concurrency Control schemes	Day 35	R2 (Pg: 317 - 118)	<a href="https://www.tutorialspoint.com/what-are-the-different-types-of-schedules-in-dbms">https://www.tutorialspoint.com/what-are-the-different-types-of-schedules-in-dbms</a>	P1-P9	Will be able to understand what is Multi-version and optimistic Concurrency Control schemes
36	36	36	Database recovery	Day 36	T3 (Pg: 318 - 320)	<a href="https://www.geeksforgeeks.org/databases-recovery-techniques-in-dbms/">https://www.geeksforgeeks.org/databases-recovery-techniques-in-dbms/</a>	P1-P9	Will be able to understand what is Database recovery

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

Total number of lectures as per syllabus: - 36

Total number of lectures as per planned: - 36

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**Assignment Plan**

Assignment No.	Topic	Given Date	Submission Date	Map With CO
1	Unit I, Unit II and Unit III	15/04/2022	30/04/2022	1, 2, 3
2	Unit IV and Unit V	03/05/2022	17/05/2022	4, 5

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**Content Beyond Syllabus Topic – Planned**

Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP
1	DBMS industry exposure.	11/06/2022	Student shall be able to exhibit the knowledge of transaction and concurrency control.

**Text Books / Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Database System Concepts	Henry Korth, Abraham Silberschatz & S. Sudarshan	McGraw-Hill Publication	6th Edition, 2011.
T2	An Introduction to Database System	Bipin Desai	West Publishing Company	College & School Division, 1990
T3	Database Management Systems	Raghu Ramakrishnan, Johannes Gehrke	McGraw-Hill Publication	3rd Edition, 2003
R1	Oracle SQL and PL/SQL for Developers	Joel Murach, Murach	Mike Murach & Associates	2nd Edition, 2014
R2	Database Design	Wiederhold	McGraw-Hill Publication	2nd Edition, 1983
R3	Fundamentals of Database System	Navathe	Addison-Wesley Publication	6th Edition, 2012.
R4	Principles of Database and Knowledge – Base Systems	J. D. Ullman	Vol 1	Computer Science Press

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**Company/Industry:**

Code	Company/Industry Name	Website	Detailed Information
C1	Google	<a href="http://www.google.com">www.google.com</a>	Search engine optimization purpose.
C2	Microsoft	<a href="http://www.microsoft.com">www.microsoft.com</a>	Microsoft Corporation's organizational culture ensures workforce resilience and capability to address business needs in the dynamic market for computer hardware and software products. A company's corporate culture refers to the values, traditions and behavioral expectations among employees. Microsoft uses its organizational culture to

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			facilitate innovation and customer satisfaction. As one of the leading firms in the IBM PC-compatible operating system market, the company must maintain cultural characteristics that suitably promote innovation and high quality output. Microsoft's long-term success partly depends on this organizational culture and the corresponding competence of the company's human resources.
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**Research Paper:**

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	Database Management Systems: A NoSQL Analysis	Innocent Mapanga, Prudence Kadebu	<a href="#">Springer International Publishing Switzerland 2015 S. Kozielski et al. (Eds.): 136–146, 2015.</a>	DOI: 10.1007/978-3-319-18422-7_12	BDAS 2015, CCIS 521, pp
P2	THE ROLE OF DATABASE MANAGEMENT SYSTEMS FOR INVESTIGATIVE DATA	Gary D. Anderson, MCMaster University	<a href="https://support.sas.com/resources/papers/proceedings-archive/SUGI82/Sugi-82-69%20Anderson.pdf">https://support.sas.com/resources/papers/proceedings-archive/SUGI82/Sugi-82-69%20Anderson.pdf</a> IEEE Transactions on Power Systems	30(6):1-12 · December 2014 10.1109/TPWRS.2014.2376935	VOL. 30, NO. 6
P3	The Database Normalization Theory and the Theory of Normalized Systems: Finding a Common Ground	Erki Eessaar	<a href="https://www.researchgate.net/publication/297731569_The_Database_Normalization_Theory_and_the_Theory_of_Normalized_Systems_Finding_a_Common_Ground">https://www.researchgate.net/publication/297731569_The_Database_Normalization_Theory_and_the_Theory_of_Normalized_Systems_Finding_a_Common_Ground</a>	February 2016	2, 2007, no. 39, 1945 – 1956 7.91 Tallinn University of Technology
P4	Prioritizing Technical Debt in Database Normalization Using Portfolio Theory and Data Quality Metrics	Mashel Albarak , Rami Bahsoon	<a href="https://arxiv.org/ftp/arxiv/papers/1801/1801.06989.pdf">https://arxiv.org/ftp/arxiv/papers/1801/1801.06989.pdf</a>	JULY 2010	ISSN 1819-0689 VOL. 5, NO. 7, JULY 2010
P5	Transaction Processing and Query Optimization	Sumathi Sai S. Esakkirajan	<a href="https://www.researchgate.net/publication/294450433_Transaction_Processing_and_Query_Optimization">https://www.researchgate.net/publication/294450433_Transaction_Processing_and_Query_Optimization</a>	January 2007	DOI: 10.1007/978-3-540-48399-1_7

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P6	Query Processing and Optimization in Distributed Database Systems	Muhammad Haroon	<a href="https://support.sas.com/resources/papers/proceedings/proceedings/sugi27/p229-27.pdf">https://support.sas.com/resources/papers/proceedings/proceedings/sugi27/p229-27.pdf</a>	September 2018	Paper 229-27
P7	Subset Queries in Relational Databases	Satyanarayana R Valluri , Kamalakar Karlapalem	<a href="https://arxiv.org/ftp/cs/papers/0406/0406029.pdf">https://arxiv.org/ftp/cs/papers/0406/0406029.pdf</a>	January 1978with 2,168	10.1093/imamat/21.1.47
P8	Teaching Relational Algebra and Relational Calculus: A Programming Approach	Kirby McMaster Nicole Anderson	<u>Journal of Information Systems Education</u>	January 2008	<a href="https://www.researchgate.net/publication/228635531_Teaching_Relational_Algebra_and_Relational_Calculus_A_Programming_Approach">https://www.researchgate.net/publication/228635531_Teaching_Relational_Algebra_and_Relational_Calculus_A_Programming_Approach</a>
P9	Deadlock Detection Views of Distributed Database	B.M. Monjurul Alom Frans Alexander Henskens	<a href="https://www.researchgate.net/publication/220841608_Deadlock_Detection_Views_of_Distributed_Database">https://www.researchgate.net/publication/220841608_Deadlock_Detection_Views_of_Distributed_Database</a>	January 2009	DOI: 10.1109/ITNG.2009.220

Prof. Anuja Ghasad  
Subject In charge

Prof. Nitin Chaudhary  
Dept. Academic Coordinator

Prof. Supriya Sawwashere  
Dept. Head CSE, IT & AI

Principal  
J D College of Engineering & Management  
Khandala, Katol Road  
Nagpur-441501



HOD  
Computer Science & Engineering  
JDCEM, Nagpur





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**Department of Computer Science & Engineering**  
*"A Place to Learn, A Chance to Grow"*  
Session: 2021-22

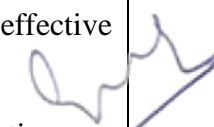


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### Teaching Plan

<b>Course :</b> B. Tech. in Computer Science & Engineering	<b>Year/Semester :</b> 7 <sup>th</sup> Semester ( 4 <sup>th</sup> Year)	
<b>Name of the Teacher :</b> Mr.Milind Tote	<b>Subject Code :</b> CS7T001	
<b>Subject :</b> Data Science	<b>Section :-</b>	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	<b>3</b>
	<b>Tutorial</b>	-
	<b>Practical</b>	-

Course Objective	Course Outcomes
<ol style="list-style-type: none"> <li>1. To Understand the basic concepts used in data Science</li> <li>2. To Understand data collection and pre-processing</li> <li>3. To Understand problems solving using data science</li> <li>4 To Introduce concepts of Data Collection and Data Pre-Processing</li> <li>5. To develop skills in students to solve applications based problems on Data Science</li> </ol>	<ol style="list-style-type: none"> <li>1. To Build the fundamentals of data science.</li> <li>2. To Apply Data Collection and Data Pre-processing Strategies.</li> <li>3.To Compare and choose data visualization method for effective visualization of data</li> <li>4. To Implement regression models, model evaluation and validation</li> <li>5. To develop skills in students to solve applications based problems on Data Science</li> </ol>

  
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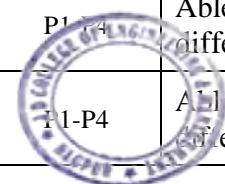
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Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Execution Teaching Dates	Text Books (Page no) Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/PPT/V ideo)	Applications (R&D/ Industry)	Learning Outcomes	CO mapping
<b>Unit I –Introduction</b>										
1	1	1	What is Data Science, importance of data science,	10/01/2022	11/01/2022	T1 (Pg : 2–12)	<a href="https://www.youtube.com/watch?v=WvduZOWof0">https://www.youtube.com/watch?v=WvduZOWof0</a>	P1-P4	Able to understand basics of Data Science	CO1, CO2, CO5
2	2	2	Big data and data Science,	11/01/2022	12/01/2022	T1 (Pg : 13-18)	<a href="https://www.youtube.com/watch?v=p8ZQIDao7ME">https://www.youtube.com/watch?v=p8ZQIDao7ME</a>	P1-P4	Able to understand basics of big data and characteristics	CO1, CO2, CO4, CO5
3	3	3	The current Scenario, Industry Perspective Types of Data: Structured vs. Unstructured Data.,	12/01/2022	17/01/2022	T2 (Pg :20-24)	<a href="https://archive.nptel.ac.in/courses/110/105/110105139/">https://archive.nptel.ac.in/courses/110/105/110105139/</a>	P1-P4	Able to understand.	CO1, CO2, CO5
4	4	4	Quantitative vs. Categorical Data	17/01/2022	18/01/2022	T2 (Pg :85-90)	<a href="https://www.youtube.com/watch?v=kwto3Ti5Yew">https://www.youtube.com/watch?v=kwto3Ti5Yew</a>	P1-P4	Able to understand,	CO1, CO2, CO5
5	5	5	, Big Data vs. Little Data	18/01/2022	19/01/2022	T1 (Pg :132-142)	<a href="https://www.youtube.com/watch?v=avSdoMz6OuA">https://www.youtube.com/watch?v=avSdoMz6OuA</a>	P1-P4	Able to understand different forms	CO1, CO2, CO5
6	6	6	, Data science process,	19/01/2022	24/01/2022	T1 (Pg :143-149)	<a href="https://www.youtube.com/watch?v=kg8WjcC2KTW">https://www.youtube.com/watch?v=kg8WjcC2KTW</a>	P1-P4	Able to understand the difference between	CO1, CO2, CO5

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7	7	7	Data science process,	24/01/2022	25/01/2022	T1 (Pg : 110-114)	<a href="https://www.youtube.com/watch?v=YjdMt9YTuW4&amp;t=434s">https://www.youtube.com/watch?v=YjdMt9YTuW4&amp;t=434s</a>	P1-P4	Able to study Data science process	CO1, CO2, CO5
8	8	8	Role Data Scientist	25/01/2022	31/01/2022	T1 (Pg 116-118)	<a href="https://www.youtube.com/watch?v=YjdMt9YTuW4&amp;t=434s">https://www.youtube.com/watch?v=YjdMt9YTuW4&amp;t=434s</a>	P1-P4	Able to study Role Data Scientist	CO1, CO2
<b>Unit II- Data Collection and Data Pre-Processing</b>										
9	9	9	Data Collection Strategies,	27/01/2022	1/02/2022	T2 (Pg :107-110)	<a href="https://www.youtube.com/watch?v=YjdMt9YTuW4&amp;t=434s">https://www.youtube.com/watch?v=YjdMt9YTuW4&amp;t=434s</a>	P1-P4	Able to understand Practical aspects of Data Collection Strategies	CO1, CO2
10	10	10	Data Pre-Processing Overview,	31/01/2022	1/02/2022	T1 (Pg :192-195)	<a href="https://www.youtube.com/watch?v=YjdMt9YTuW4&amp;t=434s">https://www.youtube.com/watch?v=YjdMt9YTuW4&amp;t=434s</a>	P1-P4	Able to understand Data Pre-Processing Overview	CO1, CO2, CO5
11	11	11	Data Cleaning,	01/02/2022	2/02/2022	T2 (Pg :120)	<a href="https://www.youtube.com/watch?v=XJOstWgJdi0">https://www.youtube.com/watch?v=XJOstWgJdi0</a>	P1-P4	Able to understand Data Cleaning	CO1, CO2, CO5
12	12	12	Data Cleaning,	02/02/2022	7/02/2022	T1 (Pg : 157-165)	<a href="https://www.youtube.com/watch?v=ApXdisOSHTQ">https://www.youtube.com/watch?v=ApXdisOSHTQ</a>	P1-P4	Able to understand Data Cleaning	CO1, CO2, CO5
13	13	13	Data Cleaning,	07/02/2022	8/02/2022	T1 (Pg :239-246)	<a href="https://www.youtube.com/watch?v=x6Tam7GufhE">https://www.youtube.com/watch?v=x6Tam7GufhE</a>	P1-P4	Able to understand Data Cleaning	CO1, CO2
14	14	14	Data Integration and Transformation,.	08/02/2022	9/02/2022	T1 (Pg : 165-167)	<a href="https://www.youtube.com/watch?v=Dgi8G1h6-Kg">https://www.youtube.com/watch?v=Dgi8G1h6-Kg</a>	P1-P4	Able to understand Data Integration and Transformation	CO1, CO2

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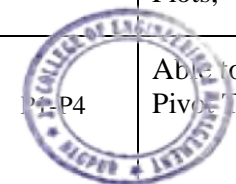


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15	15	15	Data Integration and Transformation	09/02/2022	11/02/2022	T2 (Pg :42-45)	<a href="https://www.youtube.com/watch?v=OT8PpVewQu0">https://www.youtube.com/watch?v=OT8PpVewQu0</a>	P1-P4	Able to understand Data Integration and Transformation	CO1, CO2
16	16	16	Data Reduction, Data Discretization	14/02/2022	15/02/2022	T2 (Pg :46-48)	<a href="https://www.youtube.com/watch?v=l0QLNeD33ng&amp;feature=emb_imp_woyt">https://www.youtube.com/watch?v=l0QLNeD33ng&amp;feature=emb_imp_woyt</a>	P1-P4	Able to understand Data Reduction, Data Discretization	CO1, CO2
<b>Unit III- Exploratory Data Analytics</b>										
17	17	17	Descriptive Statistics,	15/02/2022	16/02/2022	T2 (Pg : 48-54)	<a href="https://www.youtube.com/watch?v=OtsGM3zozOI">https://www.youtube.com/watch?v=OtsGM3zozOI</a>	P1-P4	Able to understand Descriptive Statistics	CO1, CO2, CO3
18	18	18	Mean, Standard Deviation,	16/02/2022	21/02/2022	T1 (Pg :170-182)	<a href="https://www.youtube.com/watch?v=OtsGM3zozOI">https://www.youtube.com/watch?v=OtsGM3zozOI</a>	P1-P4	Able to understand Mean, Standard Deviation	CO1, CO2
19	19	19	Skewness and Kurtosis,	21/02/2022	22/02/2022	T2 (Pg :206-212)	<a href="https://www.youtube.com/watch?v=a0HjmR_pOR8">https://www.youtube.com/watch?v=a0HjmR_pOR8</a>	P1-P4	Able to understand Skewness and Kurtosis,	CO1, CO2
20	20	20	Skewness and Kurtosis	22/02/2022	23/02/2022	T2 (Pg : 97-103)	<a href="https://www.youtube.com/watch?v=a757qQYLvU">https://www.youtube.com/watch?v=a757qQYLvU</a>	P1-P4	Able to understand Skewness and Kurtosis,	CO1, CO2, CO3, CO5
21	21	21	Box Plots,	23/02/2022	28/02/2022	T2 (Pg : 205-206)	<a href="https://www.youtube.com/watch?v=5h2_ACYCmHA">https://www.youtube.com/watch?v=5h2_ACYCmHA</a>	P1-P4	Able to understand Box Plots,	CO1, CO2, CO3, CO5
22	22	22	Pivot Table, Heat Map,	28/02/2022	01/03/2022	T2(Pg :206-209)	<a href="https://www.youtube.com/watch?v=0tljpdgha4">https://www.youtube.com/watch?v=0tljpdgha4</a>	P1-P4	Able to understand Pivot Table, Heat Map	CO1, CO2, CO3, CO5

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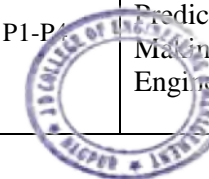
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23	23	23	Correlation Statistics.	01/03/2022	07/03/2022	T2 (Pg :232-235)	<a href="https://www.youtube.com/watch?v=e2_BAcGq42U">https://www.youtube.com/watch?v=e2_BAcGq42U</a>	P1-P4	Able to understand Correlation Statistics	CO1, CO2, CO3, CO5
<b>Unit IV- Model Development</b>										
24	24	24	:Simple and Multiple Regression,	02/03/2022	08/03/2022	T1 (Pg :227)	<a href="https://www.youtube.com/watch?v=HgtDqGXGDWM">https://www.youtube.com/watch?v=HgtDqGXGDWM</a>	P1-P4	Able to understand Simple and Multiple Regression,	CO1, CO2, CO5
25	25	25	Model Evaluation using Visualization,	07/03/2022	09/03/2022	T1 (Pg : 228)	<a href="https://www.youtube.com/watch?v=8tQa92BWjvM">https://www.youtube.com/watch?v=8tQa92BWjvM</a>	P1-P4	Able to understand Model Evaluation using Visualization	CO1, CO2, CO5
26	26	26	Residual Plot,	08/03/2022	09/03/2022	T1 (Pg : 230)	<a href="https://www.youtube.com/watch?v=lvUPQ3ersw0">https://www.youtube.com/watch?v=lvUPQ3ersw0</a>	P1-P4	Able to understand	CO1, CO2, CO5
27	27	27	Distribution Plot, Polynomial Regression and Pipelines,	09/03/2022	14/03/2022	T1 (Pg :296-306)	<a href="https://www.youtube.com/watch?v=y6fTtFNsFFY">https://www.youtube.com/watch?v=y6fTtFNsFFY</a>	P1-P4	Able to understand Residual Plot,	CO1, CO2, CO5
28	28	28	Measures for In-sample Evaluation,	14/03/2022	15/03/2022	T1 (Pg :332-335)	<a href="https://www.youtube.com/watch?v=GITBEQU7CDQ">https://www.youtube.com/watch?v=GITBEQU7CDQ</a>	P1-P4	Able to understand Measures for In-sample Evaluation,	CO1, CO2, CO5
29	29	29	Prediction and Decision Making, Feature Engineering	15/03/2022	16/03/2022	T1 (Pg :314-320)	<a href="https://www.youtube.com/watch?v=GITBEQU7CDQ">https://www.youtube.com/watch?v=GITBEQU7CDQ</a>	P1-P4	Able to understand Prediction and Decision Making, Feature Engineering	CO1, CO2, CO5

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**Unit V- Model Evaluation**

30	30	30	Generalization Error,	16/03/2022	21/03/2022	T2 (Pg :301)	<a href="https://www.youtube.com/watch?v=rcDd7A2k7ng">https://www.youtube.com/watch?v=rcDd7A2k7ng</a>	P1-P4	Able to understand Generalization Error	CO1, CO2, CO4
31	31	31	Out-of-Sample Evaluation Metrics,	21/03/2022	22/03/2022	T2 (Pg : 318)	<a href="https://www.youtube.com/watch?v=rcDd7A2k7ng">https://www.youtube.com/watch?v=rcDd7A2k7ng</a>	P1-P4	Able to understand Out-of-Sample Evaluation Metrics	CO1, CO2, CO4
32	32	32	Cross Validation, Overfitting,	22/03/2022	23/03/2022	T2 (Pg : 295)	<a href="https://www.youtube.com/watch?v=HgtdqGXGDWM">https://www.youtube.com/watch?v=HgtdqGXGDWM</a>	P1-P4	Able to understand Cross Validation, Overfitting,	CO1, CO2, CO4
33	33	33	Under Fitting and Model Selection,	23/03/2022	28/03/2022	T2(Pg : 309)	<a href="https://www.youtube.com/watch?v=zmemhcELAls">https://www.youtube.com/watch?v=zmemhcELAls</a>	P1-P4	Able to understand Under Fitting and Model Selection,	CO1, CO2, CO4
34	34	34	Prediction by using Ridge Regression,	28/03/2022	02/05/2022	T2(Pg : 311)	<a href="https://www.youtube.com/watch?v=-FyDsc5hqMI">https://www.youtube.com/watch?v=-FyDsc5hqMI</a>	P1-P4	Able to understand Prediction by using Ridge Regression,	CO1, CO2, CO4, CO5
35	35	35	Testing Multiple Parameters by using Grid Search	02/05/2022	03/05/2022	T2(Pg : 315-317)	<a href="https://www.youtube.com/watch?v=rPzIfgDAI5w">https://www.youtube.com/watch?v=rPzIfgDAI5w</a>	P1-P4	Able to understand Testing Multiple Parameters by using Grid Search	CO1, CO2, CO4
36	36	36	Testing Multiple Parameters by using Grid Search	03/05/2022	04/05/2022	T2(Pg : 315-317)	<a href="https://www.youtube.com/watch?v=rPzIfgDAI5w">https://www.youtube.com/watch?v=rPzIfgDAI5w</a>	P1-P4	Able to understand Testing Multiple Parameters by using Grid Search	CO1, CO2, CO4

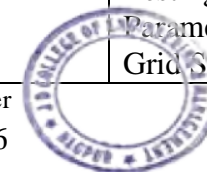
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\*T=Text Book; R= Reference Book; C= Company name; R= Research Paper

Total number of lectures as per syllabus: - 32

Total number of lectures as per planned: -36





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Tutorial Plan				
Week	Topic	No. Of Problems	Mapped With CO	
1	Data Collection Strategies	02	CO1,CO2	
2	Pivot Table, Heat Map	02	CO1,CO2	
3	Simple and Multiple Regression	01	CO1,CO3	
4	Polynomial Regression and Pipelines	02	C02,CO5	
5	Generalization Error	01	CO1,CO4	
Assignment Plan				
Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	UNIT I, II	17/02/2022	25/02/2022	CO1, CO2
2	UNIT III, IV, V	1/04/2022	10/04/2022	CO3,CO4,CO5
Content Beyond Syllabus Topic – Planned				
Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP	
1	Automation of Data Cleaning	06/05/2022	CO1,CO2,CO3,CO4,CO5	
2	Computer Vision for High Dimensional Data Analytics	09/05/2022	CO1,CO2,CO3,CO4,CO5	

**Text Books / Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	"Machine Learning	Mitchell, Tom. M	McGraw-Hill Education	1st Edition, May 2015.
T2	Programming Collective Intelligence-Building Smart Web 2.0 Applications	Segaran, Toby.	O'Reilly Media,	August 2007.
T3	An Introduction to Machine Learning	Miroslav, Kubat.	Springer Publishing	2 <sup>nd</sup> Edition /2010

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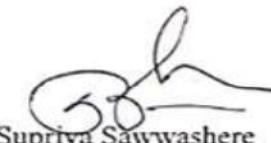
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3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

**Research Papers:**

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume /Page no/Year
P1	Data Science Methodologies: Current Challenges and Future Approaches	IñigoMartinez	Big Data Research	<a href="https://doi.org/10.1016/j.bdr.2020.100183">https://doi.org/10.1016/j.bdr.2020.100183</a>	Volume 24, 15 May 2021,
P2	Setting Privacy "by Default" in Social IoT: Theorizing the Challenges and Directions in Big Data Research	José RamónSaura	Big Data Research	<a href="https://doi.org/10.1016/j.bdr.2021.100245">https://doi.org/10.1016/j.bdr.2021.100245</a>	Volume 25, 15 July 2021
P3	Towards supporting security and privacy for social IoT applications: a network virtualization perspective	J Sun	Security and Communication Networks	<a href="https://doi.org/10.1155/2019/4074272">https://doi.org/10.1155/2019/4074272</a>	Volume 12, 2019
P4	Social-feature enabled communications among devices toward the smart iot community	Q. Du	EEE Communications Magazine,.	<a href="https://doi.org/10.255/2019/2378">https://doi.org/10.255/2019/2378</a>	vol. 57, no. 1, pp. 130–137, 2019

  
Prof. Milind Tote  
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Dept. Academic Coordinator

  
Prof. Supriya Sawwashire  
Dept. Head CSE, IT & AI

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JDCEM, Nagpur



  
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2021-22 (Even Sem)



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

### Teaching Plan

<b>Course:</b> B. Tech in Electrical Engineering	<b>Year/Semester :</b> 4th Semester (2nd Year)	
<b>Name of the Teacher :</b> Mr. A.V.Joshi	<b>Subject Code :</b> EE4T003	
<b>Subject :</b> Power Station Practice	<b>Section :-</b>	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	<b>3</b>
	<b>Tutorial</b>	<b>1</b>
	<b>Practical</b>	

Course Objective	Course Outcomes
1 Remember fundamental principles of power plant system	1 Remember the basic operations of various power plants
2 Understand various power plant and its practices	2 Understand and interpret the requirements and basics of power plant installation and site selection
3 To apply Economic Operation of Power Systems.	3 Apply knowledge to Economic Operation of Power Systems and the knowledge related to its need
4 To analyze Economic Operation of Power Systems	4 Analyze various power plants operations and distinguish between properties.
5 To utilize concept of power operations and demand also evaluation of same.	5 Evaluate thermal ,hydro, nuclear, gas power plant also able to Explain its fundamentals.
6 Design parameters of basics of power plant operation and its economy.	6 Design Economic Operation of Power Systems and also able to give solutions implementation of plant on its basics.



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	CO mapping
<b>Unit I –Introduction</b>									
1	1	1	Electric energy demand and growth in India, electric energy sources.	Day 1	T1 (17-24)	<a href="https://www.youtube.com/watch?v=0gKX3ZmT5DU">https://www.youtube.com/watch?v=0gKX3ZmT5DU</a>	C1, C2	Student will be able to explain basics of thermal power plant.	CO2,CO3, CO-5
2	2	2	Thermal Power Plant: Sites selection, general layout and operation of plant, detailed description and use of different parts.	Day 2				Student will be able to explain basics of thermal power plant, Sites selection	CO2,CO3, CO-4
3	3	3	Hydro Electric Plants: Classifications, location and site selection,	Day 3	T1 (25-39)	<a href="https://nptel.ac.in/courses/108/105/108105153/">https://nptel.ac.in/courses/108/105/108105153/</a>	C1, C2	Student will be able to explain site selection.	CO1,CO3, CO-6
4	4	4	detailed description of various components, general layout and operation of Plants	Day 4				Understand the various components of power plant,	CO1,CO3, CO-5
5	5	5	brief description of impulse, reaction, Kaplan and Francis turbines,	Day 5	T1 (78-95)	<a href="https://nptel.ac.in/courses/108/105/108105153/">https://nptel.ac.in/courses/108/105/108105153/</a>	C1, C2	Student will be able to explain the operating principle of various turbines	CO1, CO3, CO-4
6	6	6	advantages & disadvantages ,hydro-potential in India	Day 6				Able to explain advantages & disadvantages of hydro	CO1, CO2, CO3, CO-4

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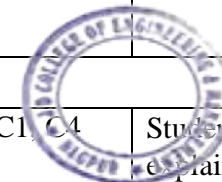


Unit II – Nuclear Power Plant									
7	7	7	Location, site selection, general layout and operation of plant. Brief description of different types of reactors Moderator material,	Day 7	T2 (95-103)	<a href="https://www.youtube.com/watch?v=ip6P7-gT2OE">https://www.youtube.com/watch?v=ip6P7-gT2OE</a>	C2	Student will be able to classify general layout and operation of plant	CO2,CO3, CO-6
8	8	8	fissile materials, control of nuclear reactors, disposal of nuclear waste material, shielding.	Day 8	T4 (120-134)	<a href="https://www.youtube.com/watch?v=hP59aaUr8iY">https://www.youtube.com/watch?v=hP59aaUr8iY</a>	C2	Student will be able to explain working of nuclear reactors,.	CO3,CO2, CO-1
9	9	9	Gas Turbine Plant: Operational principle of gas turbine plant & its efficiency, fuels, open and closed-cycle plants, regeneration, inter-cooling and reheating, role and applications.	Day 9	T1 (550- 554)	<a href="https://www.youtube.com/watch?v=ZGEGZc8M54o">https://www.youtube.com/watch?v=ZGEGZc8M54o</a>	C1	Student will be able to understand Gas Turbine Plant Operation	CO3,CO2, CO-1
10	10	10	Diesel Plants: Diesel plant layout, components & their functions ,its performance, role and applications	Day 10	T2 (125-127)	<a href="https://www.youtube.com/watch?v=TYVGndneEXE">https://www.youtube.com/watch?v=TYVGndneEXE</a>	C1,C2	Student will be able to understand functions of diesel power plant	CO6,CO2, CO-4
Unit III – Sub-stations Layout									
11	11	11	Types of substations, bus-bar	Day 11	T1 (789-796)	<a href="https://www.youtube.com/watch?v=I5k66ES">https://www.youtube.com/watch?v=I5k66ES</a>	C1, C4	Student will be able to explain the Types of	CO-1; CO-2



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			arrangements, typical layout of substation			<a href="#">HJHM&amp;t=1s</a>		substations.	
12	12	12	Power Plant Economics and Tariffs: Load curve, load duration curve, different factors related to plants and consumers,	Day 12				Able to understand the economics of power plant	CO6,CO2, CO-1
13	13	13	Power Plant Economics and Tariffs: Load curve, load duration curve, different factors related to plants and consumers,	Day 13				Able to understand the economics of power plant	CO6,CO2, CO-1
14	14	14	Cost of electrical energy, depreciation, generation cost,	Day 14				Able to understand the economics of power plant	
15	15	15	Effect of Load factor on unit cost.	Day 15	T1 (803-815)	<a href="https://www.youtube.com/watch?v=I9Fu0ZTlmqQ">https://www.youtube.com/watch?v=I9Fu0ZTlmqQ</a>	C2,C4	Student will be able to understand Effect of Load factor	CO-2
16	16	16	Fixed and operating cost of different plants,	Day 16				Study the Fixed and operating cost of different plants	
17	17	17	role of load diversity in power system economy. Objectives and forms of Tariff;	Day 17	T2 ( 525-532)	<a href="https://www.youtube.com/watch?v=6f7bgwkRfSI">https://www.youtube.com/watch?v=6f7bgwkRfSI</a>	C2	Student will be able to explain the role of load diversity in power system economy	CO-2; CO-4; CO-5
18	18	18	Causes and effects of low power factor, advantages of power factor	Day 18	T2 ( 568-572)	<a href="https://www.youtube.com/watch?v=IRk3vBpH0bs">https://www.youtube.com/watch?v=IRk3vBpH0bs</a>	C2	Student will be able to understand the Causes and effects of low power factor	CO6,CO2, CO-1

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			improvement, different methods for power factor improvements						
19	19	19	Causes and effects of low power factor, advantages of power factor improvement, different methods for power factor improvements	Day 19				Student will be able to understand the Causes and effects of low power factor	CO6,CO2, CO-1
<b>Unit IV – Economic Operation of Power Systems</b>									
20	20	20	Characteristics of steam and hydro-plants, Constraints in operation,	Day 20	T3 (124- 127)	<a href="https://www.youtube.com/watch?v=e-kfKuHGfIo">https://www.youtube.com/watch?v=e-kfKuHGfIo</a>	C3	Student will be able to understand the Characteristics of steam and hydro-plants,	CO-1; CO-2
21	21	21	Economic load scheduling of thermal plants Neglecting and considering transmission Losses,	Day 21	T3 (135-142)	<a href="https://www.youtube.com/watch?v=1VFWHCwI8PU">https://www.youtube.com/watch?v=1VFWHCwI8PU</a>	C2,C3	Student will be able to explain the process of Economic load scheduling	CO-6,CO2
22	22	22	Penalty factor, loss coefficients, Incremental transmission loss.	Day 22	T4 (159-165)	<a href="https://nptel.ac.in/courses/108/105/108105153/">https://nptel.ac.in/courses/108/105/108105153/</a>	C2, C3	Student will be able to understand the working of current and potential transformers.	CO-3; CO-4
23	23	23	Hydrothermal Scheduling	Day 23				Study Hydrothermal Scheduling	CO-3; CO-6

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Unit V –Non Conventional Energy Sources									
24	24	24	Power Crisis, future energy demand,	Day 24	T3 (435-446)	<a href="https://www.youtube.com/watch?v=0jbvqPPm0z8">https://www.youtube.com/watch?v=0jbvqPPm0z8</a>	C3	Student will be able to know various types of Power Crisis and future energy demand	CO-4,CO6
25	25	25	role of Private sectors in energy management	Day 25				Understand the role of Private sectors in energy management	
26	26	26	Concepts & principals of MHD generation,	Day 26	T4 (468-474)	<a href="https://nptel.a/c.in/courses/108/105/108105153/">https://nptel.a/c.in/courses/108/105/108105153/</a>	C3	Understand the concept of of MHD generation,	CO-5,CO6
27	27	27	Concepts & principals of MHD generation,	Day 27				Understand the concept of of MHD generation,	CO-3; CO-4
28	28	28	Solar power plant, Wind Energy,	Day 28	T4 (525-528)	<a href="https://nptel.ac.in/courses/108/105/108105153/">https://nptel.ac.in/courses/108/105/108105153/</a>	C3	Student will know working of Solar power plant	CO-3; CO-4
29	29	29	Geothermal Energy	Day 29	T2 (182-186)	<a href="https://www.youtube.com/watch?v=bC-doinU1QM">https://www.youtube.com/watch?v=bC-doinU1QM</a>	C3	Student will be able to explain the operation of Geothermal Energy	CO-2; CO-4,CO6
30	30	30	Tidal energy, Ocean Thermal Energy	Day 30	T3 (192-196)	<a href="https://www.youtube.com/watch?v=InvHHwQnoXk">https://www.youtube.com/watch?v=InvHHwQnoXk</a>	C3	Student will be able to understand Tidal energy generation	CO-5

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

Total number of lectures as per syllabus: -30

Total number of lectures as per planned: -30

  
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### Assignment Plan

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Hydroelectric Power Plant and Gas Turbine Power Plant	29/3/2022	11/4/2022	CO1, CO2, CO3, CO4
2	Non- conventional energy sources	24/4/2022	7/5/2022	CO1, CO3, CO5, CO6
Content Beyond Syllabus Topic – Planned				
Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP	
1	Dynamic Stability Analysis of Wind Turbines under Different Control Strategies	05/05/2022	CO2, CO4, CO5, CO6	

#### Text Books / Reference Books:

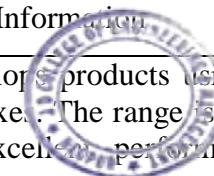
Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Generation of Electrical Energy	B.R.Gupta	Dhanpat Rai	22 <sup>nd</sup> Edition
T2	A text book on Power System Engg	Soni,Gupta & Bhatnagar,	Dhanpat Rai & Co	3 <sup>rd</sup> Edition
T3	Operation and control of Power System	P.S.R.Murthy	B S Publications	5 <sup>th</sup> Edition
T4	Elements of Power System Analysis	W.D.Stevenson	Mc Graw Hill	2 <sup>nd</sup> Edition

  
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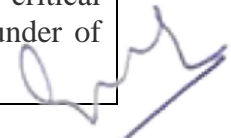
#### Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	Maxwell Scientific Corporation	<a href="http://www.maxwellindia.com/index.html">http://www.maxwellindia.com/index.html</a>	Maxwell Scientific Corporation develops products using finest grade of raw materials like brass, wire, wooden boxes. The range is widely used in diverse industries due to its efficiency, excellent performance, high durability, strength and corrosion resistance nature.

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C2	Nippen Electrical Instruments Company	<a href="https://www.nippenco.com/mimcmeter.html">https://www.nippenco.com/mimcmeter.html</a>	<p>Nippen has been a prominent name in the field of Electrical and Electronic Measuring Instrument for more than the last four decades.. These find applications in Control panels for industry, including Generating Sets, and prominent users are Electricity utilities , products being sold primarily through Electrical equipment Distributors. Our Analogue and Digital panel meters, Insulation / Earth testers, Current transformers and Shunts have been in use for many years.</p> <p>A newer generation of micro controller based products, includes Multifunction meters, Energy meters, Power Factor Controllers, Maximum Demand Meters / controllers , and transducers to complement the range. Quality, Reliability and Durability of our products are the key characteristics that have made Nippen an undisputable leader in the industry.</p>
C3	Schneider Electric	<a href="https://www.se.com/in/en/">https://www.se.com/in/en/</a>	<p>Schneider's purpose is to empower all to make the most of our energy and resources, bridging progress and sustainability for all. At Schneider, we call this Life Is On.</p> <p>We believe access to energy and digital is a basic human right. Our generation is facing a tectonic shift in energy transition and industrial revolution catalysed by accelerated digitisation in a more electric world. Electricity is the most efficient and best vector for decarbonisation; combined with a circular economy approach, we will achieve a climate-positive impact as part of the United Nations Sustainable Development Goals.</p>
C4	Hi Tech Transducers & Devices	<a href="https://hitechtransducers.com/index.html">https://hitechtransducers.com/index.html</a>	<p>In today's High Tech Industrial world, process industries call for highly precise monitoring devices which have direct impact on plant operations and on the organizations balance sheet as a whole. Keeping in mind the critical need of the pre-cision monitoring equipement Mr. D.V.Kulkarni, founder of the company decided to cater the industrial requirement.</p>



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**Research Paper:**

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	Cooperative DMPC-Based Load Frequency Control of Solar Thermal Power Plant	Y.H. Ghallab	IEEE Transactions on Circuits and Systems II: Express Briefs	10.1109/TCSII.2005.854559	16, July 2006
P2	Voltage control by small hydro power	Ding Cheng	2008 Conference on Power system Digest	10.1109/CPEM.2008.4574900	8-13 June 2008



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	plant integrated into a virtual power plant				
<b>P3</b>	Analysis on Spent Fuel Pool Monitoring System in Nuclear power plant after Fukushima Accident	Bibek Kanti Barman	2018 2nd International Conference on Power, Energy and Environment: Towards Smart Technology (ICEPE)	10.1109/EPETSG.2018.8658501	1-2 June 2018
<b>P4</b>	Simulation Model of Autonomous Solar power plant with Dual-Axis Solar Tracker	Ljubisa Jovanovic	IEEE Transactions on Instrumentation and Measurement	10.1109/TIM.2017.2653458	2 February 2017
<b>P5</b>	Index for allocation of tidal current power plant for reactive margin improvement	Sina Sadeghpour	2019 20th International Conference on Power Systems, Solid-State Sensors, Actuators and Microsystems & Euroensors XXXIII (TRANSDUCERS & EUROSENSORS XXXIII)	10.1109/TRANSDUCERS.2019.8808204	23 – 27 June 2019



Mr. A.V. Joshi  
Subject Teacher



Prof. A.V. Joshi  
Academic Incharge



Dr. V.S. Dhok  
HOD (EE)



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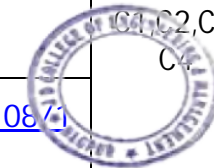
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VISION	MISSION
To be a Department providing high quality & globally competent knowledge of concurrent technologies in the field of Electronics and Telecommunication."	<ol style="list-style-type: none"> <li>To provide quality teaching learning process through well-developed educational environment and dedicated faculties.</li> <li>To produce competent technocrats of high standards satisfying the needs of all stakeholders.</li> </ol>

Pg No.									
Module-1: AM Transmission									
1	1	1.1	Introduction Overview: Signals and their classifications	Day-1	T1 (Pg. 51)	<a href="https://nptel.ac.in/courses/108/104/108104100/">https://nptel.ac.in/courses/108/104/108104100/</a>	P1,P2,P4, P7 C1,C2,C3, C4	Students should be able to understand the basics of signals and their classification	
2	2	1.2	Fourier analysis of Signals and Systems	Day-2	T1 (Pg. 51)	<a href="https://youtu.be/r18Gi8ISkfM">https://youtu.be/r18Gi8ISkfM</a>		Students will get to know about fourier analysis	CO4
3	3	1.3	Elements of a Communication System, Need for modulation	Day-3	T3 (Pg. 5)	<a href="https://nptel.ac.in/courses/112104172/1">https://nptel.ac.in/courses/112104172/1</a> (IIT. Kanpur). Time: 5:10 min to 25:13 min	P1,P2,P4, P7 C1,C2,C3, C4	Students will know elements of communication system and the need for modulation	
4	4	1.4	Channel, Noise	Day-4	T3 (Page 441) R1 (Pg 423)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>		Students will get to know about noise.	



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2. To produce competent technocrats of high standards satisfying the needs of all stakeholders.

5	5	1.5	Band pass transmission: Complex low pass representation of narrowband signals and systems	Day-5	T3 (Page 441)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>	Students will understand low pass representation and equivalent model of narrowband systems.	CO4	
6	6	1.6	Equivalent low pass transmission model	Day-6	T3 (Page 441)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>			
<b>Module-2: AM Reception</b>									
7	7	2.1	Amplitude modulation DSB-FC, DSB-SC, SSB, VSB and ISB transmissions	Day-7	T2 (Pg:264-271, 297-307, 71-74) R1 (Pg. 429, 432)	<a href="https://youtu.be/oRMfNOK9cWU">https://youtu.be/oRMfNOK9cWU</a>	Classify of AM wave, Generate the SSB and Identify the use of ISB & VSB	CO5	
8	8	2.2	Mathematical Analysis-time and frequency domain analysis	Day-8	T1 (Pg:35-42) R2 (Pg:2-3)	<a href="https://youtu.be/oRMfNOK9cWU">https://youtu.be/oRMfNOK9cWU</a>			To understand the concept of AM
9	9	2.3	Modulation	Day-9	T2 (Pg:253-	<a href="https://youtu.be/oRMfNOK9cWU">https://youtu.be/oRMfNOK9cWU</a>	Students will		

P6,P8,P9,  
P10  
C1,C2,C3,  
C4



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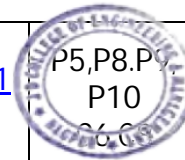
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			index, generation and detection methods		256) R2 (Pg:2-3)			come to know about the frequency spectrum and bandwidth of AM.	
10	10	2.4	Power requirement of these systems, Comparison of AM modulation schemes	Day-10	T2 (Pg: 255)	<a href="https://youtu.be/oRMfNOK9cWU">https://youtu.be/oRMfNOK9cWU</a>		Able to calculate the powerrequire ment.	
11	11	2.5	Quadrature Carrier Multiplexing (QAM)	Day-11	T1 (Pg. 217)	<a href="https://youtu.be/oRMfNOK9cWU">https://youtu.be/oRMfNOK9cWU</a>	P5,P8.P9, P10 C6,C8	Students should know the how modulation schemes are classified and concept of multiplexing.	CO2
12	12	2.6	Frequency Division Multiplexing	Day-12	T1 (Pg:563-565)	<a href="https://youtu.be/oRMfNOK9cWU">https://youtu.be/oRMfNOK9cWU</a>			
<b>Module-3: FM Transmission</b>									
13	13	3.1	Angle Modulation Frequency Modulation	Day-13	T1 (Page 75)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>	P5,P8.P9, P10 C6,C8	Students will be able to understand about types of	CO2

  
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			(FM) Single Tone Frequency Modulation					angle modulation	
14	14	3.2	Spectrum Analysis, Narrowband FM, Wideband FM	Day-14	T1 (Page 75) R1 (Pg:213)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>		Analyze frequency spectrum & BW and compare narrow band and wide band	CO2/CO5
15	15	3.3	Transmission Bandwidth of FM Waves, Generation of FM waves: Direct and Indirect Methods	Day-15	T3 (Page 182)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>	P5,P8,P9, P10 C5,C9,C10	Students will understand how an FM Wave is generated	
16	16	3.4	Demodulation of FM, Phase Locked Loops	Day-16	T3 (Page 186)	<a href="https://youtu.be/oRMfNOK9cWU">https://youtu.be/oRMfNOK9cWU</a>		Students will get to know about the demodulation of FM Wave	
17	17	3.5	Limiting of FM waves, comparison between AM	Day-17	T3 (Page 192)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>			CO6

  
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18	18	3.6	& FM Phase Modulation, Relation between FM and PM	Day-18	T3 (Page 203)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>		Students will be able to compare FM and PM Wave	CO4/CO6
<b>Module-4: FM Reception</b>									
19	19	4.1	Radio Receivers and performance in the noise	Day-19	T3 (Page 100)	<a href="https://nptel.ac.in/courses/117/102/117102059/">https://nptel.ac.in/courses/117/102/117102059/</a>	P4,P7 C5,C9,C10	Analyse the characteristic of receiver	CO1/CO3
20	20	4.2	Basic receiver (TRF), Super heterodyne receiver for AM and FM	Day-20	T3 (Page 98)	<a href="https://freevideoDays.com/course/2314/communication-engineering/4">https://freevideoDays.com/course/2314/communication-engineering/4</a>		Understand and Analyse the receiver	
21	21	4.3	Performance parameters for receiver such as sensitivity, selectivity, fidelity, image frequency rejection etc.	Day-21	T3 (Page 100) R2 (Pg 151)	<a href="https://freevideoDays.com/course/2314/communication-engineering/4">https://freevideoDays.com/course/2314/communication-engineering/4</a>		Understand and compare the characteristics	



  
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22	22	4.4	AGC technique, Sources of noise, Signal to Noise Ratios, Figure of Merit Calculations, Noise in AM	Day-22	T3 (Page 122)	<a href="https://freevideoDays.com/course/2314/communication-engineering/4">https://freevideoDays.com/course/2314/communication-engineering/4</a>			CO1/CO3
23	23	4.5	Pre emphasis and De-emphasis in FM	Day-23	T3 (Page 176)	<a href="https://www.youtube.com/watch?v=TqNKC50Qyeg">https://www.youtube.com/watch?v=TqNKC50Qyeg</a>	P3,P4 C5,C9,C10	Analyze the Pre and De Emphasis	CO1/CO3
24	24	4.6	Comparison of Noise Performance of different modulation schemes	Day-24	T3 (Page 186)	<a href="https://youtu.be/oRMfNOK9cWU">https://youtu.be/oRMfNOK9cWU</a>			
<b>Module-5: Applications of AM and FM</b>									
25	25	5.1	Applications of AM and FM AM Radio	Day-25	T1 (Page 461)	<a href="https://youtu.be/NeRdsWYqWFU">https://youtu.be/NeRdsWYqWFU</a>	P3,P4 C7,C11	Students will get to know about the different applications of AM and FM Wave	Principal Principal Principal
26	26	5.2	Television: Video Bandwidth, Choice of Modulation	Day-26	T1 (Page 466)	<a href="https://youtu.be/IMVJNDs2ptU">https://youtu.be/IMVJNDs2ptU</a>			



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CO3



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27	27	5.3	Colour Television	Day-27	T3 (Page 276)	<a href="https://youtu.be/EAybxgdgS2T4">https://youtu.be/EAybxgdgS2T4</a>		Students will get to know about the different applications of AM and FM Wave	
28	28	5.4	HDTV	Day-28	T3 (Page 179)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>			
29	29	5.5	FM Radio, FM Stereo Multiplexing	Day-29	T2 (Page 176)	<a href="https://nptel.ac.in/courses/108/104/108104091/">https://nptel.ac.in/courses/108/104/108104091/</a>			
<b>Module-6: Acoustics</b>									
30	30	6.1	Acoustics: Introduction to acoustic transducers	Day-30	R1 (Page 461)	<a href="https://nptel.ac.in/courses/117/105/117105133/">https://nptel.ac.in/courses/117/105/117105133/</a>	P10 C3,C4,C6, C7C11	Students will get introduced of Acoustics	
31	31	6.2	Microphone and Loud speakers	Day-31	R1 (Page 466)	<a href="https://nptel.ac.in/courses/117/105/117105133/">https://nptel.ac.in/courses/117/105/117105133/</a>			
32	32	6.3	Construction, Types, Characteristics and Applications	Day-32	R3 (Page 276)	<a href="https://nptel.ac.in/courses/117/105/117105133/">https://nptel.ac.in/courses/117/105/117105133/</a>	P10 C4,C7,C11	Students will get to know about different acoustic transducers	
33	33	6.4	Block schematic of Public address system	Day-33	T3 (Page 179)	<a href="https://nptel.ac.in/courses/117/105/117105133/">https://nptel.ac.in/courses/117/105/117105133/</a>			

CO3/CO6/  
CO2  
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34	34	6.5	High quality audio such as stereophonic, Dolby, surround, 3-D etc.	Day-34	T2 (Page 176)	<a href="https://nptel.ac.in/courses/117/105/117105133/">https://nptel.ac.in/courses/117/105/117105133/</a>			CO2/CO3/ CO6
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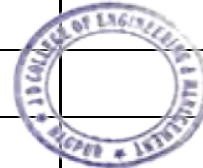
\*T=Text Book; R= Reference Book; C= Company name; P= Research Paper

Total number of Days as per syllabus: - 31

Total number of Days as per planned: - 34

<b>Tutorial Plan</b>			
Week	Topic	No. Of Problems	Mapped With CO
1	Detailed Power requirements of different types of AM	03	II
2	Numerical on AM	02	II
3	Angle modulation derivation	-	III
4	Numericals on FM	03	III

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5	Preamplifier and Deamplifier network	-	IV
6	Superhetrodyne receivers	-	IV

**Assignment Plan**

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Analog communication and AM Modulation	20/10/2021	31/10/2021	I, II
2	FM Modulation and Receivers	18/11/2021	30/11/2021	III, IV

**Content Beyond Syllabus Topic - Planned**

Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP
1	Digital communication introduction		I, II, III, IV, V, VI
2	Techniques of digital communication		I, II, III, IV, V, VI

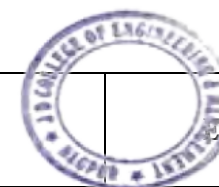
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**Text/Reference Books:**

Code	Title of the Book	Author Name/ Designation/Organization	Publisher	Edition/ Publication Year
T1	Communication system engineering	J. G. Proakis and M.	Pearson Education	Second/2002





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		Salehi		
T2	Principles of Communications: Systems, Modulation, and Noise	R. E. Ziemer, W. H. Tranter	John Wiley & Sons	Fifth/2001
T3	Communication Systems	Simon Haykins and Michael Moher	John Wiley & Sons	Fifth/2014
T4	Communication Systems - Analog and digital	Singh and Sapre	Tata McGraw Hill	Second/2007
R1	Electronic Communications Systems – Fundamentals Through advanced	Wayne Tomasi	Pearson Education	Fifth/2012
R2	Principles of Communication Systems	H. Taub and D. L. Schilling	Tata McGraw Hill	3rd Reprint /2006
R3	Electronic Communication systems	George Kennedy and Bernard Davis	Tata McGraw Hill	Fourth/2008
R4	Modern digital and analog Communication systems	B. P. Lathi	Oxford University Press	Third/2015
R5	Electronic Communication Systems	Roddy and Coolen	Pearson Education	
R6	Electronic Communication Systems	Frank R. Dungan	Delmar Publishers	

  
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Name			
C1	Bosch	<a href="http://www.bosch.in">www.bosch.in</a>	Bosch is a leading supplier of technology and services in the areas of Mobility solutions, industrial technology, consumer goods and energy and building technology.
C2	Mathworks	<a href="http://www.mathworks.com">www.mathworks.com</a>	It is the leading developer of mathematical computing software for engineers and scientists. Analyze data, develop algorithms and create mathematical model
C3	Indian Space Research Organization	<a href="http://www.isro.gov.in">www.isro.gov.in</a>	Harness space technology for national development, while pursuing space science research and planetary exploration. Designs and develops of Launch vehicles and satellites and related technologies.
C4	Defence Researc & Development Organization	<a href="http://www.drdo.gov.in">www.drdo.gov.in</a>	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	<a href="http://www.hal-india.co.in">www.hal-india.co.in</a>	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	<a href="http://www.mahindraaerospace.com">www.mahindraaerospace.com</a>	Manufactures a utility and versatile aircraft in its class.
C7	AMD	<a href="http://www.amd.com">www.amd.com</a>	Develops computer processors and related technologies like chipsets, Embedded and Graphic processors etc.
C8	XILINX	<a href="http://www.xilinx.com">www.xilinx.com</a>	Primary supplier of Programmable logic devices
C9	Qualcomm	<a href="http://www.qualcomm.com">www.qualcomm.com</a>	Invent mobile technology breakthroughs.
C10	Bharat Electronics Ltd.	<a href="http://www.bel-india.in">www.bel-india.in</a>	Indian state owned aerospace and defence company. Manufactures advanced electronic produts for the indian armed forces.
C11	Bharat Heavy Electricals Ltd.	<a href="http://www.bhel.com">www.bhel.com</a>	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.

**Research Paper**

Code	Title of the Paper	First Author	Journal/Conferenc	DOI no.	Issue / Volume/Page no/Year
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		<b>Name</b>	<b>e Name</b>		
P1	Research of Analog Communication System	<a href="#">Liwei Huang</a>	IEEE	10.1109/ICAICA52 286.2021.9498079	02 August 2021
P2	Mitigation of nonlinearities in analog radio over fiber links using machine learning approach	Muhammad UsmanHadi	Science Direct	<a href="https://doi.org/10.1016/j.ict.2020.11.002">10.1016/j.ict.2020.11.002</a>	<a href="#">Volume 7, Issue 2</a> , June 2021, Pages 253-258
P3	FPGA-Based Voice Encryption Equipment under the Analog Voice Communication Channel	Xinyu Ge	MDPI	<a href="https://doi.org/10.3390/info12110456">10.3390/info12110456</a>	4 November 2021 
P4	Distributed L2-gain control of large-scale systems under gossip communication protocol	Tao Yu	International Journal of control	<a href="https://doi.org/10.1080/00207179.2019.1631489">10.1080/00207179.2019.1631489</a>	 Principal J D College of Engineering & Management Khandola, Katol Road Nagpur-441501 19 Jun 2019



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P5	A Technique to Reduce Phase/Frequency Modulation Bandwidth in a Polar RF Transmitter	<a href="#">Jingcheng Zhuang</a>	IEEE Transactions on Circuits and Systems I: Regular Papers	Published: 2010	18 Dec 2018
P6	Amplitude, Phase, and Frequency Modulation	<a href="#">H. Roder</a>	IEEE	<a href="#">10.1109/JRPROC.1931.222283</a>	Dec. 1931
P7	1/F noise and superimposed RTS noise in Ti-Au/n-type GaAs Schottky barrier diodes	<a href="#">A. V. Klyuev</a>	IEEE	<a href="#">10.1109/ICNF.2015.7288575</a>	2-6 June 2015
P8	Analog and Digital Phase Modulation and Signal Transmission with Spin-Torque Nano-Oscillators	A. Litvinenko	APS Physics	10.1103/PhysRevApplied.16.024048	<a href="#">Vol. 16, Iss. 2 — August 2021</a>  PRINCIPAL
P9	Terahertz direct modulation techniques for high-speed communication systems	Tianchi Zou	IEEE	<a href="#">10.23919/JCC.2021.05.014</a>	 Principal J D College of Engineering & Management Khandala, Katol Road Nagpur-441501 Volume: 10, Issue: 5, May 2021



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P10	A Ka-Band GaN-on-Si MMIC Analog Vectorial Modulator and Its Broadband Calibration Procedure	G. Collodi	IEEE	<a href="#">10.1109/LMWC.2021.3054463</a>	Volume: 31, <a href="#">Issue: 4</a> , April 2021
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**Prof. Shafaque Khan**  
Subject Teacher

**Prof. A. K. Ikhar**  
Academic Incharge

**Dr. P. R. Kshirsagar**  
HOD, Dept. of ENETC  
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2. To produce competent technocrats of high standards satisfying the needs of all stakeholders.

### Teaching Plan

<b>Course</b> : B. Tech. in Electronics & Telecommunication Engineering	<b>Year/Semester</b> : 4 <sup>th</sup> Semester (2 <sup>nd</sup> Year)
<b>Name of the Teacher</b> : Dr. S. L. Haridas	<b>Subject Code</b> : ET4T005
<b>Subject</b> : Signals & System	<b>Section</b> : ETC

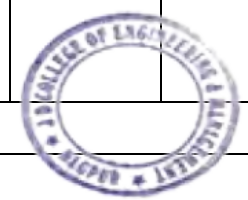
<b>Periods per Week (each 60 min)</b>	Lecture	<b>3</b>
	Practical	-
	Tutorial	-

Course Objective	Course Outcomes
<ol style="list-style-type: none"> <li>1. To develop a strong foundation for continuous and discrete time signal and system.</li> <li>2. Introduce ideas for analysis various types of continuous and discrete time system.</li> <li>3. Learn fundamental concepts and transform as relevant to time and frequency domain signal.</li> <li>4. Understand the process of sampling and interpolation in real time signal transmission.</li> </ol>	<p><b>Students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Understand the basics of signals &amp; systems.</li> <li>2. Familiar with the properties of LTI (Linear Time Invariant System) system and process involved in analysis of signals before transmission.</li> <li>3. Calculate Fourier series and Fourier transform of continuous and discrete time signals.</li> <li>4. Apply knowledge of sampling and interpolation to sample and reconstruct signals during real time signal transmission and reception.</li> <li>5. Analyze continuous and discrete systems in time and frequency domain.</li> <li>6. Analyze signal and system properties like stability and causality using Laplace and Z transforms.</li> </ol>

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 Mapped
<b>Unit I – Basics of signals and system</b>									
1	1	1	Introduction and Classification of signals, Definition of signal, Continuous time and discrete time signal Definition,	Day 1	T1 (Pg :1-5)	<a href="https://www.youtube.com/watch?v=PJZXHr5M6CU&amp;t=3s">https://www.youtube.com/watch?v=PJZXHr5M6CU&amp;t=3s</a> lecture 1	C1-C10	Able to understand Classification of signals, Definition of signal, Continuous time and discrete time	CO1
2	2	2	Classification of signals as even, odd, periodic and non-periodic, Deterministic and non-deterministic,	Day 2	T1 (Pg :6-15)	<a href="https://www.youtube.com/watch?v=PJZXHr5M6CU">https://www.youtube.com/watch?v=PJZXHr5M6CU</a> lecture 2	C1-C10	Able to understand Classification of signals	CO-1
3	3	3	energy and power, elementary signals used for testing, Exponential, sine	Day 3	T1 (Pg :6-15 )	<a href="https://www.youtube.com/watch?v=KtLtqz_P_iY">https://www.youtube.com/watch?v=KtLtqz_P_iY</a> lecture 3	C1-C10	Able to understand Elementary signals	CO1
4	4	4	impulse, step and its properties, ramp, rectangular, triangular, signum, sinc,	Day 4	T1 (Pg :16-22)	<a href="https://www.tutorialspoint.com/signals_and_systems/signals_basic_types.htm">https://www.tutorialspoint.com/signals_and_systems/signals_basic_types.htm</a>	C1-C10	Able to understand Elementary signals	CO1
5	5	5	Operations on signals, Systems Amplitude scaling, addition, multiplication, differentiation, integration, time scaling, time shifting and time folding,	Day 5	T1 (Pg :22-29)	<a href="https://www.youtube.com/watch?v=niCzs_oElqY">https://www.youtube.com/watch?v=niCzs_oElqY</a> <a href="http://signalsandsystems.wiki dot.com/notes-signals-operations">http://signalsandsystems.wiki dot.com/notes-signals-operations</a>	C1-C10	Able to understand) Operations on signals	CO1
6	6	6	Classification, linear and non-linear, time variant and invariant, causal and non-causal, static and dynamic, stable and unstable, invertible.	Day 6	T1 (Pg :30-44)	<a href="https://www.youtube.com/watch?v=PZfZGbbBuxk">https://www.youtube.com/watch?v=PZfZGbbBuxk</a>	C1-C10	Able to understand Classification of System	CO2
<b>Unit II–Time Response Analysis</b>									

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7	7	7	Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Systems,	Day 7	T1 (Pg :70)	<a href="https://www.youtube.com/watch?v=BJcn2Elm4E">https://www.youtube.com/watch?v=BJcn2Elm4E</a>	C1-C10	Able to understand Continuous-Time and Discrete-Time Signals, Transformations	CO2
8	8	8	Continuous-Time and Discrete-Time Systems, Basic	Day 8	T1 (Pg : 70)	<a href="https://www.youtube.com/watch?v=BJcn2Elm4E">https://www.youtube.com/watch?v=BJcn2Elm4E</a>	C1-C10	Able to understand Continuous-Time and Discrete-Time Signals, Transformations	CO2
9	9	9	System Properties, Discrete-Time LTI (Linear Time Invariant System)	Day 7	T1 (Pg : 70)	<a href="https://www.youtube.com/watch?v=Y8iFJVmSQIk">https://www.youtube.com/watch?v=Y8iFJVmSQIk</a>	C1-C10	Able to understand System Properties, Discrete-Time LTI	CO2
10	10	10	the Convolution Sum, Continuous-Time LTI Systems, the Convolution Integral,	Day 8	T1 (Pg :71-94)	<a href="https://www.youtube.com/watch?v=zQ7Khy-MifQ">https://www.youtube.com/watch?v=zQ7Khy-MifQ</a>	C1-C10	Able to understand the Convolution Sum, Continuous-Time LTI Systems	CO2
11	11	11	Properties of Linear Time-Invariant Systems	Day 9	T1 (Pg :71-94)	<a href="https://www.youtube.com/watch?v=mC3TiBJiCsY">https://www.youtube.com/watch?v=mC3TiBJiCsY</a>	C1-C10	Able to understand Properties of Linear Time-Invariant Systems	CO2
12	12	12	Causal LTI Systems Described by Differential and Difference Equations.	Day 10	T1 (Pg :94-108)	<a href="https://www.youtube.com/watch?v=yNc1Hvvg8CM">https://www.youtube.com/watch?v=yNc1Hvvg8CM</a>	C1-C10	Able to understand Causal LTI Systems Described by Differential and Difference Equations.	CO2

Unit III – Fourier Series Analysis

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13	13	13	The Response of LTI Systems to Complex Exponentials, Fourier Series Representation of Continuous-Time Periodic Signals,	Day 11	T1 , T2	<a href="https://www.youtube.com/watch?v=ZDCsLiC46S8">https://www.youtube.com/watch?v=ZDCsLiC46S8</a>	C1-C10	Able to understand The Response of LTI Systems to Complex Exponentials,	CO2
14	14	14	Convergence of the Fourier Series, Properties of	Day 12	T1 , T2	<a href="https://www.youtube.com/watch?v=01d8tt--4So">https://www.youtube.com/watch?v=01d8tt--4So</a>	C1-C10	Able to describe Convergence of	CO2

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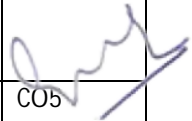
			Continuous-Time Fourier Series,					the Fourier Series, Properties of Continuous-Time Fourier Series,	
15	15	15	Fourier Series Representation of Discrete-Time Periodic Signals,	Day 13	T1 , T2	<a href="https://www.youtube.com/watch?v=wHtXNU2F0wc">https://www.youtube.com/watch?v=wHtXNU2F0wc</a>	C1-C10	Able to understand Fourier Series Representation of Discrete-Time Periodic Signals	CO2
16	16	16	Properties of Discrete-Time Fourier Series, Fourier Series and LTI Systems,	Day 14	T1 , T2	<a href="https://www.youtube.com/watch?v=ZDCsLiC46S8">https://www.youtube.com/watch?v=ZDCsLiC46S8</a>	C1-C10	Able to understand Properties of Discrete-Time Fourier Series, Fourier Series and LTI Systems,	CO2
17	17	17	Examples of Continuous-Time Filters Described by Differential Equations,	Day 15	T1 , T2	<a href="https://www.youtube.com/watch?v=it6kiQuWdCo">https://www.youtube.com/watch?v=it6kiQuWdCo</a>	C1-C10	Able to understand Examples of Continuous-Time Filters Described by Differential Equations,	CO3
18	18	18	Examples of Discrete-Time Filters Described by Difference Equations	Day 16	T1 , T2	<a href="https://www.youtube.com/watch?v=MtHpbGUiGaA">https://www.youtube.com/watch?v=MtHpbGUiGaA</a>	C1-C10	Able to understand Examples of Discrete-Time Filters Described by Difference Equations	CO3
Unit IV-									
19	19	19	The Continuous-Time Fourier Transform, Representation of Aperiodic Signals	Day 17	T1 , T2	<a href="https://www.youtube.com/watch?v=9I4z5JPbvqg">https://www.youtube.com/watch?v=9I4z5JPbvqg</a>	C1-C10	Able to understand The Continuous-Time Fourier Transform, Representation of Aperiodic Signals	CO2
20	20	20	The Fourier Transform for Periodic Signals, Properties of the Continuous-Time Fourier Transform,	Day 18	T1 , T2	<a href="https://www.youtube.com/watch?v=9I4z5JPbvqg">https://www.youtube.com/watch?v=9I4z5JPbvqg</a>	C1-C10	Able to understand The Fourier Transform for Periodic Signals, Properties of the Continuous-Time	CO3

  
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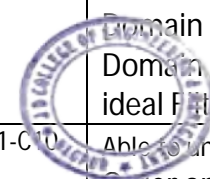
								Fourier Transform	
21	21	21	Systems Characterized by Linear Constant-Coefficient Differential Equation,	Day 19	T1 , T2	<a href="https://www.youtube.com/watch?v=it6kiOuWdCo&amp;t=10s">https://www.youtube.com/watch?v=it6kiOuWdCo&amp;t=10s</a>	C1-C10	Able to understand Systems Characterized by Linear Constant-Coefficient Differential Equation,	CO5
22	22	22	The Discrete-Time Fourier Transform, Representation of Aperiodic Signals	Day 20	T1 , T2	<a href="https://www.youtube.com/watch?v=ZFK1uZoexT0">https://www.youtube.com/watch?v=ZFK1uZoexT0</a>	C1-C10	Able to understandThe Discrete-Time Fourier Transform, Representation of Aperiodic Signals	CO5
23	23	23	The Fourier Transform for Periodic Signals,	Day 21	T1 , T2	<a href="https://www.youtube.com/watch?v=9I4z5JPbvqg&amp;t=17s">https://www.youtube.com/watch?v=9I4z5JPbvqg&amp;t=17s</a>	C1-C10	Able to understandThe Fourier Transform forPeriodic Signals,	CO5
24	24	24	Properties of the Discrete-Time Fourier Transform	Day 22	T1 , T2	<a href="https://www.youtube.com/watch?v=0A1geqU-Qac">https://www.youtube.com/watch?v=0A1geqU-Qac</a>	C1-C10	Able to understandProperties of the Discrete-Time Fourier Transform	CO5
<b>Unit V – Frequency Response Analysis</b>									
24	24	24A	The Magnitude-Phase Representation of the Frequency Response of LTI Systems,	Day 22	T1 , T2	<a href="https://www.youtube.com/watch?v=HbDUxcPTRSc">https://www.youtube.com/watch?v=HbDUxcPTRSc</a>	C1-C10	Able to understandThe Magnitude-Phase Representation of the Frequency Response of LTI Systems,	CO5
25	25	25	Concept of Frequency Response, Group Delay, Phase Delay, Time-Domain	Day 23	T1 , T2	<a href="https://www.youtube.com/watch?v=yZN_1tyOcoE">https://www.youtube.com/watch?v=yZN_1tyOcoE</a>	C1-C10	Able to understandConcept ofFrequency Response, Group Delay, Phase Delay, Time-Domain	CO5
26	26	26	Properties of Ideal Frequency-Selective Filters, Time-Domain and Frequency-Domain Aspects of Non ideal Filters	Day 24	T1 , T2	<a href="https://www.youtube.com/watch?v=iuBzZXvESiY">https://www.youtube.com/watch?v=iuBzZXvESiY</a>	C1-C10	Able to understandProperties of Ideal Frequency-Selective Filters, Time-Domain and Frequency-Domain Aspects of Non ideal Filters	CO5
27	27	27	First-Order and Second-Order Continuous-Time Systems,	Day 25	T1 , T2	<a href="https://ocw.mit.edu/resources/res-6-007-signals-and-">https://ocw.mit.edu/resources/res-6-007-signals-and-</a>	C1-C10	Able to understandFirst-Order and Second-	CO5



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						<a href="https://www.youtube.com/watch?v=3vnl_o_B3tg">systems-spring-2011/video-lectures/lecture-21-continuous-time-second-order-systems/</a>		Order Continuous-Time Systems,	
28	28	28	Discrete-Time System, Representation of a Continuous-Time Signal by its Samples,	Day 26	T1 , T2	<a href="https://www.youtube.com/watch?v=3vnl_o_B3tg">https://www.youtube.com/watch?v=3vnl_o_B3tg</a>	C1-C10	Able to understand Discrete-Time System, Representation of a Continuous-Time Signal by its Samples,	CO5
29	29	29	The Sampling theorem, Reconstruction of a Signal from Its Samples Using Interpolation	Day 27	T1 , T2	<a href="https://www.youtube.com/watch?v=FLPqshreE-g">https://www.youtube.com/watch?v=FLPqshreE-g</a>	C1-C10	Able to understand The Sampling theorem, Reconstruction of a Signal from Its Samples Using Interpolation	CO5
30	30	30	Aliasing effect, Discrete-Time Processing of Continuous-Time Signals	Day 28	T1 , T2	<a href="https://allsignalprocessing.com/lessons/aliasing-and-the-sampling-theorem-simplified/">https://allsignalprocessing.com/lessons/aliasing-and-the-sampling-theorem-simplified/</a>	C1-C10	Able to understand Aliasing effect, Discrete-Time Processing of Continuous-Time Signals	CO5

### Unit VI – Laplace and Z-Domain Analysis

31	31	31	The Laplace Transform, Region of Convergence for Laplace Transforms, ,	Day 29	T1 , T2	<a href="https://www.youtube.com/watch?v=pJYoGL9hMIM">https://www.youtube.com/watch?v=pJYoGL9hMIM</a>	C1-C10	Able to understand The Laplace Transform, Region of Convergence for Laplace Transforms, ,	CO5
32	32	32	Inverse Laplace Transform, Properties of the Laplace Transform, Analysis	Day 30	T1 , T2	<a href="https://www.youtube.com/watch?v=Y8GXpS31CGI">https://www.youtube.com/watch?v=Y8GXpS31CGI</a>	C1-C10	Able to understand Inverse Laplace Transform, Properties of the Laplace Transform, Analysis	CO5
33	33	33	Laplace Transform, Analysis and Characterization of LTISystems Using Laplace Transform,	Day 31	T1 , T2	<a href="https://www.youtube.com/watch?v=j2dmpwxmap8">https://www.youtube.com/watch?v=j2dmpwxmap8</a>	C1-C10	Able to understand Inverse Laplace Transform, Properties of the Laplace Transform, Analysis	CO5
34	34	34	System Function Algebra and Block Diagram	Day 32	T1 , T2	<a href="https://www.youtube.com/watch?v=YDtNuRSJP5A">https://www.youtube.com/watch?v=YDtNuRSJP5A</a>	C1-C10	Able to understand System Function	CO5

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			Representations, The Unilateral Laplace Transform,					Algebra and Block Diagram Representations, The Unilateral Laplace Transform,	
35	35	35	The z-Transform, Region of Convergence for the z-Transform, Inverse z-Transform,	Day 33	T1 , T2	<a href="https://www.youtube.com/watch?v=4ZYIHTcdB8Q">https://www.youtube.com/watch?v=4ZYIHTcdB8Q</a>	C1-C10	Able to understand The z-Transform, Region of Convergence for the z-Transform, Inverse z-Transform,	CO5
36	36	36	Properties of z-Transform, Analysis and Characterization of LTI Systems Using z-Transforms	Day 34	T1 , T2	<a href="https://www.youtube.com/watch?v=iG84of3cLWc">https://www.youtube.com/watch?v=iG84of3cLWc</a>	C1-C10	Able to understand Properties of z-Transform, Analysis and Characterization of LTI Systems Using z-Transforms	CO5

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

Total number of lectures as per syllabus: - 44

Total number of lectures as per planned: -44

Tutorial Plan				
Week	Topic	No. Of Problems	Mapped With CO	
1	Not Applicable			
Assignment Plan				
Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1				I, II
Content Beyond Syllabus Topic – Planned				
Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in T	

  
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1	Use of virtual lab		I, II, III
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Unit wise Marks and Question distribution					
Unit-1	Unit-2	Unit-3	Unit-4	Unit-5	Unit-6
10 Mark	10 Mark	10 Mark	10 Mark	10 Mark	10 Mark
2 Question	2 Question	2 Question	2 Question	2 Question	2 Question



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**Text Books / Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	"Signals and Systems"	Simon Haykin	John Wiley and Sons (Asia), Private Limited,	
T2	"Linear Systems and Signals",	B. P. Lathi	OXFORD University Press	
T3	Signals and Systems	A.V. Oppenheim, A.S. Willsky and I.T. Young	Prentice Hall, 1983	1983
T4	"Signals and Systems",	A. NagoorKanni	McGraw Hill.	2nd Edition
R1	"Signals and Systems",	J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar,	TMH New Delhi	,2001
R2	Signals and Systems	M. J. Roberts,	TMH	2003
R3	Signals Systems and Transforms	C. L. Philips, J.M.Parr and EveA.Riskin	Pearson education	2004
R4	Continuous and Discrete Signals and Systems	S.S. Soliman& M.D. Srinath,	Prentice-Hall,	1990
R5	Signals and Systems" Principles and Applications	ShailaDinkarApte	CambridgeUniver sityPress	

**Company/Industry:**


Code	Company/Industry Name	Website	Detailed Information
C1	BSNL	<a href="http://www.bsnl.co.in">www.bsnl.co.in</a>	The Bharat Sanchar Nigam Limited, country's largest cellular service operator was set up in the year 2000. It is a state owned telecom company with its headquarters located in New Delhi. BSNL is also the largest land line telephone establishment in India. As of April, 2011 87.1 million users have been reported to be BSNL users.
C2	MTNL	<a href="http://www.mtnl.net.in">www.mtnl.net.in</a>	Mahanagar Telephone Nigam Limited (MTNL) was set up in the year 1985, to run telecom operations in the major metro cities of India, Mumbai and Delhi. Its

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			headquarters are based in Mumbai. MTNL was the first company in India to initiate 3G services in India, having the brand name of "MTNL 3G Jadoo Services" which provided options as Video call, Mobile TV, Mobile Broadband etc to the customers.
C3	Airtel	<a href="http://www.airtel.in">www.airtel.in</a>	Also known as Bharti Airtel Limited was started in July 1995, with its head office based in New Delhi. Airtel runs its operations in as many as 19 countries across the world and is also ranked fifth as telecom service provider globally. As of April 2011, figures show that Airtel has over 164.61 million users which make it the biggest mobile service operator in India. Its service includes both 2G and 3G facilities
C4	Reliance Communications	<a href="http://www.rcom.co.in">www.rcom.co.in</a>	Also known as RCOM was set up in 2004, with its head office in Navi Mumbai. Reliance Communications as of now has more than 128 million users all across the world.
C5	Vodafone Idea	<a href="http://www.vodafoneidea.com">www.vodafoneidea.com</a>	Vodafone Idea Limited d/b/a Vi is an Indian telecom operator with its headquarters based in Mumbai and Gandhinagar. It is a pan-India integrated GSM operator offering 2G, 4G, 4G+, VoLTE, and VoWiFi service
C6	Tata Indicom	<a href="http://www.tatateleservice.com">www.tatateleservice.com</a>	<b>Tata Teleservices</b> was set up in 1996 and is under the Tata Group, which is a group worth around US\$ 22 billion and has more than 96 companies. The company Tata Teleservices Limited has been formed with an investment of around US\$ 7.5 billion.
C7	Idea Cellular	<a href="http://www.vodafoneidea.com">www.vodafoneidea.com</a>	Idea Cellular started its operations in 1995 and is under the Aditya Birla Group, which holds 98.3% stake in the company. The Company Idea Cellular Limited is one of the telephony wireless companies that functions in many states in India.
C8	AT&T Inc. (T)	<a href="http://www.att.com">www.att.com</a>	AT&T is a holding company that provides communications and digital entertainment services globally. Its services and products include wireless communications, data/broadband and Internet services, digital video services, local and long-distance telephone services, telecommunications equipment, managed networking, and feature film, television, and gaming production and distribution. The company also owns and operates regional TV sports networks
C9	Aircel	<a href="http://www.aircel.com">www.aircel.com</a>	Aircel Cellular Limited started its business operations the year 1992 and started offering wireless telecommunications facilities since its initiation. The firm provides both prepaid as well as postpaid services along with roaming facilities. It functions in the Indian states of Bihar, Orissa, Jammu and Kashmir, Tamilnadu, Himachal Pradesh, West Bengal, Manipur, Sikkim, etc
C10	Nippon Telegraph & Telephone Corp. (NTTY)	<a href="http://www.ntt.co.jp">www.ntt.co.jp</a>	Nippon Telegraph & Telephone is a Japan-based holding company that provides telecommunication services. It offers domestic intra-prefectural communication services, such as fixed voice-related, Internet Protocol (IP), and packet communications services, and sells telecommunication equipment. The company

  
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			also provides mobile voice-related, IP, and packet communications services, as well as system integration and network system services. Additionally, Nippon operates businesses in real estate, finance, and more.
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**Research Paper:**

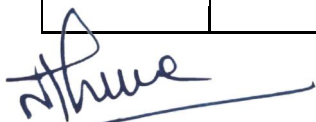
Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/ Page no/Year
P1	Sum Throughput Maximization in a Cognitive Multiple Access Channel with Cooperative Spectrum Sensing and Energy Harvesting.	S. Biswas, S. Dey, and A. Shirazinia	IEEE Transactions on Cognitive Communications and Networking , (Early Access), 2019	DOI: 10.1109/TCCN.2019.2908860	2019
P2	Low-Overhead Cyclic Reference Signals for Channel Estimation for FDD Massive MIMO.	R. Apelfröjd, W. Zirwas and M. Sternad,	IEEE Transactions on Communications		vol. 67, no.5, May 2019, pp. 3279-3291.
P3	Optimal Scheduling of Multiple Sensors over Shared Channels with Packet Transmission Constraints.	S. Wu, X. Ren, S. Dey and L. Shi	Automatica		ol. 96, Oct. 218, pp. 22-31.
P4	Towards Immortal Wireless Sensor Networks by Optimal Energy Beamforming and Data Routing.,	R. Du, A. Özelikkale, C. Fischione, and M. Xiao,	IEEE Transactions on Wireless Communications		vol. 17, no. 8, pp. 5338-5352, 2018
P5	Estimation in Wireless Sensor Networks With Security Constraints.	X. Guo, A.S. Leong and S. Dey,	IEEE Transactions on Aerospace and Electronic Systems		vol.. 53, no. 2, April 2017, pp 544-561.
P6	Massive MIMO for Decentralized Estimation of a Correlated Source	A. Shirazinia, S. Dey, D. Ciunozo and P. Salvo-Rossi,	IEEE Transactions on Signal Processing		, vol. 64, no. 10, pp. 2499-2512. 2016.
P7	Power Control and Asymptotic Throughput Analysis for the Distributed Cognitive Uplink.	E. Nekouei, H. Inatekin and S. Dey,	IEEE Transactions on Communications,	DOI: 10.1109/TCOMM.2013.112413.130510	vol. 62, no. 1, pp. 41-58, 2014.
P8	Long Term Channel Characterization for Energy Efficient Transmission in Industrial Environments.,	P. Agrawal, A. Ahlén, T. Olofsson and M. Gidlund,	IEEE Transactions on Communications		College of Engineering & Management Khandola, Katol Road Nagpur-441501 pp 3004-3014, 2014.

  
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pp 3004-3014, 2014.


P9	Optimal Energy Allocation for Kalman Filtering over Packet Dropping Links with Imperfect Acknowledgements and Energy Harvesting Constraints.,	M. Nourian, A.S. Leong and S. Dey,	IEEE Transactions on Automatic Control		vol. 59, no. 8, pp. 2128-2143, August 2014
P10	An Optimal Transmission Strategy for Kalman Filtering over Packet Dropping Links with Imperfect Acknowledgements.	M. Nourian, A.S.C. Leong, S. Dey and D. Quevedo,	IEEE Transactions on Control of Network		Systems vol. 1, no. 3, pp. 259-271, 2014.
P11	Multichannel Room Correction with Focus Control.,	L.-J. Brännmark and A. Ahlén,	Journal of the Audio Engineering Society		vol. 63, no. 1/2, pp. 21-30, January/February 2015.
P12	Interference Management for D2D Communications in Heterogeneous Cellular Networks.,	Y. Xu, F. Liu and P. Wu,	Pervasive and Mobile Computing		vol. 51, pp. 138-149, 2018.
P13	Security Measure Allocation for Industrial Control Systems : Exploiting Systematic Search Techniques and Submodularity.	J. Milošević, A. Teixeira, T. Tanaka, K-H. Johansson, and H. Sandberg,	Int. J. Robust Nonlinear Control		2018
P14	Optimal Scheduling of Multiple Sensors over Shared Channels with Packet Transmission Constraints.	S. Wu, X. Ren, S. Dey and L. Shi,	Automatica ,		vol. 96, Oct. 218, pp. 22-31.
P15	Heuristic for Learning Common Emitter Amplification with Bipolar Transistors.	K. Staffas	European Journal of Engineering Education,	Online: DOI 10.1080/03043797.2016.1226782	vol. 42, no. 6, pp. 860-874, 2017

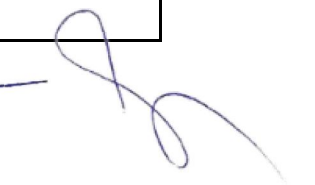
  
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An Autonomous Institute, with NAAC "A" Grade  
Department of Electronics and Telecommunication Engineering  
"Rectifying Ideas, Amplifying Knowledge"  
2021-22 (Odd Sem)



VISION

"To be a Department providing high quality & globally competent knowledge of concurrent technologies in the field of Electronics and Telecommunication."

MISSION

1. To provide quality teaching learning process through well-developed educational environment and dedicated faculties.
2. To produce competent technocrats of high standards satisfying the needs of all stakeholders.

### Teaching Plan

<b>Course</b> : B. Tech in Electronics & Telecommunication	<b>Year/Semester</b> : 5 <sup>th</sup> Semester (3rd Year)	
<b>Name of the Teacher</b> : Prof. Pranali R. Langde	<b>Subject Code</b> : BTEXC504	
<b>Subject</b> : Digital Signal Processing	<b>Section</b> : ETC - A	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	<b>3</b>
	<b>Tutorial</b>	<b>-</b>
	<b>Practical</b>	<b>2</b>

<b>Course Objective</b>	<b>Course Outcomes</b>
<ol style="list-style-type: none"><li>1. Understand use of different transforms and analyze the discrete time signals and systems.</li><li>2. Realize the use of LTI filters for filtering different real world signals.</li><li>3. Capable of calibrating and resolving different frequencies existing in any signal.</li><li>4. Design and implement multistage sampling rate converter.</li><li>5. Design of different types of digital filters for various applications.</li></ol>	<ol style="list-style-type: none"><li>1. <b>Remember</b> the use of different transforms and analyze the discrete time signals and systems.</li><li>2. <b>Understand</b> the use of LTI filters for filtering different real world signals.</li><li>3. <b>Apply</b> the knowledge of DSP for calibrating and resolving different frequencies existing in any signal.</li><li>4. <b>Analyze</b> various multirate signal processor.</li><li>5. <b>Summarize</b> and implement multistage sampling rate converter.</li><li>6. <b>Design</b> of different types of digital filters for various applications.</li></ol>

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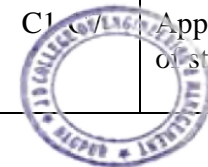


Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no) Reference Book (Page no)	URL's (NPTEL/OnlineMaterial /Ppt/Video)	Applications (R&D/ Industry)	Learning Outcomes	CO mapping
<b>Unit I –DSP Preliminaries</b>									
1	1	1	Basics of Signal Representation of signals on orthogonal basis	Lecture 1	R4(1.2), R2(1.2) R4(2.4)	<a href="https://www.youtube.com/watch?v=6dFnpz_AEyA&amp;list=PL9567DFCA3A66F299">https://www.youtube.com/watch?v=6dFnpz_AEyA&amp;list=PL9567DFCA3A66F299</a>	P5, C1-C4	Students will be able to understand the basics of signals and representation of signals.	CO 1,
2	2	2	Sampling aliasing and reconstruction of signals	Lecture 2	R6(2,187-193)	<a href="https://www.youtube.com/watch?v=rmDg3eVWT8E">https://www.youtube.com/watch?v=rmDg3eVWT8E</a>	P6, P7 C1-C4	To understand the digital signal processing, sampling and aliasing.	
3	3	3	Basic elements of DSP and its requirements	Lecture 3	R2(4)	<a href="https://www.youtube.com/watch?v=6ZdmzWJNYKA">https://www.youtube.com/watch?v=6ZdmzWJNYKA</a>	C1-C4	Students will know about basic elements of DSP	
4	4	4	Analog and Digital Signal Processing, Advantages of Digital over Analog signal Processing	Lecture 4	R2(5-6)	<a href="https://www.youtube.com/watch?v=SOYVOWeTuZE">https://www.youtube.com/watch?v=SOYVOWeTuZE</a>	P8 C1-C4	Understand the advantages of Digital signal processing	
<b>Unit II –Discrete Fourier Transforms</b>									
5	5	5	Introduction to DTFT and definition Frequency domain sampling and reconstruction of Discrete- time signal Development of DFT from DTFT	Lecture 5	R4(4.1) R2(449) R6(5-22)	<a href="https://www.youtube.com/watch?v=Q8wuqYsdnSs&amp;list=PL9567DFCA3A66F299&amp;index=8">https://www.youtube.com/watch?v=Q8wuqYsdnSs&amp;list=PL9567DFCA3A66F299&amp;index=8</a>	P9, C1-C7	Understand use of different transforms and analyze the discrete time signals and systems.	CO 1 CO 3
6	6	6	DFT, Properties of DFT	Lecture 6	R4(5.4-5.9)	<a href="https://www.youtube.com/watch?v=GDFTb-BwA0o&amp;list=PL9567DFCA3A66F299&amp;index=9">https://www.youtube.com/watch?v=GDFTb-BwA0o&amp;list=PL9567DFCA3A66F299&amp;index=9</a>	P9 C1-C7	Students will understand the properties of DFT	Principal College of Engineering & Management Khandala, Katol Road Nagpur-441501
7	7	7	Properties of DFT	Lecture 7	R4(5.4-5.9)	<a href="https://www.youtube.com/watch?v=GDFTb-BwA0o&amp;list=PL9567D">https://www.youtube.com/watch?v=GDFTb-BwA0o&amp;list=PL9567D</a>		Students will understand the properties of DFT	

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8	8	8	circular convolution	Lecture 8	R6(5-52)	<a href="https://www.youtube.com/watch?v=A6b3UkraTgw">https://www.youtube.com/watch?v=A6b3UkraTgw</a>	C1-C7	Understand the concept of convolution	CO 1, CO 3
			Linear Convolution		R5(198)	<a href="https://www.youtube.com/watch?v=A6b3UkraTgw">https://www.youtube.com/watch?v=A6b3UkraTgw</a>			
9	9	9	Computation of linear convolution using circular convolution	Lecture 9	R6(5-76)	<a href="https://www.youtube.com/watch?v=vlFdVYA XIxg">https://www.youtube.com/watch?v=vlFdVYA XIxg</a>	C1-C7	Understand the concept of convolution	
10	10	10	FFT, decimation in time using Radix-2 FFT	Lecture 10	R5(8-3)	<a href="https://www.youtube.com/watch?v=vlFdVYA XIxg">https://www.youtube.com/watch?v=vlFdVYA XIxg</a>	P2, P3 C1-C7	Students will get the decimation concept in terms of DIT domain.	
11	11	11	Decimation in frequency using Radix-2 FFT algorithm	Lecture 11	R5(8-31)	<a href="https://www.youtube.com/watch?v=fCTfKL3XluA">https://www.youtube.com/watch?v=fCTfKL3XluA</a>	P2, P3 C1-C7	Students will get the decimation concept in terms of DIF domain.	

### Unit III –Z Transforms

12	12	12	Need for transform, Definition of Z-transform	Lecture 12	R4(3.2)	<a href="https://www.youtube.com/watch?v=gkC7cXa8ewk&amp;list=PL9567DFCA3A66F299&amp;index=12">https://www.youtube.com/watch?v=gkC7cXa8ewk&amp;list=PL9567DFCA3A66F299&amp;index=12</a>	C1-C7	Understand use of different transforms and analyze the discrete time signals and systems.	CO1, CO 3  Principal J D College of Engineering & Management Khandala, Katol Road Nagpur-441501
			Relation between Laplace transform and Z transform		R7(217,218)	<a href="https://www.youtube.com/watch?v=gkC7cXa8ewk&amp;list=PL9567DFCA3A66F299&amp;index=12">https://www.youtube.com/watch?v=gkC7cXa8ewk&amp;list=PL9567DFCA3A66F299&amp;index=12</a>			
13	13	13	Properties of ROC and properties of Z transform	Lecture 13	R7(221)	<a href="https://www.youtube.com/watch?v=BAfdk3mwByM&amp;list=PL9567DFCA3A66F299&amp;index=13">https://www.youtube.com/watch?v=BAfdk3mwByM&amp;list=PL9567DFCA3A66F299&amp;index=13</a>	P10 C1-C7	Illustrate properties of Z transform	
14	14	14	Relation between pole locations and time domain behaviour	Lecture 14	R2(151)	<a href="https://www.youtube.com/watch?v=oslk6Z4PSY0">https://www.youtube.com/watch?v=oslk6Z4PSY0</a>	C1-C7	Apply the knowledge of stability.	



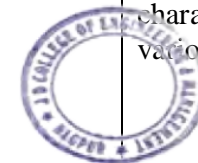
			causality and stability considerations for LTI systems		R4(3.4-3.6)	<a href="https://www.youtube.com/watch?v=D5EAuo1cWQM">https://www.youtube.com/watch?v=D5EAuo1cWQM</a>			CO1, CO 3
15	15	15	Inverse Z transform, Power series method	Lecture 15	R4(3.31), R4(3.35)	<a href="https://www.youtube.com/watch?v=Uc5SFRp6ex0">https://www.youtube.com/watch?v=Uc5SFRp6ex0</a> <a href="https://www.youtube.com/watch?v=zJfrTm5i2Co">https://www.youtube.com/watch?v=zJfrTm5i2Co</a>	C1-C7	Understand Inverse Z Transform	
16	16	16	partial fraction expansion method	Lecture 16	R4(3.32)	<a href="https://www.youtube.com/watch?v=qzATc7gPVg0">https://www.youtube.com/watch?v=qzATc7gPVg0</a>	C1-C7	Understand Inverse Z Transform by various methods	
17	17	17	Solution of difference equations	Lecture 17	R4(3.36)	<a href="https://www.youtube.com/watch?v=cAZs5Pbzdq0">https://www.youtube.com/watch?v=cAZs5Pbzdq0</a>	C1-C7	Understand Inverse Z Transform by various methods	

### Unit IV – IIR Filter Design

18	18	18	Concept of analog filter design	Lecture 18	R5(5.1)	<a href="https://www.youtube.com/watch?v=OCHfpmACqMM">https://www.youtube.com/watch?v=OCHfpmACqMM</a>	P11 C1-C7	Understand the concept of filter design	CO2, CO 5
			Design of IIR filters from analog filter		R5(5.6)				
19	19	19	IIR filter design by impulse invariance method	Lecture 19	R5(5.6-5.7)	<a href="https://www.youtube.com/watch?v=OCHfpmACqMM">https://www.youtube.com/watch?v=OCHfpmACqMM</a>	C1-C7	Apply the knowledge of filter design	
20	20	20	Bilinear transformation method	Lecture 20	R5(5.16-5.19)	<a href="https://www.youtube.com/watch?v=g8o511OswfQ">https://www.youtube.com/watch?v=g8o511OswfQ</a>	C1-C7	Apply the knowledge of filter design	
21	21	21	Characteristics of Butterworth filters	Lecture 21	R6(6-29)	<a href="https://www.youtube.com/watch?v=2IZtWnGV-K4&amp;list=PL9567DFCA3A66F299&amp;index=24">https://www.youtube.com/watch?v=2IZtWnGV-K4&amp;list=PL9567DFCA3A66F299&amp;index=24</a>	C1-C7	Students will understand the characteristics of various filter	
			Characteristics of Chebyshev filters		R5(5.47-5.49)				<a href="https://www.youtube.com/watch?v=2IZtWnGV-K4&amp;list=PL9567DFCA3A66F299&amp;index=24">https://www.youtube.com/watch?v=2IZtWnGV-K4&amp;list=PL9567DFCA3A66F299&amp;index=24</a>

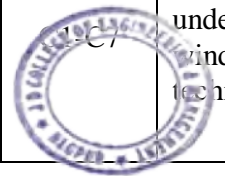
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22	22	22	Butterworth filter design	Lecture 22	R5(5.31-5.33)	<a href="https://www.youtube.com/watch?v=2IZtWnGV-K4&amp;list=PL9567DFCA3A66F299&amp;index=24">https://www.youtube.com/watch?v=2IZtWnGV-K4&amp;list=PL9567DFCA3A66F299&amp;index=24</a>	C1-C7	Students will understand the characteristics of various filter	CO2, CO 5
23	23	23	IIR filter realization using direct form	Lecture 23	R6(4-17)	<a href="https://www.youtube.com/watch?v=eExAlZ23yW4">https://www.youtube.com/watch?v=eExAlZ23yW4</a>	P12 C1-C7	Realization of filters with various form	
			cascade form and parallel form		R6(4-26)	<a href="https://www.youtube.com/watch?v=5-LWNQkIzS8&amp;t=983s">https://www.youtube.com/watch?v=5-LWNQkIzS8&amp;t=983s</a>			
24	24	24	Lowpass, High pass, Bandpass and Bandstop filters design using spectral transformation	Lecture 24	R6(4-27)	<a href="https://www.youtube.com/watch?v=gEeF8sEQTEc">https://www.youtube.com/watch?v=gEeF8sEQTEc</a> <a href="https://www.youtube.com/watch?v=dmPIydL01yM">https://www.youtube.com/watch?v=dmPIydL01yM</a>	P13 C1-C7	Design of different types of digital filters for various applications	
25	25	25	Lowpass, High pass, Bandpass and Bandstop filters design using spectral transformation	Lecture 25	R6(4-27)	<a href="https://www.youtube.com/watch?v=gEeF8sEQTEc">https://www.youtube.com/watch?v=gEeF8sEQTEc</a> <a href="https://www.youtube.com/watch?v=dmPIydL01yM">https://www.youtube.com/watch?v=dmPIydL01yM</a>	P13 C1-C7	Design of different types of digital filters for various applications	
<b>Unit V – FIR Filter Design</b>									
26	26	26	Ideal filter requirements	Lecture 26	R5(4.14)	<a href="https://www.youtube.com/watch?v=cu_L7gjtptkg">https://www.youtube.com/watch?v=cu_L7gjtptkg</a>	P 14 C1-C7	Know the Gibbs Phenomenon	
			Gibbs phenomenon		R4(6.42)				
27	27	27	windowing techniques	Lecture 27	R4(6.40)	<a href="https://www.youtube.com/watch?v=nsK7mmRSTDY&amp;list=PL9567DFCA3A66F299&amp;index=39">https://www.youtube.com/watch?v=nsK7mmRSTDY&amp;list=PL9567DFCA3A66F299&amp;index=39</a>	P 15 C1-C7	understand the windowing techniques	
28	28	28	characteristics and comparison of different window functions	Lecture 28	R4(6.53-6.54)	<a href="https://www.youtube.com/watch?v=nsK7mmRSTDY&amp;list=PL9567DFCA3A66F299&amp;index=39">https://www.youtube.com/watch?v=nsK7mmRSTDY&amp;list=PL9567DFCA3A66F299&amp;index=39</a>	C7	understand windowing techniques	

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CO5



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29	29	29	Design of linear phase FIR filter using windows and frequency sampling method	Lecture 29	R5(6-45)	<a href="https://youtu.be/JYL3NvfTG24?list=PL9567DFCA3A66F299">https://youtu.be/JYL3NvfTG24?list=PL9567DFCA3A66F299</a>	C1-C7	Design of different types of digital filters for various applications	CO2, CO 5
30	30	30	Design of linear phase FIR filter using windows and frequency sampling method	Lecture 30	R5(6-45)	<a href="https://youtu.be/JYL3NvfTG24?list=PL9567DFCA3A66F299">https://youtu.be/JYL3NvfTG24?list=PL9567DFCA3A66F299</a>	P 15 C1-C7	Design of different types of digital filters for various applications	
31	31	31	FIR filters realization using direct form, cascade form and lattice form.	Lecture 31	R4(3.100)	<a href="https://www.youtube.com/watch?v=5-LWNQkIzS8">https://www.youtube.com/watch?v=5-LWNQkIzS8</a>	P 16 C1-C7	Realization of filters with various form	
32	32	32	FIR filters realization using direct form, cascade form and lattice form.	Lecture 32	R4(3.100)	<a href="https://www.youtube.com/watch?v=5-LWNQkIzS8">https://www.youtube.com/watch?v=5-LWNQkIzS8</a>	P 16 C1-C7	Realization of filters with various form	

### Unit VI - Introduction To Multirate Signal Processing

33	33	33	Concept of Multirate DSP	Lecture 33	R4(9.1)	<a href="https://www.youtube.com/watch?v=uwr3nG990v8">https://www.youtube.com/watch?v=uwr3nG990v8</a>	C1-C7	Students will understand Concept of Multirate DSP	CO 4
34	34	34	Introduction to Up sampler	Lecture 34	R4(9.16)	<a href="https://www.youtube.com/watch?v=__uF9WIEpPo">https://www.youtube.com/watch?v=__uF9WIEpPo</a>	C1-C7	To know about sampler and get the knowledge of two channel filter bank.	
			Introduction to Down sampler and		R4(9.2)	<a href="https://www.youtube.com/watch?v=__uF9WIEpPo">https://www.youtube.com/watch?v=__uF9WIEpPo</a>			
			Introduction to two channel filter bank		R7(631)	<a href="https://www.youtube.com/watch?v=Kxyz_ryAs28">https://www.youtube.com/watch?v=Kxyz_ryAs28</a>			
35	35	35	Application of Multirate signal processing in communication	Lecture 35	R2(11.9)	<a href="https://www.youtube.com/watch?v=Kxyz_ryAs28">https://www.youtube.com/watch?v=Kxyz_ryAs28</a>	P17 C1-C7	Will come to know the Application of Multirate signal processing in various	

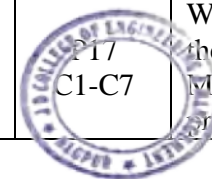
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			Application of Multirate signal processing in Music processing					domains
36	36	36	Image processing and Radar signal processing	Lecture 36	R2(11.9)		C1-C7	Will come to know the Application of Multirate signal processing in various domains

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

Total number of lectures as per syllabus: - 36

Total number of lectures as per planned: -36

<b>Tutorial Plan</b>				
Week	Topic	No. Of Problems	Mapped With CO	
1	Numerical on Convolution	03	II	
2	Numerical on Z transform	02	III	
3	Numerical on inverse Z transform	04	IV	
4	Design of IIR Filters	03	V	
5	Design of FIR Filters	02	V	
6	Design of Butterworth Filters	04	VI	
<b>Assignment Plan</b>				
Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	DSP preliminaries and convolution of signals	13/8/18	15/8/18	I, II
2	Z transforms	15/9/18	17/9/18	III, IV
<b>Content Beyond Syllabus Topic – Planned</b>				

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Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP
1	understanding on basics of digital signal processing which can be applied to communication systems		I, II, III, IV, V, VI
2	Use of virtual lab		I, II, III

**Text Books / Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Digital Signal Processing: A computer based approach.TMH	S.K.Mitra	McGraw Hill Education (India) Private Limited	Third Edition
T2	Digital Signal Processing: Principles, Algorithms, and applications	John G. Proakis, Dimitris G. Manolakis	Pearson Education	Fourth Edition/2007
T3	Introduction to Digital Signal Processing	J.R. Johnson	McGraw Hill Education (India) Private Limited	First Edition/2011
T4	Digital signal Processing	A. Nagoor Kani	McGraw Hill Education (India) Private Limited	Second Edition/2012
T5	Digital signal Processing	R.A.Barapate	Tech-Max Publication Pune	First Edition/2011
T6	Digital signal Processing	N.G.Palan	Tech-Max Publication Pune	First Edition/2017
T7	Digital Signal Processing	S. Salivahanan, C. Gnanapriya	Tata McGraw Hill Education Private Limited	Second Edition/2011

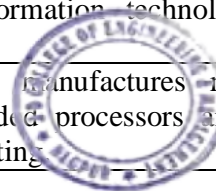
**Company/Industry:**

Code	Company/Industry Name	Website	Detailed Information
C1	<b>Toshiba India</b>	<a href="https://www.toshiba-india.com/">https://www.toshiba-india.com/</a>	Toshiba Corporation is a Japanese multinational conglomerate. Its diversified products and services include information technology and communications equipment and systems.
C2	<b>Intel</b>	<a href="http://www.intel.com">www.intel.com</a>	A company designing processors, manufactures motherboard chipsets, NI Controllers, Memory chips, embedded processors and semiconductor devices related to communication and computing.

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C3	<b>Qualcomm</b>	<a href="https://www.qualcomm.com/">https://www.qualcomm.com/</a>	Qualcomm Incorporated is a world leader in 3G and next-generation mobile technologies. Qualcomm ideas and inventions have driven the evolution of digital signal.
C4	<b>VMware Virtualization for Desktop &amp; Server, Application</b>	<a href="https://www.vmware.com/in.html">https://www.vmware.com/in.html</a>	VMware, Inc. is a publicly traded software company listed on the NYSE under stock ticker VMW. Dell Technologies is a majority share holder. VMware provides cloud computing and virtualization software and services.
C5	<b>Broadcom Inc.   Connecting Everything</b>	<a href="https://www.broadcom.com/">https://www.broadcom.com/</a>	Broadcom Inc. is a global technology leader that designs, develops and supplies semiconductor and infrastructure software solutions
C6	<b>texas instruments</b>	<a href="http://www.ti.com/">http://www.ti.com/</a>	Texas Instruments Incorporated is an American technology company that designs and manufactures semiconductors and various integrated circuits, which it sells to electronics designers and manufacturers globally.
C7	<b>Imagination technologies</b>	<a href="https://www.imgtec.com/">https://www.imgtec.com/</a>	Imagination Technologies Group plc is a British-based technology company, focusing on semiconductor and related intellectual property licensing. It markets PowerVR mobile graphics processors, MIPS embedded microprocessors, and for its Pure consumer electronics division
C8	<b>National Instruments</b>	<a href="http://www.ni.com">www.ni.com</a>	A global provider in automated Test and Measurement Systems
C9	<b>AMD</b>	<a href="http://www.amd.com">www.amd.com</a>	A global provider of Processor and Semicustom ICs and products
C10	<b>Motorola</b>	<a href="http://www.motorola.in">www.motorola.in</a>	A company designing Android cell phones and modular smartphones.
C11	<b>Xilinx</b>	<a href="http://www.xilinx.com">www.xilinx.com</a>	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.

#### Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	Discrete Fourier Transform: Approach To Signal Processing	Anant G. Kulkarni	International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering	10.15662/ijareeie.2014.0310005	Vol. 3, Issue 10, October 2014
P2	Review Paper on Radix-2 Fast Fourier Transform using Real Value Data	Deepenti Dawande	International Journal of Advanced Research in Computer Science and Software Engineering		Volume 6, Issue 4, April 2016
P3	A Radix-2 DIT FFT with reduced arithmetic complexity	Shaik Qadeer	2014 International Conference on Advances in Computing, Communications and Informatics (ICACCI)	10.1109/ICACCI.2014.6968324	2014




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P4	Comprehensive Study for Selection of Proper IIR Filter: Specifications Dependant Approach	Sujan Sarkar	2018 3rd International Conference for Convergence in Technology (I2CT)	10.1109/I2CT.2018.8529365	2018
P5	Orthogonal and Non-Orthogonal Signal Representations Using New Transformation Matrices Having NPM Structure	Shaik Basheeruddin Shah	IEEE Transactions on Signal Processing	10.1109/TSP.2020.2971936	Volume: 6, 06 February 2020/ Page(s): 1229 - 1242
P6	Sampling rates, aliasing, and the analysis of electrophysiological signals	B.R. Moon	Proceedings of the 1996 Fifteenth Southern Biomedical Engineering Conference	10.1109/SBEC.1996.493260	06 August 2002
P7	Reconstruction of signals from highly aliased multichannel samples by Generalized Matching Pursuit	Massimiliano Vassallo	2014 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)	10.1109/ICASSP.2014.6854026	<b>INSPEC Accession Number:</b> 14449121
P8	Some aspects of digital data processing vs. Analogue signal analysis	C. Jin ; X. Zhao ; Y. Zhu	IEEE Xplore:2016 Progress in Electromagnetic Research Symposium (PIERS)	<b>DOI:</b> 10.1109/PIERS.2016.7734753	<b>Date of Conference:</b> 8-11 Aug. 2016
P9	The discrete frequency Fourier transform	W. Jenkins	IEEE Transactions on Circuits and Systems	<b>DOI:</b> 10.1109/TCS.1986.1085978	Volume: 33 Issue: 7
P10	An algorithm for computing the inverse Z transform	J.L. Schiff	IEEE Transactions on Signal Processing	<b>DOI:</b> 10.1109/78.157219	Volume: 40 Issue: 9
P11	IIR based digital filter design and performance analysis	Shapna Rani Sutradhar	2017 2nd International Conference on Telecommunication and Networks (TEL-NET)	<b>DOI:</b> 10.1109/TEL-NET.2017.8343596	10-11 Aug. 2017 <b>PRINCIPAL</b>
P12	A generalized direct-form II transposed structure for IIR filter implementation with minimal roundoff noise gain	G. Li ; Z.X. Zhao ; J.X. Hao	Proceedings of the 2003 International Symposium on Circuits and Systems, 2003. ISCAS '03.	<b>DOI:</b> 10.1109/ISCAS.2003.120581	<b>Principal</b> J D College of Engineering & Management Khandala, Katol Road Nagpur-441501
P13	Tunable Bandpass/Bandstop Digital Filters Based on 1st-order Allpass	Pemmavit Sutthikarn	2019 5th International Conference on Engineering, Applied Sciences	<b>DOI:</b> 10.1109/ICEAST.2019	19 August 2019

	Network Instead of Unit Delay		and Technology (ICEAST)	9.8802574	
P14	Gibbs phenomenon removal and digital filtering directly through the fast Fourier transform	Cheh Pan	IEEE Transactions on Signal Processing	<b>DOI:</b> 10.1109/78.902128	Volume: 49 , Issue: 2 , Feb 2001, Page(s): 444 - 448
P15	Comparison of various window techniques for design FIR digital filter	Anshul ; Kavita Rathi	2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI)	<b>DOI:</b> 10.1109/ICPCSI.2017.8392331	21-22 Sept. 2017
P16	A comparison between lattice, cascade and direct form FIR filter structures by using a FPGA bit-serial distributed arithmetic implementation	M. Martinez-Peiro	ICECS'99. Proceedings of ICECS '99. 6th IEEE International Conference on Electronics, Circuits and Systems (Cat. No.99EX357)	<b>DOI:</b> 10.1109/ICECS.1999.812268	06 August 2002
P17	The application of multi-rate digital signal processing techniques to the measurement of power system harmonic levels	A.J.V. Miller	IEEE Transactions on Power Delivery	<b>DOI:</b> 10.1109/61.216856	( Volume: 8 , Issue: 2)

  
**Prof. Pranali R. Langde**  
 Subject Teacher

  
**Prof. Avinash K. Ikhari**  
 Academic Incharge

  
**Dr. P.R. Kshirsagar**  
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Department of Electronics and Telecommunication Engineering  
"Rectifying Ideas, Amplifying Knowledge"  
2020-21 (Even Sem)



॥ ज्ञानम् सर्वार्थं साधनम् ॥

VISION

MISSION

"To be a Department providing high quality & globally competent knowledge of concurrent technologies in the field of Electronics and Telecommunication."

1. To provide quality teaching learning process through well-developed educational environment and dedicated faculties.
2. To produce competent technocrats of high standards satisfying the needs of all stakeholders.

### Teaching Plan

<b>Course</b> :B. Tech in Electronics & Telecommunication	<b>Year/Semester</b> :6 <sup>th</sup> Semester (3 <sup>rd</sup> Year)	
<b>Name of the Teacher</b> :Prof. Gayatri Bhoyar	<b>Course Code</b> : ET6E004B	
<b>Course</b> :AI: Knowledge Representation & Reasoning	<b>Section</b>	:ETC
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	<b>3</b>
	<b>Tutorial</b>	<b>0</b>
	<b>Practical</b>	<b>0</b>

Course Objectives	Course Outcomes
<ol style="list-style-type: none"> <li>1. Study the concepts of Artificial Intelligence.</li> <li>2. Learn the methods of solving problems using Artificial Intelligence.</li> <li>3. Learn the knowledge representation techniques, reasoning techniques and planning.</li> </ol>	<p>At the end of this course students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the basic principles of Artificial Intelligence and challenges involved in designing intelligent systems by exploring human intelligence nature and its role in problem solving.</li> <li>2. Represent given problem using state space representation and apply informed and uninformed search techniques on it.</li> <li>3. Analyze the issues in the design of search programs and apply appropriate search algorithms</li> <li>4. Apply knowledge representation techniques and problem solving strategies to common AI applications.</li> <li>5. Use Prolog Programming language using predicate logic</li> <li>6. Design Knowledge Based Systems.</li> </ol>

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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 Mapped
<b>Module-1: Introduction</b>									
1	1	1	What is AI? The AI Problems, The Underlying Assumption	Day 1	T1(1-4)	<a href="https://nptel.ac.in/courses/106105078">https://nptel.ac.in/courses/106105078</a>	C1-C15	Students will be able to Understand the basic principles of Artificial Intelligence	CO1
2	2	2	AI Techniques, The Level of The Model	Day 2	T1(15-20)	<a href="https://www.youtube.com/watch?v=fV2k2ivttL0">https://www.youtube.com/watch?v=fV2k2ivttL0</a>	C1-C15	Students will be able to Understand the basic Artificial Intelligence techniques and level of model	CO1
3	3	3	Criteria For Success, Some General References, One Final Word.	Day 3	T1(20-24)	<a href="https://www.youtube.com/watch?v=fV2k2ivttL0">https://www.youtube.com/watch?v=fV2k2ivttL0</a>	C1-C15	Students will be able to Understand the challenges involved in designing intelligent systems	CO1
<b>Module-2: Search Techniques</b>									
4	4	4	Problems, State Space Search & Heuristic Search Techniques, Defining The Problems As A State Space Search	Day 4	T1(25-30)	<a href="https://www.youtube.com/watch?v=5g6iT_26zGQ">https://www.youtube.com/watch?v=5g6iT_26zGQ</a>	C1-C15	Students will be able to Represent given problem using state space representation	CO2
5	5	5	Production Systems, Production Characteristics	Day 5	T1(31-44)	<a href="https://archive.nptel.ac.in/courses/106/106/106106226/">https://archive.nptel.ac.in/courses/106/106/106106226/</a>	C1-C15	Students will be able to understand Production Systems and Production Characteristics	CO2, CO3
6	6	6	Issues In the Design of Search Programs, Additional Problems. Generate-And-Test	Day 6	T1(45-51)	<a href="https://archive.nptel.ac.in/courses/106/106/106106226/">https://archive.nptel.ac.in/courses/106/106/106106226/</a>	C1-C15	Students will be able to analyze Issues in the Design of Search Programs	CO2, CO3
7	7	7	Hill Climbing, Best-First Search, Problem Reduction	Day 7	T1(52-67)	<a href="https://www.youtube.com/watch?v=ZOvRZ7UJMjk">https://www.youtube.com/watch?v=ZOvRZ7UJMjk</a>	C1-C15	Students will be able to apply informed and uninformed search techniques	CO2




8	8	8	Constraint Satisfaction, Means-Ends Analysis	Day 8	T1(68-74)	<a href="https://www.digimat.in/nptel/courses/video/106106158/L01.html">https://www.digimat.in/nptel/courses/video/106106158/L01.html</a>	C1-C15	Students will be able to apply CSP and MEA on Problems	CO2, CO3
<b>Module-3: Expending Predicate Logic</b>									
9	9	9	Representation Simple Facts in Logic	Day 9	T1(99-102)	<a href="https://nptel.ac.in/courses/106/106/106106140/">nptel.ac.in/courses/106/106/106106140/</a>	C1-C15	Students will be able to represent Simple facts in Logic	CO1, CO2
10	10	10	Representation Simple Facts in Logic	Day 10	T1(99-102)	<a href="https://nptel.ac.in/courses/106/106/106106140/">nptel.ac.in/courses/106/106/106106140/</a>	C1-C15	Students will be able to represent Simple facts in Logic	CO1, CO2
11	11	11	Representing Instance And Isa Relationships	Day 11	T1(103-104)	<a href="https://www.youtube.com/watch?v=SwuFzvDOVVs">https://www.youtube.com/watch?v=SwuFzvDOVVs</a>	C1-C15	Students will be able to represent Instance and Isa Relationships	CO1, CO2
12	12	12	Computable Functions And Predicates	Day 12	T1(105-107)	<a href="https://www.youtube.com/watch?v=eUFFCynDZaM">https://www.youtube.com/watch?v=eUFFCynDZaM</a>	C1-C15	Students will be able to represent Computable Functions and Predicates	CO1, CO2
13	13	13	Resolution	Day 13	T1(108-112)	<a href="https://www.youtube.com/watch?v=eaCVH8XWapc">https://www.youtube.com/watch?v=eaCVH8XWapc</a>	C1-C15	Students will be able to problems by resolution	CO1, CO2
<b>Module-4: Representing Knowledge Using Rules</b>									
14	14	14	Procedural Knowledge	Day 14	T1(129-130)	<a href="https://www.youtube.com/watch?v=2ONm2TdQEh0">https://www.youtube.com/watch?v=2ONm2TdQEh0</a>	C1-C15	Students will be able to understand Procedural Knowledge	CO4
15	15	15	Procedural versus Declarative Knowledge	Day 15	T1(130)	<a href="https://www.youtube.com/watch?v=2ONm2TdQEh0">https://www.youtube.com/watch?v=2ONm2TdQEh0</a>	C1-C15	Students will be able to distinguish between Procedural and Declarative Knowledge	CO4
16	16	16	Logic Programming	Day 16	T1(131-133)	<a href="https://www.digimat.in/nptel/courses/video/106106140/L42.html">https://www.digimat.in/nptel/courses/video/106106140/L42.html</a>	C1-C15	Students will be able to understand Logic Programming	CO4
17	17	17	Forward Reasoning	Day 17	T1(133-134)	<a href="https://www.digimat.in/nptel/courses/video/106106226/L85.html">https://www.digimat.in/nptel/courses/video/106106226/L85.html</a>	C1-C15	Students will be able to understand Students will be able to	CO4

  
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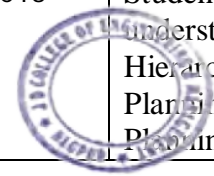
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								understand	
18	18	18	Forward Versus Backward Reasoning	Day 18	T1(134)	<a href="https://www.youtube.com/watch?v=gMRQNVc-nQY">https://www.youtube.com/watch?v=gMRQNVc-nQY</a>	C1-C15	Students will be able to distinguish between Forward and Backward Reasoning	CO4
<b>Module-5: Game Playing</b>									
19	19	19	Overview, And Example Domain : Overview, MiniMax	Day 19	T1(231-233)	<a href="https://www.youtube.com/watch?v=a2tqR2eUlek">https://www.youtube.com/watch?v=a2tqR2eUlek</a>	C1-C15	Students will be able to understand Overview and basic concepts in game playing	CO3, CO4
20	20	20	Alpha-Beta Cut-off, Refinements	Day 20	T1(234-236)	<a href="https://www.youtube.com/watch?v=0oqhN5tvLgA">https://www.youtube.com/watch?v=0oqhN5tvLgA</a>	C1-C15	Students will be able to understand Alpha-Beta Pruning	CO3, CO4
21	21	21	Iterative deepening	Day 21	T1(242-244)	<a href="https://www.youtube.com/watch?v=5LMXQ1NGHWU">https://www.youtube.com/watch?v=5LMXQ1NGHWU</a>	C1-C15	Students will be able to understand Iterative deepening	CO3, CO4
22	22	22	The Blocks World, Components of A Planning System	Day 22	T1(247-250)	<a href="https://www.youtube.com/watch?v=CfxqP8JRa2c">https://www.youtube.com/watch?v=CfxqP8JRa2c</a> <a href="https://www.youtube.com/watch?v=7lvthOTND_I">https://www.youtube.com/watch?v=7lvthOTND_I</a>	C1-C15	Students will be able to understand Components of a Planning System	CO3, CO4
23	23	23	Goal Stack Planning	Day 23	T1(255-258)	<a href="https://www.youtube.com/watch?v=w5vm3TxRpaQ">https://www.youtube.com/watch?v=w5vm3TxRpaQ</a>	C1-C15	Students will be able to understand Goal Stack Planning	CO4
24	24	24	Nonlinear Planning Using Constraint Posting	Day 24	T1(262-267)	<a href="https://www.youtube.com/watch?v=wt2iN_XrNkk">https://www.youtube.com/watch?v=wt2iN_XrNkk</a>	C1-C15	Students will be able to understand Nonlinear Planning Using Constraint Posting	CO4
25	25	25	Hierarchical Planning, Reactive Systems, Other Planning Techniques	Day 25	T1(268-269)	<a href="https://www.youtube.com/watch?v=wt2iN_XrNkk">https://www.youtube.com/watch?v=wt2iN_XrNkk</a>	C1-C15	Students will be able to understand Hierarchical Planning and Other Planning	CO4


  
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								Techniques	
<b>Module-6: Introduction to Prolog</b>									
26	26	26	Syntax and Numeric Function	Day 26	T1(27-40)	nptel.ac.in/courses/106/105/106105079/	C1-C15	Students will be able to understand Syntax and Numeric Function in Prolog	CO5
27	27	27	Basic List Manipulation Functions in Prolog	Day 27	T1(64-74)	nptel.ac.in/courses/106/105/106105079/	C1-C15	Students will be able to understand Basic List Manipulation Functions in Prolog	CO5
28	28	28	Functions, Predicates and Conditional	Day 28		nptel.ac.in/courses/106/105/106105079/	C1-C15	Students will be able to understand Functions, Predicates in Prolog	CO5
29	29	29	Input, Output and Local Variables	Day 29	T1(137-142)	nptel.ac.in/courses/106/105/106105079/	C1-C15	Students will be able to understand Input, Output and Local Variables	CO5
30	30	30	Iteration and RecursionProperty	Day 30		nptel.ac.in/courses/106/105/106105079/	C1-C15	Students will be able to apply Iteration and Recursion Property	CO5
31	31	31	Lists and Arrays, Miscellaneous Topics	Day 31		nptel.ac.in/courses/106/105/106105079/	C1-C15	Students will be able to understand Lists and Arrays	CO5
32	32	32	LISP and Other AI Programming Languages	Day 32		nptel.ac.in/courses/106/105/106105079/	C1-C15	Students will be able to use programming languages	CO5

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

Total number of lectures as per syllabus: - 28

Total number of lectures as per planned: -32

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<b>Tutorial Plan</b>			
Week	Topic	No. of Problems	Mapped With CO

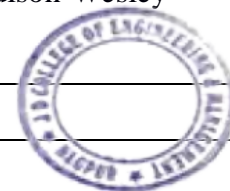
1	NA	NA	NA	
<b>Assignment Plan</b>				
Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Unit 1 and 2	28/02/2022	05/03/2022	CO1, CO2
2	Unit 4 and 5	12/04/2022	19/04/2022	CO4
<b>Content Beyond Syllabus Topic – Planned</b>				
Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP	
1	Introduction to Natural Language Processing(NLP)	13/04/2022	CO4, CO5	

### Text Books

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Artificial Intelligence	Elaine Rich, Kevin Knight, & Shivashankar B Nair	Tata Mcgraw-Hill	3 <sup>rd</sup> Edition

### Reference Books

R1	Artificial Intelligence – A Modern Approach	Stuart Russell and Peter Norvig	Mc Graw Hill	4 <sup>th</sup> Edition
R2	PROLOG Programming For Artificial Intelligence	Ivan Bratko	Addison-Wesley	Principal J D College of Engineering & Management Khandala, Katol Road Nagpur-441501



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**Company/Industry:**

Code	Company/Industry Name	Website	Detailed Information
C1	Accenture	www.accenture.com	Company is one of the Top consultancies and IT service providers, globally. Being repeatedly mentioned in the Forbes top 50, Accenture provides opportunities for a good artificial intelligence career for freshers and experienced professionals.
C2	Apple	www.apple.com	The company is popularly known for its developments in mobile phone and mobile devices technology. It's a brand that symbolises innovation as it has created revolutions in mobile devices technology and aided in the global digital revolution.
C3	Bosch	www.bosch.com	The company is one of the world's leading engineering companies and holds the same reputation in India as well. Its range of products includes consumer goods, mobility hardware and software, industrial technology and building technology.
C4	Google	www.google.com	Google.ai, the artificial intelligence division of the tech giant is renowned for its efforts to make technology accessible throughout the globe. Starting your artificial intelligence career with google can open up an array of opportunities.
C5	Niki.ai	www.niki.ai	The company, backed by Ratan Tata himself, is a promising platform for the digital revolution that is going to happen in India. Niki is an AI-powered chatbot that can predict and respond to vernacular languages, and currently is integrated into several android and IOS apps, and platforms like Facebook..
C6	InData Labs	www.indatalabs.com	The company is a high-quality provider of Big Data and Artificial Intelligence services tailored to the unique and challenging requirements of their Clients. The company specializes in Data Science, Data Analytics, Artificial Intelligence, Computer Vision, Business Intelligence, and Machine Learning.
C7	Aibono	https://www.aibono.com	Aibono began operations in 2014 by offering AI powered precision farming solutions to help farmers use analytics, the Internet of Things, and data science to improve yield. The company has since expanded its offerings to sync precision farming with real-time demand and just-in-time harvesting. The solution synchronizes the cropping matrix and predictive harvesting at the

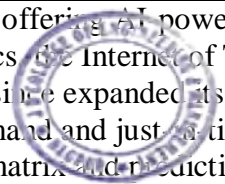
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Phone: 944751501



			farm with retailer consumption data
C8	Raven Industries	<a href="https://ravenind.com/">https://ravenind.com/</a>	Raven is a technology company that creates innovative solutions to solve great challenges. Utilizing our strength in engineering, manufacturing, and technological innovation, Raven is a leader in precision agriculture and situational awareness markets.
C9	Influential	<a href="https://influential.co/">https://influential.co/</a>	Influential is an AI social data and conversion technology, as well as a Developer Partner of IBM Watson and a Facebook Marketing Partner. Utilizing a network of over 1,000,000 social media influencers as a tactic for distribution, Influential runs both native and paid campaigns on Facebook, Instagram, Snapchat, Twitter, and YouTube for Fortune 500 brands including Walmart, McDonald's, Pepsi, Nestlé, General Mills, Toyota, Samsung, Sony Pictures and many more
C10	Heuritech	<a href="http://heuritech.com">http://heuritech.com</a>	Heuritech's solution allows for smoother communication and collaboration between different teams by fostering a data-driven mindset and transforming traditional decision-making. With its cutting-edge artificial intelligence approach, it supports brands in their digital transformation so they can dedicate themselves to what's most important: creating
C11	AIBrain Inc.	<a href="http://www.aibrain.com">www.aibrain.com</a>	AIBrain is an artificial intelligence company with the goal of building fully autonomous AI by unifying the three essential aspects of intelligence: Problem Solving, Learning and Memory.
C12	Invoca	<a href="https://www.invoca.com">https://www.invoca.com</a>	Invoca is the cloud leader in AI-powered conversation intelligence for revenue teams that enables marketing, sales, customer experience, and eCommerce teams to understand and immediately act on the information consumers share via conversations.
C13	Appier	<a href="http://www.appier.com">http://www.appier.com</a>	Appier is a software-as-a-service (SaaS) company that uses artificial intelligence (AI) to power business decision-making. Appier's products are designed to help companies build a holistic view of their customers, understand their preferences, anticipate their actions and ultimately make decisions that lead to better business outcomes
C14	Microsoft	<a href="https://www.microsoft.com/en-in">https://www.microsoft.com/en-in</a>	Across Microsoft 365, AI powers innovative apps that can help you write and design better, visualize maps and charts in Excel, and streamline your inbox. From Microsoft's popular virtual assistant Cortana, web search engine Bing, software Office 365, conversational chatbots, or its communication platforms, the platform has been heavily integrating intelligent functionality into its applications and services.
C15	Alibaba Cloud	<a href="https://www.alibabacloud.com/">https://www.alibabacloud.com/</a>	Alibaba Cloud develops highly scalable cloud computing and data management services providing large and small businesses, financial institutions, governments, and other organizations with flexible, cost-effective

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			solutions to meet their networking and information needs
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### Research Papers:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	A Brief Introduction to Artificial Intelligence	C. Williams	Proceedings OCEANS '83	<a href="https://doi.org/10.1109/OCEANS.1983.1152096">https://doi.org/10.1109/OCEANS.1983.1152096</a>	13 January 2011
P2	Artificial Intelligence (AI) applications for COVID-19 pandemic	Raju Vaishya	Published in Science Direct	<a href="https://doi.org/10.1016/j.dsx.2020.04.012">https://doi.org/10.1016/j.dsx.2020.04.012</a>	Volume 14, Issue 4, July–August 2020
P3	AI-Based Modeling: Techniques, Applications and Research Issues Towards Automation, Intelligent and Smart Systems	Iqbal H. Sarker	Published in Springer	<a href="https://link.springer.com/article/10.1007/s42979-022-01043-x#auth-Iqbal_H.-Sarker">https://link.springer.com/article/10.1007/s42979-022-01043-x#auth-Iqbal_H.-Sarker</a>	10 February 2022
P4	Artificial Intelligence in Agriculture: A Literature Survey	Gouravmoy Banerjee	International Journal of Scientific Research in Computer Science Applications and Management Studies	ISSN 2319 – 1953	Volume 7, Issue 3 (May 2018)
P5	COVID-19 Artificial Intelligence Diagnosis using only Cough Recordings	Jordi Laguarda	The IEEE Open Journal of Engineering in Medicine and Biology	<a href="https://www.embs.org/ojemb/articles/covid-19-artificial-intelligence-diagnosis-using-only-cough-recordings/">https://www.embs.org/ojemb/articles/covid-19-artificial-intelligence-diagnosis-using-only-cough-recordings/</a>	September 30, 2020
P6	Managing Artificial Intelligence	Nicholas Berente	Published in Research gate	doi: 10.25300/MSO/2021/6274	Vol 45, No 2, 2021
P7	A Knowledge Reasoning Algorithm Based on Network Structure and	Jinkui Yao	International Conference on Information, Communication and	<a href="https://doi.org/10.1109/ICICI51192.2020.9205073">https://doi.org/10.1109/ICICI51192.2020.9205073</a>	24 September 2020

  
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	Representation Learning		Networks (ICICN)		
P8	Application Analysis of Reasoning Engine Based on Artificial Intelligence in Medical Data Mining	Chenchen Li	IEEE International Conference of Safety Produce Informatization (IICSPI)	<a href="https://doi.org/10.1109/IICSPI51290.2020.9332459">https://doi.org/10.1109/IICSPI51290.2020.9332459</a>	01 February 2021
P9	Applying knowledge representation and reasoning to (simple) goal models	Alexander Borgida	IEEE International Workshop on Artificial Intelligence for Requirements Engineering (AIRE)	<a href="https://doi.org/10.1109/AIRE.2014.6894857">https://doi.org/10.1109/AIRE.2014.6894857</a>	26-26 August 2014
P10	Overview of artificial intelligence in medicine	Amisha	Journal of Family medical science and Primary care	<a href="https://www.ncbi.nlm.nih.gov/pmc/iss/ues/340268/">https://www.ncbi.nlm.nih.gov/pmc/iss/ues/340268/</a>	2019 Jul
P11	An Overview of Artificial Intelligence Applications for Power Electronics	S Zhao	IEEE Transactions on Power Electronics	<a href="https://doi.org/10.1109/TPEL.2020.3024914">https://doi.org/10.1109/TPEL.2020.3024914</a>	Volume: 36, Issue: 4, April 2021
P12	Key challenges for delivering clinical impact with artificial intelligence	Christopher J. Kelly	Published in Springer	<a href="https://link.springer.com/article/10.1186/s12916-019-1426-2">https://link.springer.com/article/10.1186/s12916-019-1426-2</a>	29 October, 2019
P13	A Survey on Explainable Artificial Intelligence (XAI): Toward Medical XAI	Erico Tjoa	IEEE Transactions on Neural Networks and Learning Systems	<a href="https://doi.org/10.1109/TNNLS.2020.3027314">https://doi.org/10.1109/TNNLS.2020.3027314</a>	20 October 2020
P14	A comprehensive review on automation in agriculture using artificial intelligence	Kirtan Zha	Published in Science Direct in Artificial Intelligence in Agriculture	<a href="https://doi.org/10.1016/j.aiia.2019.05.004">https://doi.org/10.1016/j.aiia.2019.05.004</a>	Volume 2, June 2019,
P15	Artificial intelligence and sustainable development	Margaret A. Goralski	The International Journal of Management Education	<a href="https://doi.org/10.1016/j.ijme.2019.100330">https://doi.org/10.1016/j.ijme.2019.100330</a>	Volume 18 Issue 1, March 2020
P16	Artificial intelligence and machine learning to fight COVID-19	Ahmad Alimadadi	Journal of AI and Machine Learning for Understanding Biological Processes	<a href="https://doi.org/10.1152/physiolgenet.2020.00029.2020">https://doi.org/10.1152/physiolgenet.2020.00029.2020</a>	Volume 52, issue 4 ,3 April 2020

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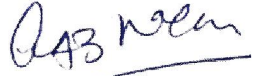


P17	A Review of AI and ML Applications for Computing Systems	Atul Negi	International Conference on Emerging Trends in Engineering and Technology, ICETET	<a href="https://doi.org/10.1109/ICETET-SIP-1946815.2019.9092299">https://doi.org/10.1109/ICETET-SIP-1946815.2019.9092299</a>	14 May 2020
P18	Artificial Intelligence and Machine Learning Applications in Smart Production: Progress, Trends, and Directions	Raffaele Ciof	Published in MDPI Journal	doi:10.3390/su12020492	8 January 2020
P19	Applications of Artificial Intelligence and Machine Learning in the Area of SDN and NFV: A Survey	Anteneh A. Gebremariam	IEEE SSD International Multi-Conference on Systems, Signals and Devices	<a href="https://doi.org/10.1109/SSD.2019.8893244">https://doi.org/10.1109/SSD.2019.8893244</a>	11 November 2019
P20	Applications of Artificial Intelligence in Machine Learning: Review and Prospect	Sumit Das	International Journal of Computer Applications	10.5120/20182-2402	Volume 115 - Number 9, 2015
P21	Role of Application of Artificial Intelligence (AI) and Its Importance in the Healthcare Industry	Giriraj Kiradoo	International Journal of Advanced Research in Engineering and Technology (IJARET),	<a href="http://www.iaeme.com/IJARET/issues.asp?JType=IJARET&amp;VType=9&amp;IType=2">http://www.iaeme.com/IJARET/issues.asp?JType=IJARET&amp;VType=9&amp;IType=2</a>	Volume 9, Issue 2, March-April 2018
P22	Research on Application of Artificial Intelligence in Medical Education	Hang Zhao	International Conference on Engineering Simulation and Intelligent Control (ESAIC)	<a href="https://doi.org/10.1109/ESAIC.2018.0085">https://doi.org/10.1109/ESAIC.2018.0085</a>	11 November 2018
P23	Artificial Intelligence and its Application in Different Areas	AvneetPannu	International Journal of Engineering and Innovative Technology (IJEIT)	ISSN: 2277-3754	Volume 4, Issue 10, April 2015
P24	AI Empowered Communication Systems for Intelligent Transportation Systems	ZhihanLv	IEEE Transactions on Intelligent Transportation Systems	<a href="https://doi.org/10.1109/TITS.2020.3017183">https://doi.org/10.1109/TITS.2020.3017183</a>	Volume: 22 Issue: 7, July 2021
P25	Research on Artificial Intelligence Algorithm and Its Application in Games	CundongTang	International Conference on Artificial Intelligence and Advanced Manufacturing (AIAM)	<a href="https://doi.org/10.1109/AIAM50918.2020.00085">https://doi.org/10.1109/AIAM50918.2020.00085</a>	11 May 2021

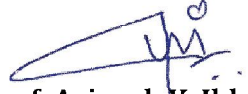


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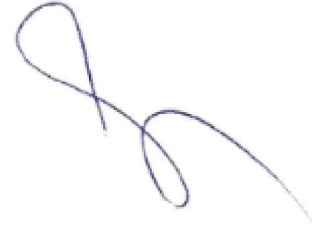
**Prof. Gayatri Bhoyar**  
**Course Coordinator**



**Prof. Avinash K. Ikhar**  
**Academic Incharge**



**Dr. P.R. Kshirsagar**  
**HOD, Dep. of EN/ETC**  
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An Autonomous Institute, with NAAC "A" Grade  
Department of Electronics and Telecommunication Engineering  
"Rectifying Ideas, Amplifying Knowledge"  
Session: 2021-22 (Odd Sem)



### VISION

### MISSION

"To be a Department providing high quality & globally competent knowledge of concurrent technologies in the field of Electronics and Telecommunication."

1. To provide quality teaching learning process through well-developed educational environment and dedicated faculties.
2. To produce competent technocrats of high standards satisfying the needs of all stakeholders.

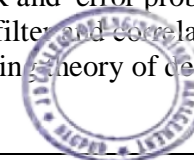
## Teaching Plan

<b>Course</b> : B. Tech in Electronics & Telecommunication	<b>Year/Semester</b> : 7 <sup>th</sup> Semester (4th Year)	
<b>Name of the Teacher</b> : Prof. Gayatri Bhoyar	<b>Subject Code</b> : BTEXPE704C	
<b>Subject</b> : Digital Communication	<b>Section</b> : ETC A	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	<b>4</b>
	<b>Tutorial</b>	-
	<b>Practical</b>	-

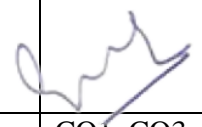
Course Objective	Course Outcomes
<ol style="list-style-type: none"><li>1. To understand the building blocks of digital communication system.</li><li>2. To prepare mathematical background for communication signal analysis.</li><li>3. To understand and analyze the signal flow in a digital communication system.</li><li>4. To analyze error performance of a digital communication system in presence of noise and other interferences.</li><li>5. To understand concept of spread spectrum communication system.</li></ol>	<ol style="list-style-type: none"><li>1. <b>Understand</b> the building blocks of digital communication system, <b>Demonstrate</b> waveform coding techniques and evaluate bit rate, bandwidth and signal to noise ratio.</li><li>2. <b>Interpret</b> data formats, multiplexing, synchronization and Intersymbol interference for reliable baseband transmission.</li><li>3. <b>Apply</b> the concepts of sampling, quantization, encoding and reconstruction in processing digital signals.</li><li>4. <b>Analyze</b> the Performance of Digital Communication System and spread spectrum System.</li><li>5. <b>Determine</b> quantization noise, SNR and error probability of modulation techniques with matched filter and correlator.</li><li>6. <b>Design</b> Optimum receiver by applying theory of detection and estimation.</li></ol>

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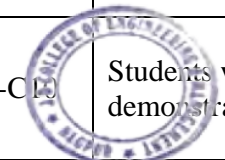


Sr. No	Lec. No	Topic Code	Contents to be Covered	Planned Teaching Dates	Text Books (Page no) Reference Book (Page no)	URL's (NPTEL/OnlineMaterial/ PPT/Video)	Applications (R&D/ Industry)	Learning Outcomes	CO Mapping
<b>Unit I –Digital Transmission of Analog Signal</b>									
1	1	1	Introduction to Digital Communication System, digital ?	Day 1	R1 (Pg : 3 – 4)	<a href="https://nptel.ac.in/course/s/117/105/117105144/">https://nptel.ac.in/course/s/117/105/117105144/</a>	C1-C10	Students will understand the basic of digital communication.	CO1
2	2	2	Block Diagram and transformations, Basic Digital Communication Nomenclature	Day 2	R1 (Pg : 4-12 )	<a href="https://nptel.ac.in/course/s/117/105/117105144/">https://nptel.ac.in/course/s/117/105/117105144/</a>	C1-C10	Students will be able to explain the block diagram of digital communication.	CO1
3	3	3	Digital Versus Analog Performance Criteria, Sampling Process	Day 3	R1 (Pg 13 –14 )	<a href="http://nptel.ac.in/courses/nptel_download.php?subjectid=106105034">http://nptel.ac.in/courses/nptel_download.php?subjectid=106105034</a>	C1-C10	Students will be able to compare analog and digital communication	CO1
4	4	4	PCM Generation and Reconstruction	Day 4	T1 (Pg : 545 –548 )	<a href="https://nptel.ac.in/content/storage2/courses/downloads/108104091/noc19ee08_Assignment9.pdf">https://nptel.ac.in/content/storage2/courses/downloads/108104091/noc19ee08_Assignment9.pdf</a>	C1-C10	Students will be able to explain the PCM generation and reconstruction.	CO1, CO3
5	5	5	Quantization Noise, Non-uniform Quantization and Companding	Day 5	T1(Pg : 548 –554 )	<a href="https://nptel.ac.in/content/storage2/courses/downloads/108104091/noc19ee08_Assignment9.pdf">https://nptel.ac.in/content/storage2/courses/downloads/108104091/noc19ee08_Assignment9.pdf</a>	C1-C10	Students will be able to analyze the process of quantization and Companding	CO1, CO3, CO5
6	6	6	PCM with noise: Decoding noise	Day 6	T1 (Pg : 554– 557)	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117102059/lec41.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117102059/lec41.pdf</a>	C1-C10	Students will be able to analyze PCM with noise and able to decode noise	CO1, CO3, CO5
7	7	7	Delta Modulation, Adaptive Delta Modulation	Day 7	T1 (Pg : 559– 565)	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117102059/lec41.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117102059/lec41.pdf</a>	C1-C10	Students will be able to demonstrate DM and ADM	CO1, CO3



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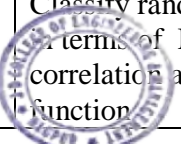
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8	8	8	Delta Sigma Modulation, Differential Pulse Code Modulation	Day 8	T1 (Pg : 565– 569)	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117102059/lec41.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117102059/lec41.pdf</a>	C1-C10	Students will be able to Compare different modulation techniques	CO1, CO3
9	9	9	LPC speech synthesis	Day 9	T1 (Pg : 569– 571)	<a href="https://www.youtube.com/watch?v=4uOsp10rGKU">https://www.youtube.com/watch?v=4uOsp10rGKU</a>	C1-C10	Students will be able to understand the concept of LPC speech synthesis	CO1, CO3
<b>Unit II – Baseband Digital Transmission</b>									
10	10	10	Digital Multiplexing: Multiplexers and hierarchies	Day 10	T1 (Pg : 575 –581 )	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106105081/lec5.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106105081/lec5.pdf</a>	C1-C10	Students will be able to understand multiplexing in detail.	CO2
11	11	11	Data Multiplexers. Data formats and their spectra, synchronization	Day 11	T1 (Pg : 582– 584)	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106105081/lec5.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106105081/lec5.pdf</a>	C1-C10	Students will be able to describe and interpret data formats for reliable data transmission.	CO2
12	12	12	Bit Synchronization, Scramblers, Frame Synchronization	Day 12	T1 (Pg : 523 –533 )	<a href="https://pdfs.semanticscholar.org/6976/9a2e530a4cbda767e4a7cce3284a50371c7b.pdf">https://pdfs.semanticscholar.org/6976/9a2e530a4cbda767e4a7cce3284a50371c7b.pdf</a>	C1-C10	Students will learn about the process of quantization.	CO2
13	13	13	Intersymbol interference, Equalization.	Day 13	R1 (Pg : 136-152 )	<a href="https://www.fradownix.com/fr/digital-and-analog-communication-systems">https://www.fradownix.com/fr/digital-and-analog-communication-systems</a>	C1-C10	Students will be able to interpret ISI and equalization for reliable data transmission	CO2
<b>Unit III – Random Processes</b>									
14	14	14	Random Processes introduction, Mathematical definition of a random process, Stationary processes	Day 14	T1 (Pg : 392 – 394)	<a href="https://nptel_data3/html/mhrd/ict/textnptel.ac.in/content/storage2/111102014/lec7.pdf">https://nptel_data3/html/mhrd/ict/textnptel.ac.in/content/storage2/111102014/lec7.pdf</a>	C1-C10	Students will be able to understand Random variables and processes.	CO4
15	15	15	Mean, Correlation & Covariance function	Day 15	T1 (Pg : 394 – 396)	<a href="https://nptel_data3/html/mhrd/ict/textnptel.ac.in/content/storage2/111102014/lec7.pdf">https://nptel_data3/html/mhrd/ict/textnptel.ac.in/content/storage2/111102014/lec7.pdf</a>	C1-C10	Students will be able to Classify random processes in terms of Mean, correlation and Covariance function	CO4

  
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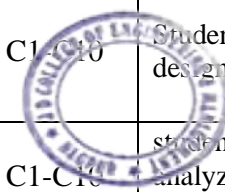
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16	16	16	Ergodic processes, Transmission of a random process through a LTI filter	Day 16	T1 (Pg : 397 –401 )	<a href="https://nptel_data3/html/mhrd/ict/textnptel.ac.in/content/storage2/111102014/lec7.pdf">https://nptel_data3/html/mhrd/ict/textnptel.ac.in/content/storage2/111102014/lec7.pdf</a>	C1-C10	Students will be able to understand the Ergodic processes and transmission of a random process through a LTI Filter.	CO4
17	17	17	Power spectral density, Gaussian process, noise	Day 17	T1 (Pg : 402 – 414)	<a href="https://nptel.ac.in/content/storage2/courses/downloads/108104091/noc19ee08_Assignment13.pdf">https://nptel.ac.in/content/storage2/courses/downloads/108104091/noc19ee08_Assignment13.pdf</a>	C1-C10	Students will be able to determine power spectral density	CO4
18	18	18	Narrowband noise, Representation of narrowband noise in terms of in phase & quadrature components	Day 18	T1 (Pg : 491 – 493)	<a href="https://scholar.google.co.in/scholar?q=Gaussian+process,+noise+nptel&amp;hl=en&amp;as_sdt=0&amp;as_vis=1&amp;oi=scholar">https://scholar.google.co.in/scholar?q=Gaussian+process,+noise+nptel&amp;hl=en&amp;as_sdt=0&amp;as_vis=1&amp;oi=scholar</a>	C1-C10	Students will be able to represent narrow band noise in terms of in phase and quadrature components	CO4
<b>Unit IV – Baseband Receivers</b>									
19	19	19	Baseband Receivers Detection Theory: MAP, LRT, Minimum Error Test, Error Probability	Day 19	R1( 809-812)	<a href="http://everscience.org/verify.php">http://everscience.org/verify.php</a>	C1-C10	Students will be able to analyze the performance of baseband receivers.	CO5, CO6
20	20	20	Signal space representation: Geometric representation of signal, Conversion of continuous AWGN channel to vector channel	Day 20	R3 (Pg :332 – 335)	<a href="https://onlinelibrary.wiley.com/doi/pdf/10.1002/0470024135.app1">https://onlinelibrary.wiley.com/doi/pdf/10.1002/0470024135.app1</a>	C1-C10	Students will be able to demonstrate signal space representation of signals.	CO5, CO6
21	21	21	Likelihood functions, Coherent Detection of binary signals in presence of noise	Day 21	R5 (Pg :513 –520 )	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec19.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec19.pdf</a>	C1-C10	Students will be able to perform the coherent detection of binary signals in presence of noise	CO5, CO6
22	22	22	Optimum Filter, Matched filter.	Day 22	R2 (Pg : 383 –392 )	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec19.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec19.pdf</a>	C1-C10	Students will be able to design optimum filter.	CO5, CO6
23	23	23	Probability of Error of Matched Filter, Correlation	Day 23	R2 (Pg : 388 –391 )	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec19.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec19.pdf</a>	C1-C10	Students will be able to analyze error probability of digital modulation	CO5, CO6

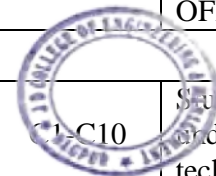
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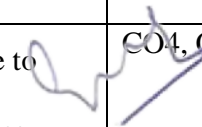


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			Receiver			<a href="http://113/lec19.pdf">113/lec19.pdf</a>		techniques with matched filter and correlation receiver	
<b>Unit V – Passband Digital Transmission</b>									
24	24	24	Passband transmission model	Day 24	R2 (Pg : 287-289 )	<a href="https://www.tutorialspoint.com/Passband-Transmission">https://www.tutorialspoint.com/Passband-Transmission</a>	C1-C10	Students will be able to illustrate the pass band transmission model.	CO4, CO5
25	25	25	Signal space diagram, Generation and detection	Day 25	R2 (Pg : 290--292 )	<a href="https://onlinelibrary.wiley.com/doi/pdf/10.1002/0470024135.app1">https://onlinelibrary.wiley.com/doi/pdf/10.1002/0470024135.app1</a>	C1-C10	Students will be able to draw signal space diagram.	CO4, CO5
26	26	26	Error Probability derivation and Power spectra of coherent BPSK, BFSK and QPSK.	Day 26	R2 (Pg : 293-299 )	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117102062/lec27.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117102062/lec27.pdf</a>	C1-C10	Students will be able to derive error probability and estimate PSD of BPSK, BFSK.QPSK.	CO4, CO5
27	27	27	Geometric representation, Generation and detection of - M-ary PSK	Day 27	R5 (Pg: 417-422)	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec56.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec56.pdf</a>	C1-C10	Students will be able to understand geometric representation, generation and detection of M-ary PSK	CO4, CO5
28	28	28	M-ary QAM and their error probability	Day 28	T1 (Pg : 689– 690)	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec56.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec56.pdf</a>	C1-C10	Students will be able to understand M-ary QAM and determine its error probability	CO4, CO5
29	29	29	Generation and detection of - Minimum Shift Keying, Gaussian MSK	Day 29	R2 (Pg : 338-346 )	<a href="http://www.digimat.in/nptel/courses/video/108102096/L19.html">http://www.digimat.in/nptel/courses/video/108102096/L19.html</a>	C1-C10	Students will be able to explain the generation and detection of MSK and Guassian MSK	CO4, CO5
30	30	30	Noncoherent BFSK, DPSK	Day 30	T1 (Pg : 673– 676)	<a href="https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec56.pdf">https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108101113/lec56.pdf</a>	C1-C10	Students will be able to compare different modulation techniques	CO4, CO5
31	31	31	DEPSK ,Introduction to OFDM.	Day 31	T1 (Pg : 696– 699)	<a href="https://www.youtube.com/watch?v=SKTVtzqJJ7Y">https://www.youtube.com/watch?v=SKTVtzqJJ7Y</a>	C1-C10	Students will be able to understand DEPSK and OFDM techniques	CO4, CO5
<b>Unit VI – Spread Spectrum Techniques</b>									
32	32	32	Spread Spectrum Techniques Introduction,Pseudo	Day 32	R2 (Pg: 625-628) R3 (Pg: 445-449)	<a href="https://nptel.ac.in/courses/117/105/117105136/">https://nptel.ac.in/courses/117/105/117105136/</a>	C1-C10	Student will be able to understand spread spectrum techniques and concept of	CO4



  
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			noise sequences, A notion of spread spectrum					Pseudo noise sequences	
33	33	33	Direct sequence spread spectrum with coherent BPSK ,Signal space dimensionality	Day 33	R2 (Pg: 633-637)	Lecture 2 <a href="https://nptel.ac.in/courses/117/105/117105136/">https://nptel.ac.in/courses/117/105/117105136/</a>	C1-C10	Students will be able to illustrate DSSS with Coherent BPSK System and concept of Signal space dimensionality	CO4
34	34	34	Processing gain,Probability of Error	Day 34	R3 (Pg: 455-460)	<a href="https://nptel.ac.in/courses/117/105/117105136/">https://nptel.ac.in/courses/117/105/117105136/</a>	C1-C10	Students will be able to derive the expression for processing gain and apply the concepts of spread spectrum to determine the probability of error	CO4
35	35	35	Concept of Jamming, Frequency hop spread spectrum	Day 35	R5 (Pg: 642-648)	Lecture 4 and 5 <a href="https://nptel.ac.in/courses/117/105/117105136/">https://nptel.ac.in/courses/117/105/117105136/</a>	C1-C10	Students will be able to understand the concept of Jamming and compare DSSS and FHSS systems	CO4
36	36	36	Wireless Telephone Systems,Personal Commmunication Systems	Day 36	T1 (Pg : 746 –750 )	<a href="https://www.youtube.com/watch?v=QHDxbbc1GWs">https://www.youtube.com/watch?v=QHDxbbc1GWs</a>	C1-C10	Students will be able to understand wireless communication systems and personal communication system.	CO4

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

Total number of lectures as per syllabus: - 36

Total number of lectures as per planned: -36

Tutorial Plan				
Week	Topic	No. Of Problems	Mapped With CO	
1	NA			
Assignment Plan				
Assignment No.	Topic	Given Date	Submission Date	Mapped With CO

  
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1	Unit 1: PCM, Delta Modulation, Uniform and Non uniform Quantization	08/10/2021	13/10/2021	CO1 and CO3
2	Unit 2 and 6 : Baseband Digital Transmission, Spread spectrum techniques	06/12/2021	12/12/2021	CO2 and CO4

**Content Beyond Syllabus Topic – Planned**

Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP
1	Use of Open source software Scilab to simulate and Analyze various Parameters of Communication Systems	28/10/2021	CO4, CO6
2	Next Generation Networks	25/11/2021	CO4, CO6

**Text Books / Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Communication Systems	A. Bruce Carlson, Paul B. Crilly	Mc Graw Hill	Fifth
T2	Modern Digital and Analog communication Systems	B.P.Lathi	Oxford	Fourth

**Reference Books**

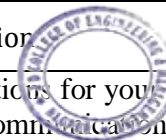
R1	Digital Communications Fundamentals And Applications	Bernard Sklar, Pratibha kumar Roy	Person Education	Second
R2	Digital Communications	Dr. Sanjay Sharma	S.K.kataria & Sons	Sixth
R3	Digital Communication	Simon Haykin	Wiley	2014
R4	Digital Communication	John G. Proakis	Pearson Education	5th Edition, 2014
R5	Digital communication	J.S.Chitode	Technical Publication, Pune	Edition 2007

  
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**Company/Industry:**

Code	Company/Industry Name	Website	Detailed Information
C1	Neel Networks	<a href="https://www.indiamart.com/neel-networks/">https://www.indiamart.com/neel-networks/</a>	Neel networks is here to bring best possible solutions for your business, wherever communication is required. As a first-class telecommunication supplier, we guarantee more assistance, more honesty and better value for money.

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C2	Air Tel	<a href="https://www.airtel.in">https://www.airtel.in</a>	Bharti Airtel Limited is a leading global telecommunications company with operations in 18 countries across Asia and Africa. It is headquartered in New Delhi, India. The company ranks amongst the top three mobile service providers globally in terms of subscribers. In India, the company's product offerings include 2G, 3G and 4G wireless servic...
C3	Reliance Jio	<a href="http://www.rcom.co.in">www.rcom.co.in</a>	Reliance Jio is an entire ecosystem that allows Indians to live the digital life to the fullest. This ecosystem consists of powerful broadband networks, useful applications, best-in-class services and smart devices distributed to every doorstep in India.
C4	BSNL	<a href="http://www.bsnl.co.in">www.bsnl.co.in</a>	BSNL is a technology-oriented company and provides all types of telecom services namely telephone services on wireline, wireless local loop (WLL) and mobile, broadband, internet, leased circuits and long-distance telecom service. The company has been in the forefront of technology with 100 per cent digital technology switching network.
C5	AT & T Inc	<a href="http://www.att.com">www.att.com</a>	AT&T Inc. is an American multinational conglomerate holding company headquartered at Whitacre Tower in Downtown Dallas, Texas. It is the world's largest telecommunications company, the largest provider of mobile telephone services and the largest provider of fixed telephone services through AT&T Communications
C6	Vodafone	<a href="http://www.vodafone.in">www.vodafone.in</a>	Vodafone Group pl is a British multinational telecommunications company. It predominantly operates services in the regions of Asia, Africa, Europe, and Oceania. Among mobile operator groups globally, Vodafone ranked 4th (behind China Mobile, Bharti Airtel and Vodafone Idea, of which the Group owns a 45% stake) in the number of mobile customers (313 million) as of 2018
C7	Telefonica	<a href="http://www.telefonica.com">www.telefonica.com</a>	Telefónica is a Spanish multinational telecommunications company headquartered in Madrid, Spain. It is one of the largest telephone operators and mobile network providers in the world. It provides fixed and mobile telephony, broadband and subscription television, operating in Europe and the Americas.
C8	MTNL	<a href="http://www.mtnl.net.in">www.mtnl.net.in</a>	MTNL is a 100% government owned top 10 telecom companies in India and the only wholly state-owned telecom sector companies in the list of top 10 telecom companies in India. This is one of the biggest telecom company in India offering IPTV, landline, and broadband besides mobile network.
C9	Telenor	<a href="http://www.telenor.com">www.telenor.com</a>	Telenor India is a major upcoming telecom company in India. This top telecom company in India was previously known as Uninor when it was launched in 2009 and is headquartered at New Delhi, India. This leading mobile network companies in India has recently been acquired by the Bharti Airtel group in September 2017 .
C10	Tata Teleservices	<a href="http://www.tatateleservices.com">www.tatateleservices.com</a>	Tata Teleservices is a leading telecom brand in India and has more than 60 million consumers for its top 10 mobile networks in India. This mobile network companies in India also offers landline and broadband services across many parts

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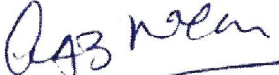



			of the country.
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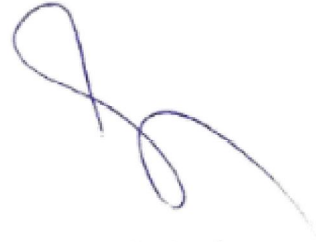
### Research Papers:


Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	The Probability of Error Due to Intersymbol Interference and Gaussian Noise in Digital Communication Systems	O. Shimbo	<u>IEEE transactions on Communication Technology</u>	<u>org/10.1109/TCOM.1971.1090619</u>	Volume: 19 , Issue: 2 , April 1971
P2	“Optimal Binary Communications With Nonequal Probabilities”	Valery P. Ipatov	<u>IEEE Transactions on Education</u>	<u>10.1109/TECOMM.2006.885062</u>	<u>Volume: 55 , Issue: 1 , Jan. 2007</u>
P3	Intersymbol Interference in Digital Communication Systems	John G. Proakis	Wiley Encyclopedia of Telecommunications	<u>doi.org/10.1002/0471219282.eot409</u>	15 April 2003
P4	A new degree of freedom for energy efficiency of digital communication systems	<u>Dushyantha A. Basnayaka</u>	<u>IEEE transaction on Communication</u>	<u>10.1109/TECOMM.2017.2684164</u>	Volume: 65 , Issue: 7 , July 2017
P5	Transmultiplexers as precoders in modern digital communication: a tutorial review	P.P. Vaidyanathan	IEEE International Symposium on Circuits and Systems	<u>10.1109/ISCAS.2004.1329590</u>	03 September 2004
P6	Spatial Sigma-Delta Modulation for the Massive MIMO Downlink	<u>Mingjie Shao</u>	53rd Asilomar Conference on Signals, Systems, and Computers	<u>https://doi.org/10.1109/IEEECONF44664.2019.9048918</u>	03 March 2020
P7	Development and study of demodulators for frequency-hopping spread spectrum signals	D.I.Kaplun	2017 Progress In Electromagnetics Research Symposium - Spring (PIERS)	<u>https://doi.org/10.1109/PIERS.2017.8261781</u>	22-25 May 2017
P8	The research of Spread Spectrum in deep space communication	Yu Wang	2nd International Asia Conference on Informatics in Control, Automation and Robotics (CAR 2010)	<u>https://doi.org/10.1109/CAR.2010.5456608</u>	6-7 March 2010
P9	Improved Spread Spectrum: A New Modulation Technique for Robust Watermarking	Henrique S. Malvar	IEEE TRANSACTIONS ON SIGNAL PROCESSING	<u>https://doi.org/10.1109/TSP.2003.809385</u>	VOL. 51, NO. 4, APRIL 2003
P10	Automatic Modulation Identification of QPSK and GMSK using Wavelet Transform for Adaptive Demodulator in SDR	P. Prakasam	2007 International Conference on Signal Processing, Communications and Networking	<u>https://doi.org/10.1109/ICSCN.2007.35065</u>	22-24 Feb 2007 Principal J D College of Engineering & Management Khandala, Katol Road Nagpur-441501
P11	OFDM and Its Wireless Applications: A Survey	Taewon Hwang	IEEE Transactions on Vehicular Technology	<u>https://doi.org/10.1109/TVT.2008.2004555</u>	Volume: 58 , Issue: 4 , May 2009 )
P12	Design and implement of the OFDM communication system	Ping Chen	IEEE International Workshop on Open-source Software for	<u>https://doi.org/10.1109/OSSC.2011.618469</u>	12-14 Oct. 2011

			Scientific Computation	5	
P13	Ultra-Wideband Communications using Hybrid Matched Filter Correlation Receivers	Fredrik Tufvesson	IEEE Transactions on Wireless Communications	<a href="https://doi.org/10.1109/TWC.2006.04767">https://doi.org/10.1109/TWC.2006.04767</a>	<u>Volume: 5 , Issue: 11 , November 2006</u>
P14	Duty Cycle Based Digital Multiplexing Technique for Advanced Communication System	S.B.Lande	2015 International Conference on Computational Intelligence and Communication Networks (CICN)	<a href="https://doi.org/10.1109/CICN.2015.107">https://doi.org/10.1109/CICN.2015.107</a>	18 Aug. 2016
P15	Digital Time-Division Multiplexing Readout Circuit for Sensor Arrays	Anubhav Sahu	IEEE Transactions on Applied Superconductivity	<a href="https://doi.org/10.1109/TASC.2016.2637336">https://doi.org/10.1109/TASC.2016.2637336</a>	<u>Volume: 27 , Issue: 4 , June 2017</u>
P16	The Delta-Sigma Modulator [A Circuit for All Seasons]	Behzad Razavi	IEEE Solid-State Circuits Magazine	<a href="https://doi.org/10.1109/MSSC.2016.2543061">https://doi.org/10.1109/MSSC.2016.2543061</a>	<u>Volume: 8 , Issue: 2 , Spring 2016</u>
P17	Delta-sigma modulation for direct digital frequency synthesis	Dayu Yang	IEEE Transactions on Very Large Scale Integration (VLSI) Systems	<a href="https://doi.org/10.1109/TVLSI.2008.2008458">https://doi.org/10.1109/TVLSI.2008.2008458</a>	Volume 17, Issue 6 June 2009
P18	Statistical Estimation of Error Probability in a Digital Wireless Communication Network	Clement Taymanesh Nyah	2014 UKSim-AMSS 16th International Conference on Computer Modelling and Simulation	<a href="https://doi.org/10.1109/UKSim.2014.16">https://doi.org/10.1109/UKSim.2014.16</a>	23 Feb, 2015
P19	Advanced personal communication system	K. Kohiyama	IEEE Conference on Vehicular Technology	<a href="https://doi.org/10.1109/VETEC.1990.110314">https://doi.org/10.1109/VETEC.1990.110314</a>	06 Aug , 2002
P20	Analysis, optimization, and implementation of a hybrid DS/FFH spread-spectrum technique for smart grid communications	Mohammed Olama	EURASIP Journal on Advances in Signal Processing volume 2015	<a href="https://doi.org/10.1186/s13634-015-0208-z">https://doi.org/10.1186/s13634-015-0208-z</a>	Jan, 25 (2015)

  
**Prof. Gayatri Bhojar**  
**Subject Teacher**

  
**Prof. Avinash K. Ikhar**  
**Academic Incharge**

  
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**Dr. P. R. Kshirsagar**  
**HOD. (EN/ETC)**  
**JD College of Engineering & Management, Nagpur**





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**VISION**

**MISSION**

"To be a Department providing high quality & globally competent knowledge of concurrent technologies in the field of Electronics and Telecommunication."

1. To provide quality teaching learning process through well-developed educational environment and dedicated faculties.
2. To produce competent technocrats of high standards satisfying the needs of all stakeholders.

### Teaching Plan

<b>Course</b> :B. Tech in Electronics & Telecommunication	<b>Year/Semester</b> :8 <sup>th</sup> Semester (4th Year)
<b>Name of the Teacher</b> :Prof. PranaliLangde	<b>Subject Code</b> :
<b>Subject</b> :Biomedical Signal Processing	<b>Section</b> :ETC
<b>Online NPTEL Course Details:</b>	
Course Type:	Elective
Duration:	12 weeks
Start Date:	24 Jan 2022
End Date:	15 Apr 2022
Exam Date:	23 Apr 2022 IST
Course Co-ordinator/ Instructor:	By Prof. Sudipta Mukhopadhyay   IIT Kharagp

Week	Points covered
Week 1:Preliminaries	Preliminaries, Biomedical signal origin & dynamics (ECG), Biomedical signal origin & dynamics (EEG, EMG etc.)
Week 2: Filtering for Removal of artifacts:	Statistical Preliminaries, Time domain filtering (Synchronized Averaging, Moving Average), Time domain filtering (Moving Average Filter to Integration, Derivative-based operator), Frequency Domain Filtering (Notch Filter), Optimal Filtering: The Wiener Filter.
Week 3:Filtering for Removal of artifacts contd.	Optimal Filtering: The Wiener Filter, Adaptive Filtering Selecting Appropriate Filter
Week 4:Event	Example events (viz. P, QRS and T wave in ECG), Derivative based Approaches for QRS Detection Pan Tompkins

  
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Detection	Algorithm for QRS Detection, Dicrotic Notch Detection Correlation Analysis of EEG Signal
Week 5:Waveform Analysis	Illustrations of problem with case studies, Morphological Analysis of ECG, Correlation coefficient, The Minimum phase correspondent.
Week 6:Waveform Analysis contd.	Signal length, Envelop Extraction, Amplitude demodulation, The Envelopgram, Analysis of activity, Root Mean Square value, Zero-crossing rate, Turns Count, Form factor
Week 7:Frequency-domain Analysis:	Periodogram, Averaged Periodogram, Blackman-Tukey Spectral Estimator, Daniell's Spectral Estimator, Measures derived from PSD.
Week 8:Modelling of Biomedical Systems	Motor unit firing pattern, Cardiac rhythm, Formants and pitch of speech, Point process, Parametric system modelling, Autoregressive model, Autocorrelation method, Application to random signals, Computation of model parameters, Levinson-Durbin algorithm, Computation of gain factor, Covariance method, Spectral matching and parameterization, Model order selection, Relation between AR and Cepstral coefficients.
Week 9:Modelling of Biomedical Systems & Tutorials	ARMA model, Sequential estimation of poles and zeros, Tutorial 1.1: Notch filter design, Tutorial 1.2: Synchronized averaging, Tutorial 1.3: Design Butterworth low pass filter.
Week 10:Tutorials	Tutorial 2.1: Design derivative-based filter, Tutorial 2.2: Design Butterworth high pass filter, Tutorial 2.3: Design Wiener filter, Tutorial 3.1: Implement the Pan-Tompkins method for QRS detection.
Week 11:Tutorials	Tutorial 3.2: Use cross-correlation to detect alpha rhythm, Tutorial 3.3: Design a matched filter, Tutorial 3.4: Pan-Tompkins method for QRS detection and the Lehner and Rangayyan method to detect dicrotic notch, Tutorial 4.1: Half wave and full wave rectification, Tutorial 4.2: RMS value calculation, Tutorial 4.3: Turns count calculation, Tutorial 4.4: RMS, Turns count and Zero-crossing rate calculations
Week 12: Tutorials	Tutorial 4.5: Derive the Envelopgram, Tutorial 4.6: RR interval and Form Factor calculations, Tutorial 5.1: Power spectrum calculations using different windows, Tutorial 5.2: Mean frequency and variance of PSD, Tutorial 5.3: Compute PSDs of Voiced, Unvoiced and Silent portion of sound signal, Tutorial 5.4: Compute mean frequency of PSDs and ratio of energies, Tutorial 5.5: Study the changes in the PSDs by varying window width, number of segments averaged, and type of the window used.



  
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### Assignment Plan

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Week 1 and Week 2	25/05/2022	31/05/2022	CO2, CO3
2	Week 3 – Week 8	25/05/2022	31/05/2022	CO1, CO2, CO3

### Text Books

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Biomedical Signal Processing	N. Vyas, S. Khalid	Laxmi Publications	First edition (1 January 2012)
T2	Biomedical Signal and Image Processing	KayvanNajarian, Robert Splinter	CRC Press;	2nd edition (7 June 2012)

### Reference Books

R1	Biomedical Signal Processing: Advances in Theory, algorithm and application.	Ganesh Naik	Springer	2020 Edition
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### Company/Industry:

Code	Company/Industry Name	Website	Detailed Information
C1	NASA	<a href="https://www.nasa.gov">https://www.nasa.gov</a>	The National Aeronautics and Space Administration is an independent agency of the United States Federal Government responsible for the civilian space program, as well as aeronautics and space research.
C2	Neeri	<a href="https://www.neeri.res.in">https://www.neeri.res.in</a>	The CSIR-National Environmental Engineering Research Institute (CSIR-NEERI) is a research institute created and funded by Government of India.
C3	Descartes Labs	<a href="http://www.descarteslabs.com">http://www.descarteslabs.com</a>	With expertise in deep learning and advanced remote sensing algorithms Descartes Labs is teaching computers how to see the world and how it changes over time.
C5	BARCO	<a href="http://www.barco.com">http://www.barco.com</a>	Barco comprises various core activities in image processing: large screen displays, display devices for application in life-critical situations and systems

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			for visual inspection and quality control.
C7	HumanEyes Technologies	<a href="http://www.humaneyes.com/">http://www.humaneyes.com/</a>	HumanEyes Technologies, Ltd., provides a complete, end-to-end solution for creation and printing of 3D and 2D effects. The award-winning company develops software for photographers, graphic artists and printers.
C8	Varex Imaging	<a href="http://www.vareximaging.com/">http://www.vareximaging.com/</a>	Varex Imaging Corporation is a leading independent supplier of medical X-ray tubes and image processing solutions.
C9	Toshiba India	<a href="https://www.toshiba-india.com/">https://www.toshiba-india.com/</a>	Toshiba Corporation is a Japanese multinational conglomerate. Its diversified products and services include information technology and communications equipment and systems.
C10	Intel	<a href="http://www.intel.com">www.intel.com</a>	A company designing processors, manufactures motherboard chipsets, NI Controllers, Memory chips, embedded processors and semiconductor devices related to communication and computing.
C11	Texas Instruments	<a href="http://www.ti.com">www.ti.com</a>	A global semiconductor design and manufacturing company. Innovate with 80000+ analog Ics and Embedded processors, software & support
C12	National Instruments	<a href="http://www.ni.com">www.ni.com</a>	A global provider in automated Test and Measurement Systems
C13	AMD	<a href="http://www.amd.com">www.amd.com</a>	A global provider of Processor and Semicustom ICs and products
C14	Motorola	<a href="http://www.motorola.in">www.motorola.in</a>	A company designing Android cell phones and modular smartphones.
C15	Xilinx	<a href="http://www.xilinx.com">www.xilinx.com</a>	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	<a href="http://www.intel.com">www.intel.com</a>	A company designing processors, manufactures motherboard chipsets, NI Controllers, Memory chips, embedded processors and semiconductor devices related to communication and computing.

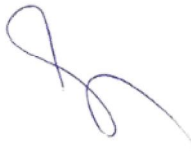
### Research Papers:


Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	An Energy-Efficient Biomedical Signal Processing Platform	Joyce Kwong	IEEE Journal of Solid-State Circuits	10.1109/JSSC.2011.2144450	( Volume: 46, Issue: 7, July 2011)
P2	Biomedical signal processing: The frequency transforms and their inter-relationships.	Challis RE	Medical & Biological Engineering & Computing,	10.1007/s00244-001-0244-0	01 Jan 1991, 29(1):1-17
P3	Independent Component Analysis	M. Ungureanu	MEASUREMENT SCIENCE		Volume 4,

	Applied in Biomedical Signal Processing		REVIEW		Section 2, 2004
P4	Detrended Fluctuation Analysis in biomedical signal processing	Agnieszka Kitlas-Golińska	Studies in Logic, Grammar and Rhetoric		29 (42) (2012)
P5	Wavelet basis functions in biomedical signal processing	J.Rafiee	Expert Systems with Applications	<a href="https://doi.org/10.1016/j.eswa.2010.11.050">https://doi.org/10.1016/j.eswa.2010.11.050</a>	Volume 38, Issue 5, May 2011, Pages 6190-6201
P6	Watermarking in Biomedical Signal Processing	Nilanjan Dey	Intelligent Techniques in Signal Processing for Multimedia Security	pp 345–369	Part of the Studies in Computational Intelligence book series (SCI, volume 660)
P7	Hands-on learning in biomedical signal processing	J.E. Greenberg	IEEE Engineering in Medicine and Biology Magazine	10.1109/MEMB.2003.1237505	Volume: 22, Issue: 4, July-Aug. 2003
P8	A fast discrete S-transform for biomedical signal processing	Robert A. Brown	Annual International Conference of the IEEE Engineering in Medicine and Biology Society	10.1109/IEMBS.2008.4649729	20-25 August 2008
P9	An Ultra Low Energy Biomedical Signal Processing System Operating at Near-Threshold	Jos Hulzink	IEEE Transactions on Biomedical Circuits and Systems	10.1109/TBCAS.2011.2176726	Volume: 5, Issue: 6, Dec. 2011
P10	BioSig: The Free and Open Source Software Library for Biomedical Signal Processing	Carmen Vidaurre	Computational Intelligence and Neuroscience	<a href="https://doi.org/10.1155/2011/935364">https://doi.org/10.1155/2011/935364</a>	Volume 2011

  
**Prof. Pranali Langde**  
 Subject Teacher

  
**Prof. Avinash K. Ikhair**  
 Academic Incharge

  
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**Dr. P.R. Kshirsagar**  
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 & Management, Nagpur



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*"A place to Learn; A Chance to Grow"*  
2021-22 (Even Sem)



**VISION**

" To be recognized for excellent innovative engineering, developing global leaders both in educational and research in the domain of Computer Science and Wireless Engineering"

**MISSION**

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

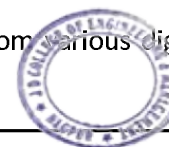
**Teaching Plan**

<b>Course</b> : B. Tech in Information Technology	<b>Year/Semester:</b> 7th Sem	
<b>Name of the Teacher</b> : Prof. Kiran Bode	<b>Subject Code:</b> IT7TE04B	
<b>Subject</b> : CF	<b>Section</b> : IT	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	<b>2</b>
	<b>Tutorial</b>	<b>1</b>
	<b>Practical</b>	<b>--</b>

<b>Course Objective</b>	<b>Course Outcomes</b>
<ol style="list-style-type: none"><li>1. To study the fundamentals of Computer Forensics</li><li>2. To learn, analyze and validate Forensics Data</li></ol>	<p>Student shall be able to-</p> <ol style="list-style-type: none"><li>1. Conduct a computer forensics investigation, including the concept of the chain of evidence.</li><li>2. Report findings from digital forensic investigations.</li><li>3. Perform recovery of digital evidence from various digital devices using variety of software</li></ol>

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	utilities. 4. To explain the tools and tactics associated with Cyber Forensics
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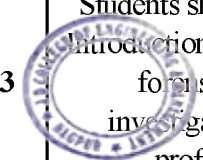
CO PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	2	1	1	2	2	2	2	-	-	-	-	2	2
CO2	-	-	2	2	2	3	3	2	3	-	2	2	3	2	2
CO3	-	1	2	1	2	2	3	-	-	3	3	2	1	1	1
CO4	3	2	2	2	2	2	2	2	3	3	2	3	3	-	-
CO5	1	1	2	1	2	2	2	2	3	3	3	2	-	2	3
CO6	1	-	2	1	1	2	2	2	2	-	-	-	-	2	2
Avg .	1.66667	1.33333	2	1.4	1.8	2.2	2.4	2	2.75	3	2.5	2.25	2.33333	1.75	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
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**Unit I: Digital forensic**

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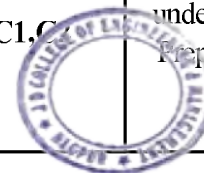
1	1	1	Computer forensics and investigations as a profession	10/6/2022	13/6/2022	Pg No. 150-151	<a href="https://www.youtube.com/results?search_query=Introduction+to+Web+Technologies">https://www.youtube.com/results?search_query=Introduction+to+Web+Technologies</a>	C1,C2,C3	Students should be able to Introduction to Computer forensics and investigations as a profession	CO1, CO2, CO5, CO6
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2	2	2	Understanding computer forensics	13/6/2022	17/6/2022	Pg No.160	<a href="https://www.youtube.com/watch?v=MkcfB7S4fq0">https://www.youtube.com/watch?v=MkcfB7S4fq0</a>	C1,C2,C3	Students should able to understand Understanding computer forensics	CO1, CO2, CO3, CO4
3	3	3	computer forensics versus other related disciplines	17/6/2022	18/6/2022	Pg No.165	<a href="https://www.youtube.com/watch?v=7gObxhJyD4o">https://www.youtube.com/watch?v=7gObxhJyD4o</a>	C1,C2,C3	Students should able to understand the computer forensics versus other related disciplines	CO1, CO2
4	4	4	A brief History of computer Forensics,	18/6/2022	20/6/2022	Pg No.166	<a href="https://www.youtube.com/watch?v=82RUmuGA8aM">https://www.youtube.com/watch?v=82RUmuGA8aM</a> <a href="https://www.youtube.com/watch?v=zEn93KmCdM">https://www.youtube.com/watch?v=zEn93KmCdM</a>	C1,C2	Students should able to understand A brief History of computer Forensics,	CO1, CO2
5	5	5	Understanding case laws	20/6/2022	24/6/2022	Pg No.169	<a href="https://www.youtube.com/watch?v=LBMG8GXyCMw">https://www.youtube.com/watch?v=LBMG8GXyCMw</a>	C1	Students should able to understand the Understanding case laws	CO1, CO2
6	6	6	Developing computer forensics resources	24/6/2022	27/6/2022	Pg No.172	<a href="https://www.youtube.com/watch?v=oNSX21dh6kw">https://www.youtube.com/watch?v=oNSX21dh6kw</a>	C1,C2	Students should able to understand the Developing computer forensics resources	CO1, CO2
7	7	7	Preparing for computer investigations	27/6/2022	1/7/2022	Pg No.174	<a href="https://www.youtube.com/watch?v=ONdUy1f9uLk">https://www.youtube.com/watch?v=ONdUy1f9uLk</a>	C1,C2	Students should able to understand the basics of Preparing for computer investigations	CO1, CO2, CO5,

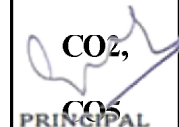
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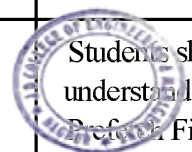




										CO6
<b>UNIT -2 Windows Systems and artifacts</b>										
9	9	9	Introduction to Windows Systems and artifacts	1/7/2022	2/7/2022	Pg No.195	<a href="https://www.youtube.com/watch?v=W-6OY9eI3hk">https://www.youtube.com/watch?v=W-6OY9eI3hk</a>	C1,C2,C3	Students should able to understand the Introduction to Windows Systems and artifacts	CO1, CO2
10	10	10	Windows File Systems	2/7/2022	4/7/2022	Pg No.199	<a href="https://www.youtube.com/watch?v=Oqz66UwqF-I&amp;t=5s">https://www.youtube.com/watch?v=Oqz66UwqF-I&amp;t=5s</a>	C1,C2,C3	Students should able to understand the Windows File Systems	CO1, CO2
11	11	11	File Allocation Table	4/7/2022	8/7/2022	Pg No.201	<a href="https://www.youtube.com/watch?v=nOZEP8hENMs&amp;t=22s">https://www.youtube.com/watch?v=nOZEP8hENMs&amp;t=22s</a>	C1,C2,C3	Students should able to understand the basics of File Allocation Table	CO1, CO2
12	12	12	New Technology File System	8/7/2022	11/7/2022	Pg No.203-204	<a href="https://www.youtube.com/watch?v=6kvcPB7RMnY&amp;t=327s">https://www.youtube.com/watch?v=6kvcPB7RMnY&amp;t=327s</a>	C1,C2	Students should able to understand the basics of New Technology File System	CO1, CO2
13	13	13	File System Summary, Registry, Event Logs	11/7/2022	15/7/2022	Pg No.215	<a href="https://www.youtube.com/watch?v=J5vkGtDc2TY">https://www.youtube.com/watch?v=J5vkGtDc2TY</a>	C1,C2	Students should able to understand the basics of File System Summary, Registry, Event Logs.	CO1, CO2, CO5
14	14	14	Prefetch Files, Shortcut Files,	15/7/2022	16/7/2022	Pg No.220	<a href="https://www.youtube.com/watch?v=YXCbjS2fxzU">https://www.youtube.com/watch?v=YXCbjS2fxzU</a>	C1,C2	Students should able to understand the basics of Prefetch Files, Shortcut Files	CO1, CO2, CO3,

  
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										CO4
15	15	15	Windows Executables	16/7/2022	18/7/2022	Pg No.172	<a href="https://www.youtube.com/watch?v=FJhL8SwS1Jw">https://www.youtube.com/watch?v=FJhL8SwS1Jw</a>	C1,C2,C3	Students should able to understand the basics of Windows Executables	
<b>UNIT-4 Current Computer Forensics Tools</b>										
23	23	23	Introduction, Linux File Systems, File System Layer	18/7/2022	22/7/2022	Pg No.318	<a href="https://www.youtube.com/watch?v=6EMkq7UqMGE">https://www.youtube.com/watch?v=6EMkq7UqMGE</a>	C1,C2	Students should able to understand the basics of Introduction, Linux File Systems, File System Layer	CO1, CO2, CO5, CO6
24	24	24	File Name Layer , Metadata Layer	22/7/2022	25/7/2022	Pg No.320	<a href="https://www.youtube.com/watch?v=5Gz7j4gDrXM">https://www.youtube.com/watch?v=5Gz7j4gDrXM</a>	C1,C2,C3	Students should able to understand the basics of File Name Layer , Metadata Layer	CO1, CO2, CO3, CO4
25	25	25	Data Unit Layer, Journal Tools, Deleted Data	25/7/2022	29/7/2022	Pg No.318	<a href="https://www.youtube.com/watch?v=6EMkq7UqMGE">https://www.youtube.com/watch?v=6EMkq7UqMGE</a>	C1,C2	Students should able to understand the basics of Data Unit Layer, Journal Tools, Deleted Data	CO2, CO3, CO4
26	26	26	Linux Logical Volume Manager, Linux Boot Process and Services	29/7/2022	30/7/2022	Pg No.318	<a href="https://www.youtube.com/watch?v=6EMkq7UqMGE">https://www.youtube.com/watch?v=6EMkq7UqMGE</a>	C1,C2	Students should able to understand the basics of Linux Logical Volume Manager, Linux Boot Process and Services	CO2, CO3,
27	27	27	System V , BSD, Linux System	30/7/2022	1/8/2022	Pg No.318	<a href="https://www.youtube.com/watch?v=6EMkq7UqMGE">https://www.youtube.com/watch?v=6EMkq7UqMGE</a>	C1,C2,C3	Students should able to understand the basics of System V , BSD, Linux	CO2,

			Organization and Artifacts,						System Organization and Artifacts,	CO4
28	28	28	Partitioning, File system Hierarchy, Ownership and Permissions,	1/8/2022	5/8/2022	Pg No.318	<a href="https://www.youtube.com/watch?v=6EMkq7UqMGE">https://www.youtube.com/watch?v=6EMkq7UqMGE</a>	C1,C2	Students should able to understand the basics of Partitioning, File system Hierarchy, Ownership and Permissions,	CO2, CO3, CO4
29	29	29	File Attributes, Hidden Files, User Accounts , Home Directories	5/8/2022	6/8/2022	Pg No.325	<a href="https://www.youtube.com/watch?v=q3x9Pxm6Yw">https://www.youtube.com/watch?v=q3x9Pxm6Yw</a>	C1,C2	Students should able to understand the basics of File Attributes, Hidden Files, User Accounts , Home Directories	CO1, CO2
30	30	30	Shell History GNOME Windows Manager Artifacts	6/8/2022	8/8/2022	Pg No.356	<a href="https://www.youtube.com/watch?v=q3x9Pxm6Yw">https://www.youtube.com/watch?v=q3x9Pxm6Yw</a>	C1,C2,C3	Students should able to understand the basics of Shell History GNOME Windows Manager Artifacts	CO1, CO2
31	31	31	Logs, User Activity Logs, Syslog, Command Line Log Processing, Scheduling Tasks.	8/8/2022	12/8/2022	Pg No.318	<a href="https://www.youtube.com/watch?v=6EMkq7UqMGE">https://www.youtube.com/watch?v=6EMkq7UqMGE</a>	C1,C2,C3	Students should able to understand the basics of Logs, User Activity Logs, Syslog, Command Line Log Processing, Scheduling Tasks	CO2, CO3, CO4
32	32	32	Basic Concepts, Semiconductor RAM Memories	12/8/2022	29/8/2022	Pg No.318	<a href="https://www.youtube.com/watch?v=6EMkq7UqMGE">https://www.youtube.com/watch?v=6EMkq7UqMGE</a>	C1,C2,C3	Students should able to understand the basics of Basic Concepts, Semiconductor RAM Memories	CO3, CO4

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UNIT-4 Current Computer Forensics Tools

33	33	33	Evaluating Computer Forensics Tool Needs, Types of Computer Forensics Tools, Tasks Performed by Computer Forensics Tools	29/8/2022	2/9/2022	Pg No.318	<a href="https://www.youtube.com/watch?v=6EMkq7UqMGE">https://www.youtube.com/watch?v=6EMkq7UqMGE</a>	C1,C2	Students should be able to understand the basics of Evaluating Computer Forensics Tool Needs, Types of Computer Forensics Tools, Tasks Performed by Computer Forensics Tools	CO1, CO2, CO5, CO6
34	34	34	Tool Comparisons, Other Considerations for Tools, Computer Forensics Software Tools	2/9/2022	3/9/2022	Pg No.320	<a href="https://www.youtube.com/watch?v=5Gz7j4gDrXM">https://www.youtube.com/watch?v=5Gz7j4gDrXM</a>	C1,C2,C3	Students should be able to understand the basics of Tool Comparisons, Other Considerations for Tools, Computer Forensics Software Tools	CO1, CO2, CO3, CO4
35	35	35	Command-Line Forensics Tools, UNIX/Linux Forensics Tools,	3/9/2022	5/9/2022	Pg No.325	<a href="https://www.youtube.com/watch?v=q3x9Pxm6Yw">https://www.youtube.com/watch?v=q3x9Pxm6Yw</a>	C1,C2	Students should be able to understand the basics of Command-Line Forensics Tools, UNIX/Linux Forensics Tools,	CO1, CO2
36	36	36	Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations, Using a Write-Blocker.	5/9/2022	12/9/2022	Pg No.356	<a href="https://www.youtube.com/watch?v=q3x9Pxm6Yw">https://www.youtube.com/watch?v=q3x9Pxm6Yw</a>	C1,C2,C3	Students should be able to understand the basics of Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations, Using a Write-Blocker.	CO1, CO2

**UNIT-5 Identification of data**

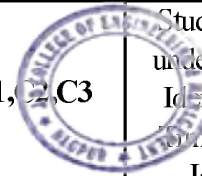
37	37	37	Identification of Data: Timekeeping, Forensic Identification and	12/9/2022	16/9/2022	Pg No.515	<a href="https://www.youtube.com/watch?v=hquaTFKYQQA">https://www.youtube.com/watch?v=hquaTFKYQQA</a>	C1,C2,C3	Students should be able to understand the basics of Identification of Data: Timekeeping, Forensic Identification and	CO1, CO2
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			Analysis of Technical Surveillance Devices						Analysis of Technical Surveillance Devices	
38	38	38	Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats,	16/9/2022	17/9/2022	Pg No.519	<a href="https://www.youtube.com/results?search_query=JAVA+Script+Types">https://www.youtube.com/results?search_query=JAVA+Script+Types</a>	C1,C2,C3	Students should able to understand the basics of Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats	CO1, CO2, CO5, CO6
39	39	39	Unusable File Formats, Converting Files, Investigating Network Intrusions and Cyber Crime,	17/9/2022	19/9/2022	Pg No.520	<a href="https://www.youtube.com/watch?v=Oud4aIVQU4s">https://www.youtube.com/watch?v=Oud4aIVQU4s</a>	C1,C2	Students should able to understand the basics of Unusable File Formats, Converting Files, Investigating Network Intrusions and Cyber Crime,	CO1, CO2, CO5, CO6
40	40	40	Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks Router Forensics. Cyber forensics tools and case studies.	19/9/2022	23/9/2022	Pg No.524	<a href="https://www.youtube.com/watch?v=I5srDu75hM">https://www.youtube.com/watch?v=I5srDu75hM</a>	C1,C2	Students should able to understand the basics of Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks Router Forensics. Cyber forensics tools and case studies,	CO1, CO2, CO3, CO4

  
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### Assignment Plan

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Assignment 1	17/07/2022	20/07/2022	CO1, CO2, CO3

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2	Assignment 2	20/08/2022	24/08/2022	CO3,CO4,CO5
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**Text Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Cyber Forensics Dejey, <u>S. Murugan</u> · 2018 · No preview	Dejey, <u>S. Murugan</u>	Oxford University Press,	26 July 2018
T2	Learn Computer Forensics	William Oettinger	:Packt Publishing	30 April 2020
T3	Computer Organization	Zaky	McGraw-Hill Publication, 2011.	5th Edition

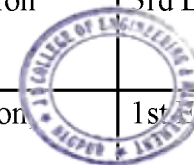
**Reference Books:**

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	Miles J. Murdocca, Vincent P. Heuring	Wiley Publication 2007.	1st Edition

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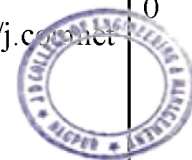
	Architecture			
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**Research Paper:**

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	<b>Factors Affecting the Efficiency of Transferring Remote Sensed Data</b>	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: <a href="https://doi.org/10.1016/j.comnet.2020.107575">https://doi.org/10.1016/j.comnet.2020.107575</a>	ARPA:1960-1970

  
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			ICDCS-IEE International Conference on Distributed Computing Systems.		
P6	Instruction Sets	Christopher j.Wells		DOI: <a href="https://doi.org/10.1109/43.387728">https://doi.org/10.1109/43.387728</a>	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: <a href="https://doi.org/10.1002/0471478326.ch4">https://doi.org/10.1002/0471478326.ch4</a>	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: <a href="https://doi.org/10.1109/54.922803">https://doi.org/10.1109/54.922803</a>	Volume-68:19-45
P9	Control Unit	John von Neumann		DOI: <a href="https://doi.org/10.1049/pi-b-1.1958.0267">https://doi.org/10.1049/pi-b-1.1958.0267</a>	Page 240-243 Volume: 105 Issue 20
P10	Input/Output Organization	Gideon Frieder and		DOI:	Page:874-879 January 2003




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		T.A.El-Ghaza wi		<a href="https://doi.org/10.1002/0471478326.ch8">https://doi.org/10.1002/0471478326.ch8</a>	
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**Prof, Kiran Bode**  
**Subject Teacher**




**Prof, Swati Raut**  
**Academic Incharge**



**Prof, S.S. Sawwashere**  
**HOD (CS/IT)**

Total number of lectures as per planned: - 36



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J D COLLEGE OF ENGINEERING & MANAGEMENT  
DEPARTMENT OF MECHANICAL ENGINEERING

**TEACHING SCHEDULE**

**SESSION 2021-22, ODD SESSION**

**NAME OF THE TEACHER: PROF.S.A.REWATKAR**

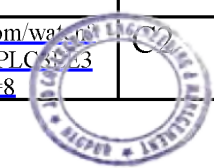
**SUBJECT:-COMPUTER AIDED DESIGN**

**SEC.-A & B**

**YR / SEM:- IV YR / VII SEM**

S N	L N	TC	Topic to be covered	Planned date	Actual Date	Text Book P.N	Reference Book (Page no	URL's (NPTEL/Online Material/Ppt/Video	Applications (R&D/Industry)	Learning Outcomes
<b>UNIT I</b>										
1		1.01	INTRODUCTION TO CAD			T1 (Pg: 27-30)	R1 (p.n.10-12)	<a href="https://www.youtube.com/watch?v=EgKc9L7cbKc&amp;list=PLC3EE33F27CF14A06&amp;index=1">https://www.youtube.com/watch?v=EgKc9L7cbKc&amp;list=PLC3EE33F27CF14A06&amp;index=1</a>	C1	Students should compute CAD model
2		1.02	Input and output devices for CAD & CAM			T1 (Pg: 5-8)	R1 (p.n.13-16)	<a href="https://www.youtube.com/watch?v=1y2Vec5XdXg&amp;list=PLC3EE33F27CF14A06&amp;index=2">https://www.youtube.com/watch?v=1y2Vec5XdXg&amp;list=PLC3EE33F27CF14A06&amp;index=2</a>	P1	Students should explain CAD design
3		1.03	SIMPLE COLOR FRAME BUFFER ALGORITHM FOR THE GENERATION OF BASIC GEOMETRIC ENTITIES FOR CIRCLE			T1 (Pg:65)	R1 (p.n.131-135)	<a href="https://www.youtube.com/watch?v=f9E8TeBebo&amp;list=PLC3EE33F27CF14A06&amp;index=6">https://www.youtube.com/watch?v=f9E8TeBebo&amp;list=PLC3EE33F27CF14A06&amp;index=6</a>	P1	Students should analyze different algorithm
4		1.04	SIMPLE COLOR FRAME BUFFER ALGORITHM FOR THE GENERATION OF BASIC GEOMETRIC ENTITIES LINE, BY USING NON -PARAMETRIC EQUATIONS			T2 (Pg: 276-278)	R1 (p.n.142-147)	<a href="https://www.youtube.com/watch?v=f9E8TeBebo&amp;list=PLC3EE33F27CF14A06&amp;index=6">https://www.youtube.com/watch?v=f9E8TeBebo&amp;list=PLC3EE33F27CF14A06&amp;index=6</a>	P1	Students should able to explain parametric equations
5		1.05	2D transformation : Translation & scaling			T2 (Pg:540-542)	R1 (p.n.201-205)	<a href="https://www.youtube.com/watch?v=iWxS2zpaRjk&amp;list=PLC3EE33F27CF14A06&amp;index=8">https://www.youtube.com/watch?v=iWxS2zpaRjk&amp;list=PLC3EE33F27CF14A06&amp;index=8</a>	P1	Students should analyze technic for scaling

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6	1.06	2D transformation : Rotation & Reflection			T2 (Pg:545-547)	R1 (p.n.207-215)	<a href="https://www.youtube.com/watch?v=iWxS2zpaRjk&amp;list=PLC3EE33F27CF14A06&amp;index=8">https://www.youtube.com/watch?v=iWxS2zpaRjk&amp;list=PLC3EE33F27CF14A06&amp;index=8</a>	C2	Students should memorize different techniques of 2D transformation
7	1.07	2D transformation on Shear &			T2 (Pg:549-550)	R1 (p.n.223-242)	<a href="https://www.youtube.com/watch?v=iWxS2zpaRjk&amp;list=PLC3EE33F27CF14A06&amp;index=8">https://www.youtube.com/watch?v=iWxS2zpaRjk&amp;list=PLC3EE33F27CF14A06&amp;index=8</a>	C3	Students should identify different clippings
8	1.08	Inverse method of 2D Transformation			T2 (Pg:545-547)	R1 (p.n.223-242)	<a href="https://www.youtube.com/watch?v=iWxS2zpaRjk&amp;list=PLC3EE33F27CF14A06&amp;index=8">https://www.youtube.com/watch?v=iWxS2zpaRjk&amp;list=PLC3EE33F27CF14A06&amp;index=8</a>	C3	Students should apply scaling practically
9	1.09	3D TRANSFORMATION ;, ROTATION			T2 (Pg:545-547)	R1 (p.n.273-280)	<a href="https://www.youtube.com/watch?v=I8o4kK9ORL4&amp;list=PLC3EE33F27CF14A06&amp;index=9">https://www.youtube.com/watch?v=I8o4kK9ORL4&amp;list=PLC3EE33F27CF14A06&amp;index=9</a>	P6	Students should identify difference of transformation
10	1.10	3D TRANSFORMATION ;, Reflection			T2 (Pg:549-550)	R1 (p.n.281-285)	<a href="https://www.youtube.com/watch?v=I8o4kK9ORL4&amp;list=PLC3EE33F27CF14A06&amp;index=9">https://www.youtube.com/watch?v=I8o4kK9ORL4&amp;list=PLC3EE33F27CF14A06&amp;index=9</a>	P6	Student should explain different terminology of transformation process

**UNIT II**

11	2.01	Introduction to Geometrical Modeling			T1 (Pg:490-497)	R1 (p.n.380-400)	<a href="https://www.youtube.com/watch?v=9ny-0gdbS94">https://www.youtube.com/watch?v=9ny-0gdbS94</a>	P6	Students should analyze the presentation
12	2.02	BEZIER CURVES			T1 (Pg:490-497)	R1 (p.n.409-465)	<a href="https://www.youtube.com/watch?v=OkncKzflw8I&amp;list=PLC3EE33F27CF14A06&amp;index=46">https://www.youtube.com/watch?v=OkncKzflw8I&amp;list=PLC3EE33F27CF14A06&amp;index=46</a>	P2	Students should explain different curve concept
13	2.03	CUBIC SPLINE CURVES , B- SPLINE CURVES			T1 (Pg:490-500)	R1 (p.n.409-465)	<a href="https://www.youtube.com/watch?v=J0fSfx8a8dY">https://www.youtube.com/watch?v=J0fSfx8a8dY</a>	P2	Students should explain different curve concept
14	2.04	CSG modeling			T1 (Pg:492-496)	R1 (p.n.409-465)			Students should analyze the presentation
15	2.05	WIRE FRAME MODELING,			T1 (Pg:490-497)	R1 (p.n.409-465)	<a href="https://www.youtube.com/watch?v=Nh6TxTUKzhA&amp;list=PLC3EE33F27CF14A06&amp;index=37">https://www.youtube.com/watch?v=Nh6TxTUKzhA&amp;list=PLC3EE33F27CF14A06&amp;index=37</a>	P4	Students should explain different modeling
16	2.06	SOLID MODELING OF BASIC ENTITIES LIKE BOX, CONE, CYLINDER			T1 (Pg:490-497)	R1 (p.n.409-465)	<a href="https://www.youtube.com/watch?v=Nh6TxTUKzhA&amp;list=PLC3EE33F27CF14A06&amp;index=37">https://www.youtube.com/watch?v=Nh6TxTUKzhA&amp;list=PLC3EE33F27CF14A06&amp;index=37</a>	P4	Students should explain different modeling
17	2.07	CSG & B- REPRESENTATION TECHNIQUE USING SET THEORY			T1 (Pg:490-500)	R1 (p.n.409-465)			
18	2.08	CSG & B- REPRESENTATION TECHNIQUE USING SET THEORY			T1 (Pg:492-496)	R1 (p.n.409-465)			Students should apply technique

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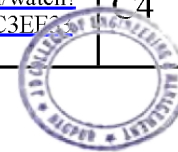
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UNIT III									
19	3.01	Introduction to CAM			T3 (Pg.48 to 52)		<a href="https://www.youtube.com/watch?v=_5r2XR1h1aQ">https://www.youtube.com/watch?v=_5r2XR1h1aQ</a>	C3	Students should understand basics of automation in manufacturing
20	3.02	Element of NC system			T3 (Pg.48 to 52)		<a href="https://www.youtube.com/watch?v=_5r2XR1h1aQ">https://www.youtube.com/watch?v=_5r2XR1h1aQ</a>	C3	Students should identify different G and M codes for NC system
21	3.03	Steps in NC base manufacturing			T3 (Pg.48 to 52)		<a href="https://www.youtube.com/watch?v=_5r2XR1h1aQ">https://www.youtube.com/watch?v=_5r2XR1h1aQ</a>	C3	Students should remember steps and sequence of NC programming
22	3.04	NC programing for point to point			T3 (Pg.52to 62)		<a href="https://www.youtube.com/watch?v=_5r2XR1h1aQ">https://www.youtube.com/watch?v=_5r2XR1h1aQ</a>	C3 & C4	Students should apply different combination of codes in proper manner
23	3.05	NC programing for straight line and contouring control			T3 (Pg.52to 62)		<a href="https://www.youtube.com/watch?v=_5r2XR1h1aQ">https://www.youtube.com/watch?v=_5r2XR1h1aQ</a>	C3	Students should create the NC programming for different machining operations.
24	3.06	Part programming ,NC and APT programming			T3 (Pg.60 to 72)		<a href="https://www.youtube.com/watch?v=_5r2XR1h1aQ">https://www.youtube.com/watch?v=_5r2XR1h1aQ</a>	C4	Students should analyze difference in NC programming.
25	3.07	Adaptive control system & Distributed numerical control system			T3 (Pg.60 to 72)		<a href="https://www.youtube.com/watch?v=_5r2XR1h1aQ">https://www.youtube.com/watch?v=_5r2XR1h1aQ</a>	C4	Students should analyze difference in NC programming.

**UNIT IV  
FINITE ELEMENT METHOD**

26	4.01	Introduction to FEA			T2 (Pg:323-340)	R1 (p.n.466-468)	<a href="https://www.youtube.com/watch?v=QnVH9N1eIc4&amp;list=PLC3EE33F27CF14A06&amp;index=15">https://www.youtube.com/watch?v=QnVH9N1eIc4&amp;list=PLC3EE33F27CF14A06&amp;index=15</a>	P3	Students should analyze FEM
27	4.02	FINITE ELEMENT ANALYSIS : ONE DIMENSIONAL PROBLEM DESIGN PROCEDURE			T2 (Pg:323-340)	R1 (p.n.466-468)	<a href="https://www.youtube.com/watch?v=o0MyjvrqdiQ&amp;list=PLC3EE33F27CF14A06&amp;index=16">https://www.youtube.com/watch?v=o0MyjvrqdiQ&amp;list=PLC3EE33F27CF14A06&amp;index=16</a>	P3	Students should analyze FEM
28	4.03	POTENTIAL ENERGY APPROACH , GALERKIN APPROACH			T2 (Pg:341-345)	R1 (p.n.466-468)	<a href="https://www.youtube.com/watch?v=o0MyjvrqdiQ&amp;list=PLC3EE33F27CF14A06&amp;index=16">https://www.youtube.com/watch?v=o0MyjvrqdiQ&amp;list=PLC3EE33F27CF14A06&amp;index=16</a>		Students should be able to explain different approach
29	4.04	LOCAL AND GLOBAL STIFFNESS MATRIX			T2 (Pg:348-352)	R1 (p.n.466-468)	<a href="https://www.youtube.com/watch?v=5L-OAjY8MDY&amp;list=PLC3EE33F27CF14A06&amp;index=17">https://www.youtube.com/watch?v=5L-OAjY8MDY&amp;list=PLC3EE33F27CF14A06&amp;index=17</a>		Students should be able to explain different approach
30	4.05	FEA WITH 2 DIMENSIONS			T2 (Pg:405-408)	R1 (p.n.501-505)	<a href="https://www.youtube.com/watch?v=1AtilleGiFlg&amp;list=PLC3EE33F27CF14A06&amp;index=21">https://www.youtube.com/watch?v=1AtilleGiFlg&amp;list=PLC3EE33F27CF14A06&amp;index=21</a>	C4	Students should be able to compute the FEM process



31	4.06	TRUSS ANALYSIS			T2 (Pg:405-408)	R1 (p.n.501-505)	<a href="https://www.youtube.com/watch?v=8j4Z0TrS96O&amp;list=PLC3EE33F27CF14A06&amp;index=22">https://www.youtube.com/watch?v=8j4Z0TrS96O&amp;list=PLC3EE33F27CF14A06&amp;index=22</a>		Students should be able to compute the truss
32	4.07	SHAPE FUNCTION WITH CST			T2 (Pg:405-408)		<a href="https://www.youtube.com/watch?v=tDhlAeuM5iI&amp;list=PLC3EE33F27CF14A06&amp;index=23">https://www.youtube.com/watch?v=tDhlAeuM5iI&amp;list=PLC3EE33F27CF14A06&amp;index=23</a>		Students should be able to compute the strain equations
33	4.08	FORMATION OF STIFFNESS MATRIX FOR STRUSS			T2 (Pg:405-408)	R1 (p.n.501-505)	<a href="https://www.youtube.com/watch?v=l8t-7-pODN4&amp;list=PLbMVogVi5nJRinZA9oryBmDdUNe7lbnB0&amp;index=25">https://www.youtube.com/watch?v=l8t-7-pODN4&amp;list=PLbMVogVi5nJRinZA9oryBmDdUNe7lbnB0&amp;index=25</a>	C5	Students should be able to compute the CST problems on FEM
34	4.09	PRE PROCESSING AND POST PROCESSING			T2 (Pg:405-408)		<a href="https://www.youtube.com/watch?v=gvi2EH_ATpE&amp;list=PLC3EE33F27CF14A06&amp;index=24">https://www.youtube.com/watch?v=gvi2EH_ATpE&amp;list=PLC3EE33F27CF14A06&amp;index=24</a>		Students should be able to compute the Stiffness matrix

**UNIT-V  
FLEXIBLE MANUFACTURING SYSTEM**

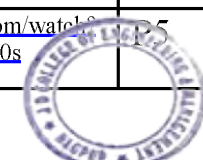
33	5.01	Introduction to FMS			T4(Pg.384-388)		<a href="https://www.youtube.com/watch?v=YoslM2Sxihs">https://www.youtube.com/watch?v=YoslM2Sxihs</a>	C1	Students should understand term FMS
34	5.02	Parts of FMS			T4(Pg.387-390)		<a href="https://www.youtube.com/watch?v=YoslM2Sxihs">https://www.youtube.com/watch?v=YoslM2Sxihs</a>	C2	Students should identify different parts in FMS
35	5.03	Layout for FMS			T4(Pg.387-390)		<a href="https://www.youtube.com/watch?v=YoslM2Sxihs">https://www.youtube.com/watch?v=YoslM2Sxihs</a>	C3	Students should plot FMS layout
36	5.04	Advantageous & Disadvantages of FMS			T4(Pg.394)		<a href="https://www.youtube.com/watch?v=YoslM2Sxihs">https://www.youtube.com/watch?v=YoslM2Sxihs</a>	C1	Students should differentiate FMS applications
37	5.05	Robotics – introduction					<a href="https://www.youtube.com/watch?v=P_PP76flZfw&amp;list=PLyqSpOzTE6M_XM9cvjLLO_Azt1FkgPhpH&amp;index=2">https://www.youtube.com/watch?v=P_PP76flZfw&amp;list=PLyqSpOzTE6M_XM9cvjLLO_Azt1FkgPhpH&amp;index=2</a>	C1 to C5	Students should understand terminology of robotics
38	5.06	Sensors used in robotics					<a href="https://www.youtube.com/watch?v=P_PP76flZfw&amp;list=PLyqSpOzTE6M_XM9cvjLLO_Azt1FkgPhpH&amp;index=2">https://www.youtube.com/watch?v=P_PP76flZfw&amp;list=PLyqSpOzTE6M_XM9cvjLLO_Azt1FkgPhpH&amp;index=2</a>		Students should choose and apply different sensors in robotics.
39	5.07	Advancement in robotics					<a href="https://www.youtube.com/watch?v=P_PP76flZfw&amp;list=PLyqSpOzTE6M_XM9cvjLLO_Azt1FkgPhpH&amp;index=2">https://www.youtube.com/watch?v=P_PP76flZfw&amp;list=PLyqSpOzTE6M_XM9cvjLLO_Azt1FkgPhpH&amp;index=2</a>		

**UNIT-VI  
COMPUTER AIDED PROCESS PLANNING**

41	6.01	OPTIMIZATION IN DESIGN			T2 (Pg:412-418)	R1 (p.n.615-618)	<a href="https://www.youtube.com/watch?v=AoIQS10Ewn4&amp;t=30s">https://www.youtube.com/watch?v=AoIQS10Ewn4&amp;t=30s</a>	P5	Students should analyze the optimization process
42	6.02	OBJECTIVES OF OPTIMUM DESIGN,			T2 (Pg:425-430)		<a href="https://www.youtube.com/watch?v=AoIQS10Ewn4&amp;t=30s">https://www.youtube.com/watch?v=AoIQS10Ewn4&amp;t=30s</a>	P5	Students should identify the optimization process

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43	6.03	JOHNSON'S METHOD OF OPTIMUM DESIGN, PRIMARY DESIGN EQUATION			T2 (Pg:431-435)	R1 (p.n.615-618)	<a href="https://www.youtube.com/watch?v=hCX5IOPFrAM">https://www.youtube.com/watch?v=hCX5IOPFrAM</a>		Students should compute the primary design parameters
44	6.04	SUBSIDIARY DESIGN EQUATIONS AND LIMIT EQUATIONS			T2 (Pg:436-440)		<a href="https://www.youtube.com/watch?v=hCX5IOPFrAM">https://www.youtube.com/watch?v=hCX5IOPFrAM</a>		Students should compute the primary design equations
45	6.05	OPTIMUM DESIGN WITH NORMAL AND REDUNDANT SPECIFICATIONS			T2 (Pg:436-440)	R1 (p.n.615-618)	<a href="https://www.youtube.com/watch?v=hCX5IOPFrAM">https://www.youtube.com/watch?v=hCX5IOPFrAM</a>	C6	Students should identify the limiting parameters
46	6.06	OPTIMUM DESIGN WITH NORMAL AND REDUNDANT SPECIFICATIONS			T2 (Pg:436-440)		<a href="https://www.youtube.com/watch?v=hCX5IOPFrAM">https://www.youtube.com/watch?v=hCX5IOPFrAM</a>	C6	
47	6.07	SIMPLE MACHINE ELEMENTS LIKE: TENSION BAR, TRANSMISSION SHAFT AND HELICAL SPRING			T2 (Pg:444-448)		<a href="https://www.youtube.com/watch?v=4Yrtiv3PTQ">https://www.youtube.com/watch?v=4Yrtiv3PTQ</a>		Students should compute the shaft and spring problems on FEM
48	6.08	SIMPLE MACHINE ELEMENTS LIKE: TENSION BAR, TRANSMISSION SHAFT AND HELICAL SPRING			T2 (Pg:436-440)	R1 (p.n.615-618)	<a href="https://www.youtube.com/watch?v=4Yrtiv3PTQ">https://www.youtube.com/watch?v=4Yrtiv3PTQ</a>		Students should compute the shaft and spring problems on FEM

\*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

### Final Outcome of the Subject:

- CO1. Students should be able to explain, classify, construct and compute the inversions, **degree of freedom, I centers for mechanisms.**
- CO2. Students should be able to explain, construct and analyze the velocity & acceleration in mechanisms.
- CO3. Students should be able to define, explain and compute the friction in mechanisms.
- CO4. Students should be able to classify, explain and design the brakes and dynamometer.
- CO5. Students should be able to classify, explain, and construct the various types of cams profiles.
- CO6. Students should be able to explain, construct and compute the balancing of rotating and reciprocating masses.

  
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**TextBooks:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	CAD/CAM, Principles and Applications	P.N. Rao	McGraw Hill	Third Edition 2012
T2	Introduction to Finite Elements in Engineering	Chandrupatla T. R	Prentice Hall India.	Fourth Edition 2015
T3	CNC machine	B.S.Pabla & M.Adinathan	New Age International Publishers	First Edition 1994
T4	CAD/CAM Theory and Concepts	Kuldeep Sareen & Chandandeep Grewal	S.Chand	First Edition, 2009

**Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	Computer Graphics,.	D. Hearn & M.P. Baker,	Pearson	Fourth edition

**Company/Industry:**

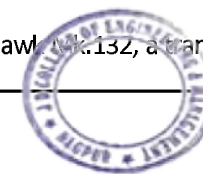
Code	Company/Industry Name	Website	Detailed Information
C1	John Deere	www.deere.com	ohn Deere is the brand name of Deere & Company, an American corporation that manufactures agricultural, construction, and forestry machinery, diesel engines, drivetrains used in heavy equipment, and lawn care equipment.
C2	Bharat Dynamics Limited	www.bdl-india.in	Bharat Dynamics Limited (BDL), A Government of India Enterprise under the administrative control of the Ministry of Defence (MoD), was established in the year 1970 to be a manufacturing base for guided weapon systems. Its coming into being reflects the visionary wisdom of the Nation to achieve self-reliance in the technological domain.
C3	HAL	www.hal-india.in	<p>Apart from 1st of Hawk Mk 132 Aircraft (66 Nos.), the division has signed contract with Indian Air Force and Indian Navy to supply additional 57 Hawk Aircraft (40 Nos.Hawk for Indian Airforce and 17 Nos. Hawk for IndianNavy).</p> <p>Currentluy, the Division is manufacturing The Hawk Mk.132, a transonic tandem-seat ground attack / trainer,</p>



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			powered by single Rolls Royce Adour Mk.871 turbo fan under licence from BASE SYSTEMS, UK.
C4	Thermax Ltd	www.thermaxglobal.com	Thermax's systems, products and services help industry achieve better resource productivity, and improve bottom lines while maintaining a clean environment. It's portfolio includes products for heating, cooling, water and waste management, and specialty chemicals.
C5	Larsen and turbo	www.larsentoubro.com	Headquartered in Mumbai, Larsen & Toubro Limited is one of the largest and most respected companies in India's private sector. With over 80 years of a strong, customer focused approach and a continuous quest for world-class quality, L&T has unmatched capabilities across Technology, Engineering, Construction and Manufacturing, and maintains a leadership in all its major lines of business.
C6	Bajaj Auto	Bajajauto.com	Bajaj Auto Limited is a global two-wheeler and three-wheeler manufacturing company based in India. It manufactures motorcycles, scooters and auto rickshaws. Bajaj Auto is a part of the Bajaj Group. It was founded by Jamnalal Bajaj in Rajasthan in the 1940s.
C7			

#### Research Paper:

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	Automatic and high-quality surface mesh generation for CAD models	Jianwei Guo	National Laboratory of Pattern Recognition, Institute of Automation, Chinese Academy of Sciences	<a href="https://doi.org/10.1016/j.cad.2018.12.005">https://doi.org/10.1016/j.cad.2018.12.005</a>	August 17, 2018
P2	An intersection algorithm for disk B- spline curves	Xuefeng Ao	Elsevier Computers & Graphics	<a href="http://dx.doi.org/10.1016/j.cag.2017.07.021">http://dx.doi.org/10.1016/j.cag.2017.07.021</a>	Volume 17, Issue 1, March 2019, Pages 38-44
P3	Trimming line development method of auto panelpart with undercutting flange	Yidong Bao	Elsevier Finite Elements in Analysis and Design	<a href="http://dx.doi.org/10.1016/j.finel.2015.04.002">http://dx.doi.org/10.1016/j.finel.2015.04.002</a>	Finite Elements in Analysis and Design 102-103(2015)29-36
P4	Creativity and solid modeling	Murat Sönmez	Elsevier Procedia - Social and Behavioral Sciences	doi: <a href="https://doi.org/10.1016/j.sbspro.2013.09.172">10.1016/j.sbspro.2013.09.172</a>	93 ( 2013 ) 165-173



P5	The Origin of Operations: Interactions Between the Product and the Manufacturing Automation Control System	Kristofer Bengtsson	Proceedings of the 13th IFAC Symposium on  Information Control Problems in Manufacturing  Moscow, Russia		June 3-5, 2009
P6	Push-pull direct modeling of solid CAD models	Qiang Zou	Advances in Engineering Software	<a href="https://doi.org/10.1016/j.advengsoft.2018.10.003">https://doi.org/10.1016/j. advengsoft.2018.10.003</a>	Advances in Engineering Software 127 (2019) 59–69,14 October 2018



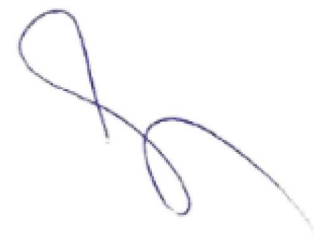
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**Subject Teacher**



**Signature**  
**Academic In charge**



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**Head-DOME**



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### Teaching Plan

<b>Course</b> : B. Tech in Artificial Intelligence	<b>Year/Semester:</b> 4th Sem	
<b>Name of the Teacher</b> : Prof. Kiran Bode	<b>Subject Code:</b> CS4T005	
<b>Subject</b> : Database Management System	<b>Section</b> : AI	
<b>Periods per Week (each 45 min)</b>	<b>Lecture</b>	<b>3</b>
	<b>Tutorial</b>	-
	<b>Practical</b>	<b>2</b>

Course Objective	Course Outcomes
<ol style="list-style-type: none"> <li>1. To explain basic database concepts, applications, data models, schemas and instances.</li> <li>2. To demonstrate the use of constraints and relational algebra operations. I</li> <li>3. Describe the basics of SQL and construct queries using SQL.</li> <li>4. To emphasize the importance of normalization in databases.</li> <li>5. To facilitate students in Database design.</li> <li>6. To familiarize issues of concurrency control and transaction management.</li> </ol>	<p>Student shall be able to-</p> <ol style="list-style-type: none"> <li>1. How and where to use Cassandra and the core concepts that drive this database</li> <li>2. Learn how to use the fault-tolerant and high availability feature of Cassandra .</li> <li>3. Understand the Apache Cassandra architecture, Big data, NO SQL, Hadoop.</li> <li>4. Identify requirements and create a Cassandra data model by applying data modelling techniques.</li> <li>5. Explain the basic concept of CQL and CQLSH</li> <li>6. Integrate the database with your application</li> </ol>

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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/Pt/Video)	Applications (R&D/ Industry)	Learning Outcomes
<b>Unit I: Introduction to Apache Cassandra</b>								
1	1	1.1	Characteristics	Day 1	T1 (Pg. 4 to 5)	<a href="https://www.youtube.com/watch?v=vf5HAEQwD5g&amp;list=PLK mL-qUJew0mPDIHMuuT06TuFfRF1WFBt">https://www.youtube.com/watch?v=vf5HAEQwD5g&amp;list=PLK mL-qUJew0mPDIHMuuT06TuFfRF1WFBt</a>	C1,C2	Will be able to understand what are the Characteristics of CASSANDRA
2	2	1.2	History of Cassandra	Day 2	T1 (Pg. 6 to 8)	<a href="https://www.youtube.com/watch?v=rrG7azSlyWI&amp;list=PLIwC9bZ0rmjSkml1VRJROX4vP2YMif4Ebh&amp;index=4">https://www.youtube.com/watch?v=rrG7azSlyWI&amp;list=PLIwC9bZ0rmjSkml1VRJROX4vP2YMif4Ebh&amp;index=4</a>	C1,C3	Will be able to understand history of Cassandra.
3	3	1.3	Features of Cassandra	Day 3	T2 (Pg. 45 to 48)	<a href="https://www.youtube.com/watch?v=2ie8fvgIsOU">https://www.youtube.com/watch?v=2ie8fvgIsOU</a>	C1	Will be able to understand features of Cassandra.
4	4	1.4	When is Cassandra Used	Day 4	T1 (Pg. 12 to 25)	<a href="https://www.youtube.com/watch?v=k6HKfdfAywU">https://www.youtube.com/watch?v=k6HKfdfAywU</a> <a href="https://www.youtube.com/watch?v=6CzfqZU2k0c">https://www.youtube.com/watch?v=6CzfqZU2k0c</a>	C1,C2,C3	Will be able to understand what is use of Cassandra
5	5	1.5	Simple Cassandra Program	Day 5	T2 (Pg. 35 to 45)	<a href="https://www.youtube.com/watch?v=tZOiC9KvsRs">https://www.youtube.com/watch?v=tZOiC9KvsRs</a>	C1,C2	Will be able to understand what is simple program of Cassandra.

  
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6	6	1.6	Cassandra Command Line Interface	Day 6	T1 (Pg. 68 to 75)	<a href="https://www.youtube.com/watch?v=uPOGPL2C0_8">https://www.youtube.com/watch?v=uPOGPL2C0_8</a>	C1,C3	Will be able to understand what is Cassandra command line interface..	
7	7	1.7	Advantages of Cassandra	Day 7	T1 (Pg. 4 to 5)	<a href="https://www.youtube.com/watch?v=tZOiC9KvsRs">https://www.youtube.com/watch?v=tZOiC9KvsRs</a>	C1,C2,C3	Will be able to understand advantages of Cassandra.	
8	8	1.8	Limitations of Cassandra	Day 8	T1 (Pg. 6 to 8)	<a href="https://www.youtube.com/watch?v=tZOiC9KvsRs">https://www.youtube.com/watch?v=tZOiC9KvsRs</a>	C3	Will be able to understand limitations of Cassandra.	
<b>Unit II: Overview of Big Data and NoSQL Database</b>									
9	7	2.1	The 3 Vs. of Big Data	Day 9	R1 (Pg : 3 to 20 )	<a href="https://www.youtube.com/watch?v=W2_Xp3V7tCg&amp;list=PLwZJjHGjgrZqJ9yQZ-WJb5gBJcKMr9iXP&amp;index=4">https://www.youtube.com/watch?v=W2_Xp3V7tCg&amp;list=PLwZJjHGjgrZqJ9yQZ-WJb5gBJcKMr9iXP&amp;index=4</a>	C1,C2,C3	Will be able to understand are 3 v's of Cassandra.	
10	10	2.2	Data Evolution	Day 10	T2 (Pg. 45 to 55)	<a href="https://www.youtube.com/watch?v=PcMr6xoundk">https://www.youtube.com/watch?v=PcMr6xoundk</a>	C1,C2	Will be able to understand what is data evolution.	
11	11	2.3	Features of Big Data	Day 11	T1 (Pg. 33 to 40)		C1,C3	Will be able to understand what is feature of big data.	
12	12	2.4	Big Data-Use Cases	Day 12	R3 (Pg: 26 to 35)	<a href="https://www.youtube.com/watch?v=p3eiiPVHGTE">https://www.youtube.com/watch?v=p3eiiPVHGTE</a>	C1,C2,C3	Will be able to understand what is use cases of big data..	
13	13	2.5	Big Data	Day 13	R3	<a href="https://www.youtube.com/w">https://www.youtube.com/w</a>	C1,C2,C3	Will Be able to	

  
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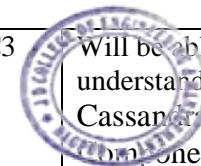
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			Analytics		(Pg : 37 to 57 )	<a href="#">atch?v=Sabwow_e2-M</a>		understand what is big data analytics.
14	14	2.6	Traditional Technology vs. Big Data Technology	Day 14	T2 (Pg. 105 to 120)	<a href="https://www.youtube.com/watch?v=Sabwow_e2-M">https://www.youtube.com/watch?v=Sabwow_e2-M</a>	C1,C2	Will be able to understand what are Traditional Technology vs. Big Data Technology
15	15	2.7	Apache Hadoop	Day 15	R2 (Pg: 26 to 35)	<a href="https://www.youtube.com/watch?v=Sabwow_e2-M">https://www.youtube.com/watch?v=Sabwow_e2-M</a>	C1,C3	Will Be able to understand what is apache Hadoop.
16	16	2.8	HDFS, Map Reduce	Day 16	R1 (Pg: 26 to 35)	<a href="https://www.youtube.com/watch?v=Sabwow_e2-M">https://www.youtube.com/watch?v=Sabwow_e2-M</a>	C1,C2,C3	Will Be able to understand what is HDFS map reduce.
17	17	2.9	NoSQL Databases	Day 17	R3 (Pg. 45 to 55)	<a href="https://www.youtube.com/watch?v=Sabwow_e2-M">https://www.youtube.com/watch?v=Sabwow_e2-M</a>	C1,C2,C3	Will Be able to understand what is NOSQL databases.
18	18	2.10	Approaches to NoSQL Databases-Types	Day 18	R3 (Pg : 62 –67 )	<a href="https://www.youtube.com/watch?v=Sabwow_e2-M">https://www.youtube.com/watch?v=Sabwow_e2-M</a>	C2,C3	Will Be able to understand what is Approaches to NoSQL Databases-Types
<b>Unit III: Cassandra Data Model</b>								
19	19	3.1	Cassandra Data Model Components	Day 19	R1 (Pg : 22 – 23)	<a href="https://www.youtube.com/watch?v=ABwD8IYByfk">https://www.youtube.com/watch?v=ABwD8IYByfk</a>	C1,C3	Will be able to understand what are Cassandra Data Model Components

  
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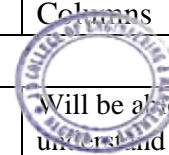
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20	20	3.2	Keyspaces(schema in a relational database)	Day 20	T1 (Pg. 108 to 112)	<a href="https://www.youtube.com/watch?v=HCLPUTFPcnk">https://www.youtube.com/watch?v=HCLPUTFPcnk</a>	C1,C3	Will be able to understand what is Keyspaces(schema in a relational database)	
21	21	3.3	Tables	Day 21	T2 (Pg : 62 –67 )	<a href="https://www.youtube.com/watch?v=eIH7zRVelnw">https://www.youtube.com/watch?v=eIH7zRVelnw</a>	C1,C2,C3	Will be able to understand what is tables.	
22	22	3.4	Columns	Day 22	T2 (Pg. 78 to 95)	<a href="https://www.youtube.com/watch?v=EGEwkad_1IA">https://www.youtube.com/watch?v=EGEwkad_1IA</a>	C1,C2,C3	Will be able to understand what is columns.	
23	23	3.5	<b>UUID (Universal Unique Identity )and TimeUUID</b>	Day 23	T3 (Pg. 56 to 66)	<a href="https://www.youtube.com/watch?v=0oeap0QDsIY">https://www.youtube.com/watch?v=0oeap0QDsIY</a>	C1,C2	Will be able to understand what are <b>UUID (Universal Unique Identity )and.</b>	
24	24	3.6	Counter Compound Keys	Day 24	R1 (Pg. 256 to 268)	<a href="https://www.youtube.com/watch?v=Sabwow_e2-M">https://www.youtube.com/watch?v=Sabwow_e2-M</a>	C1,C3	Will be able to understand what is Counter Compound Keys	
25	25	3.7	Indexes, Collection Columns	Day 25	R2 (Pg. 256 to 268)	<a href="https://www.youtube.com/watch?v=Sabwow_e2-M">https://www.youtube.com/watch?v=Sabwow_e2-M</a>	C1,C2,C3	Will be able to understand what is Indexes, Collection Columns	
<b>Unit IV: Cassandra Query Language</b>									
26	26	4.1	CQL	Day 26	R1 (Pg : 112 –	<a href="https://www.youtube.com/watch?v=RtF3KtC9qJw">https://www.youtube.com/watch?v=RtF3KtC9qJw</a>	C1,C2,C3	Will be able to understand what is CQL.	

  
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					113 )	<a href="https://www.youtube.com/watch?v=oWLYIrY_xqw&amp;t=107s">https://www.youtube.com/watch?v=oWLYIrY_xqw&amp;t=107s</a>		
27	27	4.2	DDL statements	Day 27	R1 (Pg : 114 – 123 )	<a href="https://www.youtube.com/watch?v=pAB-z0knPpk">https://www.youtube.com/watch?v=pAB-z0knPpk</a>	C1,C2	Will be able to understand what is DDL statements.
28	28	4.3	DDL statements	Day 28	R1 (Pg : 114 – 123 )	<a href="https://www.youtube.com/watch?v=oSXEQXXsIfw">https://www.youtube.com/watch?v=oSXEQXXsIfw</a>	C1,C3	Will be able to understand what is DDL statements.
29	29	4.4	DML Statements	Day 29	R1 (Pg :145 – 154 )	<a href="https://www.youtube.com/watch?v=rT4eI3p3tVk">https://www.youtube.com/watch?v=rT4eI3p3tVk</a>	C1,C2,C3	Will be able to understand what is DML statements.
30	30	4.5	DML Statements	Day 30	R1 (Pg :145 – 154 )	<a href="https://www.youtube.com/watch?v=rT4eI3p3tVk">https://www.youtube.com/watch?v=rT4eI3p3tVk</a>	C1,C3	Will be able to understand what is DML statements.
31	31	4.6	DML Statements – COPY	Day 31	R1 (Pg :145 – 154 )	<a href="https://www.youtube.com/watch?v=rT4eI3p3tVk">https://www.youtube.com/watch?v=rT4eI3p3tVk</a>	C1,C2	Will be able to understand what is DML COPY statements.

**Unit V- Apache Cassandra Interfaces**

32	32	5.1	Cassandra Interfaces	Day 32	R1 (Pg : 222 – 225 )	<a href="https://www.youtube.com/watch?v=O9ELRvuSxxA">https://www.youtube.com/watch?v=O9ELRvuSxxA</a>	C1,C2,C3	Will be able to understand what is Cassandra interfaces
33	33	5.2	Cassandra Command Line	Day 33	R3 (Pg : 222 –	<a href="https://www.youtube.com/watch?v=9CD5VelrHbw&amp;t=3">https://www.youtube.com/watch?v=9CD5VelrHbw&amp;t=3</a>	C1,C2	Will be able to understand what is

  
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			Interface		225 )	2s		Cassandra Command Line Interface
34	34	5.3	Cqlsh Options	Day 34	T1 (Pg : 269–273 )	<a href="https://www.youtube.com/watch?v=z0fPRyR12KA">https://www.youtube.com/watch?v=z0fPRyR12KA</a>	C1,C3	Will be able to understand what is I Cqlsh Options.
35	35	5.4	Cqlsh Commands	Day 35	T2 (Pg : 269 – 271 )	<a href="https://www.youtube.com/watch?v=z0fPRyR12KA&amp;t=33s">https://www.youtube.com/watch?v=z0fPRyR12KA&amp;t=33s</a>	C1,C2	Will be able to understand what is Cqlsh Commands
36	36	5.5	Cqlsh Shell Commands	Day 36	R1 (Pg : 271 – 273 )	<a href="https://www.youtube.com/watch?v=0mNY7Mqrw44&amp;t=51s">https://www.youtube.com/watch?v=0mNY7Mqrw44&amp;t=51s</a>	C1.C2,C3	Able to understand what is Cqlsh Shell Commands
37	37	5.6	Querying Cassandra	Day 37	R1 (Pg : 274 – 286 )	<a href="https://www.youtube.com/watch?v=HTuSgkDlbSA">https://www.youtube.com/watch?v=HTuSgkDlbSA</a>	C1,C2	Able to understand what is Querying Cassandra

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

Total number of lectures as per syllabus: - 37

Total number of lectures as per planned: - 37

**Assignment Plan**

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Assignment No. 1	10/02/2020	15/03/2021	1, 2, 3
2	Assignment No. 2	04/03/2020	10/03/2021	4, 5

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**Content Beyond Syllabus Topic – Planned**

Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP
1	DBMS industry exposure.	20/03/2020	L6

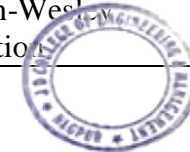
**Text Books / Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Mastering Apache Cassandra	Nishant Neeraj	Packt Publishing	2 <sup>nd</sup> Edition, 2013.
T2	Cassandra: The Definitive Guide	Eben Hewitt	Apache Cassandra	2 <sup>nd</sup> Edition, 2016.
T3	Practical Cassandra: A Developer's Approach	Bradberry	Pearson Education India	1 <sup>st</sup> Edition, 2014
T4	Beginning Apache Cassandra Development	Vivek Mishra	Apress Publications	December 2014
R1	Mastering Apache Cassandra 3.X	Nishant Neeraj Aaron Ploetz Tejaswi Malepati	Ingram short title	3 <sup>rd</sup> Edition, 2018
R2	MongoDB Complete Guide	Manu Sharma	BPB Publications	1 January 2021
R3	NoSQL Distilled	Pramod Sadalage, Martin Fowler	Addison-Wesley Publication	23 August 2017

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**Company/Industry:**

Code	Company/Industry Name	Website	Detailed Information
C1	Lorven Technologies	lorventech.com	Provides technology consulting, staffing and training services. Offers analysis, design and development of information systems, among others.
C2	DATA Inc.	datainc.biz	DATA Inc. uses 900 different technologies from 10 different vendors. They have above average use of several technologies including HP Unified Functional Testing, Windows Server 2008 and Microsoft Visio.
C3	Zendesk Inc	zendesk.com	Zendesk, Inc. (Zendesk) is a software development company. The Zendesk family of products is built to work together to help organizations understand and manage customer relationships. All Zendesk products share a common interface and are being developed to support a shared services infrastructure and common customer data platform. Zendesk's products are developed using agile software techniques, and are designed to incorporate and innovate on customer feedback obtained through beta and Early Access Programs (EAPs)..

  
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**Research Paper:**

Cod e	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/ Page no/Year
R1	The NoSQL Principles and Basic Application of Cassandra Model	Guoxi Wang	2012 International Conference on Computer Science and Service System	10.1109/CSSS.2012.336	13227039
R2	An Evaluation of Cassandra for Hadoop	Elif Dede	2013 IEEE Sixth International Conference on Cloud Computing	10.1109/CLOUD.2013.31	13935466
R3	A Big Data Modeling Methodology for Apache Cassandra	Artem Chebotko	2015 IEEE International Congress on Big Data	10.1109/BigDataCongress.2015.41	15411729

  
Prof. Kiran Bode  
Subject In charge

  
Prof. Swati Raut  
Dept. Academic Incharge

  
Dr. Supriya Sawwashire  
Dept. Head AI

HOD  
Artificial Intelligence  
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### Teaching Plan

<b>Course</b> : B. Tech in Artificial Intelligence	<b>Year/Semester</b> : 2 <sup>nd</sup> /3 <sup>rd</sup>	
<b>Name of the Teacher</b> : Prof. Jolly Nikhade	<b>Subject Code</b> : AI3T007	
<b>Subject</b> : Universal Human Values	<b>Section</b> :AI	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	<b>2</b>
	<b>Tutorial</b>	-
	<b>Practical</b>	-

<b>Course Objective</b>	<b>Course Outcomes</b>
<ol style="list-style-type: none"> <li>1. Students are expected to become more aware of their surroundings, society, social problems and their sustainable solutions, while keeping human relationships and human nature in mind.</li> <li>2. They would have better critical ability.</li> <li>3. They would also become sensitive to their commitment towards what they believe in (humane values. Humane relationships and humane society).</li> <li>4. Develop Empathy</li> </ol>	<ol style="list-style-type: none"> <li>1. Sensitization of student towards self, family (relationship), society and nature.</li> <li>2. Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.</li> <li>3. Strengthening of self-reflection.</li> <li>4. Development of commitment and courage to act.</li> <li>5. Justify the need of this education</li> <li>6. Take steps to create a better world</li> </ol>

  
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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	CO mapping
<b>Unit I –Need, Basic Guidelines,Content and Process for Value Education</b>										
1	1	1	Self-Exploration– what is it? - Its content and process;	21-09-2021	21-09-2021	Module 1 Aicte 45-46	<a href="https://youtu.be/G5EO8DbqH94">https://youtu.be/G5EO8DbqH94</a>	Applied in Day to day to lives	Sensitization of student towards self, family	1
2	2	2	Continuous Happiness and Prosperity	24-09-2021	24-09-2021	Module 1 Aicte 61	<a href="http://www.youtube.com/watch?v=3Fv%3D38CXcE_Q1Ug&amp;usg=AOvVaw3jEJ4Twu2LNYIDe1IU1OI">www.youtube.com/watch?v=3Fv%3D38CXcE_Q1Ug&amp;usg=AOvVaw3jEJ4Twu2LNYIDe1IU1OI</a>	Applied in Day to day to lives	Sensitization of student towards self, family	2
3	3	3	Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspiration	28-09-2021	28-09-2021	Module 1 Aicte 63	<a href="https://youtu.be/jSrC-EWYIJQ">https://youtu.be/jSrC-EWYIJQ</a>	Applied in Day to day to lives	Sensitization of student towards self, family	2
4	4	4	. Understanding Happiness and Prosperity correctly-	1-10-2021	1-10-2021	Module 1 Aicte 65	<a href="https://youtu.be/webOQVOuNSg">https://youtu.be/webOQVOuNSg</a>	Applied in Day to day to lives	Understanding (or developing clarity	Principal
5	5	5	in choice based on liking-disliking	5/10/2021	5-10-2021	Module 1 Aicte 65	<a href="https://youtu.be/webOQVOuNSg">https://youtu.be/webOQVOuNSg</a>	Applied in Day to day to lives	Understanding (or developing clarity	Principal College of Engineering & Management Khandala, Katol Road 2 Nagpur-441501
6	6	6	A critical appraisal of the current scenario. Method to fulfill the	8/10/2021	8/10/2021	Module 1 Aicte 69	<a href="https://www.youtube.com/watch?v=mw_AWSv6Oic">https://www.youtube.com/watch?v=mw_AWSv6Oic</a>	Applied in Day to day to lives	Understanding (or developing clarity	2



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above human aspirations

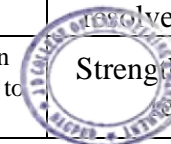
**UNIT -2 Understanding Harmony in the Human Being-Harmony in Myself**

7	7	7	Understanding human being as a co-existence of the sentient 'I' and the material 'Body	12-10-2021	12-10-2021	Module 2 Aicte 93	<a href="https://youtu.be/webOQV OuNSg">https://youtu.be/webOQV OuNSg</a>	Applied in Day to day to lives	Strengthening of self-reflection.	1
8	8	8	Understanding the needs of Self ('I') and 'Body' - happiness and physical facility	22-10-2021	12-10-2021	Module 2 Aicte 93	<a href="https://www.slideshare.net/InstaRemedy/consumer-rights-in-india-73526804">https://www.slideshare.net/InstaRemedy/consumer-rights-in-india-73526804</a>	Applied in Day to day to lives	Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.	2
9	9	9	Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)	26-10-2021	22-10-2021	Module 2 Aicte 95	<a href="https://www.slideshare.net/maheswarijaikumar/consumer-protection-act-india">https://www.slideshare.net/maheswarijaikumar/consumer-protection-act-india</a>	Applied in Day to day to lives	Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individual	3
10	10	10	Understanding the characteristics and activities of 'I' and	29-10-2021	22-10-2021	Module 2 Aicte 110	<a href="https://www.youtube.com/watch?v=qV7F1RgUTAE">https://www.youtube.com/watch?v=qV7F1RgUTAE</a>	Applied in Day to day to lives	Strengthening of self-reflection.	3

  
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			harmony in 'I'							
11	11	11	Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail	9-11-2021	26-10-2021	Module 2 Aicte 115	<a href="https://www.youtube.com/watch?v=iqePwXRnX-8">https://www.youtube.com/watch?v=iqePwXRnX-8</a>	Applied in Day to day to lives	Strengthening of self-reflection.	3
12	12	12	Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me.	12-11-2021	29-10-2021	Module 2 Aicte 125	<a href="https://www.youtube.com/watch?v=BxmlxKdAZ5g">https://www.youtube.com/watch?v=BxmlxKdAZ5g</a> <a href="https://www.youtube.com/watch?v=fYbLzYUdo68">https://www.youtube.com/watch?v=fYbLzYUdo68</a>	Applied in Day to day to lives	Sensitization of student towards self, family (relationship), society and nature	1
<b>UNIT-3 Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship</b>										

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13	13	13	Understanding values in human-human relationship; meaning of Justice (nine universal values in	16-11-2021	9-11-2021	Module 3 Aicte 128	<a href="https://www.youtube.com/watch?v=fYbLzYUdo68">https://www.youtube.com/watch?v=fYbLzYUdo68</a>	Applied in Day to day to lives	Understanding (or developing clarity	Principal JD College of Engineering & Management Khandola, Katol Road Nagpur-441501
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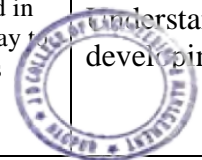
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			relationships)							
14	14	14	Understanding the meaning of Trust; Difference between intention and competence	23-11-2021	12-11-2021	Module 3 Aicte 132	<a href="https://www.youtube.com/watch?v=FtIhyf3jymE">https://www.youtube.com/watch?v=FtIhyf3jymE</a>	Applied in Day to day to lives	Strengthening of self-reflection.	2,3
15	15	15	Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship	26-11-2021	16-11-2021	Module 3 Aicte 148	<a href="https://www.youtube.com/watch?v=g5dlH_PCI9k">https://www.youtube.com/watch?v=g5dlH_PCI9k</a>	Applied in Day to day to lives	Strengthening of self-reflection.	2,3,5
16	16	16	Understanding the harmony in the society (society being an extension of family)	30-11-2021	23-11-2021	Module 3 Aicte 152	<a href="https://www.youtube.com/watch?v=0LkUpBUep2Y">https://www.youtube.com/watch?v=0LkUpBUep2Y</a>	Applied in Day to day to lives	Understanding (or developing clarity	2,4
17	17	17	Visualizing a universal harmonious order in society- Undivided Society, Universal Order from family to world family	3-12-2021	26-11-2021 30-11-21	Module 3 Aicte 156	<a href="https://www.youtube.com/watch?v=Tfcbgk2kKx4">https://www.youtube.com/watch?v=Tfcbgk2kKx4</a>	Applied in Day to day to lives	Understanding (or developing clarity	

  
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**UNIT-4 Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**

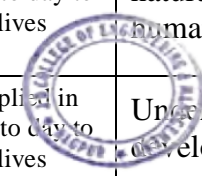
18	18	18	Understanding the harmony in the Nature	7-12-2021	7-12-2021	Module 4 Aicte 160	<a href="https://www.youtube.com/watch?v=MDNwVnA2IJM">https://www.youtube.com/watch?v=MDNwVnA2IJM</a>	Applied in Day to day to lives	Understanding the nature in harmony	3
19	19	19	Interconnectedness and mutual fulfillment among the four orders of nature-	10-12-2021	10-12-2021	Module 4 Aicte 162	<a href="https://www.youtube.com/watch?v=M7t2Y5qplBw">https://www.youtube.com/watch?v=M7t2Y5qplBw</a>	Applied in Day to day to lives	Understanding the four orders of nature	4
20	20	20	Understanding Existence as Co-existence of mutually interacting units in all-pervasive space	14-12-2021 17-12-2021	14-12-2021	Module 4 Aicte 165	<a href="https://www.youtube.com/watch?v=yALcUgV58cM">https://www.youtube.com/watch?v=yALcUgV58cM</a>	Applied in Day to day to lives	Understanding (or developing clarity	2,3
21	21	21	Holistic perception of harmony at all levels of existence	21-12-2021 24-12-2021	17-12-2021	Module 4 Aicte 178	<a href="https://www.youtube.com/watch?v=qV7F1RgUTAE">https://www.youtube.com/watch?v=qV7F1RgUTAE</a>	Applied in Day to day to lives	Understanding (or developing clarity	3

**UNIT-5 Implications of the above Holistic Understanding of Harmony on Professional Ethics**

22	18	22	Natural acceptance of human values, Definitiveness of Ethical Human Conduct	28-12-2021	21-12-2021	Module 4 Aicte 201	<a href="https://www.youtube.com/watch?v=d3MmunWiuH0">https://www.youtube.com/watch?v=d3MmunWiuH0</a>	Applied in Day to day to lives	Understanding what is natural acceptance of human values.	
23	19	23	Basis for Humanistic Education, Humanistic	31-12-2021 3-01-2022		Module 4 Aicte 210		Applied in Day to day to lives	Understanding (or developing clarity	

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			Constitution and Humanistic Universal Order Competence in professional ethics:		24-12-2021		<a href="https://www.youtube.com/watch?v=Y3JibW_oNIs">https://www.youtube.com/watch?v=Y3JibW_oNIs</a>			3
24	20	24	Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order	7-01-2022	28-12-2021 31-12-2021	Module 4 Aicte 230	<a href="https://www.slideshare.net/GuptaPandiri/professional-ethics-amp-ht-ps-mm-case-studies-74720427">https://www.slideshare.net/GuptaPandiri/professional-ethics-amp-ht-ps-mm-case-studies-74720427</a>	Applied in Day to day to lives	Understanding (or developing clarity	2,3,4
25	21	25	Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc.	10-01-2022	3-01-2022 7-01-2022	Module 4 Aicte 245	<a href="https://www.youtube.com/watch?v=iqePwXRnX-8">https://www.youtube.com/watch?v=iqePwXRnX-8</a>	Applied in Day to day to lives	Understanding (or developing clarity	Principal JD College of Engineering & Management Khandala, Katol Road Nagpur-441501







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**Assignment Plan**

Assignment No.	Topic	Given Date	Submission Date	Mapped With CO
1	Assignment 1	01/11/2021	18/11/2021	CO1, CO2
1	Assignment 2	18/11/2021	22/11/2021	CO3, CO4

**Text Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
T1	Human Values and Professional Ethics by	R R Gaur, R Sangal, G P Bagaria	Excel Books, New Delhi	2010

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**Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	Jeevan Vidhya EK Parichaya	ANagaraj	Jeevan VidhyaPrakashan ,Amarkantak	1999
R2	Human Values	A.N.Tripathi	New Age Inti.Publishers,New Delhi	2004

**Research Paper:**

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume /Page no/Year
P1	Reinventing the Universal Structure of Human Values: Development of a New Holistic Values Scale to Measure Indian Values	<del>Chaitanya Anand</del> <u>Rajat Sharma</u>	<u>Journal of Management Policy and Practice</u>	<a href="https://doi.org/10.1177/0971685821993945">https://doi.org/10.1177/0971685821993945</a>	<u>Vol 27, Issue 2, 2021</u>
P2	An Exploration of Personal Assumptions About Self-Construction and Self-Discovery	<u>Michael D. Berzonsky</u>	An International Journal of Theory and Research	<a href="https://doi.org/10.1080/15283488.2016.1229666">https://doi.org/10.1080/15283488.2016.1229666</a>	Volume 41, Issue 4, 2016
P3	How do people interpret the value	<u>Lena Seewann</u>		<a href="https://doi.org/10.1080/15283488.2016.1229666">https://doi.org/10.1080/15283488.2016.1229666</a>	Volume 41,

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Session: 2021-22



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"To be recognized for excellent innovative engineering, developing global leaders both in educational and research in the domain of Computer Science and Wireless Engineering"

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

	concept? Development and evaluation of the value conceptualization scale using a mixed method approach		Journal of Beliefs & Values	<a href="https://doi.org/10.1080/13617672.2019.1707748">80/13617672.2019.1707748</a>	2020 - <u>Issue 4.</u>
P4	The relationship between nature connectedness and happiness: a meta-analysis	<a href="#">Colin A. Capaldi</a>	ORIGINAL RESEARCH article	<a href="https://doi.org/10.3389/fpsyg.2014.00976">https://doi.org/10.3389/fpsyg.2014.00976</a>	Front. Psychol., 08 September 2014

Prof. Jolly Nikhade  
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Prof. Swati Raut  
Dept. Academic Incharge

Dr. Supriya Sawwasare  
Dept. Head AI

HOD  
Artificial Intelligence  
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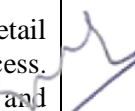
1. Transforming students into lifelong learners through, quality teaching, training and exposure to concurrent technologies.
2. Fostering conducive atmosphere for research and development through well-equipped laboratories and qualified personnel in collaboration with global organizations.

### Teaching Plan

<b>Course</b> : Master in Business Administration	<b>Year/Semester</b> : 2 <sup>nd</sup> Semester (2nd Year)	
<b>Name of the Teacher</b> : Dr. Anjali Chandak	<b>Subject Code</b> : 4T1	
<b>Subject</b> :RETAIL SALES MANAGEMENT AND SERVICES MARKETING	<b>Section</b> :MBA	
<b>Periods per Week (each 60 min)</b>	<b>Lecture</b>	3
	<b>Tutorial</b>	1
	<b>Practical</b>	-

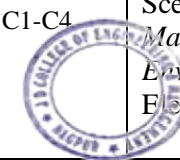
Course Objective	Course Outcomes
<ol style="list-style-type: none"> <li>1. To <b>utilise</b> the knowledge gained on Retail Industry and the existing retail environment..</li> <li>2. To be able to form their own <b>opinion</b> on various retail formats and <b>recommend</b> strategies for retail planning.</li> <li>3. To Understand the <b>relationship</b> between retail merchandising, marketing communication, CRM and retail success</li> <li>4. To Understand the concepts, functions, and techniques of service marketing services</li> <li>5. On completing this module, the students will be able to <b>examine</b> the <b>application</b> of integrated marketing communication (IMC) to retail business and <b>develop</b> an effective service marketing system for retail business. Students will also be in a position to <b>recommend</b> ethical rules for conduct of retail business in India.</li> </ol>	<ol style="list-style-type: none"> <li>1. The student will also be able to <b>plan</b> their retail business as future manager by <b>applying</b> retail segmentation</li> <li>2. The students will be able to <b>take part in</b> the decisions involved in running a retail firm.</li> <li>3. The students will be able to draw <b>relationship</b> between retail merchandising, marketing communication, CRM and retail success.</li> <li>4. The students will be able to <b>analyse</b> concepts, functions, and techniques of the craft of service marketing services and As future managers they will also be able to <b>adapt</b> a particular model of service marketing to a firm they work with.</li> <li>5. The Students will be able to <b>plan and implement</b> various activities taken under CSR activity and evaluate its effectiveness</li> </ol>




  
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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
<b>Unit I – Introduction to Retailing-</b>								
1	1	1	Introduction, Meaning of Retailing, Economic Significance of Retailing,	Day 1	R1 (Pg: 3-50)	<a href="https://www.marketing-partners.com/integrated-marketing">https://www.marketing-partners.com/integrated-marketing</a>	C1-C4	The students will be able to understand the meaning of Retailing and Significance of Retailing
2	2	2	Retailing Management Decision Process, Product Retailing vs. Service Retailing	Day 2	R1 (Pg: 3-50)	<a href="https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/">https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/</a>	C1-C4	The students will be able to understand Retailing Management Decision Process, Product Retailing vs. Service Retailing
3	3	3	Types of Retailers, Retailing Environment	Day 3	R1 (Pg: 3-50)	<a href="https://www.yourarticlelibrary.com/marketing/personal-selling/personal-selling-meaning-concept-and-need-with-diagram/69585">https://www.yourarticlelibrary.com/marketing/personal-selling/personal-selling-meaning-concept-and-need-with-diagram/69585</a>	C1-C4	The students will be able to understand Types of Retailers, Retailing Environment
4	4	4	Indian vs. Global Scenario <i>Retail Marketing Environment</i> - In Elements in a Retail Marketing Environment ;	Day 4	R1 (Pg: 3-50)	<a href="https://www.marketing-partners.com/integrated-marketing">https://www.marketing-partners.com/integrated-marketing</a>	C1-C4	The students will be able to understand Indian vs. Global Scenario <i>Retail Marketing Environment</i> - In Elements in a Retail



  
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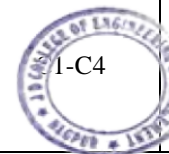
								Marketing Environment
5	5	5	Environmental Issues <i>The Retail Marketing Segmentation:</i>	Day 5	R1 (Pg: 3-50)	<a href="https://slideplayer.com/slide/7326196/">https://slideplayer.com/slide/7326196/</a> How brand communication works	C1-C4	The students will be able to understand Environmental Issues <i>The Retail Marketing Segmentation</i>
6	6	6	Segmentation in Retail, Targeted Marketing Efforts	Day 6	R1 (Pg: 3-50)	<a href="https://hbr.org/2012/05/to-keep-your-customers-keep-it-simple">https://hbr.org/2012/05/to-keep-your-customers-keep-it-simple</a>	C1-C4	The students will be able to understand Chronological evolution of CSR in India
7	7	7	Criteria for Effective Segmentation, Dimensions of Segmentation,	Day 7	R1 (Pg: 3-50)	<a href="https://www.yourarticlelibrary.com/marketing/personal-selling/personal-selling-meaning-concept-and-need-with-diagram/69585">https://www.yourarticlelibrary.com/marketing/personal-selling/personal-selling-meaning-concept-and-need-with-diagram/69585</a>	C1-C4	The students will be able to understand Criteria for Effective Segmentation, Dimensions of Segmentation,
8	8	8	Positioning Decisions	Day 8	R1 (Pg: 3-50)		C1-C4	The students will be able to understand Positioning Decisions

**Unit II –  
Store Location and Layout: Introduction**

9	9	9	Types of Retail Stores Location	Day 9	R2 (Pg: 263 -321)	<a href="https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/">https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/</a>	C1-C4	The students will be able to Understand Types of Retail Stores Location
10	10	10	Factors Affecting Retail Location Decisions, Country/Region Analysis	Day 10	R2 (Pg: 263 -321)	<a href="https://repository.up.ac.za/bitstream/handle/2263/25084/03chapter3.pdf?sequence=4&amp;isAllowed=y#:~:text=Each%20adve">https://repository.up.ac.za/bitstream/handle/2263/25084/03chapter3.pdf?sequence=4&amp;isAllowed=y#:~:text=Each%20adve</a>	C1-C4	The students will be able to understand Factors Affecting Retail Location Decisions,


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						<a href="#">rtisement%20consists%20of%20various,to%20develop%20effective%20advertising%20messages.</a>		Country/Region Analysis
11	11	11	Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies	Day 11	R2 (Pg: 263 -321)	<a href="https://marketingland.com/whats-big-idea-3-fundamentals-successful-digital-creative-153747">https://marketingland.com/whats-big-idea-3-fundamentals-successful-digital-creative-153747</a>	C1-C4	The students will be able to know Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies
12	12	12	Retail Marketing Strategies: Introduction, Target Market and Retail Format,	Day 10	R2 (Pg: 263 -321)	<a href="https://blackdogllc.com/advertising-execution/">https://blackdogllc.com/advertising-execution/</a> <a href="https://s3.studentvip.com.au/notes/11973-sample.pdf">https://s3.studentvip.com.au/notes/11973-sample.pdf</a>	C1-C4	The students will be able to Understand Retail Marketing Strategies: Introduction, Target Market and Retail Format,
13	13	13	Strategy at different levels of Business, Building a Sustainable Competitive Advantage,	Day 11	R2 (Pg: 264-266)	<a href="tps://www.iare.ac.in/sites/default/files/lecture_notes/IARE_IMC_Lecture_Notes_E">tps://www.iare.ac.in/sites/default/files/lecture_notes/IARE_IMC_Lecture_Notes_E</a>	C1-C4	The students will be able to understand Strategy at different levels of Business, Building a Sustainable Competitive Advantage tool
14	14	14	the Strategic Retail Planning Process	Day 12	R2 Pg: 264-266)	<a href="https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/">https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/</a>	C1-C4	The student will be able to know the Strategic Retail Planning Process
15	15	15	Retail Models, Retail “EST” model	Day 15		<a href="https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/">https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/</a>	C1-C4	The students will be able to know Retail Models, Retail “EST” model

  
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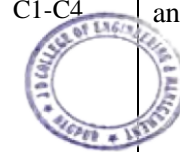
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16	16	16	the Strategic Retail Planning Process, Differentiation Strategies, Positioning Decisions	Day 16		<a href="https://www.yourarticlelibrary.com/marketing/personal-selling/personal-selling-meaning-concept-and-need-with-diagram/69585">https://www.yourarticlelibrary.com/marketing/personal-selling/personal-selling-meaning-concept-and-need-with-diagram/69585</a>	C1-C4	The student will be able to know the Strategic Retail Planning Process, Differentiation Strategies, Positioning Decisions
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**UNIT III -  
Retail Merchandising**

17	17	17	Introduction, Understanding Merchandising Management	Day 17	R1 (Pg: 330 -601)	<a href="https://www.shopify.in/encyclopedia/media-planning#:~:text=Media%20planning%20is%20the%20process,which%20to%20place%20paid%20advertisements.">https://www.shopify.in/encyclopedia/media-planning#:~:text=Media%20planning%20is%20the%20process,which%20to%20place%20paid%20advertisements.</a>	C1-C4	The students will be able to understand The concept of Merchandising Management
18	18	18	Activities of a Merchandiser, Retail Merchandising Management	Day 18	R1 (Pg: 330 -601)	<a href="http://renaissance000.blogspot.com/2012/11/chapter-10-media-planning-and-strategy.html">http://renaissance000.blogspot.com/2012/11/chapter-10-media-planning-and-strategy.html</a>	C1-C4	The students will be able to understand Activities of a Merchandiser, and Retail Merchandising Management
19	19	19	Process Private Branding in Retail- Introduction	Day 19	R1 (Pg: 330 -601)	<a href="https://smallbusiness.chron.com/consumer-sales-promotion-techniques-1035.html#:~:text=Consumer%20sales%20promotion%20is%20a,or%20unveiling%20a%20new%20product.">https://smallbusiness.chron.com/consumer-sales-promotion-techniques-1035.html#:~:text=Consumer%20sales%20promotion%20is%20a,or%20unveiling%20a%20new%20product.</a>	C1-C4	The students will be able to understand Process Private Branding in Retail- Introduction
20	20	20	Difference between a Store/Private, Brand and a National Brand,	Day 20	R1 (Pg: 330 -601)	<a href="https://www.pepperi.com/what-are-trade-promotions/">https://www.pepperi.com/what-are-trade-promotions/</a>  <a href="https://www.repsly.com/blog/consumer-goods/clever-trade-promotion-examples-convert-browsers-buyers">https://www.repsly.com/blog/consumer-goods/clever-trade-promotion-examples-convert-browsers-buyers</a>	C1-C4	The students will be able to understand Difference between a Store/Private, Brand and a National Brand



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21	21	21	Growth Drivers of Private Label, Global Scenario of Private Labels, Indian Market Scenario	Day 21	R1 (Pg: 330 -601)	<a href="https://www.yourarticlelibrary.com/marketing/personal-selling/personal-selling-meaning-concept-and-need-with-diagram/69585">https://www.yourarticlelibrary.com/marketing/personal-selling/personal-selling-meaning-concept-and-need-with-diagram/69585</a>	C1-C4	The students will be able to understand Growth Drivers of Private Label, Global Scenario of Private Labels, Indian Market Scenario
22	22	22	Advantages of Private Label, Disadvantages of Private Label	Day 22	R1 (Pg: 330 -601)	<a href="https://www.economicsdiscussion.net/marketing-management/what-is-public-relations/31834">https://www.economicsdiscussion.net/marketing-management/what-is-public-relations/31834</a>  <a href="https://www.forbes.com/sites/robertwynne/2016/01/21/five-things-everyone-should-know-about-public-relations/">https://www.forbes.com/sites/robertwynne/2016/01/21/five-things-everyone-should-know-about-public-relations/</a>	C1-C4	The students will be able to understand Advantages of Private Label, Disadvantages of Private Label
23	23	23	Integrated Marketing Communication in Retail		R1 (Pg: 330 -601)	<a href="https://www.marketing-partners.com/integrated-marketing">https://www.marketing-partners.com/integrated-marketing</a>	C1-C4	The students will be able to understand Integrated Marketing Communication in Retail
24	24	24	Customer Relationship Management in Retailing-Components of CRM, CRM and Loyalty Program, Technology in Retail Marketing Decisions			<a href="https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/">https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/</a>	C1-C4	The students will be able to understand Customer Relationship Management in Retailing-Components of CRM, CRM and Loyalty Program, Technology in Retail Marketing Decisions

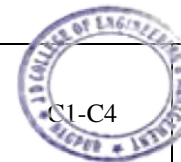
**UNIT IV-  
Services Marketing**

25	25	25	Introduction, concept and evolution of services marketing	Day 25	R2 (Pg: 23 -160)	<a href="https://www.shopify.in/encyclopedia/brand-equity">https://www.shopify.in/encyclopedia/brand-equity</a>	C1-C4	The students will be able to understand
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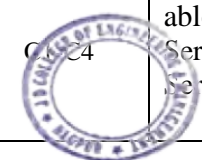
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						<a href="https://www.managementstudyguide.com/brand-management.htm">https://www.managementstudyguide.com/brand-management.htm</a>		Introduction, concept and evolution of services marketing
26	26	26	meaning of service marketing, myths encountered in services	Day 20	R2 (Pg: 23 -160)	<a href="https://www.canto.com/blog/brand-management/">https://www.canto.com/blog/brand-management/</a>	C1-C4	The students will be able to know meaning of service marketing, myths encountered in services
27	27	27	need for service marketing, and growth in Services Marketing.;	Day 27	R2 (Pg: 23 -160)	<a href="https://www.brandloom.com/branding-challenges-and-applications">https://www.brandloom.com/branding-challenges-and-applications</a>	C1-C4	The students will be able to understand need for service marketing, and growth in Services Marketing.;
28	28	28	Services Marketing Mix and Gaps Model	Day 28	R2 (Pg: 23 -160)	<a href="https://www.managementstudyguide.com/strategy-c-brand-management.htm">https://www.managementstudyguide.com/strategy-c-brand-management.htm</a>	C1-C4	The students will be able to understand Services Marketing Mix and Gaps Model
29	29	29	Introduction, 7Ps of service marketing	Day 29	R2 (Pg: 23 -160)	<a href="https://www.coursehero.com/file/paolfr/Brand-Positioning-Identify-and-Establishing-Brand-Position-It-is-necessary-to/">https://www.coursehero.com/file/paolfr/Brand-Positioning-Identify-and-Establishing-Brand-Position-It-is-necessary-to/</a>	C1-C4	The students will be able to understand Introduction, 7Ps of service marketing
30	30	30	Service gaps framework, perceived service quality	Day 30	R2 (Pg: 23 -160)	<a href="https://cultbranding.com/ceo/create-strong-brand-positioning-strategy/">https://cultbranding.com/ceo/create-strong-brand-positioning-strategy/</a>	C1-C4	The students will be able Service gaps framework, perceived service quality
31	31	31	models of service marketing	Day 31			C1-C4	The students will be able to understand models of service marketing
32	32	32	Service Design and Service Delivery Introduction, Service delivery process	Day 32		<a href="https://www.shopify.in/encyclopedia/media-planning#:~:text=Media%20planning%20is%20the%20process,which%2">https://www.shopify.in/encyclopedia/media-planning#:~:text=Media%20planning%20is%20the%20process,which%2</a>	C1-C4	The students will be able to understand Service Design and Service

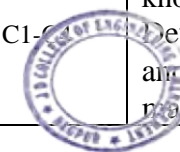
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						<a href="#">0to%20place%20paid%20advertisements.</a>		Delivery Introduction, Service delivery process
<b>UNIT V- Integrated Services Marketing</b>								
33	33	33	Introduction, meaning and Importance, Features of Integrated Service Marketing,	Day 33	R2 (Pg: 161 - 424)	<a href="https://flybluekite.com/how-to-implement-your-marketing-plan/">https://flybluekite.com/how-to-implement-your-marketing-plan/</a>	C1-C4	The students will be able to the Introduction, meaning and Importance, Features of Integrated Service Marketing,
34	34	34	Integrated Marketing Communication for Service	Day 34	R2 (Pg: 161 - 424)	<a href="https://matrixmarketinggroup.com/implementation-marketing-plan/">https://matrixmarketinggroup.com/implementation-marketing-plan/</a>	C1-C4	The students will be able to understand Integrated Marketing Communication for Service
35	35	35	Reasons for growing importance of integrated marketing communication,	Day 35	R2 (Pg: 161 - 424)	<a href="https://stickybranding.com/3-metrics-to-manage-brand-performance/">https://stickybranding.com/3-metrics-to-manage-brand-performance/</a>	C1-C4	The Student will get to know the Reasons for growing importance of integrated marketing communication,
36	36	36	Advantages of integrated marketing communication	Day 36	R2 (Pg: 161 - 424)	<a href="https://www.pica9.com/blog/measure-brand-equity">https://www.pica9.com/blog/measure-brand-equity</a>	C1-C4	The students will know the Advantages of integrated marketing communication
37	37	37	Integrated Service Marketing Mix,	Day 37	R2 (Pg: 161 - 424)	<a href="https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/">https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/</a>	C1-C4	The students will be able to understand Integrated Service Marketing Mix,
38	38	38	Developing an effective and efficient service marketing system	Day 38	R2 (Pg: 161 - 424)		C1-C4	The students will know how to develop an effective and efficient service marketing system

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39	39	39	Integration of service quality measures and managing quality emerging Issues in Service Marketing , Service Marketing Research for Global Markets and Rural Markets	Day 39	R2 (Pg: 161 - 424)	<a href="https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/">https://www.bigbuzzinc.com/6-messaging-strategies-to-market-your-practice/</a>	C1-C4	The students will know the Integration of service quality measures and managing quality and also the emerging Issues in Service Marketing , Service Marketing Research for Global Markets and Rural Markets .
40	40	40	Innovations in Services Marketing, Ethical Aspects in Service Marketing	Day 40	R2 (Pg: 23 -160)	Identify-and-Establishing-Brand-Position-It-is-necessary-to/	C1-C4	The students will know the Innovations in Services Marketing, Ethical Aspects in Service Marketin

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

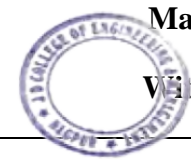
Total number of lectures as per syllabus: - 40

Total number of lectures as per planned: - 40

<b>Tutorial Plan</b>					
Week	Topic	No. Of Problems	Mapped With CO		
1	. Customer Relationship Management in Retailing- Components of CRM, CRM and Loyalty Program, Technology in Retail Marketing Decisions, Segmentation in Retail,		1,3		
2	Integrated Marketing Communication for Service		5		
<b>Assignment Plan</b>					
Assignment No.	Topic	Given Date	Submission Date	Mapped With CO	

  
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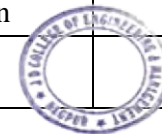
1	Types of Retailers, Retailing Environment Types of Retail Stores Location	10/05/2021	20/05/2021	I, II,
2	Difference between a Store/Private, Brand and a National Brand, Services Marketing Mix and Gaps Model, Integrated Marketing Communication for Service	31 /05/2021	10/06/2021	III IV, V

**Content Beyond Syllabus Topic – Planned**

Sr. No.	Content Beyond Syllabus Topic	Date Given	Mapped with CO's not covered in TP
1	the seven elements (7 Ps) of the service marketing mix. customer expectations and perceptions in service delivery.	25-05-2021	1,2,3
2	determinants of customer loyalty and retention in service businesses. service recovery strategies	28-05-2021	4,5

**Text Books / Reference Books:**

Code	Title of the Book	Author Name/Designation/ Organization	Publisher	Edition/ Publication Year
R1	RETAILING MANAGEMENT TEXT & CASES	Swapna Pradhan	Tata McGraw Hill Companies.	2017
R2	Retail Management	Barry Berman & Joel R	Evans	
R3	Service Marketing	S MJha	Himalaya Publishing House pearson	2008
R4	Service Marketing ,	Valarie Azeuthaml, Dwayne, Mary Bitner & Ajay Pandit		



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R5	Retailing Management	Michael Levy, Barton Weitz, Dhruv Grewal	McGraw-Hill Education;	10 Edition
R6	Retail Marketing Management,	David Gilbert,	, Pearson Education	2 edition

**Company/Industry:**

Code	Company/Industry Name	Website	Detailed Information
C1	Google	<a href="http://www.google.com">www.google.com</a>	In 2007, Google became the first major company to reach <u>carbon neutrality</u> . Ten years later, the company also achieved its 100% renewable energy target, and is now the largest corporate renewable energy purchaser on the planet. As if that wasn't enough to earn a spot at the top of the corporate social responsibility totem pole, the company is now aiming to operate solely on carbon-free energy by 2030. Their goal is to not only pursue new carbon-free technologies, but to also demonstrate that a fully decarbonized future is possible for everyone. From facilitating green commuting, to employee gift matching, to paid time off for volunteering, Google inspects nearly every part of their business with a social impact lens.
C2	LeGo	<a href="http://www.Lego.com">www.Lego.com</a>	The LEGO Group is one of the most notable examples of how social responsibility can be an incredible asset to a well-known brand. Their dedication to social impact is somewhat recent (a 2014 Greenpeace video put pressure on the toymaker to end their 50-year partnership with Shell Global due to their plans to drill in the Arctic), but the extent of their commitment has made the Danish company a shining example of the far-reaching impact of CSR.
C3	Levi Strauss	<a href="http://www.Levistrauss.com">www.Levistrauss.com</a>	The company created the first product tag in 2009, Care Tag for Our Planet, which offers tips on how to best preserve your clothing and where to donate them once you're done with them. Levi Strauss works alongside Cotton Inc.'s Blue Jeans Go Green to collect used clothing, and also sells pre-owned or restored vintage clothing items to reduce their carbon footprint. To further elevate their efforts, all owned-and-operated U.S. and Canadian retail locations, along with all U.S. wholesale locations, now use 100% post-consumer waste stock for their print materials. All new mannequins are made from 100% recycled base stock, and the company is currently working on a recycled denim coat hanger.



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C4	Microsoft	www.microsoft.com	<p>Microsoft changed the way the world works, studies, and plays with their computers and software. But their ambitions go far beyond the screen. The company, founded by Bill Gates who now devotes his time to philanthropy, began its giving program in 1983 when the fledgling company raised \$17,000 for charity. As their CSR web page explains, Microsoft's giving program has not only given time (employees in the U.S. volunteered more than 750,000 hours for nonprofits in 2020 alone), but also cash. In fiscal year 2020, the program raised over \$221 million for nonprofits.</p> <p>The software giant also created Microsoft Philanthropies, a social good initiative that works with nonprofits, governments, and businesses to create "a future where every person has the skills, knowledge, and opportunity to achieve more." Initiatives cover everything from providing computer education, offering grants to nonprofits, and forming partnerships with organizations around the world</p>
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**Research Paper:**

Code	Title of the Paper	First Author Name	Journal/Conference Name	DOI no.	Issue/Volume/Page no/Year
P1	Retail Marketing: Critical Analysis	Dr. Ashish Pandey	theresearchjournal.net	13 Jan 2017	<a href="https://www.researchgate.net/publication/338645176_Retail_Marketing_A_Critical_Analysis">https://www.researchgate.net/publication/338645176_Retail_Marketing_A_Critical_Analysis</a>
P2	THE ROLE OF STORE IMAGE IN RETAIL INTERNATIONALISATION	Steve Burt & José Carralero-Encina		17 sep 2018	<a href="https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.199.4834&amp;rep=rep1&amp;type=pdf">https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.199.4834&amp;rep=rep1&amp;type=pdf</a>



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