



Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

**SCHEME AND SYLLABUS
For I and II Semester
Academic Year 2023-24**

Dr. Ambedkar Institute of Technology, Bangalore

(An Autonomous Institution, Affiliated to Visvesvaraya Technological
University, Belagavi, Aided by Govt. of Karnataka, Approved by All India
Council for Technical Education (AICTE), New Delhi)
Outer Ring Road, Mallathahalli, Bengaluru - 560 056

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APPLIED SCIENCE COURSES			
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3	22MAU101C	Mathematics-I for ME/AE/IEM	
4	22MAU101D	Mathematics-I for ECE/EEE/ETE/EIE	
5	22MAU201A	Mathematics-II for CV	
6	22MAU201B	Mathematics-II for CSE/ISE/CSBE/AIML	
7	22MAU201C	Mathematics-II for ME/AE/IEM	
8	22MAU201D	Mathematics-II for ECE/EEE/ETE/EIE	
9	22PHU102A	Applied Physics for CV	
10	22PHU102B	Applied Physics for CSE/ISE/CSBE/AIML	
11	22PHU102C	Applied Physics for ME/AE/IEM	
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13	22CHU102A	Applied Chemistry for ME/AE/IEM	
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15	22CHU102C	Applied Chemistry for CV	
16	22CHU102D	Applied Chemistry for CSE/ISE/CSBE/AIML	
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18	22EET103	Elements of Electrical engineering	
19	22ECET103	Basic Electronics	
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28	22ETT1051/2051	Introduction to Cyber Security	
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34	22ETT1057/2057	Introduction to Nano Technology	
35	22ETT1058/2058	Introduction to Sustainable Engineering	
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40	22PLU105D/205D	Introduction to C + + Programming	
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41	22ENT106	Communicative English - 1	
42	22ENT206	Professional writing skills in English -	
43	22SKT107	Samskrutika Kannada	
44	22BKT107	Balake Kannada	
45	22CIT207	Constitution of India	
ABILITY ENHANCEMENT COURSES			
46	22SFT108	Scientific Foundation of Health	
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Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examination for I/II Semester B.E. CBCS, Academic Year-2023-24
Civil Engineering

PHYSICS CYCLE										SEMESTER: I					
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits	
					L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks		
1	ASC(IC)	22MAU101A	Mathematics-I	Maths	2	2	2	0	4+2	03	50	50	100	04	
2	ASC(IC)	22PHU102A	Applied Physics	Physics	3	0	2	0	3+2	03	50	50	100	04	
3	ESC	22CVT103	Engineering Mechanics	Civil	3	0	0	0	3	03	50	50	100	03	
4	ESC-1	22ESX104x	Engineering Science Course	Respectvie Engg. Dept.	3	0	0	0	3	03	50	50	100	03	
5	ETC-1	22ETT105x	Emerging Technology Course-I	Any Engg. Dept.	3	0	0	0	3	03	50	50	100	03	
6	AEC	22ENT106	Communicative English	Humanities	1	0	0	0	1	02	50	50	100	01	
7	HSS	22SKT107/22BKT107	Samskrutika Kannada / Balake Kannada	Humanities	1	0	0	0	1	02	50	50	100	01	
8	HSS	22IDT108	Innovation and Design Thinking	Any dept.	1	0	0	0	1	02	50	50	100	01	
9	MC	22CDN109	Career Development skill-I	Placement Cell	2	0	0	0	2	-	50	---	---	NP/PP	
Total									26		450	400	800	20	

CHEMISTRY CYCLE					SEMESTER: II									
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MAU201A	Mathematics-II	Maths	2	2	2	0	4+2	3	50	50	100	4
2	ASC(IC)	22CHU202C	Applied Chemeistry	Chemistry	3	0	2	0	3+2	3	50	50	100	4
3	ESC	22MED203	Computer Aided Engg. Drawing	Civil/Mech.	2	0	2	0	2+2	3	50	50	100	3
4	ESC-II	22ESX204x	Engineering Science Course -II	Respective Engg. Dept.	3	0	0	0	3	3	50	50	100	3
5	ETC-II	22PLU205x	Programming Language Course	Any Engg. Dept.	2	0	2	0	3	3	50	50	100	3
6	AEC	22ENT206	Professional Writing skills	Humanities	1	0	0	0	1	2	50	50	100	1
7	HSS	22CIT207	Constitution of India	Humanities	1	0	0	0	1	2	50	50	100	1
8	HSS	22SFT208	Scientific Foundation of Health	Humanities	1	0	0	0	1	2	50	50	100	1
9	MC	22CDN209	Career Development skill-II	Placement Cell	2	0	0	0	2	-	50	---	---	NP/PP
Total									26		500	450	800	20

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examination for I/II Semester B.E. CBCS, Academic Year-2023-24
CSE/IS/AI&ML/CS&BS

PHYSICS CYCLE										SEMESTER : I				
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MAU101B	Mathematics - I	Maths	2	2	2	0	4+2	03	50	50	100	04
2	ASC(IC)	22PHU102B	Applied Physics	Physics	3	0	2	0	3+2	03	50	50	100	04
3	ESC	22CSU103	Principles of Programming Using C	CSE/IS	2	0	2	0	2+2	03	50	50	100	03
4	ESC-1	22ESX104x	Engineering Science Course-I	Respective Engg. dept	3	0	0	0	3	03	50	50	100	03
5	ETC-1	22ETT105x	Emerging Technology Course-I	Any Engg. Dept	3	0	0	0	3	03	50	50	100	03
6	AEC	22ENT106	Communicative English	Humanities	1	0	0	0	1	02	50	50	100	01
7	HSS	22SKT107/22BKT107	Sanskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	1	02	50	50	100	01
8	HSS	22IDT108	Innovation and Design Thinking	Any dept.	1	0	0	0	1	02	50	50	100	01
9	MC	22CDN109	Career Development skill-I	Placement Cell	2	0	0	0	2	-	50	---	---	NP/PP
Total									26		450	400	800	20

CHEMISTRY CYCLE										SEMESTER : II				
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MAU201B	Mathematics - II	Maths	2	2	2	0	4+2	3	50	50	100	4
2	ASC(IC)	22CHU202D	Applied Chemistry	Chemistry	3	0	2	0	3+2	3	50	50	100	4
3	ESC	22MED203	Computer Aided Engg. drawing	Civil/Mech.	2	0	2	0	2+2	3	50	50	100	3
4	ESC-II	22ESX204x	Engineering Science Course-II	Respective Engg. dept	3	0	0	0	3	3	50	50	100	3
5	ETC-II	22PLU205x	Programming Language Course-II	Any Engg. Dept	2	0	2	0	3	3	50	50	100	3
6	AEC	22ENT206	Professional writing skill	Humanities	1	0	0	0	1	2	50	50	100	1
7	HSS	22CIT207	Constitution of India	Humanities	1	0	0	0	1	2	50	50	100	1
8	HSS	22SFT208	Scientific Foundation of Health	Humanities	1	0	0	0	1	2	50	50	100	1
9	MC	22CDN209	Career Development skill-II	Placement cell	2	0	0	0	2	-	50	---	---	NP/PP
Total									26		450	400	800	20

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examination for I/II Semester B.E. CBCS 2022, Academic Year-2023-24
ECE/EI/ET

CHEMISTRY CYCLE										SEMESTER: I				
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SD A	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MAU101D	Mathematics- I	Maths	2	2	2	0	4+2	03	50	50	100	04
2	ASC(IC)	22CHU102B	Applied Chemistry	Chemistry	3	0	2	0	3+2	03	50	50	100	04
3	ESC	22MED103	Computer Aided Engineering Drawing	Civil/Mech	2	2	0	0	3	03	50	50	100	03
4	ESC-1	22ESX104x	Engineering Science Course-I	Respective Engg. dept	3	0	0	0	3	03	50	50	100	03
5	ETC-1	22ETT105x	Programming Language Course - I	Any Engg. Dept	3	0	0	0	3	03	50	50	100	03
6	AEC	22ENT106	Communicative English	Humanities	1	0	0	0	1	02	50	50	100	01
7	HSS	22CIT107	Constitution of India	Humanities	1	0	0	0	1	02	50	50	100	01
8	HSS	22SFT108	Scientific Foundation of Health	Any dept.	1	0	0	0	1	02	50	50	100	01
9	MC	22CDN109	Career Development skill-1	Placement Cell	2	0	0	0	2	-	50	-	-	NP/PP
Total									25		450	400	800	20

PHYSICS CYCLE										SEMESTER : II				
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SD A	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MAU201D	Mathematics-II	Maths	2	2	2	0	4+2	3	50	50	100	4
2	ASC(IC)	22PHU202D	Applied Physics	Physics	3	0	2	0	3+2	3	50	50	100	4
3	ESC	22ECT203	Basic Electronics	EEE	3	0	0	0	3	3	50	50	100	3
4	ESC-II	22ESX204x	Engineering Science Course-II	Respective Engg dept	3	0	0	0	3	3	50	50	100	3
5	ETC-II	22ETT205X	Emerging Technology Course - II	Any Engg. Dept	2	0	2	0	4	3	50	50	100	3
6	AEC	22ENT206	Professional writing skill	Humanities	1	0	0	0	1	2	50	50	100	1
7	HSS	22SKT207/22BKT207	Sanskritika/Balake Kannada	Humanities	1	0	0	0	1	2	50	50	100	1
8	HSS	22IDT208	Innovation and Design Thinking	Humanities	1	0	0	0	1	2	50	50	100	1
9	MC	22CDN209	Career Development skill-II	Humanities	2	0	0	0	2	-	50	-	-	NP/PP
Total									26		450	400	800	20

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examination for I/II Semester B.E. CBCS 2022, Academic Year-2023-24
Electrical & Electronics Engineering

CHEMISTRY CYCLE														SEMESTER: I
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SDA	Total	Duration(Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MAU101D	Mathematics-1	Maths	2	2	2	0	4+2	03	50	50	100	04
2	ASC(IC)	22CHU102B	Applied Chemistry	Chemistry	3	0	2	0	3+2	03	50	50	100	04
	ESC	22MED103	Computer Aided Engineering Drawing	Civil/Mech	2	2	0	0	3	03	50	50	100	03
4	ESC-1	22ESX104x	Engineering Science Course-I	Respective Engg. dept	3	0	0	0	3	03	50	50	100	03
5	ETC-1	22ETT105x	Programming Language Course - I	Any Engg. Dept	3	0	0	0	3	03	50	50	100	03
6	AEC	22ENT106	Communicative English	Humanities	1	0	0	0	1	02	50	50	100	01
7	HSS	22CIT107	Constitution of India	Humanities	1	0	0	0	1	02	50	50	100	01
8	HSS	22SFH108	Scientific Foundation of Health	Any dept.	1	0	0	0	1	02	50	50	100	01
9	MC	22CDN109	Career Development skill-1	Placement cell	2	0	0	0	2	-	50	-	-	NP/PP
Total									25		450	400	800	20

PHYSICS CYCLE														SEMESTER : II
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SDA	Total	Duration(Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MAU201D	Mathematics-II	Maths	2	2	2	0	4+2	3	50	50	100	4
2	ASC(IC)	22PHU202D	Applied Physics	Physics	3	0	2	0	3+2	3	50	50	100	4
3	ESC	22EET203	Elements of Electrical Engg.	EEE	3	0	0	0	3	3	50	50	100	3
4	ESC-II	22ESX204x	Engineering Science Course-II	Respective Enggdept	3	0	0	0	3	3	50	50	100	3
5	ETC-II	22ETT205X	Emerging Technology Course - II	Any Engg. Dept	2	0	2	0	4	3	50	50	100	3
6	AEC	22ENT206	Professional writing skill	Humanities	1	0	0	0	1	2	50	50	100	1
7	HSS	22SKT207/22BKT207	Sanskritika/Balake Kannada	Humanities	1	0	0	0	1	2	50	50	100	1
8	HSS	22IDT208	Innovation and Design Thinking	Humanities	1	0	0	0	1	2	50	50	100	1
9	MC	22CDN209	Career Development skill-II	Humanities	2	0	0	0	2	-	50	-	-	NP/PP
Total									26		450	400	800	20

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examination for I/II Semester B.E. CBCS, Academic Year-2023-24
ME/AE/IEM

CHEMISTRY CYCLE										SEMESTER : I				
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MAU101C	Mathematics - I	Maths	2	2	2	0	4+2	03	50	50	100	04
2	ASC(IC)	22CHU102A	Applied Chemistry	Physics	2	2	2	0	3+2	03	50	50	100	04
3	ESC	22MED103	Computer Aided Engineering Drawing	Mechanical	2	2	2	0	2+2	03	50	50	100	03
4	ESC-1	22ESX104x	Engineering Science Course-I	Respective Engg dept	3	0	0	0	3	03	50	50	100	03
5	ETC-1	22ETT105x	Programming Language Course	Any Engg. Dept	3	0	0	0	3	03	50	50	100	03
6	AEC	22ENT106	Communicative English	Humanities	1	0	0	0	1	02	50	50	100	01
7	HSS	22CIT107	Constitution of India	Humanities	1	0	0	0	1	02	50	50	100	01
8	HSS	22SFH108	Scientific Foundation of Health	Any dept	1	0	0	0	1	02	50	50	100	01
9	MC	22CDN109	Career Development skill-I	C D Cells	2	0	0	0	2	-	50	-	-	NP/PP
Total									26		450	400	800	20

PHYSICS CYCLE										SEMESTER : II				
Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	ASC(IC)	22MAU201C	Mathematics-II	Maths	2	2	2	0	4+2	3	50	50	100	4
2	ASC(IC)	22PHU202C	Applied Physics	Physics	3	0	2	0	3+2	3	50	50	100	4
3	ESC	22MET203	Elements of Mechanical Engineering	Civil/Mech.	2	0	2	0	2+2	3	50	50	100	3
4	ESC-II	22ESX204x	Engineering Science Course-II	Respective Engg dept	3	0	0	0	3	3	50	50	100	3
5	ETC-II	22ETT205x	Programming Language Course-II	Any Engg. Dept	2	0	2	0	4	3	50	50	100	3
6	AEC	22ENT206	Professional writing skill	Humanities	1	0	0	0	1	2	50	50	100	1
7	HSS	22SKT207/22BKT207	Sanskritika/Balake Kannada	Humanities	1	0	0	0	1	2	50	50	100	1
8	HSS	22IDT208	Innovation and Design Thinking	Humanities	1	0	0	0	1	2	50	50	100	1
9	MC	22CDN209	Career Development skill-II	Humanities	2	0	0	0	2	-	50	-	-	NP/PP
Total									27		450	400	800	20

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code 22ESX104x	Title	L	T	P	Code 22ETT105x	Title	L	T	P
22EST104A	Introduction to Civil Engineering	3	0	0	22ETT1051	Introduction to Cyber Security	3	0	0
22EST104B	Introduction to Electrical Engineering	3	0	0	22ETT1052	Introduction to Internet of Things (IOT)	3	0	0
22EST104C	Introduction to Electronics Engineering	3	0	0	22ETT1053	Renewable Energy Sources	3	0	0
22EST104D	Introduction to Mechanical Engineering	3	0	0	22ETT1054	Waste Management	3	0	0
22ESU104E	Introduction to C Programming	2	0	2	22ETT1055	Green Buildings	3	0	0
					22ETT1056	Smart Materials and Systems	3	0	0
					22ETT1057	Introduction to Nano Technology	3	0	0
					22ETT1058	Introduction to Sustainable Engineering	3	0	0
					22ETT1059	Introduction to Embedded System	3	0	0
(PLC-I) Programming Language Courses-I					Applied Science Course(ASC)				
Code 22PLU105x	Title	L	T	P	Code	Title			
22PLU105A	Introduction to Web Programming	2	0	2	22MAU101C	Mathematics – I for ME/IEM/AE			
22PLU105B	Introduction to Python Programming	2	0	2	22CHU102A	Applied Chemistry for ME/IEM/AE			
22PLU105C	Basics of JAVA programming	2	0	2					
22PLU105D	Introduction to C++ Programming	2	0	2					

(ESC-II) Engineering Science Courses-II					(ETC-II) Emerging Technology Courses-II				
Code 22ESX204x	Title	L	T	P	Code 22ETT205x	Title	L	T	P
22EST204A	Introduction to Civil Engineering	3	0	0	22ETT2051	Introduction to Cyber Security	3	0	0
22EST204B	Introduction to Electrical Engineering	3	0	0	22ETT2052	Introduction to Internet of Things (IOT)	3	0	0
22EST204C	Introduction to Electronics Engineering	3	0	0	22ETT2053	Renewable Energy Sources	3	0	0
22EST204D	Introduction to Mechanical Engineering	3	0	0	22ETT2054	Waste Management	3	0	0
22ESU204E	Introduction to C Programming	2	0	2	22ETT2055	Green Buildings	3	0	0
					22ETT2056	Smart Materials and Systems	3	0	0
					22ETT2057	Introduction to Nano Technology	3	0	0
					22ETT2058	Introduction to Sustainable Engineering	3	0	0
					22ETT2059	Introduction to Embedded System	3	0	0
(PLC-II) Programming Language Courses-II					Applied Science Course(ASC)				
Code 22PLU205x	Title	L	T	P	Code	Title	L	T	P
22PLU205A	Introduction to Web Programming	2	0	2	22MAU201C	Mathematics – II for ME/IEM/AE	3	0	2
22PLU205B	Introduction to Python Programming	2	0	2	22PHU202C	Applied Physics for ME/IEM/AE	3	0	2
22PLU205C	Basics of JAVA programming	2	0	2					
22PLU205D	Introduction to C++ Programming	2	0	2					

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examinations – 2023
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2023-24)

I Semester:

Course Title	Mathematics-I for Civil Engineering Stream (Differential Calculus, Differential Equations and Linear Algebra)							
Course Code	22MAU101A							
Category	ASC (Applied Science Course)							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	02	00	04	40	20	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100			Duration of SEE: 03 Hours		

COURSE LEARNING OBJECTIVES

1. **Familiarize** the importance of calculus associated with one variable and two variables.
2. **Analyze** Engineering problems by applying Ordinary Differential Equations.
3. **Develop** the knowledge of Linear Algebra to solve system of equation by using matrices.
4. **Apply** the knowledge of curvature, partial differentiation, ordinary differential equations and linear algebra in various fields of civil engineering.

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Differential Calculus Introduction to polar coordinates and curvature relating to Civil Engineering. Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms (without proof). Self-study: Centre and circle of curvature, evolutes and involutes. Applications: Tracing of polar curves (RBT Levels: L1, L2 and L3)	04	04
II	Series Expansion and Multivariable Calculus Introduction to series expansion and partial differentiation in the field of Civil Engineering. Taylor's and Maclaurin's series expansion for one variable (Statement only). Partial differentiation, Euler's theorem, total derivative- differentiation of composite functions. Jacobian. Maxima and minima for a function of two variables. Self-study: Extended Euler's theorem and problems, Method of Lagrange's undetermined multipliers with single constraint. Applications: Solution of ODE arises in the field of Civil engineering using Taylor's series method. (RBT Levels: L1, L2 and L3)	04	04

III	Ordinary Differential Equations-I Introduction to ordinary differential equations pertaining to the applications for Civil Engineering. First order exact and reducible to exact differential equations. Higher order linear differential equations with constant coefficient-homogeneous and nonhomogeneous, inverse differential operator. Self-Study: First order linear and Bernoulli's differential equations. Applications of ordinary differential equations: Orthogonal trajectories. (RBT Levels: L1, L2 and L3)	04	04
IV	Ordinary Differential Equations-II Introduction to higher ordinary differential equations pertaining to the applications for Civil Engineering. Method of variation of parameters, Cauchy's and Legendre's differential equations. Simultaneous differential equations. Self-Study: Method of undetermined multiplier for second order equations. Applications: Transmission lines. (RBT Levels: L1, L2 and L3)	04	04
V	Linear Algebra Introduction of linear algebra related to Civil Engineering. Elementary row operation of a matrix. Rank of a matrix. Consistency and solution of system of linear equations: Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Rayleigh's power method. Self-Study: Solution of system of equations by Gauss-Jacobi iterative method, eigenvalues and eigenvectors-properties. Applications: Finding all the eigenvalues of a square matrix up to order 3 by power method. (RBT Levels: L1, L2 and L3).	04	04

COURSE OUTCOMES: On completion of the course, students are able to:

CO1	Describe the translation of coordinate system, various types of series of functions, identify the variation of multi variables and match the system of equations in matrix form.
CO2	Explain the graph of function relate to polar coordinates, interpret series of continuous function and demonstrate the methods to describe mathematical solution to equations related to Engineering problems.
CO3	Apply the Mathematical properties to solve illustrative Engineering problems, calculate Maxima and minima of a function and calculate Eigenvalue relate to Eigenvector of system of equations.
CO4	Make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvector
CO5	Familiarize with modern mathematical tools namely MAXIMA/ MATLAB/ PYTHON/ SCILAB

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.
3. Glyn James, Advanced modern Engineering Mathematics, Pearson Publications, 4 ED., 2011

REFERENCE BOOKS

1. V. Ramana, Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed., 2017
2. Srimanta Pal & Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, 3rd Ed., 2016.
3. C. Ray Wylie, Louis C. Barrett, Advanced Engineering Mathematics, McGraw Hill Book Co., New York, 6th Ed., 2017.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publication, 3rd Ed., 2014.

Web links and Video Lectures (e-Resources):

1. <http://npTEL.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>
4. VTU e-Shikshana Program
5. VTU EDUSAT Program

List of Laboratory experiments (2 hours/week per batch/batch strength 15): 10 lab sessions+ 1 repetition class+ 1 Lab Assessment.	
1	Analyzing standard 2D curves in polar, parametric and Cartesian forms. Also determining the point of intersection, nature of tangent and angle between polar curves.
2	Evaluation of bending of curves and nature at a given point on it.
3	Determination of flow of a multivariable function along the given direction and also identify the independence of given multivariable functions.
4	Determination of the optimal values of unconstrained function of at most two variables.
5	Determination of the primitive of first order differential equations
6	Solution of higher order ordinary differential equations.
7	Identifying the nature of given set of lines or planes using rank method.
8	Finding all the eigenvalues of a square matrix of order up to four using Rayleigh power method.
9	Solution of second order ordinary differential equations the method of variation of parameter.
10	Solution of simultaneous differential equations arises in circuit theory.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	1										
C02	3	2										
C03	2	3										
C04	3	2										
C05	2	3										
Strength of correlation: Low-1, Medium-2, High-3												

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examinations – 2023
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2023-24)

I Semester:

Course Title	Mathematics-1 for Computer Science and Engineering Stream (Differential Calculus, Differential Equations and Linear Algebra)							
Course Code	22MAU101B							
Category	ASC (Applied Science Course)							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	02	00	04	40	20	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours			

COURSE LEARNING OBJECTIVES

1. **Familiarize** the importance of calculus associated with one variable and multivariable for computer science and engineering.
2. **Analyze** the solutions of the input-output relations involving system behaviours with the knowledge of ordinary differential equations.
3. **Apply** the knowledge of modular arithmetic to secure communications, to develop public and private key in cryptography.
4. **Develop** the knowledge of linear algebra to test the independence of data in data science involving vector spaces.

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Differential Calculus Introduction to polar coordinates and curvature relating to Computer Science and Engineering applications. Polar coordinates, polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature-Cartesian, Parametric, Polar and Pedal forms (without proof). Self-study: Centre and circle of curvature, evolutes and involutes. Applications: Tracing of polar curves. (RBT Levels: L1, L2 and L3)	04	04
II	Series Expansion and Multivariable Calculus Introduction of series expansion and partial differentiation in Computer Science & Engineering. Taylor's and McLaurin's series expansion of one variable (no proof). Partial differentiation, Euler's theorem, total derivative - differentiation of composite functions. Jacobian. Maxima and minima for a function of two variables. Self-study: Extended Euler's theorem. Method of Lagrange's undetermined multipliers with single constraint. Applications: Solution of first order ODE arises using Taylor's series method.	04	04

	(RBT Levels: L1, L2 and L3)		
III	Ordinary Differential Equations (ODEs) Introduction to ordinary differential equations pertaining to the applications for Computer Science & Engineering. First order exact and reducible to exact differential equations. Higher order linear differential equations with constant coefficient- homogeneous and nonhomogeneous, inverse differential operator. Self-Study: First order linear and Bernoulli's differential equations. Applications of ordinary differential equations: Orthogonal trajectories. (RBT Levels: L1, L2 and L3)	04	04
IV	Linear Algebra Introduction of linear algebra related to Computer Science & Engineering. Elementary row operation of a matrix. Rank of a matrix. Consistency and solution of system of linear equations: Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Rayleigh's power method. Self-Study: Solution of system of equations by Gauss-Jacobi iterative method, eigenvalues and eigenvectors-properties. Applications: Finding all the eigenvalues of a square matrix up to order 3 using Rayleigh power method.,. (RBT Levels: L1, L2 and L3).	04	04
V	Modular Arithmetic Introduction of modular arithmetic and its applications in Computer Science and Engineering. Introduction to congruence's. Linear Diophantine equations, Basic properties of congruence's. Linear congruence's. System of Linear congruence's - Remainder theorem (no proof). Fermat's little theorem. Wilson Theorem. Applications of congruence's-RSA algorithm. Self-Study: GCD, Division algorithm, Euler's Theorem. Applications: Cryptography-encoding and decoding, RSA applications in public key encryption. (RBT Levels: L1, L2 and L3)	04	04

COURSE OUTCOMES: On completion of the course, students are able to:

CO1	Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO2	Analyze the solution of linear and nonlinear ordinary differential equations.
CO3	Get acquainted and to apply modular arithmetic to computer algorithms
CO4	Make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvector
CO5	Familiarize with modern mathematical tools namely MAXIMA/ MATLAB/ PYTHON/ SCILAB

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.
3. Glyn James, Advanced modern Engineering Mathematics, Pearson Publications, 4 ED., 2011
4. David M Burton, Elementary Number Theory, McGraw Hill, 7th Ed., 2010.

REFERENCE BOOKS

1. V. Ramana, Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed., 2017
2. Srimanta Pal & Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, 3rd Ed., 2016.
3. C. Ray Wylie, Louis C. Barrett, Advanced Engineering Mathematics, McGraw Hill Book Co., New York, 6th Ed., 2017.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publication, 3rd Ed., 2014.
5. David C Lay, Linear Algebra and its Applications, Pearson Publishers, 4th Ed., 2018.
6. Gareth Williams, Linear Algebra with applications, Jones Bartlett Publishers Inc., 6th Ed., 2017.
7. William Stallings, Cryptography and Network Security, Pearson Prentice Hall, 6th Ed., 2013.

Web links and Video Lectures (e-Resources):

1. <http://npTEL.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>
4. VTU e-Shikshana Program
5. VTU EDUSAT Program

List of Laboratory experiments (2 hours/week per batch/batch strength 15): 10 lab sessions+ 1 repetition class+ 1 Lab Assessment.	
1	Analyzing standard 2D curves in polar, parametric and Cartesian forms. Also determining the point of intersection, nature of tangent and angle between polar curves.
2	Evaluation of bending of curves and nature at a given point on it.
3	Determination of flow of a multivariable function along the given direction and also identify the independence of given multivariable functions.
4	Determination of the optimal values of unconstrained function of at most two variables.
5	Determine the primitive of first order differential equations
6	Solution of higher order ordinary differential equations.
7	Identifying the nature of given set of lines or planes using rank method.
8	Finding all the eigenvalues of a square matrix of order up to four using Rayleigh power method.
9	Solution of linear congruence's, Diophantine equations, second order ordinary differential equations by variation of parameter.
10	System of Linear congruence's using chariness remainder theorem.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1										
CO2	3	2										
CO3	2	3										
CO4	3	2										
CO5	2	3										
Strength of correlation: Low-1, Medium-2, High-3												

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examinations – 2023
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2023-24)

I Semester:

Course Title	Mathematics-1 for Mechanical Engineering Stream (Differential Calculus, Differential Equations and Linear Algebra)							
Course Code	22MAU101C							
Category	ASC (Applied Science Course)							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	02	00	04	40	20	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours			

COURSE LEARNING OBJECTIVES

1. **Familiarize** the importance of calculus associated with one variable and two variables.
2. **Analyze** Engineering problems by applying Ordinary Differential Equations.
3. **Develop** the knowledge of Linear Algebra to solve system of equation by using matrices.
4. **Apply** the knowledge of Calculus, Ordinary Differential Equations and Linear Algebra in the field of mechanical engineering.

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Differential Calculus Introduction to polar coordinates and curvature relating to Mechanical Engineering applications. Polar coordinates, polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature-Cartesian, Parametric, Polar and Pedal forms (without proof). Self-study: Centre and circle of curvature, evolutes and involutes. Applications: Tracing of polar curves. (RBT Levels: L1, L2 and L3)	04	04
II	Series Expansion and Multivariable Calculus Introduction of series expansion and partial differentiation in Mechanical Engineering. Taylor's and McLaurin's series expansion of one variable (no proof). Partial differentiation, Euler's theorem, total derivative - differentiation of composite functions. Jacobian. Maxima and minima for a function of two variables. Self-study: Extended Euler's theorem. Method of Lagrange's undetermined multipliers with single constraint. Applications: Solution of first order ODE using Taylor's series method. (RBT Levels: L1, L2 and L3)	04	04
III	Differential Equations-I Introduction to ordinary differential equations pertaining to the	04	04

	applications for Mechanical Engineering. First order exact and reducible to exact differential equations. Higher order linear differential equations with constant coefficient- homogeneous and nonhomogeneous, inverse differential operator. Self-Study: First order linear and Bernoulli's differential equations. Applications of ordinary differential equations: Orthogonal trajectories. (RBT Levels: L1, L2 and L3)		
IV	Differential Equations-II Importance of Ordinary differential equations (ODE's) of higher order in Mechanical Engineering. Method of variation of parameter, Cauchy's and Legendre's differential equations, simultaneous linear differential equations. Self study: Method of Undetermined coefficient. Application: Oscillation of a spring. (RBT Levels : L1,L2 and L3)		
V	Linear Algebra Introduction of linear algebra related to Mechanical Engineering. Elementary row operation of a matrix. Rank of a matrix. Consistency and solution of system of linear equations: Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Rayleigh's power method. Self-Study: Solution of system of equations by Gauss-Jacobi iterative method, eigenvalues and eigenvectors-properties. Applications: Finding all the eigenvalues of a square matrix up to order 3 using Rayleigh method. (RBT Levels: L1, L2 and L3).	04	04

COURSE OUTCOMES: On completion of the course, students are able to:

CO1	Describe the translation of coordinate system, various types of series of functions, identify the variation of multivariable functions and match the system of equations in matrix form.
CO2	Explain the graph of function relate to polar coordinates, interpret series of continuous function and demonstrate the methods to describe mathematical solution to equations related to Engineering problems.
CO3	Apply the Mathematical properties to solve illustrative Engineering problems, calculate Maxima and minima of a function and calculate Eigenvalue relates to Eigenvector of system of equations.
CO4	Analyze the Mathematical model of differential and systems of equations of more than one variable classify various solutions to problems, enumerate numerical solutions to system of equations.
CO5	Familiarize with modern mathematical tools namely MAXIMA/MATLAB/ PYTHON/ SCILA.

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.
3. Glyn James, Advanced modern Engineering Mathematics, Pearson Publications, 4 ED., 2011

REFERENCE BOOKS

1. V. Ramana, Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed., 2017

- Web links and Video Lectures (e-Resources):**

- | List of Laboratory experiments (2 hours/week per batch/batch strength 15):
10 lab sessions+ 1 repetition class+ 1 Lab Assessment. | |
|--|--|
| 1 | Analyzing standard 2D curves in polar, parametric and Cartesian forms. Also determining the point of intersection, nature of tangent and angle between polar curves. |
| 2 | Evaluation of bending of curves and nature at a given point on it. |
| 3 | Determination of flow of a multivariable function along the given direction and also identify the independence of given multivariable functions. |
| 4 | Determination of the optimal values of unconstrained function of at most two variables. |
| 5 | Determine the primitive of first order differential equations |
| 6 | Solution of higher order ordinary differential equations. |
| 7 | Identifying the nature of given set of lines or planes using rank method. |
| 8 | Finding all the eigenvalues of a square matrix of order up to four using Rayleigh power method. |
| 9 | Solution of second order ordinary differential equations by variation of parameter. |
| 10 | Solution of simultaneous differential equations arises in circuit theory. |

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1										
CO2	3	2										
CO3	2	3										
CO4	3	2										
CO5	2	3										
Strength of correlation: Low-1, Medium-2, High-3												

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examinations – 2023
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2023-24)

I Semester

Course Title	Mathematics-1 for Electrical and Electronics Engineering Stream (Differential Calculus, Differential Equations and Linear Algebra)							
Course Code	22MAU101D							
Category	ASC (Applied Science Course)							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	02	00	04	40	20	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100			Duration of SEE: 03 Hours		

COURSE LEARNING OBJECTIVES

- 1 Familiarize** the importance of calculus associated with one variable and multivariable for Electrical & Electronics Engineering.
- 2 Analyze** Engineering problems by applying Ordinary Differential Equations.
- 3 Apply** the knowledge of integral calculus.
- 4 Develop** the knowledge of linear algebra to solve the system of equations.

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Differential Calculus Introduction to polar coordinates and curvature relating to Electrical & Electronics Engineering applications. Polar coordinates, polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms (without proof). Self-study: derivative of arc length, envelope. Applications: Tracing of polar curves. (RBT Levels: L1, L2 and L3)	04	04
II	Series Expansion and Multivariable Calculus Introduction of series expansion and partial differentiation in Electrical & Electronics Engineering. Introduction to quadratic approximation, Taylor's and Maclaurin's series expansion of one variable (no proof). Partial differentiation, Euler's theorem, total derivative - differentiation of composite functions. Jacobian. Maxima and minima for a function of two variables. Self-study: Extended Euler's theorem. Method of Lagrange's undetermined multipliers with single constraint. Applications: Solution of ODE arises using Taylor's series method. (RBT Levels: L1, L2 and L3)	04	04
III	Ordinary Differential Equations (ODEs) Introduction to ordinary differential equations pertaining to the applications for Electrical & Electronics Engineering. Exact and reducible to exact differential equations. Orthogonal trajectories. Higher order linear differential equations with constant coefficient-	04	04

	homogeneous and nonhomogeneous, inverse differential operator. Self-Study: Linear and Bernoulli's differential equations. Applications: L-R-C circuits. (RBT Levels: L1, L2 and L3)		
IV	Linear Algebra Introduction of linear algebra related to Electrical & Electronics Engineering. Elementary row operation of a matrix. Rank of a matrix. Consistency and solution of system of linear equations: Gauss-elimination method, Gauss- Jordan method and approximate solution by Gauss-Seidel method. Dominant Eigenvalue by Rayleigh's power method. Self-Study: Solution of system of equations by Gauss-Jacobi iterative method, Eigenvalues and Eigenvectors-properties. Applications: Optimum solution by least square method for inconsistent system. (RBT Levels: L1, L2 and L3).	04	04
V	Integral Calculus Introduction to Integral Calculus in Electrical & Electronics Engineering. Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals over the region, change of order of integration and changing into polar coordinates.. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions, duplication formula. Self-Study: Center of gravity, Volume by double integrals. Applications: Area by double integral and volume by triple integral (RBT Levels: L1, L2 and L3)	04	04

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1	Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO2	Analyze the solution of linear and nonlinear ordinary differential equations.
CO3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
CO4	Make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvectors
CO5	Familiarize with modern mathematical tools namely MAXIMA/MATLAB/ PYTHON/ SCILAB

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.
3. Glyn James, Advanced modern Engineering Mathematics, Pearson Publications, 4 ED., 2011

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1. V. Ramana, Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed., 2017
2. Srimanta Pal & Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, 3rd Ed., 2016.
3. C. Ray Wylie, Louis C. Barrett, Advanced Engineering Mathematics, McGraw Hill Book Co., New York, 6th Ed., 2017.

- ### Web links and Video Lectures (e-Resources)

- | List of Laboratory experiments (2hours/week per batch/batch strength 15)
10 lab sessions +1 repetition class + 1 Lab Assessment | |
|--|--|
| 1 | Analyzing standard 2D curves in polar, parametric and Cartesian forms. Also determining the point of intersection, nature of tangent and angle between polar curves. |
| 2 | Evaluation of bending of curves and nature at a given point on it. |
| 3 | Determination of flow of a multivariable function along the given direction and also identify the independence of given multivariable functions. |
| 4 | Determination of the optimal values of unconstrained function of at most two variables. |
| 5 | Determine the primitive of first order differential equations |
| 6 | Solution of higher order ordinary differential equations. |
| 7 | Identifying the nature of given set of lines or planes using rank method. |
| 8 | Finding all the eigenvalues of a square matrix of order up to four using Rayleigh power method. |
| 9 | Evaluation of triple integrations, finding average values and centroid. |
| 10 | Evaluation of gamma and beta functions. |

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	1										
C02	3	2										
C03	2	3										
C04	3	2										
C05	2	3										
Strength of correlation: Low-1, Medium-2, High-3												

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examinations – 2023
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2023-24)

II Semester:

Course Title	Mathematics-II for Civil Engineering Stream (Integral Calculus, Partial Differential Equations and Numerical methods)							
Course Code	22MAU201A							
Category	ASC (Applied Science Course)							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	02	00	04	40	20	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours			

COURSE LEARNING OBJECTIVES

- 1. Familiarize** the fundamentals of Integral calculus, Vector calculus, Numerical Techniques
- 2. Analyze** Engineering problems by applying Partial Differential Equations Methods
- 3. Develop** the knowledge of solving engineering problems by using numerical Technique
- 4. Apply** the knowledge of calculus, partial differential equations and numerical techniques in various fields of civil engineering.

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Introduction to Integral Calculus in Civil Engineering. Multiple Integrals: Evaluation of double and triple integrals, change of order of integration, changing into polar coordinates. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Self-Study: Center of gravity, volume by double integration, duplication formula. Applications: Area by double integration and Volume by triple integration. (RBT Levels: L1, L2 and L3)	04	04
II	Vector Calculus Introduction to Vector Calculus in Civil Engineering. Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector identities (without proof). Vector Integration: Line integrals, Surface integrals, Green's theorem and Stoke's theorem (no proofs). Self-Study: Differentiation of vector function of time, volume integral and Gauss divergence theorem. Applications: velocity and acceleration. (RBT Levels: L1, L2 and L3)	04	04
III	Partial Differential Equations (PDE): Formation of PDE's by elimination of arbitrary constants and functions. Solution of non- homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only.	04	04

	<p>Method of separation of variables.</p> <p>Self-Study: One-dimensional heat equation and wave equation.</p> <p>Applications: Solution of one-dimensional heat equation and wave equation by the method of separation of variables.</p> <p>(RBT Levels: L1, L2 and L3)</p>		
IV	<p>Numerical methods-1</p> <p>Importance of Numerical methods for discrete data in the field of Civil Engineering.</p> <p>Solution of algebraic and transcendental equations, Regula-Falsi, Newton-Raphson methods and Ramanujan's methods (no proofs). Finite differences. Interpolation-Newton's Gregory forward and backward, Gauss forward and backward, Stirling's (no proofs). Newton's divided difference formula (no proof).</p> <p>Self-Study: Bisection method, Secant method, Lagrange's interpolation, inverse Interpolation.</p> <p>Applications: Estimating the approximate roots by inverse interpolation.</p> <p>(RBT Levels: L1, L2 and L3)</p>	04	04
V	<p>Numerical methods -2</p> <p>Introduction to various numerical techniques for handling Civil Engineering application:</p> <p>Numerical integration: Trapezoidal, Simpson's 1/3 rule and 3/8 rules, Weddle's rule (without proof).</p> <p>Numerical Solution of Ordinary Differential Equations (ODE's): Solutions of first order and first degree – Picard's method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations).</p> <p>Self-Study: Taylor's series method, Euler's method, Adam-Bashforth method.</p> <p>Applications: Solutions to ODE arises in civil engineering.</p> <p>(RBT Levels: L1, L2 and L3)</p>	04	04

COURSE OUTCOMES: On completion of the course, students are able to

CO1	Describe multiple integrals, scalar and vector point functions of two, solution of partial differential equations and Numerical approximations.
CO2	Explain concepts of area and volume by double integration, change to polar coordinates describe divergence and flux in vector field; classify method of solutions of PDE's, Numerical differentiation and integrations.
CO3	Apply the Mathematical properties to evaluate triple integral and improper integral to interpret the irrotational and solenoidal vector field, find the solutions to problem arises in engineering field.
CO4	Analyze multiple integrals, vector differentiations and integration, the Mathematical model by partial differential equations, Numerical solution to algebraic and transcendental, ordinary differential equations.
CO5	Familiarize with modern mathematical tools namely MAXIMA/ MATLAB/ PYTHON/ SCILAB

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
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3. Glyn James, Advanced modern Engineering Mathematics, Pearson Publications, 4 ED., 2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1										
CO2	3	2										
CO3	2	3										
CO4	3	2										
CO5	2	3										

Strength of correlation: Low-1, Medium-2, High-3

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examinations – 2023
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2023-24)

II Semester:

Course Title	Mathematics-I1 for Computer Science and Engineering Stream (Integral Calculus, Vectors calculus, Numerical methods and Vector spaces)							
Course Code	22MAU201B							
Category	ASC (Applied Science Course)							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	02	00	04	40	20	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours			

COURSE LEARNING OBJECTIVES

1. **Familiarize** the fundamentals of Integral calculus and Vector calculus
2. **Learn** vector spaces and linear transformations
3. **Develop** the knowledge of solving numerical methods and apply them to solve transcendental and differential equations.
4. **Apply** the knowledge of calculus, vector space, linear transformation and numerical techniques in various fields of computer science and engineering

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Integral Calculus Introduction to Integral Calculus in Computer Science & Engineering. Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals over the region, evaluation of double integrals by change of order of integration and changing into polar coordinates. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Self-Study: Center of gravity, Volume by double integrals. Applications: Applications to find area by double integral and volume by triple integral. (RBT Levels: L1, L2 and L3)	04	04
II	Vector Calculus Introduction to Vector Calculus in Computer Science & Engineering. Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields, vector identities (no proof). Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between Cartesian and curvilinear systems, orthogonally. Self-Study: Expressions of curl, divergence and gradient in orthogonal curvilinear coordinates. Applications: velocity and acceleration. (RBT Levels: L1, L2 and L3)	04	04

III	Vector Space and Linear Transformations Importance of Vector Space and Linear Transformations in the field of Computer Science & Engineering. Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension (No theorems) Linear transformations: Definition and examples, Matrix of a linear transformation. Rank and nullity of a linear operator, rank-nullity theorem (Only statement). Self-study: Angles and Projections. Rotation, reflection, contraction and expansion. Applications: Image processing. (RBT Levels: L1, L2 and L3)	04	04
IV	Numerical methods -1 Importance of numerical methods for discrete data in the field of computer science & engineering. Solution of algebraic and transcendental equations – Ramanujan’s method, Regula-Falsi and Newton-Raphson methods (no proofs). Finite differences, Interpolation formula- Newton’s Gregory forward and backward, Gauss forward and backward, Stirling’s (no proofs). Newton’s divided difference formula (no proof). Self-Study: Bisection method, Secant method, Lagrange’s interpolation, inverse Interpolation. Applications: Estimating the approximate roots by inverse interpolation. (RBT Levels: L1, L2 and L3)	04	04
V	Numerical methods -2 Introduction to various numerical techniques for handling Computer Science & Engineering applications. Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules, and Weddle’s rule(without proof). Numerical Solution of ODE: Solutions of first order and first degree ODE- Picard’s method, Modified Euler’s method, Runge-Kutta method of fourth order and Milne’s predictor-corrector formula (No derivations). Self-Study: Taylor’s series method, Euler’s method, Adam-Bashforth method. Applications: estimating the approximate solutions of ODE. (RBT Levels: L1, L2 and L3)	04	04

COURSE OUTCOMES: On completion of the course, students are able to:

CO1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.
CO2	Understand the applications of vector calculus refer to solenoidal and irrotational vectors. Orthogonal curvilinear coordinates.
CO3	Demonstrate the idea of Linear dependence and independence of sets in the vector space and linear transformation.
CO4	Apply the knowledge of numerical methods in analyzing the discrete data and solving the physical and engineering problems.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB.

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.

2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.
3. Glyn James, Advanced modern Engineering Mathematics, Pearson Publications, 4 ED., 2011
4. David M Burton, Elementary Number Theory, McGraw Hill, 7th Ed., 2010.
5. Kenneth Hoffman and Ray Kunze, Linear Algebra, Person 2 ED., 2016.

REFERENCE BOOKS

1. V. Ramana, Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed., 2017
2. Srimanta Pal & Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, 3rd Ed., 2016.
3. C. Ray Wylie, Louis C. Barrett, Advanced Engineering Mathematics, McGraw Hill Book Co., New York, 6th Ed., 2017.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publication, 3rd Ed., 2014.
5. David C Lay, Linear Algebra and its Applications, Pearson Publishers, 4th Ed., 2018.
6. Gareth Williams, Linear Algebra with applications, Jones Bartlett Publishers Inc., 6th Ed., 2017.
7. William Stallings, Cryptography and Network Security, Pearson Prentice Hall, 6th Ed., 2013.

Web links and Video Lectures (e-Resources):

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>
4. VTU e-Shikshana Program
5. VTU EDUSAT Program
6. <https://www.youtube.com/watch?v=TjIrEYWlonE>
7. <http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php>
8. <http://nitttrc.edu.in/nptel/courses/video/108106171/108106171.html>

List of Laboratory experiments (2 hours/week per batch/batch strength 15): 10 lab sessions+ 1 repetition class+ 1 Lab Assessment.	
1	Evaluation of multiple integrals and application to determine area, volume and surface area of standard objects.
2	Evaluation of Gamma and Beta functions.
3	Vector differential operator applied on scalar and vector point functions and its application problems.
4	Verification of Green's theorem.
5	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson Method.
6	Interpolation using Newton's forward, backward difference formula and central difference formula.
7	Application of quadrature formula.
8	Solution of linear first order ordinary differential equations by Modified Euler's Method and Picard's method.
9	Solution of linear first order ordinary differential equations by Runge-Kutta IVth order and Predictor-corrector methods.
10	Testing independence of vectors, computation of basis and dimension a vector space.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1										
CO2	3	2										
CO3	2	3										
CO4	3	2										
CO5	2	3										
Strength of correlation: Low-1, Medium-2, High-3												

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examinations – 2023
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2023-24)

II Semester:

Course Title	Mathematics-II for Mechanical Engineering Stream (Integral Calculus, Partial Differential Equations and Numerical methods)							
Course Code	22MAU201C							
Category	ASC (Applied Science Course)							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	02	00	04	40	20	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours			

COURSE LEARNING OBJECTIVES

1. **Familiarize** the fundamentals of Integral calculus, Vector calculus, Numerical Techniques
2. **Analyze** engineering problems by applying Partial Differential Equations Methods
3. **Develop** the knowledge of solving engineering problems by using numerical Technique
4. **Apply** the knowledge of calculus, partial differential equations and numerical techniques in various fields of mechanical engineering.

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Introduction to Integral Calculus in Mechanical Engineering. Multiple Integrals: Evaluation of double and triple integrals, change of order of integration, changing into polar coordinates. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Self-Study: Center of gravity, volume by double integration, duplication formula. Applications: Area by double integration and Volume by triple integration. (RBT Levels: L1, L2 and L3)	04	04
II	Vector Calculus Introduction to Vector Calculus in Mechanical Engineering. Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector identities (without proof). Vector Integration: Line integrals, Surface integrals, Green's theorem and Stoke's theorem (no proofs). Self-Study: Differentiation of vector function of time, volume integral and Gauss divergence theorem. Applications: velocity and acceleration. (RBT Levels: L1, L2 and L3)	04	04
III	Partial Differential Equations (PDE): Formation of PDE's by elimination of arbitrary constants and functions. Solution of non- homogeneous PDE by direct integration. Homogeneous	04	04

	<p>PDEs involving derivative with respect to one independent variable only. Introduction to method of separation of variables.</p> <p>Self-Study: One-dimensional heat equation and wave equation.</p> <p>Applications: Solution of one-dimensional heat equation, wave equation and two dimensional Laplace equation by the method of separation of variables.</p> <p>(RBT Levels: L1, L2 and L3)</p>		
IV	<p>Numerical methods-1</p> <p>Importance of Numerical methods for discrete data in the field of Mechanical Engineering.</p> <p>Solution of algebraic and transcendental equations, Regula-Falsi, Newton-Raphson methods and Ramanujan's methods (no proofs). Finite differences. Interpolation-Newton's Gregory forward and backward, Gauss forward and backward, Stirling's (no proofs). Newton's divided difference formula (no proof).</p> <p>Self-Study: Bisection method, Secant method, Lagrange's interpolation, inverse Interpolation.</p> <p>Applications: Estimating the approximate roots by inverse interpolation.</p> <p>(RBT Levels: L1, L2 and L3)</p>	04	04
V	<p>Numerical methods -2</p> <p>Introduction to various numerical techniques for handling Mechanical Engineering application:</p> <p>Numerical integration: Trapezoidal, Simpson's 1/3 rule and 3/8 rules, Weddle's rule (without proof).</p> <p>Numerical Solution of Ordinary Differential Equations (ODE's): Solutions of first order and first degree – Picard's method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations).</p> <p>Self-Study: Taylor's series method, Euler's method, Adam-Bashforth method.</p> <p>Applications: Solution of ODE by numerical methods in Mechanical engineering</p> <p>(RBT Levels: L1, L2 and L3)</p>	04	04

COURSE OUTCOMES: On completion of the course, students are able to:

CO1	Knowledge to evaluate double and triple integration and identify the scalar, vector notation of functions of two and three dimensions, recognize the partial differential equations and Numerical differences
CO2	Understand to explain Area, Volume by double integration, change to polar coordinates describe divergence and flux in vector field; classify method of solutions of PDE's, Numerical differentiation and integrations.
CO3	Apply the Mathematical properties to evaluate triple integral and improper integral to interpret the irrotational and solenoidal vector field, find the solutions to problem arises in engineering field.
CO4	Analyze multiple integrals ,vector differentiations and integration, the Mathematical model by partial differential equations, Numerical solution to algebraic and transcendental, ordinary differential equations
CO5	Familiarize with modern mathematical tools namely MAXIMA/MATLAB/ PYTHON/ SCILA.

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.

2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.
3. Glyn James, Advanced modern Engineering Mathematics, Pearson Publications, 4 ED., 2011

REFERENCE BOOKS

1. V. Ramanna Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed., 2017
2. Srimanta Pal & Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, 3rd Ed., 2016.
3. C. Ray Wylie, Louis C. Barrett, Advanced Engineering Mathematics, McGraw Hill Book Co., New York, 6th Ed., 2017.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publication, 3rd Ed., 2014.

Web links and Video Lectures (e-Resources):

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>
4. VTU e-Shikshana Program
5. VTU EDUSAT Program
6. <https://www.youtube.com/watch?v=TjIrEYWlonE>
7. <http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php>

List of Laboratory experiments (2 hours/week per batch/batch strength 15): 10 lab sessions+ 1 repetition class+ 1 Lab Assessment.	
1	Evaluation of multiple integrals and application to determine area, volume and surface area of standard objects.
2	Evaluation of Gamma and Beta functions.
3	Vector differential operator applied on scalar and vector point functions and its application problems.
4	Verification of Green's theorem.
5	Solution of one-dimensional heat equation and wave equation.
6	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson Method.
7	Interpolation using Newton's forward, backward difference formula and central difference formula.
8	Application of quadrature formula.
9	Solution of linear first order ordinary differential equations by Modified Euler's Method and Picard's method.
10	Solution of linear first order ordinary differential equations by Runge-Kutta IVth order and Predictor-corrector methods.

CO-PO MAPPING

[illegible]

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examinations – 2023
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2023-24)

II Semester

Course Title	Mathematics-1I for Electrical and Electronics Engineering Stream (Laplace transforms, Vectors, Numerical methods and Vector spaces)							
Course Code	22MAU201D							
Category	ASC (Applied Science Course)							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	02	00	04	40	20	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours			

COURSE LEARNING OBJECTIVES

- 1 **Familiarize** the importance of Vector calculus essential for Electronics and Electrical Engineering.
- 2 **Learn** vector spaces and linear transformations
- 3 **Develop** the knowledge of solving numerical methods and apply them to solve transcendental and differential equations.
- 4 **Apply** the knowledge of calculus, Laplace transform, vector space, linear transformation and numerical techniques in various fields of Electrical & Electronics Engineering

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	Laplace Transform Importance of Laplace Transform for Electrical & Electronics Engineering. Definition of Laplace transform (LT), transform of elementary functions, region of convergence, Properties–linearity, scaling, t-shift property, s-domain shift, differentiation in the domain, division by t, differentiation and integration in the time domain, LT of special functions-periodic functions, Heaviside unit step function. (All properties and theorems no proof). Inverse Laplace Transforms: Definition, evaluation using partial fraction methods, convolution theorem (without proof). Self-Study: Verification of convolution theorem. Applications: Applications to solve ordinary differential equations. (RBT Levels: L1, L2 and L3)	04	04
II	Vector Calculus Introduction to Vector Calculus in Electrical & Electronics Engineering. Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector Integration: Line integrals, Applications to work done by a force and flux. Statement of Green's theorem Surface integrals and Stoke's theorem. Self-Study: Volume integral and Gauss divergence theorem. Applications: velocity and acceleration.	04	04

	(RBT Levels: L1, L2 and L3)		
III	Vector Space and Linear Transformations Importance of Vector Space and Linear Transformations in the field of Electrical & Electronics Engineering. Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension (No theorems). Linear transformations: Definition and examples, Matrix of a linear transformation. Rank and nullity of a linear operator, Rank-Nullity theorem (no proof). Self-study: Angles and Projections. Rotation, reflection, contraction and expansion. Applications: Image processing. (RBT Levels: L1, L2 and L3)	04	04
IV	Numerical methods -1 Importance of numerical methods for discrete data in the field of Electrical & Electronics Engineering. Solution of algebraic and transcendental equations – Ramanujan’s method, Regula-Falsi and Newton-Raphson methods (no proofs). Finite differences, Interpolation formula- Newton’s Gregory forward and backward, Gauss forward and backward, Stirling’s (no proofs). Newton’s divided difference formula (no proof). Self-Study: Bisection method, Secant method, Lagrange’s interpolation and Lagrange’s inverse Interpolation. Applications: Estimating the approximate roots by inverse interpolation. (RBT Levels: L1, L2 and L3)	04	04
V	Numerical methods -2 Introduction to various numerical techniques for handling Electrical & Electronics Engineering. Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules, and Weddle’s rule(without proof). Numerical Solution of Ordinary Differential Equations (ODE’s): Solutions of first order and first degree – Picard’s method, Modified Euler’s method, Runge-Kutta method of fourth order and Milne’s predictor-corrector formula (No derivations). Self-Study: Runge-Kutta method of second order, Adam-Bashforth method. Applications: Estimating the approximate solutions of ODE . (RBT Levels: L1, L2 and L3)	04	04

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1	Apply the concept of changing time field to s-field using Laplace transformation as a tool to solve the definite integrals, differential equations, and problems arises in signals and systems.
CO2	Understand the applications of vector calculus refer to solenoidal and irrotational vectors, line integrals and surface integrals often in most of the electrical and electronics fields.
CO3	Demonstrate the idea of Linear dependence and independence of sets in the vector space and linear transformation.
CO4	Apply the knowledge of numerical methods in analyzing the discrete data and solving the physical and engineering problems.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/

TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.
3. Glyn James, Advanced modern Engineering Mathematics, Pearson Publications, 4th ED., 2011
4. Peter v. O'neil, advanced Engineering Mathematics, Cengage learning, 7th ed., 2012.
5. Kenneth Hoffman and Ray Kunze, Linear Algebra, Person 2 ED., 2016.

REFERENCE BOOKS

1. V. Ramana, Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed., 2017
2. Srimanta Pal & Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, 3rd Ed., 2016.
3. David C Lay, Linear Algebra and its Applications, Pearson Publishers, 4th Ed., 2018.
4. C. Ray Wylie, Louis C. Barrett, Advanced Engineering Mathematics, McGraw Hill Book Co., New York, 6th Ed., 2017.
5. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publication, 3rd Ed., 2014.

Web links and Video Lectures (e-Resources)

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>
4. VTU e-Shikshana Program
5. VTU EDUSAT Program
6. <https://www.youtube.com/watch?v=TjlrEYWlonE>
7. <http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php>
8. <http://nitttrc.edu.in/nptel/courses/video/108106171/108106171.html>

List of Laboratory experiments (2hours/week per batch/batch strength 15)
10 lab sessions +1 repetition class + 1 Lab Assessment

1	Computing Laplace Transform and inverse Laplace Transform of standard function.
2	Laplace Transform of convolution of two functions.
3	Vector differential operator applied on scalar and vector point functions and its application problems.
4	Verification of Green's theorem.
5	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson Method.
6	Interpolation using Newton's forward, backward difference formula and central difference formula.
7	Application of quadrature formula.
8	Solution of linear first order ordinary differential equations by Modified Euler's Method and Picard's method.
9	Solution of linear first order ordinary differential equations by Runge-Kutta IVth order and Predictor-corrector methods.
10	Testing independence of vectors, computation of basis and dimension a vector space.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1										
CO2	3	2										
CO3	2	3										
CO4	3	2										
CO5	2	3										
Strength of correlation: Low-1, Medium-2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus-2023-2024

Course Title	Applied Physics						
Course Code	22PHU102A/202A Civil Engineering						
Category	Applied Science Course (ASC) (Integrated Course)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40 hours theory + 10-12 Lab slots	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE:03Hours		

COURSE OBJECTIVE: To introduce the Engineering students to the Elasticity, Vibrations, Laser and fiber optics, Acoustics of auditorium & Natural hazards and Safety with an emphasis on inculcating strong analytical skills among them so that they can understand and analyze complex engineering problems with relative ease.

UNIT I	8 hours
Elasticity: Torsion: Expression for couple per unit twist of a cylindrical wire (derivation). Torsional Pendulum: Expression for period of oscillation and Rigidity modulus (derivation). Beams, bending of beams: neutral surface and neutral axis. Expression for bending moment of a beam (derivation). Cantilever, Expression for depression in loaded cantilever (derivation). Applications of beams in Engineering, Numerical problems.	
Pre-requisites: Basics of Elasticity	
Self-learning: Types of Beams	
UNIT II	8 hours
Vibrations: Theory of free vibrations, theory of damped vibrations and discussion of three cases of damping. Theory of Forced vibrations. Resonance: Condition for resonance, sharpness of resonance. Application of damping in Engineering .Numerical problems.	
Pre-requisites: Simple Harmonic motion	
Self-learning: LCR Resonance	
UNIT III	8 hours
Lasers: Interaction of radiation with matter: Induced absorption, spontaneous emission and stimulated emission of radiation. Expression for energy density in terms of Einstein's coefficients (derivation). Laser Action, Population Inversion, Metastable State. Requisites of a laser system. Condition for laser action. Principle, construction and working of Helium-Neon laser. Application of optical fibers: Point to point communication with block diagram. Numerical problems.	
Optical fibers: Expression for angle of acceptance and numerical aperture (derivation). Fractional index change, V- number and modes of propagation (N). Types of optical fibers. Attenuation: Expression for attenuation coefficient (derivation). Application of optical fibers: Point to point communication with block diagram. Advantages and limitations of fiber optic communication over conventional communication system. Numerical problems.	
Pre-requisite: TIR in optical fiber	
Self-learning: Application of Laser in medicine	
UNIT IV	8hours
Acoustics of Auditorium :	
Introduction to acoustics, Types of Acoustics, reverberation and reverberation time, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (No derivation), measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Noise and its Measurements, Sound Insulation and its measurements, Numerical problems.	
Pre-requisites: Basics of Sound Waves	
Self-learning: Applications of Acoustics	

UNIT V**8 hours****Natural hazards and Safety:**

Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquake resistant measures), Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), Landslide (causes such as excess rainfall, geological structure, human excavation etc, types of land slide, adverse effects, engineering solution for landslides). Forest Fires and detection using remote sensing. Fire hazards and fire protection, fire-proofing materials, fire safety regulations and firefighting equipment - Prevention and safety measures. Numerical problems. Pre-requisite: Oscillations

Pre-requisite: Oscillations**Self-learning:** Richter scale**Experimental Components:****Any Ten Experiments have to be completed from the list of experiments**

1. Series & Parallel LCR Circuits
2. Determination of Fermi energy of a copper.
3. Wavelength of LASER using Grating
4. Numerical Aperture using optical fiber
5. Rigidity Modulus (n) by Torsional Pendulum
6. Moment of Inertia of an Irregular body (I) by Torsional pendulum
7. Y by Single Cantilever
8. Newton's Rings
9. Bar Pendulum
10. Determination of Planck's constant using LED's
11. GNU Step Interactive Simulation
12. Study of motion using Spread sheets
13. Application of Statistic using Spread Sheets
14. PHET Interactive

Simulations(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>)

Teaching and Learning Process: Chalk and Talk, Power Point presentation, and Lab Experiment Videos.

Course outcome

At the end of the course the student will be able to:

CO1	Understand the concepts of elasticity and vibrations and their applications in engineering field.
CO2	Understand the principles of Laser and optical fibers and their applications
CO3	Summarize concepts of acoustics in buildings and its applications
CO4	Describe the various natural hazards and safety precautions
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Text Books

1. Prof. S.P. Basavaraju, Engineering Physics, Subhas Stores, Bangalore.
2. Ajoy Ghatak K.Thyagarajan, Laser fundamentals and Applications
3. Avadhanulu M.N.and P.G. Kshirsagar, A textbook of Engineering Physics, 10th Edition (2014).
4. Engineering Physics by Gaurand Gupta ,Dhanpat Rai Publications(P)Ltd.
5. Engineering Physics by R.K.Gaurand S.L.Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
6. Building Science: Lighting and Acoustics, B.P.Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltd.,
7. Building Acoustics: Tor Eric Vigran, Taylor and Francis, 2008 Edition.
8. An Introduction to Disaster Management, Natural Disaster & Man-Made Hazards, S.Vaidyanathan,
9. Natural Hazards, Edward Bryant, Cambridge University Press, 2nd Edition

10. Natural hazards, Earthquakes, Volcanoes, and landslides by Ramesh P Singh, and Darius Bartlett, CRC Press, Taylor and Francis group.
11. Principles of Fire Safety Engineering Understanding Fire & Fire Protection, Akhil Kumar Das, PHI Learning, II Edition.
12. Disaster Management, R. Subramanian, S.Chand Publishing, 2018.

Reference Books:

1. Arthur Beiser, Concepts of Modern Physics, McGrawHill, 7th edition 2017.
2. S.O. Pillai, Solid State Physics, New Age International. Sixth Edition.
3. V. Rajendran, Engineering Physics, Tata McGraw Hill CompanyLtd.,NewDelhi-2012
4. A Marikani, Engineering Physics, PHI Learning Private Limited, Delhi-2013

Web links and Video Lectures (e-Resources):

1. Simple Harmonic motion: <https://www.youtube.com/watch?v=k2FvSzWeVxQ>
2. Stress-strain curves: <https://web.mit.edu/course/3/3.11/www/modules/ss.pdf>
3. Stress curves: <https://www.youtube.com/watch?v=f08Y39UiC-o>
4. Oscillations and waves: <https://openstax.org/books/college-physics-2e>
5. Earthquakes: www.asc-india.org
6. Earthquakes and Hazards: <http://quake.usgs.gov/tsunami>
7. Land slide hazards: <http://landslides.usgs.gov>
8. Acoustics: <https://www.youtube.com/watch?v=fHBPvMDFyO8>

Activity Based Learning (Suggested Activities in Class)/Practical Based Learning:

- <http://nptel.ac.in>
- <https://swayam.gov.in>
- https://virtuallabs.merlot.org/vl_physics.html
- <https://phet.colorado.edu>
- <https://www.mypysicslab.com>

SCHEME FOR EXAMINATIONS

There shall be 10 questions

- 1) Two full questions to be set from each unit with internal choice
 - Minimum number of sub questions :2
 - Minimum number of sub questions:3
- 2) Each full question shall be for a maximum of 20 marks
- 3) Answer any Five full questions choosing at-least One full question from each unit

Note: 1. Questions from Experiments shall be included in the SEE question paper
2. Questions from Self-study component will not be asked for CIE and SEE.

Cos and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	-	-	-	2
CO5	3	2	-	-	--	-	-	-	-	-	-	2

Level 3-Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus-2023-2024

Course Title	Applied Physics						
Course Code	22PHU102B/202B CS/IS/AI&ML/CSBS						
Category	Applied Science Course (ASC) (Integrated Course)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40 hours theory + 10-12 Lab slots	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE: To introduce the Engineering students to the basics of Lasers and Optical fibers, Modern Physics, Quantum Mechanics, Electrical and Dielectric properties and Superconductivity, with an emphasis on inculcating strong analytical skills among them so that they can understand and analyze complex engineering problems with relative ease.

UNIT I	8 hours
<p>Lasers: Interaction of radiation with matter: Induced absorption, spontaneous emission and stimulated emission of radiation. Expression for energy density in terms of Einstein's coefficients (derivation). Laser Action, Population Inversion, Metastable State. Requisites of a laser system. Condition for laser action. Principle, construction and working of Semiconductor diode laser. Applications: Bar code scanner, Laser Printer and Eye surgery. Numerical problems.</p> <p>Optical fibers: Expression for angle of acceptance and numerical aperture (derivation). Fractional index change, V- number and modes of propagation (N). Types of optical fibers. Attenuation: Expression for attenuation coefficient (derivation). Application of optical fibers: Point to point communication system. Advantages and limitations of fiber optic communication over conventional communication system. Numerical problems.</p> <p>Pre-requisite: Properties of light Self-learning: Propagation Mechanism & TIR in optical fiber</p>	
UNIT II	8 hours
<p>Modern Physics: de- Broglie hypothesis, Properties of matter waves, de -Broglie wavelength extension to accelerated electron. Concept of wave packet. Phase velocity, group velocity (derivation), relation between phase velocity and group velocity, relation between group velocity and particle velocity, relation between phase velocity, group velocity and velocity of light. Expression for de-Broglie wavelength using group velocity (non-relativistic). Numerical problems.</p> <p>Pre-requisite: Blackbody radiations Self-learning: Planck law of radiation, Photoelectric effect</p>	
UNIT III	8 hours
<p>Quantum Mechanics: Heisenberg's uncertainty principle and its physical significance. Application of uncertainty principle: Non-confinement of electron in the nucleus (relativistic). Wave function. Properties and Physical significance of a wave function. Probability density and Normalization of wave function. Setup of one dimensional time independent Schrödinger's wave equation. Eigen values and Eigen functions. Application of Schrödinger wave equation to a particle in a box: Expression for energy Eigen values and Eigen functions for a particle in one-dimensional potential well of infinite height and finite width. Discussion of wave functions and probability density for a particle in a box for n=1 & 2, Numerical problems.</p> <p>Pre-requisite: Wave-Particle dualism Self-learning: The Davisson-Germer experiment</p>	

UNIT IV	8 hours
<p>Electrical properties: Assumptions of quantum free electron theory, Fermi level, Fermi energy, Fermi velocity and Fermi temperature. Fermi factor $f(E)$ and its dependence on temperature. Expression for density of states (qualitative), expression for Fermi energy at absolute temperature (derivation). Electrical conductivity based on Quantum free electron theory (derivation). Merits of quantum free electron theory. Numerical problems.</p> <p>Dielectric properties: Introduction to dielectrics, types of dielectrics: polar and nonpolar dielectrics, polarization, polarizability, dielectric constant, relation between dielectric constant and polarizability. Polarization mechanism, types of polarization. Derivation of equation for internal field in liquids and solids (1-Dimensional). Expression for Clausius -Mossotti equation (Derivation). Applications of dielectrics. Numerical problems.</p> <p>Pre-requisite: Review of Classical free electron theory Self-learning: Electrical conductivity based on CFET</p>	

UNIT V	8 hours
<p>Superconductivity:</p> <p>Introduction to Super Conductors, Temperature dependence of resistivity in superconducting materials, Effect of magnetic field on superconductors: Meissner's Effect, Type-I and Type-II superconductors, Temperature dependence of critical field, BCS theory (Qualitative), High temperature superconductors, Quantum Tunneling Josephson Junction(qualitative), Applications of super conductors: Maglev vehicles, DC and RF SQUIDS(qualitative), Numerical problems.</p> <p>Pre-requisites: Basics of Electrical conductivity Self-learning: Quantum Computing</p>	
<p>Experimental Components:</p> <p>Any Ten Experiments have to be completed from the list of experiments</p> <ol style="list-style-type: none"> 1. Series & Parallel LCR Circuits 2. Determination of Fermi energy of a copper. 3. Wavelength of LASER using Grating 4. Numerical Aperture using optical fiber 5. Charging and Discharging of a Capacitor 6. Determination of Planck's constant using LED's 7. Energy Gap of the given Semiconductor 8. Transistor Characteristics 9. Characteristics of Zener Diode 10. Radius of curvature of Plano convex lens using Newton's rings 11. Step Interactive Physical Simulations 12. Study of motion using Spread sheets 13. Application of Statistic using Spread Sheets 14. PHET Interactive Simulations (https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype) 	

Teaching and Learning Process: Chalk and Talk, Power Point presentation, and Lab Experiment Videos

Course Outcomes

On completion of the course the student should be able to

CO1: Describe the principles of LASERS and Optical fibers and their relevant applications.
CO2: Understand the concepts of Modern Physics and Quantum Mechanics and their applications.
CO3: Understand the properties of Electrical and Dielectric materials and their applications.
CO4: Summarize the essential properties of Superconductors and Applications.
CO5: Practice working in groups to conduct experiments in Physics and perform precise and honest measurements.

TEXT BOOKS

1. Prof. S. P. Basavaraju, Engineering Physics, Subhas Stores, Bangalore.
2. Avadhanulu M. N. and P.G. Kshirsagar, A text Book of Engineering Physics, 10th Edition (2014).
3. Engineering Physics by Gaur and Gupta, Dhanpat Rai Publications (P) Ltd.
- 4.. Introduction to Superconductivity, Michael Tinkham, Mc Graww Hill, INC, II Edition

REFERENCE BOOKS

1. Arthur Beiser, Concepts of Modern Physics, McGraw Hill, 7th edition 2017.
2. S. O. Pillai, Solid State Physics, New Age International. Sixth Edition.
2. A Marikani, Engineering Physics, PHI Learning Private Limited, Delhi - 2013
3. 4. V. Rajendran , Engineering Physics, Tata McGraw Hill Company Ltd., New Delhi -2012

ONLINE RESOURCES

1. **LASER:** <https://www.youtube.com/watch?v=WgzynezPiyc>
2. **Superconductivity:** <https://www.youtube.com/watch?v=MT5Xl5ppn48>
3. **Optical Fiber:** https://www.youtube.com/watch?v=N_kA8EpCUQo
4. **Quantum Mechanics:** <https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s>
5. **NPTEL Superconductivity:** <https://archive.nptel.ac.in/courses/115/103/115103108/>
6. **NPTEL Quantum Computing:** <https://archive.nptel.ac.in/courses/115/101/115101092>
7. **Virtual LAB:** <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>
8. **Virtual LAB:** <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
9. **Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**
 - <http://nptel.ac.in> <https://swayam.gov.in>
 - https://virtuallabs.merlot.org/vl_physics.html
 - <https://phet.colorado.edu> <https://www.myphysicslab.com>

SCHEME FOR EXAMINATIONS

There shall be 10 questions												
1) Two full questions to be set from each unit with internal choice												
Minimum number of sub questions : 2												
Maximum number of sub questions : 3												
2) Each full question shall be for a maximum of 20 marks												
3) Answer any Five full questions choosing at least One full question from each unit												
Note: 1. Questions from Experiments shall be included in the SEE question paper												
2. Questions from Self-study component shall not be asked for CIE and SEE.												

CO-PO Mapping:

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	-	-	-	2
CO5	3	2	-	-	-	-	-	-	-	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped,

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus-2023-2024

Course Title	Applied Physics						
Course Code	22PHU102C/202C (ME/AE/IEM)						
Category	Applied Science Course (ASC) (Integrated Course)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40 hours theory + 10-12 Lab slots	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE: To introduce the Engineering students to the Elasticity, Vibrations, Laser and fiber optics, Nanomaterials and Characterization techniques with an emphasis on inculcating strong analytical skills among them so that they can understand and analyze complex engineering problems with relative ease.

UNIT I	8 hours
Elasticity: Torsion: Expression for couple per unit twist of a cylindrical wire (derivation). Torsional Pendulum: Expression for period of oscillation and Rigidity modulus (derivation). Beams, bending of beams: neutral surface and neutral axis. Expression for bending moment of a beam (derivation). Cantilever, Expression for depression in loaded cantilever (derivation). Applications of beams in Engineering, Numerical problems.	
Pre-requisites: Basics of Elasticity	
Self-learning: Types of Beams	
UNIT II	8 hours
Vibrations: Theory of free vibrations, theory of damped vibrations and discussion of three cases of damping. Theory of Forced vibrations. Resonance: Condition for resonance, sharpness of resonance. Application of damping in Engineering .Numerical problems.	
Pre-requisites: Simple Harmonic motion	
Self-learning: LCR Resonance	
UNIT III	8 hours
Lasers: Interaction of radiation with matter: Induced absorption, spontaneous emission and stimulated emission of radiation. Expression for energy density in terms of Einstein's coefficients (derivation). Laser Action, Population Inversion, Metastable State. Requisites of a laser system. Condition for laser action. Principle, construction and working of Helium-Neon laser. Application of Laser in welding, cutting and drilling. Numerical problems.	
Optical fibers: Expression for angle of acceptance and numerical aperture (derivation). Fractional index change, V- number and modes of propagation (N). Types of optical fibers. Attenuation: Expression for attenuation coefficient (derivation). Application of optical fibers: Point to point communication with block diagram. Advantages and limitations of fiber optic communication over conventional communication system. Numerical problems.	
Pre-requisite: TIR in optical fiber	
Self-learning: Application of Laser in medicine	
UNIT IV	8 hours
Nanomaterials: Introduction to Nanoscience and Nanotechnology, Classifications of nanomaterials: 1D, 2D, 0D nanomaterials. Size effect and quantum effects in nanomaterials. Top down and Bottom up approach of synthesis of nanomaterials. Synthesis of Nanomaterials by Physical Method: High Energy Ball Milling, Synthesis of Nanomaterials by Chemical Method: Sol-Gel method. Bragg's X-ray diffraction, Bragg's formula (derivation), Scherrer's formula to find the size of the nanomaterial (derivation). Properties of Nano materials: mechanical, electrical, magnetic and optical properties. Mention the applications of nanomaterials. Numerical problems.	
Pre-requisites: Crystal structure	
Self-learning: Carbon Nanotubes	

UNIT V**8 hours****Material Characterization Techniques:**

Microscopic techniques: Introduction to electron microscopy, Scanning Electron Microscopy (SEM) and applications, Transmission Electron Microscope (TEM) and applications. Difference between SEM and TEM. Spectroscopic Techniques: UV-Visible spectroscopy and applications, Fourier Transform Infra-Red spectroscopy (FTIR) and applications.

Pre-requisites: Fundamentals of optical microscopy**Self-learning:** Atomic force Microscopy**Experimental Components:****Any Ten Experiments have to be completed from the list of experiments**

1. Series & Parallel LCR Circuits
2. Determination of Fermi energy of a copper.
3. Wavelength of LASER using Grating
4. Numerical Aperture using optical fiber
5. Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
6. Moment of Inertia by Torsional pendulum
7. Determination of Young's modulus of the material of the given bar Single Cantilever
8. Determination of the Radius of Curvature of the given Plano Convex Lens by setting Newton's Rings.
9. Bar Pendulum
10. Determination of Planck's constant using LED's
11. Study of motion using spread Sheets
12. Application of Statistics using Spread Sheets.
13. PHET Interactive

Simulations(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>)

Teaching and Learning Process: Chalk and Talk, Power Point presentation and Lab Experiment Videos.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1	Understand the concepts of elasticity and vibrations and their applications in engineering field.
CO2	Understand the principles of Laser and optical fibers and their applications
CO3	Explain the basics of nanomaterials and their properties.
CO4	Analyze the material characterization techniques.
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

Suggested Learning Resources:**Text Books**

1. Vibrations and Waves (MIT introductory Physics Series), A P French, CBS, 2003 Edition
Timoshenko, S. and Goodier J.N.
2. "Theory of Elasticity", 2nd Edition, McGraw Hill Book Co, 2001.
3. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, 1997
4. Materials Characterization Techniques-Sam Zhang, Lin Li, Ashok Kumar, CRC Press, First Edition, 2008.
5. Characterization of Materials- Mitra P.K . Prentice Hall India Learning Private Limited.
6. Nanoscience and Nanotechnology: Fundamentals to Frontiers – M.S.Ramachandra Rao & Shubra Singh, Wiley India Pvt Ltd.

Web links and Video Lectures (e-Resources):

1. Simple Harmonic motion: <https://www.youtube.com/watch?v=k2FvSzWeVxQ>
2. Stress-strain curves: <https://web.mit.edu/course/3/3.11/www/modules/ss.pdf>
3. Stress curves: <https://www.youtube.com/watch?v=f08Y39UiC-o>
4. Fracture in materials: <https://www.youtube.com/watch?v=x47nky4MbK8>
5. Virtual lab: <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>
6. Material characterization: https://onlinecourses.nptel.ac.in/noc20_mm14/preview
<https://www.encyclopedia.com/science-and-technology/physics/physics/cryogenics> <https://www>

Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning

1. <http://nptel.ac.in> <https://swayam.gov.in>
2. https://virtuallabs.merlot.org/vl_physics.html
3. <https://phet.colorado.edu> <https://www.myphysicslab.com>

SCHEME FOR EXAMINATIONS

There shall be 10 questions

- 1) Two full questions to be set from each unit with internal choice
 - Minimum number of sub questions : 2
 - Maximum number of sub questions : 3
- 2) Each full question shall be for a maximum of 20 marks
- 3) Answer any Five full questions choosing at least One full question from each unit

Note: 1. Questions from Experiments shall be included in the SEE question paper

2. Questions from Self-study component will not be asked for CIE and SEE.

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	-	-	-	2
CO5	3	2	-	-	-	-	-	-	-	-	-	2

Level 3- Highly Mapped, Level 2 - Moderately Mapped, Level 1 - Low Mapped

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Physics

Scheme and Syllabus-2023-2024

Course Title	Applied Physics						
Course Code	22PHU102D (ECE/EIE/ET/EEE)						
Category	Applied Science Course (ASC) (Integrated Course)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+ 10-12 labs	04
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE: To introduce the Engineering students to the basics of Lasers and Optical fibers, Modern Physics, Quantum Mechanics, Electrical properties of semiconductors and Superconductivity, with an emphasis on inculcating strong analytical skills among them so that they can understand and analyze complex engineering problems with relative ease.

UNIT I	8 hours
<p>Lasers: Interaction of radiation with matter: Induced absorption, spontaneous emission and stimulated emission of radiation. Expression for energy density in terms of Einstein's coefficients (derivation). Laser Action, Population Inversion, Metastable State. Requisites of a laser system. Condition for laser action. Principle, construction and working of Semiconductor diode laser. Applications: Bar code scanner, Laser Printer, Eye surgery. Numerical problems.</p> <p>Optical fibers: Expression for angle of acceptance and numerical aperture (derivation). Fractional index change, V- number and modes of propagation (N). Types of optical fibers. Attenuation: Expression for attenuation coefficient (derivation). Application of optical fibers: Point to point communication system. Advantages and limitations of fiber optic communication over conventional communication system. Numerical problems.</p> <p>Pre-requisite: Properties of light Self-learning: Propagation Mechanism & TIR in optical fiber</p>	
UNIT II	8 hours
<p>Modern Physics: de- Broglie hypothesis, Properties of matter waves, de -Broglie wavelength extension to accelerated electron. Concept of wave packet. Phase velocity, group velocity (derivation), relation between phase velocity and group velocity, relation between group velocity and particle velocity, relation between phase velocity, group velocity and velocity of light. Expression for de-Broglie wavelength using group velocity (non-relativistic). Numerical problems.</p> <p>Pre-requisite: Blackbody radiations Self-learning: Planck law of radiation, Photoelectric effect</p>	
UNIT III	8 hours
<p>Quantum Mechanics: Heisenberg's uncertainty principle and its physical significance. Application of uncertainty principle: Non-confinement of electron in the nucleus (relativistic). Wave function. Properties and Physical significance of a wave function. Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrödinger's wave equation. Eigen values and Eigen functions. Application of Schrödinger wave equation to a particle in a box: Expression for energy Eigen values and Eigen functions for a particle in one-dimensional potential well of infinite height and finite width. Discussion of wave functions and probability density for a particle in a box for n=1 & 2, Numerical problems.</p> <p>Pre-requisite: Wave-Particle dualism Self-learning: The Davisson–Germer experiment</p>	

UNIT IV	8 hours
Electrical properties of Semiconductors: Fermi level in intrinsic and extrinsic semiconductors. Expression for concentration of electrons in conduction band (derivation). Expression for concentration of holes in valence band (derivation), Law of mass action. Expression for Electrical conductivity of intrinsic semiconductor (derivation). Hall effect, Expression for Hall Voltage and Hall coefficient (derivation) and its application. Numerical problems. Pre-requisite: Band theory of solids Self-learning: Free electron theory of solids	

UNIT V:	8 hours
Superconductivity: Introduction to Super Conductors, Temperature dependence of resistivity in superconducting materials, Effect of magnetic field on superconductors: Meissner's Effect, Type-I and Type-II superconductors, Temperature dependence of critical field, BCS theory (Qualitative), High temperature superconductors, Quantum Tunneling Josephson Junction(qualitative), Applications of super conductors: Maglev vehicles, DC and RF SQUIDS(qualitative), Numerical problems. Pre-requisites: Basics of Electrical conductivity , Matthiessen rule Self-learning: Quantum Computing	

Experimental Components: Any Ten Experiments have to be completed from the list of experiments <ol style="list-style-type: none"> 1. Series & Parallel LCR Circuits 2. Determination of Fermi energy of a copper. 3. Wavelength of LASER using Grating 4. Numerical Aperture using optical fiber 5. Charging and Discharging of a Capacitor 6. Energy Gap of the given Semiconductor 7. Planck's constant using LEDs. 8. Transistor Characteristics 9. Zener Diode Characteristics 10. Radius of curvature of Plano convex lens using Newton's rings 11. GNU Step Interactive Simulations 12. Study of Electrical quantities using spreadsheet 13. Online Circuit Simulator Online Circuit Simulator(https://www.partsim.com/simulator) 14. PHET Interactive Simulations (https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype) 	
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Teaching and Learning Process: Chalk and Talk, Power Point presentation and Lab Experiment Videos.

CO1: Describe the principles of LASERS and Optical fibers and their relevant applications.	
CO2: Discuss the basic principles of Modern Physics and Quantum Mechanics	
CO3: Understand the properties of semiconductors.	
CO4: Summarize the essential properties of Superconductors and Applications	
CO5: Practice working in groups to conduct experiments in Physics and perform precise and honest Measurements.	

Suggested Learning Resources:

1. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
2. An Introduction to Lasers theory and applications by M.N. Avadhanulu and P.S. Hemne revised Edition 2012. S. Chand and Company Ltd -New Delhi.
3. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
4. Concepts of Modern Physics-Arthur Beiser: 6th Ed; Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006.
5. Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
6. Lasers and Non Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011.
8. LASERS Principles, Types and Applications by K.R. Nambiar-New Age International Publishers.
9. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018

Web links and Video Lectures (e-Resources):

1. **Laser:** <https://nptel.ac.in/courses/115/102/115102124/>
2. **Quantum mechanics:** <https://nptel.ac.in/courses/115/104/115104096/>
3. **Physics:** <http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>
4. **Numerical Aperture of fiber:** <https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement>
5. **NPTel Superconductivity:** <https://archive.nptel.ac.in/courses/115/103/115103108/>

Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning

1. <http://nptel.ac.in>
2. <https://swayam.gov.in>
3. <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>
4. <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
5. https://virtuallabs.merlot.org/vl_physics.html
6. <https://phet.colorado.edu>
7. <https://www.myphysicslab.com>

SCHEME FOR EXAMINATIONS

- 1) Two full questions to be set from each unit with internal choice
 - Minimum number of sub questions : 2
 - Maximum number of sub questions : 3
- 2) Each full question shall be for a maximum of 20 marks
- 3) Answer any Five full questions choosing at least One full question from each unit

Note: 1. Questions from Experiments shall be included in the SEE question paper

2. Questions from Self-study component will not be asked for CIE and SEE.

CO-PO Mapping :

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	-	-	-	2
CO5	3	2	-	-	-	-	-	-	-	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped,

DEPARTMENT OF CHEMISTRY

2023-24

Subject title : APPLIED CHEMISTRY FOR ME, AE, IEM BRANCHES		
Subject Code : 22CHU102A	No. of credits: 3 : 0 : 1 (L-T-P)	No. of lecture hour per week : 3
Exam duration : 3 hours.	CIE + SEE = 50 + 50 = 100	Total No. of lecture hours : 40

Course Objectives:

To interconnect the acquaintance of Chemistry involved in Basics of Electrochemical cells, Corrosion and its control; renewable sources of energy; Polymers for Electronic materials; memory and display systems; sensors in instrumental analytical methods and water treatment; e-waste management; Nanomaterials and its application.

Syllabus:

Unit No.	Syllabus content	No. of hours
1	<u>Unit I :Electrode Systems and Corrosion Science</u>	8
	<p>Electrodes and Cells – Introduction- Classification of electrochemical cells and concentration cells, numerical on concentration cells. ; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode.</p> <p>Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion Penetration Rate (CPR) , numerical. Corrosion control: Inorganic coatings – anodizing and phosphating. Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroplating – Chromium Plating; Electroless plating - Electroless plating of copper on PCB.</p> <p>Self-study: Galvanic series and its importance, Electroplating of Gold.</p>	
2	<u>Unit – II : Energy conversion and Storage</u>	8
	<p>Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Knocking- Mechanism of Knocking in IC engine; Octane number and Cetane number; Reformation of petrol.</p> <p>Sustainable energy sources: Hydrogen as a fuel - advantages, production and storage. Biofuels- Production of Biodiesel. Solar cells - Construction and working of Si based PV cell, advantages and disadvantages.</p> <p>Electrochemical Energy Systems: Introduction to batteries, Classification of batteries - primary and secondary batteries; Battery characteristics; construction, working and applications of Sodium ion batteries.</p> <p>Self-study: Fuel cells and Zinc-Air, Li-Ion batteries</p>	

Dr AMBEDKAR INSTITUTE OF TECHNOLOGY
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3	<u>Unit –III : Macromolecules for Engineering application</u>	8
	<p>Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Free radical mechanism for the formation of polyvinyl chloride as an example, Introduction to Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (T_g) –significance and factors affecting T_g, compounding of resins into plastics. Synthesis and applications- PMMA, phenol-formaldehyde resin. Elastomers: Introduction, vulcanization of rubber. Synthesis and applications of neoprene and butyl rubber; adhesives: synthesis of epoxy resins. Conducting polymers: mechanism of conduction in polyacetylene and its applications. Biodegradable polymers - Introduction, Polyglycolic acid - synthesis, degradation and uses.</p> <p>Self-study: Polycarbonates, Recycling of PET.</p>	
4	<u>Unit – IV : Materials for Engineering Applications</u>	8
	<p>Alloys: Introduction, classification, composition, properties and applications of stainless steel, solders, brass, alnico and shape memory alloys.</p> <p>Glasses & Ceramics: Introduction, Properties & Types of glasses, Manufacture and application of glasses. Ceramics - classification based on chemical composition.</p> <p>Lubricants: Introduction, classification, properties and applications of lubricants.</p> <p>Nanomaterials - Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: top-down and bottom-up approaches; Synthesis by sol-gel (ZrO₂), chemical vapor deposition methods (CNTs). Graphene by Hummer's method – properties and applications.</p> <p>Self-Study: Abrasives</p>	
5	<u>Unit – V : Phase Rule, Water Treatment and Analytical Techniques</u>	8
	<p>Phase Rule – Gibbs phase rule; Concept of Phase component, degrees of freedom with examples; Numericals. Application of Phase rule to i) one component system - water system; ii) two component system - Pb-Ag system,</p> <p>Water treatment - Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD.</p> <p>Analytical Techniques - Principle, Instrumentation and applications of Colorimetry (Copper), Potentiometry(FAS estimation), Conductometry (Acid Mixtures).\</p> <p>Self-Study: Solid waste management.</p>	

TEACHING AND LEARNING PROCESS	Chalk and talk method, power point presentation, Videos, Animations. Practical topic: Demonstration and Virtual Lab along with Performing experiments
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Autonomous Institute, Affiliated to VTU

Course outcomes: On completion of the course, the student will have the ability to:		POs Mapped	Strength of mapping
CO1	Understand and explain the principles of chemistry involved in water treatment, corrosion, energy sources, polymers, Green chemistry and instrumental methods of analysis.	PO1	3
CO2	Apply the acquired knowledge to solve the Engineering Chemistry problems .	PO1 & PO2	3, 3
CO3	Examine the Engineering Chemistry problems and draw meaningful interpretations .	PO1, PO3 & PO4	3, 3, 2
CO4	Instrument solutions through concepts of Engineering Chemistry in the field of Energy and Environment.	PO1, PO3 & PO7	3, 2, 3
CO5	Engage in self-study and make an effective oral presentation on contribution of Engineering Chemistry to society.	PO1, PO6, PO9 & PO12	3, 1, 3, 3

MAPPING of COs with POs for Applied Chemistry

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	3										
CO3	3		3	2								
CO4	3		2				3					
CO5	3					1			3			3
Strength of correlation: Low-1, Medium- 2, High-3												

REFERENCE:

- Principles of Physical Chemistry B.R.Puri, L.R.Sharma & M.S.Pathania,
- S.Nagin Chand & Co.
- Text Book of Polymer Science by F.W.Billmeyer, John Wiley & Sons
- Corrosion Engineering – by M.G.Fontana, Mc Graw Hill Publications.
- Environmental Chemistry by Stanley E. Manahan, 7th Edition, Lewis Publishers, 2000
- Engineering Chemistry by Dr Renu bapna, Macmillan publisher India limited
- Engineering Chemistry by Jayaprakash and Venugopal Subhash Publications.
- Nano Metal Oxides For Environmental Remediation. United Publications Dr. Jahagirdar A.A and Dr. Nagaswarupa H P.
- A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
- Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022.

Reference Books

- Wiley's Engineering Chemistry (Wiley India), 2nd Edition, 2013, 1026 pages.
- Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
- A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.

NPTEL/SWAYAM/MOOCs

- <http://nptel.ac.in/>
- <https://swayam.gov.in/>

Practical Module

Sl. No.	Syllabus content
<u>A – Compulsory Experiments:</u>	
1	Potentiometric estimation of Iron using std. $K_2Cr_2O_7$ (Electrochemical sensor).
2	Determination of pKa of a weak acid using glass electrode (pH sensor)
3	Conductometric estimation of mixture of strong and weak acid (conductometric sensors)
4	Estimation of copper in $CuSO_4$ by colorimetry (optical sensor).
5	Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
6	Estimation of total hardness of water by EDTA method.
7	Determination of COD of an industrial wastewater.
8	Estimation of percentage of copper in brass (analysis of alloy).
<u>B – Demonstration (offline/virtual)</u>	
1	Determination of Iron in the given sample of Haematite ore solution using $K_2Cr_2O_7$ crystals by external indicator method.
2	Synthesis of oxide nanoparticles.
<u>C – Open Ended Experiments:</u>	
1	Design an experiment to Identify the presence of proteins in given sample.
2	Determination of glucose by electrochemical sensors.

References Books:

1. Laboratory manual in Engineering Chemistry Sudharani, Dhanpatrai Publishing Company.
2. Vogel's Text Book of Quantitative Chemical Analysis revised by G.H.Jeffery, J.Bassett, J.Mendham and R.C Denney.

VIRTUAL LAB LINK DETAILS:

- <https://www.labster.com/chemistry-virtual-labs/>
- <https://youtu.be/OwZbw6Mhrqc>
- <https://youtu.be/UOLOsKZxi6Y>

DEPARTMENT OF CHEMISTRY

AY 2023-24

Subject title : APPLIED CHEMISTRY FOR EE, EC, ET, EI BRANCHES		
Subject Code : 22CHU102B	No. of credits: 3 : 0 : 1 (L-T-P)	No. of lecture hour per week : 3
Exam duration : 3 hours.	CIE + SEE = 50 + 50 = 100	Total No. of lecture hours : 40

Course Objectives:

To interconnect the acquaintance of Chemistry involved in Basics of Electrochemical cells, Corrosion and its control; renewable sources of energy; Polymers for Electronic materials; memory and display systems; sensors in instrumental analytical methods and water treatment; e-waste management; Nanomaterials and its application.

Syllabus:

Unit No.	Syllabus content	No. of hours
1	<u>Unit I : Electrode Systems and Corrosion Science</u>	8
	<p>Electrodes and Cells – Introduction- Classification of electrochemical cells and concentration cells, numerical on concentration cells. ; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode.</p> <p>Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion Penetration Rate (CPR) , numerical. Corrosion control: Inorganic coatings – anodizing and phosphating. Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroplating – Chromium Plating; Electroless plating - Electroless plating of copper on PCB.</p> <p>Self-study: Galvanic series and its importance, Electroplating of Gold.</p>	
2	<u>Unit – II : Energy Conversion and Storage</u>	8
	<p>Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Knocking- Mechanism of Knocking in IC engine; Octane number and Cetane number; Reformation of petrol.</p> <p>Sustainable energy sources: Hydrogen as a fuel - advantages, production and storage. Biofuels- Production of Biodiesel. Solar cells - Construction and working of Si based PV cell, advantages and disadvantages.</p> <p>Electrochemical Energy Systems: Introduction to batteries, Classification of batteries - primary and secondary batteries; Battery characteristics; construction, working and applications of Sodium ion batteries.</p> <p>Self-study: Fuel cells and Zinc-Air, Li-Ion batteries.</p>	

3	<p style="text-align: center;"><u>Unit –III : Macromolecules for Engineering application</u></p> <p>Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Free radical mechanism for the formation of polyvinyl chloride as an example, Introduction to Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (T_g) –significance and factors affecting T_g, compounding of resins into plastics. Synthesis and applications- PMMA, phenol-formaldehyde resin. Elastomers: Introduction, vulcanization of rubber. Synthesis and applications of neoprene and butyl rubber; adhesives: synthesis of epoxy resins. Conducting polymers: mechanism of conduction in polyacetylene and its applications. Biodegradable polymers - Introduction, Polyglycolic acid - synthesis, degradation and uses.</p> <p>Self-study: Polycarbonates, Recycling of PET.</p>	8
4	<p style="text-align: center;"><u>Unit – IV : Nano Technology, Sensors and e-waste management</u></p> <p>Nano Technology: Introduction, size dependent properties of nanomaterials (Surface area, Catalytic, Conducting), preparation of nanomaterials by sol-gel (TiO₂), chemical vapour deposition (CVD) method (CNTs and GO by Hummer's Method).</p> <p>Sensors: Introduction, Construction, working and applications of Conductometric sensors (Estimation of Acid Mixtures), Electrochemical sensors (Potentiometric estimation of FAS), Optical sensors (Colorimetric estimation of copper), Gas sensors.</p> <p>E-waste Management: Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling. Extraction of gold from e-waste.</p> <p>Self-study: Micro-electromechanical system (MEMS), Nanoelectromechanical systems (NEMS).</p>	8
5	<p style="text-align: center;"><u>Unit – V : Electronic Materials and Display System</u></p> <p>Conductors, Semiconductors and Insulators: Introduction, Band theory and examples.</p> <p>Semiconductors: production of electronic grade silicon, Refining- Float Zone method and Czochralski process.</p> <p>Memory Devices: Introduction, concepts of electronic memory. Classification of electronic memory materials -organic/polymer electronic memory devices (organic molecules, polymeric materials, organic-inorganic hybrid materials).</p> <p>Display Systems: Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Jablonski Diagram. Photoactive and electroactive materials, Light emitting electrochemical cells. Nanomaterials(QLED's) and organic materials (OLED's) used in optoelectronic devices.</p> <p>Self-study: Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminum (Al), and Brominated flame retardants in computers.</p>	7

TEACHING AND LEARNING PROCESS	Chalk and talk method, power point presentation, Videos, Animations. Practical topic: Demonstration and Virtual Lab along with Performing experiments		
Course outcomes: On completion of the course, the student will have the ability to:		POs Mapped	Strength of mapping

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CO1	Understand and explain the principles of chemistry involved in water treatment, corrosion, energy sources, polymers, Green chemistry and instrumental methods of analysis.	PO1	3
CO2	Apply the acquired knowledge to solve the Engineering Chemistry problems.	PO1 & PO2	3, 3
CO3	Examine the Engineering Chemistry problems and draw meaningful interpretations.	PO1, PO3 & PO4	3, 3, 2
CO4	Instrument solutions through concepts of Engineering Chemistry in the field of Energy and Environment.	PO1, PO3 & PO7	3, 2, 3
CO5	Engage in self-study and make an effective oral presentation on contribution of Engineering Chemistry to society.	PO1, PO6, PO9 & PO12	3, 1, 3, 3

MAPPING of COs with POs for Applied Chemistry

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	3										
CO3	3		3	2								
CO4	3		2				3					
CO5	3					1			3			3
Strength of correlation: Low-1, Medium- 2, High-3												

REFERENCE:

- Principles of Physical Chemistry B.R.Puri, L.R.Sharma & M.S.Pathania,
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- Text Book of Polymer Science by F.W.Billmeyer, John Wiley & Sons
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- A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
- Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022.
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- A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.

NPTEL/SWAYAM/MOOCs

- <http://nptel.ac.in/>
- <https://swayam.gov.in/>

Practical Module

Sl. No.	Syllabus content
<u>A – Compulsory Experiments:</u>	
1	Potentiometric estimation of Iron using std. $K_2Cr_2O_7$ (Electrochemical sensor).
2	Determination of pKa of a weak acid using glass electrode (pH sensor)
3	Conductometric estimation of mixture of strong and weak acid (conductometric sensors)
4	Estimation of copper in $CuSO_4$ by colorimetry (optical sensor).
5	Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
6	Estimation of total hardness of water by EDTA method.
7	Determination of COD of an industrial wastewater.
8	Estimation of percentage of copper in brass (analysis of alloy).
<u>B – Demonstration (offline/virtual)</u>	
1	Determination of Iron in the given sample of Haematite ore solution using $K_2Cr_2O_7$ crystals by external indicator method.
2	Synthesis of oxide nanoparticles.
<u>C – Open Ended Experiments:</u>	
1	Design an experiment to Identify the presence of proteins in given sample.
2	Determination of glucose by electrochemical sensors.

References Books:

1. Laboratory manual in Engineering Chemistry Sudharani, Dhanpatrai Publishing Company.
2. Vogel's Text Book of Quantitative Chemical Analysis revised by G.H.Jeffery, J.Bassett, J.Mendham and R.C Denney.

VIRTUAL LAB LINK DETAILS:

- <https://www.labster.com/chemistry-virtual-labs/>
- <https://youtu.be/OwZbw6Mhrqc>
- <https://youtu.be/UOLOsKZxi6Y>

DEPARTMENT OF CHEMISTRY

AY 2023-24

Subject title : APPLIED CHEMISTRY FOR CV BRANCHES		
Subject Code : 22CHU202C	No. of credits: 3 : 0 : 1 (L-T-P)	No. of lecture hour per week : 3
Exam duration : 3 hours.	CIE + SEE = 50 + 50 = 100	Total No. of lecture hours : 52

Course Objectives:

To interconnect the acquaintance of Chemistry involved in Basics of Electrochemical cells, Corrosion and its control; renewable sources of energy; Polymers for Electronic materials; memory and display systems; sensors in instrumental analytical methods and water treatment; e-waste management; Nanomaterials and its application.

Syllabus:

Unit No.	Syllabus content	No. of hours
1	<u>Unit I :Electrode Systems and Corrosion Science</u>	8
	Electrodes and Cells – Introduction- Classification of electrochemical cells and concentration cells, numerical on concentration cells. ; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode. Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion Penetration Rate (CPR) , numerical. Corrosion control: Inorganic coatings – anodizing and phosphating. Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroplating – Chromium Plating; Electroless plating - Electroless plating of copper on PCB. Self-study: Galvanic series and its importance, Electroplating of Gold.	
2	<u>Unit – II : Energy conversion and Storage</u>	8
	Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Knocking- Mechanism of Knocking in IC engine; Octane number and Cetane number; Reformation of petrol. Sustainable energy sources: Hydrogen as a fuel - advantages, production and storage. Biofuels- Production of Biodiesel. Solar cells - Construction and working of Si based PV cell, advantages and disadvantages. Electrochemical Energy Systems: Introduction to batteries, Classification of batteries - primary and secondary batteries; Battery characteristics; construction, working and applications of Sodium ion batteries. Self-study: Fuel cells and Zinc-Air, Li-Ion batteries.	

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3	<u>Unit –III : Macromolecules for Engineering application</u>	8
	<p>Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Free radical mechanism for the formation of polyvinyl chloride as an example, Introduction to Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (T_g) –significance and factors affecting T_g, compounding of resins into plastics. Synthesis and applications- PMMA, phenol-formaldehyde resin. Elastomers: Introduction, vulcanization of rubber. Synthesis and applications of neoprene and butyl rubber; adhesives: synthesis of epoxy resins. Conducting polymers: mechanism of conduction in polyacetylene and its applications. Biodegradable polymers - Introduction, Polyglycolic acid - synthesis, degradation and uses.</p> <p>Self-study: Polycarbonates, Recycling of PET.</p>	
4	<u>Unit – IV : Structural Materials</u>	8
	<p>Metals and Alloys: Composition, Properties and application of Iron and its alloys (any two), Aluminium (Duralumina & Magnalumina) and its alloys. Cement: Introduction, composition, properties, classification, manufacturing process of Portland cement, process of setting and hardening of cement, additives for cement. Geo polymer concrete: Introduction, synthesis, constituents, properties and applications.</p> <p>Refractories: Introduction, classification based on chemical composition, properties and application of refractory materials. Glass: Introduction, Composition, Types, Preparation of Soda-lime glass, properties and applications of glass.</p> <p>Self-study: Chemistry of reinforced concrete</p>	
5	<u>Unit – V : Water Technology, Phase rule and Analytical Techniques</u>	8
	<p>Water Technology - Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD, treatment of waste water - aerobic and anaerobic oxidation, primary, secondary (trickling filter method) and tertiary treatment methods.</p> <p>Phase Rule – Gibbs phase rule; Concept of Phase component, degrees of freedom with examples; Numericals. Application of Phase rule to one component system - water system.</p> <p>Analytical techniques: - Principle, Instrumentation and applications of Colorimetry (Copper), Potentiometry (FAS estimation using K₂Cr₂O₇), Conductometry (Acid Mixtures).</p> <p>Self-Study: Solid waste management.</p>	

TEACHING AND LEARNING PROCESS	<p>Chalk and talk method, power point presentation, Videos, Animations.</p> <p>Practical topic: Demonstration and Virtual Lab along with Performing experiments</p>
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Dr AMBEDKAR INSTITUTE OF TECHNOLOGY
Autonomous Institute, Affiliated to VTU

Course outcomes: On completion of the course, the student will have the ability to:		POs Mapped	Strength of mapping
CO1	Understand and explain the principles of chemistry involved in water treatment, corrosion, energy sources, polymers, Green chemistry and instrumental methods of analysis.	PO1	3
CO2	Apply the acquired knowledge to solve the Engineering Chemistry problems .	PO1 & PO2	3, 3
CO3	Examine the Engineering Chemistry problems and draw meaningful interpretations .	PO1, PO3 & PO4	3, 3, 2
CO4	Instrument solutions through concepts of Engineering Chemistry in the field of Energy and Environment.	PO1, PO3 & PO7	3, 2, 3
CO5	Engage in self-study and make an effective oral presentation on contribution of Engineering Chemistry to society.	PO1, PO6, PO9 & PO12	3, 1, 3, 3

MAPPING of COs with POs for Applied Chemistry

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	3										
CO3	3		3	2								
CO4	3		2				3					
CO5	3					1			3			3
Strength of correlation: Low-1, Medium- 2, High-3												

REFERENCE:

1. Principles of Physical Chemistry B.R.Puri, L.R.Sharma & M.S.Pathania,
2. S.Nagin Chand & Co.
3. Text Book of Polymer Science by F.W.Billmeyer, John Wiley & Sons
4. Corrosion Engineering – by M.G.Fontana, Mc Graw Hill Publications.
5. Environmental Chemistry by Stanley E. Manahan, 7th Edition, Lewis Publishers, 2000
6. Engineering Chemistry by Dr Renu bapna, Macmillan publisher India limited
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8. Nano Metal Oxides For Environmental Remediation. United Publications Dr. Jahagirdar A.A and Dr. Nagaswarupa H P.
9. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
10. Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022.
11. Wiley's Engineering Chemistry (Wiley India), 2nd Edition, 2013, 1026 pages.
12. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
13. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.

NPTEL/SWAYAM/MOOCs

1. <http://npTEL.ac.in/>
2. <https://swayam.gov.in/>

Practical Module

Sl. No.	Syllabus content
<u>A – Compulsory Experiments:</u>	
1	Potentiometric estimation of Iron using std. $K_2Cr_2O_7$ (Electrochemical sensor).
2	Determination of pKa of a weak acid using glass electrode (pH sensor)
3	Conductometric estimation of mixture of strong and weak acid (conductometric sensors)
4	Estimation of copper in $CuSO_4$ by colorimetry (optical sensor).
5	Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
6	Estimation of total hardness of water by EDTA method.
7	Determination of COD of an industrial wastewater.
8	Estimation of percentage of copper in brass (analysis of alloy).
<u>B – Demonstration (offline/virtual)</u>	
1	Determination of Iron in the given sample of Haematite ore solution using $K_2Cr_2O_7$ crystals by external indicator method.
2	Synthesis of oxide nanoparticles.
<u>C – Open Ended Experiments:</u>	
1	Design an experiment to Identify the presence of proteins in given sample.
2	Determination of glucose by electrochemical sensors.

References Books:

1. Laboratory manual in Engineering Chemistry Sudharani, Dhanpatrai Publishing Company.
2. Vogel's Text Book of Quantitative Chemical Analysis revised by G.H.Jeffery, J.Bassett, J.Mendham and R.C Denney.

VIRTUAL LAB LINK DETAILS:

- <https://www.labster.com/chemistry-virtual-labs/>
- <https://youtu.be/OwZbw6Mhrqc>
- <https://youtu.be/UOLOsKZxi6Y>

HOD

Department of Chemistry

DEPARTMENT OF CHEMISTRY

AY 2023-24

Subject title : APPLIED CHEMISTRY FOR CS, CS-BS, IS, AI-ML BRANCHES		
Subject Code : 22CHU202D	No. of credits: 3 : 0 : 1 (L-T-P)	No. of lecture hour per week : 3
Exam duration : 3 hours.	CIE + SEE = 50 + 50 = 100	Total No. of lecture hours : 52

Course Objectives:

To interconnect the acquaintance of Chemistry involved in Basics of Electrochemical cells, Corrosion and its control; renewable sources of energy; Polymers for Electronic materials; memory and display systems; sensors in instrumental analytical methods and water treatment; e-waste management; Nanomaterials and its application.

Syllabus:

Unit No.	Syllabus content	No. of hours
1	<u>Unit I : Electrode Systems and Corrosion Science</u>	8
	<p>Electrodes and Cells – Introduction- Classification of electrochemical cells and concentration cells, numerical on concentration cells. ; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode.</p> <p>Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion Penetration Rate (CPR) , numerical. Corrosion control: Inorganic coatings – anodizing and phosphating. Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroplating – Chromium Plating; Electroless plating - Electroless plating of copper on PCB.</p> <p>Self-study: Galvanic series and its importance, Electroplating of Gold.</p>	
2	<u>Unit – II : Energy : Sources, Conversion and Storage</u>	8
	<p>Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Knocking- Mechanism of Knocking in IC engine; Octane number and Cetane number; Reformation of petrol.</p> <p>Sustainable energy sources: Hydrogen as a fuel - advantages, production and storage. Biofuels- Production of Biodiesel. Solar cells - Construction and working of Si based PV cell, advantages and disadvantages.</p> <p>Electrochemical Energy Systems: Introduction to batteries, Classification of batteries - primary and secondary batteries; Battery characteristics; construction, working and applications of Sodium ion batteries.</p>	

	Self-study: Fuel cells and Zinc-Air, Li-Ion batteries.	
3	<u>Unit –III : Polymers for Engineering Applications</u>	8
	<p>Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Free radical mechanism for the formation of polyvinyl chloride as an example, Introduction to Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (T_g) –significance and factors affecting T_g, compounding of resins into plastics. Synthesis and applications- PMMA, phenol-formaldehyde resin. Elastomers: Introduction, vulcanization of rubber. Synthesis and applications of neoprene and butyl rubber; adhesives: synthesis of epoxy resins. Conducting polymers: mechanism of conduction in polyacetylene and its applications. Biodegradable polymers - Introduction, Polyglycolic acid - synthesis, degradation and uses.</p> <p>Self-study: Polycarbonates, Recycling of PET.</p>	
4	<u>Unit – IV : Materials for Memory and Display Systems</u>	8
	<p>Memory Devices: Introduction, concepts of electronic memory. Classification of electronic memory materials (organic molecules, polymeric materials).</p> <p>Display Systems: Liquid crystals (LC's) - Introduction, classification, Liquid crystal behaviour and applications. Jablonski Diagram. Photoactive and electroactive materials, Light emitting electrochemical cells. Nanomaterials (QLED's) and organic materials (OLED's) used in optoelectronic devices.</p> <p>Self-study: Properties and functions of Silicon (Si), Germanium (Ge) and Brominated flame retardants in computers.</p>	
5	<u>Unit – V : Sensors, Water treatment and E-waste management</u>	8
	<p>Sensors: Introduction, Construction, working and applications of conductometric sensors, Electrochemical sensors, Optical sensors.</p> <p>Water treatment - Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD.</p> <p>E-Waste: Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. Toxic materials used in manufacturing electronic and electrical products; Recycling and Recovery: Different approaches of recycling (separation, thermal treatments, hydrometallurgical extraction, pyrometallurgical methods, direct recycling). Recycling of Li-Ion batteries. Extraction of gold from E-waste.</p> <p>Self-study: Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminum (Al), and Brominated flame retardants in computers.</p>	

TEACHING AND LEARNING PROCESS	Chalk and talk method, power point presentation, Videos, Animations. Practical topic: Demonstration and Virtual Lab along with Performing experiments
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Dr AMBEDKAR INSTITUTE OF TECHNOLOGY
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Course outcomes: On completion of the course, the student will have the ability to:		POs Mapped	Strength of mapping
CO1	Understand and explain the principles of chemistry involved in water treatment, corrosion, energy sources, polymers, Green chemistry and instrumental methods of analysis.	PO1	3
CO2	Apply the acquired knowledge to solve the Engineering Chemistry problems .	PO1 & PO2	3, 3
CO3	Examine the Engineering Chemistry problems and draw meaningful interpretations .	PO1, PO3 & PO4	3, 3, 2
CO4	Instrument solutions through concepts of Engineering Chemistry in the field of Energy and Environment.	PO1, PO3 & PO7	3, 2, 3
CO5	Engage in self-study and make an effective oral presentation on contribution of Engineering Chemistry to society.	PO1, PO6, PO9 & PO12	3, 1, 3, 3

MAPPING of COs with POs for Applied Chemistry

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	3										
CO3	3		3	2								
CO4	3		2				3					
CO5	3					1			3			3
Strength of correlation: Low-1, Medium- 2, High-3												

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2. S.Nagin Chand & Co.
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NPTEL/SWAYAM/MOOCs

1. <http://nptel.ac.in/>
2. <https://swayam.gov.in/>

Practical Module

Sl. No.	Syllabus content
<u>A – Compulsory Experiments:</u>	
1	Potentiometric estimation of Iron using std. $K_2Cr_2O_7$ (Electrochemical sensor).
2	Determination of pKa of a weak acid using glass electrode (pH sensor)
3	Conductometric estimation of mixture of strong and weak acid (conductometric sensors)
4	Estimation of copper in $CuSO_4$ by colorimetry (optical sensor).
5	Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
6	Estimation of total hardness of water by EDTA method.
7	Determination of COD of an industrial wastewater.
8	Estimation of percentage of copper in brass (analysis of alloy).
<u>B – Demonstration (offline/virtual)</u>	
1	Determination of Iron in the given sample of Haematite ore solution using $K_2Cr_2O_7$ crystals by external indicator method.
2	Synthesis of oxide nanoparticles.
<u>C – Open Ended Experiments:</u>	
1	Design an experiment to Identify the presence of proteins in given sample.
2	Determination of glucose by electrochemical sensors.

References Books:

1. Laboratory manual in Engineering Chemistry Sudharani, Dhanpatrai Publishing Company.
2. Vogel's Text Book of Quantitative Chemical Analysis revised by G.H.Jeffery, J.Bassett, J.Mendham and R.C Denney.

VIRTUAL LAB LINK DETAILS:

- <https://www.labster.com/chemistry-virtual-labs/>
- <https://youtu.be/OwZbw6Mhrqc>
- <https://youtu.be/UOLOsKZxi6Y>

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Civil Engineering
Scheme and Syllabus - CBCS – 2023 -2024

Course Title	ENGINEERING MECHANICS						
Course Code	22CVT103						
Category	(ESC - Engineering Science Courses)						
Scheme & Credits	No. of Hours per week					Total Teaching hours	Credits
	L	T	P	SS	Total		
	4	0	0	0	4	40	03
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 hours		

Course Learning Objective: To develop the ability to analyze the problems involving forces, moments with their applications, Relative motions of the surfaces, Study the stability of the shapes with understanding the concepts of centroid and moment of inertia. Understand and analyse the bodies under the displacement like kinematics and kinetics and their applications.

UNIT – I	8 Hours
Resultant of coplanar force system: Basic dimensions and units, Idealizations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.	
UNIT – II	8 Hours
Equilibrium of coplanar force system: Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples.	
UNIT – III	8 Hours
Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples. Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.	
UNIT – IV	8 Hours
Centroid of Plane areas: Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built up sections, Numerical examples.	

Moment of inertia of plane areas: Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections,, Numerical examples.	
UNIT – V Kinematics: Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion Projectiles: Introduction, numerical examples on projectiles. Kinetics: Introduction, D ‘Alembert’s principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys, Numerical examples.	8 Hours
Teaching & Learning Process: Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.	

Course Outcomes: The students will be able to	
CO1	Understand the concept of Engineering Mechanics, force system and Compute the resultant of various force system, examine the types of loads acting on rigid bodies and compute the induced forces in various member of the structure and trusses.
CO2	Analyse the problems to obtain reactive forces in various member of the structure and the behaviour of bodies in contact with different surfaces.
CO3	Locate and compute the centroid and moment of inertia of various planes and built-up sections.
CO4	Explain the basics of dynamics and analyse the bodies in motion at various condtions.

Text Books:	
1	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2	Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB
3	Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
4	Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
5	Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
6	Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
7	Bhavikatti S S, Engineering Mechanics, 2019, New Age International
8	Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓		✓								✓
CO3	✓	✓		✓								✓
CO4	✓	✓		✓								✓

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Syllabus - CBCS – for AY 2023 -2024

Course Title	ELEMENTS OF ELECTRICAL ENGINEERING						
Course Code	22EET203						
Category	Engineering Science Course (ESC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	3	0	0	0	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

1. Describe the basic laws of electrical engineering and energy billing.
2. Explain the working of basic electrical parameters under sinusoidal excitation.
3. Make use of three phase system of power supply
4. Predict the values of electrical parameters and quantities.
5. Explain electric, wiring schemes and equipment and personal safety measures.

UNIT I	8 hours
DC circuits and Electromagnetism: Ohm's law and Kirchhoff's laws, analysis of series, parallel, and series-parallel circuitsexcited by independent voltage sources. Power and energy. Numericals Faraday's laws, Lenz's law. Fleming's rules & dynamically induced EMF, Statically induced EMF. The concept of self and mutual inductance & coefficient of coupling. Force on the current-carrying conductor. Energy stored in magnetic field. Numericals. Text book 1 & Text book 2	
UNIT II	8 hours
AC Fundamentals and Single-phase AC circuits: Generation of sinusoidal voltage. Frequency of generated voltage. Average and RMS value, form factor, and peak factors of sinusoidal quantities. Phasor representation of alternating quantities. Concept of lead, lag and in phase of two sinusoidal quantities. Voltage, current, and power waveforms with phasor diagram, in R, L, and C circuits. Analysis of R-L, R-C, R-L-C Series and Parallel circuits, Real, reactive and apparent powers, power triangle and power factor. Analysis of Series and Parallel AC circuits. Numericals. Text book 1 & Text book 2	
UNIT III	8 hours
Three-phase AC circuits: Advantages of three-phase systems. Generation of three-phase voltage, phase sequence. Balanced supply and balanced loads. Representation of the balanced star (3 wire and 4 wire system) and delta connections. Relation between phase and line quantities. Power in balanced 3-phase circuits and power tringle. Methods Measurement of three-phase power using wattmeter. Numericals. Text book 1 & Text book 2	
UNIT IV	8 hours
Measuring instruments: Construction and working principle of Wheatstone's bridge, Kelvin's double bridge, Megger. AC bridges- Maxwell's and Desauty's, concepts of current transformer and potential transformer. (Only balance equations and Excluding Vector diagram approach). Applications of CTs and PTs. Numericals. Text book 1 & Reference book 4	
UNIT V	8 hours

Electric Wiring: Types, advantages and disadvantages. Color code and gauges of wires used for lighting and heating (power) circuits. One, two and three point control of load. Service mains- overhead and underground. Fuse, fuse materials and properties.

Miniature circuit breaker (MCB) merits and demerits. Electric Shock, Safety Precautions. Earthing and its types. Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB).

Electricity bill: Power rating of household appliances. Unit of electrical energy, tariff, preparation of electricity bill. Numericals. Text book 1 & Reference book 5

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the basic concepts in electrical engineering.

CO2: Analyze-dc circuits, single-phase ac circuits.

CO3: Apply three-phase system in power generation and utilization

CO4: Determine the values of electrical parameters and quantities.

CO5: Explain the concept of electricity billing, equipment, and personal safety measures.

TEXT BOOKS

1. Basic Electrical Engineering, D. C. Kulshreshtha, McGraw-Hill Education, Revised first edition, 2019

2. Electrical and Electronic Technology, Edward Hughes, Pearson, 12th edition, 2016

3. Lecture Notes (for module 5), Dr. AIT.

REFERENCE BOOKS

1. Basic Electrical Engineering, D.P. Kothari I.J.Nagrath, McGraw-Hill Education, 4th Edition, 2019.

2. Fundamentals of Electrical Engineering and Electronics, B.L. Theraja, S Chand and Company, Reprint Edition 2013.

3. Principles Electrical Engineering and Electronics, V.K Mehata, Rohit Mehta, S Chand and Company, 2nd edition, 2015.

4. Electrical and electronic measurements and instrumentation by A K Sawhney, Dhanapat Rai and Co. edition, January 2015

5. A course in Electrical Installation Estimation and costing. JB Gupta, SK Kataria & Sons, 9th Edition, July 2012

ONLINE RESOURCES

[1. 40](#)

2. https://www.youtube.com/watch?v=IZA_bJiGiJc&list=PL_mruqjnuVd8LP2z0c4yBwKAGEiEW_Si9&index=1

3. https://www.youtube.com/watch?v=3TR_DS_7z2w&list=PLbRMhDVUMngfdEXVcdf_ijk2Eub-UHs_y

SCHEME FOR EXAMINATIONS

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions from each module
- Each full question will have sub-questions (subject to a maximum of four sub-questions)
- The students have to answer five full questions, selecting one full question from each module.

MAPPING of COs with POs and PSOs

[illegible]

I/II Semester

BASIC ELECTRONICS			
Course Code:	22ECT103/203	CIE Marks:	50
Teaching Hours/Week (L:T:P:S):	3:0:0:0	SEE Marks:	50
Total Hours of Pedagogy:	40	Total Marks:	100
Credits:	03	Exam Hours:	03
Course objectives: 1. Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications. 2. Biasing circuits for transistor (BJT) as an amplifier. 3. Study of linear Op-amps and its applications. 4. Logic circuits and their optimization. 5. Principle of basic communication system.			
Module-1			08 Hrs
Semiconductor Diodes: Introduction, PN Junction diode, Characteristics and Parameters- Forward and Reverse Characteristics, Diode Parameters, Diode Approximations-Ideal Diodes and Practical Diodes, Piecewise Linear Characteristics, DC Equivalent Circuits, DC Load Linear analysis-DC load line- Q-Point, Calculating Load Resistance and Supply Voltage (Text 1) Diode Applications: Introduction, Half-Wave Rectification-Positive Half-Wave Rectifier, Negative Halfwave Rectifier, Full-Wave Rectification-Two-Diode Full-Wave Rectifier, Bridge Rectifier. Rectifier circuit with RC and LC Filters. (Text 1) (Simple Numerical Examples excluding Derivations) Zener Diodes: Zener diode Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulators, Regulator Circuit with No Load, Loaded Regulator, Regulator Performance (Text 1) (Simple Numerical Examples excluding Derivations)			
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos		
RBT Level:	L1, L2		
Module-2			08 Hrs
Bipolar Junction Transistors: Introduction, BJT Operation- PNP and NPN Transistors and Operation, Bipolar Devices, BJT Voltages and Currents, Terminal Voltages, Transistor Currents. BJT Amplification-Current Amplification, Voltage Amplification. Common Base, Common-Emitter and Common Collector Characteristics- Circuit, Input and output characteristics, Current Gain Characteristics. (Text 1) Field Effect Transistor: Junction Field Effect Transistor - n-channel and p-channel FET, JFET Characteristics-Depletion regions, Drain Characteristics, Transfer Characteristics, MOSFETs Enhancement and Depletion MOSFETs (Text 1)			
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos		
RBT Level:	L1, L2		
Module-3			08 Hrs
Signal Generators: BJT Phase Shift Oscillator, BJT Colpitts Oscillator, BJT Hartley Oscillator. (Text 1) Operational Amplifiers: Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol. (Text 2) Op-Amp Parameters: Gain, input resistance, Output resistance, CMRR, slew rate, Bandwidth, input offset voltage, input bias Current and Input Offset Current, The Ideal Op-Amp, Equivalent Circuit of Op-Amp, Open Loop Op-Amp configurations- Inverting Amplifiers, Non-Inverting Amplifiers, Differential			

Amplifiers. (Text 2)		
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos	
RBT Level:	L1, L2	
Module-4		08 Hrs
Boolean Algebra and Logic Circuits: Binary Systems – Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms. Other Logic Operations, Digital Logic Gates (Text 3)		
Combinational logic: Introduction, Design procedure, Adder, Subtractor (Text 3)		
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos	
RBT Level:	L1, L2	
Module-5		08 Hrs
Synchronous Sequential Logic: Introduction, Flip-flops (SR, D, JK, T): working and Truth Table, Counters (JK) and Memory Unit Introduction, Registers, Shift registers (SISO), MOD-4 Ripple Counters. (Text 3)		
Communications: Introduction to communication, Block Diagram of Communication System, Modulation-Description, Need for modulation, Amplitude Modulation – Amplitude Modulation theory, Representation of AM, Frequency Modulation - Theory of Frequency and Phase Modulation. (Text 4)		
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos	
RBT Level:	L1, L2	
Course outcomes: At the end of the course the student will be able to: CO1. Summarize the operation, characteristics of diodes, diode application, zener diode Characteristics and its applications. CO2. Explain the operation of BJT and JFET with their characteristics and applications. CO3. Interpret oscillators and operational amplifiers. CO4. Analyze and simplify digital circuits or digital gates. CO5. Illustrate the concepts of various sequential logic circuits and their working principles; explain the different modulation schemes.		
Suggested Learning Resources: Text Books: 1: Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016. 2: Op-amps and Linear Integrated Circuits, Ramakanth A Gayakwad, Pearson Education, 4th Edition. 3: Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008, ISBN-978-81-203-0417-8 4: Electronic Communication Systems, George Kennedy, 4th Edition, TMH Reference Books (if required) 1: Mitchel E. Schultz, ‘Grob’s Basic Electronics’, 11th Edition, McGraw-Hill, 2011. 2: Electronic Instrumentation and Measurements (3rd Edition) – David A. Bell, Oxford University Press, 2013. Web Links: https://onlinecourses.nptel.ac.in/noc21_ee55/preview		
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning		

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2		1	2				1			1	2	
CO2	3	2	3		2	1				1			1	2	
CO3	3	2	3		3				1	1			1	2	
CO4	3	1	1		2	1			1	1		1	1	2	
CO5	3	1	1		2	1			1	1		1	1	2	

High-3, Medium-2, Low-1

Dr. Ambedkar Institute of Technology, Bengaluru-56
Department of Computer Science & Engineering
Scheme and Syllabus - CBCS – 2023 -2024

Course Title	Principles of Programming using C						
Course Code	22CSU103/203						
Category and Type	Engineering Science Course (ES), Integrated						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	00	02	00	04	42	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

1. Elucidate the basic architecture and functionalities of Computers.
2. Apply programming constructs of C language to solve real-world problems.
3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems.
4. Design and Develop Solutions to problems using modular programming constructs such as functions.

UNIT I	8 hours
Art of programming through Algorithms and Flowchart, Designing solutions to various problems. Overview of C: Basic structure of C program, executing a C program. Constant, variable and data types, Operators and expressions	
UNIT II	8 hours
Managing Input and output operations: Reading a character, writing a character, formatted Input, formatted output Decision Making and Branching: if statement, if...else statement, nesting of if...else statements, Else if Ladder, switch statement, Goto statement Decision Making and looping: While statement, do statement, for statement, Jumps in loops	
UNIT III	8 hours
Arrays: Introduction, one-dimensional Arrays, declaration of one-dimensional Arrays, Initialization of one-dimensional Arrays, Two dimensional Arrays, Initialization of two-dimensional Arrays, Multi-dimensional Arrays Character Arrays and strings: Introduction, Declaring and Initializing string variables, Reading string from the terminal, writing strings to screen, comparison of Two strings, string handling functions	
UNIT IV	10 hours
User Defined Functions: Introduction, Need for User defined functions, Multi-function program, Elements of User Defined Functions, Definition of functions, Return values and their types, Function call, function declaration, Category of Functions, Recursion, Passing Arrays to Functions, Passing strings to Functions, the scope, Visibility and lifetime of Variables Pointers: Introduction, Understanding pointers, Accessing the address of variable, Declaring pointer variable, Initialization of pointer variables, Accessing a variable through its pointer, Pointers and Arrays	
UNIT V	8 hours
Structures and Unions: Introduction, definition of structure, declaring structure variables, accessing structure members, structure initialization, Copying and comparing structure variables, Arrays of structures, Arrays within a structures, Arrays within structures, Unions File Management in C: Introduction, Defining and opening a File, Closing a File, Input/output Operations on Files	

Programming Assignments

Practice Programs

1.	To calculate simple interest (SI) for a given principal (P), time (T), and rate of interest (R) ($SI = P \cdot T \cdot R / 100$).
2.	To print the ASCII value of the given input.
3.	To find largest of three numbers.
4.	To perform simple calculator using switch case statement.
5.	To find factorial of a number.
6.	To print even and odd numbers using looping Construct.
7.	To find sum of N natural Numbers
8.	Write a C Program to search for the given key element with the help of Linear search Technique.
9.	Develop a c program to implement selection sort technique.
10.	Develop a C program to swap two numbers using pointers (Call by Reference).

Lab Programs

1	a	Write a C program to find the roots of a quadratic equation.
	b	Write a C program to print the numbers in triangular form 1 1 2 1 2 3 1 2 3 4
2	a	Write a C program to check whether the given four digit number is palindrome or not.
	b	Write a C program using function to sort the given array elements using bubble sort technique.
3	a	Develop a C program to Store age of n students and perform the following operations i. Find minimum age of student in the list ii. Find maximum age of a student in the list
	b	Develop a C Program to compute Sin(x) using Taylor series approximation. Compare your Result With the built- in Library function. Print both the results with appropriate messages.
4	a	If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss and determine how much profit or Loss incurred in percentage.
	b.	Write a C program to implement Recursive functions for Binary to Decimal Conversion.
5	a	Write a C program to generate N Fibonacci series.
	b	Develop a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
6	a	Write a C program to check whether the given number is prime or not.
	b	Write a C program to i. read N Bank Employees name ii. Search for an employee in the list using Binary Search Technique. Note: Use 2-D character array to store Bank employees names

7	a	<p>Develop a C program to calculate tax based on given yearly salary and tax percentages. Read monthly salary of an employee as an input from the user.</p> <p>Conditions to calculate tax, if yearly salary is:</p> <table><tr><td>Income Range</td><td>Tax Charges</td></tr><tr><td>$\leq 1,50,000$</td><td>No tax</td></tr><tr><td>1,50,001 to 3,00,000</td><td>10%</td></tr><tr><td>3,00,001 to 5,00,000</td><td>20%</td></tr><tr><td>5,00,001 and above</td><td>30%</td></tr></table>	Income Range	Tax Charges	$\leq 1,50,000$	No tax	1,50,001 to 3,00,000	10%	3,00,001 to 5,00,000	20%	5,00,001 and above	30%																									
Income Range	Tax Charges																																				
$\leq 1,50,000$	No tax																																				
1,50,001 to 3,00,000	10%																																				
3,00,001 to 5,00,000	20%																																				
5,00,001 and above	30%																																				
	b	Write a menu driven C Program to compute Trace and Norm of a matrix Using Functions.																																			
8		Develop a program to concatenate two strings and determine the length of the concatenated string without using string-built in function.																																			
9		Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each of them needs these commodities in differing amounts and can buy them in two shops S1, S2. Which shop is the best for every person P1, P2, P3 to pay as little as possible? The individual prices and desired quantities of the commodities are given in the following tables:																																			
		<div><p>Demanded quantity of foodstuff:</p><table><tr><td></td><td>roll</td><td>bun</td><td>cake</td><td>bread</td></tr><tr><td>P₁</td><td>6</td><td>5</td><td>3</td><td>1</td></tr><tr><td>P₂</td><td>3</td><td>6</td><td>2</td><td>2</td></tr><tr><td>P₃</td><td>3</td><td>4</td><td>3</td><td>1</td></tr></table></div> <div><p>Prices in shops S₁ and S₂:</p><table><tr><td></td><td>S₁</td><td>S₂</td></tr><tr><td>roll</td><td>1.50</td><td>1.00</td></tr><tr><td>bun</td><td>2.00</td><td>2.50</td></tr><tr><td>cake</td><td>5.00</td><td>4.50</td></tr><tr><td>bread</td><td>16.00</td><td>17.00</td></tr></table></div> <p>MATRIX MULTIPLICATION</p> <p>Write a C program by considering 2 matrices A (M x N) and B (P x Q) that uses functions to perform the following: i. Reading data to p1, p2, p3 (Matrix A) ii. Reading data to s1, s2 (Matrix B) iii. Multiplication of Two Matrices(C=AXB)</p>		roll	bun	cake	bread	P ₁	6	5	3	1	P ₂	3	6	2	2	P ₃	3	4	3	1		S ₁	S ₂	roll	1.50	1.00	bun	2.00	2.50	cake	5.00	4.50	bread	16.00	17.00
	roll	bun	cake	bread																																	
P ₁	6	5	3	1																																	
P ₂	3	6	2	2																																	
P ₃	3	4	3	1																																	
	S ₁	S ₂																																			
roll	1.50	1.00																																			
bun	2.00	2.50																																			
cake	5.00	4.50																																			
bread	16.00	17.00																																			
10		<p>Write a C Program To maintain a record of bank customer's with four fields (Customer ID, Customer Name, Address and ACC-Num). Read and display the bank customer details.</p> <p>Note: Using array of structures.</p>																																			

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

At the end of the course the student will be able to:

CO1: Understand the concept of algorithms and flowchart, **apply** logical skills to design and develop algorithms/flow charts to solve real- world problems.

CO2: Acquire the knowledge of programming constructs of C language and **Apply** the same to solve the real world problems.

CO3: Explore user-defined data structures like arrays in implementing solutions to example problems like searching, sorting etc.

CO4: Explore user-defined data structures like structures, unions and pointers in implementing solutions.

CO5: Design and Develop Solutions to problems using modular programming construct Using functions

TEXT BOOKS

- 1. E. Balaguruswamy, “Programming in ANSI C”, 7th Edition, Tata McGraw-Hill**

REFERENCE BOOKS

1. “Programming in C” by Reema Thereja, , Cengage publication.
2. Brian W. Kernighan and Dennis M. Ritchie, “The ‘C’ Programming Language”, Prentice Hall of India.
3. Yashavanth Kanetkar, Let us C, Authentic Guide to C Programming Language, bpb publisher, 17th Edition, 2020
4. “C- Programming Techniques” by A.M. Padma Reddy, Sri Nandi Publications

ONLINE RESOURCES

<https://nptel.ac.in/courses/106/105/106105171/>

MOOC courses can be adopted for more clarity in understanding the topics and varieties of problem solving methods.

MAPPING of COs with POs

[illegible]

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2023 -2024

Course Title	COMPUTER AIDED ENGINEERING DRAWING						
Course Code	22MED103/203						
Category	Mechanical						
Scheme and Credits	No. of Hours/Week					Total contact hours	Credits
	L	T	P	SS	Total		
	02	00	02*	00	04	52	03
CIE Marks: 50	SEE Marks: 50		Total Max. Marks : 100		Duration of SEE: 03 Hours		
* One additional hour may be considered for laboratory.							

Course Objectives:

1. To understand the basic principles and conventions of engineering drawing
2. To use drawing as a communication mode
3. To generate pictorial views using CAD software
4. To understand the development of surfaces
5. To visualise engineering components

Teaching-Learning (General Instructions):

- Students should be made to aware of powerful communication tool – Drawing.
- Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
- Appropriate Models, Power Point Presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly, for other shapes).
- Use any CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

UNIT I

12 hours

Introduction: Significance of Engineering drawing, Lettering, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Introduction to Scales and its types. (*Not for SEE*)
 Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves. (*Not for SEE*)

Orthographic Projections of Points, Lines and Plane surfaces: Introduction to Orthographic projections, Orthographic projections of points in all the four quadrants. Orthographic projections of lines placed in first quadrant only; Inclined to HP, to VP and to both the planes. Orthographic projections of plane surfaces (triangle, square, rectangle, pentagon, hexagon and circular laminae) placed in first quadrant only; resting on HP and on VP, inclined to HP, to VP and to both HP and VP. <i>Application on projections of Lines & Planes (Not for SEE)</i>	
UNIT II Orthographic Projection of Solids: Orthographic projection of right regular solids (Cube, Tetrahedron, Prism, Cylinder, Cone and Pyramid) Different positions of solid – axis parallel to VP and inclined to HP, axis parallel to HP and inclined to VP, and axis parallel to Profile Plane and inclined to HP or VP. Left profile view to be drawn on RPP only. <i>Projections of Frustum of cone, pyramid & truncated sphere (Not for SEE)</i>	12 hours
UNIT III Isometric Projections: Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids. Frustum of solids not to be given.	10 hours
UNIT IV Development of Lateral Surfaces of Solids: Development of lateral surfaces of frustum and truncated right regular prisms, cylinders, pyramids, and cones resting with base on HP only (Axis perpendicular to HP and parallel to VP). The section plane perpendicular to VP, inclined to HP and passing through only vertical surfaces of the solid to be considered. <i>Problems on applications of development of lateral surfaces like funnels, trays, transition pieces connecting circular duct and rectangular duct (Not for SEE)</i>	10 hours
UNIT V Multidisciplinary Applications & Practice (Not for SEE): Free hand Sketching; True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc. Drawing Simple Mechanisms; Gear trains, Ratchets, two wheeler cart & Four wheeler carts to dimensions etc. Electric Wiring and lighting diagrams; Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software Basic Building Drawing; Like, Architectural floor plan, basic foundation drawing, steel structures-Frames, bridges, trusses using Auto CAD or suitable software, Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings. Graphs & Charts: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.	08 hours

COURSE OUTCOMES: On completion of the course, student should be able to

CO1. Understand and visualize the objects with definite shape and dimensions

CO2. Analyse the shape and size of objects through different views

CO3. Develop the lateral surfaces of the object

CO4. Create a 3D view using CAD software

CO5. Identify the interdisciplinary engineering components or systems through its graphical representation

TEXT BOOKS:

1. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited, 2019.

2. K.R Gopalakrishna & Sudhir Gopalakrishna: Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017.

3. S. N. Lal: Engineering Drawing with an Introduction to Auto CAD: First-angle Projection 1st Edition, Cengage, Publication, 2018.

4. S.N. Lal, & T Madhusudhan: Engineering Visulisation, 1st Edition, Cengage, Publication.

5. Luzadder Warren J., Duff John M., Fundamentals of Engineering Drawing: with an Introduction to Interactive Computer Graphics for Design and Production, Prentice-Hall of India Pvt. Ltd., New Delhi, Eastern Economy Edition, 2005.

REFERENCE BOOKS:

1. Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press, 2015.

2. Dhawan R. K., A Textbook of Engineering Drawing, 3/e, S. Chand Publishing, 2019.

3. Venugopal K., Engineering Drawing and Graphics, New Age International publishers, 2014.

4. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint 2005.

5. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newnes, 1997.

6. K S Sai Ram Design of steel structures, Third Edition by Pearson.

7. Nainan p kurian Design of foundation systems, Narosa publications.

8. A S Pabla, Electrical power distribution, 6th edition, Tata Mcgraw hill.

SCHEME FOR INTERNAL ASSESSMENT (IA)		
	DETAILS	MAX. MARKS
Manual Sketching (25)	Classwork	15
	Assignment	10
Computer Printout (15)	Classwork	15
CIE*		10
TOTAL IA MARKS		50
* Continuous Internal Evaluation (CIE) is based on the average of two tests conducted during the mid-semester and end-semester.		

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2023 -2024

Course Title	ELEMENTS OF MECHANICAL ENGINEERING						
Course Code	22MET203						
Category	Mechanical						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SDA	Total		
	02	02	00	00	2+2	50	03
CIE Marks: 50	SEE Marks: 50		Total Max. Marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

1. Knowledge on importance of sources of energy, steam and its properties, power generating systems.
2. Overview on automobile engine's performance, hybrid and electrical vehicles and refrigeration and air conditioning.
3. To have basic insights on cooling of the products using refrigeration and air conditioning.
4. Understanding of composite materials and fabricating methods with an emphasis on importance of power transmission.
5. Complete idea on principles of basic manufacturing processes and advanced manufacturing process.

MODULE-1	ENERGY AND ENERGY SYSTEMS	10 hours
<p>Sources of energy: Classification, renewable and non- renewable sources of energy and comparison.</p> <p>Steam: Steam formation at a constant pressure: properties of steam, simple numerical problems to understand the use of steam tables.</p> <p>Power generating systems: Introduction, construction and working of: Steam turbines – Impulse and reaction turbine, Gas turbines – Open and closed cycle,</p> <p>Harnessing of renewable energy sources: Wind energy, Geothermal energy, Tidal energy, Ocean thermal energy, Bio-mass and their applications</p> <p>Power absorbing systems: Introduction, classification to pumps and compressors.</p>		
MODULE-2	MACHINE TOOL OPERATIONS	10 hours
<p>Manufacturing process: Introduction and classification of manufacturing process.</p> <p>Machine tools: Lathe - Working principle and specification of center lathe. Sketch and description of operations performed – turning, facing, knurling, thread cutting, drilling, taper turning.</p> <p>Milling machine: Principle of milling, types, working of horizontal and vertical milling machine. Milling process- plane milling, end milling, slot milling and angular milling.</p> <p>Computer numerical controlled machines: Introduction, types and operations performed and application on CNC.</p> <p>Robotics: Introduction, Joints & links, Robot anatomy, classification based on robot's configuration, polar, cylindrical, Cartesian coordinate and spherical, application, advantages and disadvantages.</p>		

MODULE-3 INTERNAL COMBUSTION ENGINES AND REFRIGERATION	10
hours	
<p>Internal combustion engines: Introduction, classification, parts and terminology of I C engines, construction and working principles of 4-stroke petrol & diesel engines, simple numerical problems on four stroke engines.</p> <p>Refrigeration and Air conditioning - Introduction, definition and unit of refrigeration. Refrigerants and their properties. Types of refrigeration systems- Vapour absorption and Vapour compression refrigeration systems and their comparison. Principle & working of room air conditioner.</p>	
MODULE-4 MECHANICAL POWER TRANSMISSION AND JOINING PROCESS	10
hours	
<p>Mechanical Power Transmission: Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, simple and compound gear trains (simple numerical problems)</p> <p>Belt Drives: Introduction, Types of belt drives (Flat and V-Belt Drive), length of the belt and tensions ratio (simple numerical problems)</p> <p>Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding, (types of flames), TIG welding, MIG welding and Fusion welding.</p>	
MODULE-5 FUTURE MOBILITY TECHNOLOGY AND MECHATRONICS	10
hours	
<p>Insight into future mobility technology; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of Electric Vehicles (EVs) and Hybrid vehicles.</p> <p>Mechatronic Systems: open-loop and closed-loop mechatronic systems. Examples, Advantages and Disadvantages, Applications.</p>	

Suggested Learning Resources:

Test Books

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008.
2. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.

Reference Books

1. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.
3. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1.

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Explain fundamentals of steam and non-conventional energy sources.

CO2: Describe different conventional and advanced machining processes.

CO3: Understand IC engines its parameters, propulsive devices, refrigeration and air-conditioning.

CO4: Explain different belt and gear drives, gear trains, joining of materials.

Assessment Details (both CIE and SEE)

Continuous Internal Evaluation (CIE) (Marks)				
Test 1	Test 2	Assignment	Group discussion	Total
20	20	05	05	50

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING OF COs WITH POs												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	2	2	1	1	1	1	3
CO2	3	2	2	1	1	2	2	1	1	1	1	3
CO3	2	1	1	1	2	2	2	1	1	1	1	3
CO4	3	1	2	1	2	2	2	1	1	1	1	3
CO5	3	2	2	1	1	2	2	1	1	1	1	3
Strength of correlation: Strongly related-3, Moderately related-2, Weakly related-1, Not related-0												
Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Civil Engineering
Scheme and Syllabus - CBCS – 2023 -2024

Course Title	INTRODUCTION TO CIVIL ENGINEERING						
Course Code	22EST104A / 22EST204A						
Category	Engineering Science Courses - I (ESC - I)						
Scheme & Credits	No. of Hours per week					Total Teaching hours	Credits
	L	T	P	SS	Total		
	4	0	0	0	4		
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 03 hours		

Course Learning Objective: To learn the scope of various field of Civil Engineering, the concepts of sustainable infrastructure. Understand the concepts of force systems to analyze the problems involving with their applications. Study the stability of the shapes with understanding the concepts of centroid and moment of inertia.

UNIT – I Civil Engineering Disciplines and Building Science Introduction to Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management. Basic Materials of Construction: Bricks, Cement & mortars, Plain, Reinforced & Pre-stressed Concrete, Structural steel, Construction Chemicals. Structural elements of a building: Foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase.	8 Hours
UNIT – II Societal and Global Impact of Infrastructure Infrastructure: Introduction to sustainable development goals, Smart city concept, clean city concept, Safe city concept Environment: Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control Built-environment: Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.	8 Hours
UNIT – III Analysis of force systems: Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution	8 Hours

and composition of forces, Law of Parallelogram of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, free body diagram, equations of Equilibrium, Equilibrium of Concurrent and Non Concurrent force systems. Numerical examples.	
UNIT – IV	8 Hours
Support Reactions: Types of Beams, Loads and Supports, Numerical Examples. Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, Numerical examples.	
UNIT – V	8 Hours
Centroid: Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections, Numerical examples. Moment of inertia: Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-up Sections.	

Teaching & Learning Process:

Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.

Course Outcomes: The students will be able to	
CO1	Understand the various fields of Civil Engineering, infrastructure requirement for sustainable development.
CO2	Examine the types of force system and compute their resultant at various conditions.
CO3	Analyse the problems to obtain support reactions, the behaviour of bodies in contact with different surfaces.
CO4	Locate the centroid of plane and built-up sections and Compute the moment of inertia of plane and built-up sections.

Text Books:	
1	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2	Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB
3	Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
4	Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
5	Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.

6	Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
7	Bhavikatti S S, Engineering Mechanics, 2019, New Age International
8	Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication.

Question paper pattern:
<ul style="list-style-type: none"> • The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of three sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓	✓					✓
CO2	✓	✓		✓								✓
CO3	✓	✓		✓								✓
CO4	✓	✓		✓								✓

Teaching & Learning Process:

Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.

Course Outcomes: The students will be able to	
CO1	Understand the concept of Engineering Mechanics, force system and Compute the resultant of various force system, examine the types of loads acting on rigid bodies and compute the induced forces in various member of the structure and trusses.
CO2	Analyse the problems to obtain reactive forces in various member of the structure and the behaviour of bodies in contact with different surfaces.
CO3	Locate and compute the centroid and moment of inertia of various planes and built-up sections.
CO4	Explain the basics of dynamics and analyse the bodies in motion at various condtions.

Text Books:	
1	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2	Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB
3	Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
4	Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.

5	Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
6	Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
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Question paper pattern:												
<ul style="list-style-type: none"> • The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of three sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit. 												
CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓		✓								✓
CO3	✓	✓		✓								✓
CO4	✓	✓		✓								✓

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Syllabus - CBCS – for AY 2023 -2024

Course Title	INTRODUCTION TO ELECTRICAL ENGINEERING						
Course Code	22EST104B						
Category	Engineering Science Core (ESC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

1. Understand the basic laws of electrical engineering and energy billing.
2. Explain the working of basic electrical parameters under sinusoidal excitation.
3. Analyze the series and parallel electrical circuits for voltage, current, power, and energy.
4. Describe the construction and working principles of electrical machines.
5. Explain electric power generation, transmission and distribution, wiring schemes and equipment and personal safety measures.

UNIT I	8 hours
DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel, and series-parallel circuitsexcited by independent voltage sources. Power and energy, (Simple Numerical). Electromagnetism: Faraday's laws, Lenz's law. Fleming's rules & dynamically induced e.m.f. Statically induced e.m.f.s., the concept of self and mutual inductance & coefficient of coupling, force on the current-carrying conductor. (Simple Numerical). Text book 1 & Reference books	
UNIT II	8 hours
AC Fundamentals: Generation of sinusoidal voltage, average and RMS value, form factor, and peak factor. (Numerical). Single-phase circuits: Voltage, current, and power waveforms with phasor diagram, in R, L, and C circuits. Analysis of R-L, R-C, R-L-C Series and Parallel circuits, Real, reactive and apparent powers, power triangle, and Power factor. (Numerical). Text book 1,2 & Reference books	
UNIT III	8 hours
Three Phase AC Circuits: Advantages of three-phase systems, generation of three-phase power, representation of the balanced star (3 wire and 4 wire system) and delta connected loads, phase and line relations of voltages and currents (Numerical). Transformers: Necessity of transformer, the principle of operation, Types, and construction of single-phase transformers, EMF equation, losses, efficiency. (Numerical). Text book 1 & Reference books	
UNIT IV	8 hours
DC Machines: Generator-Principle of operation, constructional details, induced EMF, types of generators, Motor- Principle of operation, back EMF, torque equations, types of motors, characteristics (shunt and series only) and applications. (Simple Numerical) Three-phase induction Motors: Concept of rotating magnetic field, the principle of operation, constructional features of motor, types – squirrel cage and wound rotor and their applications., slip, the significance of slip, and problems on slip calculations. (Numerical). Text book 1,2 & Reference books	

UNIT V**8 hours**

Power transmission and distribution- Concept of electric power transmission and distribution. Low voltage distribution system (400 V and 230 V) for domestic, commercial, and small scale industry through block diagram/single line diagrams.

Safety measures and Electricity bill: Fuse and Miniature circuit breaker (MCB), merits and demerits. Electric Shock, Safety Precautions, Earthing and its types. Power rating of household appliances. Electrical energy unit, two- part electricity tariff, calculation of electricity bill.

Text book 1,2 & Reference books

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, video

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the basic concepts of electrical engineering.

CO2: Analyze-dc circuits, single-phase and three-phase ac circuits.

CO3: Explain the construction and operation principle of electrical machines.

CO4: Solve basic problems on electrical machines.

CO5: Explain the concept of electric power transmission, distribution, electricity billing, equipment and personal safety measures.

TEXT BOOKS

1. Basic Electrical Engineering, D. C. Kulshreshtha, McGraw-Hill Education, Revised first edition, 2019
2. Electrical and Electronic Technology, Edward Hughes, Pearson, 12th edition, 2016
3. Lecture Notes (for module 5), Dr. AIT.

REFERENCE BOOKS

1. Basic Electrical Engineering, D.P. Kothari I.J.Nagrath, McGraw-Hill Education, 4th Edition, 2019.
2. Fundamentals of Electrical Engineering and Electronics, B.L. Theraja, S Chand and Company, Reprint Edition 2013.
3. Principles Electrical Engineering and Electronics, V.K Mehata, Rohit Mehta, S Chand and Company, 2nd edition, 2015.

ONLINE RESOURCES

1. <http://www.nptel.ac.in>

2. https://www.youtube.com/watch?v=IZA_bJiGiJc&list=PL_mruqjnuVd8LP2z0c4yBwKAGEiEW_Si9&index=1

3. https://www.youtube.com/watch?v=3TR_DS_7z2w&list=PLbRMhDVUMngfdEXVcdf_ijj2Eub-UHs_y

SCHEME FOR EXAMINATIONS

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions from each module
- Each full question will have sub-questions (subject to a maximum of four sub-questions)
- The students have to answer five full questions, selecting one full question from each module.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3										1	3		1
CO 2	3	3										1	3		1
CO 3	3	3										1	3		1
CO 4	3	3										1	2		1
CO 5	3	3				2	1					1	3		1

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electronics and Communication Engineering
Syllabus - CBCS – for AY 2023 -2024

INTRODUCTION TO ELECTRONICS ENGINEERING			
Course Code:	22EST104C/204C	CIE Marks:	50
Teaching Hours/Week (L:T:P:S):	3:0:0:0	SEE Marks:	50
Total Hours of Pedagogy:	40	Total Marks:	100
Credits:	03	Exam Hours:	03
Course objectives: 1.To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering. 2. To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems. 3. Professionalism & Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed for a successful professional career.			
Module-1			08 hrs
Power Supplies –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Voltage multipliers. (Numerical on Rectifiers & Regulators) Amplifiers – Bipolar Junction Transistor-Current components and Voltages, Amplifying action, BJT as a switch: Cut-off and saturation modes. (Text 1)			
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos		
RBT Level:	L1, L2		
Module-2			08 hrs
Operational amplifiers - Ideal op-amp; characteristics of ideal and practical op-amp; Practical op- amp circuits: Inverting and non-inverting amplifiers, voltage follower, summer, Subtractor, integrator, differentiator. (Text 1) Numerical Oscillators – Barkhausen criterion, Ladder network oscillator, Wein bridge oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations) Numerical			
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos		
RBT Level:	L1, L2		
Module-3			08 hrs
Binary Systems: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements (1's, 2's, 9's and 10's complements). Boolean Algebra and Logic Circuits: Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Digital Logic Gates (Text 2) Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder (Text 2)			
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos		
RBT Level:	L1, L2		
Module-4			08 hrs

Embedded Systems: Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC (Text 3)		
Sensors and Interfacing: Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (Text 3)		
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos	
RBT Level:	L1, L2	
Module-5		08 hrs
Analog Communication Schemes: Modern communication system scheme, Information source and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Types of communication systems. Types of modulation (only concepts) – AM, FM, PM. Concept of Radio wave propagation (Ground, space, sky).		
Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK, Multiple access techniques: TDMA, FDMA, CDMA. (Text 4)		
Teaching Learning Method:	Chalk and Talk, power point presentation, animations, videos	
RBT Level:	L1, L2	
Course outcomes: At the end of the course the student will be able to: CO1. Understand the diode based and transistor-based circuits like Power supplies and Amplifiers. CO2. Analyse and design transistor-based Oscillators and Operational amplifiers. CO3. Apply the digital electronics knowledge to build arithmetic blocks for digital systems. CO4. Understand the basics of microprocessor, microcontroller, RISC, CISC and Sensors based circuits. CO5. Explain the operation and applications of modern communication systems.		
Suggested Learning Resources: Text Books: 1: Mike Tooley, ‘Electronic Circuits, Fundamentals & Applications’, 4th Edition, Elsevier, 2015. DOI https://doi.org/10.4324/9781315737980 . 2: Digital Logic and Computer Design, M. Morris Mano, 2 nd Edition, PHI Learning, 2008. ISBN-978-81-203-0417-84. 3: K V Shibu, ‘Introduction to Embedded Systems’, 2nd Edition, McGraw Hill Education (India) Private Limited, 2016. 4: S L Kakani and Priyanka Punglia, ‘Communication Systems’, New Age International Publisher, 2017. https://elib4u.ipublishcentral.com/pdfreader/communication-systems Reference Books: 1: Mitchel E. Schultz, ‘Grob’s Basic Electronics’, 11th Edition, McGraw-Hill, 2011. Web Links: https://onlinecourses.nptel.ac.in/noc21_ee55/preview		
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning		

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		1			1	1	1		3	1	2	
CO2	3	2	2		1			1	1	1		3	1	2	
CO3	3	2	2		1			1	1	1		3	1	2	
CO4	3		1		1			1	1	1		3	1	2	
CO5	3		1		1			1	1	1		3	1	2	

High-3, Medium-2, Low-1

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2023 -2024

Course Title	INTRODUCTION TO MECHANICAL ENGINEERING						
Course Code	22EST104D						
Category	Mechanical						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SDA	Total		
	3	0	0	0	3		
CIE Marks: 50	SEE Marks: 50	Total Max. Marks=50			Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

1. To develop basic Knowledge on Mechanical Engineering, Fundamentals and Energy Sources.
2. Understand the concept of different types of Machine tool operations and Modern Manufacturing Processes like CNC, 3D printing.
3. To know the concept of IC engines and Future Mobility vehicles.
4. To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications
5. To acquire a basic understanding role of Mechanical Engineering in the Robotics and Automation in industry.

MODULE-1 ROLE OF MECHANICAL ENGINEERING IN INDUSTRIES AND ENERGY
8 hours

Introduction: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion.

MODULE-2 MACHINE TOOL OPERATIONS **8 hours**

Machine Tool Operations: Working Principle of lathe, Lathe operations: Turning, facing, knurling. Working principles of Drilling Machine, drilling operations: drilling, boring, reaming. Working of Milling Machine, Milling operations: plane milling and slot milling.

Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing.

MODULE-3 INTERNAL COMBUSTION ENGINES AND FUTURE MOBILITY	8
hours	
Introduction to IC Engines: Components and Working Principles, 4-Strokes Petrol and Diesel Engines, Application of IC Engines.	
Insight into Future Mobility; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles.	
MODULE-4 ENGINEERING MATERIALS AND JOINING PROCESS	8 hours
Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer. Introduction to composites, PMC, MMC, CMC. Shape Memory Alloys.	
Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.	
MODULE-5 MECHATRONICS, ROBOTICS AND IOT	8 hours
Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages. Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages.	
Introduction to IOT: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.	

Suggested Learning Resources:

Test Books

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008.
2. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012.

Reference Books:

1. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.
3. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017.
4. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING OF COs WITH POs												
COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	1	1	1	1	2	2	1	1	1	1	3
CO2	3	2	2	1	1	2	2	1	1	1	1	3
CO3	2	1	1	1	2	2	2	1	1	1	1	3
CO4	3	1	2	1	2	2	2	1	1	1	1	3
CO5	3	2	2	1	1	2	2	1	1	1	1	3
Strength of correlation: Strongly related-3, Moderately related-2, Weakly related-1, Not related-0												
Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped												

Dr. Ambedkar Institute of Technology, Bengaluru-56
Department of Computer Science & Engineering
Scheme and Syllabus - CBCS – 2023 -2024

Course Title	Introduction to C programming						
Course Code	22ESU104E/204E						
Category and Type	PLC and Integrated						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	00	02	00	04	42	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

1. Elucidate the basic architecture and functionalities of Computers.
2. Apply programming constructs of C language to solve real-world problems.
3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems.
4. Design and Develop Solutions to problems using modular programming constructs such as functions.

UNIT I	8 hours
Introduction to C: Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing Programs, variables, constants, Input/output statements in C, Operators in C.	
UNIT II	8 hours
Decision control and Looping statements: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.	
UNIT III	8 hours
Arrays and Strings: Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Two dimensional arrays, operations on two-dimensional arrays, Applications of arrays case study with sorting techniques. Introduction to strings: Reading strings, writing strings, summary of functions used to read and write characters, operations on strings	
UNIT IV	10 hours
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, Introduction to Recursive functions	
UNIT V	8 hours
Pointers: Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables Structures, Unions: Introduction to structures, Unions Storage classes: auto, extern, static, register.	

Programming Assignments	
Practice Programs	
1.	To calculate simple interest (SI) for a given principal (P), time (T), and rate of interest (R) ($SI = P \cdot T \cdot R / 100$).
2.	To print the ASCII value of the given input.
3.	To find the largest of three numbers.
4.	To perform a simple calculator using switch case statements.
5.	To find the factorial of a number.
6.	To print even and odd numbers using looping Construct.
7.	To find sum of N natural Numbers
8.	Write a C Program to search for the given key element with the help of Linear search Technique.
9.	Develop a c program to implement selection sort technique.
10.	Develop a C program to swap two numbers using pointers (Call by Reference).

Lab Programs		
1	a	Write a C program to find the roots of a quadratic equation.
	b	Write a C program to print the numbers in triangular form 1 1 2 1 2 3 1 2 3 4
2	a	Write a C program to check whether the given four digit number is palindrome or not.
	b	Write a C program using function to sort the given array elements using bubble sort technique.
3	a	Develop a C program to Store age of n students and perform the following operations i. Find minimum age of student in the list ii. Find maximum age of a student in the list
	b	Develop a C Program to compute Sin(x) using Taylor series approximation. Compare your Result With the built- in Library function. Print both the results with appropriate messages.
4	a	If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss and determine how much profit or Loss incurred in percentage.
	b.	Write a C program to implement Recursive functions for Binary to Decimal Conversion.
5	a	Write a C program to generate N Fibonacci series.
	b	Develop a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
6	a	Write a C program to check whether the given number is prime or not.
	b	Write a C program to i. read N Bank Employees name ii. Search for an employee in the list using Binary Search Technique. Note: Use 2-D character array to store Bank employees

		names																																			
7	a	<p>Develop a C program to calculate tax based on a given yearly salary and tax percentages. Read the monthly salary of an employee as input from the user.</p> <p>Conditions to calculate tax, if yearly salary is:</p> <table><tr><th>Income Range</th><th>Tax Charges</th></tr><tr><td><=1,50,000</td><td>No tax</td></tr><tr><td>1,50,001 to 3,00,000</td><td>10%</td></tr><tr><td>3,00,001 to 5,00,000</td><td>20%</td></tr><tr><td>5,00,001 and above</td><td>30%</td></tr></table>	Income Range	Tax Charges	<=1,50,000	No tax	1,50,001 to 3,00,000	10%	3,00,001 to 5,00,000	20%	5,00,001 and above	30%																									
Income Range	Tax Charges																																				
<=1,50,000	No tax																																				
1,50,001 to 3,00,000	10%																																				
3,00,001 to 5,00,000	20%																																				
5,00,001 and above	30%																																				
	b	Write a menu driven C Program to compute Trace and Norm of a matrix Using Functions.																																			
8		Develop a program to concatenate two strings and determine the length of the concatenated string without using string-built in function.																																			
9		<p>Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each of them needs these commodities in differing amounts and can buy them in two shops S1, S2. Which shop is the best for every person P1, P2, P3 to pay as little as possible? The individual prices and desired quantities of the commodities are given in the following tables:</p> <table><caption>Demanded quantity of foodstuff:</caption><tr><th></th><th>roll</th><th>bun</th><th>cake</th><th>bread</th></tr><tr><td>P₁</td><td>6</td><td>5</td><td>3</td><td>1</td></tr><tr><td>P₂</td><td>3</td><td>6</td><td>2</td><td>2</td></tr><tr><td>P₃</td><td>3</td><td>4</td><td>3</td><td>1</td></tr></table> <table><caption>Prices in shops S₁ and S₂:</caption><tr><th></th><th>S₁</th><th>S₂</th></tr><tr><td>roll</td><td>1.50</td><td>1.00</td></tr><tr><td>bun</td><td>2.00</td><td>2.50</td></tr><tr><td>cake</td><td>5.00</td><td>4.50</td></tr><tr><td>bread</td><td>16.00</td><td>17.00</td></tr></table> <p>MATRIX MULTIPLICATION</p> <p>Write a C program by considering 2 matrices A (M x N) and B (P x Q) that uses functions to perform the following: i. Reading data to p1, p2, p3 (Matrix A) ii. Reading data to s1, s2 (Matrix B) iii. Multiplication of Two Matrices(C=AXB)</p>		roll	bun	cake	bread	P ₁	6	5	3	1	P ₂	3	6	2	2	P ₃	3	4	3	1		S ₁	S ₂	roll	1.50	1.00	bun	2.00	2.50	cake	5.00	4.50	bread	16.00	17.00
	roll	bun	cake	bread																																	
P ₁	6	5	3	1																																	
P ₂	3	6	2	2																																	
P ₃	3	4	3	1																																	
	S ₁	S ₂																																			
roll	1.50	1.00																																			
bun	2.00	2.50																																			
cake	5.00	4.50																																			
bread	16.00	17.00																																			
10		<p>Write a C Program To maintain a record of bank customers with four fields (Customer ID, Customer Name, Address and ACC-Num). Read and display the bank customer details.</p> <p>Note: Using array of structures.</p>																																			

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

At the end of the course the student will be able to:

CO1: Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.

CO2: Acquire the knowledge of programming constructs of C language and **Apply** the same to solve the real world problems.

CO3: Explore user-defined data structures like arrays in implementing solutions to example problems like searching, sorting etc.

CO4: Explore user-defined data structures like structures, unions and pointers in implementing solutions.

CO5: Design and Develop Solutions to problems using modular programming construct Using functions

TEXT BOOKS

Reema Thareja, Computer fundamentals and programming in c, Oxford University, Second edition, 2017

REFERENCE BOOKS

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill
2. Brian W. Kernighan and Dennis M. Ritchie, “The ‘C’ Programming Language”, Prentice Hall of India.
3. Yashavanth Kanetkar, Let us C, Authentic Guide to C Programming Language, bpb publisher, 17th Edition, 2020
4. “C- Programming Techniques” by A.M. Padma Reddy, Sri Nandi Publications

ONLINE RESOURCES

<https://nptel.ac.in/courses/106/105/106105171/>

MOOC courses can be adopted for more clarity in understanding the topics and varieties of problem solving methods.

MAPPING of COs with POs

[illegible]

Dr. Ambedkar Institute of Technology, Bengaluru-56

Department of Computer Science & Engineering

Scheme and Syllabus - CBCS – 2022 -2023

Course Title	Introduction to Cyber Security						
Course Code	22ETT1051						
Category and Type	ETC-Theory						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	42	03
CIE Marks: 50	SEE Marks: 50	Total Max. marks=100			Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

1. To familiarize cybercrime terminologies and perspectives
2. To understand Cyber Offenses and Botnets
3. To gain knowledge on tools and methods used in cybercrimes
4. To understand phishing and computer forensics

UNIT I

9 hours

Introduction to Cybercrime:

Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws, Global Perspectives

UNIT II

8 hours

Cyber Offenses:

How Criminals Plan Them: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercaafe & cybercrimes. Botnets: The fuel for cybercrime, Attack Vector.

UNIT III

8 hours

Tools and Methods used in Cybercrime: Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and Spyways, Virus and Worms, Trozen Horses and Backdoors, Steganography, DoS and DDOS Attacks, Attacks on Wireless networks.

UNIT IV

8 hours

Phishing and Identity Theft: Introduction, methods of phishing, phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft.

UNIT V

9 hours

Understanding Computer Forensics: Introdcuton, Historical Background of Cyberforensics, Digital Foresics Science, Need for Computer Foresics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics.

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Explain the cybercrime terminologies

CO2: Describe cyber offenses and botnets

CO3: Illustrate tools and methods used on Cybercrime

CO4: Explain Phishing and Identity Theft

CO5: Justify the need of Computer Forensics

TEXT BOOKS

1. Sunit Belapure and Nina Godbole, “Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives”, Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)

MAPPING of COs with POs

[illegible]

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electronics and Communication Engineering
Syllabus - CBCS – for AY 2023 -2024

I/II Semester

Introduction to Internet of Things (IOT)			
Course Code:	22ETT1052/22ETT2052	CIE Marks:	50
Teaching Hours/Week (L:T:P:S):	3: 0: 0: 0	SEE Marks:	50
Total Hours of Pedagogy:	40	Total Marks:	100
Credits:	03	Exam Hours:	03
Course objectives: 1. Understand the fundamentals of IoT and its building blocks along with their characteristics. 2. Gain knowledge of various sensors and actuators for IoT applications. 3. Understand the IoT protocols for processing and communication. 4. Gain insights about current trends of associated IoT technologies and IoT Analytics. 5. Insight into the recent application domains of IoT in everyday life.			
Module-1			08 hrs
Basics of Networking: Introduction, Network Types, Layered network models, Addressing. Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components, Addressing Strategies in IoT. Textbook 1: Chapter 1- 1.1 to 1.4 Chapter 4 – 4.1 to 4.5.			
Teaching Learning Method:	Chalk and Talk, PowerPoint Presentation		
RBT Level:	L1, L2		
Module-2			08 hrs
IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, SensingTypes, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. Textbook 1: Chapters 5–5.1 to 5.9.			
Teaching Learning Method:	Chalk and Talk, PowerPoint Presentation		
RBT Level:	L1, L2, L3		
Module-3			08 hrs
IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. IoT Connectivity technologies: IEEE 802.15.4, ZigBee, RFID, NFC, LoRa, Wi-Fi, Bluetooth. Textbook 1: Chapter 6–6.1 to 6.5, Chapter 7–7.2,7.3,7.7, 7.8, 7.13, 7.15,7.16			
Teaching Learning Method:	Chalk and Talk, PowerPoint Presentation		
RBT Level:	L1, L2		
Module-4			08 hrs
Associated IoT Technologies: Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service. Textbook 1: Chapter 10–0.1 to 10.6.			
Teaching Learning Method:	Chalk and Talk, PowerPoint Presentation		
RBT Level:	L1, L2		
Module -5			08 hrs
IOT Case Studies and Future Trends: Vehicular IoT and IoT Analytics – Introduction. Agricultural IoT and Healthcare IoT – Introduction and Case studies. Textbook 1: Chapter 12-12.1-12.2, 13– 13.1, 14- 14.1-14.2, 17- 17.1.			
Teaching Learning Method:	Chalk and Talk, Power Point Presentation		
RBT Level:	L1, L2, L3		
Course outcomes:			

At the end of the course, the student will be able to:

CO1. Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.

CO2. Classify various sensing devices and actuator types.

CO3. Illustrate the architecture of IoT applications and communication

CO4. Explain associated IoT Technologies.

CO5. Demonstrate the processing in IoT.

Suggested Learning Resources:

Text Books:

1: Sudip Misra, Anandarup Mukherjee, Arijit Roy, “Introduction to IoT”, Cambridge University Press 2021.

Reference Book:

1: S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things.and Industry 4.0.CRC Press.

2: Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”,1st Edition, VPT, 2014.

3: Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.

Online Resources: <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Activity 1: Group activity for a group of 4 or 5 students -5 marks

Activity 2: Two assignments are evaluated for 5 marks: Assignment1 – From Unit 1 and 2, Assignment2 from units 3,4 and 5

CO-PO Mapping

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02	PS03
C01	3	3											1	2	
C02	3	2	2	2									1	2	
C03	3	2	2										1	2	
C04	3	2	2	2									1	2	
C05	3	2	2	2		2	1	1	2	3			1	2	

High-3, Medium-2, Low-1

Dr. Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Syllabus - CBCS – for AY 2023 -2024

Course Title	RENEWABLE ENERGY SOURCES						
Course Code	22ETT1053						
Category	Emerging Technology Courses-I (ETC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

1. To get exposure on solar radiation and its environmental impact to power.
2. To know about the types of solar collectors, their configurations and their applications.
3. To learn about the wind energy and its economic aspects.
4. To know biomass and biogas energy production, types of biomass gasifiers and its benefits.
5. To discuss tidal and ocean thermal energy resources, conversion and power generation.

UNIT I	8 hours
Introduction: Causes of Energy Scarcity, Solution to Energy Scarcity, Factors Affecting Energy Resource Development, Energy Resources and Classification, Renewable Energy – Worldwide Renewable Energy Availability, Renewable Energy in India. <i>Text Book 1,2,3 and Reference Book 1</i>	
UNIT II	8 hours
Solar Energy: Sun- earth Geometric Relationship, Layer of the Sun, Earth – Sun Angles and their Relationships, Solar Energy Reaching the Earth's Surface, Solar Thermal Energy Applications. <i>Text Book 1,2,3 and Reference Book 1</i>	
UNIT III	8 hours
Solar Thermal Energy Collectors: Types of Solar Collectors, and applications. Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Wind Turbine- Site Selection. <i>Text Book 1,2,3 and Reference Book 1</i>	
UNIT IV	8 hours
Biomass Energy: Biomass Production, Energy Plantation, Biomass Gasification, Theory of Gasification, Gasifier and Their Classifications, Chemistry of Reaction Process in Gasification. Biogas Energy: Introduction, Biogas and its Composition, Anaerobic Digestion, Biogas Production, Benefits of Biogas. Biogas Plant-KVIC and Janatha models. <i>Text Book 1,2,3 and Reference Book 1</i>	
UNIT V	8 hours
Tidal Energy: Introduction, Tidal Energy Resource, Tidal Energy Availability, Tidal Power Generation in India, Energy Availability in Tides, Tidal Power Basin, Turbines for Tidal Power, Advantages and Disadvantages of Tidal Power. Ocean Thermal Energy: Introduction, Principles of Ocean Thermal Energy Conversion (OTEC), Ocean Thermal Energy Conversion plants, Closed Cycle, Open Cycle, Advantages, Disadvantages and Benefits of	

OTEC.

Text Book 1,2,3 and Reference Book 1

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Discuss the causes of energy scarcity and its solution, energy resources and availability of renewable energy.

CO2: Analyze the implication of renewable energy.

CO3: Summarize the economic aspects in Renewable Energy.

CO4: Discuss various generation schemes of Renewable energy.

CO5: Identify various applications of various Renewable Energy.

TEXT BOOKS

1. G D Rai, “Non- Conventional Energy Sources”, Fourth Edition, Khanna Publisher, 1997
2. B H Khan, “Non-Conventional Energy Sources”, Second edition, TMH,
3. S P Sukhatme, “Solar Energy for Thermal applications”, Second edition, TMH, 2009

REFERENCE BOOKS

1. S S Thipse, “Non- Conventional and Renewable energy Sources”, Fourth edition, Narosa publishers, 2014

ONLINE RESOURCES

www.mnre.org
www.renewableenergyworld.com
www.powergridindia.com
www.saurenergy.com
<https://nptel.ac.in>

SCHEME FOR EXAMINATIONS

- i. The question paper will have ten full questions carrying equal marks.
- ii. Each full question will be for 20 marks.
- iii. There will be two full questions from each module
- iv. Each full question will have sub-questions (subject to a maximum of four sub-questions)
- v. The students have to answer five full questions, selecting one full question from each module.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3					2	2						2	2	2
CO 2	3					2	2						2	2	2
CO 3	3					2	2						2	2	2
CO 4	3					2	2						2	2	2
CO 5	3					2	2						2	2	2

Strength of correlation: Low-1, Medium- 2, High-3

Course Title	BASICS OF WASTE MANAGEMENT						
Course Code	22ETT1054 / 22ETT2054						
Category	Emerging Technology Courses – I (ETC-I)						
Scheme & Credits	No. of Hours per week					Total Teaching hours	Credits
	L	T	P	SS	Total		
	3	0	0	0	3	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 03 hours		

Course Learning Objective: To understand the various aspects of solid waste management practiced in industries, Methods of collection, transport and storage, Methods of treatments such as volume reduction, densification, Method of by product recovery.

UNIT – I	8 Hours
INTRODUCTION TO SOLID WASTE MANAGEMENT: Classification of solid wastes (source and type based), solid waste management (SWM), elements of SWM, ESSWM (environmentally sound solid waste management) and EST (environmentally sound technologies), factors affecting SWM, Indian scenario, progress in MSW (municipal solid waste) management in India.	
UNIT – II	8 Hours
WASTE GENERATION ASPECTS: Waste stream assessment (WSA), waste generation and composition, waste characteristics (physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city, handouts on solid waste compositions.	
UNIT – III	8 Hours
COLLECTION, STORAGE AND TRANSPORT OF WASTES: Waste Collection, Storage and Transport: Collection components, storage-containers/collection vehicles, collection operation, transfer station, waste collection system design, record keeping, control, inventory and monitoring, implementing collection and transfer system.	
UNIT – IV	8 Hours
WASTE PROCESSING TECHNIQUES & SOURCE REDUCTION, PRODUCT RECOVERY & RECYCLING: Purpose of processing, mechanical volume and size reduction, component separation, drying and dewatering. Source Reduction, Product Recovery and Recycling: basics, purpose, implementation monitoring and evaluation of source reduction, significance of recycling, planning of a recycling programme, recycling programme elements, commonly recycled materials and processes, a case study.	
UNIT – V	8 Hours
WASTE DISPOSAL: Key issues in waste disposal, disposal options and selection criteria, sanitary landfill, landfill gas emission, leachate formation, environmental effects of landfill, landfill operation issues. Leachate and landfill gas management –landfill closure and post closure care. Types and methods of composting.	

Teaching & Learning Process: Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.
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Course Outcomes: The students will be able to
CO1 Apply the basics of solid waste management towards sustainable development.

CO2	Apply technologies to process and dispose the waste.
CO3	Design working models to convert waste to energy.
CO4	Identify, classify and manage the hazardous waste.

Text Books:

1	Tchobanoglous, G., Theisen, H., and Samuel A Vigil, Integrated Solid Waste Management, McGraw-Hill Publishers, 1993.
2	Bilitewski B., Hard He G., Marek K., Weissbach A., and Boeddicker H., Waste Management, Springer, 1994.
3	White, F. R., Franke P. R., & Hindle M., Integrated solid waste management: a life cycle inventory. McDougall, P. John Wiley & Sons. 2001
4	Nicholas, P., & Cheremisinoff, P. D., Handbook of solid waste management and waste minimization technologies, Imprint of Elsevier Science. 2005

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓	✓					
CO2						✓		✓				
CO3					✓		✓					
CO4					✓		✓		✓			

Course Title	GREEN BUILDINGS						
Course Code	22ETT1055 / 22ETT2055						
Category	Emerging Technology Courses – I (ETC – I)						
Scheme & Credits	No. of Hours per week					Total Teaching hours	Credits
	L	T	P	SS	Total		
	3	0	0	0	3	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 03 hours		

Course Learning Objective: Understand the Concept and Objectives of cost effective techniques of construction and green building. Understand the Problems due to Global Warming.

UNIT – I	8 Hours
Introduction to the concept of cost effective construction: Uses of different types of materials and their availability- Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials-Recycling of building materials-Brick- Concrete-Steel-Plastics – Environmental issues related to quarrying of building materials.	
UNIT – II	8 Hours
Environment friendly and cost effective Building Technologies: Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies - Costford - Nirmithi Kendra – Habitat.	
UNIT – III	8 Hours
Global Warming and Green buildings: Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings. – Embodied Energy in Materials Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.	
UNIT – IV	8 Hours
Utility of Solar Energy in Buildings: Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Green Composites for Buildings: Concepts of Green Composites. Water Utilization in Buildings, Low Energy Approaches to Water, Management. Management of Solid Wastes, Sullage Water and Sewage.	
UNIT – V	8 Hours
Green Building rating Systems: BREEAM – LEED - GREEN STAR - GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age. Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Lifecycle design of Materials and Structures (Concepts only)	

Teaching & Learning Process:

Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.

Course Outcomes: The students will be able to

CO1	Select different building materials for construction.
CO2	Apply effective environmental friendly building technology.
CO3	Analyse global warming due to different materials in construction.
CO4	Analyse buildings for green rating, to use alternate source of energy and the effective use water.

Text Books:

1	HarharaIyer G, Green Building Fundamentals, Notion Press.
2	Dr. Adv. HarshulSavla, Green Building: Principles & Practices.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓							✓
CO2	✓				✓		✓	✓			✓	✓
CO3	✓				✓		✓	✓	✓		✓	✓
CO4	✓				✓		✓	✓	✓		✓	✓

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2022 -2023

Course Title	SMART MATERIALS AND SYSTEMS						
Course Code	22ETT1056/2056						
Category	Mechanical						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	3	0	0	00	3	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. Marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

1. To Acquire Knowledge of smart materials and devices used in smart systems
2. To know Degree of smartness of various materials
3. To Acquire knowledge of commonly used piezoelectric, piezopolymer and piezo ceramic smart materials
4. To Acquire knowledge of Shape memory materials, Electro/Magneto Rheological materials

MODULE-1 INTRODUCTION	8 hours
Overview of Engineering Materials- Definition, Classification of Smart Materials. Degree of Smartness, passive and active smartness. Application of Actuators and Sensors, smart systems.	
MODULE-2 PIEZOELECTRIC MATERIALS	8 hours
Piezoelectric effect, Piezoelectric materials; Piezoceramic, Piezopolymer, Application of Piezoelectric materials.	
SMART STRUCTURES - Types of smart Structures, potential feasibility of smart structures, key elements of smart structures, applications of smart structures.	
MODULE-3 SENSORS AND ACTUATORS	8 hours
Piezoelectric materials as sensors and actuators, Principles of electromagnetic, acoustics, chemical and mechanical sensing and actuation, Types of sensors and their applications.	
MODULE-4 SHAPE MEMORY MATERIALS	8 hours
Shape memory alloys (SMAs), Shape memory effect, super elasticity, Phase Transformation. Martensitic transformation, Shape memory based Actuators, SME testing of SMA wires, vibration control through SMA, Testing of super elasticity, Applications of SMAs.	
MODULE-5 ELECTRO/MAGNETO RHEOLOGICAL MATERIALS and MEMs	8 hours

Electro/Magneto Rheological materials, mechanisms and properties, Fluid Composition and behavior, applications in clutches, brakes, dampers.
MEMS: Mechanical properties of MEMS materials, scaling of mechanical systems, fundamentals of theory, the intrinsic characteristics of MEMS, miniaturization.

COURSE OUTCOMES: On completion of the course, student should be able to;

CO1: Express and Define Materials used in Sensors and Actuators considering degree of smartness.

CO2: Define commonly used smart materials.

CO3: Analyse and demonstrate piezoelectric effect in Piezoelectric, Piezopolymer and Piezoceramic smart materials.

CO4: Analyse the effect and Phase Transformation in shape memory materials

CO5: Define the mechanism and properties of Electro/Magneto Rheological materials

Suggested Learning Resources:

Test Books:

1 “Smart Materials and Structures”, M.V. Gandhi, B. S. Thompson, Smart Materials and Structures, Chapman & Hall, 1992.

2 Introduction to Shape Memory Alloys P. K. Kumar and D. C. Lagoudas

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE) (Marks)				
Test 1	Test 2	Assignment	Group discussion	Total
20	20	05	05	50

Semester End Examination (SEE):

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - 2023 -2024

Course Title	Nanotechnology						
Course Code	22ETT1057/2057						
Category	Emerging Technology Course (ETC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

Course objectives To provide a comprehensive overview of synthesis and characterization of nanoparticles, nanocomposites and hierarchical materials with nanoscale features.

- To provide the engineering students with necessary background for understanding various nanomaterials characterization techniques
- To develop an understanding of the basis of the choice of material for device applications
- To give an insight into complete systems where nanotechnology can be used to improve our everyday life .

UNIT I	8 Hours
Introduction to Nanomaterials: Nanotechnology, Frontier of future-an overview, Length Scales, Variation of physical properties from bulk to thin films to nanomaterials, Confinement of electron in 0D, 1D, 2D and 3D systems, Surface to Volume Ratio, Synthesis of Nanomaterials: Bottom-Up approach: Chemical Routes for Synthesis of nanomaterials-Sol-gel method , Solution Combustion synthesis. Top-Down approach: Ball milling technique, Laser Ablation, Properties: Mechanical, optical, Magnetic and optical properties of Nanomaterials.	
UNIT II	8 hours
Characterization of Nanomaterials: X-ray diffraction, Bragg's equation (derivation), X-ray diffractometer, derivation of Debye-Scherrer equation, numerical on Debye Scherrer equation. Microscopic Techniques: Scanning Electron Microscope , Transmission Electron Microscope, Scanning Tunneling microscope, Atomic Force Microscope, Comparison of SEM and TEM, AFM and STM. Spectroscopic Techniques: Optical Spectroscopy- Instrumentation and application of IR, UV/VIS (Band gap measurement).	
UNIT III	8 hours
Carbon Based Materials Introduction, Synthesis, Properties (electrical, Electronic and Mechanical), and Applications of Graphene, SWCNT, MWCNT, Fullerenes and other Carbon Materials: Carbon nanocomposites, nanodiamonds.	
UNIT IV	8 hours
Nanotechnology in Energy storage and conversion: Solar cells: First generation, Second generation and third generation solar cells: Construction and working of Dye sensitized and Quantum dot sensitized solar cells. Batteries: Nanotechnology in Lithium ion battery-working, Requirements of anodic and cathodic materials, classification based on ion storage mechanisms, limitations of graphite anodes, Advances in Cathodic materials, Anodic materials, Separators Fuel Cells: Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and proton exchange membranes Self study for lifelong learning: Super capacitors: Introduction, construction and working of supercapacitor.	

UNIT V**8 hours****Applications of Nanotechnology:**

Nanotech Applications and Recent Breakthroughs: Introduction, Significant Impact of Nanotechnology and Nanomaterial, Medicine and Healthcare Applications, Biological and Biochemical Applications (Nano biotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), Chemical Applications (Nano chemistry), Optical Applications (Nano photonics), Agriculture and Food Applications, Recent Major Breakthroughs in Nanotechnology.

TEACHING and LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1: Demonstrate the types, synthesis and properties of nanoparticles.

CO2: Explain working of basic instruments used in characterization of nanoparticles.

CO3: Understand the properties of carbon based nanomaterials CNT

CO4: Discuss the importance of Nanotechnology in Energy storage and conversion and applications of nanomaterials in Engineering field.

Text Books :

1. Nano Materials – A.K. Bandyopadhyay/ New Age Publishers
2. Nanocrystals: Synthesis, Properties and Applications – C.N.R. Rao, P. John Thomas and G. U. Kulkarni, Springer Series in Materials Science
3. Nano Essentials- T. Pradeep/TMH
4. Peter J. F. Harris, Carbon nanotube science: synthesis, properties, and applications. Cambridge University Press, 2011
5. M.A. Shah, K.A. Shah, “Nanotechnology: The Science of Small”, Wiley India, ISBN 13: 9788126538683

Reference Books:

1. Introduction to Nanotechnology, C. P. Poole and F. J. Owens, Wiley, 2003
2. Understanding Nanotechnology, Scientific American 2002
3. Nanotechnology, M. Ratner and D. Ratner, Prentice Hall 2003
4. Nanotechnology, M. Wildon, K. Kannagara, G. Smith, M. Simmons and B. Raguse, CRC Press Boca Raton 2002
5. Recent reviews on Li-ion batteries, solar cells and fuel cells

Web links and Video Lectures (e-Resources):

1. <https://nptel.ac.in/courses/118104008>
2. <https://www.digimat.in/nptel/courses/video/118104008/L16.html>
3. <https://archive.nptel.ac.in/courses/113/106/113106099/>
4. <https://nptel.ac.in/courses/112107283>
5. https://onlinecourses.nptel.ac.in/noc22_me131/preview Practical Based learning (Any 5 experiments x 2 hours = 10 practical hours)
6. Preparation of silver nanoparticles and characterization of particle size by optical spectroscopy

7. Preparation of ZnO nanoparticles by combustion technique
8. Preparation of Al₂O₃ nanoparticles by precipitation method
9. Preparation of Silica nanoparticles by sol-gel method
10. Preparation of metal oxide nanoparticles by hydrothermal method
11. Determination of thermal conductivity of nanofluids using a thermal analyser
12. Preparation of thin films by SILAR method
13. Determination of Band gap of given material using Tauc plot COs and POs Mapping
(Individual teacher has to fill up)

SCHEME FOR EXAMINATIONS

There shall be 10 questions

1) Two full questions to be set from each unit with internal choice

- Minimum number of sub questions : 2
- Maximum number of sub questions : 3

2) Each full question shall be for a maximum of 20 marks

3) Answer any Five full questions choosing at least One full question from each unit

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-

Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

Course Title	INTRODUCTION TO SUSTAINABLE ENGINEERING						
Course Code	22ETT1058 / 22ETT2058						
Category	Emerging Technology Courses – I (ETC-I)						
Scheme & Credits	No. of Hours per week					Total Teaching hours	Credits
	L	T	P	SS	Total		
	3	0	0	0	3	40	03
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 hours		

Course Learning Objective: To understand the concept of sustainability engineering, Principles and frame work with Life Cycle Assessment tool, Integration of sustainability with design.

UNIT – I Sustainable Development and Role of Engineers: Introduction, Why and What is Sustainable Development, The SDFs, Paris Agreement and Role of Engineering, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering Sustainable Engineering Concepts: Key concepts – Factor 4 and Factor 10: Goals of sustainability, System Thinking, Life Cycle Thinking and Circular Economy.	8 Hours
UNIT – II Sustainable Engineering and Concepts, Principles and Frame Work: Green Economy and Low Carbon Economy, Eco Efficiency, Triple bottom Line, Guiding principles of sustainable engineering, Frameworks for sustainable Engineering. Tools for sustainability Assessment: Environmental Management System, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental.	8 Hours
UNIT – III Fundamentals of Life Cycle Assessment: Why and What is LCA, LCA Goal and Scope, Life cycle inventory, Life Cycle Impact Assessment, Interpretation and presentation of Results, Iterative Nature of LCA, Methodological Choices, LCI Databases and LCA Softwares, Strength and Limitations of LCA.	8 Hours
UNIT – IV Environmental Life Cycle Costing, Social Life Cycle Assessment, and Life Cycle Sustainability Assessment: Introduction, Environmental Life Cycle Costing, Social Life Cycle Assessment, Life Cycle Sustainability, LCA Applications in Engineering: Environmental Product Declarations and Product Category Rules, Carbon and Water Foot Printing, Energy systems, Buildings and the Built Environment, Chemical and Chemical Production Food and Agriculture. Introduction to Environmental Economics: Introduction – What Is Environmental Economics?, Valuing the Environment, Market-based Incentives (or Economic Instruments) for Sustainability, Command-and-Control versus Economic Instruments, A Simple Model of Pollution Control.	8 Hours
UNIT – V Integrating Sustainability in Engineering Design: Problems Solving in Engineering, conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on sustainable Engineering Design Process – Sustainable Process, Production and product design in Engineering.	8 Hours

Teaching & Learning Process:

Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.

Course Outcomes: The students will be able to

CO1	Elucidate the basics of sustainable development and its role in engineering
CO2	Application of Sustainable Engineering Concepts and Principles.
CO3	Apply the Principle, and methodology of Life Cycle Assessment Tools.
CO4	Understand the integration methods of sustainability in Engineering Design.

Text Books:

1	Introduction to Sustainability for Engineers, Toolseeram Ramjeawon, CRC Press, 1 st Edn., 2020
2	Sustainability Engineering: Concepts, Design and Case studies, Prentice Hall, 1 st Edn, 2015
3	System Analysis for sustainable Engineering: Theory and applications, Ni bin Chang, McGraw Hill Publications, 1 st Edn., 2010
4	Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, 1 st Edn., 2021
5	Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHI Learning Pvt. Ltd., 2 nd Edn, 2016

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓	✓	✓	✓			
CO2							✓	✓				
CO3							✓	✓	✓			
CO4							✓					

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electronics and Communication Engineering
Syllabus - CBCS – for AY 2023 -2024

INTRODUCTION TO EMBEDDED SYSTEMS			
Course Code:	22ETT1059/22ETT2059	CIE Marks:	50
Teaching Hours/Week (L:T:P:S):	3:0:0:0	SEE Marks:	50
Total Hours of Pedagogy:	39	Total Marks:	100
Credits:	03	Exam Hours:	03
Course objectives: <ol style="list-style-type: none"> 1. Understand the basic concepts of Embedded Systems. 2. Identify a typical Embedded System building blocks and describe role of embedded firmware. 3. Familiarize the characteristics and quality attributes of Embedded Systems. 4. Introduction of Embedded System Software and Hardware development. 5. Exposure to trends of embedded industry. 			
Module-1			07 hrs
Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems v/s General Computing Systems, History, Classification, Major Application areas, Purpose of Embedded Systems. Application specific embedded system: Washing machine, Domain specific: Embedded system in the automotive domain, Wearable devices: The Innovative bonding of lifestyle with embedded technologies. TEXT 1			
Teaching Learning Method:	Chalk & white board, PowerPoint presentation		
RBT Level:	L1, L2		
Module-2			10 hrs
Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators – Light Emitting Diode (LED), 7-Segment LED Display, Keyboard, Communication Interface – Inter Integrated Circuit (I2C) Bus, Serial Peripheral Interface (SPI) Bus, Universal Serial Bus (USB), Infrared (IrDA), Bluetooth (BT), Wi-Fi, Embedded Firmware, Other System Components, PCB and Passive Components. TEXT 1			
Teaching Learning Method:	Chalk & white board, PowerPoint presentation		
RBT Level:	L1, L2		
Module-3			07 hrs
Characteristics and Quality Attributes of Embedded Systems: Characteristics and Quality attributes of Embedded Systems. Hardware Software Co-Design and Program Modelling: Hardware Software Co-Design concept, Typical Embedded product design and development approach, Computational Models in Embedded Design. Electronic Design Automation (EDA) Tools. TEXT 1			
Teaching Learning Method:	Chalk & white board, PowerPoint presentation		
RBT Level:	L1, L2		
Module-4			07 hrs
Embedded Firmware Design and Development: Embedded Firmware Design Approaches, Embedded Firmware Development Languages, Integration of Hardware and Firmware, The embedded system development environment, The Integrated Development Environment (IDE). TEXT 1			
Teaching Learning Method:	Chalk & white board, PowerPoint presentation		
RBT Level:	L1, L2		

[illegible]

Dr. Ambedkar Institute of Technology, Bengaluru-56

Department of Computer Science & Engineering

Scheme and Syllabus-NEP – 2022 -2023

Course Title	Introduction to Web Programming						
Course Code	22PLU105A/205A						
Category	Integrated						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	00	02	00	03	42	03
CIE Marks: 50	SEE Marks: 50		Total Max. Marks:100		Duration of SEE:03 Hours		

Course Objectives:

1. Understand the Markup Languages for the web pages.
2. Describes how HTML elements are to be displayed
3. Design an interactive and dynamic web pages.

Unit-1(9 Hours)
Traditional HTML and XHTML: First Look at HTML and XHTML, Hello HTML and XHTML World, HTML and XHTML: Version History, HTML and XHTML DTDs: The Specifications Up Close, (X) HTML Document Structure, Browsers and (X) HTML, The Rules of (X) HTML, Major Themes of (X)HTML, The Future of Markup—Two Paths? TextBook1: Chapter 1
Unit-2(8 Hours)
HTML5: Hello HTML5, Loose Syntax Returns, XHTML5, and HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined, HTML5 Document Structure Changes, Adding Semantics, HTML5's Open Media Effort, Client-Side Graphics with <canvas>, HTML5 Form Changes, Emerging Elements and Attributes to Support Web Applications. TextBook1: Chapter 2
Unit-3(8 Hours)
Cascading Style Sheets (CSS) Introduction, CSS Overview , CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Opacity Values for Color, HSL and HSLA Values for Color, Font Properties, line-height Property, Text Properties, Border Properties, Element Box, padding Property, margin Property , Case Study: Description of a Small City's Core Area. TextBook2:- Chapter 3
Unit-4(8 Hours)
Tables and CSS, Links and Images Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudo Class Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values, an Element, Relative URLs, Navigation Within a Web

Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG, img Element, Responsive Images, Positioning Images, Shortcut Icon, iframe Element .

TextBook2: 5.2 to 5.8, 6.2, 6.3, 6.6., 6.7, 6.9, 6.10, 6.12, 7.2 to 7.4

Unit-5(9 Hours)

Introduction to JavaScript: Functions, DOM, Forms, and Event Handlers:

History of JavaScript, Hello World Web Page, Buttons, Functions, Variables, Identifiers, Assignment Statements and Objects, Document Object Model, Forms and How They're Processed: Client-Side Versus Server-Side, form Element, Controls, Text Control, Accessing a Form's Control Values, reset and focus Methods.

TextBook2: 8.2 to 8.13, 8.15, 8.16

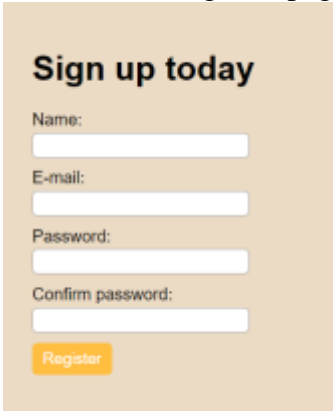

Course Outcomes

At the end of the course the student will be able to:

CO1.	Design, understand and analyze Markup Language for web pages.
CO2.	Demonstrate the use of CSS to Enhance the appearance of a webpage.
CO3.	Design, understand and analyze interactive, dynamic web pages.

Programming Assignments:

1.	Create an XHTML page using tags to accomplish the following: (i) A paragraph containing text “All that glitters is not gold”. Bold face and italicize this text (ii) Create equation: $x = 1/3(y_1^2 + z_1^2)$ (iii) Put a background image to a page and demonstrate all attributes of background image (iv) Create unordered list of 5 fruits and ordered list of 3 flowers													
2.	Create following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary <table><tr><td rowspan="9">Department</td><td rowspan="3">Sem1</td><td>SubjectA</td></tr><tr><td>SubjectB</td></tr><tr><td>SubjectC</td></tr><tr><td rowspan="3">Sem2</td><td>SubjectE</td></tr><tr><td>SubjectF</td></tr><tr><td>SubjectG</td></tr><tr><td rowspan="3">Sem3</td><td>SubjectH</td></tr><tr><td>SubjectI</td></tr><tr><td>SubjectJ</td></tr></table>	Department	Sem1	SubjectA	SubjectB	SubjectC	Sem2	SubjectE	SubjectF	SubjectG	Sem3	SubjectH	SubjectI	SubjectJ
Department	Sem1			SubjectA										
				SubjectB										
			SubjectC											
	Sem2		SubjectE											
			SubjectF											
			SubjectG											
	Sem3		SubjectH											
			SubjectI											
		SubjectJ												
3.	Use HTML5 for performing following tasks: (i) Draw a square using HTML5 SVG , fill the square with green color and make 6px brown stroke width (ii) Write the following mathematical expression by using HTML5 MathML. $d = x^2 - y^2$ (iii) Redirecting current page to another page after 5 seconds using HTML5 meta tag													
4.	Demonstrate the following HTML5 Semantic tags- <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <section> for a webpage that gives information about travel experience.													
5.	Create a class called income, and make it a background color of #0ff. Create a class called expenses, and make it a background color of #f0f.													

	<p>Create a class called profit, and make it a background color of #f00.</p> <p>Throughout the document, any text that mentions income, expenses, or profit, attach the appropriate class to that piece of text. Further create following line of text in the same document:</p> <p>The current price is 50₹ and new price is 40₹</p>
6.	<p>Change the tag li to have the following properties:</p> <ul style="list-style-type: none"> • A display status of inline • A medium, double-lined, black border • No list style type <p>Add the following properties to the style for li:</p> <ul style="list-style-type: none"> • Margin of 5px • Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left <p>Also demonstrate list style type with user defined image logos</p>
7.	<p>Create following web page using HTML and CSS with tabular layout</p> 
8.	<p>Create following calculator interface with HTML and CSS</p> 
9.	<p>Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay</p>
10.	<p>Create a webpage containing 3 overlapping images using HTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed.</p>

Text Books	
1.	HTML & CSS: The Complete Reference , Thomas A. Powell, , Fifth Edition, Tata McGraw Hill
2.	WEB PROGRAMMING with HTML5, CSS and JavaScript , John Dean, Jones & Bartlett Learning, First Edition

Web links and Video Lectures (e-Resources):
https://onlinecourses.swayam2.ac.in/aic20_sp11/preview

https://onlinecourses.swayam2.ac.in/aic20_sp11/preview

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2	3	2							-	-
CO 2	3	2	3	2							-	-
CO 3	3	2	3	2							-	-
Strength of correlation: Low-1,Medium-2, High-3												

**Dr. Ambedkar Institute of Technology,
Bengaluru-56**

Department of Computer Science & Engineering 2023-24

Course Title	INTRODUCTION TO PYTHON PROGRAMMING						
Course Code	22PLU105B/205B						
Category	Programming Language Courses – 1 (PLC-1)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	02	42	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES

Describe the core syntax and semantics of Python programming language.

1. Discover the need for working with the strings and functions.
2. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
3. Indicate the use of built-in functions to navigate the file system.
4. Infer the Object-oriented Programming concepts in Python.

UNIT-1 (08 hrs)
<p>Introduction: What Is a Program? Programming Languages, Software Development, History of Python Programming Language, Features of Python, Execution of a Python Program, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the <i>type ()</i> Function and Is Operator</p> <p>Control Flow Statements: The <i>if</i>, <i>if...else</i>, <i>if...elif...else</i>, Nested <i>if</i> Statement, while Loop, the <i>for</i> Loop, the <i>continue</i> and <i>break</i> Statements</p> <p>Textbook 1: Chapters 1,2,3</p>
UNIT-2 (08 hrs)
<p>Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters</p> <p>Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods</p> <p>Textbook 1: Chapters 4,5</p>
UNIT-3 (08 hrs)
<p>List: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, Populating Lists with Items, Traversing of Lists, The del Statement</p> <p>Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement,</p> <p>Textbook 1: Chapter 6, 7</p>
UNIT-4 (08 hrs)

Tuples and Sets: Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Tuple Methods, using zip () Function, Sets, Set Methods, Traversing of Sets

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data,
Textbook 1: Chapter 8,9

UNIT-5 (08 hrs)

Exception Handling: Catching Exceptions Using try and except Statement, Syntax Errors, Exceptions, Exception Handling Using try...except...finally

Object-Oriented Programming: Features of OOPS, Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, inheritance, polymorphism.

Textbook 2: Chapter 13,14

Programming Exercises:

- 1
 - a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
 - b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not
- 2
 - a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
 - b. Develop a function to calculate factorial of a number.
- 3 Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
- 4 Develop python program to demonstrate the linear search applied on the array where if the element is present or not with suitable message.
- 5 Develop a python program that has dictionary of names of students and list of list of marks in three subjects. Create another dictionary from this dictionary that has names of the students and their total marks. Display the topper based on his or her score.
- 6
 - a) Develop a program to count the numbers of characters in the given string and store them in a dictionary data structure
 - b) Develop a program to use split and join methods in the given string and trace a birthday with a dictionary data structure
- 7 Develop a python program to identify number of vowels, consonants, special characters and digits in a given file.
- 8 Develop a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
- 9 Develop a function named DivExp which takes TWO parameters a, b and returns a value c ($c=a/b$). Write suitable assertion for $a>0$ in function DivExp and raise an exception for when $b=0$. Develop a suitable program which reads two values from the console and calls a function DivExp.
- 10 Develop python program to simulate banking operation using class and objects

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to,

C05: Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.

1. Gowrishankar S, Veena A, “**Introduction to Python Programming**”, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
2. R Nageswara Rao “**Core Python Programming**”, 2nd Edition, Dream Tech Publishers., 2017

1. Wesley J Chun, “**Core Python Applications Programming**”, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
2. Allen B. Downey, “**Think Python: How to Think Like a Computer Scientist**”, 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <http://greenteapress.com/thinkpython2/thinkpython2.pdf>)

1. <https://www.learnbyexample.org/python-lambda-function/>
2. <https://www.youtube.com/watch?v=daefaLgNkw0>
3. <https://www.youtube.com/watch?v=W8KRzm-HUcc>
4. <https://www.learnpython.org/>
5. <https://pythontutor.com/visualize.html#mode=edit>
6. https://github.com/sushantkhara/Data-Structures-And-Algorithms-with-Python/raw/main/Python%20%20_%20400%20exercises%20and%20solutions%20for%20beginners.pdf

[illegible]

Dr. Ambedkar Institute of Technology, Bengaluru-56
Department of Computer Science & Engineering Scheme and Syllabus

Course Title	Basics of Java Programming						
Course Code	22PLU105C/205C						
Category	Integrated						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	00	02	00	01	42	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- Learn fundamental features of object oriented language and JAVA
- Set up Java JDK environment to create, debug and run simple Java programs.
- Study the concepts of creation of Threads ,Inheritance concepts and to learn GUI Based programs Using Applets.
- Study the concepts of importing of packages and exception handling mechanism.

UNIT I	08 hours
An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings.	
UNIT II	08 hours
Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements. Applet: Introduction to Applet, Applet Life Cycle, Graphics in Applet, Displaying Image in Applet, Painting in Applet.	
UNIT III	08 hours
Introducing Classes and Methods: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables,Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize() Method, A Stack Class.A Closer Look at Methods and Classes: Overloading Methods, Using Objects as	

Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final.

UNIT IV

10 hours

Multi-Threaded Programming: MultiThreaded Programming: What are threads? How to make the classes threadable , Extending threads, Implementing runnable, Synchronization, Changing state of the thread, producer consumer problems.

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions

UNIT V

08 hours

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces.

Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.

Program Exercises:

1. Write a JAVA program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.
2. Write a JAVA program for multiplication of two arrays
3. Demonstrate the following operations and sign extension with Java programs:
(i) << (ii) >> (iii) >>>
4. Write a JAVA program for passing parameters to Applet.
5. Create a JAVA class called Student with the following details as variables within it. USN NAME BRANCH PHONE PERCENTAGE Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings.
6. Write a JAVA program demonstrating Method overloading and Constructor overloading.
7. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a JAVA

program to read and display at least 3 staff objects of all three categories.

8. Write a JAVA program to create MultipleThreads and perform following task using above functions:

i)isAlive () ii) join() iii) setPriority iv) getpriority v) setName().

9. Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C . In package P2, create class D inherited from class A in package P1 and class E. Demonstrate working of access modifiers (private, public, protected, default) in all these classes using JAVA.

10. Write a JAVA program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate working of ArrayIndexOutOfBoundsException.

TEACHING LEARNING PROCESS:

Chalk and Talk, power point presentation, animations, videos, Hands on problem solving.

COURSE OUTCOMES:

At the end of the course the student will be able to:

CO1: Design Classes and establish relationship among Classes for various applications from problem definition.

CO2: Analyze and implement reliable object-oriented applications using Java features.

CO3: Demonstrate Java concepts to implement window based program and GUI Programms.

CO4: Write Java programs to implement Multithreads and handle Exceptions in Program.

TEXT BOOKS:

1. The Complete Reference - Java, Herbert Schildt 9th Edition, 2016, TMH Publications, ISBN :978-93-392-1209-4.

REFERENCE BOOKS:

1. Cay S.Horstmann :Core Java volume I-Fundamental ,11th Edition, Pearson Education, 2019.

SELF STUDY REFERENCES/WEBLINKS:

1. https://www.youtube.com/watch?v=mQj34vUhpts&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=44&t=0s
2. https://www.youtube.com/watch?v=FY3g4gGPhio&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=44

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

1. Answer ANY ONE from Question No. 1 and 2
2. Answer ANY ONE from Question No. 3 and 4
3. Answer ANY ONE from Question No. 5 and 6
4. Answer ANY ONE from Question No. 7 and 8
5. Answer ANY ONE from Question No. 9 and 10

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2							
CO2	3	3	2	1	2							
CO3	3	3	2	2	2							
CO4	3	3	2	2	2							
Strength of correlation: Low-1, Medium- 2, High-3												

Faculty Incharge:

1. Dr.SMITHA SHEKAR B
2. Prof.PUSHPAVENI H P

Dr.Ambedkar Institute of Technology, Bengaluru-560056
Department of Computer Science &Engineering
Scheme and Syllabus-CBCS 2023 -2024

Course Title:	Introduction to C++ Programming		
Course Code:	22PLU105D/22PLU 205D	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:0:2	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives <ul style="list-style-type: none"> ● Understanding about object oriented programming and Gain knowledge about the capability to store information together in an object. ● Understand the capability of a class to rely upon another class and functions. ● Understand about constructors which are special type of functions. ● Create and process data in files using file I/O functions ● Use the generic programming features of C++ including Exception handling 			
Teaching-Learning Process These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective <ol style="list-style-type: none"> 1. Chalk and talk 2. Online demonstration 3. Hands on problem solving 			
Module-1 (8 hours)			
Introduction to Object Oriented Programming: Computer programming background- Need for C++, Concepts of Object-oriented Programming, Classes and Objects, Methods and Messages, Abstraction and Encapsulation, Inheritance, Abstract Classes, Polymorphism. C++ overview: Identifiers and Constants, Keywords, Data Types, Pointers, Reference Variables. Functions in C++: Function prototyping – Call by reference – Return by reference – Inline functions -Default arguments – Function overloading.			
Module-2 (8 hours)			
Classes and Objects: Class Specification, Defining member functions, Static members, Friend functions, Passing objects as arguments, Returning objects, Arrays of objects, Constructors, Destructors. Operator overloading: Rules, Defining operator overloading, Overloading unary operators, Overloading binary operators and Overloading binary << and >> using friend functions.			
Module-3 (8 hours)			
Inheritance: Defining derived class, single inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual base classes.			
Module-4 (8 hours)			
Virtual functions: Virtual functions, Need for virtual function, Calling a Virtual function through a base class reference. I/O Streams: C++ Class Hierarchy- File Stream-Text File Handling- Binary File Handling during file operations.			
Module-5 (8 hours)			
Exception Handling: Introduction to Exception – Basics of Exception handling, Exception handling mechanism – Try, Throw and Catch, Re-throwing an Exception, Specifying Exception.			

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

- C01:** Understand and design the solution to a problem using object oriented programming concepts.
- C02:** Illustrate the concept of constructors, destructors and operator overloading.
- C03:** Achieve code reusability and extensibility by means of Inheritance and Polymorphism
- C04:** Implement the features of C++ including exceptions and file handling for providing programming solutions to complex problems.

Programming Assignments:

1. Write a C++ program to sort the elements in ascending and descending order.
2. Write a C++ program to find the sum of all the natural numbers from 1 to n.
3. Write a C++ program to swap 2 values by writing a function that uses call by reference technique.
4. Write a C++ program to demonstrate function overloading for the following prototypes.
 - i) `add(int a, int b)`
 - ii) `add(double a, double b)`
5. Design and implement a class STUDENT with attributes like: roll number, name, three test marks. Implement member functions
 - i) to read student data like name and test marks,
 - ii) to compute average marks (considering best two out of three test marks)
 - iii) to display the student information.Declare an array of STUDENT objects in the main function.
6. Write a program to find mean of two numbers belonging to two different classes using friend function.
7. Create a class called DATE. Accept two valid dates in the form dd/mm/yyyy. Implement the following by overloading - and << operators.
 - i) `no_of_days = d1 - d2`; where d1 and d2 are DATE objects, `d1 >= d2`
8. Create a class named Shape with a function that prints "This is a shape". Create another class named Polygon inheriting the Shape class with the same function that prints "Polygon is a shape". Create two other classes named Rectangle and Triangle having the same function which prints "Rectangle is a polygon" and "Triangle is a polygon" respectively. Again, make another class named Square having the same function which prints "Square is a rectangle". Now, try calling the function by the object of each of these classes.
9. Write a C++ program to create a text file, check file created or not, if created it will write some text into the file and then read the text from the file.
10. Write a function which throws a division by zero exception and catch it in catch block.
Write a C++ program to demonstrate usage of try, catch and throw to handle exception.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

Textbooks

1. Bhushan Trivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012.
2. Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt.Ltd , Fourth Edition 2010.
3. Herbert Schildt, "*The Complete Reference C++*, 5th Edition", Tata McGraw Hill, 2013.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):**Two Unit Tests each of 20 Marks (duration 01 hour)**

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration.

Two assignments each of 10 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. . The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the COs and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 60 marks and will be scaled down to 30 marks CIE for the practical component of the Integrated Course

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and **scaled down to 15 marks**.
- The laboratory test (**duration 02/03 hours**) at the end of the 14th /15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and **scaled down to 05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **20 marks**.

Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.

The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 30 marks. There will be 2 questions from each module. Each of the two questions under a

module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

Lab SEE will be conducted based on the Lab assignments with both internal and external examiners as per prevailing practice. The exam will be conducted for 50 marks and minimum passing is 20 marks. The marks obtained will be proportionally reduced to 20 marks (max) and will be summed with theory SEE to get the total SEE marks.

Passing in the subject: The student will pass the subject only if he obtained minimum passing marks both in theory SEE and Lab SEE. If a student fails in either theory/lab he has to clear the corresponding component only. Grading will be assigned by combining the performance in Lab and theory.

Web links and Video Lectures (e-Resources):

Web-links and Video Lectures (e-Resources):

1. Basics of C++ - <https://www.youtube.com/watch?v=BCIS40yzssA>

2. Functions of C++ - <https://www.youtube.com/watch?v=p8ehAjZWjPw>

Tutorial Link:

1. https://www.w3schools.com/cpp/cpp_intro.asp

2. <https://www.edx.org/course/introduction-to-c-3>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Assign small tasks to Develop and demonstrate using C++

COs and POs Mapping (Individual teacher has to fill up)

Course Outcomes	POs											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	3	2		-	-	-	-	-	-	-
CO2	3	3	2	2		-	-	-	-	-	-	-
CO3	2	3	2	2		-	-	-	-	-	-	-
CO4	2	2	3	2								

Level 3- Highly Mapped,

Level 2-Moderately Mapped,

Level 1-Low Mapped,

Level 0- Not Mapped

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2023 -2024

Course Title	COMMUNICATIVE ENGLISH						
Course Code	22ENT106						
Category	Humanities & Social Sciences (HS)						
Scheme and Credits	No. of Hours/Week					Total	Credits
	L	T	P	SS	Total	Hrs./semester	
	1	0	1	-	02	26	01
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 02 Hours		

COURSE OBJECTIVE: To enable the students to assimilate the correct patterns of the language, & to develop students' insight into the structure of English language. To enrich vocabulary bank, to communicate more effectively in English, to express opinions including facts & ideas & maintain conversation in everyday situations. To use digital literacy tools their LSRW skills can be enhanced and to master good speaking skills with different strategies.

UNIT I COMMUNICATION SKILLS: LSRW Skills	5 hours
UNIT II GRAMMAR AND VOCABULARY: English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Conjunctions, Interjection, Articles and Wh-questions/ yes-no questions, Question tags, Synonyms & Antonyms.	5 hours
UNIT III READING COMPREHENSION: Good Manners by J C Hills The Generation Gap by Benjamin Spock	6 hours
UNIT IV INTERPERSONAL COMMUNICATION SKILLS: Team-work, Social skills, Empathy, Emotional Intelligence. Presentation Strategies: planning, preparation, organization, delivery.	5 hours
UNIT V ETIQUETTE & BODY LANGUAGE: Concept of human behavior , Individual and Group behavior, Body language, Dimensions of body language: Proxemics, Haptics, Paralanguage and Kinesics	5 hours
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos	

COURSE OUTCOMES: On completion of the course, student will be able to:

- CO1:** Learn basic grammar rules, developed the mastery of language.
- CO2:** Enhance vocabulary and fluency will be increased.
- CO3:** Gain the ability to communicate confidently in various situations.
- CO4:** improve listening, speaking, reading and writing skills.
- CO5:** Overcome their stage freight and express their views freely without hesitation.

TEXT BOOKS

1. Workbook
2. English Grammar and composition by WREN AND MARTIN
3. Contemporary English Grammar by JAYANTHI DAKSHINAMURTHY
4. English for Technical Communication by LAKSHMINARAYANA K.R
5. Effective English for Technical Communication by FARATULLAH T.M

REFERENCE BOOKS

1. Objective English (Multiple choice questions with answers for competitive examinations) by Dr.B.James
2. The English Errors of Indian Students by T.L.H Smith Pearse.
3. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018.
4. A Textbook of English Language Communication Skills, Infinite Learning Solutions – (Revised Edition) 2020.
5. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press 2018.
6. Technical Communication by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
7. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – 2019.
8. Practical English Usage by Michael Swan, Oxford University Press – 2016.
9. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
10. Effective Technical Communication – Second Edition by M. Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

CIE- Objective type (Max. marks: 25 marks)

SEE- Objective type (Max. marks: 50 marks)

MAPPING of COs with POs

Ss	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										3		
CO2										3		
CO3										3		
CO4										3		
CO5										3		
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2023 -2024

Course Title	PROFESSIONAL WRITING SKILLS IN ENGLISH						
Course Code	22ENT206						
Category	Humanities & Social Sciences (HS)						
Scheme and Credits	No. of Hours/Week					Total Hrs./semester	Credits
	L	T	P	SS	Total		
	1	0	1	-	02	26	01
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 02 Hours		

Course objective:

To impart English vocabulary and language proficiency, to achieve effective communicative skills and to learn better sentence structures, and also to acquire Employment and Workplace communication skills and learn about the Techniques of Information transferred through presentation in different levels.

UNIT I SELF ANALYSIS: SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem, Self-talk. READING SKILLS: Great Books Born Out of Great Minds (Dr.APJ Kalam)	4 hours
UNIT II GRAMMAR AND IMPORTANCE OF WRITING SKILLS: Subject Verb Agreement, Identifying Common Errors in Writing and Speaking, Idioms and phrases. Clichés. Misplaced modifiers, Redundancies Nature and Style of sensible writing, Importance of Proper Punctuation.	6 hours
UNIT III DRAFTING, INTERVIEWING - SKILLS AND COMMUNICATION TECHNIQUES: Formats and types of different letters, Model Letter of Application (Cover Letter) with Resume, Emails and other recent communication types. Vocabulary for resume Manners in conversation, Communication at Workplace, Non-Verbal Communication Skills. Interviews skills. Interview Vocabulary. Professional etiquettes.	6 hours
UNIT IV GOAL SETTING: Wish List, SMART Goals, and Blueprint for success, Short Term, Long Term, Life Time Goals. Group Discussion and Presentation skills and Formal Presentations by Students. (Practical Sessions by Students).	5 hours
UNIT V TIME MANAGEMENT: Value of time, Diagnosing Time Management, Weekly Planner To-do list, Prioritizing work.	5 hours

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Identify common errors in spoken and written communication.

CO2: Get familiarized with English vocabulary and language proficiency.

CO3: Improve nature and style of sensible writing & acquire employment and workplace skills.

CO4: Improve their Technical Communication Skills through Technical Reading and Writing practices.

CO5: Perform well in campus recruitment, engineering and all other general competitive examinations.

TEXT BOOKS:

1. Workbook
2. Functional English, Cengage learning India Pvt Limited [Latest Revised Edition] - 2020.
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2. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
3. High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015.
4. Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.
5. Intermediate Grammar, Usage and Composition by M.L.Tichoo, A.L.Subramanian, P.R.Subramanian, Orient Black Swan – 2016.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

CIE- Objective type (Max. marks: 25 marks)

SEE- Objective type (Max. marks: 50 marks)

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										3		
CO2										3		
CO3										3		
CO4										3		
CO5										3		
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2023 -2024

Course Title	KANNADA – SAMSKRUTHIKA KANNADA (Kannada Students)						
Course Code	23SKT107/207						
Category	Humanities & Social Sciences (HS)						
Scheme and Credits	No. of Hours/Week					Total Hrs./semester	Credits
	L	T	P	SS	Total		
	0	1	0	-	01	13	01
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 02 Hours		

COURSE OBJECTIVE: ಕನ್ನಡ ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ಭಾಷಾ ಅಭಿರುಚಿಯನ್ನು ಬೆಳೆಸಿಕೊಳ್ಳುವುದರ ಜೊತೆಗೆ ಸಾಹಿತ್ಯ , ವ್ಯಾಕರಣಾಂಶ, ವಿಷಯಗಳನ್ನು ತಿಳಿಸಲಾಗುವುದು. ಪಠ್ಯ ವಿಷಯದ ಜೊತೆಗೆ ಮಾನವೀಯ ಮೌಲ್ಯಗಳು ,ಸಮಾಜಕ್ಕೆ ಕೊಡುಗೆಯನ್ನು ನೀಡಿದ ಮಹಾನ್ ವ್ಯಕ್ತಿಗಳ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಹಾಗೂ ಗಣಕಯಂತ್ರ ಮತ್ತು ಪಾರಿಭಾಷಿಕ ಪದಗಳ ಬಗೆಗೆ ಬೋಧಿಸಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಭಾಷಾ ಸಾಹಿತ್ಯದ ಜೊತೆಗೆ ಸಮಾಜದ ಮಾನವೀಯ ಮೌಲ್ಯಗಳ ಬಗೆಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಸಹಾಯವಾಗುತ್ತದೆ. ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕವನ್ನು ಸಿದ್ಧಪಡಿಸಿ ನೀಡಲಾಗುವುದು. ಇದರಲ್ಲಿ ವ್ಯಾಕರಣಾಂಶದ ಬಗೆಗೆ ಹೆಚ್ಚು ವಿಷಯಗಳನ್ನು ಪ್ರಸ್ತುತ ಪಡಿಸಲಾಗಿರುತ್ತದೆ. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಭಾಷಾ ಸಾಮರ್ಥ್ಯದ ಅರಿವು ಹೆಚ್ಚಿಸಿಕೊಳ್ಳಲು ಮತ್ತು ಓದುವ ಮತ್ತು ಬರೆಯುವ ಕೌಶಲ ಹೆಚ್ಚಿಸಿಕೊಳ್ಳಲು ಸಹಾಯವಾಗುತ್ತದೆ.

UNIT I ಲೇಖನಗಳು ಕನ್ನಡ ನಾಡು,ನುಡಿ ಮತ್ತು ಸಂಸ್ಕೃತಿಗೆ ಸಂಬಂಧಿಸಿದ ಲೇಖನಗಳು ೧. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ : ಹಂಪ ನಾಗರಾಜಯ್ಯ ೨. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ ೩. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ವಿತಾವಿಯ ಆಡಳಿತ ಕನ್ನಡ ಪುಸ್ತಕದಿಂದ ಆಯ್ದ ಲೇಖನ *	3hours
UNIT II ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ ಪೂರ್ವ) ೪. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರ ದಾಸಿಮಯ್ಯ , ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ. ೫. ಕೀರ್ತನೆಗಳು : ಅದರಿದೇನು ಫಲ ಇದರಿದೇನು ಫಲ - ಪುರಂದರದಾಸ ತಲ್ಲಣಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೆ - ಕನಕದಾಸ ೬. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಷರೀಫ ಶಿವಯೋಗಿ - ಬಾಲಲೀಲಾ ಮಹಂತ ಶಿವಯೋಗಿ ೭. ಜನಪದ ಗೀತೆ : ಬೀಸುವ ಪದ, ಬಡವರಿಗೆ ಸಾವ ಕೊಡಬೇಡ	3 hours
UNIT III ಕಾವ್ಯಭಾಗ (ಆಧುನಿಕ) ೮. ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ : ಡಿ.ವಿ.ಜಿ ೯. ಕುರುಡು ಕಾಂಚಾಣ : ದ.ರಾ.ಬೇಂದ್ರೆ ೧೦. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು ೧೧. ಹೆಂಡತಿಯ ಕಾಗದ : ಕೆ.ಎಸ್.ನರಸಿಂಹಸ್ವಾಮಿ ೧೨. ಮುಬ್ಬಿನಿಂದ ಮುಬ್ಬಿಗೆ : ಜಿ.ಎಸ್.ಶಿವರುದ್ರಪ್ಪ ೧೩. ಆ ಮರ ಈ ಮರ : ಚಂದ್ರಶೇಖರ ಕಂಬಾರ ೧೪. ಚೋಮನ ಮಕ್ಕಳ ಹಾಡು : ಸಿದ್ಧಲಿಂಗಯ್ಯ	3 hours

2 hours

೧೫. ಡಾ.ಸರ್.ಎಂ ವಿಶ್ವೇಶ್ವರಯ್ಯ - ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ : ಎ ಎನ್ ಮೂರ್ತಿರಾವ್
 ೧೬. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ
 ೧೭. ಮೆಗಾನ್ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

2 hours

೧೮. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ
೧೯. 'ಕ' ಮತ್ತು 'ಬ' ಬರಹ ತಂತ್ರಾಂಶಗಳು ಮತ್ತು ಕನ್ನಡದ ಟೈಪಿಂಗ್ *
೨೦. ಕನ್ನಡ - ಕಂಪ್ಯೂಟರ್ ಶಬ್ದಕೋಶ *
೨೧. ತಾಂತ್ರಿಕ ಪದಕೋಶ : ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು *
* (ವಿತಾವಿಯ ಆಡಳಿತ ಕನ್ನಡ ಪುಸ್ತಕದಿಂದ ಆಯ್ದ ಲೇಖನಗಳು -
ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ.ವಿ.ಕೇಶವಮೂರ್ತಿ

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಕನ್ನಡ ನಾಡು,ನುಡಿ ಮತ್ತು ಸಂಸ್ಕೃತಿಗೆ ಸಂಬಂಧಿಸಿದ ಲೇಖನಗಳ ಬಗೆಗೆ ವಿವರಿಸಲಾಗುವುದು. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿಯಲ್ಲಿ ಸಂಸ್ಕೃತಿಯ ಅರ್ಥ, ಭಾರತೀಯ ಸಂಸ್ಕೃತಿ, ಧರ್ಮದ ಆಚರಣೆ,ಜೀವನ ಮೌಲ್ಯಗಳ ಬಗೆಗೆ ವಿವರಿಸಲಾಗುವುದು. ಮತ್ತು "ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ" ಮಹತ್ವದ ಬಗೆಗೆ ತಿಳಿಸಲಾಗುವುದು.

1. ಪತ್ಯದ ಹೆಸರು : ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (ಕನ್ನಡ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ)
2. ಡಾ.ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ-ವಿಶ್ರಾಂತ ಕುಲಪತಿಗಳು, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ , ಹಂಪಿ,
3. ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶ - ಸಹಾಯಕ ಪ್ರಾಧ್ಯಾಪಕರು ಮತ್ತು ಮುಖ್ಯಸ್ಥರು
4. ಪ್ರೊ.ವಿ.ಕೇಶವಮೂರ್ತಿ - ಶೈಕ್ಷಣಿಕ ಸಲಹೆಗಾರರು

- 1 ಕನ್ನಡ ಮನಸು - ಡಾ.ಹೆಚ್.ಜೆ ಲಕ್ಕಪ್ಪಗೌಡ
2. ಆಡಳಿತ ಕನ್ನಡ-ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶ - ಸಹಾಯಕ ಪ್ರಾಧ್ಯಾಪಕರು ಮತ್ತು ಮುಖ್ಯಸ್ಥರು
ಪ್ರೊ.ವಿ.ಕೇಶವಮೂರ್ತಿ - ಶೈಕ್ಷಣಿಕ ಸಲಹೆಗಾರರು
3. ಕನ್ನಡ ವ್ಯಾಕರಣ ಮತ್ತು ರಚನೆ - ಎನ್.ಗೋಪಾಲಕೃಷ್ಣ ಉಡುಪ
4. ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ

SEE- Objective type (Max. marks: 50 marks)

[illegible]

Strength of correlation: Low-1, Medium- 2, High-3

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Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2023 -2024

Course Title	NON KANNADA – BALAKE KANNADA (Non Kannada & Non Karnataka Students)						
Course Code	23BKT107/207						
Category	Humanities & Social Sciences (HS)						
Scheme and Credits	No. of Hours/Week					Total Hrs./semester	Credits
	L	T	P	SS	Total		
	0	1	0	-	01	13	01
CIE Marks: 50	SEE Marks: 50 (ORAL)		Total Max. Marks: 100		Duration of SEE: 02 Hours		

COURSE OBJECTIVE: ಕನ್ನಡೇತರ ಮತ್ತು ಹೊರನಾಡು ಕನ್ನಡ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪ್ರಪ್ರಥಮವಾಗಿ ಭಾಷೆಯ ಅಡಿಯಪಾಯವನ್ನು ಬೋಧಿಸಲಾಗುವುದು. ಮತ್ತು ಕನ್ನಡ ವ್ಯಾಕರಣಾಂಶದ ಪರಿಚಯ ಜೊತೆಗೆ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಚಟುವಟಿಕೆಗಳನ್ನು ನೀಡುವುದರ ಮೂಲಕ ಮೌಖಿಕ ಸಾಮರ್ಥ್ಯವನ್ನು ಹೆಚ್ಚಿಸಲು ಉತ್ತೇಜನ ನೀಡಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಭಾಷೆಯ ಬಗೆಗೆ ಹೆಚ್ಚು ಆತ್ಮವಿಶ್ವಾಸ ಬೆಳೆಸಿಕೊಳ್ಳಲು ಸಹಾಯವಾಗುತ್ತದೆ. ಹಾಗೂ ಅಕ್ಷರದಿಂದ ಪದ, ಪದದಿಂದ ವಾಕ್ಯ ರಚಿಸಲು ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳು ಭಾಷೆಯನ್ನು ಅರಿಯಲು ಸಹಾಯವಾಗುತ್ತದೆ. ಹಾಗೂ ಪ್ರತ್ಯೇಕವಾಗಿ ಕಾರ್ಯ ಪುಸ್ತಕವನ್ನು ಸಿದ್ಧಪಡಿಸಿ ನೀಡಲಾಗುವುದು. ಇದರಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳ ಭಾಷಾ ಬೆಳವಣಿಗೆಗೆ ಸಹಾಯಕವಾಗುವ ಅಂಶವನ್ನು ರಚಿಸಿ ನೀಡಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳ ಸಂವಹನ ಮಾಧ್ಯಮದ ಸಾಮರ್ಥ್ಯ ಹೆಚ್ಚಿಸಲು ಮತ್ತು ಓದುವ ಮತ್ತು ಬರೆಯುವ ಕೌಶಲ ಹೆಚ್ಚಿಸಿಕೊಳ್ಳಲು ಸಹಾಯವಾಗುತ್ತದೆ.

UNIT I ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ : ಕನ್ನಡ ವರ್ಣಮಾಲೆ ,ಕನ್ನಡ ಒತ್ತಕ್ಷರ, ಕನ್ನಡ ಅಂಕಿಗಳು , ವಿರುದ್ಧಪದಗಳು, ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು	2hours
UNIT II ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ : ಲಿಂಗಪರಿಚಯ. ನಾಮಪದಗಳು.	2hours
UNIT III ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ : ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು , ಬಹುವಚನ, ಏಕವಚನ.	2hours
UNIT IV ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ : ಅಕ್ಷರದಿಂದ ಪದ, ಪದದಿಂದ ವಾಕ್ಯ	2hours
UNIT V ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ : ಅಶುಭಾಷಣ ವಿಷಯ ಸಂವಹನ ಮಾಧ್ಯಮ , ಮೌಖಿಕ ಚಟುವಟಿಕೆ	1hours

COURSE OUTCOMES:

ವ್ಯವಹಾರಿಕ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಭಾಷೆಯ ಅಡಿಪಾಯದ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಈ ಪಾಠದಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಂವಹನ ಮಾಧ್ಯಮದ ಜೊತೆಗೆ ಕೇಳಿಸಿಕೊಳ್ಳುವುದು ಮತ್ತು ಮಾತನಾಡುವುದರ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು.

ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಶಬ್ದಕೋಶಗಳ ಬಳಕೆ, ಸಂವಹನ ಮಾಧ್ಯಮದ ಬಗೆಗೆ ಸಂಭಾಷಣೆಗಾಗಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳ ಪರಿಚಯ, ಕ್ರಿಯಾವಿಶೇಷಣಗಳ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಮತ್ತು ಮೌಖಿಕ ಸಾಮರ್ಥ್ಯದ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು.

1. ಪಠ್ಯದ ಹೆಸರು : ಬಳಕೆ ಕನ್ನಡ ಕನ್ನಡೇತರ ಮತ್ತು ಹೊರನಾಡು ಕನ್ನಡ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ
2. ಡಾ.ಪಿ.ಪಾಂಡುರಂಗ ಬಾಬು - ಪ್ರಾಧ್ಯಾಪಕರು, ಕನ್ನಡ ಭಾಷಾಧ್ಯಯನ ವಿಭಾಗ, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ
3. ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶ - ಸಹಾಯಕ ಪ್ರಾಧ್ಯಾಪಕರು ಮತ್ತು ಮುಖ್ಯಸ್ಥರು
4. ಪ್ರೊ.ವಿ.ಕೇಶವಮೂರ್ತಿ - ಶೈಕ್ಷಣಿಕ ಸಲಹೆಗಾರರು

- 1 ಕನ್ನಡ ಕಲಿ - ಲಿಂಗದೇವರು ಹಳಿಮನೆ
2. ವ್ಯವಹಾರಿಕ ಕನ್ನಡ-ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶಿ -ಸಹಾಯಕ ಪ್ರಾಧ್ಯಾಪಕರು ಮತ್ತು ಮುಖ್ಯಸ್ಥರು
ಪ್ರೊ.ವಿ.ಕೇಶವಮೂರ್ತಿ - ಶೈಕ್ಷಣಿಕ ಸಲಹೆಗಾರರು
3. ಕನ್ನಡ ವ್ಯಾಕರಣ ಮತ್ತು ರಚನೆ - ಎನ್.ಗೋಪಾಲಕೃಷ್ಣ ಉಡುಪ
4. ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 25 marks)
SEE- Objective type (Max. marks: 50 marks)

[illegible]

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2023 -2024

Course Title	INDIAN CONSTITUTION						
Course Code	22CIT107/207						
Category	Humanities & Social Sciences (HS)						
Scheme and Credits	No. of Hours/Week					Total Hrs./semester	Credits
	L	T	P	SS	Total		
	0	1	0	-	01	13	01
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 02 Hours		

COURSE OBJECTIVES:

To know the fundamental political structure & codes, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens.

UNIT I	4 hours
Introduction: Framing of Indian Constitution, Salient features of Indian Constitution, Preamble of the Constitution.	
UNIT II	2 hours
Fundamental Rights and its Restriction and limitations in different complex situations. Directive principles of State policy and its present relevance in Indian society, Fundamental Duties.	
UNIT III	2 hours
Union Government: Executive – President, Prime Minister, Council of Ministers, Parliament – Lok Sabha & Rajya Sabha. Supreme Court.	
UNIT IV	2 hours
State Government: Executive – Governor, Chief Minister, Council of Ministers, State Legislature-Legislative Assembly & Legislative Council, High Court.	
UNIT V	3 hours
Election Commission. Positive and Negative aspects of Engineering Ethics, Professional Risks and Safety.	
TEACHING LEARNING PROCESS:	

Direct instructional method (Low /Old Technology), Flipped classrooms (High/advanced Technology tools), Blended learning (combination of both), Enquiry and evaluation based learning, Personalized learning, Problems based learning through discussion, Following the method of expeditionary learning

Tools and techniques

COURSE OUTCOMES:

At the end of the course the student should:

CO 1: Have constitutional knowledge and legal literacy.

CO 2: the functioning of various government institutions.

TEXT BOOKS

INTRODUCTION TO THE CONSTITUTION OF INDIA by DURGA DAS BASU. (Students Edition) Prentice – Hall EEE, 19th/20th Edn., 2001.

2. ENGINEERING ETHICS by CHARLES E. HARRIS, MICHAEL S. PRITCHARD AND MICHAEL J. ROBINS THOMPSON ASIA, 2003-08-05

REFERENCE BOOKS

1 An Introduction to Constitution of India by M.V.Pylee, Vikas Publishing, 2002.

2. Constitution of India by B S Raman

2 Engineering Ethics by M.Govindarajan, S. Natarajan, V.S.Sendilkumar, Prentice – Hall of India Private Ltd, New Delhi, 2004.

3 Constitution of India and Professional Ethics—K R Phaneesh

4 Introduction to the Constitution of India—Brij Kishore Sharma

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

CIE- Objective type (Max. marks: 25 marks)

SEE- Objective type (Max. marks: 50 marks)

MAPPING of COs with POs

Ss	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3						
CO2						3						
CO3						3						
CO4						3						
CO5						3		3				
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2023 -2024

Course Title	The Scientific Foundation of Health						
Course Code	22SFT108/208						
Category	Ability Enhancement Course (AEC)						
Scheme and Credits	No. of Hours/Week					Total	Credits
	L	T	P	SS	Total	Hrs./semester	
	1	0	-	-	01	13	01
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100		Duration of SEE: 02 Hours			

Course objective:

The definition of Health and quality of life will teach the learner the necessity for a balanced strength and well-being. The Determinants of Health and Wellness topics like Diet, Food & Nutrition, life style, bring the points of understanding. Physical health, mental health, Social Health, Spiritual health, etc is a point to learn. The adolescent chooses the food as per the taste rather than the usefulness. Warming up exercises, physical exercises, yogasanas, pranayama and certain aspects of personality development may help in going a long way to improve the health and personality of the youth.

UNIT I	5 hours
Fundamentals of Balanced Health: Health and quality of life, Definition of Health (WHO), Five Pillars of Balanced Health, Body and Mind concepts, Disease and Healing, Genetics & Environment.	
UNIT II	4 hours
Determinants of Health and Wellness: Lifestyle and Health, Sleep and health, Relaxation and Meditation, Physical Fitness and Stamina, Reproductive health and hygiene.	
UNIT III	7 hours
Seven dimensions of Health & Wellness: Physical health, Mental health, Social Health, Spiritual health, Cultural health, Moral health, Economical health.	
UNIT IV	5 hours
Healthy Eating- Diet and Nutrition: Food and Diet – Difference, Concept of DIET, Nutrition.	
UNIT V	5 hours
Physical activity and personality Development: Warming up exercise, Physical exercise, Yogasanas, Pranayama etc. Special training for the challenged students A few words on personality development (personal quality)	
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos	

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Understand the necessity for a balanced health and well-being.

CO2: know one's life style, physical fitness and stamina.

CO3: Differentiate types of health.

CO4: understand 'Food is medicine' or 'Medicine is food' concept.

CO5: Have the knowledge of yogasanas & pranayama for an overall personality.

TEXT BOOKS

1. Dixit Suresh (2006) Swasthya Shiksha Sports Publications, Delhi.
2. Pinto John and Ramachandra K (2021) Kannada version “ Daihika Shikshanada Parichaya”, Louis Publications, Mangalore.

REFERENCE BOOKS

1. Simplified Physical Exercises, Thathvagnani, The World Community Service Center, Vethathiri Maharshi, Vethathiri Publications, Erode, SKY Yoga.
2. Puri K. & Chandra S.S (2005) “Health & Physical Education’, Surjeet Publication, New Delhi.
3. Shanti K.Y (1987) “The Science of Yogic Breathier” Pranayama D B Bombay.s

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

CIE- Objective type (Max. marks: 25 marks)

SEE- Objective type (Max. marks: 50 marks)

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3						
CO2						3						
CO3						3						
CO4						3						
CO5						3						
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Syllabus - CBCS – for AY 2023 -2024

Course Title	INNOVATION AND DESIGN THINKING						
Course Code	22IDT208						
Category	Humanity and Social Science Course (HSS)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	01	00	00	00	01	15	01
CIE Marks: 50	SEE Marks: 50		Total Max. marks = 100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

1. To explain the concept of design thinking for product and service development.
2. To explain the fundamental concept of innovation and design thinking.
3. To discuss the methods of implementing design thinking in the real world.

UNIT I PROCESS OF DESIGN Understanding Design thinking Introduction to Design Thinking - Theory and practice in Design thinking – Shared model in team-based design – MVP or Prototyping. <i>Text Book 1,2,3,4 and Reference Book 1,2</i>	3 hours
UNIT II Tools for Design Thinking Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design. <i>Text Book 1,2,3,4 and Reference Book 1,2</i>	3 hours
UNIT III Design Thinking in IT Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping. <i>Text Book 1,2,3,4 and Reference Book 1,2</i>	3 hours
UNIT IV DT for strategic innovations Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design. <i>Text Book 1,2,3,4 and Reference Book 1,2</i>	3 hours
UNIT V The Design Challenge: Define the Design Challenge, Prototyping & Iteration- Feasibility Study, Testing-Documentation and the Pitching. <i>Text Book 1,2,3,4 and Reference Book 1,2</i>	3 hours
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos	

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the various design process procedure.

- CO2:** Evaluate design ideas through different technique.
CO3: Generate design ideas through design thinking.
CO4: Identify the significance of reverse Engineering to Understand products.
CO5: Predict the design challenge properly.

TEXT BOOKS

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson "Engineering Design", Cengage learning (International edition), 2nd Edition, 2013.
2. Roger Martin "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), Design Thinking: Understand – Improve Apply, Springer, 2011.
4. Idris Mootee "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons, 2013

REFERENCE BOOKS

1. Yousef Haik and Tamer M. Shahin "Engineering Design Process" Second Edition, Cengage Learning, 2011.
2. Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author), "Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover" 20 Sep 2013.

ONLINE RESOURCES


1. www.tutor2u.net/business/presentations/. /productlifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com > Home > Marketing > Product Development
4. <https://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit>
6. www.vertabelo.com/blog/documentation/reverse-engineering <https://support.microsoft.com/en-us/kb/273814>
7. <https://support.google.com/docs/answer/179740?hl=en>

SCHEME FOR EXAMINATIONS

- i. Theory Question Paper Pattern:
 CIE – Objective type (Max. marks : 25 marks)
 SEE – Objective type (Max. marks : 25 marks)

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3		3			2	2						2	1	2
CO 2	3		3			2	2						2	1	2
CO 3	3		3			2	2						2	1	2
CO 4	3		3			2	2						2	1	2
CO 5	3		3			2	2						2	1	2
Strength of correlation: Low-1, Medium- 2, High-3															

	CAREER DEVELOPMENT SKILLS 1 – I semester (2023-24)		
	Subject Code: 22CDN109	Mandatory Course (CGPC)	No of lecture hours per week: 2 Hrs
	Exam Duration:	Exam Marks: NIL	Total No. of lecture hours: 26 hrs per semester

CGPC – Career Guidance and Placement Cell

COURSE OBJECTIVE:

1. The lessons under this unit are designed to enable the students to plan their career on correct measures and motivate them to set their goals on prior basis.
2. This unit aims to develop the personality skills of the students and teach them to lead a corporate discipline nurture. It also helps them to get groomed with professional ethics.
3. This unit complies with the overcoming ability of students dealt in stress and it also teaches the punctuality and time managing.
4. This lesson will help students make inferences and predictions about spoken, writing & listening discourse.
5. To prepare for Verbal Ability, stick to the rule of – concepts first and practice later. Study English grammar to understand the concepts. Then practice several sample questions of different kinds to gain confidence, speed and accuracy

UNIT I	6 hours
Career Planning: Qualities of an Engineer, available opportunities for Engineering graduates, Avenues and Skills.	
Goal Settings: Importance of goal, Creating SMART goals, Action plan to meet goals, Tips for effective execution of goals	
Self-awareness and Self-confidence: Knowing your own self, Knowing others, Working well with others, Knowing personal attitudes, Developing the right attitude for work, Being proactive & positive.	
UNIT II	6 hours
Building Personality and Discipline: Personality Building, Types of Personality, Ways of developing personality, 3 types of discipline, Advantages of being disciplined	
Grooming, hygiene and Cleanliness: Expectations from the industry, Building personal presence, Corporate grooming, Types and Impact of Grooming, Tips on Personal Grooming.	
Attitude and Behavior: Types & Structures of Attitudes, Personal & Positive Attitudes	
Emotional intelligence Quotient: Types of emotional quotient, Signs of emotional intelligence, Characteristics of emotional intelligence, Ways to increase EQ	
UNIT III	6 hours
Time Management: Importance of time, Time Management Matrix, Tips for managing time effectively, Prioritizing.	
Stress Management: Causes, Types & Symptoms of stress	
Reading Skills: Dos & Don'ts of good reading, Improve your reading skills.	
Writing Skills: Importance of Writing Skills, Dos & DON'T's of Writing Skills, Ways to improve writing skills, Tips for writing skills	


UNIT IV	4 hours
Listening Skills: Hearing & Listening, Barriers to Listening, Active Listening Skills & Importance of listening Speaking Skills: Basics of Speaking skills, 7 C's for Better Speaking, Types of Speaking & Elements of public speaking. Leadership skills and motivation: Attributes of a leader, Leadership Styles, Key Characteristics	
UNIT V	4 hours
Common mistake in English, Classic Indianisms, Course of action, Cause and effect, Statement and assumptions, Statement and Conclusions.	

COURSE OUTCOME:

1. The students will be able to learn about the overview of their goals and also gets to know diversities in the field of their career planning.
2. The student will develop and improve their personal and professional effectiveness. By the end of this unit, students will have deployed themselves about the corporate culture.
3. At the completion of this unit, students will develop the self-confidence and emerge as the confident person.
4. After the completion of this unit students will understand the stress, time and emotional management. Also they will learn about the overcoming the fear and uncomfortable situations such as Public speaking.
5. After the completion of this unit, students will gain knowledge about the assertiveness of Listening, Reading, Writing & Interpersonal segments.

REFERENCE:

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education
3. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.
4. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.
5. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
6. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing

	CAREER DEVELOPMENT SKILLS 2 – II semester (2023-24)		
	Subject Code: 22CDN209	Mandatory Course (CGPC)	No of lecture hours per week: 2 Hrs
	Exam Duration:	Exam Marks: NIL	Total No. of lecture hours: 26 hrs per semester

CGPC – Career Guidance and Placement Cell

COURSE OBJECTIVE:

1. The main goal of this unit is to help students to overcome the fear of speaking in both personal and professional culture and it also focuses on the presenting the topics with confidence.
2. This unit teaches the students on how to be effective team player & contribute to the organizational growth. It also depicts the easier decision making and problem-solving techniques & enables students to think creatively there by moulding them to be future leaders
3. This unit makes the students understand about the English usage properly with the right set of course and action. This unit aims at teaching the Verbal Ability and It gives them the insight about grammar rules & concepts.
4. This unit begins with the Quantitative Aptitude and Logical Aptitude content as it is a crucial round to clear in order to proceed for further rounds of interviews. This will help students to strengthen the general aptitude.
5. This unit aims to teach students understand their interpretation skills in relation to patterns, diagrammatic tests, abstract reasoning test.

UNIT I	6 hours
Team building: Importance of Team Building, Benefits of Team Building, Key Roles in Team building, Helpful Team Behavior	
Decision making and Problem Solving: Decision making styles, Types of Decision making, Steps of Decision making, Decision Making skills, Problem Solving, Steps of Problem solving	
Small talk and Debate	
UNIT II	6 hours
Workplace etiquette, Business Communication, sales and negotiation and Customer service	
UNIT III	4 hours
Grammar Brush up: Parts of Speech	
Verbal Ability – II Grammar based Exercise: Sentence correction, Sentence Completion, Spotting errors	
UNIT IV	6 hours
Number System: Number system, Power cycle, Remainder cycle, Factors, Multiples, HCF and LCM, Trailing Zeroes	
Algebra: Different types of Algebraic expressions, Different types of Algebraic equations	
UNIT V	4 hours

Coding and Decoding: Different types of Problems on Coding and Decoding, Forward Coding, Reverse Coding, Mirror Coding.

Alphanumeric Problems and Number series: Different types of Problems

COURSE OUTCOME:

1. The students will have learnt about the way of quality communication with the co-workers and it will also help to build a strong social relationship with outside society. And students will also learn to deliver the presentation in a more powerful and persuasive way.
2. After the completion of this unit, student will have learnt how to work in teams & be effective leader. And students will learn about the synchronization with the workmate and also gives them an opportunity to unlock their individual potentials by taking the right decisions.
3. At this unit, students would have learnt the mistakes in the usage of English vocabulary during their common talks.
4. After the completion of this unit student will know about the basic concepts of general quantitative aptitude.
5. The problems on Alphanumeric & numbers will be learnt after the completion of this unit. And also it also covers the Analytical reasoning concept of Coding and Decoding.

REFERENCE:

1. Soft skills an integrated approach to maximize personality by SANGEETHA SHARMA, GAJENDRA SINGH CHAUHAN, and Wiley Publishing.
2. Quantitative aptitude for competitive exams by S.Chand, Dr. R.S. Aggarwal
3. Quantitative aptitude for CAT by Arun Sharma, Tata McGraw Hill
4. Rapid Quantitative Aptitude by Er. Deepak Agarwal and Mr. D.P Gupta
5. Numerical Ability and Quantitative aptitude for Competitive examinations by P.K.Mittal.
6. Verbal Ability and Reading comprehension by Arun Sharma and Meenakshi Upadhyay, Tata McGraw Hill Education