Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

SCHEME AND SYLLABUS
(AS PER 2022 SCHEME)

Scheme of Teaching and Examinations
For I Semester and II Semester

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

Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

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Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Scheme of Teaching and Examination for I/II Semester B.E. CBCS, Academic Year-2022-23
2022 Scheme: Civil Engineering

PHYSICS CYCLE   **SEMESTER: I**

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	Credits
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	L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	Credits
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 Langauge 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-2022-23
2022 Scheme for CSE/IS/AI&ML/CS&BS

PHYSICS CYCLE — SEMESTER : I

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	Credits
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	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	L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	Credits
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-2022-23
2022 Scheme for 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	SDA	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	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	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	Samskrutika/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-2022-23
2022 Scheme for EEE

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	Samskrutika/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-2022-23
2022 Scheme : ME/AE/IEM stream

CHEMISTRY CYCLE — SEMESTER : I

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	Credits
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	22CIT1O7	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	L	T	P	SS	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	Credits
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	22MEU203	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	Samskrutika/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-56
Department of Mathematics
Scheme and Syllabus - 2022 -2023

Course Title	**Calculus, Differential Equations and Linear Algebra**							
Course Code	**22MAU101A**							
Category	**Mathematics-I (CV)**							
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 OBJECTIVE:
   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

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

UNIT-1	**8 Hours**

Introduction to polar coordinates and curvature relating to Civil Engineering: Introduction, 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: Center and circle of curvature, evolutes and involutes.
Applications: Structural design and paths, Strength of materials, Elasticity.
(RBT Levels: L1, L2 and L3)

UNIT-II	**8 Hours**

Introduction to series expansion and partial differentiation in the field of Civil Engineering:
Taylor's and Maclaurin's series expansion for one variable (no proof). Indeterminate forms-L'Hospital's rule.
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: Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.

(**RBT Levels:** L1, L2 and L3)

UNIT-III	8 Hours

Introduction to first-order ordinary differential equations pertaining to the applications for Civil Engineering:
 Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations. Applications of ODE's - Orthogonal trajectories. **Nonlinear differential equations**: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations.

Self-Study: Applications of ODE's: Solvable for x and y, Newton's law of cooling, reducible to Clairaut's equations.

Applications: Rate of Growth or Decay, Conduction of heat.
(**RBT Levels:** L1, L2 and L3)

UNIT-IV	8 Hours

Ordinary Differential Equations of higher order: Higher-order linear ODE's with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's differential equations.

Self - study: Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients.

Applications: Oscillations of a spring, Transmission lines, highway engineering.
(**RBT Levels:** L1, L2 and L3)

UNIT-V	8 Hours

Introduction to linear algebra related to Civil Engineering applications: Elementary row transformation of a matrix, Rank of a matrix. Consistency and solution of a system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors. Rayleigh's power method.
Self-Study: Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse and power of a square matrix by Cayley- Hamilton theorem.

Applications: Structural analysis, balancing equations.

(**RBT Levels:** L1, L2 and L3)

COURSE OUTCOMES: On completion of the course, student should be able to:
CO1: Describe the translation of coordinate system, various types of series of functions, identify the variation of multi variable's 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: **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 and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

TEXTBOOKS
1. B.S.Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, NewDelhi.
2. E.Kreysizig, Advanced Engineering Mathematics, JohnWiley and sons,10th Ed.(Reprint) 2016.

REFERENCE BOOKS
1. V.Ramana: Higher Engineering Mathematics, McGraw–Hill Education,11th Ed..
2. H.C.Taneja, Advanced Engineering Mathematics, Volume I & II, I.K.International Publishing House Pvt. Ltd., New Delhi.
3. N.P.Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES
1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://ocw.mit.edu/courses/18-085-computational-science-and-engineering-i-fall-2008/resources/lecture-28-fourier-series-part-1/
4. https://www.thefouriertransform.com/
5. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php

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

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives, Jacobian and plotting the graph
4	Applications to Maxima and Minima of two variables
5	Solution of first order differential equation and plotting the graphs
6	Solutions of Second order ordinary differential equations with initial/boundary conditions
7	Solution of a differential equation of oscillations of a spring/deflection of a beam with different loads
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

Suggested software's: Mathematica/MatLab/Python/Scilab

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - 2022 -2023

Course Title	**Calculus, Differential Equations and Linear Algebra**							
Course Code	**22MAU101B**							
Category	**Mathematics-I for Computer Science and Engineering Stream**							
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 computer science and engineering problems by applying ordinary differential equations.
3.Apply the knowledge of modular arithmetic to computer algorithms.
4.Develop the knowledge of linear algebra to solve the system of equations

UNIT-I 8 Hours
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.
Self-study: Center and circle of curvature, evolutes and involutes.
Applications: Computer graphics, Image processing.
(RBT Levels: L1, L2 and L3)
UNIT-II 8 Hours
Series Expansion and Multivariable Calculus
Introduction of series expansion and partial differentiation in Computer Science & Engineering.
Taylor's and Maclaurin's series expansion for one variable (no proof) Indeterminate forms – L'Hospital's rule.
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: Series expansion in computer programming, Errors and approximations, calculators.
(RBT Levels: L1, L2 and L3)
UNIT-III 8 Hours
Ordinary Differential Equations (ODEs) of first order
Introduction to first-order ordinary differential equations pertaining to the applications

for Computer Science & Engineering.
Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations. Orthogonal trajectories.

Non-linear differential equations: Introduction to general and singular solutions, Equations solvable for p, Clairaut's equations.

Self-Study: Applications of ODEs to L-R and R-C circuits, Solvable for x and y. Reducible to Clairaut's equations, Newton's law of cooling.

Applications of ordinary differential equations: In gradient descent in back propagation-Neural networks, Support vector mechanics (SVM), and AI.

(RBT Levels: L1, L2 and L3)

UNIT-IV	8 Hours

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. Fermat's little theorem. Wilson Theorem. Euler's Theorem. Applications of congruence's-RSA algorithm.

Self-Study: Divisibility, GCD, properties of prime numbers, fundamental theorem of arithmetic.

Applications: Cryptography-encoding and decoding, RSA applications in public key encryption.

(RBT Levels: L1, L2 and L3)

UNIT-V	8 Hours

Linear Algebra

Introduction of linear algebra related to Computer Science & Engineering.

Elementary row transformation 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. Eigen values and Eigen vectors-properties, Rayleigh's power method.

Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Inverse and power of a square matrix by Cayley-Hamilton theorem.

Applications: Boolean matrix, Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.

(RBT Levels: L1, L2 and L3).

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:** get acquainted and to apply modular arithmetic to computer algorithms

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- **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 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.Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS
1. V.Ramana: Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed..
2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press,3rd Ed., 2016.
3. N.P.Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. C. Ray Wylie, Louis C. Barrett:"Advanced Engineering Mathematics" McGraw Hill Book Co., Newyork, 6th Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
7. James Stewart: "Calculus" Cengage Publications, 7th Ed., 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc.,6th Ed., 2017.
10. William Stallings: "Cryptography and Network Security" Pearson Prentice Hall, 6th Ed.,2013.
11. William Stallings: "Cryptography and Network Security" Pearson Prentice Hall, 6th Ed.,2013.
12. David M Burton: "Elementary Number Theory" Mc Graw Hill, 7th Ed.,2010.

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)
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	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives, Jacobian and plotting the graph
4	Applications to Maxima and Minima of two variables
5	Solution of first-order differential equation and plotting the graphs
6	Solutions of Second-order ordinary differential equations with initial/boundary conditions
7	Solution of differential equation of oscillations of spring with various load
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

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

Course Title	**Calculus, Ordinary Differential Equations and Linear Algebra**							
Course Code	**22MAU101C**							
Category	**Mathematics-I for Mechanical Engineering Stream**							
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-I	**8 Hours**
Introduction to polar coordinates and curvature relating to mechanical engineering:	
Introduction, 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.	
Self -study: Center and circle of curvature, evolutes and involutes.	
Applications: Applied mechanics, Strength of materials, Elasticity.	
(RBTLevels:L1, L2 and L3)	
UNIT-II	**8 Hours**
Introduction to series expansion and partial differentiation in the field of Mechanical engineering applications:	
Taylor's and Maclaurin's series expansion for one variable (no proof). Indeterminate forms - L'Hospital's rule.	
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: Computation of stress and strain, errors and approximations in manufacturing process and critical points and extreme values.	
(RBTLevels:L1, L2 and L3)	
UNIT-III	**8 Hours**
Introduction to first-order ordinary differential equations pertaining to the applications for mechanical engineering:	
Linear and Bernoulli's differential equations. Exact and reducible to exact	
Applications of ODE's - Orthogonal trajectories,	
Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only.	

Clairaut's equations.
Self-Study: Applications to RC, LR Circuts: Solvable for x and y, reducible to Clairaut's equations, Newton's law of cooling.
Applications: Rate of growth or decay, conduction of heat.
(RBTLevels:L1, L2 and L3)

UNIT-IV	8 Hours

Importance of higher-order ordinary differential equations in Mechanical Engineering applications.
Higher-order linear ODE's with constant coefficients - Inverse differential operator method, method of variation of parameters. Cauchy's and Legendre's differential equations.
Self-study: Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients. **Applications:** Applications to oscillations of a spring, Mechanical systems and Transmission lines, LRC circuits.
(RBTLevels:L1, L2 and L3)

UNIT-V	8 Hours

Introduction of linear algebra related to Mechanical Engineering applications:
Elementary row transformation of a matrix, Rank of a matrix. Consistency and solution of a system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors and properties, Rayleigh's power method.
Self-Study: Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse and power of a square matrix by Cayley- Hamilton theorem.
Applications of Linear Algebra: Network analysis, Balancing equations.
(RBTLevels:L1, L2 and L3)

COURSE OUTCOMES: On completion of the course, student should be able to:
CO1: Describe the translation of coordinate system, various types of series of functions, identify the variation of multivariables 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 Eigen value 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 and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

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

TEXTBOOKS
1. B.S.Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, NewDelhi.
2. E.Kreysizig, Advanced Engineering Mathematics, JohnWiley and sons,10th Ed. (Reprint) 2016.

REFERENCEBOOKS
1. V.Ramana: Higher Engineering Mathematics, McGraw–Hill Education,11th Ed..
2. H.C.Taneja, Advanced Engineering Mathematics,VolumeI & II, I.K. International Publishing

House Pvt.Ltd., NewDelhi.
3. N.P. Baliand Manish Goyal, A textbook of Engineering Mathematics,
   Laxmi Publications, Reprint, 2010.

ONLINERESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://ocw.mit.edu/courses/18-085-computational-science-and-engineering-i-fall-2008/resources/lecture-28-fourier-series-part-1/
4. https://www.thefouriertransform.com/
5. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php

	List of Laboratory experiments (2 hours/week per batch/batchstrength15) 10 lab sessions + 1 repetition class + 1 Lab Assessment
1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives, Jacobian and plotting the graph
4	Applications to Maxima and Minima of two variables
5	Solution of first-order differential equation and plotting the graphs
6	Solutions of Second-order ordinary differential equations with initial/boundary conditions
7	Solution of differential equation of oscillations of spring with various load
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

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

Course Title	**Calculus, Ordinary Differential Equations and Linear Algebra**							
Course Code	**22MAU101D**							
Category	**Mathematics-I for Electrical & Electronics Engineering Stream**							
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: 03Hours**			

Course Learning Objectives:
Familiarize the importance of calculus associated with one variable and multivariable for computer science and engineering
Analyze computer science and engineering problems by applying ordinary differential equations.
Apply the knowledge of integral calculus.
Develop the knowledge of linear algebra to solve the system of equations

UNIT-I 8 Hours
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.
Self-study: Center and circle of curvature, evolutes and involutes.
Applications: Communication signals, Manufacturing of microphones and Image processing.
(RBT Levels: L1, L2 and L3)
UNIT-II 8 Hours
Series Expansion and Multivariable Calculus I
Introduction of series expansion and partial differentiation in Electrical & Electronics Engineering Engineering applications.
Taylor's and Maclaurin's series expansion for one variable (Statement only).
Indeterminate forms – L'Hospital's rule.
Partial differentiation, total derivative - differentiation of composite functions. Jacobian, Euler's theorem. 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: Series expansion in communication signals, Errors and approximations and vector calculus.
(RBT Levels: L1, L2 and L3)

UNIT-III	8 Hours

Ordinary Differential Equations (ODEs) of first order

Introduction to first-order ordinary differential equations pertaining to the applications for EC &EE Engineering.

Linear and Bernoullis differential equations. Exact and reducible to exact differential equations. Orthogonal trajectories.

Non-linear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations.

Self-Study: Applications of ODEs, Solvable for x and y, reducible to Clairaut's equations, L-R and C-R circuits.

Applications of ordinary differential equations: Rate of Growth or Decay, Conduction of heat.

(RBT Levels: L1, L2 and L3)

UNIT-IV	8 Hours

Integral Calculus

Introduction to Integral Calculus in Electrical & Electronics Engineering applications.

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area by double integration and volume by triple integration.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.

Self-Study: Volume by triple integration, Centre of gravity.

Applications: Antenna and wave propagation, Calculation of optimum power in electrical circuits, field theory.

(RBT Levels: L1, L2 and L3)

UNIT-V	8 Hours

Linear Algebra

Introduction of linear algebra related to Electrical & Electronics Engineering.

Elementary row transformation 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-properties.

Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Inverse and power of a square matrix by Cayley- Hamilton theorem.

Applications of Linear Algebra: Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.

(RBT Levels: L1, L2 and L3).

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 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, NewDelhi.
2. E.Kreysizig, Advanced Engineering Mathematics, John Wiley and sons,10th Ed. (Reprint) 2016.

REFERENCE BOOKS
1. V.Ramana: Higher Engineering Mathematics, McGraw–Hill Education,11th Ed..
2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics"Oxford University Press, 3rd Ed., 2016.
3. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics"McGraw Hill Book Co., Newyork, 6th Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar:"Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma:"Higher Engineering Mathematics"S. Chand Publication, 3rd Ed., 2014.
7. James Stewart: "Calculus", Cengage Publications, 7th Ed., 2019.
8. David C Lay:"Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. Gareth Williams:"Linear Algebra with applications", Jones Bartlett Publishers Inc.,6th Ed.2017.

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)
3. http://academicearth.org/
4. VTU e-Shikshana Program
5. VTU EDUSAT Program

	List of Laboratory experiments (2hours/week per batch/batch strength 15) 10 lab sessions +1 repetition class + 1 Lab Assessment
1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives, Jacobian and plotting the graph
4	Analyze to Maxima and Minima of two variables
5	Solution of first-order differential equation and plotting the graphs

6	Solutions of second-order ordinary differential equations with initial/boundary conditions
7	Solution of differential equation of oscillations of spring with various load
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - 2022 -2023

Course Title	Integral Calculus, Partial Differential Equations and Numerical Methods							
Course Code	**22MAU201A**							
Category	**Mathematics for Civil Engineering Stream-II**							
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-I	8 Hours

Integral Calculus

Introduction to Integral Calculus in Civil Engineering applications: Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area by double integration and Volume by triple integration.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Evaluation of Euler's integrals of first and second kind.

Self-Study: Duplication formula, Center of gravity

Applications: Applications to mathematical quantities (Area, Surface area, Volume). Analysis of probabilistic models.
(**RBT Levels:** L1, L2 and L3)

UNIT-II	8 Hours

Vector Calculus

Introduction to Vector Calculus in Civil Engineering applications: Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector identities.

Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem.

Self-Study: Volume integral and Gauss divergence theorem.

Applications: Heat and mass transfer, oil refinery problems, environmental engineering. Analysis of stream lines, velocity and acceleration of a moving particle.

(**RBT Levels:** L1, L2 and L3)

UNIT-III	8 Hours

Partial Differential Equations (PDE's):

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. Method of separation of variables.Solution of one-dimensional heat equation and wave equation by the method of separation of variables.

Self-Study: Derivation of one-dimensional heat equation and wave equation.

Applications: Design of structures (vibration of rod/membrane).

(RBT Levels: L1, L2 and L3)

| UNIT-IV | **8 Hours** |

Numerical methods-1

Importance of Numerical methods for discrete data in the field of Civil Engineering:

Finite differences: Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula (no proof).

Numerical differentiation: Numerical differentiation using Newton's forward and backward interpolation formulae,(All formulae without proof) and Applications to Maxima and Minima.

Numerical integration: Trapezoidal rule, Simpson's $(\frac{1}{3})^{rd}$ rule, Simpson's $(\frac{3}{8})^{th}$ rule and Weddle's rule (no proof).

Self-Study: Sterling's formula, Lagrange's interpolation and Lagrange's inverse Interpolation formula. Boole's rule.

Applications: Estimating the approximate roots, extremum values, Area, volume, surface area. Finding approximate solutions to civil engineering problems.

(**RBT Levels:** L1, L2 and L3)

| UNIT-V | **8 Hours** |

Numerical methods -2

Introduction to various numerical techniques for handling Civil Engineering application:

Solution of algebraic and transcendental equations: Regula-Falsi and Newton- Raphson methods (no proof).

Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (no proof).

Self-Study: Bisection method. Euler's method Adam-Bashforth method, Picard's method.

Applications: Finding approximate solutions to ODE related to civil engineering fields.

(**RBT Levels:** L1, L2 and L3)

COURSE OUTCOMES: On completion of the course, student should be 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 and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

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.Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

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2. H.C.Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://ocw.mit.edu/courses/18-085-computational-science-and-engineering-i-fall-2008/resources/lecture-28-fourier-series-part-1/
4. https://www.thefouriertransform.com/
5. 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	Program to compute surface area, volume and centre of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
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/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's(1/3)rd and (3/8)th rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler'smethod
10	Solution of ODE of first order and first degree by Runge-Kutta 4th order and Milne's predictor-corrector method

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

Course Title	**Mathematics-II for Computer Science and Engineering stream**						
Course Code	**22MAU201B**						
Category	**Mathematics-II for Computer Science and Engineering stream**						
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-I   8 Hours

Integral Calculus

Introduction to Integral Calculus in Computer Science & Engineering.

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find area by double integral and volume by triple integral.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Evaluation of Euler's integral of first and second kind.

Self-Study: Center of gravity, Duplication formula.

Applications: Antenna and wave propagation, Calculation of optimum value in various geometries. Analysis of probabilistic models.
(RBT Levels: L1, L2 and L3)

UNIT-II   8 Hours

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.

Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality.

Self-Study: Volume integral. Expressions of curl, divergence and gradient in O.C.C.

Applications: Conservation of laws, Electromagnetic waves, Analysis of streamlines.

Vector Space and Linear Transformations

UNIT-III   **8 Hours**

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.

Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Rank and nullity of a linear operator, rank-nullity theorem. Inner product spaces and orthogonality.

Self-study: Angles and Projections. Rotation, reflection, contraction and expansion.

Applications: Image processing, AI & ML, CS & BS graphs and networks, computer graphics.
(RBT Levels: L1, L2 and L3)

UNIT-IV   **8 Hours**

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 proof).

Finite differences, Interpolation formula-Newton's Gregory forward and backward, Gauss forward and backward, Stirling's, Bessel's, and Everett's (no proofs). Newton's divided difference formula and Lagrange's interpolation formula (no proofs)

Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules, and Weddle's rule(without proof).

Self-Study: Bisection method, Secant method, NR- method for repeated roots, inverse Interpolation and Numerical differentiation.

Applications: Estimating the approximate roots, extremum values, Area, volume, and surface area. Errors in finite precision.
(RBT Levels: L1, L2 and L3)

UNIT-V   **8 Hours**

Numerical methods -2

Introduction to various numerical techniques for handling Computer Science & Engineering applications.

Numerical Solution of Ordinary Differential Equations (ODE's): Solutions of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae).

Self-Study: Adam-Bashforth method, Picard's method, simultaneous differential equations.

Applications: Estimating the approximate solutions of ODE. (RBT Levels: L1, L2 and L3)

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

Textbooks

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCEBOOKS:

1. V.Ramana: Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed..
2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3 rd Ed., 2016.
3. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., Newyork, 6th Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
7. James Stewart: "Calculus" Cengage Publications, 7th Ed., 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.

ONLINE RESOURCES:

- http://nptel.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicearth.org/
- VTU e-Shikshana Program
- 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	Program to compute surface area, volume and centre of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
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/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule

9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's Method
10	Solution of ODE of first order and first degree by Runge-Kutta 4th order and Milne's predictor-corrector method

QUESTION PAPER PATTERN (SEE)

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - 2022 -2023

Course Title	Integral Calculus, Partial Differential Equations and Numerical methods						
Course Code	**22MAU201C**						
Category	**Mathematics for Mechanical Engineering streams -II**						
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 OBJECTIVE:

1. **Familiarize** the fundamentals of Integral calculus and Vector calculus
2. **Analyze** Engineering problems by applying Partial Differential Equations
3. **Develop** the knowledge of solving engineering problems by using numerical Technique

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UNIT-I   **8 Hours**
Integral Calculus
Introduction to Integral Calculus in Mechanical Engineering applications:
Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area by double integral and volume by triple integral.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Evaluation of Euler's integrals of first and second kind.

Self-Study: Duplication formula, Center of gravity.

Applications: Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models.
(RBT Levels:L1, L2 and L3)

UNIT-II   **8 Hours**
Vector Calculus
Introduction to Vector Calculus in Mechanical Engineering applications.
Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector identities.
Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Green's theorem and Stoke's theorem (no proof).

Self-Study: Volume integral and Gauss divergence theorem.

Applications: Heat and mass transfer, oil refinery problems, environmental engineering, velocity and acceleration of moving particles, analysis of streamlines.
(RBT Levels: L1, L2 and L3)

UNIT-III   **8 Hours**
Partial Differential Equations (PDE's):
Importance of partial differential equations for Mechanical Engineering application.
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. Method of separation of variables.Solution of one-dimensional heat equation and wave equation by the method of separation of variables.

Self-Study: Derivation of one-dimensional heat equation and wave equation, Fourier series
Applications: Vibration of a rod/membrane and boundary problem
(RBT Levels: L1, L2andL3)

UNIT-IV   **8 Hours**

Numerical methods-1:

Importance of numerical methods for discrete data in the field of Mechanical Engineering.

Finite differences: Interpolation using Newton's forward and backward difference formulae, Guass Forwards and Backwards formula Newton's divided difference formula (no proof).

Numerical differentiation: Numerical differentiation using Newton's forward and backward interpolation formulae,(no proof)

Numerical integration: Trapezoidal rule, Simpson's $(\frac{1}{3})^{rd}$ rule, Simpson's $(\frac{3}{8})^{th}$ rule, and Weddle's rule (no proof)

Self-Study: Sterling's formula, Lagrange's interpolation and Lagrange's inverse Interpolation formula. Boole's rule

Applications: Finding approximate solutions to solve mechanical engineering problems involving numerical Input output data.

(RBT Levels: L1, L2 and L3)

UNIT-V   **8 Hours**

Numerical methods -2:

Introduction to various numerical techniques for handling Mechanical Engineeringapplications.

Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (no proof), Ramanujan's method.

Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (no proof).

Self-Study: Bisection method. Euler's method Adam-Bashforth method, Picard's method, N-R method for Repeated roots.

Applications: Finding approximate solutions to solve mechanical engineering problems.

Semester

> **COURSE OUTCOMES:** On completion of the course, student should be 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   and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

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

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

2. E.Kreysizig, Advanced Engineering Mathematics, John Wiley
    and sons,10th Ed.(Reprint) 2016.

REFERENCE BOOKS
1. V. Ramana: Higher Engineering Mathematics, McGraw–Hill Education,11th Ed..
2. H.C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., NewDelhi.

N.P. Bali and Manish Goyal, A textbook of Engineering
Mathematics, Laxmi Publications, Reprint, 2010

ONLINE RESOURCES
1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://ocw.mit.edu/courses/18-085-computational-science-and-engineering-i-fall 2008/resources/lecture-28-fourier-series-part-1/
4. https://www.thefouriertransform.com/
5. 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	Program to compute surface area, volume and centre of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
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/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta 4th order and Milne's predictor-corrector method

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - 2022 -2023

Course Title	**Mathematics-II for Electrical & Electronics Engineering Stream**							
Course Code	**22MAU201D**							
Category	**Mathematics-II for Computer Science and Engineering Stream**							
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: 03Hours**			

UNIT-I	**8 Hours**

Vector Calculus
Introduction to Vector Calculus in EC & EE engineering applications.
Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields.
Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem.
Self-Study: Volume integral and Gauss divergence theorem.
Applications: Conservation of laws, Electrostatics, Analysis of streamlines and electric potentials.
(RBT Levels: L1, L2 and L3)

UNIT-II	**8 Hours**

Vector Space and Linear Transformations
Importance of Vector Space and Linear Transformations in the field of EC & EE engineering applications.
Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension.
Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Rank and nullity of a linear operator, Rank-Nullity theorem.
Inner product spaces and orthogonality.
Self-study: Angles and Projections. Rotation, reflection, contraction and expansion.
Applications: Image processing, AI & ML, Graphs and networks, computer graphics.
(RBT Levels: L1, L2 and L3)

UNIT-III	**8 Hours**

Laplace Transform
Importance of Laplace Transform for EC & EE engineering applications.
Existence and Uniqueness 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 (square wave, saw-tooth wave, triangular wave, full & half wave rectifier), Heaviside Unit step function, Unit impulse function.

Inverse Laplace Transforms:
Definition, properties, evaluation using different methods, convolution theorem (without proof) and applications to solve ordinary differential equations.
Self-Study: Verification of convolution theorem.
Applications: Signals and systems, Control systems, LR, CR & LCR circuits.
(RBT Levels: L1, L2 and L3)

UNIT-IV	8 Hours

Numerical methods -1
Importance of numerical methods for discrete data in the field of EC & EE engineering applications.
Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae).
Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and
Lagrange's interpolation formula (All formulae without proof).
Numerical integration: Weddle's rule, Simpson's $(1/3)_{rd}$ and $(3/8)_{th}$ rules (without proof).
Self-Study: Bisection method, Lagrange's inverse Interpolation, Trapezoidal rule.
Applications: Estimating the approximate roots, extremum values, Area, volume and surface area.
(RBT Levels: L1, L2 and L3)

UNIT-V	8 Hours

Numerical methods -2
Introduction to various numerical techniques for handling EC & EE applications.
Numerical Solution of Ordinary Differential Equations (ODEs):
solution of first order and first degree – Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor corrector formula (No derivations of formulae).
Self-Study: Adam-Bashforth method, Picard's method.
Applications: Estimating the approximate solutions of ODE for electric circuits.
(RBT Levels: L1, L2 and L3)

COURSE OUTCOMES: On completion of the course, student should be able to:
CO1: Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO2: Demonstrate the idea of linear dependence and independence of sets in the vector space and linear transformation.
CO3: To understand the concept of Laplace transform and to solve initial value problems.
CO4: Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO5: Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB.

Textbooks

1. B.S.Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, NewDelhi.
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5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
7. James Stewart: "Calculus" Cengage Publications, 7th Ed., 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.

   ONLINE RESOURCES:

   - http://nptel.ac.in/courses.php?disciplineID=111
   - http://www.class-central.com/subject/math(MOOCs)
   - http://academicearth.org/
   - VTU e-Shikshana Program
   - VTU EDUSAT Program

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

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7	Interpolation/Extrapolation using Newton's forward and backward difference formula

8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1										
CO2	2	2										
CO3	2	2										
CO4	1	3										
CO5	1	3										
Strength of correlation: Low-1, Medium-2, High-3												

Course Title	**Applied Physics**					
Course Code	**22PHU102A** **Civil Engineering**					
Category	Applied Science Course (ASC) (IC)					
Scheme and Credits	No. of Hours/Week				Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+ 10-12 lab	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, 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 solid cylinder (derivation). Torsional Pendulum: Expression for period of oscillation and Rigidity modulus (derivation). Bending of Beams: Definition of beam, neutral surface and neutral axis. Expression for bending moment of a beam (derivation). Expression for Young's modulus of the material of a single cantilever (derivation). 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. Numerical problems.

Pre-requisites: Simple Harmonic motion   **Self-learning:** Applications of damping in Engineering

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). Requisites of a laser system. Condition for laser action. Principle, construction and working of He-Ne laser. Mention the applications of laser. 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: Properties of light   **Self-learning:** Propagation Mechanism &TIR in optical fiber

UNIT IV	**8 hours**

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 (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 landslide, 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 Self-learning: Richter scale.

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

TEACHING and LEARNING PROCESS: Chalk and Talk, Power Point presentation, Animations and videos and experimental learning in Laboratory.

Course outcome (Course Skill Set)	
At the end of the course the student will be able to:	
CO1	Elucidate the concepts in elasticity and vibrations
CO2	Discuss the principles of photonic devices and their application relevant to Civil engineering
CO3	Summarize concepts of acoustics in buildings and explain the concepts in radiation and photometry
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. 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. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
5. Building Science:Lighting and Acoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltc.,
6. Building Acoustics: Tor Eric Vigran, Taylor and Francis, 2008 Edition.
7. Lasers and Non-Linear Optics, B B Loud, New Age Internationals, 2011 edition
8. An Introduction to Disaster Management, Natural Disaster & Man-Made Hazards, S. Vaidyanathan,
9. IKON Books P
10. Natural Hazards, Edward Bryant, Cambridge University Press, 2nd Edition
11. Natural hazards, Earthquakes, Volcanoes, and landslides by Ramesh P Singh, and Darius Bartlett, CRC Press, Taylor and Francis group.
12. Principles of Fire Safety Engineering Understanding Fire & Fire Protection, Akhil Kumar Das, PHI Learning, II Edition.
13. Disaster Management, R.Subramanian, S. Chand Publishing, 2018.

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

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. Landslidehazards: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.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	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-		-	-	-	-	-	-	-
CO5	3	2	-	-	--	-	-	-	-	-	-	-

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title	**Applied Physics**						
Course Code	**22PHU102B** **CS/IS/AI&ML/CSBS**						
Category	Applied Science Course (ASC) (IC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+ 10-12 Lab	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**
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). Requisites of a laser system. Condition for laser action. Principle, construction and working of Semiconductor diode laser. Mention the applications of laser, Numerical problems.
Optical fibers: Propagation mechanism in 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: Properties of light   **Self-learning:** Propagation Mechanism &TIR in optical fiber

UNIT II   **8 hours**
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. Numerical problems.
 Pre-requisite: Blackbody radiations   **Self-learning:** Planck law of radiation, Photoelectric effect

UNIT III   **8 hours**
Quantum Mechanics: Heisenberg's uncertainty principle and its physical significance. Application of uncertainty principle: Non-confinement of electron in the nucleus. Wave function. Properties andPhysical significance of a wave function. Probability density and Normalization of wave function. Settingup 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.
 Pre-requisite: Wave-Particle dualism   **Self-learning:** The Davisson–Germen experiment

1

UNIT IV	8 hours

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.

Dielectric properties: Introduction to dielectrics: types of dielectrics, polarization, polarizability, dielectric constant, relation between dielectric constant and polarizability. Polarization mechanism and types of polarization. Derivation of equation for internal field in liquids and solids (1-Dimensional). Expression for Clausius -Mossotti equation (Derivation). Numerical problems.

  Pre-requisite: Review of Classical free electron theory(CFET)

  Self-learning: Electrical conductivity based on CFET

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, Josephson Junction, , Applications of super conductors: Super conducting magnets, Maglev vehicles, SQUIDs and Quantum computing. Numerical problems.

Pre-requisites: Basics of Electrical conductivity	**Self-learning:** Resistivity and Mobility

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. 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. GNU Step Interactive Simulations
12. Study of motion using Spread sheets
13. Application of Statistic using Spread Sheets
14. PHET Interactive Simulations

  TEACHING and LEARNING PROCESS: Chalk and Talk, Power Point presentation, Animations and 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: Discuss the basic principles of Modern Physics and Quantum Mechanics

CO3: Understand the properties of Electrical, Dielectric materials.

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.

2

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	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - 2022 -2023

Course Title	**Applied Physics**					
Course Code	**22PHU102C (ME/AE/IEM)**					
Category	Applied Science Course (ASC) (IC)					
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 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 solid cylinder (derivation). Torsional Pendulum: Expression for time period of oscillation and Rigidity modulus (derivation). Bending of Beams: Definition of beam, neutral surface and neutral axis. Expression for bending moment of a beam (derivation). Expression for Young's modulus of the material of a single cantilever (derivation). 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. Numerical problems.

Pre-requisites: Simple Harmonic motion   **Self-learning:** Applications of damping in Engineering

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). Requisites of a laser system. Condition for laser action. Principle, construction and working of Semiconductor diode laser. Application of Laser in welding, cutting and drilling. Numerical problems.

Optical fibers: Propagation mechanism in 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: Properties of light   **Self-learning:** Propagation Mechanism &TIR in optical fiber

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, Shearer's formula to find the size of the nanomaterial (derivation). Properties of

nanomaterials: 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: Principle of electron microscope, Scanning Electron Microscopy (SEM) and applications, Transmission Electron Microscope (TEM) and applications. Atomic Force Microscopy (AFM) and applications.
Spectroscopy Techniques: UV-Visible spectroscopy and applications, Fourier Transform Infra-Red spectroscopy (FTIR) and applications, X-ray photoelectron spectroscopy (XPS) and applications.

Pre-requisites: Fundamentals of optical microscopy   **Self-learning:** Difference between SEM & TEM

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

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

Course outcome (Course Skill Set)	
At the end of the course the student will be able to:	
CO1	Elucidate the concepts Elasticity and Vibrations.
CO2	Discuss the fundamentals of Lasers and optical fibers.
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
2. Timoshenko, S. and Goodier J.N. "Theory of Elasticity", 2nd Edition, McGraw Hill Book Co, 2001.

3. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, 1997

4. Mechanical Properties of Engineered Materials By Wole Soboyejo, CRC Press; 1st edition, 2002

5. Materials Characterization Techniques-Sam Zhang, Lin Li, Ashok Kumar, CRC Press, First Edition, 2008.

6. Characterization of Materials- Mitra P.K . Prentice Hall India Learning Private Limited.

7. 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. Materialcharacterization: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	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	--	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title	**Applied Physics**						
Course Code	**22PHU102D (ECE/EIE/ET/EEE)**						
Category	**Applied Science Course (ASC) (IC)**						
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**

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). Requisites of a laser system. Condition for laser action. Principle, construction and working of Semiconductor diode laser. Mention the applications of laser. Numerical problems.

Optical fibers: Propagation mechanism in 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: Properties of light   **Self-learning:** Causes for Attenuation

UNIT II	**8 hours**

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. Numerical problems.

 Pre-requisite: Blackbody radiations   **Self-learning:** Planck law of radiation, Photoelectric effect

UNIT III	**8 hours**

Quantum Mechanics: Heisenberg's uncertainty principle and its physical significance. Application of uncertainty principle: Non-confinement of electron in the nucleus. Wave function. Properties andPhysical significance of a wave function. Probability density and Normalization of wave function. Settingup 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.

 Pre-requisite: Wave-Particle dualism   **Self-learning:** The Davisson–Germen experiment

UNIT IV	**8 hours**

Electrical properties of Semiconductors	**8 hours**

Fermi level in intrinsic and extrinsic semiconductors. Expression for concentration of electrons in conduction band (derivation). Expression for concentration of holes in valence band, Law of mass action. Expression for Electrical conductivity of intrinsic semiconductor (derivation). Hall effect, Expression for Hall Voltage, Hall coefficient (derivation) and its application. Numerical problems.

Pre-requisite: Basics of Semiconductors	**Self-learning:** Semiconductor devices

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, Josephson Junction, Applications of Super conductors: Super conducting magnets, Maglev vehicles, SQUIDs and Quantum computing. Numerical problems.

Pre-requisites: Basics of Electrical conductivity, dielectrics	**Self-learning:** Resistivity and Mobility

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. 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

TEACHING and LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos and experimental learning in Laboratory.

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:// **Laser:** https://nptel.ac.in/courses/115/102115102124/
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

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.

CO-PO Mapping :

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	-	-	--	-	-	-	-	-	-	-
CO5	3	2	--	--	--	-	-	-	-	-	-	-

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Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Chemistry
Scheme and Syllabus - 2022 -2023

Course Title	**APPLIED CHEMISTRY**					
Course Code	**22CHU102A ME/AE/ IEM**					
Category	Applied Science Course (ASC) (IC)					
Scheme andCredits	No. of Hours/Week				Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+ 10-12 lab	04
CIE Marks: 50	**SEE Marks: 50**	**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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 content
UNIT I : Electrode Systems and Corrosion Science   **8 hours**
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.**
Unit – II : Energy conversion and Storage   **8 hours**
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 Lithium ion batteries. **Self-study: Fuel cells and Zinc-Air, Na-Ion batteries.**
Unit –III : Macromolecules for Engineering application   **8 hours**
Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Introduction to Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (Tg) –significance and factors affecting Tg, compounding of resins into plastics. Synthesis and applications- PMMA, Polyurethane, 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.
Self-study: Polycarbonates, Recycling of PET.

Unit – IV : Materials for Engineering Applications	**8 hours**

Alloys: Introduction, classification, composition, properties and applications of stainless steel, solders, brass, alnico and shape memory alloys.

Ceramics: Introduction, classification based on chemical composition, properties and applications of perovskites.

Lubricants: Introduction, classification, properties and applications of lubricants.

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 (ZrO_2), chemical vapor deposition methods (CNTs). Graphene by Hummer's method – properties and applications.

Self-Study: Abrasives

Unit – V : Phase Rule, Water Treatment and Analytical Techniques	**8 hours**

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,

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.

Analytical Techniques - Principle, Instrumentation and applications of Colorimetry (Copper), Potentiometry(FAS estimation), Conductometry (Acid Mixtures).\

Self-Study: Solid waste management.

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**
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, Macmilan publisher India limited
7. Engineering Chemistry by Jayaprakash and Venugopal Subhash Publications.
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.

    Refrence Books

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
A – Compulsory Experiments:	
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 CuSO4 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).
	B – Demonstration (offline/virtual)
1	Determination of rate of corrosion of mild steel by weight loss method.
2	Synthesis of oxide nanoparticles.
3	Synthesis of polyaniline and its conductivity measurement.
	C – Open Ended Experiments:
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 Chemistry
Scheme and Syllabus - 2022 -2023

Course Title	**Applied Chemistry**					
Course Code	**22CHU102B** (ECE/EIE/ET/EEE)					
Category	Applied Science Course (ASC) (IC)					
Scheme andCredits	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 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.

Unit I : Electrode Systems and Corrosion Science	**8 hours**

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.

Unit – II : Energy Conversion and Storage	**8 hours**

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 Lithium ion batteries.

Self-study: Fuel cells and Zinc-Air, Na-Ion batteries.

Unit –III : Macromolecules for Engineering application	**8 hours**

Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Introduction to Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (Tg) –significance and factors affecting Tg, compounding of resins into plastics. Synthesis and applications- PMMA, Polyurethane, 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.

Self-study: Polycarbonates, Recycling of PET.

<u>Unit – IV :</u> **Nano Technology, Sensors and e-waste management**	**8 hours**

Nano Technology: Introduction, size dependent properties of nanomaterials (Surface area, Catalytic, Conducting), preparation of nanomaterials by sol-gel (TiO_2), chemical vapour deposition (CVD) method (CNTs and GO by Hummer's Method).

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.

E-waste Management: Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling. Extraction of copper from e-waste.

Self-study: Micro-electromechanical system (MEMS), Nanoelectromechanical systems (NEMS).

<u>Unit – V :</u> **Electronic Materials and Display System**	**8 hours**

Conductors, Semiconductors and Insulators: Introduction, Band theory and examples.
Semiconductors: production of electronic grade silicon, Refining- Float Zone method and Czochralski process.

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).

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.

Self-study: Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminum (Al), and Brominated flame retardants in computers.

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**
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
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NPTEL/SWAYAM/MOOCs
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Practical Module

Sl. No.	Syllabus content
	A – Compulsory Experiments:
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 CuSO4 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).
	B – Demonstration (offline/virtual)
1	Determination of rate of corrosion of mild steel by weight loss method.
2	Synthesis of oxide nanoparticles.
3	Synthesis of polyaniline and its conductivity measurement.
	C – Open Ended Experiments:
1	Design an experiment to Identify the presence of proteins in given sample.
2	Determination of glucose by electrochemical sensors.

References Books:

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- https://youtu.be/OwZbw6Mhrqc
- https://youtu.be/UOLOsKZxi6Y

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Chemistry

Scheme and Syllabus - 2022 -2023

Course Title	**Applied Chemistry**						
Course Code	**22CHU102C**		**Civil Engineering**				
Category	Applied Science Course (ASC) (IC)						
Scheme andCredits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+ 10-12 lab	04
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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.

Unit I :Electrode Systems and Corrosion Science   **8 hours**

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.

Unit – II : Energy conversion and Storage   **8 hours**

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 Lithium ion batteries.

Self-study: Fuel cells and Zinc-Air, Na-Ion batteries.

Unit –III : Macromolecules for Engineering application   **8 hours**

Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Introduction to Molecular weight - number average and weight

average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (Tg) –significance and factors affecting Tg, compounding of resins into plastics. Synthesis and applications- PMMA, Polyurethane, 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.
Self-study: Polycarbonates, Recycling of PET.

Unit – IV : Structural Materials   8 hours

Metals and Alloys: Introduction, Properties and application of Iron and its alloys(any two), Aluminium(any two) and its alloys. **Cement:** Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement. **Geo polymer concrete**: Introduction, synthesis, constituents, properties and applications.

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.

Self-study: Chemistry of reinforced concrete

Unit – V : Water Technology, Phase rule and Analytical Techniques   8 hours

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.

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,

Analytical techniques: - Principle, Instrumentation and applications of Colorimetry (Copper),Potentiometry (FAS estimation using $K_2Cr_2O_7$), Conductometry (Acid Mixtures).

Self-Study: Solid waste management.

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
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.
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NPTEL/SWAYAM/MOOCs
1. **http://nptel.ac.in/**
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Practical Module

Sl. No.	Syllabus content
	A – Compulsory Experiments:
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 CuSO4 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).
B – Demonstration (offline/virtual)	
1	Determination of rate of corrosion of mild steel by weight loss method.
2	Synthesis of oxide nanoparticles.
3	Synthesis of polyaniline and its conductivity measurement.
C – Open Ended Experiments:	
1	Design an experiment to Identify the presence of proteins in given sample.
2	Determination of glucose by electrochemical sensors.

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VIRTUAL LAB LINK DETAILS:

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Chemistry
Scheme and Syllabus - 2022 -2023

Course Title	**Applied Chemistry**					
Course Code	**22CHU102D (CS/CS-BS/IS/AIML)**					
Category	Applied Science Course (ASC) (IC)					
Scheme andCredits	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 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.

Unit I : Electrode Systems and Corrosion Science	**8 hours**
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.**	

Unit – II : Energy : Sources, Conversion and Storage	**8 hours**
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 Lithium ion batteries. **Self-study: Fuel cells and Zinc-Air, Na-Ion batteries.**	

Unit –III : Polymers for Engineering Applications	**8 hours**
Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Introduction to Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (Tg) –significance and factors affecting Tg, compounding of resins into plastics. Synthesis and applications- PMMA, Polyurethane, 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.

Self-study: Polycarbonates, Recycling of PET.

Unit – IV : Materials for Memory and Display Systems	8 hours

Memory Devices: Introduction, concepts of electronic memory. Classification of electronic memory materials (organic molecules, polymeric materials, organic-inorganic hybrid materials).

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.

Self-study: Properties and functions of Silicon (Si), Germanium (Ge) and Brominated flame retardants in computers.

Unit – V : Sensors, Water treatment and E-waste management	8 hours

Sensors: Introduction, Construction, working and applications of conductometric sensors, Electrochemical sensors, Optical sensors.

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.

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 copper from E-waste.

Self-study: Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminum (Al), and Brominated flame retardants in computers.

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
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,
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Practical Module

Sl. No.	Syllabus content
A – Compulsory Experiments:	
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)

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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.
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2	Synthesis of oxide nanoparticles.
3	Synthesis of polyaniline and its conductivity measurement.
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Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Civil Engineering
Scheme and Syllabus - 2022 -2023

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	**8 Hours**

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.

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
Scheme and Syllabus –2022 -2023

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_ijj2Eub-UHs_y

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	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															

Course Title	**Basic Electronics**					
Course Code	**22ECT103/203 (ECE AND ALLIED BRANCHES)**					
Category	**Engineering Science Course (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 OBJECTIVES: Students will be taught
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.

UNIT-I   **8 hours**
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 Line 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 Half-Wave Rectifier, Full-Wave Rectification-Two-Diode Full-Wave Rectifier, Bridge Rectifier, RC AND LC Power Supply Filters-RC π FILTER (Text 1)
Zener Diodes: Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulators, Regulator Circuit with No Load, Loaded Regulator, Regulator Performance (Text 1)

UNIT-II   **8 hours**
Bipolar Junction Transistors: Introduction, BJT Operation- pnp and npn Transistors, npn and pnp Transistor 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)

UNIT-III   **8 hours**
Amplifiers: Single-Stage CE Amplifier-Specification, Selection of IC, RC, and RE, Bias Resistors, Bypass Capacitor, Coupling Capacitors. (Text 1)
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)

	UNIT-IV	8 hours

UNIT-IV   **8 hours**
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, Adders, Subtractors (Text 3)

UNIT-V   **8 hours**
Synchronous Sequential Logic: Introduction, Flip-flops, Registers, Counters and Memory Unit-
Introduction, Registers, Shift registers, Ripple Counters, Synchronous counters. (Text 4)
Communications: Introduction to communication, Communications, Communication System,
Modulation-Description, Need for modulation, Amplitude Modulation – Amplitude Modulation
theory, Representation of AM, Frequency Modulation - Theory of Frequency and Phase Modulation,
Descriptionof systems. (Text 5)

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

CO1: Explain the basic knowledge on construction, operation and characteristics of
semiconductorDevices.
CO2: Apply the acquired knowledge to construct small scale circuits consisting of
semiconductorDevices
CO3: Construct basic digital circuit by making use of basic gates and their functions.
CO4: Explain the conceptual blocks of basic communication system and representation of
differenttypes of modulation.
CO5: Illustrate the concepts of various sequential logic circuits and their working principles.

TEXT BOOKS
1. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016.
2. Op-amps and Linear Integrated Circuits, Ramakanth A Gayakwad,
PearsonEducation, 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 BOOK
1. Mitchel E. Schultz, 'Grob's Basic Electronics', 11th Edition, McGraw-Hill, 2011.
2. Electronic Instrumentation and Measurements (3rd Edition) – David A.
Bell, OxfordUniversity Press, 2013.

ONLINE RESOURCES
1. https://onlinecourses.nptel.ac.in/noc21_ee55/preview.

MODERN TOOLS:
1. PSPICE

MAPPING of COs with POs:

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

Dr. Ambedkar Institute of Technology, Bengaluru-56
Department of Computer Science & Engineering
Scheme and Syllabus - 2022 -2023

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*T*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	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.

Conditions to calculate tax, if yearly salary is:

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		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:

Demanded quantity of foodstuff:

	roll	bun	cake	bread
P_1	6	5	3	1
P_2	3	6	2	2
P_3	3	4	3	1

Prices in shops S_1 and S_2:

	S_1	S_2
roll	1.50	1.00
bun	2.00	2.50
cake	5.00	4.50
bread	16.00	17.00

MATRIX MULTIPLICATION

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)

10	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. Note: Using array of structures.

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 flowchar**t, apply** logical skills to design
and develop algorithms/flow charts to solve real- world problem**s.**

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

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

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.

Application on projections of Lines & Planes (Not for SEE)

UNIT II	12 hours

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.

Projections of Frustum of cone, pyramid & truncated sphere (Not for SEE)

UNIT III	10 hours

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.

UNIT IV	10 hours

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.

Problems on applications of development of lateral surfaces like funnels, trays, transition pieces connecting circular duct and rectangular duct (Not for SEE)

UNIT V	08 hours

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.

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.		

QUESTION PAPER PATTERN FOR SEMESTER END EXAMINATION (SEE)								
UNIT	1		2		3		4	
Max. Marks	15		15		10		10	
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8

NOTE:
1. Two Full Questions to be set from each Unit with internal choice.
2. Each Full question shall cover all the topics of the Unit.
3. Unit 1 and Unit 2 to have both manual sketching and computer solution/print out.
4. Unit 3 and Unit 4 to have only manual sketching.
5. Model question paper may be referred for distribution of topics in each Full Question.

Scheme of Evaluation for Semester End Examination (SEE)			
Unit	Maximum Marks	Manual Sketching	Computer solution and print out
1	15	07	08

2	15	07	08
3	10	10	--
4	10	10	--
Total	**50**	**34**	**16**

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

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.

UNIT-I   ENERGY AND ENERGY SYSTEMS   10 hours

Sources of energy: Classification, renewable and non- renewable sources of energy and comparison.

Steam: Steam formation at a constant pressure: properties of steam, simple numerical problems to understand the use of steam tables.

Power generating systems: Introduction, construction and working of: Steam turbines – Impulse and reaction turbine, Gas turbines – Open and closed cycle,

Harnessing of renewable energy sources: Wind energy, Geothermal energy, Tidal energy, Ocean thermal energy, Bio-mass and their applications

Power absorbing systems: Introduction, classification to pumps and compressors.

UNIT-II   MACHINE TOOL OPERATIONS   10 hours

Manufacturing process: Introduction and classification of manufacturing process.

Machine tools: Lathe - Working principle and specification of center lathe. Sketch and description of operations performed – turning, facing, knurling, thread cutting, drilling, taper turning.

Milling machine: Principle of milling, types, working of horizontal and vertical milling machine. Milling process- plane milling, end milling, slot milling and angular milling.

Computer numerical controlled machines: Introduction, types and operations performed and application on CNC.

Part programming using G Codes and M codes.

Robotics: Introduction, classification based on robot's configuration, polar, cylindrical, Cartesian coordinate and spherical, application, advantages and disadvantages.

UNIT-III INTERNAL COMBUSTION ENGINES AND REFRIGERATION	10 hours

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.
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.

UNIT-IV MECHANICAL POWER TRANSMISSION AND JOINING PROCESS	10 hours

Mechanical Power Transmission: Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, simple and compound gear trains (simple numerical problems)

Belt Drives: Introduction, Types of belt drives (Flat and V-Belt Drive), length of the belt and tensions ratio (simple numerical problems)
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.

UNIT-V FUTURE MOBILITY TECHNOLOGY AND MECHATRONICS	10 hours

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.

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Joints & links, Robot anatomy, Applications of Robots in material handling, processing and assembly and inspection.

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 nd 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.
CO5: Know the principle, application and aspects of future mobility and fundamentals of robotics.
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):

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											

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	40	03
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	8 Hours

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.

UNIT – II	8 Hours

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.

UNIT – III	8 Hours

Analysis of force systems:
Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution 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:

• 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
Scheme and Syllabus - 2022 -2023

Course Title	**INTRODUCTION TO ELECTRICAL ENGINEERING**					
Course Code	**22EST104B/204B**					
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	

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

(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)

(iv) 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														

Course Title	**Introduction to Electronics Engineering**						
Course Code	**22EST104C/204C**						
Category	Theory						
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:

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.

UNIT I	08 hours

Power Supplies –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltageregulators, Output resistance and voltage regulation, Voltage multipliers., Numerical

Amplifiers – CE amplifier with and without feedback, Multi-stage amplifier; BJT as a switch: Cut-off and saturation modes. (Text 1)

UNIT II	08 hours

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator,Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations) Numerical

Operational amplifiers - Ideal op-amp; characteristics of ideal and practical op-amp; Practical op- ampcircuits: Inverting and non-inverting amplifiers, voltage follower, summer, subtractor, integrator, differentiator. (Text 1) Numerical

UNIT III	08 hours

Binary Systems: Binary numbers, Number Base Conversion, octal & HexaDecimal Numbers, Complements.
Boolean Algebra and Logic Circuits: Basic definitions, Axiomatic Definition of Boolean Algebra, BasicTheorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms,Other Logic Operations, Digital Logic Gates (Text 2: 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5,
2.6, 2.7)
Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder (Text 2: 4.1, 4.2, 4.3)

UNIT IV	08 hours

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 2)
Sensors and Interfacing – Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (Text 3)

UNIT V	08 hours

Analog Communication Schemes – Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM, FM, Concept of Radio wave propagation (Ground, space, sky).

Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques. (Text 4)

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

CO1: Understand/ analyse/design the diode based and transistor based circuits like Power supplies,Amplifiers.

CO2: Analyse and design transistor based Oscillator**s** 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: Understand the operation and applications of modern communication systems.

TEXT BOOKS
1. Mike Tooley, 'Electronic Circuits, Fundamentals & Applications', 4th Edition, Elsevier, 2015. DOIhttps://doi.org/10.4324/9781315737980. eBook ISBN9781315737980
2. Digital Logic and Computer Design, M. Morris Mano, 2nd 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 BOOK
1. Mitchel E. Schultz, 'Grob's Basic Electronics', 11th Edition, McGraw-Hill, 2011.

ONLINE RESOURCES
1. https://onlinecourses.nptel.ac.in/noc21_ee55/preview

MODERN TOOLS:
1. PSPICE

MAPPING of COs with POs

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

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

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

Course Title	**INTRODUCTION TO MECHANICAL ENGINEERING**						
Course Code	**22EST104D/204D**						
Category	**Mechanical**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SDA	Total		
	3	0	0	0	3	40	03
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.

UNIT-I 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.	
UNIT-II 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. (No sketches of machine tools, sketches to be used only for explaining the operations). **Introduction to Advanced Manufacturing Systems:** Introduction, components of CNC, advantages and applications of CNC, 3D printing.	
UNIT-III 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.	
UNIT-IV ENGINEERING MATERIALS AND JOINING PROCESS	**8 hours**
Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer. Shape Memory Alloys. **Joining Processes**: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.	

UNIT-V 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.
5. Dr SRN Reddy, Rachit Thukral and Manasi Mishra, " Introduction to Internet of Things: A Practical Approach", ETI Labs.
6. Raj kamal, " Internet of Things: Architecture and Design", McGraw hill.

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

CO1: Explain the concepts of Role of Mechanical Engineering and Energy sources.
CO2: Describe the Machine Tool Operations and advanced Manufacturing process.
CO3: Explain the Working Principle of IC engines and EV vehicles.
CO4: Discuss the Properties of Common Engineering Materials and various Metal Joining Processes.
CO5: Explain the Concepts of Mechatronics, Robotics and Automation in IoT.

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):

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 Computer Science & Engineering
Scheme and Syllabus - 2022 -2023

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*T*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 Search for an employee in the list using Binary Search Technique. Note: Use 2-D character array to store Bank employees names
7	a	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. Conditions to calculate tax, if yearly salary is:

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		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:

Demanded quantity of foodstuff:

	roll	bun	cake	bread
P_1	6	5	3	1
P_2	3	6	2	2
P_3	3	4	3	1

Prices in shops S_1 and S_2:

	S_1	S_2
roll	1.50	1.00
bun	2.00	2.50
cake	5.00	4.50
bread	16.00	17.00

MATRIX MULTIPLICATION

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)

10		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. Note: Using array of structures.

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

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

MAPPING of COs with POs

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

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	**22ETT1051/2051**						
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 Attackes, Attacks on Wireless networks.

UNIT IV	8 hours

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

UNIT V	9 hours

Understanding Computer Forensics: Introdcution, 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

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

Course Title	**Introduction to Internet of Things (IoT)**						
Course Code	**22ETT1052/2052**						
Category	**Theory - 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:
1. Understand about the fundamentals of IoT and its building blocks along with their characteristics.
2. Gain the knowledge of various sensors and actuators for IoT application.
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.

UNIT I	**08 hours**

 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

UNIT II	**08 hours**

 IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations,

SensingTypes, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.

 Textbook 1: Chapter 5–5.1 to 5.9

UNIT III	**08 hours**

 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

UNIT IV	**08 hours**

 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;

UNIT V	**08 hours**

 IOT Case Studies and Future Trends: Agricultural IoT – Introduction and , Case studies, Vehicular

IoT– Introduction, IoT Analytics- Introduction, Healthcare IoT – Introduction, Case studies.

 Textbook 1: Chapter 12-12.1-12.2, 13– 13.1, 14- 14.1-14.2, 17- 17.1

Note:
1. Unit 1,2,3,4, and Unit 5 will have the internal choice.
2. Two assignments are evaluated for 5 marks: Assignment1 – From Unit 1 and 2, Assignment2 from units 3,4and 5

Course Outcomes:

CO1. Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2. Classify various sensing devices and actuator types.
CO3. Illustrate architecture of IoT applications and communication.
CO4. Explain associated IoT Technologies.
CO5. Demonstrate the processing in IoT.

COs	Mapping with Pos
CO1	PO1, PO2, PO12
CO2	PO1, PO2, PO3, PO4, PO12
CO3	PO1, PO2, PO3, PO6, PO12
CO4	PO1, PO2, PO3, PO4, PO12
CO5	PO1, PO2, PO3, PO4, PO6, PO7, PO8, PO9, PO10, PO12

Text Books.

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press2021.

Reference Text Books.

1. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things andIndustry 4.0.CRC Press.
2. Vijay Madisetti 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 ConnectingEverything", 1st Edition, Apress Publications, 2013.

Web Links.

1. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/

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

Course Title	**RENEWABLE ENERGY SOURCES**						
Course Code	**22ETT1053/2053**						
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. *Text Book 1,2,3 and Reference Book 1*	
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. *Text Book 1,2,3 and Reference Book 1*	
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. *Text Book 1,2,3 and Reference Book 1*	
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. *Text Book 1,2,3 and Reference Book 1*	
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

1. www.mnre.org

2. www.renewableenergyworld.com

3. www.powergridindia.com

4. www.saurenergy.com

5. 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															

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

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, l e a c h a t e 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.

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	Tchobaanoglous, 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 Course (ETC)**					
Scheme & Credits	No. of Hours per week					Total Teaching hours	Cre dits
	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 - **Emerging Technology Course (ETC)**						
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, piezoploymer and piezo ceramic smart materials
4. To Acquire knowledge of Shape memory materials, Electro/Magneto Rheological materials

UNIT-I	**8 hours**
INTRODUCTION Overview of Engineering Materials- Definition, Classification of Smart Materials. Degree of Smartness, passive and active smartness. Application of Actuators and Sensors, smart systems.	
UNIT-II **8 hours** **PIEZOELECTRIC MATERIALS** 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.	
UNIT-III **8 hours** **SENSORS AND ACTUATORS** Piezoelectric materials as sensors and actuators, Principles of electromagnetic, acoustics, chemical and mechanical sensing and actuation, Types of sensors and their applications.	
UNIT-IV **8 hours** **SHAPE MEMORY MATERIALS** 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.	
UNIT-V **8 hours** **ELECTRO/MAGNETO RHEOLOGICAL MATERIALS and MEMs** **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):

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 Physics
Scheme and Syllabus - 2022 -2023

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), Optical Applications (Nano photonics), Agriculture and Food Applications,

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

Course outcome
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):https://nptel.ac.in/courses/118104008

1. https://www.digimat.in/nptel/courses/video/118104008/L16.html

2. https://archive.nptel.ac.in/courses/113/106/113106099/

3. https://nptel.ac.in/courses/112107283

4. https://onlinecourses.nptel.ac.in/noc22_me131/preview Practical Based learning (Any 5 experiments x 2 hours = 10 practical hours)

5. Preparation of silver nanoparticles and characterization of particle size by optical spectroscopy

6. Preparation of ZnO nanoparticles by combustion technique

7. Preparation of Al2O3 nanoparticles by precipitation method

8. Preparation of Silica nanoparticles by sol-gel method

9. Preparation of metal oxide nanoparticles by hydrothermal method

10. Determination of thermal conductivity of nanofluids using a thermal analyser

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	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	1	-	-	-	-	-	-	2
CO5	3	2	1	-	2	-	-	3	3	-	-	2

Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Course Title	**INTRODUCTION TO SUSTAINABLE ENGINEERING**				
Course Code	**22ETT1058 / 22ETT2058**				
Category	**Emerging Technology Course (ETC)**				
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	8 Hours

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.

UNIT – II	8 Hours

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.

UNIT – III	8 Hours

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.

UNIT – IV	8 Hours

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.

UNIT – V	8 Hours

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.

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, 1stEdn., 2020
2	Sustainability Engineering: Concepts, Design and Case studies, Prentice Hall, 1stEdn, 2015
3	System Analysis for sustainable Engineering: Theory and applications, Ni bin Chang, McGraw Hill Publications, 1stEdn., 2010
4	Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, 1stEdn., 2021
5	Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHI Learning Pvt. Ltd., 2ndEdn, 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
Scheme and Syllabus - CBCS – 2022 -2023

Course Title	**INTRODUCTION TO EMBEDDED SYSTEM**					
Course Code	**22ETT1059/22ETT2059**					
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	39	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:
1. Understand the basic concepts of embedded Systems.
2. Get exposure to typical embedded system concepts.
3. Familiarize the characteristics and quality attributes of Embedded Systems.
4. Understand the design and development concepts of a basic embedded system.
5. Get exposure to present trends of embedded system industry.

UNIT I	**7 hours**

Introduction to Embedded Systems: What is an Embedded System? Embedded Systems vs General Computing Systems, History of Embedded System, Classification of Embedded Systems, Major Application areas of Embedded Systems, Purpose of Embedded Systems. Wearable Devices—The Innovative Bonding of Lifestyle with Embedded Technologies.
TEXT 1

UNIT II	**10 hours**

Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System Components, PCB and Passive Components.
TEXT 1

UNIT III	**7 hours**

Characteristics and Quality Attributes of Embedded Systems: Characteristics of an Embedded system, Quality attributes of Embedded Systems.
Hardware Software Co-Design and Program Modelling:
Fundamental issues in Hardware Software Co-Design, Computational Models in Embedded Design. Electronic Design Automation (EDA) Tools (only introduction).
TEXT 1

UNIT IV	**7 hours**

Embedded Firmware Design and Development: Embedded Firmware Design Approaches, Embedded Firmware Development Languages, Integration of Hardware and Firmware, A typical embedded system development environment (Figure illustration), The Integrated Development Environment (IDE).
TEXT 1

UNIT V	**8 hours**

Trends in the Embedded Industry: Processor trends in embedded system, Embedded OS trends, Development Language Trends, Open Standards, Frameworks and Alliances, Bottlenecks, Development Platform Trends, Cloud, Internet of Things (IoT) and Embedded Systems – The Next Big Thing.
Design Case Studies: Digital camera, Embedded systems in automobile, Smart Card Reader, Automated Meter Reading System.
TEXT 1

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

CO1. Explain the basic concepts of embedded system.
CO2. Analyse different elements of a typical embedded system.
CO3. Explain characteristics, quality enhancing factors and importance of EDA tools related to embedded systems**.**
CO4. Apply embedded firmware design approaches, embedded firmware development languages concepts in designing simple embedded systems.
CO5. Evaluate the current trends of embedded industry and analyze domain specific examples of embedded systems through case studies.

TEXT BOOKS
1. Shibu K V, "Introduction to Embedded Systems", First Edition, Tata McGraw Hill Education Private Limited, 2009

REFERENCE BOOKS
1. Frank Vahid, Tony Givargis "Embedded System Design – A unified Hardware/Software Introduction", 2006

ONLINE RESOURCES
1. https://onlinecourses.nptel.ac.in

MAPPING of COs with POs

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

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	**8 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-II	**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-III	**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-IV	**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-V	8 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.
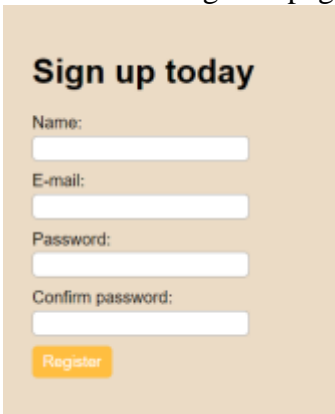**TextBook2: 8.2 to 8,13, 8.15, 8.16**

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
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 = x²-y² (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. Create a class called profit, and make it a background color of #f00.

	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: ~~The current price is 50₹~~ and new price is 40₹

6.	Change the tag li to have the following properties:
	    ● A display status of inline
	    ● A medium, double-lined, black border
	    ● No list style type
	Add the following properties to the style for li:
	    ● Margin of 5px
	    ● Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left
	Also demonstrate list style type with user defined image logos

7.	Create following web page using HTML and CSS with tabular layout **Sign up today** Name: E-mail: Password: Confirm password: Register
8.	Create following calculator interface with HTML and CSS 5789541257*653 ( ) C % 7 8 9 X 4 5 6 - 1 2 3 + 0 . / =
9.	Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay
10.	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.

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 |

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												

Faculty Incharge
1. Asha K N
2. Harish Kumar H C

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-I	**8 Hours**

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 *type ()* Function and Is Operator

Control Flow Statements: The *if,* if*…else, if…elif…else,* Nested *if* Statement, while Loop, the *for* Loop, the *continue* and *break* Statements
Textbook 1: Chapters 1,2,3

UNIT-II	**8 Hours**

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
Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods
Textbook 1: Chapters 4,5

UNIT-III	**8 Hours**

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
Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement,
Textbook 1: Chapter 6, 7

UNIT-IV	**8 Hours**

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-V   **8 Hours**   **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,

CO1: Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
CO2: Express proficiency in the handling of strings and functions.

CO3: Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.

CO4: Identify the commonly used operations involving file systems and Exception handling to develop efficient and error free codes.

CO5: Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.

TEXT BOOKS
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

REFERENCE BOOKS

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

ONLINE RESOURCES

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%203%20_%20400%20exercises%20and%20solutions%20for%20beginners.pdf

MAPPING of COs with POs

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

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 Exception

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 ArrayIndexOutOfBoundException.

TEACHING LEARNING PROCESS:

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

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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_h540QNf MkCQ0ho&index=44&t=0s**
2. **https://www.youtube.com/watch?v=FY3g4gGPhio&list=PLfn3cNtmZdPOe3R_wO_h540QNf MkCQ0ho&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												

Course Title	Introduction to C++ Programming					
Course Code	**22PLU105D/22PLU205D**					
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
- Understanding about object oriented programming and Gain knowledge about thecapability 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

1. Chalk and talk
2. Online demonstration
3. Hands on problem solving

UNIT-I	**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.	

UNIT-II	**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.	

UNIT-III	**8 Hours**
Inheritance: Defining derived class, single inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual base classes.	

UNIT-IV	**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.	

UNIT-V	**8 Hours**
Exception Handling: Introduction to Exception – Basics of Exception handling, Exception handling mechanism – Try, Throw and Catch, Re-throwing an Exception, Specifying Exception.	

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

CO1: Understand and design the solution to a problem using object oriented programming concepts.

CO2: Illustrate the concept of constructors, destructors and operator overloading.

CO3: Achieve code reusability and extensibility by means of Inheritance and Polymorphism

CO4: 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 besttwo 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 ofthe 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 methodof 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 marksCIE 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 **scaleddown 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 forthe subject (**duration 03 hours)**

- The question paper shall be set for 100 marks. The medium of the question paper shall beEnglish/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 maximumof 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. Themarks 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 bothin 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=BClS40yzssA   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 – 2022 -2023

Course Title	**COMMUNICATIVE ENGLISH**					
Course Code	**22ENT106**					
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 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	5 hours

Introduction to Communicative English, Fundamentals of Communicative English, Barriers to Effective Communicative English, Interpersonal Communication Skills, How to improve Interpersonal Communication Skills, Developing Interpersonal Skills. Grammar: Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Conjunctions & Interjection.

UNIT II	5 hours

Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exceptions in Question Tags and Exercises, Vocabulary: One Word Substitutes and Exercises, Synonyms and Antonyms, Exercises on it. Idioms & Phrases, Words often confused, Homophones, homonyms.

UNIT III	6 hours

Grammar: Articles – Definite & Indefinite articles, Word Pairs (Minimal Pairs), Situational dialogues: Self-introduction, greeting, thanking, accepting thanks, apologizing, invitations, making complaints, Wh-questions/ yes-no questions.

UNIT IV	5 hours

Communication Skills: LSRW Skills

UNIT V	5 hours

Speaking Skills**:** Extempore / Public Speaking, Oral Presentation, Role Plays Just a minute (JAM), Group Discussion, Persuasion Speech, Description.

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. 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												
CO2												
CO3												
CO4												
CO5												
Strength of correlation: Low-1, Medium- 2, High-3												

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 implement English vocabulary at command and ensure language proficiency, to achieve better Technical writing and Presentation skills, identify the common errors in speaking and writing English. Learn better sentence structures, acquire Employment and Workplace communication skills, to learn about Techniques of Information Transfer through presentation in different levels.

UNIT I	**4 hours**
Identifying Common Errors in Writing and Speaking English, Subject Verb Agreement (Concord Rules with Exercises), Common errors in Subject-verb agreement, Noun-pronoun agreement, Adjective, Adverb, Verb, Sequence of Tenses, Misplaced modifiers, Common errors in Conjunctions, Common errors in the use of Idioms and phrases.	

UNIT II	**6 hours**
Nature and Style of sensible writing, organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Redundancies & Clichés.	

UNIT III	**6 hours**
Technical Reading and Writing Practices, Effective Technical Reading and Writing Practices, technical Reports writing and Technical Proposals Writing, Grammar – Voice (Active and Passive Voices), Reported Speech, Vocabulary – Analogies, Words Confused/Misused, Collocations	

UNIT IV	**5 hours**
Communication for Employment, Components of a formal letter, Formats and types of business letters, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing and other recent communication types, Reading Skills and Reading Comprehension.	

UNIT V	**5 hours**
Communication at Workplace, Interpersonal Communication Skills, Non-Verbal Communication Skills (Body Language), Group Discussion and Employment Interviews, Presentation skills and Formal Presentations by Students, Dialogues in Various Situations (Practical Sessions by Students).	

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.
3. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018. Refer it's workbook for activities and exercises – "Communication Skills – I (A Workbook)" published by Oxford University Press – 2018.
4. A Course in Technical English, Cambridge University Press – 2020.

REFERENCE BOOKS

1. Professional Writing Skills in English, Infinite Learning Solutions – (Revised Edition) 2021.
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												
CO2												
CO3												
CO4												
CO5												
Strength of correlation: Low-1, Medium- 2, High-3												

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Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2022 -2023

Course Title	KANNADA – SAMSKRUTHIKA KANNADA (2022-2023) (Kannada Students)						
Course Code	**22SKT107/207**						
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. ಪದ್ಯ ವಿಷಯದ ಜೊತೆಗೆ ಮಾನವೀಯ ಮೌಲ್ಯಗಳು ,ಸಮಾಜಕ್ಕೆ ಕೊಡುಗೆಯನ್ನು ನೀಡಿದ ಮಹಾನ್ ವ್ಯಕ್ತಿಗಳ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಹಾಗು 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	**3hours**
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.	
ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ – ಕನ್ನಡ ಭಾಷೆಯ ಅಡಿಪಾಯ, ವಿರುದ್ಧಪದಗಳು ,ನಾಮಪದಗಳು.	

UNIT II	**3 hours**
ಈ ಪಾಠದಲ್ಲಿ ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ ಪೂರ್ವ) ದ ಬಗೆಗೆ ತಿಳಿಸಲಾಗುವುದು. ವಚನಗಳು, ಕೀರ್ತನೆಗಳು, ತತ್ವಪದಗಳ ಬಗೆಗೆ ತಿಳಿಸಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಧುನಿಕ ಪೂರ್ವ ಕಾಲದಕಾವ್ಯ ಸಾಹಿತ್ಯದ ಬಗೆಗೆ ತಿಳಿಯಲು ಸಹಾಯವಾಗುತ್ತದೆ.	
ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ – ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು ,ಲಿಂಗಪರಿಚಯ ಅಕ್ಷರದಿಂದ ಪದ, ಪದದಿಂದ ವಾಕ್ಯ.	

UNIT III	**3 hours**
ಈ ಪಾಠದಲ್ಲಿ ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ) ದ ಬಗೆಗೆ ತಿಳಿಸಲಾಗುವುದು. ಆಧುನಿಕ ಕಾಲದ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಕವಿಗಳು, ಕವನಗಳ ಬಗೆಗೆ ತಿಳಿಸಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಜೀವನದ ಸಾರಾಂಶದ ಬಗೆಗೆ ತಿಳಿಯಲು ಸಹಾಯವಾಗುತ್ತದೆ.	
ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ – ಏಕವಚನ ಮತ್ತು ಬಹುವಚನ, ತತ್ಸಮ ತದ್ಭವ.	

UNIT IV	**2 hours**
ಈ ಪಾಠದಲ್ಲಿ ತಾಂತ್ರಿಕ ಶಿಕ್ಷಣ, ವ್ಯಕ್ತಿ ಪರಿಚಯ, ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನದ ಬಗೆಗೆ ತಿಳಿಸಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳು ತಾಂತ್ರಿಕ ಶಿಕ್ಷಣದ ಜೊತೆಗೆ ವ್ಯಕ್ತಿಗಳು ಸಮಾಜಕ್ಕೆ ನೀಡಿದ ಕೊಡುಗೆ ಬಗೆಗ ತಿಳಿಯುತ್ತಾರೆ.	
ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ – ಅನುಕರಣಾವ್ಯಯ , ದ್ವಿರುಕ್ತಿ , ಜೋಡುನುಡಿ.	

UNIT V	**2 hours**
ಈ ಪಾಠದಲ್ಲಿ ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನದ ಬಗೆಗೆ ತಿಳಿಸಲಾಗುವುದು. ಕ ಮತ್ತು ಬ ಬರಹ ತಂತ್ರಾಂಶಗಳ ಬಗೆಗೆ, ಕನ್ನಡ ಕಂಪ್ಯೂಟರ್ ಶಬ್ದಕೋಶದ ಬಗೆಗೆ ತಿಳಿಸಲಾಗುವುದು. ತಾಂತ್ರಿಕ ಪದಕೋಶ ಮತ್ತು ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳ ಬಗೆಗೆ ವಿವರಿಸಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಕನ್ನಡ ತಂತ್ರಾಂಶದ ಬಗೆಗೆ ತಿಳಿಯಲು ಸಹಾಯವಾಗುತ್ತದೆ.	
ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ – ಪತ್ರಲೇಖನ, ಪ್ರಬಂಧ ರಚನೆ, ಆಶುಭಾಷಣ ವಿಷಯ , ಚರ್ಚಾಸ್ಪರ್ಧೆ.	

COURSE OUTCOMES:

CO1: ಕನ್ನಡ ನಾಡು,ನುಡಿ ಮತ್ತು ಸಂಸ್ಕೃತಿಗೆ ಸಂಬಂಧಿಸಿದ ಲೇಖನಗಳು

CO2: ಕಾವ್ಯಭಾಗ (ಆಧುನಿಕ ಪೂರ್ವ)

CO3: ಕಾವ್ಯಭಾಗ(ಆಧುನಿಕ)

CO4: ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿ ಪರಿಚಯ, ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ

CO5: ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ

TEXT BOOKS:

1. ಪಠ್ಯದ 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

REFERENCE BOOKS

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

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	PO	PO	PO	PO4	PO5	PO6	PO	PO	PO9	PO10	PO1	PO1
CO												
CO												
CO												
CO												
CO												
Strength of correlation: Low-1, Medium- 2, High-3												

Course Title	**NON KANNADA – BALAKE KANNADA (2022-2023)** **(Non Kannada & Non Karnataka Students)**					
Course Code	**22BKT107/207**					
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	09	01
CIE Marks: 50	SEE Marks: 50		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. ಹಾಗು ಅಕ್ಷರದಿಂದ ಪದ, ಪದದಿಂದ ವಾಕ್ಯ ರಚಿಸಲು ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳು ಭಾಷೆಯನ್ನು ಅರಿಯಲು ಸಹಾಯವಾಗುತ್ತದೆ. ಹಾಗು 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   **2hours**
ವ್ಯವಹಾರಿಕ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಭಾಷೆಯ ಅಡಿಪಾಯದ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಈ ಪಾಠದಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಂವಹನ ಮಾಧ್ಯಮದ ಜೊತೆಗೆ ಕೇಳಿಸಿಕೊಳ್ಳುವುದು ಮತ್ತು ಮಾತನಾಡುವುದರ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು **ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ** : ಕನ್ನಡ ವರ್ಣಮಾಲೆ ,ಕನ್ನಡ ಒತ್ತಕ್ಷರ, ಕನ್ನಡ ಅಂಕಿಗಳು , ವಿರುದ್ಧಪದಗಳು, ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು
UNIT II   **2hours**
ಈ ಪಾಠಗಳಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಕನ್ನಡ ಭಾಷೆಯ ಪರಿಚಯ,ಕನ್ನಡ ಅಕ್ಷರಮಾಲೆ, ಉಚ್ಚಾರಣೆ, ಕಾಗುಣಿತ,ಒತ್ತಕ್ಷರಗಳು, ಅಕ್ಷರಗಳ ಜೋಡಣೆ ಮತ್ತು ಭಾಷಾಂತರದ ಜೊತೆಗೆ ವಚನ ಪರಿಚಯ, ಸರ್ವನಾಮಗಳ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು **ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ** : ಲಿಂಗಪರಿಚಯ. ನಾಮಪದಗಳು.
UNIT III   **2hours**
ಈ ಪಾಠಗಳಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಕನ್ನಡ ವ್ಯಾಕರಣದ ಪರಿಚಯ, , ಲಿಂಗ ಪರಿಚಯ, ವಿರುದ್ಧ ಪದಗಳು, ಕನ್ನಡ ಅಂಕಿಗಳು, ಓದುವ ಕೌಶಲ್ಯ ಮತ್ತು ಬರೆಯುವ ಕೌಶಲ್ಯದ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಭಾಷಾಂತರ ಪದಗಳು ಮತ್ತು ವ್ಯಕ್ತಿ ಸಂಬಂಧಗಳು, ನಾಮ ವಿಶೇಷಣಗಳು ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ : ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು , ಬಹುವಚನ, ಏಕವಚನ.
UNIT IV   **2hours**
ಈ ಪಾಠಗಳಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಾಮಪದದ ಪರಿಚಯ, ಸರ್ವನಾಮ, ಗುಣವಾಚಕ, ಮತ್ತು ಕನ್ನಡ ಭಾಷೆಯ ಬಗೆಗೆ, ಕ್ರಿಯಾಪದಗಳ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ವ್ಯಾಕರಣಾಂಶದ ಬಗೆಗೆ ಹೆಚ್ಚು ತಿಳಿದುಕೊಳ್ಳಲು ಸಹಾಯವಾಗುತ್ತದೆ. ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ : ಅಕ್ಷರದಿಂದ ಪದ, ಪದದಿಂದ ವಾಕ್ಯ
UNIT V   **1hours**
ಈ ಪಾಠಗಳಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಶಬ್ದಕೋಶಗಳ ಬಳಕೆ, ಸಂವಹನ ಮಾಧ್ಯಮದ ಬಗೆಗೆ ಸಂಭಾಷಣೆಗಾಗಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳ ಪರಿಚಯ, ಕ್ರಿಯಾವಿಶೇಷಣಗಳ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. ಮತ್ತು ಮೌಖಿಕ ಸಾಮರ್ಥ್ಯದ ಬಗೆಗೆ ತಿಳಿಸಿಕೊಡಲಾಗುವುದು. **ಕನ್ನಡ ಕಾರ್ಯಪುಸ್ತಕ** : ಆಶುಭಾಷಣ ವಿಷಯ ಸಂವಹನ ಮಾಧ್ಯಮ , ಮೌಖಿಕ ಚಟುವಟಿಕೆ

COURSE OUTCOMES:

1. Listening and Speaking - KelisikoLLuvudu mattu Maatanaduvudu (ಕೇಳಿಸಿಕೊಳ್ಳುವುದು ಮತ್ತು ಮಾತನಾಡುವುದು)

2. Pronouns – SarvanaamagaLu (ಸರ್ವನಾಮಗಳು)

3. Adjectives – Naama VisheshaNagaLu(ನಾಮ ವಿಶೇಷಣಗಳು)

4. Verbs – KriyapadagaLu (ಕ್ರಿಯಾಪದಗಳು)

5. Adverbs – KriyavisheshaNagaLu (ಕ್ರಿಯಾವಿಶೇಷಣಗಳು)

TEXT BOOKS:

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

REFERENCE BOOKS

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

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	PO	PO	PO	PO4	PO5	PO6	PO	PO	PO9	PO10	PO1	PO1
CO												
CO												
CO												
CO												
CO												
Strength of correlation: Low-1, Medium- 2, High-3												

Course Title	**CONSTITUTION OF INDIA & PROFESSIONAL ETHICS (2022-2023)**					
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:
1. To know the fundamental political structure & codes, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens.
2. To understand engineering ethics and their responsibilities, identify their individual roles and ethical responsibilities towards society.

UNIT I	**4 hours**
Introduction: Framing of Indian Constitution, Salient features of Indian Constitution, Preamble of the Constitution, Fundamental Rights Part III -Article 14, 15, 16, 19 & 32, Part IV- Directive principles of State policy, Part IV A- Fundamental Duties.	
UNIT II	**2 hours**
Union Government: Executive – President, Prime Minister, Council of Ministers, Parliament – Lok Sabha & Rajya Sabha. Supreme Court.	
UNIT III	**2 hours**
State Government: Executive – Governor, Chief Minister, Council of Ministers, State Legislature-Legislative Assembly & Legislative Council, High Court.	
UNIT IV	**2 hours**
Election Commission. Emergency Provisions.	
UNIT V	**3 hours**
Professional Ethics: Work Ethics- Integrity- Honesty- Valuing Time- Cooperation- Commitment-Occupational Crime –Professional Rights- Employee Rights. Positive and Negative aspects of Engineering Ethics, Professional Risks and Safety.	
TEACHING LEARNING PROCESS:	
Direct instructional method (Low /Old Technology), Flipped classrooms (High/advanced Technologi tools), Blended learning (combination of both), Enquiry and evaluation based learning, Personali: learning, Problems based learning through discussion, Following the method of expeditionary learn Tools and techniques	

COURSE OUTCOMES:
At the end of the course the student should:
CO 1: Have constitutional knowledge and legal literacy.
CO 2: Understand Engineering and Professional ethics and responsibilities of Engineers

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. HARIES, 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												
CO2												
CO3												
CO4												
CO5												
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 – 2022 -2023

Course Title	**SCENTIFIC FOUNDATION OF HEALTH & WELLNESS**					
Course Code	**22SFT108/208**					
Category	**Ability Enhancement Course (AEC)**					
Scheme and Credits	No. of Hours/Week				Total Hrs./semester	Credits
	L	T	P	SS	Total		
	1	0	1	-	02	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												
CO2												
CO3												
CO4												
CO5												
Strength of correlation: Low-1, Medium- 2, High-3												

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

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	**3 hours**

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.

Text Book 1,2,3,4 and Reference Book 1,2

UNIT II	**3 hours**

Tools for Design Thinking

Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design.

Text Book 1,2,3,4 and Reference Book 1,2

UNIT III	**3 hours**

Design Thinking in IT

Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping.

Text Book 1,2,3,4 and Reference Book 1,2

UNIT IV	**3 hours**

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.

Text Book 1,2,3,4 and Reference Book 1,2

UNIT V	**3 hours**

The Design Challenge:

Define the Design Challenge, Prototyping & Iteration- Feasibility Study, Testing-Documentation and the Pitching.

Text Book 1,2,3,4 and Reference Book 1,2

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 - I – 1st semester (2022-23)		
	Subject Code: 22CDN109	**Mandatory Course (CGPC)**	**No of lecture hours per week: 2 Hrs**
	CIE Marks-50	**SEE Exam-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 is designed to give the awareness to the students about the job market to prepare themselves at their own pace and potential. It also teaches them about the self-developing attitude through their emotions and intelligence.
4.   This unit complies with the overcoming ability of students dealt in stress and it also teaches the punctuality and time managing.
5.   This lesson will help students make inferences and predictions about spoken, writing & listening discourse.

UNIT I	**4 hours**
Career Planning: Qualities of an Engineer, Engineering Graduate v/s Engineers, Avenues, 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	**4 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.	
UNIT III	**6 hours**
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 IV	**4 hours**
Time Management: Importance of time, Time Management Matrix, Tips for managing time effectively, Prioritizing. **Stress Management:** Causes, Types & Symptoms of stress	

UNIT V	8 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. **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	

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**

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Placement
Scheme and Syllabus - 2022 -2023

	Career Development skills - II – 2nd semester (2022-23)		
	Subject Code: 22CDN209	**Mandatory Course (CGPC)**	**No of lecture hours per week: 2 Hrs**
	CIE Marks- 50	**SEE Exam : 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 deals with the preparation of Resume Building thereby laying path for good career start. It also teaches on behaviour & mannerism that should be maintained during the interview.**

5. **This unit is framed to up bring their skill of Creative thinking.**

UNIT I	**10 hours**
Presentation skills + Mock presentations: Aspects in the development of good presentation, Structuring, Effective delivery, Group facilitation, Handling questions, Visual Aids, Mock presentations **Small talk and Debate** **Body language**	
UNIT II	**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 **Leadership skills and motivation:** Attributes of a leader, Leadership Styles, Key Characteristics	
UNIT III	**6 hours**
Common mistake in English, Classic Indianisms, Course of action, Cause and effect, Statement and assumptions, Statement and Conclusions	
UNIT IV	**2 hours**
Resume Building: Guidelines for Writing a resume, Points to keep in mind when writing a resume, Sample resume, Resume correction	
UNIT IV	**2 hours**

Creative thinking skills: Fostering Creativity, Four Stages to creative thinking, Imaginative Space, Creativity in Everyday life

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 have learnt about pre-requisites to build effective resume that being asked during the recruitment process.

5. After the completion of this unit students will demonstrate an ability to recognise and would have deployed themselves in the active creative thinking.

REFERENCE:

01. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI

02. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education

03. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.

04. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.

05. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA

06. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing

07. Enhancing English and Employability Skills by State Board of Technical.

08. Soft skills an integrated approach to maximize personality by SANGEETHA SHARMA, GAJENDRA SINGH CHAUHAN, and Wiley Publishing.