MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution Under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru - 560074

UG (B.E) Scheme

2024-25

II Semester – Physics Cycle

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

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Engineering Science Courses (ESC) - I/II						Emerging Technology Courses (ETC) - I/II					
Sl. No	Course Code	Name of the Course	L	T	P	Sl. No	Course Code	Name of the Course	L	T	P
1	B24ESCK141/241	Introduction of Civil Engineering	3	0	0	1	B24ETCK151/251	Smart Materials and Systems	3	0	0
2	B24ESCK142/242	Introduction to Electrical Engineering	3	0	0	2	B24ETCK152/252	Concepts of Green Buildings	3	0	0
3	B24ESCK143/243	Introduction to Electronics	3	0	0	3	B24ETCK153/253	Introduction to sustainable Engineering	3	0	0
4	B24ESCK144/244	Introduction to Mechanical Engineering	3	0	0	4	B24ETCK154/254	Renewable Energy Sources	3	0	0
5	B24ESCK145/245	Introduction to C Programming	2	0	2	5	B24ETCK155/255	Waste Management	3	0	0
						6	B24ETCK156/256	Introduction to IoT	3	0	0
						7	B24ETCK157/257	Introduction to Embedded Systems	3	0	0
						8	B24ETCK158/258	Introduction to Cyber Security	3	0	0

Programming Language Course (PLC) - I/II					
Sl. No	Course Code	Name of the Course	L	T	P
1	B24PLCK151/251	Introduction to web programming	2	0	2
2	B24PLCK152/252	Introduction to Python programming	2	0	2
3	B24PLCK153/253	Basics of Java programming	2	0	2
4	B24PLCK154/254	Programming with C++	2	0	2

Example: B24MACS101

B	24	MA	CS	1	01
Bachelor Degree	Scheme	Course Code	Stream	Semester	Course Serial No

Example: B24PWSK206

B	24	PWS	K	2	06
Bachelor Degree	Scheme	Course Code	Common Course	Semester	Course Serial No

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Name of the branch: ECE **Stream: EEE** **Semester: II** **Academic Year: 2024-25** **Group: Physics**

S. No	Course and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				SDA
					Lecture	Tutorial	Practical	Credits	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P						
1.	ASC(IC)	B24MAEE201	Mathematics-II for EE	Maths	2	2	2	4	3	50	50	100	
2.	ASC(IC)	B24PHEE202	Applied Physics for EE	Physics	2	2	2	4	3	50	50	100	
3.	ESC	B24BECE203	Basic Electronics	ECE	3	0	0	3	3	50	50	100	
4.	ESC-II	B24ESCK245	Introduction to C Programming	CSE	2	0	2	3	3	50	50	100	
5.	ETC-II	B24ETCK257	Introduction to Embedded Systems	Any Dept.	3	0	0	3	3	50	50	100	
6.	AEC	B24PWSK206	Professional Writing Skills	Humanities	1	0	0	1	1	50	50	100	
7.	HSMC	B24HCIK207	Constitution of India	Humanities	1	0	0	1	1	50	50	100	
8.	AEC/SDC	B24IDTK208	Innovation and Design Thinking	Any Dept.	1	0	0	1	1	50	50	100	
				TOTAL	15	04	06	20		400	400	800	

SDA: Skill Development Activity, TD/PSB: Teaching department/Paper setting board, ASC: Applied Science Course, ESC: Engineering Science Course, ETC: Emerging Technology Course, AEC: Ability Enhancement Course, HSMC: Humanities, Social Science and Management Course, SDC: Skill Development Course, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

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Name of the branch: EEE **Stream: EEE** **Semester: II** **Academic Year: 2024-25** **Group: Physics**

S.No	Course and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				SDA
					Theory Lecture	Tutorial	Practical	Credits	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P						
1.	ASC(IC)	B24MAEE201	Mathematics-II for EE	Maths	2	2	2	4	3	50	50	100	
2.	ASC(IC)	B24PHEE202	Applied Physics for EE	Physics	2	2	2	4	3	50	50	100	
3.	ESC	B24EEEE203	Elements of Electrical Engineering	EEE	3	0	0	3	3	50	50	100	
4.	ESC-II	B24ESCK245	Introduction to C Programming	CSE	2	0	2	3	3	50	50	100	
5.	ETC-II	B24ETCK254	Renewable Energy Sources	EEE	3	0	0	3	3	50	50	100	
6.	AEC	B24PWSK206	Professional Writing Skills	Humanities	1	0	0	1	3	50	50	100	
7.	HSMC	B24HCIK207	Constitution of India	Humanities	1	0	0	1	1	50	50	100	
8.	AEC/SDC	B24IDTK208	Innovation and Design Thinking	Any Dept.	1	0	0	1	1	50	50	100	
				TOTAL	15	04	06	20		400	400	800	

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Name of the branch: ISE **Stream: CSE** **Sem: II** **Academic Year: 2024-25** **Group: Physics**

S.No	Course Category and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				SDA
					Lecture	Tutorial	Practical	Credits	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P						
1	ASC(IC)	B24MACS201	Mathematics-II for CS	Maths	2	2	2	4	3	50	50	100	
2	ASC(IC)	B24PHCS202	Applied Physics for CS	Physics	2	2	2	4	3	50	50	100	
3	ESC	B24POPC203	Principles of Programming using C	CSE	2	0	2	3	3	50	50	100	
4	ESC-II	B24ESCK242	Introduction to Electrical Engineering	EEE	3	0	0	3	3	50	50	100	
5	ETC-II	B24ETCK256	Introduction to IoT	Any Dept.	3	0	0	3	3	50	50	100	
6	AEC	B24PWSK206	Professional Writing Skills	Humanities	1	0	0	1	1	50	50	100	
7	HSMC	B24HCIK207	Constitution of India	Humanities	1	0	0	1	1	50	50	100	
8	AEC/SDC	B24IDTK208	Innovation and Design Thinking	Any Dept.	1	0	0	1	1	50	50	100	
				TOTAL	15	04	06	20		400	400	800	

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Name of the branch: R&A **Stream: ME** **Sem : II** **Academic Year: 2024-25** **Group: Physics**

S. No	Course and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				SDA
					Lecture	Tutorial	Practical	Credits	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P						
1.	ASC(IC)	B24MAME201	Mathematics-II for ME	Maths	2	2	2	4	3	50	50	100	
2.	ASC(IC)	B24PHME202	Applied Physics for ME	Physics	2	2	2	4	3	50	50	100	
3.	ESC	B24EMME203	Elements of Mechanical Engineering	ME	2	2	0	3	3	50	50	100	
4.	ESC-II	B24ESCK245	Introduction to C Programming	CSE	2	0	2	3	3	50	50	100	
5.	ETC-II	B24ETCK256	Introduction to IoT	Any Dept.	3	0	0	3	3	50	50	100	
6.	AEC	B24PWSK206	Professional Writing Skills	Humanities	1	0	0	1	1	50	50	100	
7.	HSMC	B24HCIK207	Constitution of India	Humanities	1	0	0	1	1	50	50	100	
8.	AEC/SDC	B24IDTK208	Innovation and Design Thinking	Any Dept.	1	0	0	1	1	50	50	100	
				TOTAL	14	06	06	20		400	400	800	

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Name of the branch: CV **Stream: CV** **Sem: II** **Academic Year: 2024-25** **Group: Physics**

S.No	Course and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				SDA
					Theory Lecture	Tutorial	Practical	Credits	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P						
1	ASC(IC)	B24MACV201	Mathematics -II for CV	Maths	2	2	2	4	3	50	50	100	
2	ASC(IC)	B24PHCV202	Applied Physics for CV	Physics	2	2	2	4	3	50	50	100	
3	ESC	B24EMCV203	Engineering Mechanics	Civil	2	2	0	3	3	50	50	100	
4	ESC-II	B24ESCK245	Introduction to C Programming	EEE	3	0	0	3	3	50	50	100	
5	ETC-II	B24ETCK252	Concepts of Green Buildings	Any Dept.	3	0	0	3	3	50	50	100	
6	AEC	B24PWSK206	Professional Writing Skills	Humanities	1	0	0	1	3	50	50	100	
7	HSMC	B24HCIK207	Constitution of India	Humanities	1	0	0	1	1	50	50	100	
8	AEC/SDC	B24IDTK208	Innovation and Design Thinking	Any Dept.	1	0	0	1	1	50	50	100	
				TOTAL	15	06	04	20		2	400	800	

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UG (B.E) Syllabus

2024-25

II Semester – Physics Cycle

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CONTENTS OF SYLLABUS

II Semester – Physics Cycle

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UG (B.E) Syllabus

2024-25

II Semester – Physics Cycle

Electronics and Communication Engineering (ECE)

SEMESTER II					
Mathematics-II for EE					
Course Code	:	B24MAEE201	CIE	:	50 Marks
Teaching Hours L:T: P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3 Hrs.

Course Objectives	
1	Familiarize the importance of Integral calculus
2	Familiarize the fundamentals of Vector calculus
3	Learn vector spaces and linear transformations
4	Develop the knowledge of numerical methods and apply them to solve algebraic and transcendental Equations.
5	Develop the knowledge of numerical methods and apply them to solve differential equations.

Module 1: Integral Calculus	**9 hrs.**
Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral -Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions – Problems. **Self-Study:** Centre of gravity, Duplication formula. **Applications:** Antenna and wave propagation, Calculation of optimum power in electrical circuits, field theory.	
Module 2: Vector Calculus	**9 hrs.**
Scalar and vector fields. Gradient, directional derivative, curl and divergence – physical interpretation, solenoidal and irrotational vector fields - Problems. Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between Cartesian and curvilinear systems, orthogonality - Problems. **Self-study:** Vector integration and Vector line integral. **Applications:** Conservation of laws, Electrostatics, Analysis of streamlines.	
Module 3: Vector Space and Linear Transformations	**9 hrs.**
Definition and examples, subspace, linear span, linearly independent and dependent sets, Basis, and dimension. Problems. Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, rank-nullity theorem. Inner product spaces and orthogonality. Problems. **Self-study:** Angles and Projections. Rotation, Reflection, Contraction and Expansion **Applications:** Image processing, AI & ML, Graphs and networks, Computer graphics.	
Module 4: Numerical Methods-I	**9 hrs.**
Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward differenceformulae, Newton's divided difference formula and Lagrange's interpolation formula(All formulae without proof). Problems. Numerical integration: Trapezoidal, Simpson's $(1/3)rd$&$(3/8)th$rules(without proof). Problems. **Self-Study:** Bisection method, Lagrange's inverse Interpolation, Weddle's rule. **Applications:** Estimating the approximate roots, extremum values, area, volume, and surface area	
Module 5: Numerical Methods-II	**9 hrs.**
Numerical Solution of Ordinary Differential Equations (ODEs): 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, Adam-Bashforth method - Problems. **Self-Study:** Picard's Method **Applications:** Estimating the approximate solutions of ODE for electric circuits.	

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

1	Finding gradient, divergent, curl and their geometrical interpretation and Verification of Green's theorem
2	Computation of basis and dimension for a vector space and Graphical representation of Linear transformation
3	Visualization in time and frequency domain of standard functions
4	Computing inverse Laplace transform of standard functions
5	Laplace transform of convolution of two functions
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$(1/3)rd\&(3/8)th$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

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

Course Outcomes: At the end of the course, the students will 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	Apply the knowledge of numerical methods in analyzing the solution of first order differential equations

Text Books	
1	B.S. Grewal:"Higher Engineering Mathematics", Khanna publishers,44thEd.2018
2	E. Kreyszig:"Advanced Engineering Mathematics", John Wiley&Sons,10thEd.(Reprint),2016
Reference Text Books	
1	V. Ramana: "Higher Engineering Mathematics", McGraw-Hill Education,11th Edition.
2	Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematics for Semester I and II", McGraw Hill Education (India) Pvt. Ltd, 2015

Web links and Video lectures (e-Resources)

1. https://nptel.ac.in/courses/122106025
2. VTU EDUSAT PROGRAMME – 20
3. http://www.class-central.com/subject/math(MOOCs)

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 mark each. **Part - A is Compulsory**and carries 20 Marks.
4. **Part-B**contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks andmarks scored out of 100 shall beproportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Semester I/II					
Applied Physics for EE Category: ASC Stream: **EEE** (Common to ECE & EEE branch) (Integrated)					
Course Code	:	**B24PHEE102/202**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		4	SEE Duration	:	3 Hrs

Course Objectives	
1	To study the principles of modern physics and quantum mechanics.
2	To study the essentials and applications of lasers and optical fibers.
3	To study the concepts electrical conductivity and dielectric properties of materials.
4	To study the properties and applications of superconductors.
5	To study the properties and applications of semiconductors.

Module - 1 Modern Physics and Quantum Mechanics	**No. of Hrs**
Concepts of modern physics and quantum mechanics: Wave-particle dualism, de Broglie hypothesis (qualitative), phase and group velocities, relation between group velocity and phase velocity, relation between group velocity and particle velocity. Heisenberg's uncertainty principle, non-confinement of electrons in atomic nucleus, Setting up of one dimensional time independent Schrodinger's wave equation from classical wave equation, properties and physical significance of wave function, energy eigen values of a particle in an infinite one dimensional potential well, Numerical problems on modern physics and quantum mechanics.	9
Module – 2 Lasers and Optical Fibers	**No. of Hrs**
Lasers, interaction of radiation with matter, induced absorption, spontaneous emission and stimulated emission, expression for energy density of radiation in terms of Einstein coefficients at thermal equilibrium, requisites of a laser system, three and four level lasers, principle and operation of CO_2 laser, applications of lasers. Optical fibers, propagation mechanisms in optical fibers, angle of acceptance and numerical aperture (derivation), types of optical fibers, attenuation, attenuation mechanisms in optical fibers, application of optical fiber in point to point communication system. Numerical problems on lasers and optical fibers.	9
Module – 3 Electrical conductivity and dielectric properties of Solids	**No. of Hrs**
Classical free electron theory, assumptions, drift velocity, mean free path, mean collision time, relaxation time, mobility of electrons, expression for electrical conductivity (no derivation), effect of temperature and impurity on electrical resistivity of metals, failures of classical free-electron theory. Quantum free electron theory, assumptions, density of states (no derivation), Fermi-energy, Fermi factor & its temperature dependence, Fermi - Dirac Statistics, expression for electrical conductivity (expression only), merits of quantum free electron theory. Dielectrics: Electric dipole, dipole moment, polarization of dielectric materials, types of polarizations, internal field in solids for one dimensional infinite array of dipoles (derivation). Claussius-Mossotti equation (derivation), Numerical problems on electrical conductivity and dielectric properties of Solids.	9
Module – 4 Superconductivity	**No. of Hrs**
Introduction to superconductors, temperature dependence of resistivity in superconducting materials and critical temperature, Meissner's effect, critical magnetic field, temperature dependence of critical field, Type-I and Type-II superconductors, BCS theory (Qualitative), high temperature superconductors, Applications of super conductors in superconducting magnet, maglev vehicles & SQUIDs, numerical problems on superconductivity.	9
Module – 5 Physics of Semiconductors	**No. of Hrs**

Semiconductors and devices: Fermi level in intrinsic & extrinsic semiconductor (qualitative), expression for concentration of electrons in conduction band & holes concentration in valance band (expression only), relation between Fermi energy & energy gap intrinsic semiconductors(derivation), law of mass action, electrical conductivity of a semiconductor (derivation), Hall effect, expression for Hall coefficient (derivation) and its application, photo-diode and power responsivity, construction and working of semiconducting laser, numerical problems on semiconductors.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain the concepts of Modern Physics and Quantum Mechanics and their Applications.
CO2	Describe the principles of LASERS and Optical fibers and their relevant applications.
CO3	Describe the electrical and dielectric properties of materials and their applications
CO4	Summarize the essential properties of semiconductors and Superconductors, and their applications
CO5	Practice working in groups to conduct experiments in Physics and perform precise and honest measurements.

Text Books	
1	S P Basavaraj, Engineering Physics, , 2018 Edition, Subhash Stores.
2	Gupta and Gour, Engineering Physics, Dhanpat Rai Publications, 2016 (Reprint).
Reference Text Books	
1	Arthur Beiser, Concepts of Modern Physics-: 6th edition, Tata McGraw Hill Edu Pvt Ltd-New Delhi 2006.
2	Halliday, D., Resnick, R. & Walker, J. ―Principles of Physics. Wiley, 2015.
3	B B Laud, Lasers and Non-linear optics, , 3rd edition, New Age International Publishers 2011.
4	S.O Pillai, Solid state physics, , 10th edition, 2022.

Web links and Video lectures (e-Resources)

1. https://www.youtube.com/watch?v=WgzynezPiyc
2. https://www.youtube.com/watch?v=MT5Xl5ppn48
3. https://www.youtube.com/watch?v=N_kA8EpCUQo
4. https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s
5. https://archive.nptel.ac.in/courses/115/103/115103108
6. https://www.youtube.com/watch?v=tz_3M3v3kxk

LIST OF EXPERIMENTS

Experiment Number	Name of the Experiment
1	Dielectric constant of a capacitor
2	Photo Diode
3	Fermi Energy
4	Diffraction Grating
5	Acceptance Angle and NA of an Optical Fiber
6	Black Box
7	Transistor Characteristics
8	LCR Series and Parallel Resonance Circuit
9	Determination of Magnetic Field Intensity

10	Plank's Constant
11	Newton's Rings
12	Single Cantilever
13	Young's modulus by uniform bending
14	Spring Constants
15	Study of motion using spread Sheets

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.
The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Semester I/II					
Basic Electronics Category: ESC Stream: **EEE** (Only for ECE Branch) (Theory)					
Course Code	:	**B24BECE203**	CIE	:	50 Marks
Teaching Hours/Week (L:T:P)	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives
The course objective is to make students to understand the efficacy of Electronic principles which are pervasive in engineering application.

Module - 1	**No. of Hrs**
Semiconductor Diodes: Diode-Forward and Reverse bias, V-I Characteristics, Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, Reverse Recovery Time. Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters (Qualitative analysis), Clippers and Clampers.(T1: 1.6, 1.8 – 1.11, 2.6-2.9	**10**
Module - 2	**No. of Hrs**
Special Purpose Devices: Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, , Photo diode, Solar Cell, LED, Schottky diode. (T1: 1.16, 2.11, 16.2-16.5, 16.10, 17.2-17.4, 17.12)	**9**
Module - 3	**No. of Hrs**
Bipolar Junction Transistor (BJT): Transistor Operation, Common Emitter, Common Base and Common Collector Configurations, BJT DC biasing. (T1: 3.3 – 3.6, 4.1-4.8)	**8**
Module - 4	**No. of Hrs**
Junction Field Effect Transistor (FET): FET Construction, Principle of Operation, Volt Ampere Characteristics, MOSFET- Depletion and Enhancement MOSTET, FET biasing. (T1: 6.2, 6.3, 6.7. 6.8. 7.1-7.4)	**9**
Module - 5	**No. of Hrs**
Boolean Algebra and Logic Circuits: 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. Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder (T2: 1.2-1.5, 2.1-2.7, 4.1, 4.3, 4.4)	**9**

Course Outcomes: At the end of the course, the students will be able to	
CO1	Develop the basic knowledge on construction and characteristics of semiconductor devices, the applications of diode in rectifiers, filter circuits and wave shaping.
CO2	Acquire the knowledge about the role of special purpose devices and their applications
CO3	Apply the knowledge to construct small scale circuits using BJT
CO4	Apply the knowledge on working principle of FET and MOSFET Explain various types of FET biasing.

CO5	Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates,

Text Books	
1.	Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.
2.	M Moris Mano, Digital Design by, 5th Edition Prentice Hall of India
Reference Text Books	
1.	Jacob Millman, Christos Chalkias , Integrated Electronics , TMH
2	David A. Bell , Electronic Devices and Circuits, 5th Edition, Oxford.

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/courses/122106025 2. https://nptel.ac.in/courses/108105132 3. https://nptel.ac.in/courses/117104072

CIE Evaluation

Assessment Details both (CIE and SEE)

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CIE for the theory:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for 40 marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks).
5. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50).

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**30+10+10=50**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Semester I/II					
Introduction to C Programming Category: ESC-I/II Common to All Branches except CSE allied branches (Integrated)					
Course Code	:	**B24ESCK145/245**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1.	Learn the concepts of computer, functionalities of a computer and C programming principles
2.	Use various constructs structuring and implementing the C program
3.	Illustrate the user-defined function and data structures like arrays for the solutions to problems
4.	Understand the concepts of strings and pointers to solve a realistic problems
5.	Solve simple real-world problems using modular approach and file handling mechanisms

Module - 1	**No. of Hrs**
Introduction to Computing: Computer Systems-Hardware and Software, Computer Languages, Algorithm, Flowchart, Representation of Algorithm and Flowchart with examples. Introduction to C–History of C, Features of C, Structure of C Program, Character Set, C Tokens-Keywords, Identifiers, Constants, Variables, Data types, Input/output statements in C, Types of errors.	09
Module - 2	**No. of Hrs**
Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators, Operators Precedence, Type conversion and typecasting. **Decision control and looping statements:** Statements-Selection statements (Decision Making)- if and switch statements with examples, iterative statements (loops)- for, while, do-while statements with examples, Unconditional statements- break, continue, goto statements with examples.	09
Module - 3	**No. of Hrs**
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, Storage classes, Recursion. **Arrays:** array Declaration and Initialization of arrays, accessing the elements of an array, storing values in arrays- One dimensional, two dimensional, Operations on arrays-Searching and sorting.	09
Module - 4	**No. of Hrs**
Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions. **Pointers:** Introduction to pointers, Declaration of pointer variables, Types of pointers, passing arguments to functions using pointers.	09
Module - 5	**No. of Hrs**
Structure, Union and Enumerated Data Type: Introduction to structure, Declaration and Initialization, Array of structures, Introduction to Unions, Declaration and Initialization, differentiate between structure and union, Enumerated data type. **File management in C:** File Operations-open, close, read, write, append, simple program on reading and writing data files.	09

Course Outcomes: At the end of the course, the students will be able to	
CO1	Learn the working principles of computer, various functions of peripheral devices and fundamental concept of C programming language.
CO2	Understanding the procedural programming constructs of C language to solve the real-world problem.
CO3	Understand the user defined data structures like arrays in implementing solutions to searching and sorting methods.
CO4	Learn the use of strings, structures, union, pointers and I/O files to solve a realistic problem.
CO5	Know the solutions to problems using modular programming constructs using functions.

Practical Component

Demonstration of Computer and Its Accessories

Laboratory Session-1: Write-up on Functional block diagram of Computer and explain its parts.

Laboratory Session-2: Write-up on Input and Output devices of computer.

Note: These TWO Laboratory sessions fill the gap between theory classes and practical sessions. Students to write-up and execute the same, updated in Lab record and evaluated.

Sl. No.	Experiments for Conduction
1.	Find Mechanical Energy of a particle using E = mgh+1/2 mv2.
2.	To convert Kilometers into Meters and Centimeters.
3.	To Read 3 integer values and find the largest among them using nested if statement.
4.	To Check the Given Character is Lowercase or Uppercase or Special Character.
5.	To balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
6.	To Read a string (word), store it in an array and check whether it is a palindrome word or not.
7.	To Implement Matrix multiplication and validate the rules of multiplication.
8.	To Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
9.	Program to Sort the given set of N numbers using Bubble sort technique.
10.	Using functions, demonstrate the string operations such as compare, concatenate, and string length. Use the parameter passing techniques.
11.	Apply structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
12.	Using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.

Text Books	
1.	Reema Thareja, "Computer fundamentals and programming in C", Oxford University, Second edition, 2017.
Reference Text Books	
1.	E. Bala Guruswamy, "Programming in ANSI C", 7th Edition, Tata McGraw-Hill.
2.	Brian W. Kernighan and Dennis M. Ritchie, "The 'C' Programming Language", Second edition, PrenticeHall of India.
3.	Yashwanth Kanethkar, "Let us C" ,13th Edition, BPB Publications.
4.	Brian W. Kernighan, Dennis M. Ritchie, Programming Languages C with Practicals, Margham Publications; 1 edition (2012).

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods. 2. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.htm

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.
The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.

6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	1	-	-	-	-	-	2
CO2	2	2	2	1	1	-	-	-	-	-	-	2
CO3	2	2	2	1	2	-	-	-	-	-	-	2
CO4	3	3	3	2	3	-	-	-	-	-	-	2
CO5	3	2	-	-	2	-	-	-	-	-	-	2
CO6	3	3	3	2	-	1	-	-	-	-	-	2

Level 3- High, Level 2- Moderate, Level 1- Low

Semester I/II					
Introduction To Embedded Systems Category: ETC- I/II (Common to All Branches) (Theory)					
Course Code	:	**B24ETCK157/257**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1	Introductory topics of Embedded System design
2	Characteristics & attributes of Embedded System
3	Introduction of Embedded System Software and Hardware development
4	RTOS based Embedded system design

Module - 1	**No. of Hrs**
Introduction: Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems **Chapter 1 – Text 1** **Core of Embedded Systems :** Microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensorsandactuators,communicationinterface,embeddedfirmware,othersystemcomponents, PCB and passive components **Chapter2–Text1**	**9**
Module - 2	**No. of Hrs**
Characteristics and quality attributes of embedded systems: Characteristics, Operational and Non- operational quality attributes, application specific embedded system - washing machine, domain specific – automotive **Chapter 3 & 4 – Text 1**	**9**
Module - 3	**No. of Hrs**
Hardware Software Co design and Program Modelling : Fundamental issues in Hardware Software Co-design, Computational models in Embedded System Design **Chapter7–Text1:7.1,7.2** **Embedded Hardware Design and Development:** Analog Electronic Components, Digital Electronic Components, VLSI & Integrated Circuit Design, Electronic Design Automation Tools **Chapter8–Text1:8.1,8.2,8.3, 8.4**	**9**
Module - 4	**No. of Hrs**
Embedded Firmware Design and Development: Embedded Firmware DesignApproaches, Embedded Firmware Development Languages **Chapter 9 – Text 1: 9.1, 9.2** **Embedded System Development Environments:** Types of files generated on cross	**9**

compilation (only explanation–programming codes need not be dealt),disassemble/ decompliler , Simulators, Emulators and Debugging **Chapter13–Text 1: 13.2,13.3,13.4**	
Module - 5	**No. of Hrs**
Real-time Operating System(RTOS)based Embedded System Design: Operating System basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling **Chapter 10 – Text 1: 10.1 to 10.5**	**9**

Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain characteristics of Embedded System design
CO2	Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS
CO3	Analyze embedded system software and hardware requirements
CO4	Develop programming skills in embedded systems for various applications.
CO5	Design basic embedded system for real time applications

Text Books	
1	Shibu K V,“ Introduction to Embedded Systems”, Second Edition, McGraw Hill Education
Reference Books:	
1	Joseph Yiu, "TheDefinitiveGuidetotheARMCortex-M3", 211d Edition, Newnes, (Elsevier), 2010.
2	James K. Peckol, "Embedded systems- A contemporary design tool", John Wiley, 2008, ISBN: 978-0-471-72180-2.
3	Rajkamal, Embedded Systems, 211d Edition, McGraw hill Publications, 2010.

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/courses/108102045Embedded Systems, IIT Delhi, Prof. SantanuChaudhary

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CIE for the theory:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for 40 marks, scaled down to 20 marks.

4. Total marks scored (30+20 = 50 marks).
5. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50).

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**30+10+10=50**
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4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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CO2	3	2	3	2	3	-	1	-	1	3	1	2
CO3	3	2	3	2	3	-	1	-	1	3	1	2
CO4	3	2	3	2	3	-	1	-	1	3	1	2
CO5	3	2	3	2	3	-	1	-	1	3	1	2

Level 3 - High, Level 2 - Moderate, Level 1 - Low

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution Under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru - 560074

UG (B.E) Syllabus

2024-25

II Semester – Physics Cycle

Electrical and Electronics Engineering (EEE)

SEMESTER II					
Mathematics-II for EE					
Course Code	:	B24MAEE201	CIE	:	50 Marks
Teaching Hours L:T: P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3 Hrs.

Course Objectives	
1	Familiarize the importance of Integral calculus
2	Familiarize the fundamentals of Vector calculus
3	Learn vector spaces and linear transformations
4	Develop the knowledge of numerical methods and apply them to solve algebraic and transcendental Equations.
5	Develop the knowledge of numerical methods and apply them to solve differential equations.

Module 1: Integral Calculus	**9 hrs.**
Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral -Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions – Problems. **Self-Study:** Centre of gravity, Duplication formula. **Applications:** Antenna and wave propagation, Calculation of optimum power in electrical circuits, field theory.	
Module 2: Vector Calculus	**9 hrs.**
Scalar and vector fields. Gradient, directional derivative, curl and divergence – physical interpretation, solenoidal and irrotational vector fields - Problems. Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between Cartesian and curvilinear systems, orthogonality - Problems. **Self-study:** Vector integration and Vector line integral. **Applications:** Conservation of laws, Electrostatics, Analysis of streamlines.	
Module 3: Vector Space and Linear Transformations	**9 hrs.**
Definition and examples, subspace, linear span, linearly independent and dependent sets, Basis, and dimension. Problems. Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, rank-nullity theorem. Inner product spaces and orthogonality. Problems. **Self-study:** Angles and Projections. Rotation, Reflection, Contraction and Expansion **Applications:** Image processing, AI & ML, Graphs and networks, Computer graphics.	
Module 4: Numerical Methods-I	**9 hrs.**
Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward differenceformulae, Newton's divided difference formula and Lagrange's interpolation formula(All formulae without proof). Problems. Numerical integration: Trapezoidal, Simpson's $(1/3)rd$&$(3/8)th$rules(without proof). Problems. **Self-Study:** Bisection method, Lagrange's inverse Interpolation, Weddle's rule. **Applications:** Estimating the approximate roots, extremum values, area, volume, and surface area	
Module 5: Numerical Methods-II	**9 hrs.**
Numerical Solution of Ordinary Differential Equations (ODEs): 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, Adam-Bashforth method - Problems. **Self-Study:** Picard's Method **Applications:** Estimating the approximate solutions of ODE for electric circuits.	

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

1	Finding gradient, divergent, curl and their geometrical interpretation and Verification of Green's theorem
2	Computation of basis and dimension for a vector space and Graphical representation of Linear transformation
3	Visualization in time and frequency domain of standard functions
4	Computing inverse Laplace transform of standard functions
5	Laplace transform of convolution of two functions
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$(1/3)rd\&(3/8)th$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

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

Course Outcomes: At the end of the course, the students will 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	Apply the knowledge of numerical methods in analyzing the solution of first order differential equations

Text Books	
1	B.S. Grewal:"Higher Engineering Mathematics", Khanna publishers,44thEd.2018
2	E. Kreyszig:"Advanced Engineering Mathematics", John Wiley&Sons,10thEd.(Reprint),2016
Reference Text Books	
1	V. Ramana: "Higher Engineering Mathematics", McGraw-Hill Education,11th Edition.
2	Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematics for Semester I and II", McGraw Hill Education (India) Pvt. Ltd, 2015

Web links and Video lectures (e-Resources)

1. https://nptel.ac.in/courses/122106025
2. VTU EDUSAT PROGRAMME – 20
3. http://www.class-central.com/subject/math(MOOCs)

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 mark each. **Part - A is Compulsory**and carries 20 Marks.
4. **Part-B**contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks andmarks scored out of 100 shall beproportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Semester I/II					
Applied Physics for EE Category: ASC Stream: **EEE** (Common to ECE & EEE branch) (Integrated)					
Course Code	:	**B24PHEE102/202**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		4	SEE Duration	:	3 Hrs

Course Objectives	
1	To study the principles of modern physics and quantum mechanics.
2	To study the essentials and applications of lasers and optical fibers.
3	To study the concepts electrical conductivity and dielectric properties of materials.
4	To study the properties and applications of superconductors.
5	To study the properties and applications of semiconductors.

Module - 1 Modern Physics and Quantum Mechanics	**No. of Hrs**
Concepts of modern physics and quantum mechanics: Wave-particle dualism, de Broglie hypothesis (qualitative), phase and group velocities, relation between group velocity and phase velocity, relation between group velocity and particle velocity. Heisenberg's uncertainty principle, non-confinement of electrons in atomic nucleus, Setting up of one dimensional time independent Schrodinger's wave equation from classical wave equation, properties and physical significance of wave function, energy eigen values of a particle in an infinite one dimensional potential well, Numerical problems on modern physics and quantum mechanics.	9
Module – 2 Lasers and Optical Fibers	**No. of Hrs**
Lasers, interaction of radiation with matter, induced absorption, spontaneous emission and stimulated emission, expression for energy density of radiation in terms of Einstein coefficients at thermal equilibrium, requisites of a laser system, three and four level lasers, principle and operation of CO_2 laser, applications of lasers. Optical fibers, propagation mechanisms in optical fibers, angle of acceptance and numerical aperture (derivation), types of optical fibers, attenuation, attenuation mechanisms in optical fibers, application of optical fiber in point to point communication system. Numerical problems on lasers and optical fibers.	9
Module – 3 Electrical conductivity and dielectric properties of Solids	**No. of Hrs**
Classical free electron theory, assumptions, drift velocity, mean free path, mean collision time, relaxation time, mobility of electrons, expression for electrical conductivity (no derivation), effect of temperature and impurity on electrical resistivity of metals, failures of classical free-electron theory. Quantum free electron theory, assumptions, density of states (no derivation), Fermi-energy, Fermi factor & its temperature dependence, Fermi - Dirac Statistics, expression for electrical conductivity (expression only), merits of quantum free electron theory. Dielectrics: Electric dipole, dipole moment, polarization of dielectric materials, types of polarizations, internal field in solids for one dimensional infinite array of dipoles (derivation). Claussius-Mossotti equation (derivation), Numerical problems on electrical conductivity and dielectric properties of Solids.	9
Module – 4 Superconductivity	**No. of Hrs**
Introduction to superconductors, temperature dependence of resistivity in superconducting materials and critical temperature, Meissner's effect, critical magnetic field, temperature dependence of critical field, Type-I and Type-II superconductors, BCS theory (Qualitative), high temperature superconductors, Applications of super conductors in superconducting magnet, maglev vehicles & SQUIDs, numerical problems on superconductivity.	9
Module – 5 Physics of Semiconductors	**No. of Hrs**

Semiconductors and devices: Fermi level in intrinsic & extrinsic semiconductor (qualitative), expression for concentration of electrons in conduction band & holes concentration in valance band (expression only), relation between Fermi energy & energy gap intrinsic semiconductors(derivation), law of mass action, electrical conductivity of a semiconductor (derivation), Hall effect, expression for Hall coefficient (derivation) and its application, photo-diode and power responsivity, construction and working of semiconducting laser, numerical problems on semiconductors.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain the concepts of Modern Physics and Quantum Mechanics and their Applications.
CO2	Describe the principles of LASERS and Optical fibers and their relevant applications.
CO3	Describe the electrical and dielectric properties of materials and their applications
CO4	Summarize the essential properties of semiconductors and Superconductors, and their applications
CO5	Practice working in groups to conduct experiments in Physics and perform precise and honest measurements.

Text Books	
1	S P Basavaraj, Engineering Physics, , 2018 Edition, Subhash Stores.
2	Gupta and Gour, Engineering Physics, Dhanpat Rai Publications, 2016 (Reprint).
Reference Text Books	
1	Arthur Beiser, Concepts of Modern Physics-: 6th edition, Tata McGraw Hill Edu Pvt Ltd-New Delhi 2006.
2	Halliday, D., Resnick, R. & Walker, J. ―Principles of Physics. Wiley, 2015.
3	B B Laud, Lasers and Non-linear optics, , 3rd edition, New Age International Publishers 2011.
4	S.O Pillai, Solid state physics, , 10th edition, 2022.

Web links and Video lectures (e-Resources)

1. https://www.youtube.com/watch?v=WgzynezPiyc
2. https://www.youtube.com/watch?v=MT5Xl5ppn48
3. https://www.youtube.com/watch?v=N_kA8EpCUQo
4. https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s
5. https://archive.nptel.ac.in/courses/115/103/115103108
6. https://www.youtube.com/watch?v=tz_3M3v3kxk

LIST OF EXPERIMENTS

Experiment Number	Name of the Experiment
1	Dielectric constant of a capacitor
2	Photo Diode
3	Fermi Energy
4	Diffraction Grating
5	Acceptance Angle and NA of an Optical Fiber
6	Black Box
7	Transistor Characteristics
8	LCR Series and Parallel Resonance Circuit
9	Determination of Magnetic Field Intensity

10	Plank's Constant
11	Newton's Rings
12	Single Cantilever
13	Young's modulus by uniform bending
14	Spring Constants
15	Study of motion using spread Sheets

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.
The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15^{th} week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Semester II					
Elements of Electrical Engineering Category: ESC Stream: EEE (Only for EEE Branch) (Theory)					
Course Code	:	**B24EEEE203**	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1	To explain the basic laws used in the analysis of DC circuits and electromagnetism
2	To explain the behaviour of circuit elements in single-phase circuits.
3	To explain the behaviour of circuit elements in three-phase circuits.
4	To explain the basic concept and working of transformer and dc motor.
5	To explain domestic wiring and safety measures.

Module - 1	**No. of Hrs**
DC circuits: Ohm's law and Kirchhoff's laws, Analysis of Series, Parallel and series-parallel circuits, Reciprocity Theorem, Power and energy – Simple Numericals **Electromagnetism:** Statically and Dynamically induced EMF; concepts of self and mutual inductance, Coefficient of Coupling, Energy stored in magnetic field.	09
Module - 2	**No. of Hrs**
Single-phase AC circuits: Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form factor and peak factor of sinusoidal voltage and currents. Phasor representation of alternating quantities. Analysis of R, L, C, R-L, R-C and R-L-C circuits with phasor diagrams, Real power, Reactive power, Apparent power, and Power factor. Series, Parallel and Series-Parallel circuits. Simple Numericals	09
Module - 3	**No. of Hrs**
Three-phase AC circuits: Necessity and advantage of 3-phase system, Generation of 3-phase power, Definition of phase sequence, Balanced supply and balanced load, Relationship between line and phase values of balanced star and delta connections, Power in balanced 3-phase circuits, Measurement of 3-phase power by 2-wattmeter method, Simple Numericals	09
Module - 4	**No. of Hrs**
Transformers: Necessity of transformer, Principle of operation, Types and construction of single phase transformers, EMF equation, Losses of transformer, Efficiency (Simple numerical) **DC Motor:** Principle of operation, Back EMF and its significance, Types of motors, Characteristics and speed control (armature & field) of DC motors (series & shunt only), Torque equation, Applications of DC motors	09
Module - 5	**No. of Hrs**
Measuring instruments: Classification, Deflecting, control and damping torques, Ammeters and Voltmeters, PMMC and PMMI type instruments **Domestic Wiring:** Requirements, Types of wiring: casing, capping, Two way and three-way control of load. **Electrical Safety:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits, Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB). **Electricity bill:** Power consumption of electrical energy, Two-part electricity tariff, *Case study on calculation of electricity bill for domestic consumers*.	09

Course Outcomes: At the end of the course, the students will be able to

CO1	Understand the concepts of DC circuits and electromagnetism to solve circuits.
CO2	Analyze the behavior of single-phase circuits under various operating conditions.
CO3	Analyze the behavior of three-phase circuits under various operating conditions.
CO4	Understand the principle of operation and construction of transformer and DC motor.
CO5	Understand the concepts of measuring instruments, domestic wiring and safety measures.

Text Books	
1	D C Kulshreshtha, Basic Electrical Engineering, Tata McGraw Hill, First Edition 2019
Reference Books	
1	B.L. Theraja, A text book of Electrical Technology, S Chand and Company, reprint edition 2014
2	D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, , Tata McGraw Hill 4th edition, 2019
3	V. K. Mehta, Rohit Mehta Principles of Electrical Engineering & Electronics, S. Chand and Company Publications, 2nd edition, 2015
4	E. Hughes, Electrical Technology, Pearson, 12th Edition, 2016
5	A K Sawhney, Dhanapat Rai and Co., Electrical and Electronic Measurements and Instrumentation, 2nd edition, January 2015

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CIE for the theory:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for 40 marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks).
5. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50)

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**30+10+10=50**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B

3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3- High, Level 2- Moderate, Level 1- Low

Semester I/II					
Introduction to C Programming Category: ESC-I/II Common to All Branches except CSE allied branches (Integrated)					
Course Code	:	**B24ESCK145/245**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1.	Learn the concepts of computer, functionalities of a computer and C programming principles
2.	Use various constructs structuring and implementing the C program
3.	Illustrate the user-defined function and data structures like arrays for the solutions to problems
4.	Understand the concepts of strings and pointers to solve a realistic problems
5.	Solve simple real-world problems using modular approach and file handling mechanisms

Module - 1	**No. of Hrs**
Introduction to Computing: Computer Systems-Hardware and Software, Computer Languages, Algorithm, Flowchart, Representation of Algorithm and Flowchart with examples. Introduction to C–History of C, Features of C, Structure of C Program, Character Set, C Tokens-Keywords, Identifiers, Constants, Variables, Data types, Input/output statements in C, Types of errors.	09
Module - 2	**No. of Hrs**
Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators, Operators Precedence, Type conversion and typecasting. **Decision control and looping statements:** Statements-Selection statements (Decision Making)- if and switch statements with examples, iterative statements (loops)- for, while, do-while statements with examples, Unconditional statements- break, continue, goto statements with examples.	09
Module - 3	**No. of Hrs**
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, Storage classes, Recursion. **Arrays:** array Declaration and Initialization of arrays, accessing the elements of an array, storing values in arrays- One dimensional, two dimensional, Operations on arrays-Searching and sorting.	09
Module - 4	**No. of Hrs**
Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions. **Pointers:** Introduction to pointers, Declaration of pointer variables, Types of pointers, passing arguments to functions using pointers.	09
Module - 5	**No. of Hrs**
Structure, Union and Enumerated Data Type: Introduction to structure, Declaration and Initialization, Array of structures, Introduction to Unions, Declaration and Initialization, differentiate between structure and union, Enumerated data type. **File management in C:** File Operations-open, close, read, write, append, simple program on reading and writing data files.	09

Course Outcomes: At the end of the course, the students will be able to	
CO1	Learn the working principles of computer, various functions of peripheral devices and fundamental concept of C programming language.
CO2	Understanding the procedural programming constructs of C language to solve the real-world problem.
CO3	Understand the user defined data structures like arrays in implementing solutions to searching and sorting methods.
CO4	Learn the use of strings, structures, union, pointers and I/O files to solve a realistic problem.
CO5	Know the solutions to problems using modular programming constructs using functions.

Practical Component

Demonstration of Computer and Its Accessories

Laboratory Session-1: Write-up on Functional block diagram of Computer and explain its parts.

Laboratory Session-2: Write-up on Input and Output devices of computer.

Note: These TWO Laboratory sessions fill the gap between theory classes and practical sessions. Students to write-up and execute the same, updated in Lab record and evaluated.

Sl. No.	Experiments for Conduction
1.	Find Mechanical Energy of a particle using E = mgh+1/2 mv2.
2.	To convert Kilometers into Meters and Centimeters.
3.	To Read 3 integer values and find the largest among them using nested if statement.
4.	To Check the Given Character is Lowercase or Uppercase or Special Character.
5.	To balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
6.	To Read a string (word), store it in an array and check whether it is a palindrome word or not.
7.	To Implement Matrix multiplication and validate the rules of multiplication.
8.	To Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
9.	Program to Sort the given set of N numbers using Bubble sort technique.
10.	Using functions, demonstrate the string operations such as compare, concatenate, and string length. Use the parameter passing techniques.
11.	Apply structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
12.	Using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.

Text Books	
1.	Reema Thareja, "Computer fundamentals and programming in C", Oxford University, Second edition, 2017.
Reference Text Books	
1.	E. Bala Guruswamy, "Programming in ANSI C", 7th Edition, Tata McGraw-Hill.
2.	Brian W. Kernighan and Dennis M. Ritchie, "The 'C' Programming Language", Second edition, PrenticeHall of India.
3.	Yashwanth Kanethkar, "Let us C" ,13th Edition, BPB Publications.
4.	Brian W. Kernighan, Dennis M. Ritchie, Programming Languages C with Practicals, Margham Publications; 1 edition (2012).

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods. 2. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.htm

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.
The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.

6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	1	-	-	-	-	-	2
CO2	2	2	2	1	1	-	-	-	-	-	-	2
CO3	2	2	2	1	2	-	-	-	-	-	-	2
CO4	3	3	3	2	3	-	-	-	-	-	-	2
CO5	3	2	-	-	2	-	-	-	-	-	-	2
CO6	3	3	3	2	-	1	-	-	-	-	-	2

Level 3- High, Level 2- Moderate, Level 1- Low

Semester I/II					
Renewable Energy Sources Category: ETC-I/II (Common to ALL Branches) (Theory)					
Course Code	:	**B24ETCK154/254**	CIE	:	50 Marks
Teaching Hours L:T:P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1	To explain energy scenario, energy sources and their utilization
2	To describe the solar energy and its applications
3	To inculcate the principles of renewable energy conversion systems
4	To outline the benefits of fuel cell and green energy

Module - 1	**No. of Hrs**
Introduction: Principles of renewable energy; Energy and sustainable development,Fundamentals and social implication, Reasons for energy scarcity,world-wide renewable energy availability, Renewable energy availability in India, brief descriptions on solar energy, Wind energy, Tidal energy, Wave energy, Ocean thermal energy, Biomass energy, Geothermal energy, Oil shale, Introduction to Internet of energy (IOE).	09
Module - 2	**No. of Hrs**
Solar Energy: Fundamentals: Sun and layers of sun; Solar Radiation; Estimation of solar radiation on horizontal and inclined surfaces; Solar radiation Measurements-Pyrheliometer, Pyrometer, Sunshine Recorder, Solar Thermal systems: Flat plate collector; Solar distillation; Solar Pond electric power plant. **Solar electric power generation**- Principle of Solar cell, Photovoltaic system for electric power generation, advantages, Disadvantages and applications of solar photovoltaic system; Off grid solar inverter.	09
Module - 3	**No. of Hrs**
Wind Energy: Properties of wind, Availability of wind energy in India, Wind velocity and power from wind; Major problems associated with wind power, Choice of site selection, Basic components of wind energy conversion system (WECS); Classification of WECS- Horizontal axis- single, double and multi blade system. Vertical axis- Savonius and darrieus types. **Biomass Energy:** Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies-Fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft) .	09
Module - 4	**No. of Hrs**
Tidal Power: Tides and waves as energy suppliers and their mechanics; Fundamental characteristics of tidal power, Harnessing tidal energy, Advantages and limitations. **Ocean Thermal Energy Conversion:** Principle of working, OTEC power stations in the world, Problems associated with OTEC- General block diagram.	09
Module - 5	**No. of Hrs**
Green Energy: Introduction, Fuel cells: Classification of fuel cells – H2; Operating principles, Zero energy Concepts. Benefits of hydrogen energy,	09

Hydrogen production technologies (electrolysis method only), Hydrogen energy storage, Applications of hydrogen energy, Problem associated with hydrogen energy.	

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand the environmental aspects of renewable energy resources and comparethem with various conventional energy systems, highlighting their prospects and limitations.
CO2	Describe the use of solar energy and the various components used in energy production, focusing on applications such as heating, cooling, desalination, andpower generation.
CO3	Understand the conversion principles of wind and biomass energy
CO4	Understand the concept of tidal energy resources and OTEC
CO5	Understand the basic concept of fuel cell and hydrogen energy

Text Books	
1	G D Rai, Nonconventional Energy sources, Khanna Publication, Fourth Edition, 1988
2	S.Rao and Dr. B.B. Parulekar, Energy Technology, Khanna Publication, 2005
3	Subhas P Sukhatme, Solar energy, Tata Mc Graw Hill, 2nd Edition,1996.
Reference Text Books	
1	A. W. Culp Jr.,Principles of Energy conversion, McGraw Hill, 1996
2	Shobh Nath Singh, Non-Convention EnergyResources, Pearson, 2018
3	Rajendra Prasad, Fundamentals of Electrical Engineering, PHI, 3rd edition, 2014.

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CIE for the theory:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for 40 marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks).
5. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50).

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**30+10+10=50**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	2	2	1	0	1	-	1
CO2	3	3	-	-	-	2	2	1	0	1	-	1
CO3	3	3	-	-	-	2	2	1	0	1	-	1
CO4	3	3	-	-	-	2	2	1	0	1	-	1
CO5	3	3	-	-	-	2	2	1	0	1	-	1

Level 3- High, Level 2- Moderate, Level 1- Low

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution Under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru - 560074

UG (B.E) Syllabus

2024-25

II Semester – Physics Cycle

Information Science and Engineering
(ISE)

SEMESTER II					
Mathematics-II for CS					
Course Code	:	B24MACS201	CIE	:	50 Marks
Teaching Hours L:T: P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3 Hrs.

Course Objectives	
1	Familiarize the importance of Integral calculus
2	Familiarize the fundamentals of Vector calculus
3	Analyze engineering problems applying Ordinary Differential Equations.
4	Develop the knowledge of numerical methods and apply them to solve algebraic and Transcendental equations.
5	Develop the knowledge of numerical methods and apply them to solve differential equations.

Module-1: Integral Calculus	**9 hrs.**
Evaluation of double and triple integrals, evaluation of double integrals by changing of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integration, Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems. **Self-Study:** Centre of gravity, Duplication formula. **Applications:** Antenna and wave propagation, Calculation of optimum value in various geometries. Analysis of probabilistic models.	
Module-2: Vector Calculus	**9 hrs.**
Scalar and vector fields. Gradient, directional derivative, curl and divergence – physical interpretation, solenoidal and irrotational vector fields. Problems. Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between Cartesian and curvilinear systems, orthogonality. Problems. **Self-study:** Vector integration and Vector line integral. **Applications:** Conservation of laws, Electrostatics, Analysis of streamlines.	
Module-3: Vector Space & Linear transformations	**9 hrs.**
Definition and examples, subspace, linear span, linearly independent and dependent sets, Basis, and dimension. Problems. Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, rank-nullity theorem. Inner product spaces and orthogonality. Problems. **Self-study:**AnglesandProjections.Rotation,Reflection,ContractionandExpansion **Applications:** Image processing, AI & ML, Graphs and networks, Computer graphics.	
Module-4: Numerical Methods-I	**9 hrs.**
Solution of algebraic and transcendental equations – Regula – Falsi and Newton – Raphson methods (only formulae) Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula. Numerical integration: Simpson's $(1/3)rd\&(3/8)th$ rule, Weddle's rule (without proof). Problems. **Self-Study:** Trapezoidal rule, Bisection method, Lagrange's inverse Interpolation, Numerical differentiation (All formulae without proof). Problems. **Applications:** Estimating the approximate roots, extremum values, Area, volume, and surface area. Errors in finite precision.	
Module 5: Numerical Methods-II	**9 hrs.**
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 method, Adams Bashforth method (No derivations of formulae)Problems. **Self-Study:** Newton's core formula. **Applications:** Estimating the approximate solutions of ODE.	

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

1	Program to compute area, surface area, volume and center of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
4	Computation of basis and dimension for a vector space and Graphical representation of linear transformation
5	Computing the inner product and orthogonality.
6	Solution of algebraic and transcendental equations by Ramanujan's, 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 $(1/3)rd\&(3/8)th$ 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.

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

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply the concept of change of order of integration and variables to evaluate Multiple Integrals and the 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 an analyzing the discrete data and solving the Physical and engineering problems.
CO5	Apply the knowledge of numerical methods in analyzing the solution of first order differential equations.

Text Books	
1	B.S.Grewal:"Higher Engineering Mathematics", Khanna publishers,44th Ed.2018
2	E.Kreyszig:"Advanced Engineering Mathematics", John Wiley &Sons, 10th Ed.(Reprint),2016
Reference Text Books	
1	V. Ramana: "Higher Engineering Mathematics", McGraw-Hill Education,11th Edition.
2	Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematics for Semester I and II", McGraw (India) Pvt. Ltd, 2015

Web links and Video lectures (e-Resources)

1. https://nptel.ac.in/courses/122106025
2. VTUEDUSATPROGRAMME –20
3. http://www.class-central.com/subject/math(MOOCs)

CIE Evaluation

Assessment Details both (CIE and SEE)

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The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 mark each. **Part - A is Compulsory**and carries 20 Marks.
4. **Part-B**contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks andmarks scored out of 100 shall beproportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Semester I/II					
Applied Physics for CS Category: ASC Stream: **CSE** (Common to all CSE allied branches) (Integrated)					
Course Code	:	**B24PHCS102/202**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		4	SEE Duration	:	3 Hrs

Course Objectives	
1	To study the principles of modern physics and quantum mechanics
2	To study the essentials and applications of lasers and optical fibers
3	To study the concepts of quantum computing
4	To study the electrical properties of materials and basics of digital displays
5	To study the properties and applications of Semiconductors

Module - 1 Modern Physics and Quantum Mechanics	**No. of Hrs**
Concepts of modern physics and quantum mechanics: Wave-particle dualism, de Broglie hypothesis (qualitative), phase and group velocities, relation between group velocity and phase velocity, relation between group velocity and particle velocity. Heisenberg's uncertainty principle, non-confinement of electrons in atomic nucleus, Setting up of one dimensional time independent Schrodinger's wave equation from classical wave equation, properties and physical significance of wave function, energy eigen values of a particle in an infinite one dimensional potential well, Numerical problems on modern physics and quantum mechanics.	9
Module – 2 Lasers and Optical Fibers	**No. of Hrs**
Lasers, interaction of radiation with matter, induced absorption, spontaneous emission and stimulated emission, expression for energy density of radiation in terms of Einstein coefficients at thermal equilibrium, requisites of a laser system, three and four level lasers, principle and operation of CO_2 laser, applications of lasers. Optical fibers, propagation mechanisms in optical fibers, angle of acceptance and numerical aperture (derivation), types of optical fibers, attenuation, attenuation mechanisms in optical fibers, application of optical fiber in point to point communication system. Numerical problems on lasers and optical fibers.	9
Module – 3 Quantum Computing	**No. of Hrs**
Introduction to Quantum Computing, Moore's law & its end, Differences between Classical & Quantum computing. Concept of qubit and its properties. Representation of qubit by Bloch sphere. Single and Two qubits. Extension to N qubits. Matrix representation of 0 and 1 States, Identity Operator I, Applying I to$\|0\rangle$and $\|1\rangle$ states, Pauli Matrices and its operations on $\|0\rangle$and $\|1\rangle$states, Explanation of i) Conjugate of a matrix and ii) Transpose of a matrix. Unitary matrix U, Examples: Row and Column Matrices and their multiplication (Inner Product), Probability, and Quantum Superposition, normalization rule. Orthogonally, Orthonormality. Numerical Problems. Single Qubit Gates: Quantum Not Gate, Pauli – X, Y and Z Gates, Hadamard Gate. Multiple Qubit Gates: Controlled gate, CNOT Gate, (Discussion for 4 different input states), Toffoli gate.	9
Module – 4 Electrical conductivity in metals	**No. of Hrs**
Classical free electron theory, assumptions, drift velocity, mean free path, mean collision time, relaxation time, mobility of electrons, expression for electrical conductivity (no derivation), effect of temperature and impurity on electrical resistivity of metals, failures of classical free-electron theory. Quantum free electron theory, assumptions, density of states (no derivation), Fermi-energy, Fermi factor & its temperature dependence, Fermi - Dirac Statistics, expression for electrical	9

conductivity (expression only), merits of quantum free electron theory, numerical problems.	
Module – 5 Physics of Semiconductors and introduction to digital display	**No. of Hrs**
Semiconductors and devices: Fermi level in intrinsic & extrinsic semiconductor (qualitative), expression for concentration of electrons in conduction band & holes concentration in valance band (expression only), relation between Fermi energy & energy gap intrinsic semiconductors(derivation), law of mass action, electrical conductivity of a semiconductor (derivation), Hall effect, expression for Hall coefficient (derivation) and its application, photo-diode and power responsivity, construction and working of semiconducting laser. Introduction to digital displays, CRT (Cathode Ray Tube) displays, LCD (Liquid Crystal Display), LED (Light Emitting Diode) displays, OLED (Organic Light Emitting Diode) displays, plasma displays, quantum dot displays, numerical problems on semiconductors.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Describe the concepts of Modern Physics and Quantum Mechanics and their Applications
CO2	Explain the principles of LASERS and Optical fibers and their relevant applications
CO3	Describe the concepts of quantum computing
CO4	Elucidate the concepts of electrical conductivity of conductors and semiconductors, and digital displays
CO5	Practice working in groups to conduct experiments in Physics and perform precise and honest measurements

Text Books	
1	S P Basavaraj, Engineering Physics, , 2018 Edition, Subhash Stores.
2	Gupta and Gour, Engineering Physics, Dhanpat Rai Publications, 2016 (Reprint)
Reference Text Books	
1	Arthur Beiser, Concepts of Modern Physics, 6th edition, Tata McGraw Hill Edu Pvt Ltd-New Delhi 2006
2	Halliday, D., Resnick, R. & Walker, J, Principles of Physics, Wiley, 2015
3	BB Laud, Lasers and Non-linear optics, 3rd edition, New Age International Publishers 2011
4	Parag K Lala, Quantum Computing – A Beginner's Introduction, , Indian Edition, Mc GrawHill, Reprint 2020
5	S.O Pillai, Solid state physics, , 10th edition, 2022

Web links and Video lectures (e-Resources)

1. https://www.youtube.com/watch?v=WgzynezPiyc
2. https://www.youtube.com/watch?v=MT5Xl5ppn48
3. https://www.youtube.com/watch?v=N_kA8EpCUQo
4. https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s
5. https://archive.nptel.ac.in/courses/115/103/115103108
6. https://www.youtube.com/watch?v=tz_3M3v3kxk

LIST OF EXPERIMENTS

Experiment Number	Name of the Experiment
1	Dielectric constant of a capacitor
2	Photo Diode
3	Fermi Energy
4	Diffraction Grating
5	Acceptance Angle and NA of an Optical Fiber

6	Black Box
7	Transistor Characteristics
8	LCR Series and Parallel Resonance Circuit
9	Determination of Magnetic Field Intensity
10	Plank's Constant
11	Newton's Rings
12	Single Cantilever
13	Young's modulus by uniform bending
14	Spring Constants
15	Study of motion using spread Sheets

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15^{th} week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Semester I/ II					
Principles of Programming using C Category: ESC Stream: **CSE** (Common to all CSE allied branches) (Integrated)					
Course Code	:	**B24POPC103/203**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1.	Learn the concepts of computer, functionalities of a computer and C programming principles
2.	Use various constructs structuring and implementing the C program
3.	Illustrate the user-defined function and data structures like arrays for the solutions to problems
4.	Understand the concepts of strings and pointers to solve a realistic problem
5.	Solve simple real-world problems using modular approach and file handling mechanisms

Module - 1	**No. of Hrs**
Basics of Programming: Introduction to computers, input and output devices, program design tools: the meaning of Algorithms, Flowcharts, Pseudocode, Memory concepts. **C Fundamentals:** Importance of 'C' Language, History, Structure of 'C' program, Sample 'C' Program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, data types, Enumeration, Input/output statements in C.	09
Module - 2	**No. of Hrs**
Operators in C, Type conversion and typecasting. **Decision control and looping statements:** Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.	09
Module - 3	**No. of Hrs**
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. **Arrays:** The meaning of an array, one dimensional and two dimensional arrays, declaration and initialization of arrays, reading, writing the elements of an array, storing values in arrays, Operations on arrays: Traversing, Searching and sorting, Passing arrays to functions, applications of arrays.	09
Module – 4	**No. of Hrs**
Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions. **Pointers:** Introduction to pointers, accessing the address space of a variable, declaring and initialization of pointer variables, accessing a variable through its pointer, pointer and arrays, pointer to a function, calling a functions through function pointer.	09
Module - 5	**No. of Hrs**
Structure, Union and Enumerated Data Type: Defining a structure, Declaring and accessing structure variables, structure initialization, array of structures, Nested structure, structures and functions, Unions, Enumerated data type. **File Handling:** Defining and opening a file, input/output operations on files, error handling during I/O	09

operations, random access files, command line arguments, C preprocessor.	

Course Outcomes: At the end of the course, the students will be able to	
CO1	Learn the working principles of computer, various functions of peripheral devices and fundamental concept of C programming language.
CO2	Understanding the various constructs structuring and implementing the C program.
CO3	Understand the user defined data structures like arrays in implementing solutions to searching and sorting methods.
CO4	Understand the use of strings, structures, union, pointers and I/O files to solve a realistic problem.
CO5	Know the solution for real-world problems using modular approach and file handling mechanisms.

Practical Component

Demonstration of Computer and Its Accessories

Laboratory Session-1: Write-up on Functional block diagram of Computer and explain its parts.

Laboratory Session-2: Write-up on Input and Output devices of computer.
Note: These TWO Laboratory sessions fill the gap between theory classes and practical sessions. Students have to wr up and execute the same, updated in Lab record and evaluated.

Sl. No.	Experiments for Conduction
1.	Simulation of a Simple Calculator.
2.	Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
3.	Program to calculate the Gross Salary of an employee by considering the input as basic salary and include a 5% Dearness Allowance (DA) and a 10% House Rent (HR) allowance, where the Gross Salary is determined as the sum of the basic salary, DA, and HR. Also calculate the tax deducted for an annual income with the given conditions: a) If income is less than or equal to 5 lakhs, then no tax b) If income is in the range 5 lakhs to 10 lakhs, then tax is 10% c) If income is above 10 lakhs, then the tax is 30%
4.	Program to display the following by reading the number of rows as input 1 1 2 1 1 2 3 2 1 1 2 3 4 3 2 1 …… n^{th} row
5.	Program for Binary Search on Integers.
6.	Implement Matrix multiplication and validate the rules of multiplication.
7.	Program to Sort the given set of N numbers using Bubble sort technique.

8.	Using functions, perform the string operations such as compare, concatenate, and string length. Use the parameter passing techniques.
9.	Apply structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
10.	Using pointers, compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
11.	Program to copy a text file to another, read both the input file name and target file name.

Text Books	
1.	Reema Thareja, "Computer fundamentals and programming in C", Oxford University, Second edition, 2017.
Reference Text Books	
1.	E. Bala Guruswamy, "Programming in ANSI C", 7th Edition, Tata McGraw-Hill.
2.	Brian W. Kernighan and Dennis M. Ritchie, "The 'C' Programming Language", Second edition, PrenticeHall of India.
3.	Yashwanth Kanethkar, "Let us C" ,13th Edition, BPB Publications.
4.	Brian W. Kernighan, Dennis M. Ritchie, Programming Languages C with Practicals, Margham Publications; 1 edition (2012).

Web links and Video lectures (e-Resources)

1. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods.
2. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.htm
3. https://tinyurl.com/4xmrexre

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Assessment Details both (CIE and SEE)

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The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
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3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
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IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	

2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3- High, Level 2- Moderate, Level 1- Low

Semester I/II					
Introduction to Electrical Engineering Category: ESC- I/II (Common to All Branches except EEE) (Theory)					
Course Code	:	**B24ESCK142/242**	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1	To explain the power generation concepts and laws used in the analysis of DC circuits.
2	To explain the behavior of circuit elements in single-phase and three phase circuits.
3	To describe the construction and operation DC machines and Transformers
4	To describe the application of renewable energy and introduction to EV
5	To describe domestic wiring and safety measures.

Module - 1	**No. of Hrs**
Introduction: Conventional and non-conventional energy resources; Generalstructure of electrical power systems using single line diagram approach. **Power Generation:** Hydel, Nuclear, Solar & Wind power generation (BlockDiagram approach). **DC Circuits:** Ohm's Law and its limitations, KCL & KVL, Series, Parallel, Series-Parallel circuits. Simple Numerical.	09
Module - 2	**No. of Hrs**
Single Phase Circuits: Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Analysis of R-L, R-C, R-L-C Series circuits, Active power, Reactive power and Apparent power, Concept of power factor. **Three Phase Circuits:** Generation of Three phase AC quantity, Advantages and limitations; Star and Delta connection, Relationship between line and phase quantities	09
Module - 3	**No. of Hrs**
DC Machines: DC Generator: Principle of operation, Constructional details, Induced EMF expression, Types of generators, Relation between induced EMF and terminal voltage, simple numericals on EMF equation, DC Motor**:** Principle of operation, Back EMF and its significance, Types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only), Torque equation, Applications of DC motors **Transformers:** Necessity of transformer, Principle of operation, Types and construction of single phase transformers, EMF equation, Losses of transformer, Efficiency, Simple numerical on Losses and Efficiency	09
Module - 4	**No. of Hrs**
Applications of Renewable energy: Photovoltaic Systems, Solar distillation; Solar Pond electric power plant, Off grid solar inverter, Urban waste to energy conversion, Hydrogen based transportation system Introduction to EV: History, General block diagram, Application and Benefits	09
Module - 5	**No. of Hrs**
Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load.	09

Electrical Safety: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits, Electric Shock, Earthing and its types, Safety Precautions to avoid shock **Electricity bill:** Power consumption of electrical energy, Two-part electricity tariff, *Case study on calculation of electricity bill for domestic consumers*.	

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand the concepts of power generation and and solve DC circuit problems
CO2	Analyze single-phase circuits, solve R-L, R-C, and R-L-C circuits, and comprehend three-phase circuit principles.
CO3	Understand DC machines, transformers and their characteristics
CO4	Understand the application of renewable energy and basics of EV
CO5	Understand domestic wiring and safety measures

Text Books	
1	D C Kulshreshtha, Basic Electrical Engineering, Tata McGraw Hill, First Edition 2019
Reference Books	
1	B.L. Theraja, A text book of Electrical Technology, S Chand and Company, reprint edition 2014.
2	G D Rai, Nonconventional Energy sources, , Khanna Publication, Fourth Edition, 1988
3	D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, , Tata McGraw Hill 4th edition, 2019.
4	V. K. Mehta, Rohit Mehta, Principles of Electrical Engineering & Electronics, S. Chand and Company Publications, 2nd edition, 2015.
5	Rajendra Prasad, Fundamentals of Electrical Engineering, PHI, 3rd edition, 2014.
6	Iqbal Husain, Electric and Hybrid Vehicles Design Fundamentals, CRC Press, second edition,2011.

CIE Evaluation

Assessment Details both (CIE and SEE)

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CIE for the theory:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for 40 marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks).
5. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50)

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**30+10+10=50**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3- High, Level 2- Moderate, Level 1- Low

Semester I / II					
Introduction to IoT Category: ETC-I/II (Common to ALL branches) (Theory)					
Course Code	:	**B24ETCK156/256**	CIE	:	50 Marks
Teaching Hours L: T: P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1	Understand the fundamentals of the Internet of Things, its building blocks, and their characteristics
2	Understand the recent application domains of IoT in everyday life
3	Gain insights about the current trends of Associated IoT technologies and IoT Analytics

Module - 1	**No. of Hrs**
Basics of Networking: Introduction, Network Types, Layered network Models **Predecessors of IoT:** Introduction, Wireless Sensor Networks, Machine-to- Machine Communications **Emergence of IoT:** Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components **Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 3 – 3.1 - 3.3 Chapter 4 – 4.1 to 4.4**	**9**
Module - 2	**No. of Hrs**
IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. **Textbook 1: Chapter 5 – 5.1 to 5.9**	**9**
Module - 3	**No. of Hrs**
IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. **Textbook 1: Chapter 6 – 6.1 to 6.5**	**9**
Module - 4	**No. of Hrs**
IoT Connectivity Technologies: Introduction, IEEE802.15.4, Zigbee, RFID, LoRa, Wi-Fi, Bluetooth **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 7- 7.1 - 7.3, 7.7, 7.13, 7.15, 7.16 Chapter 10– 10.1 to 10.6**	**9**
Module - 5	**No. of Hrs**
IOT CASE STUDIES AND FUTURE TRENDS **Agricultural IoT** – Introduction and Case Studies **Vehicular IoT** – Introduction **Healthcare IoT** – Introduction, Case Studies **Textbook 1: Chapter 12- 12.1-12.2 Chapter 13– 13.1; Chapter 14- 14.1-14.2**	**9**

Course Outcomes: At the end of the course, the students will be able to	
CO1	Describe the basics of Networking, Predecessors of IoT, and the emergence of IoT
CO2	Classify various sensing devices and actuator types
CO3	Demonstrate the processing Topologies in IoT and types
CO4	Explain IoT Connectivity technologies and Associated IoT technologies
CO5	Illustrate the architecture of IoT Applications

Textbooks	
1	Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.
Reference Textbooks	
1	S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
2	Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.
3	Francis da Costa, "Rethinking the Internet of Things: A Scalable Approach toConnecting Everything", 1st Edition, Apress Publications, 2013.

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/

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CO-PO Mapping:

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

Level 3- High, Level 2- Moderate, Level 1- Low

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution Under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru - 560074

UG (B.E) Syllabus

2024-25

II Semester – Physics Cycle

Robotics and Automation
(R & A)

SEMESTER II					
Mathematics-II for ME					
Course Code	:	B24MAME201	CIE	:	50 Marks
Teaching Hours L: T :P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1	Familiarize the importance of Integral calculus
2	Familiarize the fundamentals of Vector calculus
3	Analyze problems by applying Partial Differential Equations.
4	Develop the knowledge of numerical methods and apply them to solve algebraic and transcendental equations.
5	Develop the knowledge of numerical methods and apply them to solve differential equations.

Module-1:Integral Calculus	**9 hrs.**
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 and Volume by double integral. Problems. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems. **Self-Study:** Volume by triple integration, Center of gravity. **Applications:** Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models	
Module-2:Vector Calculus	**9 hrs.**
Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence – physical interpretation, solenoidal and irrotational vector fields. problems. Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems. **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.	
Module-3: Partial Differential Equations(PDE)	**9 hrs..**
Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation. **Self-Study:** Solution of the one-dimensional heat equation and wave equation by the method of separation of variables. **Applications:** Vibration of a rod/membrane.	
Module-4:Numerical Methods-I	**9 hrs.**
Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. 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). Problems. Numerical integration: Trapezoidal, Simpson's $(1/3)rd$&$(3/8)th$rules(without proof). Problems. **Self-Study:** Bisection method, Lagrange's inverse Interpolation. **Applications:** Finding approximate solutions to solve mechanical engineering problems involving numerical data.	
Module-5: Numerical Methods-II	**9 hrs.**
Numerical Solution of Ordinary Differential Equations (ODEs): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Picard's method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor corrector formula (No derivations of formulae). Problems. **Self-Study:** Adam-Bash forth method. **Applications:** Finding approximate solutions to solve mechanical engineering problems.	

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

1	Program to compute surface area, volume and center 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 $(1/3)rd\&(3/8)th$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

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

Course Outcomes: At the end of the course, the students will 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 partial differential equations and their solutions for physical interpretations.
CO4	Apply the knowledge of numerical methods in analyzing the discrete data and solving the physical and engineering problems.
CO5	Apply the knowledge of numerical methods in analyzing the solution of first order differential equations

Text Books	
1	B.S. Grewal:"Higher Engineering Mathematics", Khanna publishers,44th Ed.2018
2	E. Kreyszig:"Advanced Engineering Mathematics", John Wiley & Sons,10th Ed.(Reprint),2016
Reference Text Books	
1	V. Ramana:"Higher Engineering Mathematics", Mc Graw-HillEducation,11th Edition.
2	Gupta C.B, Sing S.R and Mukesh Kumar:"Engineering Mathematic for Semester I and II", Mc Graw (India) Pvt.Ltd,2015

Web links and Video lectures(e-Resources)

1. https://nptel.ac.in/courses/122106025
2. VTUEDUSATPROGRAMME–20
3. http://www.class-central.com/subject/math(MOOCs)

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 mark each. **Part - A is Compulsory**and carries 20 Marks.
4. **Part-B**contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks andmarks scored out of 100 shall beproportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
PART - A		
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
PART – B (Minimum 3 subdivisions only)		
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Semester I/II					
Applied Physics for ME Category: ASC Stream: **ME** (Common to ME & RA branch) (Integrated)					
Course Code	:	**B24PHME102/202**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		4	SEE Duration	:	3 Hrs

Course Objectives,	
1	To understand the types of oscillation, shock waves & its generation, and applications.
2	To Study the elastic properties of materials and failures of engineering materials
3	To study the concepts of acoustics, radiometry and photometry.
4	To understand the concepts of semiconductors and material characterization techniques.
5	To study the various relevant material characterization techniques.

Module 1 Oscillations and Shock waves	**No. of Hrs**
Oscillations: Simple harmonic motion (SHM), differential equation for SHM, theory of damped oscillations, types of damping (graphical approach), applications of damped oscillations, theory of forced oscillations, conditions for resonance, sprigs, stiffness factor and its physical significance, series and parallel combination of springs (derivation), types of springs and their applications, numerical problems. Shock waves: Mach number and mach angle, mach regimes, definition and characteristics of shock waves, construction and working of Reddy shock tube, applications of shock waves, numerical problems.	9
Module 2 Elasticity	**No. of Hrs**
Elasticity in materials, stress-strain curve, stress hardening and softening, failures of engineering materials, ductile fracture, brittle fracture, fatigue and factors affecting fatigue (only qualitative explanation), elastic moduli, Poisson's ratio, relation between Y, n and σ (derivation), relation between K, Y and σ (derivation), limiting values of Poisson's ratio, beams, types of beams, expression for bending moment, derivation for young's modulus using single cantilever, numerical problems.	9
Module 3 Acoustics, Radiometry and Photometry	**No. of Hrs**
Acoustics: 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, sound insulation and its measurements, noise and its measurements, impact of noise in multi-storey buildings. Radiometry and Photometry: Radiation quantities, spectral quantities, relation between luminance and radiant quantities, reflectance and transmittance, photometry (cosine law and inverse square law).	9
Module 4 Physics of Semiconductors	**No. of Hrs**
Semiconductors and devices: Fermi level in intrinsic & extrinsic semiconductor (qualitative), expression for concentration of electrons in conduction band & holes concentration in valance band (expression only), relation between Fermi energy & energy gap intrinsic semiconductors(derivation), law of mass action, electrical conductivity of a semiconductor (derivation), Hall effect, expression for Hall coefficient (derivation) and its application, photo-diode and power responsivity, construction and working of semiconducting laser, numerical	9

problems.	
Module 5 Material Characterization and Instrumentation Techniques	**No. of Hrs**
Bragg's law, construction and working of X-ray diffractometer, crystallite size determination by Scherrer equation, principle, construction, working and applications of atomic force microscopy (AFM), scanning electron microscopy (SEM), transmission electron microscopy (TEM), Numerical Problems.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Elucidate the concepts in oscillations, waves, elasticity and material failures.
CO2	Describe the elastic properties of materials and failures of engineering materials.
CO3	Summarize concepts of acoustics in buildings and explain the concepts in radiation and photometry.
CO4	Explain the various material characterization techniques.
CO5	Practice working in groups to conduct experiments in Physics and perform precise and honest measurements.

Text Books	
1	S P Basavaraj, Engineering Physics, 2018 Edition, Subhash Stores.
2	Gupta and Gour, Engineering Physics, Dhanpat Rai Publications, 2016 (Reprint).
Reference 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	Wole Soboyejo, Mechanical Properties of Engineered Materials by, CRC Press; 1st edition, 20
5	S.O Pillai, Solid state physics, 10th edition, 2022.

Web links and Video lectures (e-Resources)
1.Simple Harmonic motion:https://www.youtube.com/watch?v=k2FvSzWeVxQ 2.Shock waves:https://physics.info/shock/ 3.Shock waves and its applications:https://www.youtube.com/watch?v=tz_3M3v3kxk 4.Stress- strain curves:https://web.mit.edu/course/3/3.11/www/modules/ss.pdf 5.Stress curves:https://www.youtube.com/watch?v=f08Y39UiC-o 6.Fracture in materials:https://www.youtube.com/watch?v=x47nky4MbK8 7.Virtual lab:https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham 8.Material characterization :https://onlinecourses.nptel.ac.in/noc20_mm14/preview 9.https://www.encyclopedia.com/science-and-technology/physics/physics/cryogenics 10.https://www.usna.edu/NAOE/_files/documents/Courses/EN380/Course_Notes/Ch_Deformation.pdf

LIST OF EXPERIMENTS

Experiment Number	Name of the Experiment
1	Diffraction Grating
2	Young's modulus by uniform bending
3	Single Cantilever
4	Newton's Rings
5	Fermi Energy

6	Spring Constants
7	Torsional Pendulum
8	LCR Series and Parallel Resonance Circuit
9	Determination of Magnetic Field Intensity
10	Acceptance Angle and NA of an Optical Fiber
11	Plank's Constant
12	Dielectric constant of a capacitor
13	Photo Diode
14	Black Box
15	Study of motion using spread Sheets

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Semester II					
Elements of Mechanical Engineering Category: ESC Stream: **ME** (Only for RA Branch) (Theory)					
Course Code	:	**B24EMME203**	CIE	:	50 Marks
Teaching Hours L : T : P:S	:	2:2:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Objectives	
1	Acquire a basic understanding about the scope of mechanical engineering, and fundamentals about steam and non-conventional energy sources.
2	Acquire a basic knowledge about conventional and advanced manufacturing processes.
3	Acquiring a basic understanding about IC engines, propulsive devices and air-conditioners.
4	Acquiring a basic knowledge about power transmission and joining processes.
5	Acquiring a basic insight into future mobility and mechatronics and robotics.

Module - 1	**No. of Hrs**
Introduction to Mechanical Engineering (Overview only): Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors. **Steam Formation and Application:** Modes of heat transfer, Steam formation, Types of steam, Steam properties and applications of steam. (simple numerical problems). Energy Sources and Power Plants: Basic working principles of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant and Wind power plant.	9
Module - 2	**No. of Hrs**
Machine Tool Operations: Lathe: Principle of working of a centre lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swivelling the compound rest, Drilling Machine: Working of simple drilling machine, drilling operations: drilling, boring, reaming, tapping, counter sinking, counter boring, Milling Machine: Working and types of milling machine, milling operations: plane milling, end 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. Demonstration of lathe/milling/drilling/CNC operations	9
Module - 3	**No. of Hrs**
Introduction to IC Engines: Components and working principles, 4-Stroke Petrol and Diesel engines, Application of IC Engines, performance of IC engines (Simple numerical). **Introduction to Refrigeration and Air Conditioning:** Principle of refrigeration, Refrigerants and their desirable properties. Working principle of VCR refrigeration system. Demonstration of working of IC engine/refrigerator	9
Module - 4	**No. of Hrs**
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. Demonstration of metal joining process	9

Module - 5	No. of Hrs
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. Video demonstration of the latest trends in mobility/robotics	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain the role of mechanical engineering in industry and society, fundamentals of steam and non-conventional energy sources
CO2	Describe different conventional and advanced machining processes, IC engines, propulsive devices, air-conditioning, and refrigeration.
CO3	Explain different gear drives, gear trains and different joining processes.
CO4	Determine the condition of steam and its energy, performance parameters of IC engines, velocity ratio and power transmitted through power transmission systems.
CO5	Explain the aspects of future mobility and the fundamentals of robotics.

Text Books	
1	K R Gopala Krishna, Elements of Mechanical Engineering, Subhash Publications, 2008.
2	Hazra Choudhry and Nirzar Roy, Elements of Workshop Technology (Vol. 1 and 2), , Media Promoters and Publishers Pvt. Ltd., 2010.
Reference Text Books	
1	Jonathan Wickert and Kemper Lewis, An Introduction to Mechanical Engineering, , Third Edition, 2012
2	P.N.Rao, Manufacturing Technology- Foundry, Forming and Welding, Tata McGraw Hill 3rd Ed., 2003.
3	Appu Kuttan KK K, Robotics,International Pvt Ltd, volume 1

Web links and Video lectures (e-Resources)

1. https://nptel.ac.in/courses/122106025
2. https://www.tlv.com/steam-info/steam-theory/steam-basics/principal-applications-for-steam
3. https://www.makino.com/en-us/resources/content-library/videos

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CIE for the theory:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for 40 marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks).
5. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50)

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**30+10+10=50**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	1	1	-	-	1	-	1
CO2	3	-	-	-	-	1	1	-	-	1	-	1
CO3	3	-	-	-	-	1	1	-	-	1	-	1
CO4	3	-	-	-	-	1	1	-	-	1	-	1
CO5	3	-	-	-	-	1	1	-	-	1	-	1

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Semester I/II					
Introduction to C Programming Category: ESC-I/II Common to All Branches except CSE allied branches (Integrated)					
Course Code	:	**B24ESCK145/245**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1.	Learn the concepts of computer, functionalities of a computer and C programming principles
2.	Use various constructs structuring and implementing the C program
3.	Illustrate the user-defined function and data structures like arrays for the solutions to problems
4.	Understand the concepts of strings and pointers to solve a realistic problems
5.	Solve simple real-world problems using modular approach and file handling mechanisms

Module - 1	**No. of Hrs**
Introduction to Computing: Computer Systems-Hardware and Software, Computer Languages, Algorithm, Flowchart, Representation of Algorithm and Flowchart with examples. Introduction to C–History of C, Features of C, Structure of C Program, Character Set, C Tokens-Keywords, Identifiers, Constants, Variables, Data types, Input/output statements in C, Types of errors.	09
Module - 2	**No. of Hrs**
Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators, Operators Precedence, Type conversion and typecasting. **Decision control and looping statements:** Statements-Selection statements (Decision Making)- if and switch statements with examples, iterative statements (loops)- for, while, do-while statements with examples, Unconditional statements- break, continue, goto statements with examples.	09
Module - 3	**No. of Hrs**
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, Storage classes, Recursion. **Arrays:** array Declaration and Initialization of arrays, accessing the elements of an array, storing values in arrays- One dimensional, two dimensional, Operations on arrays-Searching and sorting.	09
Module - 4	**No. of Hrs**
Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions. **Pointers:** Introduction to pointers, Declaration of pointer variables, Types of pointers, passing arguments to functions using pointers.	09
Module - 5	**No. of Hrs**
Structure, Union and Enumerated Data Type: Introduction to structure, Declaration and Initialization, Array of structures, Introduction to Unions, Declaration and Initialization, differentiate between structure and union, Enumerated data type. **File management in C:** File Operations-open, close, read, write, append, simple program on reading and writing data files.	09

Course Outcomes: At the end of the course, the students will be able to	
CO1	Learn the working principles of computer, various functions of peripheral devices and fundamental concept of C programming language.
CO2	Understanding the procedural programming constructs of C language to solve the real-world problem.
CO3	Understand the user defined data structures like arrays in implementing solutions to searching and sorting methods.
CO4	Learn the use of strings, structures, union, pointers and I/O files to solve a realistic problem.
CO5	Know the solutions to problems using modular programming constructs using functions.

Practical Component

Demonstration of Computer and Its Accessories

Laboratory Session-1: Write-up on Functional block diagram of Computer and explain its parts.

Laboratory Session-2: Write-up on Input and Output devices of computer.

Note: These TWO Laboratory sessions fill the gap between theory classes and practical sessions. Students to write-up and execute the same, updated in Lab record and evaluated.

Sl. No.	Experiments for Conduction
1.	Find Mechanical Energy of a particle using E = mgh+1/2 mv2.
2.	To convert Kilometers into Meters and Centimeters.
3.	To Read 3 integer values and find the largest among them using nested if statement.
4.	To Check the Given Character is Lowercase or Uppercase or Special Character.
5.	To balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
6.	To Read a string (word), store it in an array and check whether it is a palindrome word or not.
7.	To Implement Matrix multiplication and validate the rules of multiplication.
8.	To Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
9.	Program to Sort the given set of N numbers using Bubble sort technique.
10.	Using functions, demonstrate the string operations such as compare, concatenate, and string length. Use the parameter passing techniques.
11.	Apply structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
12.	Using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.

Text Books	
1.	Reema Thareja, "Computer fundamentals and programming in C", Oxford University, Second edition, 2017.
Reference Text Books	
1.	E. Bala Guruswamy, "Programming in ANSI C", 7th Edition, Tata McGraw-Hill.
2.	Brian W. Kernighan and Dennis M. Ritchie, "The 'C' Programming Language", Second edition, PrenticeHall of India.
3.	Yashwanth Kanethkar, "Let us C" ,13th Edition, BPB Publications.
4.	Brian W. Kernighan, Dennis M. Ritchie, Programming Languages C with Practicals, Margham Publications; 1 edition (2012).

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods. 2. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.htm

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.
The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.

6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	1	-	-	-	-	-	2
CO2	2	2	2	1	1	-	-	-	-	-	-	2
CO3	2	2	2	1	2	-	-	-	-	-	-	2
CO4	3	3	3	2	3	-	-	-	-	-	-	2
CO5	3	2	-	-	2	-	-	-	-	-	-	2
CO6	3	3	3	2	-	1	-	-	-	-	-	2

Level 3- High, Level 2- Moderate, Level 1- Low

Semester I / II					
Introduction to IoT Category: ETC-I/II (Common to ALL branches) (Theory)					
Course Code	:	**B24ETCK156/256**	CIE	:	50 Marks
Teaching Hours L: T: P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1	Understand the fundamentals of the Internet of Things, its building blocks, and their characteristics
2	Understand the recent application domains of IoT in everyday life
3	Gain insights about the current trends of Associated IoT technologies and IoT Analytics

Module - 1	**No. of Hrs**
Basics of Networking: Introduction, Network Types, Layered network Models **Predecessors of IoT:** Introduction, Wireless Sensor Networks, Machine-to- Machine Communications **Emergence of IoT:** Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components **Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 3 – 3.1 - 3.3 Chapter 4 – 4.1 to 4.4**	**9**
Module - 2	**No. of Hrs**
IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. **Textbook 1: Chapter 5 – 5.1 to 5.9**	**9**
Module - 3	**No. of Hrs**
IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. **Textbook 1: Chapter 6 – 6.1 to 6.5**	**9**
Module - 4	**No. of Hrs**
IoT Connectivity Technologies: Introduction, IEEE802.15.4, Zigbee, RFID, LoRa, Wi-Fi, Bluetooth **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 7- 7.1 - 7.3, 7.7, 7.13, 7.15, 7.16 Chapter 10– 10.1 to 10.6**	**9**
Module - 5	**No. of Hrs**
IOT CASE STUDIES AND FUTURE TRENDS **Agricultural IoT** – Introduction and Case Studies **Vehicular IoT** – Introduction **Healthcare IoT** – Introduction, Case Studies **Textbook 1: Chapter 12- 12.1-12.2 Chapter 13– 13.1; Chapter 14- 14.1-14.2**	**9**

Course Outcomes: At the end of the course, the students will be able to	
CO1	Describe the basics of Networking, Predecessors of IoT, and the emergence of IoT
CO2	Classify various sensing devices and actuator types
CO3	Demonstrate the processing Topologies in IoT and types
CO4	Explain IoT Connectivity technologies and Associated IoT technologies
CO5	Illustrate the architecture of IoT Applications

Textbooks	
1	Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.
Reference Textbooks	
1	S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
2	Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.
3	Francis da Costa, "Rethinking the Internet of Things: A Scalable Approach toConnecting Everything", 1st Edition, Apress Publications, 2013.

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CIE for the theory:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for 40 marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks).
5. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50).

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**30+10+10=50**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping:

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

Level 3- High, Level 2- Moderate, Level 1- Low

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution Under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru - 560074

UG (B.E) Syllabus

2024-25

II Semester – Physics Cycle

Civil Engineering
(CV)

SEMESTER II					
Mathematics-II for CV					
Course Code	:	B24MACV201	CIE	:	50 Marks
Teaching Hours L: T :P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1	Familiarize the importance of Integral calculus
2	Familiarize the fundamentals of Vector calculus
3	Analyze problems by applying Partial Differential Equations.
4	Develop the knowledge of numerical methods and apply them to solve algebraic and transcendental equations.
5	Develop the knowledge of numerical methods and apply them to solve differential equations.

Module-1:Integral Calculus	**9 hrs.**
Multiple Integrals: Evaluation of double and triple integrals, change of order of integration, changing into polar coordinates. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions-Problems. **Self-Study:** Centre of gravity, volume by double integration, duplication formula. **Applications:** Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models.	
Module-2:Vector Calculus	**9 hrs.**
Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence – physical interpretation, solenoidal and irrotational vector fields-Problems. Vector Integration: Line integrals, Surface integrals, Green's theorem and Stoke's theorem (no proofs)- Problems. **Self-Study:** Differentiation of vector function of time, volume integral and Gauss divergence theorem **Applications:** Heat and mass transfer, oil refinery problems, environmental engineering. Analysis of streamlines, velocity and acceleration of a moving particle.	
Module-3: Partial Differential Equations(PDE)	**9 hrs.**
Formation of PDE's by elimination of arbitrary constants and functions. Solution of non- homogeneous PDE by direct integration, Homogeneous PDEs involving derivatives with respect to one independent variable only, Solution of Lagrange's linear PDE $P_p + Q_q = R$, Method of separation of variables, **Self-Study:** One-dimensional heat equation and wave equation. **Applications:** Design of structures (vibration of rod/membrane)	
Module-4:Numerical Methods-I	**9 hrs.**
Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. 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)-Problems. Numerical integration: Trapezoidal, Simpson's $(1/3)rd\&(3/8)th$rules (without proof)- Problems. **Self-Study:** Bisection method, Secant method, Lagrange's interpolation, inverse Interpolation. **Applications:** Estimating the approximate roots, extremum values, area, volume, and surface area. Finding approximate solutions to civil engineering problems.	
Module 5: Numerical Methods-II	**9 hrs.**
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, Adam-Bash forth method(No derivations). **Self-Study:** Picard's method. **Applications:** Finding approximate solutions to ODE related to civil engineering fields.	

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

1	Program to compute surface area, volume and center 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 $(1/3)rd\&(3/8)th$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

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

Course Outcomes: At the end of the course, the students will 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 partial differential equations and their solutions for physical interpretations.
CO4	Apply the knowledge of numerical methods in analyzing the discrete data and solving the physical and engineering problems.
CO5	Apply the knowledge of numerical methods in analyzing the solution of first order differential equations

Text Books	
1	B.S.Grewal:"Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018
2	E.Kreyszig:"Advanced Engineering Mathematics", John Wiley & Sons,10th Ed.(Reprint),2016
Reference Text Books	
1	V. Ramana:"Higher Engineering Mathematics", Mc Graw-Hill Education,11th Edition.
2	Gupta C.B,Sing S.R and Mukesh Kumar:"Engineering Mathematic for Semester I and II", Mc Graw (India) Pvt.Ltd,2015

Web links and Video lectures(e-Resources)

1. https://nptel.ac.in/courses/122106025
2. VTUEDUSATPROGRAMME–20
3. http://www.class-central.com/subject/math(MOOCs)

CIE Evaluation

Assessment Details both (CIE and SEE)

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The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 mark each. **Part - A is Compulsory**and carries 20 Marks.
4. **Part-B**contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks andmarks scored out of 100 shall beproportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Semester I/II					
Applied Physics for CV Category: ASC Stream: **CV** (Integrated)					
Course Code	:	**B24PHCV102/202**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		4	SEE Duration	:	3 Hrs

Course Objectives,	
1	To understand the types of oscillation, shock waves & its generation and applications.
2	To understand elastic properties of materials and failures of engineering materials.
3	To study the concepts of acoustics buildings and essentials radiometry and photometry.
4	To understand the principles photonic devices and their application relevant to civil engineering.
5	To study the various relevant Nanocomposites.

Module 1 Oscillations and Shock waves	**No. of Hrs**
Oscillations: Simple harmonic motion (SHM), differential equation for SHM, theory of damped oscillations, types of damping (graphical approach), applications of damped oscillations, theory of forced oscillations, conditions for resonance, sprigs, stiffness factor and its physical significance, series and parallel combination of springs (derivation), types of springs and their applications, numerical problems. Shock waves: Mach number and mach angle, mach regimes, definition and characteristics of shock waves, construction and working of Reddy shock tube, applications of shock waves, numerical problems.	9
Module 2 Elasticity	**No. of Hrs**
Elasticity in materials, stress-strain curve, stress hardening and softening, failures of engineering materials, ductile fracture, brittle fracture, fatigue and factors affecting fatigue (only qualitative explanation), elastic moduli, Poisson's ratio, relation between Y, n and σ (derivation), relation between K, Y and σ (derivation), limiting values of Poisson's ratio, beams, types of beams, expression for bending moment, derivation for young's modulus using single cantilever, numerical problems.	9
Module 3 Acoustics, Radiometry and Photometry	**No. of Hrs**
Acoustics: 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, sound insulation and its measurements, noise and its measurements, impact of noise in multi-storey buildings. Radiometry and Photometry: Radiation quantities, spectral quantities, relation between luminance and radiant quantities, reflectance and transmittance, photometry (cosine law and inverse square law).	9
Module 4 Photonics	**No. of Hrs**
LASER: Properties, interaction of radiation with matter, LASER action, population inversion, metastable state, requisites of a LASER system, semiconductor LASER, application of laser in LASER range finder, road profiling, bridge deflection, speed checker, numerical problems. Optical Fiber: Principle and construction of optical fibers, acceptance angle and numerical aperture, expression for numerical aperture, types of optical fibers, attenuation and fiber losses, fiber optic temperature sensor, numerical Problems on lasers and optical fibers.	9

Module 5 Nanocomposites	**No. of Hrs**
Different types of nano fillers: Carbon, silica, clay and metal oxides. Properties of nanoparticles. Nanocomposites: Surface to volume ratio, nano composites, stability improvement in nanocomposites compared to normal composites. Types of nanocomposites: Metal matrix nanocomposites, polymer matrix nanocomposites and ceramic matrix nanocomposites. Applications of nanocomposites. Material characterization techniques: Scanning electron microscopy (SEM), transmission electron Microscope (TEM), Bragg's law and x-ray diffractometer, crystallite size determination by Scherrer equation, numerical problems.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Elucidate the concepts in oscillations, waves, elasticity and material failures.
CO2	Describe the elastic properties of materials and summarize the concept of nanomaterials and their characterization techniques.
CO3	Summarize concepts of acoustics in buildings and explain the concepts in radiation and photometry.
CO4	Describe the principles of LASERS and Optical fibers and their relevant applications.
CO5	Practice working in groups to conduct experiments in Physics and perform precise and honest measurements.

Text Books	
1	S P Basavaraj, Engineering Physics, 2018 Edition, Subhash Stores.
2	M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, A Textbook of Engineering Physics, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
Reference Text Books	
1	A P French, Vibrations and Waves (MIT introductory Physics Series) , CBS, 2003 Edition
2	Timoshenko, S. and Goodier J.N. "Theory of Elasticity", 2nd Edition, McGraw Hill Book Co, 2001
3	B. P. Singh and Devaraj Singh, Building Science: Lighting and Accoustics, , Dhanpat Rai Publications (P) Ltc.,
4	R. K. Gaur and S. L. Gupta, Engineering Physics by, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
5	S.O Pillai, Solid state physics, , 10th edition, 2022.

Web links and Video lectures (e-Resources)
Simple Harmonic motion: https://www.youtube.com/watch?v=k2FvSzWeVxQ Shock waves: https://physics.info/shock/ Shock waves and its applications:https://www.youtube.com/watch?v=tz_3M3v3kxk Stress-strain curves: https://web.mit.edu/course/3/3.11/www/modules/ss.pdf Stress curves: https://www.youtube.com/watch?v=f08Y39UiC-o Oscillations and waves :https://openstax.org › books › college-physics-2e Earthquakes:www.asc-india.org Earthquakes and Hazards:http://quake.usgs.gov/tsunami Landslide hazards: http://landslides.usgs.gov 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

LIST OF EXPERIMENTS

Experiment Number	Name of the Experiment
1	Diffraction Grating
2	Young's modulus by uniform bending
3	Single Cantilever
4	Newton's Rings
5	Fermi Energy
6	Spring Constants
7	Torsional Pendulum
8	LCR Series and Parallel Resonance Circuit
9	Determination of Magnetic Field Intensity
10	Acceptance Angle and NA of an Optical Fiber
11	Determination of the Moment of Inertia of the given irregular body using torsional pendulum.
12	Dielectric constant of a capacitor
13	Photo Diode
14	Black Box
15	Study of motion using spread Sheets

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.

2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.
6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
PART - A		
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
PART – B (Minimum 3 subdivisions only)		
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16

8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Semester I/II					
Engineering Mechanics Category: ESC Stream: **CV** (Only for CV Branch) (Theory)					
Course Code	:	**B24EMCV203**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:2:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1	To develop students ability to analyze the problems involving forces, moments with their applications.
2	To analyze the Coplanar force system
3	To make students to learn the effect of friction on different planes & Trusses
4	To develop the student's ability to find out the Centroid and moment of inertia and their applications.
5	To make the students learn about kinematics and their applications

Module - 1	**No. of Hrs**
Resultant of coplanar force system: Basic dimensions and S I units, Idealisations, Classification of force system, principle of transmissibility of a force composition of forces, resolution of a force, Free body diagrams, moment, Principleofmoments,couple,Resultantofcoplanarconcurrentforcesystem,Resultantofcoplanarnon-concurrentforcesystem,Numericalexamples.	9
Module - 2	**No. of Hrs**
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.	9
Module - 3	**No. of Hrs**
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, Numerical examples.	9
Module - 4	**No. of Hrs**
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 area sand simple built up sections, Numerical examples.	9

Module - 5	No. of Hrs
Kinematics: Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion Projectiles: Introduction ,numerical examples on projectiles.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Compute the resultant of a force system and resolution of a force
CO2	Computetheactionforforces,moments,andothertypesofloadsonrigidbodiesand Compute the reactive forces
CO3	Analyse the frictional resistance offered by different planes and Compute the Truss reaction
CO4	Locate the centroid and compute the moment of inertia of sections
CO5	Analyze the bodies in motion

Text Books	
1	M.N. Shesha Prakash and G.B. Mogaveer, Elements of Civil Engineering and Engineering Mechanics, PHI Learning (New edition)
2	S.S. Bhavikatti, Elements of Civil Engineering (IV Edition), New Age International Publisher, New Delhi (2019)
Reference Text Books	
1	BansalR.K.,RakeshRanjanBeoharandAhmadAliKhan,BasicCivilEngineeringand Engineering Mechanics, 2015,Laxmi Publications.
2	KolhapureBK,ElementsofCivilEngineeringandEngineeringMechanics,2014,EBPB
3	Beer F.P.and Johnston E.R.,Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.

Web links and Video lectures (e-Resources)

- https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT
- https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2
- https://www.youtube.com/watch?v=ljDIIMvx-eg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5
- https://www.youtube.com/watch?v=3YBXteL-qY4
- https://www.youtube.com/watch?v=atoP5_DeTPE
- https://www.youtube.com/watch?v=ksmsp9OzAsI
- https://www.youtube.com/watch?v=1_Nck-X49qc
- https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force
- https://www.youtube.com/watch?v=RIBeeW1DSZg
- https://www.youtube.com/watch?v=R8wKV0UQtlo
- https://www.youtube.com/watch?v=0RZHHgL8m_A
- https://www.youtube.com/watch?v=Bls5KnQOWkY

Activity-BasedLearning(SuggestedActivitiesinClass)/PracticalBasedlearning

- https://www.youtube.com/watch?v=Zrc_gB1YYS0
- https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc
- https://www.youtube.com/watch?v=Hn_iozUo9m4

- https://play.google.com/store/apps/details?id=com.teobou
- https://www.youtube.com/watch?v=WOHRp3V-QA0

CIE Evaluation

Assessment Details both (CIE and SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CIE for the theory:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for 40 marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks).
5. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50).

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**30+10+10=50**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Semester I/II					
Introduction to C Programming Category: ESC-I/II Common to All Branches except CSE allied branches (Integrated)					
Course Code	:	**B24ESCK145/245**	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	45(T) + 15(P)	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Objectives	
1.	Learn the concepts of computer, functionalities of a computer and C programming principles
2.	Use various constructs structuring and implementing the C program
3.	Illustrate the user-defined function and data structures like arrays for the solutions to problems
4.	Understand the concepts of strings and pointers to solve a realistic problems
5.	Solve simple real-world problems using modular approach and file handling mechanisms

Module - 1	**No. of Hrs**
Introduction to Computing: Computer Systems-Hardware and Software, Computer Languages, Algorithm, Flowchart, Representation of Algorithm and Flowchart with examples. Introduction to C–History of C, Features of C, Structure of C Program, Character Set, C Tokens-Keywords, Identifiers, Constants, Variables, Data types, Input/output statements in C, Types of errors.	09
Module - 2	**No. of Hrs**
Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators, Operators Precedence, Type conversion and typecasting. **Decision control and looping statements:** Statements-Selection statements (Decision Making)- if and switch statements with examples, iterative statements (loops)- for, while, do-while statements with examples, Unconditional statements- break, continue, goto statements with examples.	09
Module - 3	**No. of Hrs**
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, Storage classes, Recursion. **Arrays:** array Declaration and Initialization of arrays, accessing the elements of an array, storing values in arrays- One dimensional, two dimensional, Operations on arrays-Searching and sorting.	09
Module - 4	**No. of Hrs**
Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions. **Pointers:** Introduction to pointers, Declaration of pointer variables, Types of pointers, passing arguments to functions using pointers.	09
Module - 5	**No. of Hrs**
Structure, Union and Enumerated Data Type: Introduction to structure, Declaration and Initialization, Array of structures, Introduction to Unions, Declaration and Initialization, differentiate between structure and union, Enumerated data type. **File management in C:** File Operations-open, close, read, write, append, simple program on reading and writing data files.	09

Course Outcomes: At the end of the course, the students will be able to	
CO1	Learn the working principles of computer, various functions of peripheral devices and fundamental concept of C programming language.
CO2	Understanding the procedural programming constructs of C language to solve the real-world problem.
CO3	Understand the user defined data structures like arrays in implementing solutions to searching and sorting methods.
CO4	Learn the use of strings, structures, union, pointers and I/O files to solve a realistic problem.
CO5	Know the solutions to problems using modular programming constructs using functions.

Practical Component

Demonstration of Computer and Its Accessories

Laboratory Session-1: Write-up on Functional block diagram of Computer and explain its parts.

Laboratory Session-2: Write-up on Input and Output devices of computer.

Note: These TWO Laboratory sessions fill the gap between theory classes and practical sessions. Students to write-up and execute the same, updated in Lab record and evaluated.

Sl. No.	Experiments for Conduction
1.	Find Mechanical Energy of a particle using E = mgh+1/2 mv2.
2.	To convert Kilometers into Meters and Centimeters.
3.	To Read 3 integer values and find the largest among them using nested if statement.
4.	To Check the Given Character is Lowercase or Uppercase or Special Character.
5.	To balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
6.	To Read a string (word), store it in an array and check whether it is a palindrome word or not.
7.	To Implement Matrix multiplication and validate the rules of multiplication.
8.	To Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
9.	Program to Sort the given set of N numbers using Bubble sort technique.
10.	Using functions, demonstrate the string operations such as compare, concatenate, and string length. Use the parameter passing techniques.
11.	Apply structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
12.	Using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.

Text Books	
1.	Reema Thareja, "Computer fundamentals and programming in C", Oxford University, Second edition, 2017.
Reference Text Books	
1.	E. Bala Guruswamy, "Programming in ANSI C", 7th Edition, Tata McGraw-Hill.
2.	Brian W. Kernighan and Dennis M. Ritchie, "The 'C' Programming Language", Second edition, PrenticeHall of India.
3.	Yashwanth Kanethkar, "Let us C" ,13th Edition, BPB Publications.
4.	Brian W. Kernighan, Dennis M. Ritchie, Programming Languages C with Practicals, Margham Publications; 1 edition (2012).

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods. 2. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.htm

CIE Evaluation

Assessment Details both (CIE and SEE)

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The CIE marks for the theory component of the **Integrated Course (IC)** shall be 25 marks and for the laboratory component 25 marks

CIE for the theory component of IC:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for (20+20) marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks) scaled down to **25**.

CIE for the Practical component of IC:

1. On completion of every experiment / program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
2. Each experiment is evaluated for 10 marks and scaled down to **5 marks**
3. Laboratory test at the end of the 15th week of the semester / after completion of all the experiments shall be conducted for **50 marks** and scaled down to **20 marks.**
4. Total marks scored for lab component: 05+20= **25 marks**.
5. The minimum marks to be secured in CIE to appear for SEE shall be 10(40% of maximum marks 25) in the theory and 10(40% of Maximum marks 25) in the practical.

6. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
7. The maximum of 05 questions is to be set from the practical component and the total marks of all questions should not be more than 25 marks.

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**50/2=25**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

LAB			
Continuous performance and record writing	**Each experiments evaluated for 10 marks**	**Scaled down to 05 marks**	**5+20=25**
Internal Test + Viva voce	**Exam conducted for 50 Marks**	**Scaled down to 20 marks**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.
4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	1	-	-	-	-	-	2
CO2	2	2	2	1	1	-	-	-	-	-	-	2
CO3	2	2	2	1	2	-	-	-	-	-	-	2
CO4	3	3	3	2	3	-	-	-	-	-	-	2
CO5	3	2	-	-	2	-	-	-	-	-	-	2
CO6	3	3	3	2	-	1	-	-	-	-	-	2

Level 3- High, Level 2- Moderate, Level 1- Low

Semester I/II					
Concepts of Green Buildings Category: ETC-I/II (Common to ALL branches) (Theory)					
Course Code	:	**B24ETCK152/252**	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Objectives	
1	Understand the Definition, Concept & Objectives of the terms cost effective construction and green building
2	Apply cost effective Techniques, Technologies and Methods in Construction
3	Understand the Problems due to Global Warming
4	State the Concept of Green Building
5	Understand Green Buildings

Module - 1	**No. of Hrs**
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.	9 Hrs
Module - 2	**No. of Hrs**
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	9 Hrs
Module - 3	**No. of Hrs**
Global Warming – 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.	9 Hrs
Module - 4	**No. of Hrs**
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)	9 Hrs
Module - 5	**No. of Hrs**
Utility of Solar Energy in Buildings Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings. **Green Composites for Buildings** Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban	9 Hrs.

Environment and Green Buildings. Green Cover and Built Environment.	

Course Outcomes: At the end of the course, the students will be able to	
CO1	Select different building materials for construction
CO2	Apply effective environmental friendly building technology
CO3	Analyze global warming due to different materials in construction
CO4	Analyse buildings for green rating
CO5	Use alternate source of energy and effective use water

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

Web links and Video lectures (e-Resources)
1. https://www.youtube.com/watch?v=THgQF8zHBW8 2. https://www.youtube.com/watch?v=DRO_rIkywxQ

CIE Evaluation

Assessment Details both (CIE and SEE)
The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks(20 marks out of 50). The minimum passing mark for SEE is 35% of 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 course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CIE for the theory:

1. Three tests each of 50 marks, after the completion of the syllabus 40%, 70% and 100% respectively.
2. Average of best two internal assessment tests each of 50 marks, scale down to 30 marks.
3. Any two assessment methods as per regulations i.e. Two assignments / Two Quizzes/ Weekly test / project work for 40 marks, scaled down to 20 marks.
4. Total marks scored (30+20 = 50 marks).
5. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50).

Theory				
IA Test	**Exam conducted for**	**Scaled down to**	**Average of best two tests**	**Total**
IA-1	**50**	**30**	**30**	**30+10+10=50**
IA-2	**50**	**30**		
IA-3	**50**	**30**		
Two Assignments	**2X10=20**	**10**	**10**	
Two Quizzes	**2X10=20**	**10**	**10**	

Semester End Examination (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part –A and Part – B
3. **Part - A** should contain minimum **Two or Four** quiz questions from each module of 02 marks / 01 mark each. **Part - A is Compulsory** and carries 20 Marks.

4. **Part - B** contains two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. Question papers to be set as per the Blooms Taxonomy levels.

Rubrics for Semester End Examination (SEE)		
Q. No	CONTENTS	MARKS
	PART - A	
1	Two or Four Quiz questions from each module of 2 marks / 1 mark	20
	PART – B (Minimum 3 subdivisions only)	
2 or 3	Module : 1	16
4 or 5	Module : 2	16
6 or 7	Module : 3	16
8 or 9	Module : 4	16
10 or 11	Module : 5	16
	TOTAL	100

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	1	1	-	-	-	-	-
CO2	2	1	-	-	-	1	1	-	-	-	-	-
CO3	2	1	-	-	-	1	1	-	-	-	-	-
CO4	2	1	-	-	-	1	1	-	-	-	-	-
CO5	2	1	-	-	-	1	1	-	-	-	-	-

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Common Courses

II Semester – Physics Cycle

Semester-II					
Professional Writing Skills Category: AEC Common to All Branches (Theory)					
Course Code	:	**B24PWSK206**	CIE	:	50 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	50 Marks
Total Hours	:	15	Total	:	100 Marks
Credits		1	SEE Duration	:	1 Hr

Course Objectives: The course Professional Writing Skills in English will enable the students,

1.	To Identify the Common Errors in Writing and Speaking of English.
2.	To Achieve better Technical writing and Presentation skills for employment.
3.	To read Technical proposals properly and make them to write good technical reports.
4.	To Acquire Employment and Workplace communication skills.
5.	To learn about Techniques of Information Transfer through presentation in different level.

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: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogyshall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.

(i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blendedlearning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learningTools and techniques, (viii) Use of audio visual methods through language Labs in teaching of LSRW skills.

Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.

Module - 1	**No. of Hrs**
Identifying Common Errors in Writing and Speaking English : Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused.	03
Module - 2	**No. of Hrs**
Nature and Style of sensible writing: Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Sentence arrangements and Corrections activities. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words.	03
Module - 3	**No. of Hrs**
Technical Reading and Writing Practices: Technical writing process, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar – Voices and Reported Speech, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.	03
Module - 4	**No. of Hrs**
Professional Communication for Employment: Listening Comprehension, Types of Listening,	

Listening Barriers, Improving Listening Skills. Reading Comprehension, Tips for effective reading. Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. Writing effective resume for employment, Emails, Blog Writing and Memos**.**	03
Module - 5	**No. of Hrs**
Professional Communication at Workplace: Group Discussion and Professional Interviews, Characteristics and Strategies of a GD and PI's, Intra and Interpersonal Communication Skills at workplace, Non-Verbal Communication Skills and its importance in GD and Interview. Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills.	03

Course Outcomes: At the end of the course, the students will be able to	
CO1	To understand and identify the Common Errors in Writing and Speaking.
CO2	To Achieve better Technical writing and Presentation skills.
CO3	To read Technical proposals properly and make them to Write good technical reports.
CO4	Acquire Employment and Workplace communication skills.
CO5	To learn about Techniques of Information Transfer through presentation in different level.

Text Books	
1.	**"Professional Writing Skills in English"** published by Fillip Learning – Education (ILS), Bangalore – 2022.
2.	**"Functional English"** (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learningIndia Pvt Limited [Latest Edition 2019].
Reference Text Books	
1.	**English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
2.	**Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learningIndia Pvt Limited [Latest Revised Edition] - 2019.
3.	**Technical Communication** – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma,Oxford University Press 2017.
4.	**High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd – 2015.
5.	**Effective Technical Communication** – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private

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): Three Unit Tests each of 50 Marks (duration 01 hour). The pattern of the question paper is MCQ (multiple choice questions).

1st, 2nd, and 3rd tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 100% of the course/s respectively. However best two tests out of three shall be taken into consideration.

Two assignments each of 10 Marks. The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time.

Conducting Seminar for 10 Marks. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs.

Total Marks scored = Average of best two tests (30) + Two Assignments (10) + Seminar (10) = 50 Marks (maximum)

Semester End Examinations (SEE): SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

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

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions, Seminars and assignments

Semester-I/II					
Constitution of India Category: HSMC Common to All Branches (Theory)					
Course Code	:	**B24HCIK107/207**	CIE	:	50 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	50 Marks
Total Hours	:	15	Total	:	100 Marks
Credits		1	SEE Duration	:	1 Hr

Course Objectives: The course **INDIAN CONSTITUTION** will enable the students,

1.	To know about the basic structure of Indian Constitution.
2.	To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
3.	To know about our Union Government, political structure & codes, procedures.
4.	To know the State Executive & Elections system of India.
5.	To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

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: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

(i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools),(iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion.

(ii) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills.

Module - 1	**No. of Hrs**
Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.	03
Module - 2	**No. of Hrs**
Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.	03
Module - 3	**No. of Hrs**
Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.	03
Module - 4	**No. of Hrs**
Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.	03
Module - 5	**No. of Hrs**
State Executive and Governer, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.	03

Course Outcomes: At the end of the course, the students will be able to	
CO1	Analyse the basic structure of Indian Constitution.
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
CO3	Know about our Union Government, political structure & codes, procedures.
CO4	Understand our State Executive & Elections system of India.
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

Text Books	
1.	**"Constitution of India" (for Competitive Exams)** - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
2.	"**Introduction to the Constitution of India**", (Students Edition.) by Durga Das Basu (**DD Basu**): Prentice –Hall, 2008.
Reference Text Books	
1.	**"Constitution of India, Professional Ethics and Human Rights"** by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
2.	**"The Constitution of India"** by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru.
3.	**"Samvidhana Odu" - for Students & Youths by Justice HN Nagamohan Dhas, Sahayana, kerekon.**
4.	M.Govindarajan, S.Natarajan, V.S.Senthilkumar, "**Engineering Ethics**", Prentice –Hall, 2004.

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1st, 2nd, and 3rd tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 100% of the course/s respectively. However best two tests out of three shall be taken into consideration.

Two assignments each of 10 Marks. The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time.
Conducting Seminar for 10 Marks. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs.

Total Marks scored = Average of best two tests (30) + Two Assignments (10) + Seminar (10) = 50 Marks (maximum)

Semester End Examinations (SEE): SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

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

- Contents related activities (Activity-based discussions)
- For active participation of students instruct the students to prepare Flowcharts and Handouts
- Organising Group wise discussions Connecting to placement activities
- Quizzes and Discussions
- Seminars and assignments

Semester I/II					
Innovation and Design Thinking Category: AEC/SDC Common to All Branches (Theory)					
Course Code	:	**B24IDTK108/208**	CIE	:	50 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	50 Marks
Total Hours	:	15	Total	:	100 Marks
Credits		1	SEE Duration	:	1 Hr

Course Objectives	
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.

Teaching-Learning Process (General Instructions)

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain concepts
3. Encourage collaborative (Group Learning) Learning in the class
4. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recallit.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module - 1	**No. of Hrs**
PROCESS OF DESIGN **Understanding Design thinking** Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping	03
Module - 2	**No. of Hrs**
Tools for Design Thinking Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space– Empathy for design – Collaboration in distributed Design	03
Module - 3	**No. of Hrs**
Design Thinking in IT Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenariobased Prototyping	03
Module - 4	**No. of Hrs**
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	03

Organization – Business Model design.	
Module - 5	**No. of Hrs**
Design thinking workshop Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test	03

Course Outcomes: At the end of the course, the students will be able to	
CO1	Appreciate various design process procedure
CO2	Generate and develop design ideas through differenttechnique
CO3	Identify the significance of reverse Engineering to Understand products
CO4	Draw technical drawing for design ideas

Text Books	
1.	John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design",Cengage learning (International edition) Second 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 Businessor Design School", John Wiley & Sons 2013.
Reference Text Books	
1.	Yousef Haik and Tamer M.Shahin, "Engineering Design Process", CengageLearning, Second Edition, 2011.
2.	Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

Web links and Video Lectures (e-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 Developmen
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
8. https://www.youtube.com/watch?v=2mjSDIBaUlM
   thevirtualinstructor.com/foreshortening.html
   https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf
   https://dschool.stanford.edu/use-our-methods/ 6. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
9. http://www.creativityatwork.com/design-thinking-strategy-for-innovation/ 49 8. https://www.nngroup.com/articles/design-thinking/ 9. https://designthinkingforeducators.com/design-thinking/ 10. www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf

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Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
http://dschool.stanford.edu/dgift/