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

Physics Cycle - I Semester

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

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#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru-74

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

Dean-Academics

DEAN ACADEMICS
Rajarajeswari College of Engineering
Bengaluru - 560 074.

Principal

Principal
RAJARAJESWARI
COLLEGE OF ENGINEERING
Bengaluru-74

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

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Name of the branch: CSE, CSD Stream: CSE Sem : I 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)	B24MACS101	Mathematics - I for CS	Maths	2	2	2	4	3	50	50	100	
2.	ASC(IC)	B24PHCS102	Applied Physics for CS	Physics	2	2	2	4	3	50	50	100	
3.	ESC	B24POPC103	Principles of Programming using C	CSE	2	0	2	3	3	50	50	100	
4.	ESC-1	B24ESCK142	Introduction to Electrical Engineering.	EEE	3	0	0	3	3	50	50	100	
5.	ETC-1	B24ETCK156	Introduction to IoT	Any Dept.	3	0	0	3	3	50	50	100	
6.	AEC	B24ENGK106	Communicative English	Humanities	1	0	0	1	3	50	50	100	
7.	HSMC	B24HCIK107	Constitution of India	Humanities	1	0	0	1	1	50	50	100	
8.	AEC/SDC	B24IDTK108	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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Ramohalli Cross, Bengaluru-74

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Name of the branch: AIML, CSE(IC) Stream: CSE Sem : I 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)	B24MACS101	Mathematics - I for CS	Maths	2	2	2	4	3	50	50	100	
2.	ASC(IC)	B24PHCS102	Applied Physics for CS	Physics	2	2	2	4	3	50	50	100	
3.	ESC	B24POPC103	Principles of Programming using C	CSE	2	0	2	3	3	50	50	100	
4.	ESC-1	B24ESCK143	Introduction to Electronics	ECE	3	0	0	3	3	50	50	100	
5.	ETC-1	B24ETCK156	Introduction to IoT	Any Dept.	3	0	0	3	3	50	50	100	
6.	AEC	B24ENGK106	Communicative English	Humanities	1	0	0	1	3	50	50	100	
7.	HSMC	B24HCIK107	Constitution of India	Humanities	1	0	0	1	1	50	50	100	
8.	AEC/SDC	B24IDTK108	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 and Social Science and Management Course, SDC: Skill Development Course, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

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UG (B.E) Syllabus

2024-25

I Semester – Physics Cycle

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

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CONTENTS OF SYLLABUS

I Semester – Physics Cycle

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

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UG (B.E) Syllabus

2024-25

I Semester – Physics Cycle

Computer Science and Engineering
(CSE)
Computer Science and Design
(CSD)

SEMESTER I					
Mathematics-I for CS					
Course Code	:	B24MACS101	CIE	:	50 Marks
Teaching Hours L: T :P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	50 Hours	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

	Course Objectives
1	Develop the knowledge of Linear Algebra referring to matrices.
2	Develop the knowledge of solving engineering problems of pedal equation and Taylors series
3	Analyze engineering problems by applying Partial Differential Equations.
4	Develop the knowledge on fundamentals of arithmetic
5	Develop the knowledge of solving differential equations and their applications in engineering.

Module-1: Linear Algebra-I	**10hrs.**
Rank of a matrix by elementary row transformations. Consistency of linear system of equations. Solution of linear system of equations: Gauss elimination, Gauss Jordan, and Gauss-Seidel methods, Rayleigh's Power Method to find the dominant eigen value and eigen vector of a square matrix. **Self-Study:** Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem. **Applications:** Boolean matrix, Network Analysis, Markov Analysis, Critical point of a Network system, Optimum solution.	
Module-2: Polar curves	**10hrs.**
Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equation. Curvature and Radius of Curvature-Cartesian, Parametric, Polar and Pedal forms (Proof only for Cartesian and Polar Forms). Taylor's and Maclaurin's series expansion for one variable (Statement only)– problems. **Self-study:** Centre and circle of curvature, evolutes, and involutes. **Applications:** Computer graphics, Image processing.	
Module-3: Partial Derivatives	**10hrs.**
Evaluation of indeterminate forms. Function of two or more variables, Partial derivatives, Differentiation of composite functions. Jacobians (direct examples). Maxima and Minima of functions of two variables and problems. **Self-study:** Method of Lagrange's undetermined multipliers with single constraint. Euler's and Euler's extension theorem and problems. **Applications:** Series expansion in computer programming, Computing errors and approximations.	
Module-4: Modular Arithmetic	**10hrs.**
Introduction to Divisibility, GCD and Congruences, Linear Congruences, The Remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Applications of Congruences- RSA algorithm. **Self-study:** Properties of Prime Numbers, Fundamental theorem of Arithmetic **Applications:** Cryptography, encoding and decoding, RSA applications in public key encryption.	
Module-5: Differential Equations	**10hrs.**
Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations. Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right) and \frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$, Orthogonal trajectories.Problems. Non-linear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations -Problems. **Self-Study:** Applications of ODEs, Solvable for x and y. **Applications**: Rate of Growth or Decay, Conduction of heat	

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

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Finding GCD using Euclid's Algorithm
7	Solving linear congruence's $ax \equiv b (mod m)$
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute Eigen values and Eigen vectors and find the largest and smallest eigen value by Rayleigh power method.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Test the consistency of a system of linear equations and to solve by direct and iterative methods.
CO2	Applytheknowledgeofcalculustosolveproblemsrelatedtopolarcurvesanditsapplicationsin Determining the bentness of a curve.
CO3	Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve Problems related to composite functions and Jacobian.
CO4	Get acquainted fundamentals of Arithmetic and to apply modular arithmetic to computer algorithms
CO5	Solve first-order linear/nonlinear ordinary differential equations analytically using standard methods. Demonstrate various models through higher order differential equations and solve such linear ordinary 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)

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)

Theory SEE will be conducted by the institution as per the scheduled timetable, with common question papers for the subject.

1. The question paper shall be set for 100 marks. The medium of the question paper shall be in English. The duration of SEE is 3 hours.
2. The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module.
3. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
4. There will be two questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.

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	:	50	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.	8
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.	8
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.	8
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	8

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.	8

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)

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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)

Theory SEE will be conducted by the institution as per the scheduled timetable, with common question papers for the subject.

1. The question paper shall be set for 100 marks. The medium of the question paper shall be in English. The duration of SEE is 3 hours.
2. The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module.
3. Students has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
4. There will be two questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.

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	:	50	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.	08
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.	08
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.	08
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.	08
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	08

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

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)

Theory SEE will be conducted by the institution as per the scheduled timetable, with common question papers for the subject.

1. The question paper shall be set for 100 marks. The medium of the question paper shall be in English. The duration of SEE is 3 hours.
2. The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module.
3. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
4. There will be two questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.

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	:	40 hrs	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.	08
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	08
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	08
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	08
Module - 5	**No. of Hrs**
Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load.	08

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)

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)

Theory SEE will be conducted by the institution as per the scheduled timetable, with common question papers for the subject.

1. The question paper shall be set for 100 marks. The medium of the question paper shall be in English. The duration of SEE is 3 hours.
2. The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module.
3. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
4. There will be two questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

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	:	40	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**	**8**
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**	**8**
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**	**8**
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**	**8**
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**	**8**

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)

Theory SEE will be conducted by the institution as per the scheduled timetable, with common question papers for the subject.

1. The question paper shall be set for 100 marks. The medium of the question paper shall be in English. The duration of SEE is 3 hours.
2. The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module.
3. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
4. There will be two questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

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

I Semester – Physics Cycle

Artificial Intelligence & Machine Learning
(AIML)
CSE (IoT, Cyber Security including Blockchain Technology)
(CSE[IC])

SEMESTER I					
Mathematics-I for CS					
Course Code	:	B24MACS101	CIE	:	50 Marks
Teaching Hours L: T :P	:	2:2:2	SEE	:	50 Marks
Total Hours	:	50 Hours	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

	Course Objectives
1	Develop the knowledge of Linear Algebra referring to matrices.
2	Develop the knowledge of solving engineering problems of pedal equation and Taylors series
3	Analyze engineering problems by applying Partial Differential Equations.
4	Develop the knowledge on fundamentals of arithmetic
5	Develop the knowledge of solving differential equations and their applications in engineering.

Module-1: Linear Algebra-I	**10hrs.**
Rank of a matrix by elementary row transformations. Consistency of linear system of equations. Solution of linear system of equations: Gauss elimination, Gauss Jordan, and Gauss-Seidel methods, Rayleigh's Power Method to find the dominant eigen value and eigen vector of a square matrix. **Self-Study:** Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem. **Applications:** Boolean matrix, Network Analysis, Markov Analysis, Critical point of a Network system, Optimum solution.	
Module-2: Polar curves	**10hrs.**
Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equation. Curvature and Radius of Curvature-Cartesian, Parametric, Polar and Pedal forms (Proof only for Cartesian and Polar Forms). Taylor's and Maclaurin's series expansion for one variable (Statement only)– problems. **Self-study:** Centre and circle of curvature, evolutes, and involutes. **Applications:** Computer graphics, Image processing.	
Module-3: Partial Derivatives	**10hrs.**
Evaluation of indeterminate forms. Function of two or more variables, Partial derivatives, Differentiation of composite functions. Jacobians (direct examples). Maxima and Minima of functions of two variables and problems. **Self-study:** Method of Lagrange's undetermined multipliers with single constraint. Euler's and Euler's extension theorem and problems. **Applications:** Series expansion in computer programming, Computing errors and approximations.	
Module-4: Modular Arithmetic	**10hrs.**
Introduction to Divisibility, GCD and Congruences, Linear Congruences, The Remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Applications of Congruences- RSA algorithm. **Self-study:** Properties of Prime Numbers, Fundamental theorem of Arithmetic **Applications:** Cryptography, encoding and decoding, RSA applications in public key encryption.	
Module-5: Differential Equations	**10hrs.**
Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations. Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right) and \frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$, Orthogonal trajectories.Problems. Non-linear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations -Problems. **Self-Study:** Applications of ODEs, Solvable for x and y. **Applications**: Rate of Growth or Decay, Conduction of heat	

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

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Finding GCD using Euclid's Algorithm
7	Solving linear congruence's $ax \equiv b(mod m)$
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute Eigen values and Eigen vectors and find the largest and smallest eigen value by Rayleigh power method.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Test the consistency of a system of linear equations and to solve by direct and iterative methods.
CO2	Applytheknowledgeofcalculustosolveproblemsrelatedtopolarcurvesanditsapplicationsin Determining the bentness of a curve.
CO3	Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve Problems related to composite functions and Jacobian.
CO4	Get acquainted fundamentals of Arithmetic and to apply modular arithmetic to computer algorithms
CO5	Solve first-order linear/nonlinear ordinary differential equations analytically using standard methods. Demonstrate various models through higher order differential equations and solve such linear ordinary 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)

Theory SEE will be conducted by the institution as per the scheduled timetable, with common question papers for the subject.

1. The question paper shall be set for 100 marks. The medium of the question paper shall be in English. The duration of SEE is 3 hours.
2. The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module.
3. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
4. There will be two questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.

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	:	50	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.	8
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.	8
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.	8
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	8

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.	8

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 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)

Theory SEE will be conducted by the institution as per the scheduled timetable, with common question papers for the subject.

1. The question paper shall be set for 100 marks. The medium of the question paper shall be in English. The duration of SEE is 3 hours.
2. The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module.
3. Students has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
4. There will be two questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.

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	:	50	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.	08
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.	08
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.	08
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.	08
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	08

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

CIE Evaluation

Assessment Details both (CIE and SEE)

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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.
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Theory				
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IA-3	**50**	**30**		
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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)

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3. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
4. There will be two questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.

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 Electronics Category: ESC- I/II (Common to All Branches except ECE) (Theory)					
Course Code	:	**B24ESCK143/243**	CIE	:	50 Marks
Teaching Hours/Week (L:T:P: S)	:	3:0:0	SEE	:	50 Marks
Total Hours	:	40	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Objectives	
1	To Explain the operation of Semiconductor diode, Zener diode and their applications.
2	To Explain the Transistor operation and Different configurations, working and construction of FET and MOSFET.
3	To Explain the operation of linear Op-amps and its applications
4	To Explain the Basic Logic gates, circuits and their optimization.
5	To Explain the Principles of Communication system

Module - 1	**No. of Hrs**
Diode Applications - Load line analysis, series- diode configuration. Sinusoidal inputs - half wave rectification, Full wave Rectification, Zener diodes, voltage multiplier Circuits . T1: 2.2,2.3,2.6,2.7,2.11, 2.12	8
Module - 2	**No. of Hrs**
Bipolar junction transistor - Transistor operation, common base configuration, common emitter configuration, common collector configuration. Junction field effect transistor - construction and characteristics of JFET, Transfer Characteristics. MOSFET- Depletion type MOSFET, Enhancement type MOSFET T1: 3-3, 304, 305, 306, 6-2, 6-3, 6-7, 6-8	8
Module - 3	**No. of Hrs**
Operational amplifier –Operational amplifier basics, practical Op-Amp circuits, Op-Amp specification –DC offset parameter, frequency parameter, Differential and common mode operation. Practical Op-Amp circuits– Inverting amplifier, non-inverting amplifier, Unity follower, Summingamplifier, Integrator, Differentiator. T1:10.4, 10.5, 10.6, 10.7, 10.9	8
Module– 4	**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 (Text 2: 1.2, 1.3, 1.4, 1.5,2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7) Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder (Text 2:4.1, 4.2, 4.3)	8
Module– 5	**No. of Hrs**
Elements of a Communication system, Need for Modulation, Amplitude Modulation (Am) Techniques, Frequency Modulation, Phase modulation, Comparison of FM & PM, Comparison of FM and AM. T3: 1.2, 1.3, 3.2.1, 4.1.1, 4.1.2, 4.1.3, 4.2.6, 6.2.1, 6.2.2	8

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.
CO2	Summarize the basic concept of small scale circuits using BJT,JFET,MOSFET scale circuits
CO3	Apply the knowledge on various applications of operational amplifiers
CO4	Understand the concepts of Boolean algebra and Logic circuits
CO5	Illustrate the outline of Communication system.

Text Books	
1	Robert L Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory,11th Edition, Pearson Education, 2013, ISBN: 978-93-325-4260-0.
2	M. Morris Mano, Digital Logic and Computer Design, PHI Learning, 2008 ISBN-978-81-203 0417-84.
3	George Kenndy, Electronics communication systems, 5thEdition,TataMcgrahill.
Reference Books	
1	David A Bell, Electronic Devices and Circuits,5th Edition, Oxford, 2016 2.
2	Ramakanth A Gayakwad, Op-amps and Linear Integrated Circuits, Pearson Education, 4th Edition

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:

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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)

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CO2	3	2	3	2	-	1	-	-	1	-	-	1
CO3	3	2	3	1	-	-	-	-	1	-	-	1
CO4	2	1	1	1	2	1	-	-	1	-	-	1
CO5	2	1	1	-	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	:	40	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**	**8**
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**	**8**
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**	**8**
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**	**8**
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**	**8**

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)

Theory SEE will be conducted by the institution as per the scheduled timetable, with common question papers for the subject.

1. The question paper shall be set for 100 marks. The medium of the question paper shall be in English. The duration of SEE is 3 hours.
2. The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module.
3. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
4. There will be two questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

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

Common Courses

I Semester – Physics Cycle

Semester-I					
Communicative English Category: AEC Common to All Branches (Theory)					
Course Code	:	**B24ENGK106**	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 Communicative English (BENGK106) will enable the students

1.	To know about Fundamentals of Communicative English and Communication Skills in general.
2.	To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills.
3.	To impart basic English grammar and essentials of important language skills.
4.	To enhance with English vocabulary and language proficiency for better communication skills.
5.	To learn about Techniques of Information Transfer through presentation.

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 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) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning,(v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods through language Labs in teaching of 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**
Introduction to Communicative English : Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills	03
Module - 2	**No. of Hrs**
Introduction to Phonetics : Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation	03
Module - 3	**No. of Hrs**
Basic English Communicative Grammar and Vocabulary PART - I : Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it.	03

Module - 4	No. of Hrs
Basic English Communicative Grammar and Vocabulary PART - II: Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence ofTenses (Rules in use of Tenses) and Exercises on it.	03
Module - 5	**No. of Hrs**
Communication Skills for Employment : Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises.	03

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand and apply the Fundamentals of Communication Skills in their communication skills
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills
CO3	To impart basic English grammar and essentials of language skills as per present requirement
CO4	Understand and use all types of English vocabulary and language proficiency
CO5	Adopt the Techniques of Information Transfer through presentation

Text Books	
1.	Sanjay Kumar & Pushpa Lata, Communication Skills, Oxford University Press India Pvt Ltd - 2019
2.	A Textbook of English Language Communication Skills, (ISBN-978-81-955465-2-7), Published by InfiniteLearning Solutions, Bengaluru - 2022
Reference Text Books	
1.	Gajendra Singh Chauhan and Et al , Technical Communication, (ISBN-978-93-5350-050-4), Cengage learningIndia Pvt Limited [Latest Revised Edition] - 2019
2.	N.P.Sudharshana and C.Savitha ,English for Engineers, Cambridge University Press – 2018
3.	English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited[Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019
4.	D Praveen Sam, KN Shoba, A Course in Technical English, Cambridge University Press – 2020
5.	Michael Swan, Practical English Usage, Oxford University Press – 2016

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 + Two Assignments + Seminar) out of 80 shall be scaled down to 50 marks.

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
- Organizing 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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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.
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- 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/