Visvesvaraya Technological University, Belagavi
SchemeofTeaching and examinations-2022
Outcome-Based Education (OBE)andChoiceBasedCreditSystem(CBCS)
(Effectivefromtheacademicyear 2022-23)

ISemester (CSE Stream) (Physics Group)

Sl. No	Course and course code		Course titlee	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	**BMATS101**	**Mathematics-I** for CSE Stream	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	**BPHYS102**	**Applied Physics** for CSE stream	Physics	2	2	2	0	03	50	50	100	04
3	ESC	**BPOPS103**	Principles of Programming Using C	CSE	2	0	2	0	03	50	50	100	03
4	ESC-I	**BESCK104x**	Engineering Science Course-I	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	**BETCK105x**	Emerging Technology Course-I	Any Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	**BPLCK105x**	Programming Languages Course-I		2	0	2	0	03				
6	AEC	**BENGK106**	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BPWSK106	Professional Writing Skills in English										
7	HSMC	**BKSKK107 BKBKK107**	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
			OR										
		BICOK107	Indian Constitution										
8	AEC/SDC	**BIDTK158**	Innovation and Design Thinking	Any Dept	1	0	0	0	02	50	50	100	01
			OR										
		BSFHK158	Scientific Foundations of Health		1	0	0	0	01				
				TOTAL						**400**	**400**	**800**	**20**

SDA-Skill Development Activities, **TD/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**-

Emerging Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE**–Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

Credit Definition: 1-hour Lecture **(L)** per week=**1Credit** 2-hoursTutorial**(T)** per week=**1Credit** 2-hours Practical / Drawing (**P**) per week=**1Credit** **2-**hous Skill Development Actives **(SDA)** per week = **1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXURE-I of Induction Programs notification of the University published at the beginning of the 1st semester.

AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

***- BMATS101**Shall have the 03 hours of theory examination (SEE), however, practical sessions question shall be included in the theory question papers. ****The mathematics subject should be taught by a single faculty member per division, with no sharing of the course(subject)module-wise by different faculty members.**

#- BPHYS102SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or **if the nature then, of course, required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).**

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
BESCK104A	Introduction to Civil Engineering	3	0	0	BETCK105A	Smart Materials and Systems	3	0	0
BESCK104B	Introduction to Electrical Engineering	3	0	0	BETCK105B	Green Buildings	3	0	0
BESCK104C	Introduction to Electronics **Communication**	3	0	0	BETCK105C	Introduction to Nano Technology	3	0	0
BESCK104D	Introduction to Mechanical Engineering	3	0	0	BETCK105D	Introduction to Sustainable Engineering	3	0	0
BESCK104E	Introduction to C Programming	2	0	2	BETCK105E	Renewable Energy Sources	3	0	0
					BETCK105F	Waste Management	3	0	0
					BETCK105G	Emerging Applications of Biosensors	3	0	0
					BETCK105H	Introduction to Internet of Things (IOT)	3	0	0
					BETCK105I	Introduction to Cyber Security	3	0	0
					BETCK105J	Introduction to Embedded System	3	0	0
(PLC-I) Programming Language Courses-I									
Code	**Title**	**L**	**T**	**P**					
BPLCK105A	Introduction to Web Programming	2	0	2					
BPLCK105B	Introduction to Python Programming	2	0	2					
BPLCK105C	Basics of JAVA programming	2	0	2					
BPLCK105D	Introduction to C++ Programming	2	0	2					
The course 22ESC145/245, Introduction to C Programming, and all courses under PLC and ETC groups can be taught by ANY DEPARTMENT									

- The student has to select one course from the ESC-I group.
- CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-I group **except,** BESCK104E**-Introduction to C Programming**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-I or PLC-I group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa

I Semester

Course Title:	**Mathematics-I for Computer Science and Engineering stream**		
Course Code:	**BMATS101**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to12 Lab slots	Credits	04

Course objectives: The goal of the course**Mathematics-I for Computer Science and Engineering stream**(**22MATS11**) is to

- **Familiarize** the importance of calculus associated with one variable and multivariable for computer science and engineering.
- **Analyze**Computer science and engineering problems by applying Ordinary Differential Equations.
- **Apply** the knowledge of modular arithmetic to computer algorithms.
- **Develop** the knowledge of Linear Algebra to solve the system of equations.

Teaching-Learning Process
Pedagogy (General Instructions):
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
   - As an introduction to new topics (pre-lecture activity).
   - As a revision of topics (post-lecture activity).
   - As additional examples (post-lecture activity).
   - As an additional material of challenging topics (pre-and post-lecture activity).
   - As a model solution of some exercises (post-lecture activity).

Module-1:Calculus (8 hours)

Introduction to polar coordinates and curvature relating to Computer Science and Engineering.

Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

Self-study: Center and circle of curvature, evolutes and involutes.
Applications: Computer graphics, Image processing.
(RBT Levels: L1, L2 and L3)

Module-2:Series Expansion and Multivariable Calculus (8 hours)

Introduction of series expansion and partial differentiation in Computer Science & Engineering applications.

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule-Problems.

Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.

Self-study: Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

Applications: Series expansion in computer programming, Computing errors and approximations.

(RBT Levels: L1, L2 and L3)

Module-3: Ordinary Differential Equations (ODEs) of First Order (8 hours)

Introduction to first-order ordinary differential equations pertaining to the applications for Computer Science & Engineering.

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - 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, L-R & C-R circuits. 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 of ordinary differential equations: Rate of Growth or Decay, Conduction of heat.

(RBT Levels: L1, L2 and L3)

Module-4: Modular Arithmetic (8 hours)

Introduction of modular arithmetic and its applications in Computer Science and Engineering.

Introduction to 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: Divisibility, GCD, Properties of Prime Numbers, Fundamental theorem of Arithmetic.

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

(RBT Levels: L1, L2 and L3)

Module-5: Linear Algebra (8 hours)

Introduction of linear algebra related to Computer Science &Engineering.

Elementary row transformationofa matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

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.

(RBT Levels: L1, L2 and L3).

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

1	2D plots for Cartesian and polar curves	
2	Finding angle between polar curves, curvature and radius of curvature of a given curve	
3	Finding partial derivatives 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 congruences $\boldsymbol{ax \equiv b(mod\ m)}$	
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 eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.	

Suggested software: Mathematica/MatLab/Python/Scilab

Course outcome (Course Skill Set)

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

CO1	apply the knowledge of calculus to solve problems related to polar curves andlearn the notion of partial differentiation to compute rate of change of multivariate functions
CO2	analyze the solution of linear and nonlinear ordinary differential equations
CO3	get acquainted and to apply modular arithmetic to computer algorithms
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
CO5	familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/ SCILAB

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 total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

CIE for the theory component of the IC

- Three Tests each of 20 Marks**;** after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

CIE for the practical component of the IC

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

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

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination(SEE):

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

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

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

Text Books

1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna Publishers, 44thEd., 2021.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10thEd., 2018.
3. **David M Burton:** "Elementary Number Theory" Mc Graw Hill, 7th Ed.,2017.

Reference Books

4. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
5. **Srimanta Pal & Subodh C.Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
6. **N.P Bali and Manish Goyal**: "A Textbook of Engineering Mathematics" Laxmi

Publications, 10th Ed., 2022.
7. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017.
8. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
9. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
10. **James Stewart: "**Calculus" Cengage Publications, 7thEd., 2019.
11. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
12. **Gareth Williams:** "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.
13. **Gilbert Strang:** "Linear Algebra and its Applications", Cengage Publications, 4th Ed. 2022.
14. **William Stallings:** "Cryptography and Network Security" Pearson Prentice Hall, 6th Ed., 2013.
15. **Kenneth H Rosen:** "Discrete Mathematics and its Applications" McGraw-Hill, 8th Ed. 2019.
16. **Ajay Kumar Chaudhuri:** "Introduction to Number Theory"NCBA Publications, 2nd Ed., 2009.
17. **Thomas Koshy:** "Elementary Number Theory with Applications"Harcourt Academic Press, 2nd Ed., 2008.

Web links and Video Lectures (e-Resources):

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

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

- Quizzes
- Assignments
- Seminar

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

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

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

Course Title:	**Applied Physics for CSE Stream**		
Course Code:	**BPHYS102/202**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Credits	04

Course objectives

- To study the essentials of photonics and its application in computer science.
- To study the principles of quantum mechanics and its application in quantum computing.
- To study the electrical properties of materials
- To study the essentials of physics for computational aspects like design and data analysis.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Flipped Class
2. Chalk and Talk
3. Blended Mode of Teaching and Learning
4. Simulations, Interactive Simulations and Animations
5. NPTEL and Other Videos for theory topics
6. Smart Class Room
7. Lab Experiment Videos

Module-1 (8 Hours)

Laser and Optical Fibers:

LASER: Characteristic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action, Population Inversion, Metastable State, Requisites of a laser system, Semiconductor Diode Laser, Applications: Bar code scanner, Laser Printer, Laser Cooling(Qualitative), Numerical Problems.

Optical Fiber: Principle and Structure, Propagation of Light, Acceptance angle and Numerical Aperture (NA), Derivation of Expression for NA, Modes of Propagation, RI Profile, Classification of Optical Fibers, Attenuation and Fiber Losses, Applications: Fiber Optic networking, Fiber Optic Communication. Numerical Problems

Pre requisite:Properties of light

Self-learning: Total Internal Reflection

Module-2 (8 Hours)

Quantum Mechanics:

de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus - Non Relativistic), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, Quantization of Energy States, Waveforms and Probabilities. Numerical Problems.

Pre requisite:Wave–Particle dualism

Self-learning: de Broglie Hypothesis

Module-3 (8 Hours)

Quantum Computing:

Principles of Quantum Information & Quantum Computing:

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.

Dirac representation and matrix operations:

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. Orthogonality, Orthonormality. Numerical Problems

Quantum Gates:

Single Qubit Gates: Quantum Not Gate, Pauli – X, Y and Z Gates, Hadamard Gate, Phase Gate (or S Gate), T Gate

Multiple Qubit Gates: Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of Swap gate, Controlled -Z gate, Toffoli gate.

Pre requisites: Matrices

Self-learning: Moore's law

Module-4 (8 Hours)

Electrical Properties of Materials and Applications

Electrical Conductivity in metals

Resistivity and Mobility, Concept of Phonon, Matheissen's rule, Failures of Classical Free Electron Theory, Assumptions of Quantum Free Electron Theory, Fermi Energy, Density of States, Fermi Factor, Variation of Fermi Factor With Temperature and Energy. Numerical Problems.

Superconductivity

Introduction to Super Conductors, Temperature dependence of resistivity, Meissner's Effect, Critical Field, Temperature dependence of Critical field, Types of Super Conductors, BCS theory (Qualitative), Quantum Tunnelling, High Temperature superconductivity, Josephson Junctions (Qualitative), DC and RF SQUIDs (Qualitative), Applications in Quantum Computing: Charge, Phase and Flux qubits, Numerical Problems.

Pre requisites:Basics of Electrical conductivity

Self-learning: Resistivity and Mobility

Module-5 (8 hours)

Applications of Physics in computing:

Physics of Animation:

Taxonomy of physics based animation methods, Frames, Frames per Second, Size and Scale, Weight and Strength, Motion and Timing in Animations, Constant Force and Acceleration, The Odd rule, Odd-rule Scenarios, Motion Graphs, Examples of Character Animation: Jumping, Parts of Jump, Jump Magnification, Stop Time, Walking: Strides and Steps, Walk Timing. Numerical Problems

Statistical Physics for Computing: Descriptive statistics and inferential statistics, Poisson distribution and modeling the probability of proton decay, Normal Distributions (Bell Curves), Monte Carlo Method: Determination of Value of π. Numerical Problems.

Pre requisites: Motion in one dimension, Probability

Self-learning: Frames, Frames per Second

Course outcome (Course Skill Set)

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

CO1	**Describe** the principles of LASERS and Optical fibers and their relevant applications.
CO2	**Discuss** the basic principles of the Quantum Mechanics and its application in Quantum Computing.
CO3	**Summarize** the essential properties of superconductors and its applications in qubits.
CO4	**Illustrate** the application of physics in design and data analysis.
CO5	**Practice** working in groups to conduct experiments in physics and **perform** precise and honest measurements.

Assessment Details (both CIE and SEE)

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Continuous Internal Evaluation(CIE):
The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

CIE for the theory component of the IC

- Three Tests each of 20 Marks**;** after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

CIE for the practical component of the IC

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

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

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

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

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Solid State Physics, S O Pillai, New Age International Private Limited, 8th Edition, 2018.
2. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
3. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
4. Concepts of Modern Physics, Aurthur Beiser, McGrawhill, 6th Edition, 2009.
5. Lasers and Non Linear Optics, B B Loud, New age international, 2011 edition.
6. A Textbook of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
7. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition.

8. Quantum Computing, Vishal Sahani, McGraw Hill Education, 2007 Edition.
9. Quantum Computing – A Beginner's Introduction, Parag K Lala, Indian Edition, Mc GrawHill, Reprint 2020.
10. Engineering Physics, S P Basavaraj, 2005 Edition, Subhash Stores.
11. Physics for Animators, Michele Bousquet with Alejandro Garcia, CRC Press, Taylor & Francis, 2016.
12. Quantum Computation and Logic: How Quantum Computers Have Inspired Logical Investigations,Maria Luisa Dalla Chiara, Roberto Giuntini, Roberto Leporini, Giuseppe Sergioli,TrendsinLogic, Volume 48, Springer.
13. Statistical Physics: Berkely Physics Course, Volume 5, F. Reif, McGraw Hill.
14. Introduction to Superconductivity, Michael Tinkham, McGraw Hill, INC, II Edition

Web links and Video Lectures (e-Resources):

LASER: https://www.youtube.com/watch?v=WgzynezPiyc

Superconductivity : https://www.youtube.com/watch?v=MT5Xl5ppn48

Optical Fiber : https://www.youtube.com/watch?v=N_kA8EpCUQo

Quantum Mechanics : https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s

Quantum Computing : https://www.youtube.com/watch?v=jHoEjvuPoB8

Quantum Computing :https://www.youtube.com/watch?v=ZuvCUU2jD30

Physics of Animation : https://www.youtube.com/watch?v=kj1kaA_8Fu4

Statistical Physics Simulation : https://phet.colorado.edu/sims/html/plinko-probability/latest/plinko-probability_en.html

NPTEL Supercoductivity:https://archive.nptel.ac.in/courses/115/103/115103108/

NPTEL Quantum Computing : https://archive.nptel.ac.in/courses/115/101/115101092

Virtual LAB :https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

Virtual LAB : https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1

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

http://nptel.ac.in

https://swayam.gov.in

https://virtuallabs.merlot.org/vl_physics.html

https://phet.colorado.edu

https://www.myphysicslab.com

Laboratory Component:

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

a) Exercise
b) Demonstration
c) Structured Inquiry
d) Open Ended

Based on the convenience classify the following experiments into above categories. Select at least one simulation/spreadsheet activity.

List of Experiments

1. Determination of wavelength of LASER using Diffraction Grating.
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Planck's Constant using LEDs.
10. Determination of Fermi Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Study of Application of Statistics using spread sheets
16. PHET Interactive Simulations(https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

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

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

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

Note : The CO-PO mapping values are indicative. The course coordinator can alter the mapping using **Competency and Performance Indicators** mentioned in the **AICTE Exam reforms.**

Course Title:	**Principles of Programming using C**	
Course Code:	**BPOPS103/203**	CIE Marks 50
Course Type (Theory/Practical /Integrated)	Integrated	SEE Marks 50
		Total Marks100
Teaching Hours/Week (L:T:P: S)	2:0:2	Exam Hours 3+2
Total Hours of Pedagogy	40 hours	Credits 03

CourseObjectives:

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

Teaching-LearningProcess(GeneralInstructions)

ThesearesampleStrategies,whichteacherscanusetoacceleratetheattainmentofthevariouscourse outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effectiveteachingmethodscouldbeadoptedtoattaintheoutcomes.
2. UseofVideo/Animationtoexplainfunctioningofvariousconcepts.
3. Encouragecollaborative(GroupLearning)Learningintheclass.
4. AskatleastthreeHOT(HigherorderThinking)questionsintheclass,whichpromotescri ticalthinking.
5. AdoptProblemBasedLearning(PBL),whichfostersstudents'Analyticalskills,develo pdesignthinking skills such as the ability to design, evaluate, generalize, and analyze informationratherthan simplyrecall it.
6. IntroduceTopicsinmanifoldrepresentations.
7. Showthedifferentwaystosolvethesameproblemandencouragethestudentstocome upwiththeirowncreative waystosolve them.
8. Discusshoweveryconceptcanbeappliedtotherealworld-andwhenthat'spossible,ithelps to improvethestudents'understanding.
9. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the operations of C Programs

Module-1 (6 Hours of Pedagogy)

Introduction to C: Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C,

Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 - 8.6 ,9.1-9.14

Teaching-LearningProcess	Chalkandtalkmethod/PowerPointPresentation/ Web Content: https://tinyurl.com/4xmrexre

	Module-2 (6 Hours of Pedagogy)
	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. **Textbook: Chapter 9.15-9.16, 10.1-10.6**
Teaching-LearningProcess	Chalkandtalkmethod/PowerPointPresentation

Module-3 (8 Hours of Pedagogy)
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays, applications of arrays. Textbook: Chapter 11.1-11.10**,** 12.1-12.10,12.12

Teaching-LearningProcess	Chalkandtalkmethod/PowerPointPresentation

Module-4 (6 Hours of Pedagogy)
Strings and Pointers: Introduction, string taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. Pointers: Introduction to pointers, declaring pointer variables, Types of pointers, Passing arguments to functions using pointers **Textbook: Chapter 13.1-13.6, 14-14.7**

Teaching-LearningProcess	Chalkandtalkmethod/PowerPointPresentation

Module-5 (6 Hours of Pedagogy)
Structure, Union, and Enumerated Data Type: Introduction, structures and functions, Unions, unions inside structures, Enumerated data type. **Files:** Introduction to files, using files in C, reading and writing data files. , Detecting end of file **Textbook: Chapter 15.1 – 15.10, 16.1-16.5**

Teaching-LearningProcess	Chalkandtalkmethod/PowerPointPresentation

CourseOutcomes(CourseSkillSet)

Attheendofthecoursethestudentwillbeableto:

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

CO 2. Apply programming constructs of C language to solve the real world problem

CO 3.Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting

CO 4.Explore user-defined data structures like structures, unions and pointers in implementing solutions

CO5.Design and Develop Solutions to problems using modular programming constructs using functions

Programming Assignments

1 Simulation of a SimpleCalculator.

2 Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.

3 An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.

4. Write a C 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 Implement Binary Search on Integers.

6 Implement Matrix multiplication and validate the rules of multiplication.

7 Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.

8 Sort the given set of N numbers using Bubble sort.

9 Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.

10 Implement 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.

11 Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.

12. Write a C program to copy a text file to another, read both the input file name and target file name.

Note:

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. OR based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Students can pick one experiment from the questions lot with equal choice to all the students in a batch. Student should develop an algorithm, program, execute and demonstrate the results with appropriate output for the given problem.

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

The duration of SEE is 02 hours

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):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

CIE for the theory component of the IC

- Three Tests each of 20 Marks**;** after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totaling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the

continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.

- The laboratory test **(duration 03 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks.**

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

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination:

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

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Textbooks

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

Reference Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.

Web links and Video Lectures (e-Resources):

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. 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.

3. https://tinyurl.com/4xmrexre
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning • Quizzes • Assignments • Seminars

Course Title:	**Introduction to Electronics & Communication**		
Course Code:	**BESCK104C/204C**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

1. To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
2. To equip students with a basic foundation in electronic engineeringrequired for comprehending the operation and application of electroniccircuits, logic design, embedded systems, and communication systems.
3. Professionalism & Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed for a successful professional career.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. 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. Arrange visits to nearby PSUs such as BHEL, BEL, ISRO, etc., and small-scale hardware Industries to give brief information about the electronics manufacturing industry.
3. Show Video/animation films to explain the functioning of various analog and digital circuits.
4. Encourage collaborative (Group) Learning in the class
5. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes criticalthinking
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
7. Topics will be introduced in multiple representations.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helpsimprove the students' understanding.

Module-1 (8 hours)

Power Supplies –Block diagram, Half-wave rectifier, Full-waverectifiers and filters, Voltage regulators, Output resistanceand voltage regulation, Voltage multipliers.

Amplifiers – Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negativefeedback, multi-stage amplifiers (Text 1)

Module-2(8 hours)

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations) **Operational amplifiers -**Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits. Text 1)
Module-3 (8 hours)
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)
Module-4 (8 hours)
Embedded Systems – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC **Sensors and Interfacing** – Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (Text 3)
Module-5 (8 hours)
Analog Communication Schemes – Modern communication system scheme, Information source, andinput transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems.Types of modulation (only concepts) – AM , FM, Concept of Radio wave propagation (Ground, space, sky) **Digital Modulation Schemes**: Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques. (Text 4)

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 Tests each of 20 Marks**;**

- 1st, 2nd, and 3rd tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

  If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

Semester End Examination(SEE):

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

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)
1.Mike Tooley, 'Electronic Circuits, Fundamentals & Applications',4thEdition, Elsevier, 2015. DOI https://doi.org/10.4324/9781315737980. eBook ISBN9781315737980
2. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-84.
3. K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016
4. S L Kakani and Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017.

Course Title:	**INTRODUCTION TO EMBEDDED SYSTEMS**		
Course Code:	**BETCK105J-205J**	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives: To teach students

- Introductory topics of Embedded System design
- Characteristics & attributes of Embedded System
- Introduction of Embedded System Software and Hardware development
- RTOS based Embedded system design

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. 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 the functioning of various analog and digital circuits.
3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1 (8 Hours)

Introduction: Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems **Chapter 1 – Text 1**

Core of Embedded Systems : Microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components **Chapter 2 – Text 1**

Module-2(8 Hours)

Characteristics and quality attributes of embedded systems: Characteristics, Operational and nonoperational quality attributes, application specific embedded system - washing machine, domain specific – automotive **Chapter 3 & 4 – Text 1**

Module-3(8 Hours)

Hardware Software Co design and Program Modelling : Fundamental issues in Hardware Software Co-design, Computational models in Embedded System Design **Chapter 7 – Text 1: 7.1, 7.2**

Embedded Hardware Design and Development: Analog Electronic Components, Digital Electronic Components, VLSI & Integrated Circuit Design, Electronic Design Automation Tools

Chapter 8 – Text 1: 8.1, 8.2, 8.3, 8.4

Module-4(8 Hours)

Embedded Firmware Design and Development: Embedded Firmware Design Approaches, Embedded Firmware Development Languages **Chapter 9 – Text 1: 9.1, 9.2**

Embedded System Development Environments: Types of files generated on cross compilation (only explanation – programming codes need not be dealt), disassemble/decompliler, Simulators, Emulators and Debugging **Chapter 13 – Text 1: 13.2, 13.3,13.4**

Module-5(8 Hours)

Real-time Operating System(RTOS) based Embedded System Design:

Operating System basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling **Chapter 10 – Text 1: 10.1 to 10.5**

Course outcome (Course Skill Set)

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

CO1	Explain characteristics of Embedded System design
CO2	Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS
CO3	Analyse embedded system software and hardware requirements
CO4	Develop programming skills in embedded systems for various applications.
CO5	Design basic embedded system for real time applications

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 Tests each of 20 Marks**;**

- 1st, 2nd, and 3rd tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

  If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

Semester End Examination (SEE):

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

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks.The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

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

1. Shibu K V, "Introduction to Embedded Systems", Second Edition, McGraw Hill Educatiion

Web links and Video Lectures (e-Resources):

NPTL Lectures: https://nptel.ac.in/courses/108102045

Embedded Systems, IIT Delhi, Prof. Santanu Chaudhary

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

- To design a simple Embedded System like simple remote
- To demonstrate simple microcontroller based experiments like LED interfacing, LCD interfacing, DAC etc

Theory - 01 Credit Course **BENGK106-206**

Communicative English

Course Title:	**Communicative English**		
Course Code:	BENGK106-206	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives: The course Communicative English (22ENG16) 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.

Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.

Module-1 **(03 hours of pedagogy)**

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.

Module-2 **(03 hours of pedagogy)**

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.

Module-3 **(03 hours of pedagogy)**

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.

Module-4 **(03 hours of pedagogy)**

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 of Tenses (Rules in use of Tenses) and Exercises on it.

Module-5 **(03 hours of pedagogy)**

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.

Course outcome (Course Skill Set)

At the end of the course Communicative English (22ENG16) the student 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.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation(CIE):

Two Unit Tests each of 30 Marks (duration 01 hour)

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

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

Two assignments each of 20 Marks

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

The sum of two tests, two assignments, will be out of 100 marks and will 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.

Suggested Learning Resources:

Textbook:

1) **Communication Skills** by Sanjay Kumar & Pushp Lata, Oxford University Press India Pvt Ltd - 2019.
2) **A Textbook of English Language Communication Skills,** (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.

Reference Books:

1. **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
2. **English for Engineers** by N.P.Sudharshana and C.Savitha, 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. **A Course in Technical English – D Praveen Sam, KN Shoba,** Cambridge University Press – 2020.
5. **Practical English Usage** by Michael Swan, Oxford University Press – 2016.

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

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

BICOK107-207

Theory - 01 Credit Course

Indian Constitution

Course Title:	**Indian Constitution**		
Course Code:		CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

BICOK107-207

Course objectives :

The course **INDIAN CONSTITUTION (22ICO17 / 27)** 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 (03 hours of pedagogy)

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.

Module-2 (03 hours of pedagogy)

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.

Module-3 (03 hours of pedagogy)

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.

Module-4 (03 hours of pedagogy)

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.

Module-5 (03 hours of pedagogy)

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.

Course outcome (Course Skill Set)

At the end of the course 22ICO17/27 the student 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.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation(CIE):

Two Unit Tests each of 30 Marks (duration 01 hour)

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

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

Two assignments each of 20 Marks

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

The sum of two tests, two assignments, will be out of 100 marks and will 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.

Suggested Learning Resources:

Textbook:

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 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.

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

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

I Semester

INNOVATION and DESIGN THINKING			
Course Code	BIDTK158/258	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01

Course Category: Foundation

Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.

Course objectives:

- To explain the concept of design thinking for product and service development
- To explain the fundamental concept of innovation and design thinking
- 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 recall it.
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.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1

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

Teaching-Learning Process	Introduction about the design thinking: Chalk and Talk method Theory and practice through presentation MVP and Prototyping through live examples and videos

Module-2

Tools for Design Thinking

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

Teaching-Learning	Case studies on design thinking for real-time interaction and analysis

Process	Simulation exercises for collaborated enabled design thinking Live examples on the success of collaborated design thinking

Module-3

Design Thinking in IT

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

Teaching-Learning Process	Case studies on design thinking and business acceptance of the design Simulation on the role of virtual eco-system for collaborated prototyping

Module-4

DT For strategic innovations

Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.

Teaching-Learning Process	Business model examples of successful designs Presentation by the students on the success of design Live project on design thinking in a group of 4 students

Module-5

Design thinking workshop

Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test

Teaching-Learning Process	8 hours design thinking workshop from the expect and then presentation by the students on the learning from the workshop

Course Outcomes:

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Appreciate various design process procedure	K2
CO2	Generate and develop design ideas through different technique	K2
CO3	Identify the significance of reverse Engineering toUnderstand products	K2
CO4	Draw technical drawing for design ideas	K3

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation (CIE):

- Two Tests (preferably in MCQ pattern) each of **30 Marks;** The first test after the completion of the 40 -50% syllabus of the course. A second test after the completion of 90-100% of the syllabus of the course.
- Two Assignments/two quizzes/two seminars/one field survey and report presentation/one-course project totaling **40 marks**

Total Marks scored (test + assignments) out of 100 shall be scaled down to **50 marks**

At the beginning of the semester, the instructor/faculty teaching the course has to announce the methods of CIE for the course.

The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

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

SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is **01 hour**

Suggested Learning Resources:

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 Business or Design School", John Wiley & Sons 2013.

References:

5. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", CengageLearning, Second Edition, 2011.
6. 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 7. 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

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

- http://dschool.stanford.edu/dgift/

https://onlinecourses.nptel.ac.in/noc19_mg60/preview