SGT UNIVERSITY

SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY
(UGC Approved) Gurugram, Delhi NCR

FACULTY OF ENGINEERING AND TECHNOLOGY

COMPUTER SCIENCE & ENGINEERING

2024-2028

Bachelor of Technology in Computer Science & Engineering/Bachelor of Technology in Computer Science & Engineering(Cyber Security/ Data Science/Block Chain/Cloud Computing/Gaming & Augmented Reality)

With effect from Session 2024 - 25

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Head of the Department

Dean

Dean – Academics

1. NATURE AND EXTENT OF THE PROGRAM

B.Tech CSE (Bachelor of Technology in Computer science & engineering) is a 4-year undergraduate program that focuses on the design, development, and application of computer software and hardware. The program provides students with a strong foundation in the fundamental principles of computer science & engineering.

The nature of the B.Tech CSE program is technical and hands-on. Students learn to write code, build software applications, and design hardware systems. They also gain knowledge in computer architecture, algorithms, operating systems, database management, programming languages, and web technologies.

The extent of the B.Tech CSE program is vast and covers a wide range of topics. Some of the core subjects that students study in this program include:

Data Structures and Algorithms
Computer Networks
Database Management Systems
Operating Systems
Object-Oriented Programming
Computer Architecture and Organization
Software Engineering
Artificial Intelligence and Machine Learning

The B.Tech CSE program also includes practical training in the form of internships, projects, and laboratory sessions, where students can apply their theoretical knowledge to real-world problems. The program also provides opportunities for students to specialize in various areas such as artificial intelligence, cybersecurity, cloud computing, data analytics, and more.

Overall, the B.Tech CSE program is designed to equip students with the knowledge and skills required to become competent computer professionals who can meet the demands of the industry.

2. PROGRAM EDUCATION OBJECTIVES (PEOs)

After completing (B.Tech(CSE)), students will be able to:

PEO No.	Education Objective
PEO1	Professionalism: Graduates will be able to function effectively as ethical and socially responsible professionals in the field of computer science & engineering.
PEO2	Technical Skills: Graduates will have a strong foundation in the principles of computer science & engineering and will be able to apply their knowledge to solve complex problems.
PEO3	Adaptability: Graduates will be able to adapt to new and emerging technologies and will be able to continuously learn and update their skills.
PEO4	Communication Skills: Graduates will be able to communicate effectively and work collaboratively with others, including technical and non-technical stakeholders.
PEO5	Entrepreneurship: Graduates will have an entrepreneurial mindset and will be able to identify and pursue opportunities in the field of computer science & engineering.
PEO6	Leadership: Graduates will have the ability to take on leadership roles and work effectively in teams, and will have an understanding of the social, economic, and environmental impacts of their work.

3. GRADUATE ATTRIBUTES

Sl. No.	Attributes	Description
1	Professional / Disciplinary Knowledge	As a language model, I can provide you with general information about the professional and disciplinary knowledge associated with a Bachelor of Technology (B.Tech) degree in Computer science & engineering (CSE). B.Tech in CSE typically covers a broad range of topics related to computer hardware, software, algorithms, data structures, and programming languages.
2	Technical / Laboratory / practical skills	B.Tech CSE students need to have a strong foundation in computer science concepts and programming languages such as Java, C++, Python, etc. In a B.Tech CSE program, laboratory skills may involve setting up and configuring computer systems, installing software, and troubleshooting hardware and software issues. Students may also need to work on simulation projects to design and test new software systems. B.Tech CSE students need to have practical skills in software development methodologies such as Agile, Scrum, and Waterfall. They need to be able to write code that is well-documented, modular, and maintainable. In summary, a B.Tech CSE program requires a combination of technical, laboratory, and practical skills.
3	Communication Skill	Communication skills are an essential part of B.Tech CSE education and can help students excel in various aspects of their career. B.Tech CSE students must develop excellent communication

		skills to become successful software professionals.
4	Cooperation/Team work	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings
5	Professional ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
6	Research / Innovation-related Skills	Extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research methodologies, techniques, and tools, design, conduct experiments, analyze and interpret data, demonstrate higher order skill and view things in a broader perspective, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domains of engineering.
7	Critical thinking and problem solving	Analyze complex engineering problems critically, apply independent judgment for synthesizing information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.
8	Reflective thinking	Observe and examine critically the outcomes of one's actions and make corrective measures subsequently and learn from mistakes without depending on external feedback.
9	Information/digital literacy	Think laterally and originally, conceptualize, and solve engineering problems, evaluate a wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors in the core areas of expertise.
10	Multi-cultural competence	Possess knowledge and understanding of

		group dynamics, recognize opportunities and contribute positively to collaborative multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness, objectivity, and rational analysis in order to achieve common goals and further the learning of themselves as well as others.
11	Leadership readiness/qualities	Demonstrate knowledge and understanding of engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economic and financial factors.
12	Lifelong Learning	Recognize the need for and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.

4. QUALIFICATION DESCRIPTORS:

B.Tech (Bachelor of Technology) in Computer science & engineering (CSE) is an undergraduate program that prepares students for a career in the field of computer science and technology. Some of the qualification descriptors for B.Tech CSE program are:

Technical knowledge: B.Tech CSE graduates should have a strong foundation in computer science concepts and should be familiar with programming languages, algorithms, data structures, operating systems, databases, computer networks, and other related technologies.

Analytical skills: B.Tech CSE graduates should possess strong analytical skills to analyze and solve complex problems related to computer systems and software applications.

Creativity: B.Tech CSE graduates should be able to think creatively to design and develop innovative software applications, websites, and computer systems.

Teamwork: B.Tech CSE graduates should be able to work collaboratively in a team environment to develop and implement software applications and computer systems.

Communication skills: B.Tech CSE graduates should possess excellent communication skills to articulate technical concepts and ideas to a diverse audience.

Project management skills: B.Tech CSE graduates should have project management skills to plan, organize, and execute software development projects successfully.

Ethical and professional conduct: B.Tech CSE graduates should adhere to ethical and professional conduct in their work and be aware of the impact of technology on society and the environment.

5. PROGRAM OUTCOME

PO No.	Attribute	Competency
PO1	**Engineering Knowledge**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization in Computer science & engineering for the solution of complex engineering problems.
PO2	**Problem Analysis**	Identify, formulate, review research literature, and analyze complex Computer science and engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**	Design solutions for complex Computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct Investigations of Complex Problems**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tools Usage**	Create, select, and apply proper procedure, resources, and current engineering and mechanical tools including prediction and modelling to complex engineering activities in Computer science and engineering with an understanding of the limitations.
PO6	**The Engineer and Society**	Apply reasoning inferred by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and Sustainability**	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	**Individual and Team work**	Function effectively as an individual, and as a member or leader in diverse teams, and multidisciplinary settings.
PO10	**Communication**	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being

		able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project Management and Finance**	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Lifelong Learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

6. PROGRAM SPECIFIC OUTCOME

PSO No.	Competency
PSO1	Graduates of the program will be able to design, implement, and maintain complex software systems using a range of programming languages and tools.
PSO2	Graduates of the program will be able to analyze and solve complex problems in computer science & engineering using a range of algorithms and data structures.
PSO3	Graduates of the program will be able to communicate effectively with technical and non-technical audiences, and work collaboratively in teams to solve complex problems.
PSO4	Graduates of the program will be able to demonstrate ethical and professional behavior, and understand the social and ethical implications of computer science & engineering in a global and societal context.

7. COURSE STRUCTURE

SEMESTER – I

Course Code	Course Title	Credit Distribution (Hours/Week)				Marks Distribution		
		L	T	P	C	IAE	ESE	Total
	Engineering Mathematics-I	3	0	0	3	40	60	100
	Basics of Electrical & Electronics Engineering	3	0	0	3	40	60	100
	Basics of Electrical & Electronics Engineering Lab	0	0	2	1	20	30	50
	Engineering Physics-I	2	0	0	2	40	60	100
	Engineering Physics-I Lab	0	0	2	1	20	30	50
	New age Skill	0	0	4	2	20	30	50
	MGEC-I	4	0	0	4	40	60	100
	AECC-I	2	0	0	2	20	30	50
	VAC-I	2	0	0	2	20	30	50
	Total	16	0	8	20	260	390	650

Note – L: Lecture Hour/week, T: Tutorial Hour/week, P: Practical Hour/week, C: Credits, IAE: Internal Assessment Examination, ESE: End Semester Examination.

SEMESTER – II

Course Code	Course Title	Credit Distribution (Hours/Week)				Marks Distribution		
		L	T	P	C	IAE	ESE	Total
	Engineering Mathematics-II	3	0	0	3	40	60	100
	Engineering Physics-II	2	0	0	2	40	60	100
	Engineering Physics-II Lab	0	0	2	1	20	30	50
	Programming for Problem Solving	2	0	0	2	40	60	100
	Programming for Problem Solving Lab	0	0	4	2	20	30	50
	Design Thinking and Innovation	0	0	4	2	40	60	100
	MGEC-II	4	0	0	4	40	60	100
	AECC-II	2	0	0	2	20	30	50
	VAC-II	2	0	0	2	20	30	50
	Total	15	0	10	20	280	420	700

Multidisciplinary Generic Electives (MGE)
Multidisciplinary Generic Electives is credited and choice-based. The students make a choice from pool of MGE offered by the Faculty under the University. (Reference: University Umbrella Multidisciplinary Generic Electives)

Value Added Courses (VAC)
Value Added Courses is credited and choice-based. The students make a choice from pool of VAC offered by the Faculty under the University. (Reference: University Umbrella Value Added Courses)

Ability Enhancement Compulsory Course (AEC)
Ability Enhancement Compulsory Courses is credited and choice-based. The students make a choice from pool of AEC offered by the Faculty under the University. (Reference: University Umbrella Ability Enhancement Compulsory Course)

Skill Enhancement Courses (SEC)
Ability Enhancement Compulsory Courses is credited and choice-based. The students make a choice from pool of AEC offered by the Faculty under the University.

SEC Courses

SEC-I	Web development using HTML and CSS
SEC-II	Embedded System development
SEC-III	MATLAB
SEC-IV	Drone Remote Sensing

Multidisciplinary Generic Electives		**Value Added Courses**	
MGE (Odd Sem)	Computational Thinking and Programming	VAC (Odd Sem)	Applied Artificial Intelligence
MGE (Even Sem)	Problem Solving using Python	VAC (Even Sem)	Applied Cloud Computing

Program Electives pool

Program Elective Course-I	**Program Elective Course-II**	**Program Elective Course-III**	**Program Elective Course-IV**	**Program Elective Course-V**	**Program Elective Course-VI**
Computer Programming with R	Soft Computing	Pattern Recognition	Concepts of Neural Networks	Deep Learning and its Applications	Satellite Data Analysis
Object Oriented Programming	Information Retrieval and Search	Image and Video Processing	Animation and Rendering Techniques	Intelligent Model Design	AI in Healthcare

using Python	Engine			using AI	
Object Oriented Programming using C++	IoT Networks and Protocols	Sensor-Cloud for Internet of Things	Industrial IoT: Smart Manufacturing	Applications of AIoT	Robotics and Intelligent Systems

Minor Electives Pool					
Minor Specialization	**MEC-I (3rd Sem)**	**MEC-II (4th Sem)**	**MEC-III (5th Sem)**	**MEC-IV (6th Sem)**	**MEC-V (7th Sem)**
Cyber Security	Cyber Security Fundamentals	Cryptography and Network Security	DB Security and Access Control	Cyber Threats and Attacks	Ethical Hacking and Penetration Testing
Block Chain	Introduction to Blockchain	Blockchain using Multichain	Web Development for Blockchain Applications	Smart Contracts and Solidity Programming	Cyber Security with Blockchain
Data Science	Overview of Data Science	Introduction to Data Science Tools	Big Data Technologies	Data Analysis and Visualization	Computational Data Analytics
Cloud Computing	Cloud fundamentals	Virtualisation concepts	Private cloud environment	Cloud as PaaS, SaaS	Cloud computing securitization
Gaming & Augmented Reality	Intelligent Game Design and its Applications	Virtual Reality and Augmented Reality	Augmented Reality and its Applications	Vision Intelligence and Machine Learning	Virtual Reality and its Applications

OVERALL CREDIT DISTRIBUTION TABLE FOR B.TECH 1st YEAR CSE

SEMESTER	**HOURS PER WEEK**			**Total Credit**	**Marks Distribution**		
SEMESTER – I	16	0	8	20	260	390	650
SEMESTER – II	15	0	10	20	280	420	700
Total	31	0	18	40	540	810	1350

Note – L: Lecture Hour, T: Tutorial Hour, P: Practical Hour, TC: Total Credits, IAE: Internal Assessment Examination, ESE: End Semester Examination.

8. SEMESTER-WISE COURSE DETAILS

SEMESTER - I

Course Code	Course Title
	Engineering Mathematics-I
	Engineering Physics-I
	Engineering Physics-I Lab
	Basics of Electrical & Electronics Engineering
	Basics of Electrical & Electronics Engineering Lab
	New age Skill
	MGEC-I
	AECC-I
	VAC-I

FACULTY OF ENGINEERING AND TECHNOLOGY

Name of the Department	Computer science & engineering
Name of the Program	Bachelor of Technology
Course Code	
Course Title	**Engineering Mathematics-I**
Academic Year	1
Semester	1
Number of Credits	3
Course Prerequisite	Student having knowledge about simple maths
Course Synopsis	To provide the students with sufficient knowledge in calculus and matrix algebra, this can be used in their respective fields.

Course Outcomes:

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

CO1	Apply elementary transformations to reduce the matrix into the echelon form and normal form to determine its rank and interpret the various solutions of system of linear equation.
CO2	Identify the special properties of a matrix such as the eigen value, eigen vector, employ orthogonal transformations to express the matrix into diagonal form, quadratic form and canonical form.
CO3	Equip themselves familiar with the functions of several variables and mean value theorems.
CO4	Familiarize with special functions to evaluate some proper and improper integrals using beta and gamma functions.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PS O4
CO1	3	2	1	1	-	-	-	-	-	-	1	1	1	-	1	-
CO2	3	2	1	1	1	-	-	-	-	-	1	1	1	-	1	-
CO3	3	2	1	1	1	-	-	-	-	-	1	1	1	-	1	-
CO4	3	1	1	1	-	-	-	-	-	-	1	1	1	-	1	-
Aver age	3	1.75	1	1	0.5	-	-	-	-	-	1	1	1	-	1	-

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
3	-	-	3

Unit	Content and Competency
1	1. Explain Matrices. (C2: Comprehension) 2. Describe vectors: addition and scalar multiplication, matrix multiplication. (C2: Comprehension) 3. Demonstrate Linear systems of equations and Linear Independence. (C3: Application) 4. Identify rank of a matrix, inverse of a matrix, Symmetric, skew-symmetric and orthogonal matrices. (C1: Knowledge) 5. Define Determinants; Eigenvalues and eigenvectors, eigen bases. (C1: Knowledge) 6. Demonstrate Diagonalization of matrices. (C3: Application) 7. Illustrate Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms. (C3: Application)
2	1. Describe Cramer's Rule. (C2: Comprehension) 2. Implement Gauss elimination and Gauss-Jordan elimination. (C6: Evaluation) 3. Create Gram-Schmidt orthogonalization. (C5: Synthesis)
3	1. Describe Vector Space, linear dependence of vectors, basis, dimension. (C2: Comprehension) 2. Define Linear transformations (maps). (C1: Knowledge) 3. Demonstrate range and kernel of a linear map. (C3: Application) 4. Define rank and nullity. (C1: Knowledge) 5. Explain Inverse of a linear transformation. (C2: Comprehension) 6. Implement rank-nullity theorem. (C6: Evaluation) 7. Describe composition of linear maps. (C2: Comprehension) 8. Identify Matrix associated with a linear map. (C1: Knowledge)
4	1. Describe Laplace Transforms & Inverse Laplace Transforms. (C2: Comprehension) 2. Explain solution based on definition, change of scale property. (C2: Comprehension) 3. Explain 1st & 2nd shifting properties. (C2: Comprehension) 4. Implement LT division by t, LT of derivative, LT by multiplication by t. (C6: Evaluation) 5. Define Convolutions & application on LT & Inverse LT. (C1: Knowledge)

Note: The course plan included as an annexure has the details of each unit with the number of hours and mode of delivery and pedagogical approach.

Learning Strategies and Contact Hours

Learning Strategies	Contact Hours
Lecture	32
Practical	
Seminar/Journal Club	2
Small group discussion (SGD)	2
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓
Feedback Process	Student's Feedback			

References:	Textbooks: 1. B. S. Grewal, "Higher Engineering Mathematics", 44/e, Khanna Publishers, 2017. 2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10/e, John Wiley& Sons, 2011.
	References: 1. N. P. Bali, "Engineering Mathematics", Lakshmi Publications. 2. George B. Thomas, Maurice D. Weir and Joel Hass, "Thomas Calculus", 13/e, Pearson Publishers, 2013. 3. H. K. Dass, "Advanced Engineering Mathematics", S. Chand and complany Pvt. Ltd. 4. Michael Greenberg, "Advanced Engineering Mathematics", Pearson, Second Edition.

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer science & engineering
Name of the Program	B. Tech.
Course Code	
Course Title	**Engineering Physics-I**
Academic Year	I
Semester	I
Number of Credits	2
Course Prerequisite	Basic aspect of physics
Course Synopsis	This course gives idea about basic monochromatic light methods, introduction to resistance of a wire and rate the ammeter and voltmeter.
Course Outcomes: At the end of the course, students will be able to:	
CO1	Use Maxwell's equations and time varying electric field to show the nature of propagation of electromagnetic waves, radiation pressure and its energy through free space, non-conducting and conducting media.

CO2	Extend the concepts of Planck's black body radiation law & Schrodinger wave equation to calculate the matter waves energy & momentum, probability of finding the particle and wave function of quantum system (particle in a box).
CO3	Determine the thickness of thin films, refractive index and resolving power of grating using principles of interference and diffraction of light.
CO4	Evaluate and categorize among different types of lasers and optical fiber, fiber loss and transition probabilities of laser.

Mapping of Course Outcomes (COs) to Program Outcomes (POs)& Program Specific Outcomes:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	2	-	1	0	3	-	-	-	-	2	-	-	3	2	1
CO2	2	1	1	1	3	-	-	-	-	2	-	-	3	2	1
CO3	2	1	1	1	3	-	-	-	-	2	-	-	3	2	1
CO4	2	1	1	1	3	-	-	-	-	2	-	-	3	2	1
Average	2	0.75	1	0.75	3	-	-	-	-	2	-	-	3.0	2.0	1

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
2	**0**	**0**	**2**

Unit	Content & Competency
1	1. Importance of Black body radiation spectrum (C1: Knowledge) 2. Understanding the significance of Weins law and Rayleigh-Jeans law (C1: Knowledge) 3. Introduction to Assumption of quantum theory of radiation (C1: Knowledge-C2: Comprehension) 4. Overview of essential Planck's law. (C1: Knowledge) 5. Understanding Wave-particle duality (C2: Comprehension) 6. Principles of de-Broglie matter waves (C2: Comprehension) 7. Introduction to Bohr's quantization rule. (C2: Comprehension) 8. Understanding the purpose and applications of Davisson-Germer experiment (C3: Application) 9. Heisenberg uncertainty principle and its applications (C3: Application) 10. Wave function and its significance (C3: Application) 11. Understanding the Schrödinger's wave equation (Time dependent and time independent) – particle in one dimensional potential box, Eigen values and Eigen function. (C3: Application)

2	1. Interference: Coherent sources, Interference in thin films (parallel and wedge shaped film), Newton's rings and its applications. (C2: Comprehension - C3: Application) 2. Diffraction: Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating. (C1: Knowledge, C2: Comprehension)
3	1. Overview of Polarization: Phenomena of double refraction (C1: Knowledge) 2. Define Nicol prism. (C1: Knowledge) 3. Production and analysis of plane. (C4: Analysis) 4. Explain circular and elliptical polarized light. (C1: Knowledge) 5. Retardation Plate, Optical Activity, Fresnel's theory, Specific rotation. (C1: Knowledge) 6. Overview of Laser: Spontaneous and stimulated emission of radiation, population inversion, Einstein's Coefficients. (C2: Comprehension) 7. Concept of 3 and 4 level Laser. (C1: Knowledge) (C3: Application) 8. Construction and working of Ruby, He-Ne lasers and laser applications. (C4: Analysis)
4	1. Fiber Optics: Fundamental ideas about optical fiber (C1: Knowledge) 2. Explain Propagation mechanism. (C1: Knowledge) 3. Define Acceptance angle and cone. (C1: Knowledge) (C3: Application) 4. Overview of Numerical aperture, Single and Multi Mode Fibers. (C1: Knowledge) (C3: Application) 5. Dispersion and Attenuation. (C2: Comprehension) 6. Holography: Basic Principle of Holography (C1: Knowledge) 7. Construction and reconstruction of Image on hologram and applications of holography. (C1: Knowledge) (C3: Application)

Teaching Learning Strategies and Contact Hours

Learning Strategies	**Contact Hours**
Lecture	20
Practical	
Seminar/Journal Club	1
Small group discussion (SGD)	1
Self-directed learning (SDL) / Tutorial	2
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	2

Others If any:	
Total Number of Contact Hours	30

Assessment Methods:

Formative	**Summative**
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Mapping of Assessment with Cos

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Quiz	✓	✓	✓	✓
VIVA				
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Practical Log Book/ Record Book				
Mid-Semester Examination 1	✓	✓	✓	✓
Mid-Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓

Feedback Process	1. Student's Feedback 2. Course Exit Survey

Students Feedback is taken through various steps

1. Regular feedback through the Mentor Mentee system.
2. Feedback between the semester through google forms.
3. Course Exit Survey will be taken at the end of the semester.

References:	1. Concepts of Modern Physics - Aurthur Beiser (Mc-Graw Hill) 2. Introduction to Special Theory of Relativity- Robert Resnick (Wielly) 3. Optics –Ajoy Ghatak (Tata McGraw Hill Education Private Ltd. New Delhi) 4. Optics - Brijlal & Subramanian (S. Chand)

	5. Engineering Physics- C. Mani Naidu(Pearson) 6. Lasers Principles, Types and Applications- K R Nambiar (New Age) 7. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer science & engineering
Name of the Program	B. Tech.
Course Code	
Course Title	**Engineering Physics-I Lab**
Academic Year	I
Semester	I
Number of Credits	1
Course Prerequisite	Basic aspect of physics
Course Synopsis	This course gives idea about basic monochromatic light methods, introduction to resistance of a wire and rate the ammeter and voltmeter.

Course Outcomes:

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

CO1	Determine the wavelengths of light emerging from a monochromatic source or polychromatic source and specific rotation of an optically active substance applying the principles of interference, diffraction and polarization phenomenon.
CO2	Measure the variation of magnetic field with the distance along the axis of a current carrying coil and ECE of copper applying Biot Savart's and Faraday's law.
CO3	Estimate the power radiated by the black body and the energy band gap of the semiconductor by electrical method.
CO4	Measure specific resistance of a wire and rate the ammeter and voltmeter, applying Wheatstone Bridge principle.

Mapping of Course Outcomes (COs) to Program Outcomes (POs)& Program Specific Outcomes:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	2	-	1	0	3	-	-	-	-	2	-	-	3	2	1
CO2	2	1	1	1	3	-	-	-	-	2	-	-	3	2	1

CO3	2	1	1	1	3	-	-	-	-	2	-	-	3	2	1
CO4	2	1	1	1	3	-	-	-	-	2	-	-	3	2	1
Average	2	0.75	1	0.75	3	-	-	-	-	2	-	-	3.0	2.0	1

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
0	0	2	2

Unit	Content & Competency
1	To determine the wavelength of monochromatic light by Newton's ring. (C1: Knowledge) (C3: Application)
2	To determine the specific rotation of cane sugar solution using polarimeter. (C1: Knowledge) (C3: Application)
3	To determine the focal length of two lenses by nodal slide and locate the position of cardinal points. (C1: Knowledge) (C3: Application)
4	To determine the wavelength of monochromatic light with the help of Fresnel's biprism. (C1: Knowledge) (C3: Application)
5	To determine the wavelength of spectral lines using plane transmission grating. (C1: Knowledge) (C3: Application)
6	To study the polarization of light by simple reflection using laser. (C1: Knowledge) (C3: Application)
7	Measurement of Wavelength of a laser (He- Ne) light using single slit diffraction. (C1: Knowledge) (C3: Application)
8	To determine the specific resistance of a given wire using Carey Foster's bridge. (C1: Knowledge) (C3: Application)
9	To study the variation of magnetic field along the axis of current carrying - Circular coil and then to estimate the radius of the coil. (C1: Knowledge) (C3: Application)
10	To verify Stefan's Law by electrical method. (C1: Knowledge) (C3: Application)
Note:	

Teaching - Learning Strategies and Contact Hours

Teaching - Learning Strategies	Contact Hours
Lecture	--

Practical	30
Seminar/Journal Club	--
Small group discussion (SGD)	20
Self-directed learning (SDL) / Tutorial	--
Problem Based Learning (PBL)	10
Case/Project Based Learning (CBL)	--
Revision	--
Others If any:	--
Total Number of Contact Hours	60

Assessment Methods:

Formative	**Summative**
Multiple Choice Questions (MCQ)	Mid Semester Examination 1,2, End term
Viva-voce	--
Objective Structured Practical Examination (OSPE)	University Examination
Quiz	Multiple Choice Questions (MCQ)
Seminars	Multiple Choice Questions (MCQ)
Problem-Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination (OSPE)

Mapping of Assessment with COs

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Quiz				
VIVA	✓	✓	✓	✓
Assignment / Presentation				
Unit test				
Practical Log Book/ Record Book	✓	✓	✓	✓
Mid-Semester Examination 1				

Mid-Semester Examination 2				
University Examination	✓	✓	✓	✓

Feedback Process	1. Student's Feedback 2. Course Exit Survey

Students Feedback is taken through various steps

1. Regular feedback through the Mentor Mentee system.
2. Feedback between the semester through google forms.
3. Course Exit Survey will be taken at the end of the semester.

References:	1. Concepts of Modern Physics - Aurthur Beiser (Mc-Graw Hill) 2. Introduction to Special Theory of Relativity- Robert Resnick (Wielly) 3. Optics –Ajoy Ghatak (Tata McGraw Hill Education Private Ltd. New Delhi) 4. Optics - Brijlal & Subramanian (S. Chand) 5. Engineering Physics- C. Mani Naidu(Pearson) 6. Lasers Principles, Types and Applications- K R Nambiar (New Age) 7. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer science & engineering
Name of the Program	Bachelor of Technology
Course Code	
Course Title	Basics of Electrical and Electronics Engineering
Academic Year	I
Semester	I
Number of Credits	3
Course Prerequisite	Basic aspects of electrical engineering.
Course Synopsis	This course gives idea about basic circuit solution methods, introduction to electrical machines and basics of domestic electrical installations

Course Outcomes:

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

CO1	Understand & apply Kirchoff's laws, network theorems, time domain analysis for RL & RC series circuit.
CO2	Understand and analyse phasor diagram and waveforms for purely resistive, purely inductive and purely capacitive as well as series and parallel R-L, R-C & R-L-C circuits and also circuit Resonance.
CO3	Understand concepts of Real, Reactive & apparent power and Power factor. Understand 3- phase supply and star and delta connection and their relationships.
CO4	Understand about types of batteries & its important Characteristics. Understand basic calculations for energy consumption & power factor improvement.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	-	1	-	1	-	-	-	-	2	1	-	-	-
CO2	3	2	1	-	1	-	1	-	-	-	-	2	1	1	1	-
CO3	3	2	1	-	1	1	1	-	-	-	-	2	1	-	1	-
CO4	3	2	1	-	-	1	1	-	-	-	-	2	1	-	-	-
Average	3	2	1	-	0.75	1	1	-	-	-	-	2	1	0.25	0.5	-

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
3	0	0	3

Unit	Content and Competency
1	1. Explain Circuit Analysis: Ohm's Law, KCL, KVL Mesh and Nodal Analysis. (C2: Comprehension) 2. Define Circuit parameters, energy storage aspects. (C1: Knowledge) 3. Implement Superposition Theorem and Thevenin's Theorem, 4. Implement Norton's, Reciprocity, Maximum Power Transfer Theorem, and Describe Millman's Theorem. (C2: Comprehension)

	5. Define Star-Delta Transformation. (C1: Knowledge) 6. Application of theorem to the Analysis of D.C. circuits. (C3: Application)
2	1. Explain A.C. Circuits: R-L, R-C, R-L-C circuits (series and parallel), Time Constant. (C2: Comprehension) 2. Describe Phasor representation. (C2: Comprehension) 3. Implement Response of RL, R-C and R-L-C circuit to sinusoidal input Resonance-series and parallel R-L-C Circuits. (C6: Evaluation) 4. Explain Q-factor. (C2: Comprehension) 5. Explain Bandwidth. (C2: Comprehension) 6. Describe Cathode Ray Oscilloscope: Basic CRO circuit (Block Diagram), (C2: Comprehension) 7. Describe Cathode ray tube (CRT) & its component. (C2: Comprehension)
3	1. Explain Semiconductor Physics: Basic concepts. (C2: Comprehension) 2. Differentiate Intrinsic and extrinsic semiconductors. (C2: Comprehension) 3. Differentiate diffusion and drift currents. (C2: Comprehension) 4. Implement P-N junction diode: Ideal diode, P-N junction under open-circuit and closed-circuit. (C6: Evaluation) 5. Describe Diode Current Equation. (C2: Comprehension) 6. Describe Diode Resistance. (C2: Comprehension) 7. Demonstrate Transition and Diffusion Capacitance. (C3: Application) 8. Define Effect of Temperature. (C1: Knowledge) 9. Define Carrier Life Time. (C1: Knowledge) 10. Demonstrate Continuity Equation. (C3: Application) 11. Explain Special Diodes: Zener Diode, Photodiode, Light Emitting Diodes, applications of Diodes. (C2: Comprehension)
4	1. Explain Digital Electronics: Boolean algebra. (C2: Comprehension) 2. Implement Truth tables of logic gates (AND, OR, NOT), NAND, NOR as universal gates. (C6: Evaluation) 3. Define Bipolar junction transistor. (C1: Knowledge) 4. Describe transistors: construction, transistor operations, BJT characteristics, load

	line, operating point, leakage currents. (C2: Comprehension) 5. Application of BJT: CB, CE configurations. (C3: Application) 6. Introduction to FETs and MOSFETs. (C1: Knowledge)

Note: The course plan included as an annexure has the details of each unit with the number of hours and mode of delivery and pedagogical approach.

Teaching Learning Strategies and Contact Hours

Learning Strategies	Contact Hours
Lecture	32
Practical	
Seminar/Journal Club	2
Small group discussion (SGD)	2
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓

Unit test	✓	✓	✓	✓
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓

Feedback Process	Student's Feedback

References:	Textbooks: 1. Fundamentals of Electrical Circuits by Charles k.Alexander, Mattew N.O. Saidiku, Tata McGraw Hill company. 2. V.N. Mittle "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990. 3. Electrical Technology by Surinder Pal Bali, Pearson Publications. 4. R.S. Sedha, "Applied Electronics" S. Chand & Co., 2006. 5. Electronic Devices and Circuits. R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.
	References: 1. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition 2. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics, and Computer Engineering", Tata McGraw Hill, Second Edition, (2006). 3. Industrial Electronics by G.K. Mittal, PHI 4. Nagsarkar T K and Sukhija MS, "Basics of Electrical Engineering", Oxford Press (2005).

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer Science & Engineering
Name of the Program	B. Tech.
Course Code	
Course Title	**Basics of Electrical and Electronics Engineering Lab**

Academic Year	I
Semester	I
Number of Credits	1
Course Prerequisite	NIL
Course Synopsis	To design electrical systems. To analyze a given network by applying various network theorems. To know the response of electrical circuits for different excitations. To study various electrical measuring instruments and transducers. To summarize the performance characteristics of electrical machines

Course Outcomes:

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

CO1	Understand the basic concepts and terminology of electrical quantities
CO2	Analyze the DC circuit using various network theorems
CO3	Understand the response of different types of electrical circuits to different excitations
CO4	Understand the measurement, calculation and relation between the basic electrical parameter.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	2	-	1	0	3	-	-	-	-	2	-	-	3	2	1
CO2	2	1	1	1	3	-	-	-	-	2	-	-	3	2	1
CO3	2	1	1	1	3	-	-	-	-	2	-	-	3	2	1
CO4	2	1	1	1	3	-	-	-	-	2	-	-	3	2	1
Average	2	0.75	1	0.75	3	-	-	-	-	2	-	-	3.0	2.0	1

Course Content:

L (Hours/Week)	**T (Hours/Week)**	**P (Hours/Week)**	**Total Hour/Week**
0	**0**	**2**	**2**

Content & Competency

Unit	**Title**
1	Familiarization of electrical Elements, sources, measuring devices and transducers related to electrical circuits. (C1: Knowledge)

2	Verification of KVL and KCL. (C6: Evaluation)
3	Verification of Thevenin's and Norton's theorems. (C6: Evaluation)
4	Verification of superposition theorem. (C6: Evaluation)
5	Verification of maximum power transfer theorem. (C6: Evaluation)
6	Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits. (C6: Evaluation)
7	Verification of relation between phase and line quantities in a 3-phase balanced star and delta connected systems. (C6: Evaluation)
8	Measurement of Active and Reactive Power in a balanced Three-phase circuit. (C6: Evaluation)
9	Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor. (C1: Knowledge)
10	Load test on single phase transformer. (C1: Knowledge)
11	Demonstration of measurement of electrical quantities in DC and AC systems. (C6: Evaluation)
Note:	Faculty should add 10 to 15 more practical

Teaching - Learning Strategies and Contact Hours

Teaching - Learning Strategies	**Contact Hours**
Lecture	--
Practical	30
Seminar/Journal Club	--
Small group discussion (SGD)	20
Self-directed learning (SDL) / Tutorial	--
Problem Based Learning (PBL)	10
Case/Project Based Learning (CBL)	--
Revision	--
Others If any:	--
Total Number of Contact Hours	60

Assessment Methods:

Formative	**Summative**

Multiple Choice Questions (MCQ)	Mid Semester Examination 1,2, End term
Viva-voce	--
Objective Structured Practical Examination (OSPE)	University Examination
Quiz	Multiple Choice Questions (MCQ)
Seminars	Multiple Choice Questions (MCQ)
Problem-Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination (OSPE)

Mapping of Assessment with COs

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Quiz				
VIVA	✓	✓	✓	✓
Assignment / Presentation				
Unit test				
Practical Log Book/ Record Book	✓	✓	✓	✓
Mid-Semester Examination 1				
Mid-Semester Examination 2				
University Examination	✓	✓	✓	✓

Feedback Process	Student's Feedback
References:	Electrical and electronics engineering, person publication 2017

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer Science & Engineering
Name of the Program	B. Tech.
Course Code	
Course Title	**New age skill**

Academic Year	1
Semester	1
Number of Credits	2
Course Prerequisite	NIL
Course Synopsis	Knowledge of MS Word, MS Excel, MS PowerPoint, and MS Access.

Course Outcomes:

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

CO1	Understand the concept of MS Word.
CO2	Understand the concept of MS Excel.
CO3	Understand the concept of MS PowerPoint.
CO4	Understand the concept of MS Access.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PS O3**	**PS O 4**
CO1	2	1	1	0	3	-	-	-	-	2	1	1	3	2	1	-
CO2	2	1	1	1	3	-	-	-	-	2	1	1	3	2	1	-
CO3	2	1	1	1	3	-	-	-	-	2	1	1	3	2	1	-
CO4	2	1	1	1	3	-	-	-	-	2	1	1	3	2	1	-
Average	2	1	1	0.75	3	-	-	-	-	2	1	1	3.0	2.0	1	-

Course Content:

L (Hours/Week)	**T (Hours/Week)**	**P (Hours/Week)**	**Total Hour/Week**
0	**0**	**4**	**4**

Content & Competency

Unit	**Content**
1	Create a news-paper document with at least 200 words using MS Word. (C5: Synthesis) a. Use margins as, top:1.5, bottom:2, left:2, right:1 inches. b. Use heading "Gandhi Jayanti", font size: 16, font color: red, font face: Arial Black. c. With first letter "dropped" (use drop cap option) of the first paragraph containing a picture at the right side d. Use three columns from the second paragraph onwards till the half of the page. e. Then use heading "Computer basics"

2	Create a Mathematical question paper using MS Word. at least five equations (C5: Synthesis) a. With fractions, exponents, summation function b. With at least one m*n matrix c. Basic mathematical and geometric operators. d. Use proper text formatting, page color and page border.
3	Create a flowchart using MS Word. (C5: Synthesis) a. Proper shapes like ellipse, arrows, rectangle, and parallelogram. b. Use grouping to group all the parts of the flowchart into one single object
4	Create a table using table menu with word. (C5: Synthesis) a. At least 5 columns and 10 rows. b. Merge the first row into one cell. c. Merge the second row into one cell, then split the second row into three cells
5	Create a table using MS excel "Student result" with following conditions. a. The heading must contain, Sl. No., Name, Mark1, Mark2, Mark3, Total, average and result with manual entry. (C5: Synthesis) b. Use formulas for total and average. c. Find the name of the students who has secured the highest and lowest marks. d. Round the average to the nearest highest integer and lowest integer (use ceiling and floor function respectively).
6	Do as directed using MS excel (C5: Synthesis) a. Create a notepad file as per the following fields Slno name th1 th2 th3 th4 th5 total % grade b. Import this notepad file into excel sheet using „data◊from text" option. c. Grade is calculated as, i. If %>=90, then grade A ii. If %>=80 and =70 and =60 and
7	Create a power-point presentation with minimum 5 slides. a. The first slide must contain the topic of the presentation and name of the presentation. (C5: Synthesis) b. Must contain at least one table. c. Must contain at least 5 bullets, 5 numbers. d. The heading must be, font size:32, font-face: Arial Rounded MT Bold, font-color: blue. e. The body must be, font size: 24, font-face: Comic Sans MS, font-color: green. f. Last slide must contain „thank you"
8	Create a power-point presentation with minimum 10 slides 24 (C5: Synthesis) a. Use word art to write the heading for each slides. b. Insert at least one clip-art, one picture c. Insert at least one audio and one video d. Hide at least two slides
9	Create a power-point presentation with minimum 5 slides a. Use custom animation option to animate the text; the text must move left to right one line at a time. (C5: Synthesis) b. Use proper transition for the slides.

10	Create a database using MS Access "Student" with. (C5: Synthesis) a. At least one table named "mark sheet" with field name "student name, roll number, mark1, mark2, mark3, mark4, total" b. The data types are, student name: text, roll number: number, mark1 to mark4: number, total: number. Roll number must be the primary key. c. Enter data in the table. The total must be calculated using update query. d. Use query for sorting the table according to the descending/ascending order of the total marks
11	With addition to the table above, (C5: Synthesis) a. Add an additional field "result" to the "mark sheet" table. b. Enter data for at least 10 students c. Calculate the result for all the students using update queries, if total>=200, then pass, else fail. d. Search the students, whose name starts with "sh". e. Show the names and total marks of the students who have passed the examination.
Note:	

Teaching - Learning Strategies and Contact Hours

Teaching - Learning Strategies	**Contact Hours**
Lecture	--
Practical	30
Seminar/Journal Club	--
Small group discussion (SGD)	20
Self-directed learning (SDL) / Tutorial	--
Problem Based Learning (PBL)	10
Case/Project Based Learning (CBL)	--
Revision	--
Others If any:	--
Total Number of Contact Hours	60

Assessment Methods:

Formative	**Summative**
Multiple Choice Questions (MCQ)	Mid Semester Examination 1,2, End term
Viva-voce	--
Objective Structured Practical Examination (OSPE)	University Examination
Quiz	Multiple Choice Questions (MCQ)

Seminars	Multiple Choice Questions (MCQ)
Problem-Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination (OSPE)

Mapping of Assessment with COs

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Quiz				
VIVA	✓	✓	✓	✓
Assignment / Presentation				
Unit test				
Practical Log Book/ Record Book	✓	✓	✓	✓
Mid-Semester Examination 1				
Mid-Semester Examination 2				
University Examination	✓	✓	✓	✓

Feedback Process	Student's Feedback

References:	1. Microsoft Word, Excel, and PowerPoint: Just for Beginners, 2015 2. Microsoft Excel Formulas & Functions For Dummies, 5ed, 2020.

SEMESTER - II

Course Code	Course Title
	Engineering Mathematics-II
	Engineering Physics-II
	Engineering Physics-II Lab
	Programming for Problem Solving
	Programming for Problem Solving Lab
	Minor Electives Course - II
	MGEC-II
	AECC-II
	VAC-II
	SEC-II
	Design Thinking and Innovation

FACULTY OF ENGINEERING AND TECHNOLOGY

Name of the Department	Computer science & engineering
Name of the Program	Bachelor of Technology
Course Code	
Course Title	**Engineering Mathematics-II**
Academic Year	I
Semester	II
Number of Credits	3
Course Prerequisite	NIL
Course Synopsis	Create and analyze mathematical models using first and higher order differential equations to solve application problems such as electrical circuits, orthogonal trajectories and Newton"s law of cooling and also familiarize the student in various topics in numerical analysis such as interpolation, numerical differentiation, integration and direct methods for solving linear system of equations.

Course Outcomes:

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

CO1	Demonstrate solutions to first order differential equations by various methods and solve basic application problem related to electrical circuits, orthogonal trajectors and Newton"s law of cooling.
CO2	Discriminate among the structure and procedure of solving a higher order differential equations with constant coefficients and variable coefficients
CO3	Apply various numerical methods to solve linear and non-linear equations
CO4	Familiar with numerical integration and differentiation

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PS O4
CO1	3	2	1	2	-	-	-	-	-	-	1	1	1	1	1	-
CO2	3	3	1	2	-	-	-	-	-	-	1	1	1	1	1	-
CO3	3	3	1	2	-	-	-	-	-	-	-	1	1	1	1	-
CO4	3	2	1	2	-	-	-	-	-	-	-	1	1	-	1	-

Aver age	3	1.7 5	1	2	-	-	-	-	-	-	0.5	1	1	0.75	1	-

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
3	-	-	3

Unit	Content and Competency
1	1.Define Linear differential equations with constant coefficients: Solutions of second and higher order differential equations inverse differential operator method. (C1: Knowledge) 2. Explain method of undetermined coefficients and method of variation of parameters. (C2: Comprehension)
2	1.Describe Linear differential equations with variable coefficients: Solution of Cauchy's and Legendre's linear differential equations. (C2: Comprehension) 2.Define Nonlinear differential equations - Equations solvable for p, equations solvable for y, equations solvable for x, general and singular solutions. (C1: Knowledge) 3.Implement Clairauit's equations and equations reducible to Clairauit's form. (C6: Evaluation)
3	1.Describe Partial Differential equations: Formulation of Partial differential equations by elimination of arbitrary constants/functions. (C2: Comprehension) 2.Solution of non-homogeneous Partial differential equations by direct integration. (C6: Evaluation) 3.Solution of homogeneous Partial differential equations involving derivative with respect to one independent variable only. (C6: Evaluation) 4.Derivation of one dimensional heat and wave equations and their solutions by variable separable method. (C6: Evaluation)
4	1.Explain Double and triple integrals: Evaluation of double and triple integrals. (C2: Comprehension) 2.Evaluation of double integrals by changing the order of integration and by changing into polar co-ordinates. (C6: Evaluation) 3.Application of double and triple integrals to find area and volume. (C3: Application) 4.Describe Beta and Gamma functions: definitions, Relation between beta and gamma functions and simple problems. (C2: Comprehension)

Teaching Learning Strategies and Contact Hours

Learning Strategies	Contact Hours
Lecture	32
Practical	
Seminar/Journal Club	2
Small group discussion (SGD)	2
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓

Feedback Process	Student's Feedback

References:	Textbooks: 1. B. S. Grewal "Higher Engineering Mathematics" 44/e, Khanna Publishers, 2017. 2. Erwin Kreyszig "Advanced Engineering Mathematics" 10/e, John Wiley& Sons, 2011.
	References: 1. R.K. Jain and S. R.K.Iyengar "Advanced Engineering Mathematics" 3/e, Alpha Science International Ltd., 2002. 2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas "Calculus" 13/e, Pearson Publishers, 2013

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer science & engineering
Name of the Program	B. Tech.
Course Code	
Course Title	**Engineering Physics-II**
Academic Year	I
Semester	II
Number of Credits	2
Course Prerequisite	NIL
Course Synopsis	**Engineering Physics-I**

Course Outcomes:

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

CO1	Gain knowledge of the different Crystal Structures and X-ray Diffraction processes which are commonly employed in the industry.
CO2	Gain Knowledge of the basics Electromagnetic Theory.
CO3	Get practical knowledge of the Band Theory of Solids. Also, able to study and analyse different semiconductors.
CO4	Gain Knowledge of the basics of Physics of some technologically important Materials and

	able to design their own components.

Mapping of Course Outcomes (COs) to Program Outcomes (POs)& Program Specific Outcomes:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	1	2	-	3	1	-	-	-	-	-	1	3	2	1
CO2	3	2	2	-	-	1	-	-	-	-	2	3	3	2	-
CO3	3	2		-	-	-	-	-	-	-	1	3	3	2	-
CO4	3	2	3	3	1	-	-	-	-	-	2	3	3	2	1
Average	3.0	1.8	2.3	0.8	1.0	0.5	-	-	-	-	1.3	2.5	3.0	2.0	0.5

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
2	0	0	2

Unit	Content & Competency
1	1. Overview of Space lattice, Unit cell, Lattice parameter, Seven crystal systems and Fourteen Bravais lattices. (C1: Knowledge) 2. Explain Atomic radius and Packing factor of different cubic structures. (C1: Knowledge) 3. Identifying Crystal structure of NaCl and diamond. (C2: Comprehension) 4. Lattice planes and Miller Indices. (C2: Comprehension - C4: Analysis) 5. Diffraction of X-rays by crystal, Laue's experiment, Bragg's Law, Bragg's spectrometer. (C2: Comprehension - C4: Analysis) 6. Compton Effect. (C1: Knowledge -C3) 7. Dielectric Properties: Dielectric constant and Polarization of dielectric materials. (C2: Comprehension) 8. Relation between E, D and P, Types of Polarization (Polarizability). (C1: Knowledge) 9. Equation of internal fields in liquid and solid (One- Dimensional). (C2: Comprehension) 10. Claussius-Mossotti equation. (C1: Knowledge) 11. Frequency dependence of dielectric constan. (C1: Knowledge) 12. Dielectric Losses, Important applications of dielectric material, (C1: Knowledge) 13. Explain Ferroelectricity, Piezoelectricity. (C2: Comprehension)
2	1. Magnetic Properties: Magnetization, Origin of magnetic moment, Dia, para and ferro magnetism (C3: Application) 2. Langevin's theory for diamagnetic material. Phenomena of hysteresis and its applications.(C4: Analysis)

	3. Equation of continuity. Maxwell's Equations (Integral and Differential Forms) and its derivations. (C1: Knowledge) 4. Displacement Current. Poynting vector and Poynting theorem. (C4: Analysis) 5. EM - Wave equation and its propagation characteristics in free space, non-conducting and conducting media, energy density of electromagnetic wave. Skin depth. (C1: Knowledge - C3: Application) 6. Introduction to glass cutting techniques (C2: Comprehension)
3	1. Overview of Free electron Theory. Formation of bands in Solids. (C1: Knowledge) 2. Classification of solids on band theory. (C1: Knowledge) 3. Define Density of states. (C2: Comprehension) 4. Explain Fermi-Dirac distribution. (C2: Comprehension) 5. Explain the Concept of effective mass, Charge carrier density (electrons and holes). (C2: Comprehension) 6. Define the Conductivity of semiconductors, carrier concentrations Fermi energy. (C1: Knowledge) 7. Position of Fermi level in intrinsic and in extrinsic semiconductors. Temperature dependence of conductivity in semiconductors. (C1: Knowledge)
4	1. Superconductors: Temperature dependence of resistivity in superconducting materials. (C2: Comprehension) 2. Define Effect of magnetic field (Meissner effect). (C1: Knowledge) 3. Define Temperature dependence of critical field. (C1: Knowledge) 4. Define London equations. (C1: Knowledge) 5. Define Josephson theory. (C1: Knowledge) 6. Define persistent currents. (C1: Knowledge) 7. Explain Type I and Type II superconductors. (C2: Comprehension) 8. Define BCS theory (Qualitative). (C1: Knowledge) 9. Explain High temperature superconductors and Applications of Super-conductors. (C2: Comprehension) 10. Nano-Materials: Basic principle of nanoscience and technology, structure, properties and uses of Fullerene. (C2: Comprehension) 11. Carbon nanotubes Single and double walled nanotubes, synthesis of nanotubes, Properties and Applications of nanotubes. (C2: Comprehension)

Teaching Learning Strategies and Contact Hours

Learning Strategies	**Contact Hours**
Lecture	20
Practical	
Seminar/Journal Club	1
Small group discussion (SGD)	1
Self-directed learning (SDL) / Tutorial	2
Problem Based Learning (PBL)	2

Case/Project Based Learning (CBL)	2
Revision	2
Others If any:	
Total Number of Contact Hours	30

Assessment Methods:

Formative	**Summative**
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Mapping of Assessment with COs

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Quiz				
Assignment / Presentation	✓	✓	✓	✓
Unit test				
Mid-Semester Examination 1	✓	✓	✓	✓
Mid-Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓

Feedback Process	1. Student's Feedback 2. Course Exit Survey

Students Feedback is taken through various steps

1. Regular feedback through Mentor Mentee system.
2. Feedback between the semester through google forms.
3. Course Exit Survey will be taken at the end of semester.

References:	1. Concept of Modern Physics - by Beiser (Tata Mc-Graw Hill) 2. Solid State Physics - by C. Kittel, 7th edition (Wiley Eastern) 3. Materials Science and Engineering - by V. Raghavan (Prentice- Hall India) 4. Solid State Physics - by S.O. Pillai. 5th edition (New Age International)

FACULTY OF ENGINEERING AND TECHNOLOGY

Name of the Department	Computer science & engineering
Name of the Program	B. Tech.
Course Code	
Course Title	**Engineering Physics-II Lab**
Academic Year	I
Semester	II
Number of Credits	1
Course Prerequisite	NIL
Course Synopsis	Engineering Physics I

Course Outcomes:

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

CO1	Gain knowledge of the different Crystal Structures and X-ray Diffraction processes which are commonly employed in the industry.
CO2	Gain Knowledge of the basics Electromagnetic Theory.
CO3	Get practical knowledge of the Band Theory of Solids. Also, able to study and analyse different semiconductors.
CO4	Gain Knowledge of the basics of Physics of some technologically important Materials and able to design their own components.

Mapping of Course Outcomes (COs) to Program Outcomes (POs)& Program Specific Outcomes:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	1	2	-	3	1	-	-	-	-	-	1	3	2	1
CO2	3	2	2	-	-	1	-	-	-	-	2	3	3	2	-
CO3	3	2		-	-	-	-	-	-	-	1	3	3	2	-
CO4	3	2	3	3	1	-	-	-	-	-	2	3	3	2	1
Average	3.0	1.8	2.3	0.8	1.0	0.5	-	-	-	-	1.3	2.5	3.0	2.0	0.5

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
0	0	2	2

Sr. No.	Content & Competency
1	To calibrate the given ammeter and voltmeter by potentiometer. (C1: Knowledge) (C3: Application)
2	To study the Hall effect and determine Hall coefficient, carrier density and - mobility of a given semiconductor using Hall effect set up. (C1: Knowledge) (C3: Application)
3	To determine the energy band gap of a given semiconductor material. (C1: Knowledge) (C3: Application)
4	To determine E.C.E. of copper using Tangent or Helmholtz galvanometer. (C1: Knowledge) (C3: Application)
5	To draw hysteresis curve of a given sample of ferromagnetic material and from - this to determine magnetic susceptibility and permeability of the given specimen.
6	To determine the ballistic constant of a ballistic galvanometer.
7	To determine the coefficient of viscosity of a liquid.
8	Measurement of fiber attenuation and aperture of fiber.
9	High resistance by leakage method.
10	Magnetic Susceptibility of paramagnetic solution.
Note:	1. At least ten experiments/ jobs are to be performed/ prepared by students in the semester. 2. At least 8 experiments/ jobs should be performed/prepared from the above list, the remaining two may either be performed/prepared from the above list or designed and set as per the scope of the syllabus of the Engineering Physics II.

Teaching - Learning Strategies and Contact Hours

Teaching - Learning Strategies	Contact Hours
Lecture	--
Practical	30
Seminar/Journal Club	--
Small group discussion (SGD)	20
Self-directed learning (SDL) / Tutorial	--
Problem Based Learning (PBL)	10
Case/Project Based Learning (CBL)	--
Revision	--
Others If any:	--
Total Number of Contact Hours	60

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	--
Viva-voce	Practical Examination & Viva-voce
Objective Structured Practical Examination (OSPE)	University Examination
Quiz	--
Seminars	--
Problem Based Learning (PBL)	--
Journal Club	--

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz				
VIVA	✓	✓	✓	✓
Assignment / Presentation				
Unit test				
Practical Log Book/ Record Book	✓	✓	✓	✓
Mid-Semester Examination 1				
Mid-Semester Examination 2				
University Examination	✓	✓	✓	✓

Feedback Process	1. Student's Feedback 2. Course Exit Survey

Students Feedback is taken through various steps

1. Regular feedback through the Mentor Mentee system.
2. Feedback between the semester through google forms.
3. Course Exit Survey will be taken at the end of the semester.

References:	1. Concept of Modern Physics - by Beiser (Tata Mc-Graw Hill) 2. Solid State Physics - by C. Kittel, 7th edition (Wiley Eastern) 3. Materials Science and Engineering - by V. Raghavan (Prentice- Hall India) 4. Solid State Physics - by S.O. Pillai, 5th edition (New Age International)

	5. Introduction to Electrodynamics - by David J. Griffith (PH I) 6. Engineering Physics- C. Mani Naidu(Pearson) 7. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New Delhi)

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer science & engineering
Name of the Program	Bachelor of Technology
Course Code	
Course Title	**Programming for problem solving**
Academic Year	I
Semester	II
Number of Credits	2
Course Prerequisite	NIL
Course Synopsis	Understand various computer components.

Course Outcomes:

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

CO1	Understand various computer components. design flowchart and write program in C programming language.
CO2	Identify and represent numbers in different number system.
CO3	Understand, explain and use different data types and operators to write programs.
CO4	Formulate, evaluate and analyze the problems by applying programming concepts using decision control statements and loop control statements.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PS O4
CO1	3	1	1	1	-	1	-	-	-	-	-	1	**1**	1	**1**	-
CO2	3	1	-	-	-	1	-	-	-	-	-	-	**1**	1	**1**	-
CO3	3	1	-	1	-	1	-	-	-	-	-	-	**1**	1	**1**	-
CO4	3	2	1	2	2	1	-	-	3	-	1	-	**1**	1	**1**	-

Aver age	3	1.2 5	0.5	1	0.5	1	-	-	0.7 5	-	0.5	0.5	1	1	1	-

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
2	-	-	2

Unit	Content and Competency
1	1.Explain the Operating System [Unix, Linux, Windows]. (C2: Comprehension) 2. Explain the Programming Environment, and Write & Execute the first program. (C2: Comprehension) 3. Recall the purpose Digital Computer. (C1: Knowledge) 4. Recite the concept of an algorithm, their termination and correctness. (C1: Knowledge) 5. Analyze Algorithms to programs: specification, top-down development and stepwise refinement. (C4: Analysis) 6. Analyze Programming. Use of high level programming language for the systematic development of programs. (C4: Analysis) 7.Design and implementation of correct, efficient and maintainable programs. (C5: Synthesis) 8.Discribe number systems and conversion methods. (C2: Comprehension)
2	1.Generalize the concept of Standard I/O in "C". (C5: Synthesis) 2. Explain the concepts of Data Types: Character types, Integer, short, long, unsigned, single and double-precision floating point. (C2: Comprehension) 3. Define storage classes: automatic, register, static and external. (C2: Comprehension) 4. Analyze the Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, and Bit operations. (C4: Analysis)
3	1. Explain the concepts of Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch. (C2: Comprehension) 2. Recall the purpose and importance of Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue. (C1: Knowledge) 3. Describe Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules. (C2: Comprehension)

	4. Outline the purpose and significance of Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size. (C1: Knowledge) 5. Explain the principles of Structures: usage of structures, declaring structures, and assigning of structures. (C2: Comprehension)
4	1. Recall the purpose and basic functions of Pointers to Objects using pointers as function arguments. (C1: Knowledge) 2. Explain the principles of Dynamic memory allocation. (C2: Comprehension) 3. Generalize the concept of Standard C Preprocessor. (C5: Synthesis) 4.Defining and calling macros. (C2: Comprehension) 5.Explain Standard C Library: Input/Output : fopen, fread, etc, string handling functions, Math functions : log, sin, alike Other Standard C functions. (C2: Comprehension)

Teaching Learning Strategies and Contact Hours

Learning Strategies	Contact Hours
Lecture	20
Practical	
Seminar/Journal Club	1
Small group discussion (SGD)	1
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	1
Revision	4
Others If any:	
Total Number of Contact Hours	30

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)

Journal Club	Long Answer Question (LAQ)

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓
Feedback Process	Student's Feedback			

References:	Textbooks: 1. B. S. Grewal "Higher Engineering Mathematics" 44/e, Khanna Publishers, 2017. 2. Erwin Kreyszig "Advanced Engineering Mathematics" 10/e, John Wiley& Sons, 2011.
	References: 1. R.K. Jain and S. R.K.Iyengar "Advanced Engineering Mathematics" 3/e, Alpha Science International Ltd., 2002. 2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas "Calculus" 13/e, Pearson Publishers, 2013

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer science & engineering
Name of the Program	B. Tech.
Course Code	
Course Title	**Programming for problem solving Lab**
Academic Year	I
Semester	II

Number of Credits	2
Course Prerequisite	NIL
Course Synopsis	Understand the concept of C programming language.

Course Outcomes:

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

CO1	Understand various computer components, design flowchart and write program in C programming language.
CO2	Identify and represent numbers in different number system.
CO3	Understand, explain and use different data types and operators to write programs.
CO4	Formulate, evaluate and analyze the problems by applying programming concepts using decision control statements and loop control statements.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	POI 1	PO 12	PSO 1	PSO 2	PS O3	PS O4
CO1	3	1	2	-	3	1	-	-	-	-	-	1	3	2	1	-
CO2	3	2	2	-	-	1	-	-	-	-	2	3	3	2	-	-
CO3	3	2		-	-	-	-	-	-	-	1	3	3	2	-	-
CO4	3	2	3	3	1	-	-	-	-	-	2	3	3	2	1	-
Average	3.0	1.8	2.3	0.8	1.0	0.5	-	-	-	-	1.3	2.5	3.0	2.0	0.5	-

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
0	**0**	**4**	**4**

Content & Competency

Sr. No.	Title	
1	a) Write a C program to find sum and average of three numbers. (C1: Knowledge) b) Write a C program to find the sum of individual digits of a given positive integer. (C1: Knowledge)	
2	a) Write a C program to generate the first n terms of the Fibonacci sequence. (C1: Knowledge) b) Write a C program to generate prime numbers from 1 to n. (C1: Knowledge) c) Write a C program to check whether given number is Armstrong Number or not.	

	(C1: Knowledge)
3	a) Write a C program to check whether given number is perfect number or not. (C1: Knowledge) b) Write a C program to check whether given number is strong number or not. (C1: Knowledge)
4	a) Write a C program to find the roots of a quadratic equation. (C1: Knowledge) b) Write a C program to perform arithmetic operations using switch statement. (C1: Knowledge)
5	a) Write a C program to find factorial of a given integer using non-recursive function. (C1: Knowledge) b) Write a C program to find factorial of a given integer using recursive function. (C1: Knowledge)
6	a) Write C program to find GCD of two integers by using recursive function. b) Write C program to find GCD of two integers using non-recursive function.
7	a) Write a C program to find both the largest and smallest number in a list of integers. (C1: Knowledge) b) Write a C program to Sort the Array in an Ascending Order. (C1: Knowledge) c) Write a C program to find whether given matrix is symmetric or not. (C1: Knowledge)
8	a) Write a C program to perform addition of two matrices. (C1: Knowledge) b) Write a C program that uses functions to perform multiplication of two Matrices. (C1: Knowledge)
9	a) Write a C program to use function to insert a sub-string in to given main string from a given position. (C1: Knowledge) b) Write a C program that uses functions to delete n Characters from a given position in a given string. (C1: Knowledge)
10	a) Write C program to count the number of lines, words and characters in a given text. (C1: Knowledge) b) Write a C program to find the sum of integer array elements using pointers. (C1: Knowledge)
11	a) Write a C program to Calculate Total and Percentage marks of a student using structure. (C1: Knowledge)
Note:	

Teaching - Learning Strategies and Contact Hours

Teaching - Learning Strategies	**Contact Hours**
Lecture	--
Practical	30

Seminar/Journal Club	--
Small group discussion (SGD)	20
Self-directed learning (SDL) / Tutorial	--
Problem Based Learning (PBL)	10
Case/Project Based Learning (CBL)	--
Revision	--
Others If any:	--
Total Number of Contact Hours	60

Assessment Methods:

Formative	**Summative**
Multiple Choice Questions (MCQ)	--
Viva-voce	Practical Examination & Viva-voce
Objective Structured Practical Examination (OSPE)	University Examination
Quiz	--
Seminars	--
Problem Based Learning (PBL)	--
Journal Club	--

Mapping of Assessment with COs

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Quiz				
VIVA	✓	✓	✓	✓
Assignment / Presentation				
Unit test				
Practical Log Book/ Record Book	✓	✓	✓	✓
Mid-Semester Examination 1				
Mid-Semester Examination 2				
University Examination	✓	✓	✓	✓

Feedback Process	Student's Feedback
Students Feedback is taken through various steps 1. Regular feedback through the Mentor Mentee system. 2. Feedback between the semester through google forms. Course Exit Survey will be taken at the end of the semester.	
References:	Textbooks: 1. B. S. Grewal "Higher Engineering Mathematics" 44/e. Khanna Publishers. 2017. 2. Erwin Kreyszig "Advanced Engineering Mathematics" 10/e, John Wiley& Sons, 2011.
	References: 1. R.K. Jain and S. R.K.Iyengar "Advanced Engineering Mathematics" 3/e. Alpha Science International Ltd., 2002. 2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas "Calculus" 13/e. Pearson Publishers, 2013

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer Science & Engineering
Name of the Program	B. Tech.
Course Code	
Course Title	**Design Thinking and Innovation**
Academic Year	I
Semester	II
Number of Credits	2
Course Prerequisite	NIL
Course Synopsis	Design Thinking and Innovation is a practical course that introduces students to the principles and methodologies of design thinking, a human-centred approach to problem-solving. This course explores the process of identifying and solving complex problems, fostering creativity, and promoting innovation. Through hands-on exercises, projects, and case studies, students will deeply understand design thinking principles and gain practical skills to apply them in various contexts.
Course Outcomes: At the end of the course, students will be able to:	

CO1	Apply design thinking principles to generate innovative ideas and solutions.
CO2	Differentiate between traditional problem-solving and design thinking approaches.
CO3	Understand the different stages of the design thinking process and apply them in real-world scenarios.
CO4	Create prototypes for complex problems and validate them with the users.

Mapping of Course Outcomes (COs) to Program Outcomes (POs)& Program Specific Outcomes:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO3
CO1	2	3	3	-	3	3	-	-	-	-	3	1	3	2	1
CO2	2	3	2	-	-	2	-	-	-	-	2	3	3	2	2
CO3	2	3	2	-	-	3	-	-	-	-	1	3	3	2	2
CO4	2	3	3	3	3	2	-	-	-	-	2	3	3	2	1
Average	2	3	2.5	0.8	1.5	2.5	-	-	-	-	2	2.5	3.0	2.0	1.5

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
0	**0**	**4**	**4**

Sr. No.	Content & Competency
1	1. Introduction to Design Thinking (Week 1-2) • Understanding the concept of Design Thinking and its significance (C1) • Exploring the role of Design Thinking in problem-solving and innovation (C1) 2. Different Stages of Design Thinking (C2) • Empathize: Understanding the importance of empathy in the design process (C2) • Define: Defining the problem statement and framing the design challenge (C2) • Ideate: Generating creative ideas and exploring multiple solutions (C2) • Prototype: Building tangible representations of ideas (C2) • Test: Iteratively testing and refining prototypes to gather feedback (C2) 3. Problems Solved using Design Thinking (C2-C3) • Identifying the types of problems that can benefit from Design Thinking (C2) • Analyzing how Design Thinking can be applied across various industries and disciplines (C3) 4. Case Studies and Videos (C3-C4) • Reviewing case studies illustrating the application of Design Thinking in real-world scenarios (C3) • Watching videos showcasing Design Thinking processes and outcomes (C3)

2	Empathize and Define (Week 3-4) 1. Techniques to Understand and Empathize with Users' Needs (C2) • Conducting user interviews and observations (C2) • Applying active listening and empathy techniques (C2) • Engaging in participatory design activities (C2) • Analyzing user feedback and insights (C2) 2. Key Points for Defining the Problem Statement (C3) • Understanding the importance of a well-defined problem statement (C3) • Identifying the key elements of a problem statement (C3) • Focusing on user needs and desired outcomes (C3) • Formulating clear and concise problem statements (C3) 3. Creating User Personas and Customer Journey Maps (C3) • Developing user personas based on research and insights (C3) • Mapping the customer journey to understand the user experience (C3) • Analyzing pain points and opportunities for improvement (C3) • Incorporating personas and journey maps into the design process (C3) 4. Hands-on Activities and Case Studies (C4) • Engaging in hands-on activities to apply user-centered design techniques (C4) • Analysing and discussing case studies illustrating successful user-centred design (C4) • Collaborating on design challenges and problem-solving exercises (C4) • Reflecting on lessons learned and applying insights to real-world scenarios (C4)
3	Ideation (Week 5-6) 1. Methods to Brainstorm Ideas and Approaches (C2) • Understanding the importance of brainstorming in the ideation process (C2) • Exploring different brainstorming techniques, such as free association, mind mapping, and SCAMPER (C2) • Stimulating creativity through techniques like analogies, random word associations, and reverse thinking (C2) • Fostering a collaborative and inclusive brainstorming environment (C2) 2. Using Criteria to Select the Best Ideas and Approaches (C3) • Defining evaluation criteria based on project goals, user needs, and feasibility (C3) • Applying decision matrices or scoring systems to compare and prioritize ideas (C3) • Conducting effective group discussions and consensus-building to select the best ideas (C3) • Considering the potential impact, viability, and alignment with project constraints (C3) 3. Hands-on Activities and Creativity Techniques (C3) • Engaging in hands-on activities, such as design challenges and ideation exercises (C3) • Applying creativity techniques like SCAMPER, mind mapping, random

	stimuli, and role reversal (C3) • Stimulating divergent thinking through techniques like brainstorming variations and quantity-focused exercises (C3) • Encouraging experimentation and risk-taking to foster creative thinking (C3) 4. Practice Sessions and Case Study Discussions (C4) • Participating in practice sessions to apply brainstorming and idea selection techniques (C4) • Analyzing and discussing case studies showcasing successful ideation and innovation (C4) • Reflecting on lessons learned and applying insights to real-world challenges (C4) • Collaborating with peers in group activities to share ideas and feedback (C4)
4	Prototype & Test (Week 7-10) 1. Designing a Prototype (C2) • Understanding the purpose and benefits of prototyping in the design process (C2) • Selecting appropriate prototyping methods based on project goals and constraints (C2) • Creating low-fidelity prototypes using paper, cardboard, or digital tools (C2) • Developing high-fidelity prototypes using software, 3D printing, or other relevant tools (C2) 2. Approaches to Testing and Validating the Prototype (C3) • Defining objectives and research questions for prototype testing (C3) • Conducting user testing sessions to gather feedback and insights (C3) • Employing methods such as usability testing, A/B testing, and surveys (C3) • Iteratively refining and improving the prototype based on user feedback (C3) 3. Hands-on Activities and Design Exercises (C3) • Engaging in hands-on activities to create prototypes and iterate designs (C3) • Participating in design exercises that simulate real-world challenges (C3) • Collaborating with peers to gather feedback and iterate on designs (C3) • Applying design principles and user-centered approaches in prototype development (C3) 4. Class Presentation of Prototypes (C4) • Preparing a comprehensive presentation of the prototype, design process, and user feedback (C4) • Showcasing the functionality, usability, and value of the prototype (C4) • Engaging in class discussions and receiving feedback from peers and instructors (C4) • Reflecting on the design decisions and lessons learned throughout the prototyping process (C4)
5	Implementation Challenges (Week 11-12) 1. Overcoming Implementation Challenges (C2) • Identifying common challenges and barriers when implementing design thinking (C2)

	• Developing strategies to overcome resistance and skepticism (C2) • Creating a supportive organizational culture for design thinking adoption (C2) • Addressing resource constraints and time limitations (C2) 2. Collaborative Approaches to Implement Design Thinking (C3) • Promoting cross-functional collaboration and teamwork (C3) • Establishing multidisciplinary design teams for diverse perspectives (C3) • Adopting co-creation and participatory approaches (C3) • Encouraging open communication and knowledge sharing (C3) 3. Evaluation Techniques (C3) • Defining evaluation criteria and metrics for design thinking initiatives (C3) • Conducting qualitative and quantitative assessments of design thinking outcomes (C3) • Using feedback loops and iterative improvement cycles (C3) • Incorporating user feedback and stakeholder perspectives in the evaluation process (C3) 4. Case Study Discussion (C4) • Analyzing and discussing case studies showcasing successful design thinking implementation (C4) • Extracting lessons learned and best practices from real-world examples (C4) • Applying insights from case studies to identify opportunities and strategies for implementation (C4) • Engaging in group discussions to reflect on challenges and potential solutions (C4)
6	Innovation in Design Thinking (Week 13-14) 1. Identifying Innovation in Design Thinking (C2) • Understanding the role of innovation in design thinking processes (C2) • Identifying innovative solutions and approaches in real-world design cases (C2) • Analyzing design thinking projects for their innovative aspects (C2) • Recognizing the impact of innovation on user experiences and business outcomes (C2) 2. Staying Curious and Seeking New Insights and Ideas (C3) • Cultivating a mindset of curiosity and openness to new perspectives (C3) • Actively seeking diverse sources of inspiration and knowledge (C3) • Applying techniques such as active listening, asking questions, and conducting research (C3) • Embracing a continuous learning approach to stay updated on emerging trends (C3) 3. Techniques to Enhance Creativity and Overcome Obstacles (C3) • Exploring techniques for idea generation, such as brainstorming, mind mapping, and SCAMPER (C3) • Overcoming creative blocks and fostering a positive mindset (C3) • Embracing experimentation and risk-taking to explore unconventional ideas (C3) • Applying problem-solving frameworks to address obstacles and challenges (C3) 4. Assignment Forum Discussion (C4) • Engaging in assignment forums to discuss innovation-related topics (C4)

	• Sharing perspectives, insights, and experiences with fellow students (C4) • Providing feedback and constructive criticism to peers (C4) • Reflecting on and refining ideas through discussions and collaborative learning (C4)
7	Final Project Presentation (Week 15) 1. Presentation of Final Project (C4) • Preparing a comprehensive presentation of the final design thinking project (C4) • Demonstrating the design process, key insights, and solutions (C4) • Showcasing the impact and value of the project for users and stakeholders (C4) • Engaging the audience through effective storytelling and visual aids (C4) 2. Collecting Feedback and Evaluation Techniques (C4) • Implementing techniques to collect constructive feedback on the project (C4) • Conducting peer reviews and evaluations to gather diverse perspectives (C4) • Incorporating feedback to refine and improve the project (C4) • Using evaluation criteria to assess the effectiveness of the project (C4) 3. Final Course Evaluation (C3) • Reflecting on the learning outcomes and achievements of the entire course (C3) • Assessing personal growth and development in design thinking skills (C3) • Identifying strengths, areas for improvement, and future learning goals (C3) • Providing an overall evaluation of the course structure, content, and delivery (C3) 4. Final Course Feedback Form (C2) • Engaging in a structured feedback process to provide input on the course (C2) • Sharing suggestions, comments, and recommendations for improvement (C2) • Offering insights on the effectiveness of the course materials and learning activities (C2) • Contributing to the continuous improvement of the design thinking program (C2)

Teaching - Learning Strategies and Contact Hours

Teaching - Learning Strategies	Contact Hours
Lecture	--
Practical	15
Seminar/Journal Club	--
Small group discussion (SGD)	15
Self-directed learning (SDL) / Tutorial	--
Problem Based Learning (PBL)	15
Case/Project Based Learning (CBL)	15
Revision	--

Others If any:	--
Total Number of Contact Hours	60

Assessment Methods:

Formative	**Summative**
Multiple Choice Questions (MCQ)	--
Viva-voce	Practical Examination & Viva-voce
Objective Structured Practical Examination (OSPE)	University Examination
Quiz	--
Seminars	--
Problem Based Learning (PBL)	--
Journal Club	--

Mapping of Assessment with COs

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Quiz				
VIVA	✓	✓	✓	✓
Assignment / Presentation				
Unit test				
Practical Log Book/ Record Book	✓	✓	✓	✓
Mid-Semester Examination 1				
Mid-Semester Examination 2				
University Examination	✓	✓	✓	✓

Feedback Process	Student's Feedback

Students Feedback is taken through various steps

- Regular feedback through the Mentor Mentee system.
- Feedback between the semester through google forms.

Course Exit Survey will be taken at the end of the semester.

References:	(List of reference books)
	1. Innovation By Design by Chakravarthy, Battula Kalyana, and

	JanakiKrishnamoorthy. Springer India. 2013. ISBN 978-81-322-0901-0 2. Innovation by Design: How Any Organization Can Leverage Design Thinking to Produce Change. Drive New Ideas. and Deliver Meaningful Solutions by Thomas Lockwood. New Page Books. US: 1st edition (28 November 2017). ISBN: 1632651165. 3. Innovation by Design by Gerard Gaynor. Amacom. A Division of American Management Associ135 West 50th Street New York. NY. United States. ISBN:978-0-8144-0696-0

9. MAPPING OF COURSE OUTCOMES, PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Sem	Course Code	Course Title	C	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
I		Engineering Mathematics-I	3	3	1.75	1	1	0.5	-	-	-	-	-	1	1	1	-	1	-
I		Basics of Electrical & Electronics Engineering	3	3	2	1	-	0.75	1	1	-	-	-	-	2	1	0.25	0.5	-
I		Basics of Electrical & Electronics Engineering Lab	1	2	0.75	1	0.75	3	-	-	-	-	2	-	-	3.0	2.0	1	
I		Engineering Physics-I	1	2	0.75	1	0.75	3	-	-	-	-	2	-	-	3.0	2.0	1	-
I		Engineering Physics-I Lab	2	2	0.75	1	0.75	3	-	-	-	-	2	-	-	3.0	2.0	1	-
I		New age Skill	2	2	1	1	0.75	3	-	-	-	-	2	1	1	3.0	2.0	1	-
II		Engineering Mathematics-II	3	3	1.75	1	2	-	-	-	-	-	-	0.5	1	1	0.75	1	-
II		Engineering Physics-II	1	3.0	1.8	2.3	0.8	1.0	0.5	-	-	-	-	1.3	2.5	3.0	2.0	0.5	-
II		Engineering Physics-II Lab	2	3.0	1.8	2.3	0.8	1.0	0.5	-	-	-	-	1.3	2.5	3.0	2.0	0.5	-
II		Programming for Problem Solving	2	3	1.25	0.5	1	0.5	1	-	-	0.75		0.5	0.5	1	1	1	-
II		Programming for Problem Solving Lab	2	3.0	1.8	2.3	0.8	1.0	0.5	-	-	-	-	1.3	2.5	3.0	2.0	0.5	-
II		Design Thinking and Innovation	2	2	3	2.5	0.8	1.5	2.5	-	-	-	-	2	2.5	3.0	2.0	1.5	-
Average			2	2.6	1.5	1.4	0.9	1.7	1.0	1.0	-	0.8	2.0	1.1	1.7	2.3	1.6	0.9	-

Note: C-Credits

Annexure

(Bachelor of Technology in Computer Science & Engineering/Bachelor of Technology in Computer Science & Engineering(Cyber Security/ Data Science/Block Chain/Cloud Computing/Gaming & Augmented Reality)

Course Plan

Course Title:			Course Code:		
Total Credits:	L	T	P	CL	Hour/Week
Course Content:					

Unit	Content	No. of Hours	Mode of Delivery
1			
2			
3			
4			
5			
6			
	Total Hours		

Note – L: Lecture Hour/week, T: Tutorial Hour/week, P: Practical Hour/week, CL: Clinical Hour/week,

Exit Point

Certification Course in Bachelor of Technology in Computer Science & Engineering/Bachelor of Technology in Computer Science & Engineering (iOS and Mobile Applications/Artificial Intelligence & Machine learning). At the end of first year the student can work as designer either as a freelancer.

Entry Point

Three years Diploma or One-year Certification Course in Computer Science & Engineering and in lieu of Industrial Internship of 4-6 weeks student has to complete MOOC Course of 4-6 weeks (1 Credit) in 3rd semester.

Value Added Courses

Course Code	Course Title
VAC (Odd Sem)	
	Applied Artificial Intelligence
VAC (Even Sem)	
	Applied Cloud Computing

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer science and engineering
Name of the Program	Bachelor of Technology
Course Code	
Course Title	**Applied Artificial Intelligence**
Academic Year	2023-2027
Semester	
Number of Credits	2
Course Prerequisite	A course on "Design and Analysis of Algorithms"
Course Synopsis	To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities

Course Outcomes:

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

CO1	Possess the skill for representing knowledge using the appropriate technique for a given problem.
CO2	Possess the ability to apply AI techniques to solve problems of game playing
CO3	Understand the concepts of computational intelligence.
CO4	Understand the Neural Networks and its usage.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	1	1	1	1	1	_	_	1	1	1	1	_	_
CO2	3	2	1	2	-	1	-	1	_	_	1	1	1	1	_	_
CO3	3	2	1	1	1	-	-	1	_	_	1	1	1	1	_	_
CO4	3	2	1	2	_	_	_	_	_	_	_	1	1	_	_	_
Average	3	2	1	1.5	0.5	0.5	0.25	0.75	_	_	0.75	1	1	0.75	_	_

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
2	-	-	2

Unit	Content and Competency
1	1.Explain Problem Solving by Search-I. (C2: Comprehension) 2. Define Intelligent Agents Problem Solving by Search –II: Problem-Solving Agents. Searching for Solutions. (C1: Knowledge) 3. Recall the purpose and importance of Uninformed Search Strategies: Breadth-first search, Uniform cost search. Depth-first search. Iterative deepening Depth-first search. Bidirectional search. (C1: Knowledge) 4. Explain Informed (Heuristic) Search Strategies: Greedy best-first search. A* search. Heuristic Functions, Beyond Classical Search: Hill-climbing search. Simulated annealing search, Local Search in Continuous Spaces. Searching with Non-Deterministic Actions, Searching wih Partial Observations. Online Search Agents and Unknown Environment. (C2: Comprehension)
2	1. Analyze the Artificial Neural Networks-I- Introduction, neural network representation, appropriate problems for neural network learning, perceptions. multilayer networks and the back-propagation algorithm. (C4: Analysis)

	2. Analyze the Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks. (C4: Analysis) 3.Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms. (C6: Evaluation)
3	1. Generalize the concept of Bayesian learning –Bayes theorem and concept learning. (C5: Synthesis) 2. Explain the Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm. (C2: Comprehension) 3. Describe the Computational learning theory, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning. (C2: Comprehension) 4. Recall the Instance-Based Learning- Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning. (C1: Knowledge)
4	1. Explain the principles and mechanisms of Genetic Algorithms an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms. (C2: Comprehension) 2. Analyze the Learning Sets of Rules, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution. (C4: Analysis) 3. Describe Combining Inductive and Analytical Learning, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis. (C1: Knowledge)

Teaching Learning Strategies and Contact Hours

Learning Strategies	Contact Hours
Lecture	20
Practical	-
Seminar/Journal Club	1
Small group discussion (SGD)	1
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	1
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	-
Total Number of Contact Hours	30

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓

Feedback Process	Student's Feedback
References:	Textbooks: 1. Artificial Intelligence A Modern Approach, Third Edition. Stuart Russell and Peter Norvig, Pearson Education.
	References: 1. Artificial Intelligence, 3rd Edn. E. Rich and K.Knight (TMH) 2. Artificial Intelligence, 3rd Edn.. Patrick Henny Winston. Pearson Education.

Faculty of Engineering & Technology	
Name of the Department	Computer Science and Engineering
Name of the Program	Bachelor of Computer Applications
Course Code	
Course Title	**Applied Cloud Computing**
Academic Year	2023-2027
Semester	
Number of Credits	2
Course Prerequisite	Networks and Systems
Course Synopsis	In this course, students will learn about Cloud computing fundamentals, core issues of Design and Development of application on Cloud computing

Course Outcomes:

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

CO1	Explain the core issues of Design and Development of application on Cloud computing such as security, privacy, and interoperability
CO2	Choose the appropriate technologies, algorithms, and approaches for the related issues
CO3	Provide basics of cloud files systems
CO4	Understand basic issues concerning cloud security

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	2	3	2	-	-	-	-	2	-	1
CO2	1	2	3	3	-	-	-	-	-	1	1
CO3	3	2	3	-	-	-	-	-	3	-	1
CO4	2	2	3	-	-	-	-	-	-	1	1
Average	2	2	3	1.2					1.2	0.5	1

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
2			2

Unit	Content & Competencies
1	**Cloud computing fundamentals** Explain the role of networks in Cloud computing (C2: Comprehension) Describe Essential characteristics of Cloud computing (C2: Comprehension) Explain Cloud economics and benefits (C1: Knowledge) Describe Cloud types (C2: Comprehension) Discuss challenges in cloud NIST guidelines (C2: Comprehension) Explain Cloud economics and benefits (C1: Knowledge)
2	**Virtualization:** Explain Basic Concepts of Virtualization (C1: Knowledge) Describe types of Virtualizations: Server virtualization, Storage virtualization (C2: Comprehension) Discuss about Storage services (C1: Knowledge) Compare Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures (C4: Analysis)
3	**Relational databases** Analyze Cloud file systems: GFS and HDFS (C4: Analysis) Analyze Bigtable, HBase and Dynamo (C4: Analysis) Discuss about MapReduce and extensions: Parallel computing, the map-Reduce model (C2: Comprehension)

4	**Cloud security fundamentals** Discuss Vulnerability assessment tool for cloud (C2: Comprehension) Discuss Privacy and Security in cloud (C2: Comprehension) Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications (C3: Application)

Learning Strategies and Contact Hours

Learning Strategies	Contact Hours
Lecture	24
Practical	-
Seminar/Journal Club	2
Small group discussion (SGD)	-
Self-directed learning (SDL) / Tutorial	-
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	-
Revision	2
Others If any:	-
Total Number of Contact Hours	30

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
	Mid Semester Examination 2
Quiz	University Examination
Seminars	Short Answer Questions (SAQ)
Problem Based Learning (PBL)	Long Answer Question (LAQ)

Mapping of Assessment with COs

	CO1	CO2	CO3	CO4
Quiz	√	√	√	√
Assignment / Presentation	√	√	√	√
Unit test	√	√	√	√
Mid Semester Examination 1	√	√	√	√
Mid Semester Examination 2	√	√	√	√
University Examination	√	√	√	√

Feedback Process	Student's Feedback

References	List of reference books
	1.Enterprise Cloud Computing, Gautam Shroff, Cambridge Publication 2.Cloud computing – Automated virtualized data center, Venkata Josyula, CISCO Press 3.Cloud and virtual data storage networking, Greg Schulr CRC Press Handbook of Cloud Computing, Borko Furht, Springer

MGEC

Course Code	Course Title
MGEC (Odd Sem)	
	Computational Thinking and Programming
MGEC (Even Sem)	
	Problem Solving using Python

FACULTY OF ENGINEERING AND TECHNOLOGY	
Name of the Department	Computer science and engineering
Name of the Program	Bachelor of Technology
Course Code	
Course Title	**Computational Thinking and Programming**
Academic Year	2023-27
Semester	
Number of Credits	4
Course Prerequisite	NIL
Course Synopsis	Understand C programming.

Course Outcomes:

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

CO1	Understand various computer components, design flowchart and write program in C programming language.
CO2	Identify and represent numbers in different number system.
CO3	Understand, explain and use different data types and operators to write programs.

CO4	Formulate, evaluate and analyze the problems by applying programming concepts using decision control statements and loop control statements.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	1	-	1	-	-	-	-	-	1	1	1	1	-
CO2	3	1	-	-	-	1	-	-	-	-	-	-	1	1	1	-
CO3	3	1	-	1	-	1	-	-	-	-	-	-	1	1	1	-
CO4	3	2	1	2	2	1	-	-	3	-	1	-	1	1	1	-
Average	**3**	**1.25**	**0.5**	**1**	**0.5**	1	-	-	**0.75**		**0.5**	**0.5**	**1**	**1**	**1**	

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
4	-	-	**4**

Unit	Content and Competency
1	1.Explain the Operating System [Unix, Linux, Windows]. (C2: Comprehension) 2. Explain the Programming Environment, and Write & Execute the first program. (C2: Comprehension) 3. Recall the purpose Digital Computer. (C1: Knowledge) 4. Recite the concept of an algorithm, their termination and correctness. (C1: Knowledge) 5. Analyze Algorithms to programs: specification, top-down development and stepwise refinement. (C4: Analysis) 6. Analyze Programming, Use of high level programming language for the systematic development of programs. (C4: Analysis) 7.Design and implementation of correct, efficient and maintainable programs. (C 5: Synthesis)

	8.Discribe number systems and conversion methods. (C2: Comprehension)
2	1.Generalize the concept of Standard I/O in "C". (C5: Synthesis) 2. Explain the concepts of Data Types: Character types, Integer, short, long, unsigned, single and double-precision floating point. (C2: Comprehension) 3. Define storage classes: automatic, register, static and external. (C2: Comprehension) 4. Analyze the Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, and Bit operations. (C4: Analysis)
3	1. Explain the concepts of Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch. (C2: Comprehension) 2. Recall the purpose and importance of Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue. (C1: Knowledge) 3. Describe Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules. (C2: Comprehension) 4. Outline the purpose and significance of Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size. (C1: Knowledge) 5. Explain the principles of Structures: usage of structures, declaring structures, and assigning of structures. (C2: Comprehension)
4	1. Recall the purpose and basic functions of Pointers to Objects using pointers as function arguments. (C1: Knowledge) 2. Explain the principles of Dynamic memory allocation. (C2: Comprehension) 3. Generalize the concept of Standard C Preprocessor. (C5: Synthesis) 4.Defining and calling macros. (C2: Comprehension) 5.Explain Standard C Library: Input/Output : fopen, fread, etc, string handling functions. Math functions : log, sin, alike Other Standard C functions. (C2: Comprehension)

Teaching Learning Strategies and Contact Hours

Learning Strategies	Contact Hours

Lecture	20
Practical	
Seminar/Journal Club	1
Small group discussion (SGD)	1
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	1
Revision	4
Others If any:	
Total Number of Contact Hours	30

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓

Feedback Process	Student's Feedback
References:	Textbooks: 1. B. S. Grewal "Higher Engineering Mathematics" 44/e, Khanna Publishers, 2017. 2. Erwin Kreyszig "Advanced Engineering Mathematics" 10/e, John Wiley& Sons, 2011.
	References: 1. R.K. Jain and S. R.K.Iyengar "Advanced Engineering Mathematics" 3/e, Alpha Science International Ltd., 2002. 2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas "Calculus" 13/e, Pearson Publishers, 2013

Faculty of Engineering and Technology	
Name of the Department	Computer Science and Engineering
Name of the Program	Bachelor of Computer Applications
Course Code	
Course Title	Problem Solving using Python
Academic Year	
Semester	
Number of Credits	4
Course Prerequisite	Object oriented Programming
Course Synopsis	In this course, Student will learn core Python scripting elements such as variables and flow control structures

Course Outcomes:

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

CO1	Master the fundamentals of writing Python scripts.
CO2	Learn core Python scripting elements such as variables and flow control structures
CO3	Discover how to work with lists and sequence data.
CO4	Perform File management using Python

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO3
CO1	3	2	1	2		2		1	1	2	
CO2	3	2	-	2		2		1	2	-	
CO3	3	2	3	2		2		1	-	2	
CO4	-	2	-	2		2		1	-	-	
Average	3	2	1.3	2		2		1	0.5	1.3	

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week
4			4

Unit	Content & Competencies
I	**Introduction to Python Programming Language:** Explain Programming Language, History and Origin of Python Language (C2: Comprehension) Describe Features of Python, Limitations, Major Applications of Python (C2: Comprehension) Installing Python, setting up Path and Environment Variables (C6: Synthesis) Running Python, First Python Program, Python Interactive Help Feature (C6: Synthesis) Analyze Python differences from other languages (C4: Analysis) **Python Data Types & Input/Output:** Explain Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple Assignment (C2: Comprehension) Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command (C2: Comprehension) **Operators and Expressions:** Analyze Operators in Python, Expressions, Precedence, Associativity of Operators, Non-Associative Operators (C4: Analysis)

2	**Control Structures:** Design Decision making statements, Python loops, Python control statements. (C6: Synthesis) **Python Native Data Types:** Explain Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings (in detail with their methods and operations). (C2: Comprehension)
3	**Python Functions:** Describe Functions, Advantages of Functions, Built-in Functions, User defined functions, Anonymous functions (C2: Comprehension) Implement Pass by value Vs. Pass by Reference, Recursion (C3: Application) Explain Scope and Lifetime of Variables (C2: Comprehension)
4	**Exception Handling:** Analyze Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python (C4: Analysis) **Classes and Objects:** Describe the concept of OOPS in Python (C2: Comprehension) Designing classes, Creating objects (C6: Synthesis)