



**FUTURE
UNIVERSITY**

Learn • Assimilate • Transcend

FUTURE UNIVERSITY, BAREILLY

(Established under the Uttar Pradesh Private Universities (Third Amendment) Act, 2024)

COURSE CURRICULUM

AND

EVALUATION SCHEME

B.Tech (CS, A.I, CE) Ist year

For the Students Admitted in Academic Session _____

Effective From

Academic Session 2025-26

Prepared By

Future University, Bareilly

Approved By

Academic Council

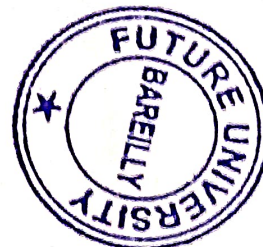
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Future University, Bareilly

Academic Session: 2025-26



(This Curriculum and Evaluation Scheme shall be applicable to all students admitted to the B.Tech. Programme from the Academic Session 2025-26 onwards and shall remain in force until amended or revised by the Academic Council of Future University, Bareilly.)

FUTURE UNIVERSITY
(Established under Govt. of U. P. Act No. 12, 2024)

Study & Evaluation Scheme Of

Bachelor of Technology

**B. TECH. (CS/AI/CE) (Computer
Science/Artificial Intelligence/Civil
Engineering)**

[Applicable w.e.f. Academic Session 2025-26]

Approved by Academic Council



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FUTURE UNIVERSITY

**18th Milestone, Bareilly-Lucknow Highway NH-24
Near Faridpur, Bareilly, Uttar Pradesh 243503
Website: www.futureuniversity.in**

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SUMMARY

Programme	B. Tech(CS/AI/CE)				
Duration	Four years Full Time (eight semesters)				
Medium	English				
Minimum Required Attendance	75%				
Maximum Credit	170				
Minimum Credit (required for the degree)	160				
Assessment (Theory)	Internal		External		Total
	30%		70%		100%
Assessment (Practical)	Internal		External		Total
	50%		50%		100%
Internal Evaluation (Theory Papers)	Class Test I	Class Test 2	Assignment(s)	Other Activity (including attendance)	Total
	10 marks	10 marks	5 marks	5 marks	30 marks
Internal Evaluation (Practical Papers)	Experiment File Viva	Exam	Attendance	Total	
	10 marks	30 marks	10 marks	50 marks	
Duration of Examination (Theory)	External		Internal		
	3 hrs.		1 ½ hrs.		
Duration of Examination (Practical)	As per the requirement of the practical paper				

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To qualify the course a student is required to secure a minimum of 40% marks in aggregate including the semester end examination and teachers' continuous evaluation. (i.e., both internal and external).

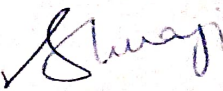
A candidate who secures less than of 40% of marks in a course shall be deemed to have failed in that course. The student should have at least 50% marks in aggregate to clear the semester. In case a student has more than 40% in each course, but less than 50% overall in a semester, he/she shall re-appear in courses where the marks are less than 50% to achieve the required aggregate percentage of 50% in the semester.

Question Paper Structure

- 1. The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weight age 4 marks each).***
- 2. Out of the rest five questions, students shall be required to attempt all five questions, but there will be an internal choice of A or B. Each question will be from one unit of the syllabus. The weight age of Question No. 2 to 6 shall be 10 marks each.***


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Faculty of Engineering and Technology

Department of (CS/AI/CE)

Credit Framework for the B. Tech. (CS/AI/CE) -NEP-2020									
Sem.	Major (Core)	Minor Stream	Multidisciplinary	Ability Enhancement Course	Skill Enhancement Course	Value Added Courses Common for All UG	Summer Internship	Research Project/ Dissertation	Total Credit
1	10	4	5	0	2	2			23
2	10	2	5	0	2	2			21
Students exiting the programme after securing 40 credits will be awarded UG Certificate in the relevant Discipline / Subject provided they secure 4 credits in work based vocational courses offered during summer term or internship / Apprenticeship in addition to 6 credits from skill-based courses earned during first and second semester									
3	10	6	2	2	2				22
4	14	3		2					19
Students exiting the programme after securing 80 credits will be awarded UG Diploma in the relevant Discipline / Subject provided they secure 4 credits in skill based vocational courses offered during first year or second year summer term.									
5	15	3			2				20
6	13	4						3	20
Students who want to undertake 3-year UG Programme will be awarded UG Degree in the relevant Discipline/ Subject Upon securing 120 credits									
7	11	3						6	20
8	9	4						12	25
Students will be awarded UG Degree (Honours) with Research in the relevant Discipline/ Subject provided they secure 160 credits (As per NEP guidelines)									

Total = 170 Credit

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				Future University							
				B. Tech. Civil Engineering specialization in Computational Techniques in Structural Design powered by L&T							
				Course Structure 2025-2029							
Program Name:		B. Tech. (CE)					Program Code:		07		
			Total Credit of Program: 170				Branch Code:		05		
		Theory			Week			Evaluation Scheme		Total	Credit
S N	Course Category	Code	Course Title		L	T	P	C A	E E		
Semester –I											
1	Multidisciplinary Course	HSS1101	Engineering Mathematics-1		3	0	0	30	70	100	3
2	Minor Course	HSS1102	Advanced Engineering Physics		2	1	0	30	70	100	3
3	Major Core Courses	EEE1103/EE C1103	Essentials of Electrical Engineering / Essentials of Electronics Engineering		3	0	0	30	70	100	3
4	Major Core Courses	ECS1104/E ME1104	Principles of Problem-Solving Using Advance C / Elements of Mechanical		3	0	0	30	70	100	3
5	Value added course	ECS1105	AI for Everyone		2	0	0	30	70	100	2
6	Minor Course	ECS1106	MOOC		Self-Paced Learning				100		3
Practical											
7	Minor Course	HSS1170	Advanced Engineering Physics LAB		0	0	2	50	50	100	1
8	Major Core Courses	ECS1171/EME 1171	Programming using advanced C LAB / EME Lab		0	0	2	50	50	100	1
9	Major Core Courses	EEE1172/EEEC1 172	Essentials of Electrical Engineering LAB / Essentials of Electronics Engineering LAB		0	0	2	50	50	100	1
10	Skill Enhance ment Course	EME1173/EME 1173	Workshop Practice Lab / Engineering Graphics Lab		0	0	4	50	50	100	2
11	Multidisci	IKS1101	IKS-1 (Indian Knowledge System-1)		1	0	0	5		50	1

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	plinary Course					0					
		TOTAL			14	1	10	400	550	1050	23

			Theory	Week			Evaluati on Scheme		Tot al	Cre dit
SN	Course Category	Code	Course Title	L	T	P	C A	EE		
Semester –II										
1	Multidiscipli nary Course	HSS1201	Engineering Mathematics – II	3	0	0	3 0	70	10 0	3
2	Minor Course	HSS1202	Environmental Science	2	0	0	3 0	70	10 0	2
3	Major Core Courses	EEC1203/EEE 1203	Essentials of Electronics Engineering / Essentials of Electrical Engineering	3	0	0	3 0	70	10 0	3
4	Major Core Courses	EME1204/EC S1204	Elements of Mechanical Engg. / Principles of Problem Solving Using Advance C	3	1	0	3 0	70	10 0	4
5	Value added course	ECS1205	AI for Engineers	2	0	0	3 0	70	10 0	2
6	Minor Course	ECS1206	MOOC	Self-Paced Learning					10 0	3
Practical										
7	Major Core Courses	EME1271/EC S1271	EME Lab/Programming using advanced C LAB	0	0	2	5 0	50	10 0	1
8	Major Core Courses	EEC1272/EEE 1272	Essentials of Electronics Engineering LAB / Essentials of Electrical Engineering	0	0	2	5 0	50	10 0	1
9	Skill Enhancement Course	EME1273/EM E1273	Engineering Graphics Lab / Workshop Practice Lab	0	0	4	5 0	50	10 0	2
10	Skill Enhancement Course	LSM1210	LSM - I (Life Skill & Mentoring I)	1	0	0	5 0		5 0	1
			TOTAL	1 4	3	8	3 0 0	500	90 0	22

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HSS1101: ENGINEERING MATHEMATICS-I

Course Outcome (CO)

CO	Description
CO1	To visualize and conceptualize the engineering problems.
CO2	To model the engineering problem mathematically using theory of calculus and matrices.
CO3	To determine the solution of the studied engineering problem from application point of view.
CO4	To validate the solution.
CO5	To implement the solution for engineering problem.

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Matrices: Elementary transformations, Inverse of a matrix, Rank of matrix, Solution of system of linear equations, Characteristic equation, Cayley-Hamilton Theorem and its application, Linear Dependence and Independence of vectors, Eigen values and Eigen vectors, Complex Matrices, Hermitian, Skew-Hermitian and Unitary Matrices, Applications to Engineering problems.	8
II	Differential Calculus-I: Successive Differentiation (nth order derivatives), Leibnitz theorem, Curve tracing, Partial derivatives, Euler's Theorem for homogeneous functions, Total derivative, Change of variables, Change of variables.	6
III	Differential Calculus-II: Expansion of functions by Taylor's and Maclaurin's theorems for functions of one and two variables, Maxima and Minima of functions of several variables, Lagrange's method of multipliers, Jacobians, Approximation of errors.	6
IV	Multiple Integration: Double integral, Triple integral, Change of order of integration, Change of variables, Beta and Gamma function and their properties, Dirichlet's integral and its applications to area and volume, Liouville's extensions of Dirichlet's integral.	10
V	Vector differentiation: Gradient, Curl and Divergence and their Physical interpretation, Directional derivatives. Vector Integration: Line integral, Surface integral, Volume integral, Gauss's Divergence theorem, Green's theorem and Stoke's theorem (without proof) and their applications.	10

Text Books:

1. B. V. Ramana, *Higher Engineering Mathematics*, McGraw-Hill Publishing Company Ltd., 2008.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publisher, 2005.
3. R. K. Jain & S. R. K. Iyenger, *Advance Engineering Mathematics*, Narosa Publishing House, 2002.

Reference Books:

1. E. Kreyszig, *Advance Engineering Mathematics*, John Wiley & Sons, 2005.
2. Peter V. O'Neil, *Advance Engineering Mathematics*, Thomson (Cengage) Learning, 2007.
3. Maurice D. Weir, Joel Hass, Frank R. Giordano, *Thomas' Calculus*, Eleventh Edition, Pearson.

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4. Veerarajan T., *Engineering Mathematics for first year*, McGraw-Hill, New Delhi, 2008.

HSS1102: Advanced Engineering Physics

Course Outcome (CO)

CO	Description
CO1	Demonstrate knowledge of interference, diffraction, and polarization along with their engineering applications.
CO2	Explain the basics of lasers and optical fibers and their use in industrial applications.
CO3	Understand concepts and principles in quantum mechanics and relate them to physics applications.
CO4	Understand semiconductor theory and its applications in semiconductor devices.
CO5	Summarize fundamentals of magnetism and superconductivity to explore technological applications.

Detailed Syllabus

Unit	Topic	Proposed Lectures
I	Quantum Mechanics: Limitations of classical mechanics, Planck's theory of black body radiation, Compton effect, de Broglie concept of matter waves, Davisson and Germer experiment, phase velocity and group velocity, time-dependent and time-independent Schrödinger wave equations, physical interpretation of wave function, particle in a one-dimensional box.	8
II	Electromagnetic Field Theory: Basic concepts of Stokes' theorem and divergence theorem, fundamental laws of electricity and magnetism, continuity equation for current density, displacement current, Maxwell's equations in integral and differential form, Maxwell's equations in vacuum and conducting medium, Poynting vector and Poynting theorem, plane electromagnetic waves in vacuum and their transverse nature, relation between electric and magnetic fields of an electromagnetic wave, plane electromagnetic waves in conducting medium, skin depth.	10
III	Wave Optics: Coherent sources, interference in uniform and wedge-shaped thin films, necessity of extended sources, Newton's rings and their applications, introduction to diffraction, Fraunhofer diffraction at single slit and double slit, absent spectra, diffraction grating, spectra with grating, dispersive power, resolving power, Rayleigh's criterion of resolution, resolving power of grating.	6
IV	Fiber Optics & Laser: Fiber Optics: Principle and construction of optical fiber, acceptance angle, numerical aperture, acceptance cone, step index and graded	6

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	index fibers, fiber optic communication principle, attenuation, dispersion, applications of fiber. Laser: Absorption of radiation, spontaneous and stimulated emission of radiation, population inversion, Einstein's coefficients, principles of laser action, solid-state laser (Ruby laser) and gas laser (He-Ne laser), laser applications.	
V	Superconductors and Nano-Materials: Superconductors: Temperature dependence of resistivity in superconducting materials, Meissner effect, temperature dependence of critical field, persistent current, Type I and Type II superconductors, high-temperature superconductors, properties and applications of superconductors. Nano Materials: Introduction and properties of nano materials, basic concepts of quantum dots, quantum wires, and quantum wells, fabrication of nano materials - top-down approach (CVD) and bottom-up approach (Sol-Gel), properties and applications of nano materials.	6

Reference Books:

1. Concepts of Modern Physics – Aurthur Beiser (Mc-Graw Hill)
2. Optics – Brijlal & Subramanian (S. Chand)
3. Engineering Physics: Theory and Practical – Katiyar and Pandey (Wiley India)
4. Applied Physics for Engineers – Neeraj Mehta (PHI Learning, New)


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	index fibers, fiber optic communication principle, attenuation, dispersion, applications of fiber. Laser: Absorption of radiation, spontaneous and stimulated emission of radiation, population inversion, Einstein's coefficients, principles of laser action, solid-state laser (Ruby laser) and gas laser (He-Ne laser), laser applications.	
V	Superconductors and Nano-Materials: Superconductors: Temperature dependence of resistivity in superconducting materials, Meissner effect, temperature dependence of critical field, persistent current, Type I and Type II superconductors, high-temperature superconductors, properties and applications of superconductors. Nano Materials: Introduction and properties of nano materials, basic concepts of quantum dots, quantum wires, and quantum wells, fabrication of nano materials - top-down approach (CVD) and bottom-up approach (Sol-Gel), properties and applications of nano materials.	6

Reference Books:

1. Concepts of Modern Physics – Aurthur Beiser (Mc-Graw Hill)
2. Optics – Brijlal & Subramanian (S. Chand)
3. Engineering Physics: Theory and Practical – Katiyar and Pandey (Wiley India)
4. Applied Physics for Engineers – Neeraj Mehta (PHI Learning, New)

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ECS1104: PRINCIPLE OF PROBLEM SOLVING USING ADVANCED C

Course Outcome (CO)	Description
CO1	Control the sequence of the program and give logical outputs, Manage I/O operations in your C program.
CO2	Implement strings in your C program.
CO3	Store different data types in the same memory, Apply code reusability with functions and pointer.
CO4	Repeat the sequence of instructions and points for a memory location, Explain the uses of pre-processors and various memory models.
CO5	Understand the basics of file handling mechanisms.

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Introduction to Components of a Computer System: Memory, Processor, I/O Devices, Storage, Operating System, Concept of Assembler, Compiler, Interpreter, Loader and Linker. Idea of Algorithm: Representation of Algorithm, Flowchart, Pseudo Code with Examples, From Algorithms to Programs, Source Code. Programming Basics: Structure of C Program, Writing and Executing the First C Program, Syntax and Logical Errors in Compilation, Object and Executable Code. Components of C Language. Standard I/O in C, Fundamental Data types, Variables and Memory Locations, Storage Classes.	10
II	Arithmetic Expressions and Precedence: Operators and Expression Using Numeric and Relational Operators, Mixed Operands, Type Conversion, Logical Operators, Bit Operations, Assignment Operator, Operator precedence and Associativity. Conditional Branching: Applying if and Switch Statements, Nesting if and Else and Switch.	6
III	Iteration and Loops: Use of While, do While and for Loops, Multiple Loop Variables, Use of Break, Goto and Continue Statements. Arrays: Array Notation and Representation, Manipulating Array Elements, using Multi-Dimensional Arrays. Character Arrays and Strings, Structure, Union, Enumerated Data types, Array of Structures, Passing Arrays to Functions.	8
IV	Functions: Introduction, Types of Functions, Functions with Array, Passing Parameters to Functions, Call by Value, Call by Reference, Recursive Functions. Basic of Searching and Sorting Algorithms: Searching & Sorting Algorithms (Linear Search, Binary Search, Bubble Sort, Insertion and Selection Sort).	8
V	Pointers: Introduction, Declaration, Applications, Introduction to Dynamic Memory Allocation (Malloc, Calloc, Realloc, and Free), String and String functions, Use of Pointers in Self-Referential Structures, Notion of Linked List (No Implementation). File Handling: File I/O Functions, Standard C Preprocessors, Defining and Calling Macros and Command-Line Arguments.	8

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Text Books:

1. **Schaum's Outline of Programming with C** by Byron Gottfried, *McGraw-Hill*
2. **The C programming** by Kernighan Brian W. and Ritchie Dennis M., *Pearson Education*
3. **Computer Basics and C Programming** by V. Rajaraman, *PHI Learning Pvt. Limited, 2015*

EME1104: ELEMENTS OF MECHANICAL ENGINEERING

(CO)	Description
CO1	Define the basic terminologies and fundamentals of engineering mechanics.
CO2	Recall the basic concepts of mechanical engineering.
CO3	Understand the concepts of machine tools, metal cutting operations and hydraulic machines.
CO4	Understand the fundamentals of solid mechanics, thermal engineering & RAC.
CO5	Apply the concepts & knowledge to solve the engineering problems.

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Introduction to Engineering Mechanics: Force moment and couple, principle of transmissibility, Varignon's theorem. Resultant of force system—concurrent and non-concurrent coplanar forces, Types of supports (Hinge, Roller) and loads (Point, UDL, UVL), free body diagram, equilibrium equations and Support Reactions.	8
II	Properties of Engineering Materials: Mechanical Property measurement: Tensile, compression and torsion tests; Young's modulus, relations between true and engineering stress-strain curves, generalized Hooke's law, yielding and yield strength, ductility, resilience, toughness and elastic recovery; Hardness: Rockwell, Brinell and Vickers and their relation to strength.	8
III	Introduction to Thermo dynamics, RAC and IC Engines: Thermodynamics: Introduction - Basic Concepts: System, Control Volume, Surroundings, Boundaries, Universe, Types of Systems, Concept of Zeroth, First and Second law of thermodynamics Refrigeration: Refrigeration, Ton of Refrigeration; Coefficient of performance, construction and working of domestic refrigerator. Air-Conditioning: Its meaning and application, humidity, dry bulb, wet bulb, and dew point temperatures, construction and working of window air conditioner. IC Engine: Basic definition of engine and Components, Construction and Working of Two stroke and four stroke SI & CI engine, merits and demerits.	8

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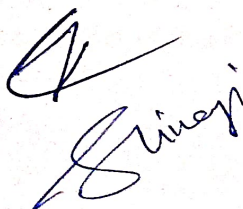
IV	Introduction to Fluid Mechanics and Applications: Introduction: Fluids properties, pressure, density, dynamic and kinematic viscosity, specific gravity, Newtonian and Non-Newtonian fluid, Pascal's Law and Continuity Equation. Working principles of hydraulic turbines (Pelton Wheel and Francis) & pumps (Centrifugal and Reciprocating) and their classifications and hydraulic lift.	8
V	Measurement and Mechatronics: Introduction to Measurement: Concept of Measurement, Error in measurements, Calibration, measurements of pressure (Bourdon Tube Pressure and U-Tube Manometer), temperature (Thermocouple and Optical Pyrometer), mass flow rate (Venturi Meter and Orifice Meter), strain (Bonded and Unbonded Strain Gauge), force (Proving Ring) and torques (Prony Brake Dynamometer); Concepts of accuracy, precision and resolution. Introduction to Mechatronic Systems: Evolution, Scope, Advantages and disadvantage Mechatronics, Industrial applications of Mechatronics, Introduction to autotronics, bionics and avionics and their applications. Sensors and Transducers: Types of sensors, types of transducers and their characteristics.	8

Reference Books:

1. **Basic Mechanical Engineering**, G. Shanmugam, S. Ravindran, McGraw Hill
2. **Basic Mechanical Engineering**, M. P. Poonia and S. C. Sharma, Khanna Publishers
3. **Mechatronics: Principles, Concepts and Applications**, Nitaigour Mahalik, McGraw Hill
4. **Mechatronics**, As per AICTE: *Integrated Mechanical Electronic Systems*, K. P. Ramachandran, G. K. Vijayaraghavan, M. S. Balasundaram, Wiley India
5. **Mechanical Measurements & Control**, Dr. D. S. Kumar, Metro Polytan Book Company
6. **Fluid Mechanics and Hydraulic Machines**, Mahesh Kumar, Pearson India



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ECS1105	AI FOR EVERYONE	L T P 2 1 0	3 credits
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Course Objectives:

CO1	Introduce fundamental concepts of Artificial Intelligence (AI) and its real-world applications.
CO2	Familiarize students with basic AI techniques such as machine learning, natural language processing and computer vision.
CO3	Enhance understanding of ethical considerations and societal impacts of AI.
CO4	Develop problem-solving skills using AI tools and frameworks.
CO5	Encourage critical thinking about the future of AI in various domains such as healthcare, education, business, and security.

Unit-I

Introduction to AI (Concept + Hands-on): What is AI? Understanding AI vs. Machine Learning vs. Deep Learning, AI in daily life: Smart assistants, AI in social media, AI in e-commerce, Prompt Engineering, Real Life Applications of AI. Tools: Explore AI-based tools (Google AI, ChatGPT , MetaAI, Gemini).

Unit-II

Introduction to Machine Learning and Deep Learning: Introduction to learning theory, Methods and Models. Supervised vs. Unsupervised Learning (Examples from real life), Reinforcement Learning, Introduction to ANN and Deep Learning.

Unit-III

Computer Vision & Image Processing: Introduction to Image processing and Computer Vision ?, Hardware used, Face Recognition, Object Detection, and AI-powered Cameras, How AI understands text & speech, AI in Chatbots, Sentiment Analysis, and AI-based Translation Practical

Unit-IV

AI in Automation & Robotics: AI-powered automation in businesses, How AI is used in robotics and smart homes, Ethical AI & Responsible AI, Bias in AI and fairness in decision-making, How to use AI responsibly.

Unit-V

Mini AI Projects (Without Coding): Hands-on Project Options: AI for Image Classification: Train an AI model to recognize objects Create an AI Chatbot: Use Dialog flow or Chatbot.com, AI in Business: Automate tasks using AI-based productivity tools.

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* Students will present their AI Project (Simple AI-based tool using existing platforms)
Complete an AI-based quiz & get a certification.

Text books and References:

1. **Stuart Russell & Peter Norvig** – *Artificial Intelligence: A Modern Approach* (Pearson, 4th Edition)
2. **John Paul Mueller & Luca Massaron** – *Artificial Intelligence For Dummies* (Wiley) "A beginner-friendly guide to AI concepts, applications, and future trends."
3. **Thomas H. Davenport & Nitin Mittal** – *All in on AI: How Smart Companies Win Big with Artificial Intelligence* (Harvard Business Review Press), Explains AI strategies in business and industry.

COURSE OUTCOMES:

CO1	Understand the fundamental principles and applications of AI in different industries.
CO2	Explain key AI techniques, including supervised and unsupervised learning, deep learning, and neural networks.
CO3	Analyze ethical challenges and biases in AI systems and their impact on society.
CO4	Apply AI-driven solutions in fields like healthcare, finance, and automation.
CO5	Critically evaluate the benefits and risks associated with AI technologies.

HSS1170: ADVANCED ENGINEERING PHYSICS LAB

(CO)	Description
CO1	Prepare and perform individually a wide spectrum of experiments.
CO2	Present experimental data in various appropriate forms like tabulation and plots.
CO3	Analyse, interpret and summarize the experimental results
CO4	Communicate clearly the understanding of various experimental principles, instruments/setup, and procedure

List of Experiments

Group A

1. To determine the wavelength of sodium light by Newton's ring experiment.
2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.
3. To determine the specific rotation of cane sugar solution using polarimeter.

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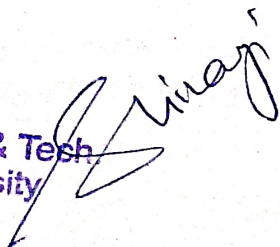
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4. To determine the focal length of the combination of two lenses separated by a distance and verify the formula for the focal length of combination of lenses.
5. To measure attenuation in an optical fiber.
6. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
7. To verify Stefan's law by electric method.
8. To determine resistance per unit length and specific resistance of a given resistance using Carey Foster's Bridge.
9. To study the resonance condition of a series LCR circuit.
10. To determine the electrochemical equivalent (ECE) of copper.
11. To determine the energy band gap of a given semiconductor material.
12. To study Hall Effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall effect setup.



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ECS1171: PROGRAMMING USING ADVANCED C LAB

Course Outcome (CO)

CO	Description
CO1	Apply the knowledge of advanced C programming concepts to implement given requirement specification or to solve real world problem.
CO2	Implement, interpret, debug and test any given advanced C program.
CO3	Read, understand and trace the execution of programs written in C language.
CO4	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
CO5	Write programs that perform operations using derived data types.

List of Experiments:

1. WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
2. WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.
3. WAP to calculate the area and circumference of a circle.
4. WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula $C/5 = (F-32)/9$.
5. WAP that swaps values of two variables using a third variable.
6. WAP that checks whether the two numbers entered by the user are equal or not.
7. WAP to find the greatest of three numbers.
8. WAP that finds whether a given number is even or odd.
9. WAP that tells whether a given year is a leap year or not.
10. WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:

- Between 90-100% ---- Print 'A'
- 80-90% ----- Print 'B'
- 60-80% ----- Print 'C'
- Below 60% ----- Print 'D'

11. WAP that takes two operands and one operator from the user, perform the operation, and prints the result by using Switch statement.
12. WAP to print the sum of all numbers up to a given number.
13. WAP to find the factorial of a given number.
14. WAP to print sum of even and odd numbers from 1 to N numbers.
15. WAP to print the Fibonacci series.
16. WAP to check whether the entered number is prime or not.
17. WAP to find the sum of digits of the entered number.
18. WAP to find the reverse of a number.
19. WAP to print Armstrong numbers from 1 to 100.
20. WAP to convert binary number into decimal number and vice versa.

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21. WAP that simply takes elements of the array from the user and finds the sum of these elements.
22. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in third array and prints them.
23. WAP to find the minimum and maximum element of the array.
24. WAP to search an element in an array using Linear Search.
25. WAP to sort the elements of the array in ascending order using Bubble Sort technique.

Note:

- a) The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.
- b) The subject teachers are suggested to use the concept of project based learning. The subject teacher may give certain use cases/case studies where student is able to apply multiple concepts in one single program.
- c) It is also suggested that open source tools should be preferred to conduct the lab. Some open source online compilers to conduct the C lab are as follows:

- ❖ <https://www.jdoodle.com/c-online-compiler/>
- ❖ https://www.tutorialspoint.com/compile_c_online.php
- ❖ <https://www.programiz.com/c-programming/online-compiler/>
- ❖ <https://www.hackerrank.com/>


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EME1171: EME LAB

Course Outcome (CO)

CO	Description
CO1	Analyze the performance of heat exchangers.
CO2	Measure the coefficients of heat transfer
CO3	Discuss the working of Air conditioning and refrigeration systems
CO4	Experiment with the working of gyroscopes and identify the effects of forces and moments on their motion
CO5	Demonstrate the working of governor apparatus and illustrate the effects of forces and moments on their motion

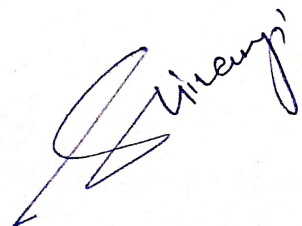
DETAILED SYLLABUS

Objectives:

To understand the principle and performance characteristics of different materials.

- To know about material properties.
- List of Experiments: (At least 8 of the following)
 1. Strength test of a given mild steel specimen on UTM.
 2. Impact test on impact testing machine like Charpy, Izod or both.
 3. Hardness test of given specimen using Rockwell and Vickers/Brinell testing machines.
 4. Experiment on deflection of beam, comparison of actual measurement of deflection with dial gauge to the calculated one, and/or evaluation of young's modulus of beam.
 5. Torsion test of a rod using torsion testing machine.
 6. Study of NDT (non-destructive testing) methods like magnetic flaw detector, ultrasonic flaw detector, eddy current testing machine, dye penetrant tests.
 7. Study of two stroke and four stroke petrol engine.
 8. Study of two stroke and four stroke Diesel engine.
 9. Study of Models of Boiler.
 10. Study of Hydraulic Turbines.
 11. Study of Hydraulic Pumps.
 12. Study of Refrigeration and Air Conditioning system.


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EME1173: WORKSHOP PRACTICE LAB

Course Outcome (CO)

CO	Description
CO1	Demonstrate and produce different types of fitting models.
CO2	Gain knowledge of development of sheet metal models with an understanding of their applications.
CO3	Perform soldering and welding of different sheet metal & welded joints.
CO4	Understand the Basics of Workshop practices.

DETAILED SYLLABUS

S. No.	Content	Duration
1	Introduction to Mechanical workshop material, tools and machines - Study layout, safety measures, and different engineering materials (mild steel, medium carbon steel, high carbon steel, high speed steel, cast iron, etc.) used in workshop. - Study and use of tools, equipment, devices & machines used in fitting, sheet metal, and welding sections. - Learn Vernier caliper, Vernier height gauge, micrometer (screw gauge), and take readings over metallic pieces.	6 Hrs
2	Machine shop - Demonstration of working, construction, and accessories for Lathe machine. - Perform operations on Lathe : Facing, Plane Turning, Step Turning, Taper Turning, Threading, Knurling, and Parting. - Introduction to Milling Machine : Facing, Chamfering, Slotting, and Profiling.	6 Hrs
3	Fitting Shop - Practice marking operations. - Prepare U or V-shape Male-Female workpiece including Filing, Sawing, Drilling, and Grinding .	3 Hrs
4	Carpentry Shop - Study of Carpentry tools, equipment, and different joints. - Make Cross Half Lap Joint, Half Lap Dovetail Joint, Mortise Tenon Joint .	3 Hrs
5	Welding Shop - Introduction to BIS standards and reading of welding drawings. - Practice of operations: Butt Joint, Lap Joint, TIG Welding, MIG Welding .	6 Hrs

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EME1173: ENGINEERING GRAPHICS LAB**Course Outcomes (CO)**

CO	Description
CO1	Get acquainted with the knowledge of various lines, geometrical constructions and construction of various kinds of scales, and Ellipse.
CO2	Improve their imagination skills by gaining knowledge about points, lines, and planes.
CO3	Become proficient in drawing the projections of various solids.
CO4	Gain knowledge about orthographic and isometric projections.

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture Hours
I	Introduction to Engineering Drawing and Orthographic Projections - Principles of Engineering Graphics and their significance. - Dimensioning, Lettering. - Scales: Plain, Diagonal, and Engineering Scales. - Orthographic Projection: Projection of Point, Projection of Lines: Projection of straight lines; Projection of lines inclined to one plane and both planes.	8 hrs
II	Projection of Planes and Solids - Projection of polygonal surface and circular lamina located in the first quadrant inclined to one or both reference planes. - Classification of solids, Projection of solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.	8 hrs
III	Sections of Regular Solids and Development of Surfaces - Sections of Solids: Right regular solids and Auxiliary views for the true shape of sections such as Prism, Cylinder, Pyramid, and Cone. - Development of surfaces for regular solids like Prism, Cylinder, Pyramid, and Cone.	8 hrs
IV	Isometric Projection - Isometric scales and projections of simple and combined solids. - Perspective Projection: Orthographic representation of plane figures and simple solids – Visual Ray Method. - Conversion of pictorial view into orthographic projection.	8 hrs
V	Introduction to Computer Aided Design - Introduction to AutoCAD: Basic commands for 2D drawing (Line, Circle, Polyline, Rectangle, Hatch, Fillet, Chamfer, Trim, Extend, Offset, Dim style, etc.) - Transformation of Projections: Conversion of Isometric Views to Orthographic Views and Vice-Versa in AutoCAD. - Geometry and topology of engineered components, creation of engineering models, and their 2D blueprint presentation. - Geography of India and how it shaped the country's culture, heritage and resources.	8 hrs

Suggested Readings:

1. *Pride of India – A Glimpse of India's Scientific Heritage*, Edited by Pradeep Kohle et al., Samskrit Bharati (2006).
2. *Vedic Physics* by Keshav Dev Verma, Motilal Banarsidass Publishers (2012).
3. *India's Glorious Scientific Tradition* by Suresh Soni, Ocean Books Pvt. Ltd. (2010).

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IKS1101: IKS-I (INDIAN KNOWLEDGE SYSTEM – I)

CO	Description
CO1	Creating awareness amongst the youths about the true history and rich culture of the country.
CO2	Understanding the scientific value of the traditional knowledge of Bharata.
CO3	Promoting the youths to do research in the various fields of Bhartiya knowledge system.
CO4	Converting the Bhartiya wisdom into the applied aspect of the modern scientific paradigm.
CO5	Adding career, professional, and business opportunities to the youths.

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Indian Education - <i>Vedic Education</i> : Focus on the traditional learning system during the Vedic period. - <i>Spiritual and Moral Development</i> : Education's role in ethics and spiritual growth. - <i>Intellectual Growth</i> : Contributions of Vedic education to intellectual advancement. - <i>Social and Cultural Refinement</i> : Cultural impact of education on society.	
II	Methodology of Indian Knowledge System - <i>Pramana</i> : Means of obtaining and validating knowledge in Indian philosophy. - <i>Nyaya</i> : Logical reasoning and debate in the Indian knowledge tradition.	
III	Indian Metallurgy - <i>Indian Text for Metallurgy</i> : Ancient scriptures related to metallurgy. - <i>Important Specimens</i> : Notable preserved/found metalwork examples from Indian history. - <i>Vedic References</i> : Mentions of metals in Vedic texts and their significance.	
IV	Indian Health Sciences Literature - <i>Vedic Foundations of Ayurveda</i> : Ancient texts forming the basis of Ayurveda. - <i>Ayurveda Concern for Good Health</i> : Holistic well-being focus. - <i>Key Concepts</i> : Three Guna, Three Dosha, Panch Mahabhoot, Sapta Dhatu, Six Rasa. - <i>Daily/Seasonal Regimens</i> : Dinacharya & Ritucharya. Practical - <i>Sushruta Samhita</i> : Ancient surgery text. - <i>Charaka Samhita</i> : Ayurvedic medicine text. - <i>Ashtanga Hridaya – Sutra Sthana</i> : Ayurvedic classic. - <i>Qualities of a Surgeon</i> : Attributes of a good surgeon. - <i>Surgical Practices</i> : Ancient surgical methods.	
V	Foundational Literature of Indian Civilization - <i>Key Texts</i> : Vedang, Ayurveda, Natya Shastra, Dharma Shastra, Arthashastra. - <i>Covered Areas</i> : Linguistics, health, arts, law, politics.	

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VI	Bharata Varsha — A Land of Rare Natural Endowments - Topics: Seasons, Land Variations, Heritage, Natural Resources, Geographical Isolation.	
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HSS1201: ENGINEERING MATHEMATICS-II

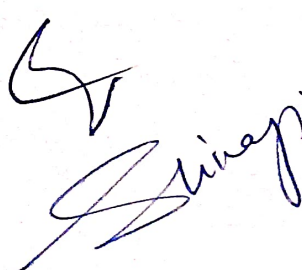
Course Outcome (CO)	
CO1	Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators
CO2	Compute interpolating polynomial for the given data.
CO3	Solve ordinary differential equations numerically using Euler's and RK method.
CO4	Find Fourier series and Fourier transforms for certain functions.
CO5	Identify/classify and solve the different types of partial differential equations.

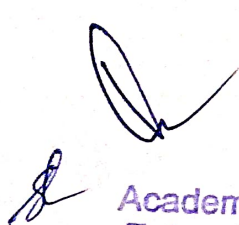
DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Ordinary Differential Equation of Higher Order Linear differential equation of nth order with constant coefficients, Simultaneous linear differential equations, Second order linear differential equations with variable coefficients, Solution by changing independent variable, Method of variation of parameters, Cauchy-Euler equation, Application of differential equations in solving engineering problems.	10
II	Laplace Transform Laplace transform, Existence theorem, Properties of Laplace Transform, Laplace transform of derivate and integrals, Unit step function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem. Application of Laplace Transform to solve ordinary differential equations and simultaneous differential equations.	10
III	Sequence and Series Definition of Sequence and series with examples, Convergence of series, Tests for convergence of series, Ratio test, D' Alembert's test, Raabe's test, Comparison test. Fourier series, Half range Fourier sine and cosine series.	6
IV	Complex Variable–Differentiation Functions of complex variable, Limit, Continuity and differentiability, Analytic functions, Cauchy–Riemann equations (Cartesian and Polar form), Harmonic functions, Method to find Analytic functions, Milne's Thompson Method, Conformal mapping, Mobius transformation and their properties.	6
V	Complex Variable–Integration Complex integration, Cauchy-Integral theorem, Cauchy integral formula, Taylor's and Laurent's series, singularities and its classification, zeros of analytic functions, Residues, Cauchy's Residue theorem and its application.	8

Text Books:


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1. B. V. Ramana, *Higher Engineering Mathematics*, Tata McGraw-Hill Publishing Company Ltd., 2008.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publisher, 2005.
3. R. K. Jain & S. R. K. Iyenger, *Advance Engineering Mathematics*, Narosa Publishing House, 2002.

HSS1202: ENVIRONMENTAL SCIENCE

Course Outcome (CO)

CO1	Gain knowledge about environment and ecosystem.
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Environment: Definition, Types of Environment, Components of environment, Segments of environment, Scope and importance, Need for Public Awareness. Ecosystem: Definition, Types of ecosystem, Structure of ecosystem, Food Chain, Food Web, Ecological pyramid. Balance Ecosystem. Effects of Human Activities such as Food, Shelter, Housing, Agriculture, Industry, Mining, Transportation, Economic and Social security on Environment, Environmental Impact Assessment, Sustainable Development.	8
II	Natural Resources: Introduction, Classification. Water Resources: Availability, sources and Quality Aspects, Water Borne and Water Induced Diseases, Fluoride and Arsenic Problems in Drinking Water. Mineral Resources: Material Cycles; Carbon, Nitrogen and Sulfur cycles. Energy Resources: Conventional and Non-conventional Sources of Energy. Forest Resources: Availability, Depletion of Forests, Environment impact of forest depletion on society.	8
III	Pollution and their Effects; Public Health Aspects of Environmental: Water Pollution, Air Pollution, Soil Pollution, Noise Pollution, Solid waste management.	8
IV	Current Environmental Issues of Importance: Global Warming, Green House Effects, Climate Change, Acid Rain, Ozone Layer Formation and Depletion, Population Growth and Automobile pollution, Burning of paddy straw.	8
V	Environmental Protection: Environmental Protection Act 1986, Initiatives by Non-Governmental Organizations (NGO's), Human Population and the Environment: Population growth, Environmental Education, Women Education.	8

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Reference Books:

1. *Textbook of Environment and Ecology* by Dave, Katewa & Singh, 2nd Edition, Cengage Learning India Pvt. Ltd. Delhi.
2. *Environmental Studies* by S Deswal, Dhanpat Rai & Co.
3. *Environmental Studies* by K V Ahluwalia, 2nd Edition, TERI Press, and New Delhi.
4. *Environmental Studies* by R Rajagopalan, Oxford University Press.
5. *Environment & Ecology* by Singh & Maliyea, Ace Learning.

EEE1203: ESSENTIALS OF ELECTRICAL ENGINEERING

Course Outcome (CO)	
CO1	Analysis of Resistive Circuits and Solution of resistive circuits with independent sources
CO2	Two Terminal Element Relationships for inductors and capacitors and analysis of magnetic circuits.
CO3	Analysis of Single Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits.
CO4	Awareness of general structure of power systems.

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	DC Circuits: Electrical circuit elements (R, L and C), Concept of active and passive elements, voltage and current sources, concept of linearity, unilateral and bilateral elements. Kirchhoff's laws, Mesh and nodal methods of analysis.	8
II	Steady State Analysis of Single Phase AC Circuits: Representation of Sinusoidal waveforms – Average and effective values, Form and peak factors. Analysis of single phase AC Circuits consisting R-L-C combination (Series and Parallel) Apparent, active & reactive power, Power factor. Concept of Resonance in series & parallel circuits, bandwidth and quality factor. Three phase balanced circuits, voltage and current relations in star and delta connections.	10
III	Transformers: Magnetic circuits, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency	6
IV	Electrical Machines: DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems). Three Phase Induction Motor: Principle & Construction, Types, Slip-torque characteristics, Applications (Numerical problems related to slip only). Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications. Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications.	6
V	Electrical Installations: Introduction of Switch Fuse Unit (SFU), MCB, ELCB, MCCB, ACB. Types of Wires, Cables and Bus-bars.	8

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Text Books:

1. Ritu Sahdev, "Basic Electrical Engineering", Khanna Publishing House, 2018.
2. P.V. Prasad, S. Sivanagaraju, "Electrical Engineering: Concepts and Applications", Cengage, 2018
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
4. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

Reference Books:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

EEEC1203: ESSENTIALS OF ELECTRONICS ENGINEERING

Course Outcome (CO)	
CO1	To give knowledge of some basic electronic components and circuits.
CO2	To introduce basics of diode and transistor circuits
CO3	To understand working of some IC based circuits
CO4	To study logic gates and their usage in digital circuits
CO5	To expose the students to working of some power electronic devices, transducers and application of transducers.

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Semiconductor Diode: Depletion layer, V-I characteristics, ideal and practical Diodes, Diode Equivalent Circuits, Zener Diodes breakdown mechanism (Zener and avalanche). Diode Application: Diode Configuration, Half and Full Wave rectification, Clippers, Clampers, Zener diode as shunt regulator, Voltage-Multiplier Circuits. Special Purpose two terminal Devices: Light-Emitting Diodes, Photo Diodes, Varactor Diodes, Tunnel Diodes.	10
II	Bipolar Junction Transistor: Transistor Construction, Operation, Amplification action. Common Base, Common Emitter, Common Collector Configuration. Field Effect Transistor: Construction and Characteristic of JFETs. Transfer Characteristic. MOSFET (MOS) (Depletion and Enhancement) Type, Transfer Characteristic.	6
III	Operational Amplifiers: Introduction, Op-Amp basic, Practical Op-Amp Circuits (Inverting Amplifier, Non-inverting Amplifier, Unit Follower, Summing Amplifier, Integrator, Differentiator). Differential and Common-Mode Operation, Comparator.	8
IV	Digital Electronics: Number system & representation, Binary arithmetic, Introduction of Basic and Universal Gates, using Boolean algebra simplification of Boolean function. K Map Minimization up to 6 Variables.	8

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V	Fundamentals of Communication Engineering: Basics of signal representation and analysis, Electromagnetic spectrum, Elements of a Communication System, Need of modulation and typical applications. Fundamentals of amplitude modulation and demodulation techniques. Introduction to Wireless Communication: Overview of wireless communication, cellular communication, different generations and standards in cellular communication systems, Fundamentals of Satellite & Radar Communication.	8
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Text Books:

1. Robert L. Boylestand / Louis Nashelsky, "*Electronic Devices and Circuit Theory*", Pearson Education.
2. George Kennedy, "*Electronic Communication Systems*", McGraw Publication
3. David A. Bell, "*Electronic Devices and Circuits*", Oxford University Press
4. Jacob Millman, C.C. Halkias, Satyabratajit, "*Electronic Devices and Circuits*", McGraw Hill
5. A. Anand Kumar, "*Fundamental of Digital Circuits*", PHI 4th edition, 2018

ECS1205	AI for Engineers	L T P 3 0 0	3 credits
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Course Objectives:

CO1	To understand the concepts of Artificial Intelligence (AI).
CO2	To understand strength of and weakness of searching algorithms.
CO3	To learn and compare the searching techniques for AI applications.
CO4	To acquaint with the various knowledge representation & experts' systems.
CO5	To understand basic probability notations in artificial Intelligence/ Game theory.

Unit-I

Introduction: History & overview of Artificial Intelligence, Different Definitions, Problem Solving Strategies, Applications, Physical Symbol System Hypothesis, production systems, Characteristics of production, Agents and Environments, Concept of rationality, Nature of environments, Structure of agents.

Unit-II

Searching Techniques: Search Strategies- Informed-Uninformed Search, depth first search, breadth first search, Heuristic Search Strategies, Evolutionary algorithms Local Search Algorithms, Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning.

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Unit-III

KNOWLEDGE REPRESENTATION: Syntax and semantics of First Order Logic, Prolog Programming, Forward Chaining Backward Chaining Resolution, Knowledge Based Agents, Example, Propositional Logic, Reasoning Patterns in Propositional Logic, Inference in First Order Logic Knowledge Base Reasoning Systems for Categories.

Unit-IV

Game Playing: Constraint Satisfaction Problems(CSP), constraint propagation, backtracking search for CSP, local search for CSP, structure of CSP, Minimax & Alpha-Beta Pruning Algorithm, Imperfect Real-time decisions.

Unit-V

APPLICATIONS: AI applications, Language Models, Information Retrieval, Information Extraction, Natural Language Processing, Machine Translation, Speech Recognition, Robot, Hardware, Perception, Planning & Moving. Fuzzy logic, Probabilistic Reasoning Structured knowledge, graphs, frames and related structures.

Text books and References:

1. Artificial Intelligence by Luger (Pearson Education).
2. Artificial Intelligence, A Modern Approach. Stuart Russell and Peter Norvig.
3. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-GrawHill.
4. Introduction to AI & Expert System: Dan W. Patterson, PHI.

COURSE OUTCOMES:

CO1	To understand the fundamentals of Artificial Intelligence.
CO2	To design smart system using different search strategies of Artificial Intelligence.
CO3	To analyze various basic probability notations, game theory.
CO4	Implement Artificial Intelligence solutions using logical reasoning.
CO5	To apply various algorithms for Artificial Intelligence application development.

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EME1271: EME LAB

Course Outcome (CO)

CO	Description
CO1	Analyze the performance of heat exchangers.
CO2	Measure the coefficients of heat transfer
CO3	Discuss the working of Air conditioning and refrigeration systems
CO4	Experiment with the working of gyroscopes and identify the effects of forces and moments on their motion
CO5	Demonstrate the working of governor apparatus and illustrate the effects of forces and moments on their motion

DETAILED SYLLABUS

Objectives:

To understand the principle and performance characteristics of different materials.

- To know about material properties.
- List of Experiments: (At least 8 of the following)

13. Strength test of a given mild steel specimen on UTM.
14. Impact test on impact testing machine like Charpy, Izod or both.
15. Hardness test of given specimen using Rockwell and Vickers/Brinell testing machines.
16. Experiment on deflection of beam, comparison of actual measurement of deflection with dial gauge to the calculated one, and/or evaluation of young's modulus of beam.
17. Torsion test of a rod using torsion testing machine.
18. Study of NDT (non-destructive testing) methods like magnetic flaw detector, ultrasonic flaw detector, eddy current testing machine, dye penetrant tests.
19. Study of two stroke and four stroke petrol engine.
20. Study of two stroke and four stroke Diesel engine.
21. Study of Models of Boiler.
22. Study of Hydraulic Turbines.
23. Study of Hydraulic Pumps.
24. Study of Refrigeration and Air Conditioning system.

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EEC1272: ESSENTIALS OF ELECTRONICS ENGINEERING LAB

Course Outcome (CO)

CO	Description
CO1	To apply the concepts and analytical principles to analyze electronic (diodes, transistors) circuits.
CO2	To understand the operation of diodes and transistors in order to build circuits.
CO3	To learn the characteristics of Transistor.
CO4	To learn the basics of Amplifiers.
CO5	The students are able to design Op-amp circuits.

DETAILED SYLLABUS

Suggestive List of Experiments

Part A:

1. Study of various types of Active & Passive Components based on their ratings.
2. Identification of various types of Printed Circuit Boards (PCB) and soldering techniques.
3. **PCB Lab:**
 - a. Artwork & printing of a simple PCB
 - b. Etching & drilling of PCB
4. Winding shop: Step down transformer winding of less than 5VA.
5. Soldering shop:
 - o Soldering and desoldering of resistor in PCB
 - o Soldering and desoldering of capacitor in PCB

Part B:

1. Study of Lab Equipment and Components:
 - o CRO
 - o Multimeter
 - o Function Generator
 - o Power supply
 - o Active & Passive Components
 - o Bread Board
2. **PN Junction Diode:**
 - o Characteristics of PN junction diode
 - o Static and dynamic resistance measurement from graph
3. **Applications of PN Junction diode:**
 - o Half & full wave rectifier
 - o Measurement of V_{rms} , V_{dc} , V_{rms} , V_{dc} , and ripple factor
4. Characteristics of Zener diode:
 - o V-I characteristics of zener diode
 - o Graphical measurement of forward and reverse resistance
5. **Characteristic of BJT:** BJT in CE configuration
6. Study of **Operational Amplifier** as Adder and Subtractor

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7. Verification of **Truth Table** of Various Logic Gates
8. Implementation of a given **Boolean function** using logic gates in both SOP and POS forms

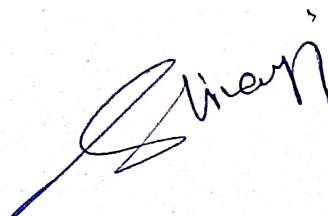
Part C:

Part	Practical Component Description	Notes
Part A	PCB Lab: a. Artwork & printing of a simple PCB. b. Etching & drilling of PCB	This practical is not possible by virtual lab. It will be conducted only in physical mode.
Part B	Study of Lab Equipment & Components: CRO, Multimeter, Function Generator, etc.	NA. These test equipment can be demonstrated online from any lab of ECE department or physical mode is only option.






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EEE1272: ESSENTIALS OF ELECTRICAL ENGINEERING LAB

Course Outcome (CO)

CO	Description
CO1	Calibrate Ammeter and Wattmeter.
CO2	Demonstrate the measuring instrument and electrical machines.
CO3	Conduct open circuit and short circuit test of single-phase transformer.
CO4	Measure 3 phase power using two Wattmeter.
CO5	Identify the components of LT switchgear. Understand the characteristic of RLC series and parallel circuit.

DETAILED SYLLABUS

LIST OF EXPERIMENTS

Note: A minimum of **EIGHT** experiments from the following should be performed.

1. **Verification of Kirchoff's laws**
2. **Measurement of power and power factor in:**
 - i. a single phase AC series inductive circuit
 - ii. study improvement of power factor using capacitor
3. **Study of phenomenon of resonance** in RLC series circuit and obtain resonant frequency.
4. **Connection and measurement of power consumption** of a fluorescent lamp (tube light).
5. **Measurement of power in 3-phase circuit** by two-wattmeter method and determination of power factor for star as well as delta connected load.
6. **Determination of parameters** of AC single phase series RLC circuit
7. **Determination of:**
 - i. Voltage ratio
 - ii. Polarity
 - iii. Efficiency by load test of a single phase Transformer
8. **Determination of efficiency** of a DC shunt motor by load test
9. **To study running and speed reversal** of a three-phase induction motor and record speed in both directions.
10. **Demonstration of cut-out sections of machines:**
 - DC machine
 - Three phase induction machine
 - Single-phase induction machine
 - Synchronous machine

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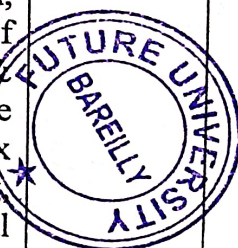
Course Outcome (CO)	
CO1	Understand the significance of value inputs in a classroom and start applying them in their life and profession.
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO3	Understand the value of harmonious relationship based on trust and respect in their life and profession.
CO4	Understand the role of a human being in ensuring harmony in society and nature.
CO5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Overview of Life Skills: Meaning and significance of life skills. Life skills identified by WHO: Self-awareness, Empathy, Critical thinking, Creative thinking, Decision making, Problem solving, Effective communication, Interpersonal relationship, Coping with stress, Coping with emotion. Life skills for professionals: Positive thinking, right attitude, attention to detail, having the big picture, learning skills, research skills, perseverance, setting goals and achieving them, helping others, leadership, motivation, self-motivation, and motivating others, personality development, IQ, EQ, and SQ.	
II	Self-awareness: Definition, need for self-awareness; Coping with Stress and Emotions, Human Values, tools and techniques of SA: questionnaires, journaling, reflective questions, meditation, mindfulness, psychometric tests, feedback. Stress Management: Stress, reasons and effects, identifying stress, stress diaries, the four A's of stress management, techniques, Approaches: action-oriented, emotion-oriented, acceptance-oriented, resilience, Gratitude Training. Coping with emotions: Identifying and managing emotions, harmful ways of dealing with emotions, PATH method and relaxation techniques. Morals, Values and Ethics: Integrity, Civic Virtue, Respect for Others, Living Peacefully, Caring, Sharing, Honesty, Courage, Valuing Time, Time management, Cooperation, Commitment, Empathy, Self-Confidence, Character, Spirituality, Avoiding Procrastination, Sense of Engineering Ethics.	
III	21st century skills: Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Need for Creativity in the 21st century, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking vs Creative thinking, Functions of Left Brain & Right Brain, Convergent & Divergent Thinking, Critical Reading & Multiple Intelligence. Steps in problem solving: Problem Solving Techniques, Six Thinking Hats, Mind Mapping, Forced Connections, Analytical Thinking, Numeric, symbolic, and graphic reasoning, Scientific temperament and Logical thinking.	
IV	Group and Team Dynamics: Introduction to Groups: Composition, formation, Cycle, thinking, Clarifying expectations, Problem Solving, Consensus, Dynamics techniques, Group vs Team, Team Dynamics, and Virtual Teams.	

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	Managing team performance and managing conflicts, Entrepreneurship.	
V	Leadership: Leadership framework, entrepreneurial and moral leadership, vision, cultural dimensions, Growing as a leader, turnaround leadership, managing diverse stakeholders, crisis management. Types of Leadership, Traits, Styles, VUCA Leadership, Levels of Leadership, Transactional vs Transformational Leaders, Leadership Grid, Effective Leaders.	

Suggested Readings:

1. Girish Batra, *Experiments in Leadership*, Chennai: Notion Press, 2018
2. Mitesh Khatri, *Awaken the Leader in You*, Mumbai: Jaico Publishing House, 2013
3. Carnegie Dale, *Become an Effective Leader*, New Delhi: Amaryllis, 2012
4. Hall, C.S., Lindzey, G. & Campbell, J.B. *Theories of Personality*, John Wiley & Sons, 1998
5. A. Nagraj, 1998, *Jeevan Vidya Ek Parichay*, Divya Path Sansthan, Amarkantak
6. P. L. Dhar RR Gaur, 1990, *Science and Humanism*, Commonwealth Publishers
7. A. N. Tripathy, 2003, *Human Values*, New Age International Publishers

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