MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

MAKAUT.SPACE

B.TECH. COMPUTER SCIENCE & ENGINEERING — SYLLABUS (SESSION 2023-24 ONWARDS)

Official Portal: makaut.space

SEMESTER 1 SYLLABUS

PROGRAMME: B.Tech CSE **SEMESTER: 1** **COURSES: 6**

Syllabus and curricular mapping as published by MAKAUT. Course outcomes, CO-PO mapping and unit hours are shown for every course.

6	3 Theory · 3 Practical	22	36
COURSES	COURSE TYPES	CONTACT HRS / WEEK (SUM)	COURSE OUTCOMES

COURSE LIST

Code	Course	Type	Designation	Contact hours	CA	Final
BS-M101	Mathematics-IA	Theory	Compulsory	3L+1T/week	25	70
BS-PH101	Physics-I	Theory	Compulsory	3L+1T/week	25	70
ES-EE101	Basic Electrical Engineering	Theory	Compulsory	3L+1T/week	25	70
BS-PH191	Physics-I Laboratory	Practical	Compulsory	3P/week	40	60
ES-EE191	Basic Electrical Engineering Lab	Practical	Compulsory	2P/week	40	60
ES-ME192	Workshop	Practical	Compulsory	1L+4P/week	40	60

WEEKLY CONTACT HOURS PER COURSE

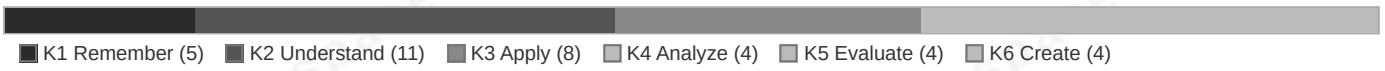


AVERAGE CO MAPPING PER PROGRAMME OUTCOME (0-3)



Bars show PO1-PO12 then PSO1 (S1) and PSO2 (S2), averaged over this semester's courses.

COGNITIVE LEVEL OF COURSE OUTCOMES



BS-M101 — Mathematics-IA

THEORY

Type	Theory	**Designation**	Compulsory	**Contact hours**	3L+1T/week
Continuous assessment	25 marks	**Final exam**	70 marks	**Total unit hours**	40

COURSE OUTCOMES

CO	Statement	Action verb	Level
CO1	Learn the basic mathematical tools to deal with problems of engineering sciences.	Learn	Level I
CO2	Understand properties and application of Calculus and Linear Algebra.	Understand	Level II
CO3	Analyze physical or engineering problems.	Analyze	Level IV
CO4	Acquire problem solving skills related to engineering science.	Acquire	Level II
CO5	Apply Calculus and Linear Algebra in real life problems.	Apply	Level III
CO6	Classify ensembles and differentiate between Calculus and Linear Algebra.	Classify	Level IV

Cognitive levels — K1: 1 K2: 2 K3: 1 K4: 2

CO-PO / PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1
CO3	3	3	3	2	-	-	-	-	-	-	-	3	2	1
CO4	3	1	2	1	-	-	-	-	-	-	1	3	2	2
CO5	2	2	2	2	-	-	-	-	-	-	2	3	1	-
CO6	3	2	2	2	-	-	-	-	-	-	2	3	-	-
AVG	**2.83**	**2.33**	**2.5**	**2.33**	**0**	**0**	**0**	**0**	**0**	**0**	**1.6667**	**3**	**2**	**1.5**

Mapping strength: 1 = low, 2 = medium, 3 = high, - = no mapping. Darker cells mean stronger mapping.

UNIVERSITY SYLLABUS

Unit	Content	Hrs	Share
1	**Calculus (Integration)**: Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	8	
2	**Calculus (Differentiation)**: Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin's theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.	6	
3	**Matrices: Matrices, Vectors**: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.	7	
4	**Vector Spaces: Vector Space, linear dependence of vectors, Basis, Dimension**: Linear transformations (maps), Range and Kernel of a linear map, Rank and Nullity, Inverse of a linear transformation, Rank-Nullity theorem, composition of linear maps, Matrix associated with a linear map.	9	
5	**Vector Spaces (Continued)**: Eigenvalues, Eigenvectors, Symmetric, Skew-symmetric, and Orthogonal Matrices, Eigenbases. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.	10	

BS-PH101 — Physics-I

THEORY

Type	Theory	**Designation**	Compulsory	**Contact hours**	3L+1T/week
Continuous assessment	25 marks	**Final exam**	70 marks	**Total unit hours**	44

COURSE OUTCOMES

CO	Statement	Action verb	Level
CO1	Apply basic concepts of mechanics	Apply	K3
CO2	Discuss Physical optics and analyze principles of lasers with applications	Discuss	K6
CO3	Categorize dielectric and magnetic properties of materials leading to Electromagnetic laws	Categorize	K4
CO4	Differentiate between Classical Physics and Quantum Physics by introducing Planck's law	Differentiate	K5
CO5	Apply wave particle duality in real life problems followed by simple quantum mechanics calculations	Apply	K3
CO6	Classify ensembles and differentiate between classical and Quantum statistical mechanics	Classify	K4

Cognitive levels — K3: 2 K4: 2 K5: 1 K6: 1

CO-PO / PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	1	3	2	0	-	-	-	-	-	-	-	-	-	-
CO6	-	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG	**1.80**	**2.33**	**1.83**	**1.00**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Mapping strength: 1 = low, 2 = medium, 3 = high, - = no mapping. Darker cells mean stronger mapping.

UNIVERSITY SYLLABUS

text printed above the unit table, or null

Unit	Content	Hrs	Share
1	**Mechanics**: Problems including constraints & friction. Basic ideas of vector calculus and partial differential equations. Potential energy function F = -grad V, equipotential surfaces and meaning of gradient. Conservative and non-conservative forces. Conservation laws of energy & momentum. Non-inertial frames of reference. Harmonic oscillator; Damped harmonic motion, forced oscillations and resonance. Motion of a rigid body in a plane and in 3D. Angular velocity vector. Moment of inertia.	7	
2	**Optics**: Distinction between interference and diffraction, Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and multiple slits (only the expressions for max;min, & intensity and qualitative discussion of fringes); diffraction grating (resolution formula only), characteristics of diffraction grating and its applications. Polarisation : Introduction, polarisation by reflection, polarisation by double reflection, scattering of light, circular and elliptical polarisation, optical activity. Lasers : Principles and working of laser : population inversion, pumping, various modes, threshold population inversion with examples.	5	

3	**Electromagnetism and Dielectric Magnetic Properties of Materials**: Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielectrics, internal fields in a solid, Clausius-Mossotti equation (expression only), applications of dielectrics. Magnetisation, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.	8	
4	**Quantum Mechanics**: Introduction to quantum physics, black body radiation, explanation using the photon concept, Compton effect, de Broglie hypothesis, wave-particle duality, verification of matter waves, uncertainty principle, Schrodinger wave equation, particle in box, quantum harmonic oscillator, hydrogen atom.	16	
5	**Statistical Mechanics**: Macrostate, Microstate, Density of states, Qualitative treatment of Maxwell Boltzmann, Fermi-Dirac and Bose-Einstein statistics.	8	

UNIVERSITY SYLLABUS

Unit
Content
Hrs/Unit
1
Mechanics (7L) Problems including constraints & friction. Basic ideas of vector calculus and partial differential equations. Potential energy function F = -grad V, equipotential surfaces and meaning of gradient. Conservative and non-conservative forces. Conservation laws of energy & momentum. Non-inertial frames of reference. Harmonic oscillator; Damped harmonic motion forced oscillations and resonance. Motion of a rigid body in a plane and in 3D. Angular velocity vector. Moment of inertia.
7
2
Optics (5L)
Distinction between interference and diffraction, Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and multiple slits (only the expressions for max;min, & intensity and qualitative discussion of fringes); diffraction grating(resolution formulac only), characteristics of diffration grating and its applications.
Polarisation : Introduction, polarisation by reflection, polarisation by double reflection, scattering of light, circular and elliptical polarisation, optical activity.
Lasers : Principles and working of laser : population inversion, pumping, various modes, threshold population inversion with examples .
5
3
Electromagnetism and Dielectric Magnetic Properties of Materials (8L)
Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielecrrics, internal fields in a solid, Clausius- Mossotti equation(expression only), applications of dielectrics.
Magnetisation , permeability and susceptibility, classificationof magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.
8
4
Quantum Mechanics (16L)
Introduction to quantum physics, black body radiation, explanation using the photon concept, Compton effect, de Broglie hypothesis, wave-particle duality, verification of matter waves, uncertainty principle, Schrodinger wave equation, particle in box, quantum harmonic oscillator, hydrogen atom.
16
5
Statistical Mechanics (8L) Macrostate, Microstate, Density of states, Qualitative treatment of Maxwell Boltzmann, Fermi-Dirac and Bose-Einstein statistics.
8

ES-EE101 — Basic Electrical Engineering

THEORY

Type	Theory	**Designation**	Compulsory	**Contact hours**	3L+1T/week
Continuous assessment	25 marks	**Final exam**	70 marks	**Total unit hours**	42

COURSE OUTCOMES

CO	Statement	Action verb	Level
CO1	Understand and analyze basic electric and magnetic circuits.	Understand	K2
CO2	Study the working principles of electrical machines and power converters.	Study	K1
CO3	Introduce the components of low voltage electrical installations.	Introduce	K1
CO4	Understand the general structure of electrical power system.	Understand	K2
CO5	Understand the construction and operation of single-phase transformer.	Understand	K2
CO6	Explain the working principle of power converters.	Explain	K2

Cognitive levels — K1: 2 K2: 4

CO-PO / PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO2	2	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	2	-	3	1	-	-	-	-	-	-	-	1	-	-
CO4	2	-	2	2	3	-	-	-	-	-	-	2	-	-
CO5	2	2	-	2	3	-	-	-	-	-	-	1	-	-
CO6	2	1	3	3	3	-	-	-	-	-	-	1	-	-
AVG	**2.17**	**2**	**2.75**	**2**	**2.6**	**0**	**0**	**0**	**0**	**0**	**0**	**1.25**	**0**	**0**

Mapping strength: 1 = low, 2 = medium, 3 = high, - = no mapping. Darker cells mean stronger mapping.

UNIVERSITY SYLLABUS

University Syllabus :

Unit	Content	Hrs	Share
1	**DC Circuits**: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.	8	
2	**AC Circuits**: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.	8	
3	**Transformers**: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.	6	
4	**Electrical Machines**: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.	8	
5	**Power Converters**: DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation	6	

6	**Electrical Installations**: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.	6	

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BS-PH191 — Physics-I Laboratory

PRACTICAL

Type	Practical	**Designation**	Compulsory	**Contact hours**	3P/week
Continuous assessment	40 marks	**Final exam**	60 marks	**Total unit hours**	28

COURSE OUTCOMES

CO	Statement	Action verb	Level
CO1	Observe and read data in slide caliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge of Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics	Observe	K1
CO2	Arrange sequential connection in electrical experiment to verify principles of Kirchhoff’s law to verify passive elements of electrical circuit	Arrange	K3
CO3	Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant	Operate	K3
CO4	Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.	Determine	K5
CO5	Apply concepts of quantum mechanics to verify Bohr’s atomic orbital theory	Apply	K3
CO6	Determine Planck’s constant and Stefan’s constant applying modern Physics	Determine	K5

Cognitive levels — K1: 1 K3: 3 K5: 2

CO-PO / PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO4	2	3	1	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO6	2	1	3	2	-	-	-	-	-	-	-	-	-	-
AVG	**2**	**2.33**	**2**	**1.33**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

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UNIVERSITY SYLLABUS

Choose 10 experiments including at least one from Optics, Electricity and Magnetism and Quantum Mechanics and at least a total of six from these three groups.

Unit	Content	Hrs	Share
1	**Experiments in Optics**: 1. Determination of dispersive power of the material of a prism 2. Determination of wavelength of a monochromatic light by Newton's ring 3. Determination of wavelength of a monochromatic light by Fresnel's bi-prism 4. Determination of wavelength of the given laser source by diffraction method	8	

2	**Electricity & Magnetism experiments**: 1. Determination of thermo electric power of a given thermocouple. 2. Determination of specific charge (e/m) of electron by J.J. Thompson's method. 3. Determination of dielectric constant of a given dielectric material. 4. Determination of Hall coefficient of a semiconductor by four probe method. 5. To study current voltage characteristics, load response, areal characteristic and spectral response of a photovoltaic solar cell. 6. Determination of resistance of ballistic galvanometer by half deflection method and study of variation of logarithmic decrement with series resistance. 7. Determination of unknown resistance using Carey Foster's bridge 8. Study of Transient Response in LR, RC and LCR circuits using expeyes 9. Generating sound from electrical energy using expeyes	8	
3	**Experiments in Quantum Physics**: 1. Determination of Stefan-Boltzmann constant. 2. Determination of Planck constant using photocell. 3. Determination of Lande-g factor using Electron spin resonance spectrometer. 4. Determination of Rydberg constant by studying Hydrogen spectrum. 5. Determination of Band gap of semiconductor. 6. To study current voltage characteristics, load response, areal characteristic and spectral response of a photovoltaic solar cell.	6	
4	**Miscellaneous experiments**: 1. Determination of Young's modulus of elasticity of the material of a bar by the method of flexure 2. Determination of bending moment and shear force of a rectangular beam of uniform cross-section 3. Determination of modulus of rigidity of the material of a rod by static method 4. Determination of rigidity modulus of the material of a wire by dynamic method 5. To determine the moment of inertia of a body about an axis passing through its centre of gravity and to determine the modulus of rigidity of the material of the suspended wire 6. Determination of coefficient of viscosity by Poiseulle's capillary flow method	6	

ES-EE191 — Basic Electrical Engineering Lab

PRACTICAL

Type	Practical	**Designation**	Compulsory	**Contact hours**	2P/week
Continuous assessment	40 marks	**Final exam**	60 marks	**Total unit hours**	30

COURSE OUTCOMES

CO	Statement	Action verb	Level
CO1	Calibrate Ammeter and Wattmeter	Calibrate	K3
CO2	Demonstrate the measuring instrument and electrical machines	Demonstrate	K3
CO3	Conduct open circuit and short circuit test of single-phase transformer	Conduct	K2
CO4	Measure 3 phase power using two wattmeters	Measure	K5
CO5	Identify the components of LT switchgear	Identify	K1
CO6	Understand the characteristics of RLC series and parallel circuit	Understand	K2

Cognitive levels — K1: 1 K2: 2 K3: 2 K5: 1

CO-PO / PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	3	-	-	-	2	-	-	-	-	-
CO2	2	3	3	1	2	-	-	-	3	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	2	-	-	-	-	-
CO4	2	-	2	-	3	-	-	-	3	-	-	-	-	-
CO5	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO6	2	1	2	1	3	-	-	-	2	-	-	-	-	-
AVG	**1.83**	**2**	**2.5**	**1**	**2.4**	**0**	**0**	**0**	**2.4**	**0**	**0**	**0**	**0**	**0**

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UNIVERSITY SYLLABUS

Choose 10 experiments from the following:

Unit	Content	Hrs	Share
1	**First activity**: Introduction to basic safety precautions and mentioning of the do's and Don'ts. Noting down list of experiments to be performed, and instruction for writing the laboratory reports by the students. Group formation. Students are to be informed about the modalities of evaluation.	2	
2	**Introduction and uses of following instruments**: (a) Voltmeter (b) Ammeter (c) Multimeter (d) Oscilloscope Demonstration of real life resistors, capacitors with color code, inductors and autotransformer.	2	
3	**Demonstration of cut-out sections of machines**: DC machine, Induction machine, Synchronous machine and single phase induction machine.	2	
4	**Calibration of ammeter and Wattmeter**:	2	
5	**Determination of steady state and transient response of R-L, R-C and R-L-C circuit to a step change in voltage**:	2	
6	**Determination of steady state response of R-L and R-C and R-L-C circuit and calculation of impedance and power factor**:	2	
7	**Determination of resonance frequency and quality factor of series and parallel R-L-C circuit**:	2	

8	**Open circuit and short circuit test of a single-phase transformer**: (a) Open circuit and short circuit test of a single-phase transformer (b) Load test of the transformer and determination of efficiency and regulation	2	
9	**Demonstration of three phase transformer connections**: Voltage and current relationship, phase shifts between the primary and secondary side.	2	
10	**Measurement of power in a three phase unbalanced circuit by two wattmeter method**:	2	
11	**Determination of Torque –Speed characteristics of separately excited DC motor**:	2	
12	**Determination of Torque speed characteristics and observation of direction reversal by change of phase sequence of connection of Induction motor**:	2	
13	**Determination of operating characteristics of Synchronous generator**:	2	
14	**Demonstration of operation of (a) DC-DC converter (b) DC-AC converter (c) DC-AC converter for speed control of an Induction motor**:	2	
15	**Demonstration of components of LT switchgear**:	2	

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ES-ME192 — Workshop

PRACTICAL

Type	Practical	**Designation**	Compulsory	**Contact hours**	1L+4P/week
Continuous assessment	40 marks	**Final exam**	60 marks	**Total unit hours**	16

COURSE OUTCOMES

CO	Statement	Action verb	Level
CO1	Understanding the applications of hand tools and machine tools.	Understand	K2
CO2	Comprehend the safety measures required to be taken while using the tools.	Comprehend	K2
CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Select	K2
CO4	Fabricate components with their own hands	Fabricate	K6
CO5	Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes	Analyze	K6
CO6	Produce small devices of their interest, by assembling different components.	Produce	K6

Cognitive levels — K2: 3 K6: 3

CO-PO / PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-
CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1
AVG	**1**	**0**	**0**	**0**	**0**	**1**	**2**	**1**	**1.75**	**1**	**1.33**	**1**	**0**	**1**

Mapping strength: 1 = low, 2 = medium, 3 = high, - = no mapping. Darker cells mean stronger mapping.

UNIVERSITY SYLLABUS

University Syllabus :

Unit	Content	Hrs	Share
1	**Lectures & videos**: Detailed contents: 1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods 2. CNC machining, Additive manufacturing 3. Fitting operations & power tools 4. Electrical & Electronics 5. Carpentry 6. Plastic moulding, glass cutting 7. Metal casting 8. Welding (arc welding & gas welding), brazing	8	

2	**Workshop Practice**: Machine shop (8 hours) Typical jobs that may be made in this practice module: To make a pin from a mild steel rod in a lathe. To make rectangular and vee slot in a block of cast iron or mild steel in a shaping and / or milling machine. Fitting shop (8 hours) Typical jobs that may be made in this practice module: To make a Gauge from MS plate. Carpentry (8 hours) Typical jobs that may be made in this practice module: To make wooden joints and/or a pattern or like. Welding shop (8 hours (Arc welding 4 hrs + gas welding 4 hrs)) Typical jobs that may be made in this practice module: ARC WELDING (4 hours): To join two thick (approx 6mm) MS plates by manual metal arc welding. GAS WELDING (4 hours): To join two thin mild steel plates or sheets by gas welding. Casting (8 hours) Typical jobs that may be made in this practice module: One/ two green sand moulds to prepare, and a casting be demonstrated. Smithy (4 hours) Typical jobs that may be made in this practice module: A simple job of making a square rod from a round bar orlike. Plastic moulding & Glass cutting (4 hours) Typical jobs that may be made in this practice module: For plastic moulding, making at least one simple plastic component should be made. For glass cutting, three rectangular glass pieces may be cut to make a kaleidoscope using a black colour diamond cutter, or similar other components may be made. Electrical & Electronics (8 hours) Familiarization with LT switchgear elements, making its sketches and noting down its specification. Kitkat fuse, Glass cartridge fuse, Plastic fuse holders (optional), Iron clad isolators, MCB style isolators, Single phase MCB, Single-phase wire, wiring cable. Demonstration of domestic wiring involving two MCB, two piano key switches, one incandescent lamp, one LED lamp and plug point. Simple wiring exercise to be executed to understand the basic electrical circuit. Simple soldering exercises to be executed to understand the basic process of soldering. Fabrication of a single-phase full wave rectifier with a step down transformer using four diodes and electrolytic capacitor and to find its volt-ampere characteristics to understand basic electronic circuit fabrication.	8	

PROGRAMME OUTCOMES (PO) AND PROGRAMME SPECIFIC OUTCOMES (PSO)

ID	Statement
PO1	**Engineering Knowledge** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the 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 Tool Usage** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The Engineer and Society** Apply reasoning informed 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 the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.
PO8	**Ethics** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and Team Work** Function effectively as an individual, and as a member or leader in diverse teams, and in 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	**Life-long 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.
PSO1	The Computer Science and Engineering graduates are able to analyze, design, develop, test and apply skills on the basis of mathematical and programming foundations in the development of computational solutions to design software and hardware.
PSO2	Work with and communicate effectively with professionals in inter-disciplinary fields and pursue lifelong professional development in computing and identify research gaps and hence to provide solution to new ideas and innovations to satisfy the environmental and social issues.