MOTHERHOOD
UNIVERSITY, Roorkee
ENLIGHTENING WORLD

A

STUDY AND EVALUATION SCHEME

OF

DIPLOMA IN ENGINEERING

(MECHANICAL ENGG.)

II Year

[Academic Session 2020-21 onwards]

Roorkee-Dehradun Road, Village Karoundi,
Post Bhagwanpur, Tehsil-Roorkee
Pin -247661
Distt-Haridwar-(Uttarakhand)

MOTHERHOOD UNIVERSITY

Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Uttrakhand, India

Sr. No.	Subject Code	Subject Name	Effective Teaching			Credit	Evaluation Scheme		
			L	T	P		Internal Assessment	External Assessment	Total Marks
			Hours/week						
THEORY									
1	MUPME-301N	Applied Mechanics	4	-	-	4	30	80	110
2	MUPME-302N	Material Science & Metallurgy	3	-	-	3	30	80	110
3	MUPME-303N	Workshop Technology	3	-	-	3	20	80	100
4	MUPME-304N	Machine Drawing	2	-	-	2	30	80	110
5	MUPME-305N	Thermodynamics	3	-	-	3	20	80	100
6	MUPME-306N	Basic Electrical & Electronics Technology	3	-	-	5	30	80	110
PRACTICAL									
7	MUPME-351N	Applied Mechanics Lab	-	-	2	1	20	30	50
8	MUPME-352N	Material Science & Metallurgy Lab	-	-	2	2	20	30	50
9	MUPME-353N	Workshop Technology Lab	-	-	4	4	25	50	75
10	MUPME-354N	Machine Drawing Lab	-	-	4	4	20	30	50
11	MUPME-355N	Thermodynamics Lab	-	-	2	1	20	30	50
12	MUPME-356N	Basic Electrical & Electronics Technology Lab	-	-	2	2	30	30	60
13	MUPGP-351N	General Proficiency	-	-	2	2	25	-	25
		TOTAL	**18**	**-**	**18**	**36**	**320**	**680**	**1000**

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Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Uttrakhand, India

MUPME-301N	APPLIED MECHANICS	L:4:T:0:2:0	4 Credits

Course Objectives:

• To understand distributed force systems, centroid/ center of gravity and method of finding centroids of composite figures and bodies.

• To understand the moment of inertia and method of finding moment of inertia of areas and bodies.

• To understand types of frames and analyze for the forces in the members of the truss by method of joints and method of sections

Course Outcomes:

	At the end of the course ,students will be able to:	Blooms Level
CO1	To develop ability to model and analysis of mechanical engineering systems using vectoral representation of forces and moments	K
CO2	To be able to draw the free body diagrams of mechanical components and systems.	K
CO3	Ability to draw shear force diagram and banding moment for different types of beams taking	K
CO4	To understand the phenomenon of friction and ability to solve problem related to the same.	K
CO5	Students will gain knowledge regarding center of gravity and moment of inertia and apply them for practical problems.	K

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaulate, K6- Create

UNIT-1:Introduction
1.1 Concept of engineering mechanics definition of mechanics, statics, dynamics application of engineering mechanics in practical fields. Definition of Applied Mechanics.
1.2 Definition, basic quantities and derived quantities of basic units and derived units
1.3 Different systems of units (FPS, CGS, MKS and SI) and their conversion from one to another density,

force, pressure, work, power, velocity, acceleration
1.4   Concept of rigid body, scalar and vector quantities

UNIT-2:Laws of forces
2.1   Definition of force, measurement of force in SI units, its representation, types of force: Point force/concentrated force & Uniformly distributed force, effects of force, characteristics of a force
 2.2   Different force systems (coplanar and non-coplanar), the principle of transmissibility of forces, law of superposition
 2.3   Composition and resolution of coplanar concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law o forces - graphically, analytically, resolution of forces, resolving a force into two rectangular components
2.4   Free body diagram
2.5   Equilibrant force and its determination
2.6   Lami's theorem (concept only)

UNIT-3:Moment
3.1   Concept of moment
3.2   Moment of a force and units of moment
3.3   Varignon's theorem (definition only)
3.4   Principle of moment and its applications (Levers – simple and compound, steel yard, safety value, reaction at support)
3.5   Parallel forces (like and unlike parallel force), calculating their resultant
3.6   Concept of couple, its properties and effects
3.7   General conditions of equilibrium of bodies under coplanar forces and beams fixed support, roller, support, overhanging, uniformly distributed load, point load, varying load
3.8   Position of resultant force by moment [Simple problems on the above topics]

UNIT-4:Friction

4.1   Definition and concept of friction, types of friction, force of friction
        Laws of static friction, coefficient of friction, angle of friction, angle
4.2   of repose,

        cone of friction
        Equilibrium of a body lying on a horizontal plane, equilibrium of a
4.3   body lying on a

        rough inclined plane, friction in simple screw jack
        Calculation of least force required to maintain equilibrium of a body
4.4   on a rough

        inclined plane subjected to a force:

        a) Acting along the inclined plane Horizontally
        b) At some angle with the inclined plane

UNIT-5: Centre of Gravity

1. Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies

2. Determination of centroid of plain and composite lamina using moment method only, centroid of bodies with removed portion

3. Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed

UNIT-6: Moment of Inertia

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle *(without derivations).* Second moment of area for L, T and I sections, section modulus.

UNIT-7: Simple Machines

7.1   Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machines
7.2   Simple and compound machine (Examples)
7.3   Definition of ideal machine, reversible and self-locking machine
7.4   Effort lost in friction, Load lost in friction, determination of maximum mechanical advantage and maximum efficiency
7.5   System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency
7.6   Working principle and application of wheel and axle, different pulley blocks, simple screw jack, worm and worm wheel, single and double winch crab. Expression for their velocity ratio and field of their application

LIST OF PRACTICALS

1.   Verification of the following laws:
   a) Parallelogram law of forces
   b) Triangle law of forces
   c) Polygon law of forces
2.   To verify the forces in different members of jib crane.
3.   To verify the reaction at the support of a simply supported beam.
4.   To find the Mechanical Advantage, Velocity Ratio and efficiency in case of an inclined plane.
5.   To find the Mechanical Advantage, Velocity Ratio and efficiency of a screw jack.
6.   To find Mechanical Advantage, Velocity Ratio and efficiency of worm and worm wheel.
7.   To find Mechanical Advantage, Velocity Ratio and efficiency of single purchase crab.
8.   To find out center of gravity of regular lamina.
9.   To find out center of gravity of irregular lamina.
10.   To determine coefficient of friction between three pairs of give

RECOMMENDED BOOKS

1. A Text Book of Applied Mechanics by S Ramamurtham, Dhanpath Rai Publishing Co LTD.

2. A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi;S; S; S. Chand and Co.Ltd., New Delhi.

3. A Text Book of Applied Mechanics by RK Rajput; Laxmi Publications, New Delhi

MOTHERHOOD UNIVERSITY

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MUPME-302N	MATERIAL SCIENCE & METALLURGY	L:3:T:0:2:0	3Credits

Course Objectives:

This course provides students an understanding of basic structure and• crystal arrangement of materials, the phase diagrams, advantages of heat treatment and the method of heat treatment processes, powder metallurgy processes, the need and application of composite materials.

Course Outcomes:

At the end of the course ,students will be able to:		Blooms Level
CO1	Identify the properties of metals with respect to crystal structure and grain size	K
CO2	Understand concept of mechanical behavior of materials and calculations of same using appropriate equations	K
CO3	Explain the concept of phase & phase diagram & understand the basic terminologies associated with metallurgy. Construction and identification of phase diagrams and reactions	K
CO4	Understand and suggest the heat treatment process & types. Significance of properties Vs microstructure. Surface hardening & its types. Introduce the concept of hardenability & demonstrate the test used to find hardenability of steels	K
CO5	Explain features, classification, applications of newer class materials like smart materials, piezoelectric materials, biomaterials, composite materials etc.	K

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaulate, K6- Create

1. Importance of Materials

1.1 Classification: Metals and non-metals, Ferrous and non-ferrous metals and their alloys.
1.2 Crystalline and non-crystalline structures; unit cells, Bravais space lattices, cubic closed pack structures, coordination number, miller indices, crystallographic planes and directions.
1.3 Structural imperfections- point, line, planar and volume defects, structure property relationship.

1.4 Names of common metals, their alloys and non-metals used in Industry
1.5 Properties of metals and alloys
1.6 Physical properties - Appearance, luster, colour, density and melting point
1.7 Thermal and electrical conductivity
1.8 Corrosion, causes, effects and prevention.
1.9 Study of creep and fatigue.

2. Ferrous Metals and Alloys

2.1 Flow diagram for the production of ferrous metals from their ores, constituents of iron, iron carbon diagram.
2.2 Classification, composition and uses of cast iron and plain carbon steels. IS, BS and SAE Grades
2.3 Effect of alloying elements such as Aluminum, chromium, Nickel, Cobalt, Manganese, Molybdenum, tungsten, Vanadium, Silicon, Sulphur and Phosphorous on steels.
2.4 Composition, properties, and uses of special steels such as High speed steel, Stainless steels, Silicon steels, Heat resistant steels, Spring steel.
2.5 Heat Treatment: Iron-carbon diagram, objectives of heat treatment. Brief description and uses with examples of principal heat treatment processes, Annealing, Normalizing, Tempering, Hardening, Carburizing, Nit riding and Cyaniding and applications, case hardening

3. Iron Carbon Equilibrium Diagram

3.1   Phase transformation
3.2   Nucleation and growth

4. T-T-T Diagram

4.1   Importance of critical cooling rate.
4.2   Marten site transformation
4.3   Nucleation and growth

5. Non-ferrous Metals and Alloys

5.1 Copper: Properties and uses
5.2 Composition, properties and uses of copper alloys.
5.3 Brasses: Cartridge brass, Nickel silver
5.4 Bronzes: Phosphor bronze, Al-bronze, MN-bronze, and Gun metal.
5.5 Properties and uses of Aluminum.
5.6 Composition, properties and uses of Al-alloys e.g., Duralumin, Yellow metal, Magnesium And Hindalium
5.7 Properties and uses of alloys of lead, tin and magnesium.
5.8 Bearing Metals: Requisite qualities. Composition, properties and uses of white metal bearing, copper based bearing metals. Aluminum based bearing metals. Use of nylon/PTFE for bushes/bearings, bi-metallic and trimetallic bushes

6. Other Important Materials

6.1 Plastics: Definition, classification of plastics, fiber glass, reinforced plastics. Major applications of various plastics and their uses and grades.

6.2 Composite materials.

6.3 Heat insulating materials: Properties and uses of asbestos, glass wool, thermos Cole, cork, mica.

6.4 Electrical insulating materials. Properties and uses of china clay, leather, Bakelite, ebonite, glass wool, rubber, felt.

6.5 Sound insulating materials: Cork, fiber boards.

6.6 Fabrication materials: Wood, plywood, rubber – natural and synthetic, Glass – plate glass, toughened glass, safety glass.

6.7 Refractory materials: General characteristics and uses of dolomite, ceramics.

6.8 Protective coating materials: Paints, primers, varnishes, enamels, putti, electroplating materials, rubasil, Teflon coating.

6.9 Sealant and adhesives – Application and availability of sealant and adhesives for industrial user.

6.10 Smart materials.

7. Diffusion

Fick's Laws of Diffusion and practical examples.

8.   Powder Metallurgy and Mechanical Working of Metals
8.1   Introduction of powder metallurgy
8.2   Advantage and limitations of powder metallurgy
8.3   Powder metallurgy processes
8.4   Principles of hot and cold working
8.5   Effect on properties and limitations Selection, specifications and commercial availability of materials
9.1   Practical considerations for selection of material for different purposes
9.2   ISO/ Bureau of Indian standard specifications for metals, non-metals, various components and materials.

LIST OF PRACTICALS

1.   Classification of about 25 specimen of materials/ parts into
      Metal and Non Metals
      Metal and Alloys
      Ferrous and nonferrous metals
      Ferrous and nonferrous alloys

2   Given a set of specimen of metals and alloys (copper, brass, aluminum, cast iron, HSS, Gun metal), identify and indicate the various properties possessed by them

3   Study of heat treatment furnace

4   Study of metallurgical microscope and a specimen polishing machine.

5   To prepare specification of following materials for microscopic examination and to examine the micro structure of specimens of following materials

6   To anneal a given specimen and find out difference in hardness as a result of annealing
7   To normalize a given specimen and to find out the difference in hardness as a result of normalizing
8   To temper a given specimen to find out the difference in hardness as a result of tempering
9   Study of Ball Mills used in preparation of powder
10   Study of Pallet Press.

RECOMMENDED BOOKS

1   Material Science by R.K. Rajput; Laxmi Publication, Darya Ganja, New Delhi.
2   Advances in material Science by R.K. Dogra and Dr.A.K. Sharma; S.K. Kat aria & sons;
3.   Material Science by GBS Narang; Khanna Publishers New Delhi.

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MUPME-303N	WORKSHOP TECHNOLOGY	L:3:T:0:P:0	3Credits

Course Objectives:

- To know various Moulding processes and tools

- To develop a skill in dignity of labour, precision, safety at work place, team working and development of right attitude.

- Understand various forging processes and its tools and heat treatment

Course Outcomes:

	At the end of the course ,students will be able to:	Blooms Level
CO1	Select the various types of Fabrication Process for Mechanical applications.	K
CO2	Understand new technologies in metal joining process	K
CO3	Understand fundamental concept of pattern making and Moulding in practice	K
CO4	Understand the Metal casting Techniques and basic structure of products.	K
CO5	Understand basic concept of use of different types of furnace	K

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaulate, K6- Create

UNIT-1

Principle of welding, Classification of welding processes, Advantages and limitations, Industrial applications of welding, Welding positions and techniques, symbols. Gas Welding, Principle of gas

welding, Types of gas welding flames and their applications, Gas welding equipment's, Gas welding torch, Oxy acetylene cutting torch, Blow pipe, Pressure regulators, Filler rods and fluxes.

UNIT-2
Arc Welding, Principle of operation, Arc welding machines and equipment, A.C. and D.C. arc welding, Effect of polarity, current regulation and voltage regulation, Electrodes, Flux for arc welding. Other Welding processes, Resistance welding: Principle, advantages, limitations, working and applications of spot welding, seam welding, projection welding and percussion welding. Shielded metal arc welding, submerged arc welding, welding defects, methods of controlling welding defects and inspection of welded joints.

UNIT-3

Modern Welding Methods, Principle of operation, advantages, disadvantages and applications of:
Tungsten inert gas (TIG) welding, Metal inert gas (MIG) welding, Thermit welding, Electro slag welding.

UNIT-4

Pattern Making, Types of pattern, Pattern material, Pattern allowances, Pattern codes as per B.I.S. Introduction to cores, core boxes and core materials, Core making procedure, Core prints, positioning of cores. Moulding Sand, Properties of Moulding sand, permeability, refractoriness, adhesiveness, cohesiveness, strength, flow ability, collapsibility etc. Various types of Moulding sand and testing of Moulding sand. MouldMaking, Types of moulds, molding boxes, hand tools used for moulds making, molding processes: Bench molding, floor molding, pit molding and machine molding.

UNIT-5

Casting Processes Principle, working and applications of Die casting: hot chamber and cold chamber, Investment and lost wax process, Centrifugal casting, Continuous casting process. Gating and Rise ring system, Elements of gating system, pouring basin, sprue, runner, gates Types of risers, location of riser, Casting Defects, Different types of casting defects and their reasons, testing of defects: radiography, magnetic particle inspection, and ultrasonic inspection.

UNIT-6

Melting Furnaces Construction and working of: Pit furnace, Cupola furnace, Crucible furnace –tilting type.

MUPME-304N	MACHINE DRAWING	L:2:T:0:P:0	2Credits

Course Objectives:

- To understand and apply national and international standards while drawing machine component.

- To understand the concept of various tolerances and fits used for component design

- To familiarize in drawing assembly, orthographic and sectional views of various machine components.

Course Outcomes:

	At the end of the course ,students will be able to:	Blooms Level
CO1	Identify the national and international standards pertaining to machine drawing	K
CO2	Understand the basic knowledge of drawing bearings and pulleys	K
CO3	Understand the basic knowledge of assembling drawing from detail drawing	K
CO4	Understand the basic knowledge of drawing gears and gearings	K
CO5	The student will be able to draw the assembly from the individual part drawing and draw jigs ,fixtures and gauges	K

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaulate, K6- Create

1. Introduction to Machine Drawing

1.1 Graphic language, classification of machine drawing, conventional representation.
1.2 System of orthographic projections. Third angle projection, first angle Projection No. of views required. One view, Two views, Three views drawing
1.3 Sectioning- Material convention, important types of section- full section, half Section, revolved section and aligned section
1.4 Temporary and permanent fasteners

2-Bearings

2.1   Bush bearing
2.2   Foot Step bearing
2.3   Simple wall bracket

3. Pulleys

3.1   Flat belt pulley
3.2   V belt pulley
3.3   Cone or stepped pulley
3.4   Fast and loose pulley

4. Pipe Joints

4.1   Flange joint
4.2   Spigot and socket joint
4.3   Threaded pipe joint
4.4   Expansion joint
4.5   piping joint

5. Assembling drawing from detail drawing

5.1 Stuffing box
5.2 Eccentric
5 3 Blow off cock
5.4 Cross head
5.5 Connecting rod
5.6 Ram's bottom safety valve
5.7 Stop valve
5.8 Plummer block
5.9 Tail stock
5.10 Shaper tool head
5.11 Machine vice
5.12 Screw jack
5.13 Swivel Bearing

6. Gears and Gearing

6.1 Spur gear- Nomenclature, gear formula, method to draw base circle,
involute curve, tooth profile of internal and external gears.
6.2 Bevel gear- Nomenclature, gear formula, method to
draw Bevel gear.

7. Free hand sketches

7.1 Cutting tool of lathe, shaper, milling cutter, drilling tools, broaching tools.
7.2 Gear puller, C clamp
7.3 Square and hexagonal nut bolt assembly
7.4 Cotter joint
7.5 Knuckle joint
7.6 pipe joint

8. Jig, fixture and Gauges

8.1 Concept of jig and fixture, types of jig and fixture and applications
8.2 Simple plate drill jig, drill jig for batch production
8.3 Indexing fixture
8.4 Introduction to gauges, use of Go-No Go gauge and ring gauge

RECOMMENDED BOOKS

1.   Machine Drawing by P.S. Gill; Kataria and Sons, Ludhiana.

2.   A Text book of Machine Drawing by R.K. Dhawan, S. Chand and Company LTD.

3.   Machine Drawing by GR Nag pal; Khanna Publishers, New Delhi.

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MUPME-305N	**THERMODYNAMICS**	**L:3:T:0:P:0**	**3Credits**

Course Objectives:

- Use thermodynamic terminology correctly.
- Explain fundamental thermodynamic properties.
- Derive and discuss the first and second laws of thermodynamics.
- Solve problems using the properties and relationships of thermodynamic fluids.
- Analyze basic thermodynamic cycles.
- Students must have understanding of thermodynamic fundamentals before studying their application in applied thermodynamics

Course Outcomes:

	At the end of the course ,students will be able to:	Blooms Level
CO1	Explain the basic concepts of thermodynamics like system, properties, equilibrium, pressure, specific volume, temperature, zeroth law of thermodynamics, temperature measurement and temperature scales	K
CO2	Calculate thermodynamic properties using tables of thermodynamic properties and analyze the processes on T-v diagrams to solve advanced engineering problems	K
CO3	Evaluate the performance of steam power plants, refrigeration plants and their components using the first law of thermodynamics for open systems	K
CO4	Apply the inequality of Clausius and establish the property entropy of a system.	K
CO5	Derive and apply principle of increase of entropy to evaluate the feasibility of a thermodynamic process	K

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaulate, K6- Create

1. Fundamental Concepts

Introduction, thermodynamic system, surrounding, boundary, state, universe, thermodynamic systems–closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic, properties of system – intensive and extensive, thermodynamic equilibrium, quasi – static process, reversible and irreversible processes, concept of work and heat, equality of temperature, Zeroth law of thermodynamics, definition of properties like pressure, volume, temperature, enthalpy, internal energy, Simple numerical problems.

2. Laws of Perfect Gases

Definition of gases, concept of perfect gas, explanation of perfect gas laws – Boyle's law, Charlee's law, Avogadro's law, Universal gas constant, Characteristic gas equations (Simple numerical problems) Specific heat at constant pressure, specific heat at constant volume of gas.

3. Thermodynamic Processes on Gases

Types of thermodynamic processes – isochoric, isobaric, isothermal, hyperbolic, isentropic, polytrophic and throttling processes, equations representing the processes Derivation of work done in various processes change in internal energy.

4. Laws of Thermodynamics

Law of conservation of energy, first law of thermodynamics (Joule's experiment), Application of first law of thermodynamics to non-flow systems –Constant volume, constant pressure, Adiabatic and polytrophic processes, steady flow energy equation, Application of steady flow energy equation to turbines, pump, boilers, compressors, nozzles, evaporators. Limitations. Heat source and heat sinks, statement of second laws of thermodynamics: Kelvin Planck's statement, Classius statement, equivalence of statements, Perpetual motion Machine of first and second kind, Carnot engine

5. Properties of Steam

Formation of steam and related terms, thermodynamics properties of steam, steam tables, internal latent heat, internal energy of stream, T- s diagrams, Mollier diagram (H – S Chart), Expansion of steam, Hyperbolic, reversible adiabatic and throttling processes Quality of steam (dryness fraction), measurement of dryness fraction, throttling calorimeter.

6. Steam Boiler

Classification of steam Boilers, Working principle of Simple vertical boilers &Babcock and Wilcox boiler, boiler mountings and accessories

7. Steam Turbines

Function and use of steam turbine, Steam nozzles- types and applications, Steam turbines, impulse, reaction, Throttle governing of steam turbines

- Function and use of steam turbine,
- Steam nozzles- types and applications,
- Steam turbines, impulse, reaction,
- Throttle governing of steam turbines
-

8. **Steam condensers**
   - Function of a steam condenser, elements of condensing plant
   - Classification-jet condenser, surface condenser
   - Cooling pond and cooling towers
   -
9. **Air compressors**

   Function of air compressor, type of air compressor- signal stage, multi stage reciprocating compressors, inter-cooling of compressors, rotary compressor, Construction and working

RECOMMENDED BOOKS

1. Engineering Thermodynamics by PK Nag; Tata Mc Graw Hill, Delhi.
2. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi.
3. Engineering Thermodynamics by CP Arora, Tata McGraw Hill, Delhi.

LIST OF PRACTICLES

1. Demonstration of steam turbines through models and visit
2. Demonstration of steam condensers through models and visits
3. Study of modern high pressure steam boilers (at least one)
4. Demonstration of boiler Accessories and mountings
5. Demonstration/study of an impulse turbines
6. Demonstration/ study of a reaction turbine
7. Demonstration of air compressor

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MUPME-306N	BASIC ELECTRICAL & ELECTRONICS TECHNOLOGY	L:3:T:0:P:0	3Credits

Course Objectives:

Course Outcomes:

	At the end of the course ,students will be able to:	Blooms Level
CO1	Students will gain knowledge regarding the various laws and principles associated with electrical systems.	K
CO2	Illustrate basics of AC and DC circuits	K
CO3	Students will gain knowledge regarding electrical machines and apply them for practical problems.	K
CO4	Students will gain knowledge regarding various types' semiconductors	K
CO5	Student will gain knowledge on electronic systems.	K

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaulate, K6- Create

1. Overview of Electricity:

General use and applications of electricity; Use and applications of electricity to agriculture, Mechanical & Automobile sector; Advantages of electrical energy over other forms of energy.

2. DC Circuits

Introduction to basic terms: charge, current, voltage, power, and energy; Ohm's law; Power dissipation in resistors; Series and parallel combination of resistors; Kirchhoff's laws; Star-delta conversions; The venin's theorem, Norton's theorem, and Maximum-power-transfer theorem; Ideal and practical voltage source; Current source.

2. AC Circuits:

Concept of alternating voltage and current; Introduction to basic terms: cycle, frequency, time period, amplitude, instantaneous value, rams value, peak value, phase difference, form factor, and peak factor

3. Batteries and Solar Cells:

Primary and secondary cells; Construction, working, and applications of Lead-Acid, Charging methods for Lead-Acid batteries; Maintenance of Lead-Acid batteries; Series and parallel connection of batteries; Maintenance free batteries; General idea of solar cells, solar panels and their applications.

4. Electrical Machines

transformers; Efficiency and regulation; Operation of welding transformer, functions and basic principles of motors, types of motors, Construction and operation of stepper motors & Servo motor.

5. Semiconductors:

Classification of materials as conductors, insulators, and semiconductors; Intrinsic and extrinsic semiconductors; p-type and n-type semiconductors; pan-junction diode.

6. Electrical Installation and Safety:

Various Accessories and parts of electrical installation, overview of industrial and domestic wiring systems; Common electrical safety measures; Protection and precaution against electrical shock; Treatment of electrical shock

LIST OF PRACTICALS

1. Verification of Ohms Law
2. Verification of KCL and KVL
3. Test of charging and discharging of lead-acid battery using hydrometer
4. Connection of a three –phase motor and starter with fuses and reversing of
5. Connection of analog and digital single phase energy meter
6. Study of a distribution board for domestic and industrial installation
7. Open -circuit and short-circuit test on a single-phase transformer
8. Star-delta starting of induction motor

RECOMMENDED BOOKS

1. Basic Electrical Engineering by Satya Prakash an, New Delhi
2. Basic Electricity by BR Sharma; PS Donegal; Tata McGraw Hill Publishers
3. Electrical Machine by SK Bhattacharya; Tata McGraw Hill, New Delhi.