SUBJECT: Basic Mechanical Theory & Cooling System

CLASS XI

SEMESTER I

THEORY

FULL MARKS – 20

(MCQ Type Question)

UNIT	Topic	No of periods assigned	Marks
1	Basic Thermodynamics	18	7
2	Fluid Mechanics	09	3
3	Basics of Heat transfer	09	5
4	Introduction to Cooling system	09	5
	Total	**45**	**20**

DETAIL SYLLABUS

Unit	Topics / Sub Topics	No of periods assigned
1	**Basic Thermodynamics:** 1.1 Concept of Thermodynamic system, boundary, surroundings and control volume 1.2 Classification of Thermodynamic systems 1.3 Definition of Thermodynamic properties, processes and cycles 1.4 Concept of Thermodynamic equilibrium and quasi-static process 1.5 Definition of Energy (heat & work), internal energy and enthalpy 1.6 Concept and unit of heat, specific heats 1.7 Concept of Zeroth law of thermodynamics 1.8 Statement of 1st law of Thermodynamics and 2nd law of Thermodynamics (Kelvin Planck & Clausius statement only) 1.9 Application of 2nd law of Thermodynamics to various thermodynamic system (Heat engine, Heat pump and Refrigerator)	18
2	**Fluid Mechanics:** 2.1Introduction of fluid (Liquid and Gas) 2.2 Definition of different properties of fluid: Density, Specific gravity, Specific weight, Specific volume, Viscosity, Surface tension, Capillarity 2.3Concept of vacuum and gauge pressures, atmospheric pressure, absolute pressure	09
3	**Basics of Heat transfer:** 3.1 Concept of heat transfer	09

	3.2 Definition of Three modes of heat transfer: Conduction, Convection and radiation 3.3 Definition of Thermal conductivity 3.4 Definition of Absorptivity, reflectivity and transmissivity 3.5 Concept of Grey and Black bodies 3.6 Definition and use of Heat exchanger	
4	**Introduction to Cooling system:** 4.1 Definition of Cooling system 4.2 Need of different cooling systems: refrigerator, air-conditioner, freezer 4.3 Definition of refrigerator, air-conditioner and freezer 4.4 Difference between refrigerator and freezer	09
	Total	**45**

SUBJECT: Basic Mechanical Theory & Cooling System

CLASS XI

SEMESTER II

THEORY

FULL MARKS – 30

(SAQ AND LAQ Type Question)

UNIT	Topic	No of periods assigned	Marks
5	Engineering Materials, their properties & uses	09	2(SAQ) & 4(LAQ)
6	Measuring Instruments & Gauges	09	2(SAQ) & 4(LAQ)
7	Manufacturing Processes	15	2(SAQ) & 4(LAQ)
8	Mechanical Power Transmission	09	2(SAQ) & 4(LAQ)
9	Refrigeration and Air-conditioning	21	2(SAQ) & 4(LAQ)
	Total	**63**	**30**

DETAIL SYLLABUS

Unit	Topic / Sub Topics	No of periods assigned
5	**Engineering Materials, their properties & uses:** 5.1 Classification of steel according to percentage of carbon and their properties & uses, Properties & uses of cast iron, Properties and uses of copper, brass, zinc, lead & aluminum 5.2 Definition of Mechanical Properties: Ductility, Malleability, Hardness, Toughness, Elasticity, Plasticity and Brittleness.	09
6	**Measuring Instruments & Gauges:** 5.1 Definition and Difference between Measuring Instruments & Gauges, Examples of Measuring Instruments & Gauges. 5.2 Description & Least count of Micrometer, Procedure for taking measurement by using micrometer. 5.3 Description & vernier constant of Vernier Calliper, Procedure for taking measurement by using Vernier Calliper 5.4 Types and uses of different types of Gauges	09
7	**Manufacturing Processes:** 7.1 Definition of Manufacturing process 7.2 Different manufacturing processes: Metal Casting, Metal Forming, Metal joining and Machining operation	15

	Metal Casting: basic terminologies and principle of casting process Metal Forming: Basic idea of different processes like Forging, Rolling Metal joining: basic idea about general procedure of Welding, Riveting, Bolting, Soldering and Brazing Machining operation: Basic idea about application of different machine tools like Lathe, Drilling and grinding 7.3 Fitting- Different tools (vice, hammer, chisel, file, punch scriber, surface plate, v-block, try square etc.) used for fitting work and their purpose; Specification of file; Purpose of using drill, reamer and tap. Tap drill size	
8	**Mechanical Power Transmission:** 8.1 Definition of Mechanical Power Transmission 8.2 Importance of power transmission 8.3 Different power transmission elements: Shafts, Belts, Chains, Gears, Couplings (Application only) 8.4 Types & Uses: Nut & Screw, Key & Key way 8.5 Uses of Pulleys, Cams, Followers, Couplings & Bearings.	09
9	**Refrigeration and Air-conditioning:** 9.1 Definition of Refrigeration, Refrigerating effect, Coefficient of Performance (COP), Capacity of Refrigeration, Refrigeration cycle 9.2 Definition of refrigerant, Some common refrigerants (Name only) 9.3 Labelled Flow diagram of Vapour Compression Refrigeration Cycle (Block diagram only) 9.4 Labelled Flow Diagram of Vapour Absorption Refrigeration System (Block diagram only) 9.5 Components of Single Door Refrigerator and Double Door Refrigerator (Name, Location and use) 9.6 Definition Air-conditioning, Factors affecting Air conditioning (Name only) 9.7 Show and uses of psychrometry chart 9.8 Different systems of Air Conditioning, such as-Summer Air conditioning system, Winter (Brief idea with block diagram) 9.9 Air Conditioning system, Year-Round Air-Conditioning System (Brief idea with block diagram) 9.10 Components of Window Air Conditioner and Split Air Conditioner. (Brief idea with block diagram)	21
	Total	**63**