

FUNDAMETALS OF MECHANICAL ENGINEERING

LIST OF IMPORTANT QUESTIONS (LONG QUESTIONS)

UNIT-I (INTRODUCTION TO MECHANICS)

- 1) Draw the stress-strain curve for mild steel and cast iron. Also describe its salient points.
- 2) Write short notes on types of beam.
- 3) Develop the relationship between E (Young's modulus), K (Bulk modulus) and μ (Poisson ratio).
- 4) Develop the relationship between E (Young's modulus), C (Shear modulus), and μ (Poisson ratio).
- 5) NUMERICAL ON REACTION OF BEAM.
- 6) NUMERICAL ON COMPOSITE BAR.
- 7) NUMERICAL ON RESULTANT OF FORCES.
- 8) NUMERICAL ON ROLLER.

UNIT-II (INTRODUCTION TO IC ENGINES & ELECTRIC VEHICLES)

- 1) Compare the following- (i) SI Engine and CI Engine (ii) 4-stroke Engine and 2-stroke Engine
- 2) Explain the working of four stroke CI engine with P-V diagram and with suitable sketch.
- 3) Give the types of energy storage technologies suitable for hybrid electric vehicle. Explain the lithium-ion batteries in detail.
- 4) Explain the different engine parts with neat diagram including their functions.
- 5) What are the main components of electric vehicles? Write down their advantages and disadvantages.

UNIT-III (INTRODUCTION TO REGRIGERATION AND AIR-CONDITIONING)

- 1) Explain basic components and working of Window Air Conditioner. Also draw T-S and p-h diagram.
- 2) Explain the following: (i) DPT (ii) Comfort Conditions (iii) Specific Humidity
- 3) With a neat sketch, explain the working principle of vapour compression Refrigeration system. Also draw T-s and P-h diagram.
- 4) Define coefficient of performance (COP) for a refrigeration system. Why do we express the performance in terms of COP instead of efficiency? Also, compare the COPs of a refrigerator and a heat pump.
- 5) NUMERICAL ON COP (REFRIGERATOR, HEAT ENGINE, HEAT PUMP)

UNIT-IV (INTRODUCTION TO FLUID MECHANICS & APPLICATIONS)

- 1) What are the hydraulic pumps? Enlist the various types of pumps.
- 2) Explain the working and construction details of reciprocating pump.

- 3) What is Turbine? Explain construction details of Pelton Turbine with diagram.
- 4) Describe the Pascal Law. Explain the working of Hydraulic Lift with the help of a neat diagram.
- 5) With a neat sketch illustrate the construction and working of Centrifugal Pump.
- 6) Give the classification of turbine. Explain the construction details and working of Francis turbine.
- 7) NUMERICAL ON PASCAL'S LAW AND CONTINUITY EQUATION.
- 8) NUMERICAL ON VISCOSITY.

UNIT-V (INTRODUCTION TO MEASUREMENT & MECHATRONICS)

- 1) What are the Avionics, Bionics, and Autotronics? Also write their applications.
- 2) Define mechatronics. Write the advantages, disadvantages and applications of mechatronics.
- 3) Explain the construction and working of optical pyrometer and bourdon tube pressure gauge
- 4) What are the parts of venturimeter? Derive a formula to measure the rate of flow of a liquid through venturimeter.
- 5) Define mechanical actuators. Explain the following in brief: (i) Kinematic chain (ii) Gear and its types (iii) Cam-Follower
- 6) Describe the construction and operation of a Prony brake dynamometer.
- 7) What are the examples of mechatronic system? How does the evolution of mechatronics take place?
- 8) Differentiate between bonded and unbonded strain gauges systems.

(SHORT QUESTIONS)

UNIT-I (INTRODUCTION TO MECHANICS)

- 1) Define Young's modulus, Bulk modulus and Poisson's ratio.
- 2) State Hooke's law.
- 3) Discuss about superposition theorem.
- 4) Explain the principle of transmissibility of forces.
- 5) Define lateral, longitudinal, and volumetric strain.
- 6) What do you mean by shear strain?
- 7) Explain Poisson's ratio and factor of safety (FoS).

UNIT-II (INTRODUCTION TO IC ENGINES & ELECTRIC VEHICLES)

- 1) Define scavenging process in IC Engine.
- 2) Discuss the terms used in IC engine - TDC, BDC, Stroke and Bore.
- 3) What are internal combustion engines?

UNIT-III (INTRODUCTION TO REGRIGERATION AND AIR-CONDITIONING)

- 1) What is the function of an accumulator?
- 2) Describe the one ton of refrigeration in SI system.
- 3) Differentiate between dry bulb temperature (DBT) and wet bulb temperature (DBT).
- 4) Define dew point temperature (DPT).

UNIT-IV (INTRODUCTION TO FLUID MECHANICS & APPLICATIONS)

- 1) Define specific gravity of a fluid.
- 2) Differentiate between gauge pressure and absolute pressure
- 3) Discuss the equation of continuity.
- 4) Calculate the specific gravity of one liter of a liquid that weighs 7N.
- 5) Define: Density, weight density and specific volume and specific gravity.
- 6) What is the difference between dynamic viscosity and kinematic viscosity?
- 7) What are Newtonian and non-Newtonian fluids?
- 8) A pressure of 2000 Pa is transmitted throughout a liquid column due to a force being applied on a piston. If the piston has an area of 0.1 m^2 , what force is applied?

UNIT-V (INTRODUCTION TO MEASUREMENT & MECHATRONICS)

- 1) Write any four mechanical actuators.
- 2) Explain the calibration in measurement.
- 3) Differentiate between precision and accuracy.
- 4) Differentiate active and passive transducers.
- 5) Define pressure control valve.
- 6) What is a transducer? Describe with any one example.
- 7) Why gears are used?