BASIC MECHANICL ENGINEERIG, BT-203.

IMPORTANT QUESTIONS

UNIT – 1, MATERIALS

Q-1. Define Hardness? Explain the methods to measure the following

  (1) Hardness of materials.   (2) Impact testing of materials.   (3) Tensile testing of steel.

Q-2. Classify Engineering Materials. What is alloy steel? Name 05 alloying elements & their effects on properties.

Q-3. Write short notes on:-

  (1) Stress – Strain diagram of ductile material.   (2) Hook's law & Modulus of Elasticity.

  (3) Elastic Limit & Ultimate point   (4) Strength, Ductility, Toughness & Creep.

UNIT – 2, MEASUREMENT & PRODUCTION ENGINERING.

Q -1. With a neat diagram explain the main parts & any four operations performed on the following

  (1) A Lathe Machine.   (2) Drilling Machine

Q-2. Discuss the application of Vernier Caliper. Also explain the measurement process using Vernier Caliper with neat Sketch.

Q -3. Give a detailed description of the following:-

  (1) Various methods used for Temperature Measurement? Explain any one of them.

  (2) Working of a manometer for pressure measurement. Also relate Absolute pressure, gauge pressure & vacuum pressure.

  (3) Sine Bar & Micrometer.

UNIT – 3, FLUIDS.

Q -1. Explain working principle of Hydraulic Turbines (Pelton Wheel) with neat sketch.

Q-2. Define Viscosity, Newton's law of viscosity & Pascal law. What is the importance of viscosity, while

  selecting fluids in various Engineering applications?

Q -3. Give a detailed description of the following:-

  (1) Bernoulli's theorem and mention the assumptions involved in it.

  (2) Reciprocating Pump also explain its working with a neat sketch, with two application.

  (3) Draft tube, why is it used in a reaction turbine? Describe with a neat sketch.

UNIT – 4, THERMODYNAMICS & STEAM ENGINEERING.

Q -1. Define Thermodynamic system, explain types of system & also explain properties & state.

Q-2. How Steam Boilers are classified? Also explain the construction & working of

    (1)Babcock & Wilcox boiler   (2) Cochran boiler.

Q -3. Give a detailed description of the following:-
    (1) Kelvin Plank and Clausius statement of thermodynamics.
    (2) Boiler Mountings & Accessories. Also write their functions.
    (3) Equivalent Evaporation & Boiler Efficiency.

UNIT – 5, RECIPROCATING MACHINES.

Q -1. Explain the structure & working of (1) Four stroke Diesel Engine.   (2) Four stroke Petrol Engine.

                                         (3) Two stroke Petrol Engine.   (4) Two stroke Diesel Engine.

Q-2. Derive an Expression for air standard efficiency with neat sketches of P-V & T-S diagrams of

    (1) OTTO Cycle   (2) CARNOT Cycle

Q -3. Give a detailed description of the following:-
    (1) Working principle of Steam Engine.
    (2) Working principle of the Centrifugal Compressor.
    (3) Differentiate between 02 stroke engines and 04 stroke engines
    (4) The advantages of 4 stroke engine over 2 stroke engines.

NUMERICALS FOR PRACTICE.

UNIT – 1, MATERIALS

1. A mild steel specimen with an original diameter of 10 mm & a gauge length of 50 mm was found to have an ultimate load of 60 KN & Breaking load of 40 KN. The gauge length at rupture was 55 mm & diameter at rupture cross- section was 8 mm. Determine:

i) The Ultimate Stress   ii) Breaking Stress

iii) True Breaking Stress   iv) Percentage Elongation.

2. A rod 200 cm long & of diameter of 3 cm is subjected to an axial pull of 30 KN. If the Young's Modulus of the material of the rod is 2×10^{5} N/mm^{2}, determine:

1) Stress.   2) Strain   3) Elongation of the rod.

3. Find the Modulus of Elasticity of a brass rod of diameter 25 mm & of length 250 mm which is subjected to a tensile load of 50 KN when the extension of the rod is equal to 0.3 mm.

4. A square rod of 30 mm side & 5 m length is subjected to an axial compressive load of 150kN. Calculate the shortening of the length of the road, if the Modulus of Elasticity is 215 GN/m^{2}.

UNIT – 3, FLUIDS.

1. A flat plate of area 1.5×10 mm² is pulled with a speed of 0.4m/s relative to another plate located at a

distance of 0.15mm from it. Find the force & power required to maintain this speed, if the fluid

separating them is having viscosity as 1 poise [1 poise=0.1Ns/m²].

2. The water is flowing through a pipe having diameter 20 cm and 10 cm at section 1 and 2 respectively.

The rate of flow through pipe is 35 liters/s. The section 1 is 6 m above the datum and section 2 is 4m

above the datum. If the pressure at the section 1 is 39.34 N/cm². Find intensity of pressure at section 2.

UNIT – 4, THERMODYNAMICS & STEAM ENGINEERING.

1. A reversible heat engine delivers 0.5 kW power and rejects heat energy to a reservoir at 290 K at the rate of 22kJ/min. Determine the cycle efficiency and temperature of the thermal reservoir supplying heat to the Engine.

2. During a trial operation of a boiler 1630 kg of coal were consumed in 24 hrs &13000 kg of water evaporated. The mean steam pressure was 7kgf/cm² and condition dry saturated. The fuel contained 3 percent moisture & 4 percent ash & had a calorific value of 7200 kcal/kg. The feed water temperature was 35°C.Determine

(1) The Boiler Efficiency.

(2) The Equivalent Evaporation per kg of dry coal.

(3) The Equivalent Evaporation per kg of combustibles.

3. Determine the Work done in compressing 1 kg of air from a volume of 0.15 m^3 at a pressure of 1 bar to a Volume of 0.05 m^3, when the compression is –

i) Isothermally   ii) Adiabatically.

4. Find the temperature, enthalpy, entropy & internal energy of 1 kg of dry saturated steam at 10 bar.

5. Calculate the internal energy of 1 kg of steam at a pressure of 10 bar, when the steam is –

i)   0.9 dry

ii) Dry saturated

iii) Superheated to 250^0 C