

Code: EE1T6

I B.Tech-I Semester-Regular Examinations-February 2013

BASIC MECHANICAL ENGINEERING

(For Electrical Engineering)

Duration: 3hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a. Derive the relation between Bulk modulus and Young's Modulus. [7M]
- b. Draw the stress strain diagram for mild Steel and explain its features. [7M]
2. An I-section is made up of three rectangles viz. two flanges having thin long horizontals and one web connecting them having its long side vertical. The top flange section is 15cmX2.5cm and that of the bottom flange is 30cmX5cm. The web section is 20cm deep and 2.5cm broad. Find the height of the centroid of the area of this cross section from bottom of the lower flange. [14M]
3. a. Derive the expressions for the moment of inertia of a rectangular section of size b X d. [7M]

- b. Calculate the moment of inertia of a hollow circular section of external and internal diameters 10cm and 8cm respectively about an axis passing through the centroid. [7M]
4. A bar of magnesium alloy 28mm in diameter was tested on a gauge length of 25cm in tension and in torsion. A tensile load of 5 tonnes produced an extension of 0.4mm and a torque of 1250 kg.cm produced a twist of 1.51° . Determine (i) The young's modulus, (ii) the modulus of rigidity, (iii) the bulk modulus, and (iv) the Poisson's ratio for the material under test. [14M]
5. a. State the advantages and disadvantages of two-stroke over Four-stroke cycle engines. [7M]
- b. Distinguish between petrol engines and diesel engines. [7M]
6. Derive an expression for the efficiency of a carnot cycle with the aid of p-v & T-S diagrams. [7M]
7. a. What are the differentiating features between a water tube and fire tube boiler? [7M]
- b. Explain with a neat sketch the working of a Benson boiler. [7M]

8. a. Describe with a neat sketch, water level indicator for a boiler. [7M]
- b. What is a function of a superheater? Describe Sudgen's superheater. [7M]