

Code No: RT32033

R13**SET - 1**

III B. Tech II Semester Supplementary Examinations, November - 2017
DESIGN OF MACHINE MEMBERS- II
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What are journal bearings? Give a classification of these bearings. [3M]
- b) What is the difference between centre and overhung crankshafts? [3M]
- c) What are the main functions of the piston? List out the main parts of piston. [4M]
- d) Define curved beam. How is it different from straight beam? State the engineering application of curved beam. [4M]
- e) What are the advantages of V-belts over flat belts? Explain by comparing equations. [4M]
- f) What is a lever? Explain the principle on which it works. [4M]

PART -B

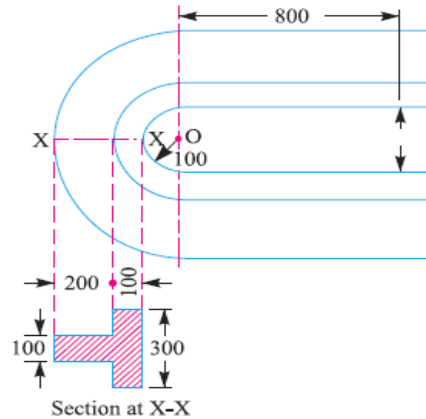
- 2 a) Design a journal bearing for the following data : [12M]
Journal diameter = 70 mm
Journal speed = 450 rpm
Clearance = 0.0025 mm/mm
Viscosity of the oil = 10 centipoise at 75°C
Ambient temperature = 27°C
Specific gravity of oil = 0.9
- b) Why are ball and roller bearings described as anti-friction bearings? [4M]
- 3 a) Explain the design of centre crankshaft when crank is at dead center. [8M]
- b) Explain the design of centre crankshaft when crank is at an angle with the line of dead centre positions and subjected to maximum torsional moment. [8M]
- 4 a) Design a cast iron trunk type piston for a single acting four stroke engine developing 75 kW per cylinder when running at 600 r.p.m. The other available data is as follows: [16M]
Maximum gas pressure = 4.8 N/mm²; Indicated mean effective pressure = 0.65 N/mm²; Mechanical efficiency = 95%; Radius of crank = 110 mm; Fuel consumption = 0.3 kg/BP/hr; Calorific value of fuel (higher) = 44 × 10³ kJ/kg; Difference of temperatures at the centre and edges of the piston head = 200°C; Allowable stress for the material of the piston = 33.5 Mpa; Allowable stress for the material of the piston rings and gudgeon pin = 80 Mpa; Allowable bearing pressure on the piston barrel = 0.4 N/mm² and allowable bearing pressure on the gudgeon pin = 17 N/mm².

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- 5 a) A punch press, used for stamping sheet metal, has a punching capacity of 50 kN. The section of the frame is as shown in Fig. Find the resultant stress at the inner and outer fibre of the section. (All dimensions are in mm) [10M]



- b) Explain the design procedure for crane hook. [6M]
- 6 a) The nominal diameter of a triple threaded square screw is 50 mm, while the pitch is 8 mm. It is used with a collar having an outer diameter of 100 mm and inner diameter as 65 mm. The coefficient of friction at the thread surface as well as at the collar surface can be taken as 0.15. The screw is used to raise a load of 15 kN. Using the uniform wear theory for collar friction, calculate:
(i) torque required to raise the load;
(ii) torque required to lower the load; and
(iii) the force required to raise the load, if applied at a radius of 500 mm. [8M]
- b) A rope drive is required to transmit 750 kW from a pulley of 1 m diameter running at 450 r.p.m. The safe pull in each rope is 2250 N and the mass of the rope is 1 kg / m length. The angle of lap and the groove angle are 150° and 45° respectively. Find the number of ropes required for the drive if the coefficient of friction between the rope and the pulley is 0.3. [8M]
- 7 a) A parallel helical gear 300 mm in diameter has 20° involute full depth teeth and helix angle is 30° . It transmits a torque of 4500 N-m. Find the tangential, radial and axial loads acting on the teeth. Indicate them graphically. [10M]
- b) State the application of hand and foot levers. Discuss the procedure for designing a hand lever. [6M]
