Code No: 9A03605/R09

B.Tech. III Year II Semester Regular and Supplementary Examinations **Set-2**

April/May - 2013

DESIGN OF MACHINE ELEMENTS-II

(Mechanical Engineering)

Time: 3 Hours Max. Marks: 70

*Answer any **FIVE** Questions*

***All** Questions carry **equal** marks*

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1. (a) What are the different bearing materials?

   (b) Describe the various stages of friction in the case of plain bearings.

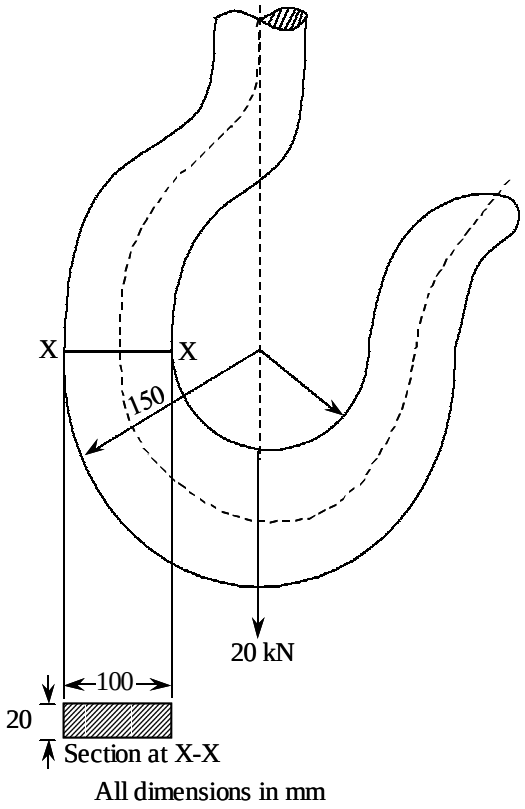
2. (a) List various liner materials used in the manufacturing of cylinder of I.C. engine.

)(b) Explain design calculation of piston barrel and gudgeon pin.

3. (a) Compare centre and side crank, crank shafts.

   (b) Explain any one with neat sketch with design considerations.

4. The crane hook carries a load of 20 kN, as shown in figure. The section at X-X is rectangular whose horizontal side is 100 mm. Find the stresses in the inner and outer fibers at the given section.



Figure

5. (a) What are the advantages and disadvantages of V-belt drive over flat belt drive?

(b) Derive the relation for the ratio of driving tensions of a V-belt.

6. (a) Write a short note on gear drives giving their merits and demerits.

(b) It is required to design a pair of spur gears with 20° full depth involute teeth based on Lewis equation. The velocity factor is to be used to account for dynamic load. The pinion shaft is connected to a 10 kW, 1440 r.p.m motor. The starting torque of the motor is 150% of the rated torque. The speed reduction is 4:1. The pinion as well as the gear are made of plain carbon steel 40C8 (σ = 600 N/mm^2). The factor of safety can be taken as 1.5. Design the gear, specify their dimensions.

7. (a) A helical torsion spring of mean diameter 60 mm is made of a round wire of 6 mm diameter. If a torque of 6 N-m is applied on the spring, find the bending stress induced and the angular deflection of the spring in degrees. The spring index is 10 and modulus of elasticity for the spring material is 200 kN/mm^2. The number of effective turns may be taken as 5.5.

(b) Design a leaf spring for the following specifications, Total load = 140 kN; number of springs supporting the load = 4; maximum number of leaves = 10; span of the spring = 1000 mm; permissible deflection = 80 mm. Take Young's modulus, E = 200 kN/mm^2 and allowable stress in spring material as 600 MPa.

8. A bar is raised and lowered by two 40 mm square threads having a pitch of 10 mm. Determine the force required at a radius of 80 mm to raise or lower at 10000 N cross bar of a planer. The screw and nut materials are steel bronze respectively. The collar materials are steel and bronze respectively. The collar material is steel; it has an outside diameter of 76 mm and an inside diameter of 38 mm; coefficients of friction at threads and at collar are 0.11 and 0.13 respectively.