

R07**Code: R7320305**

B.Tech III Year II Semester (R07) Supplementary Examinations December/January 2015/2016

DESIGN OF MACHINE MEMBERS – II

(Mechanical Engineering)

(For 2008 regular admitted batch only)

Time: 3 hours

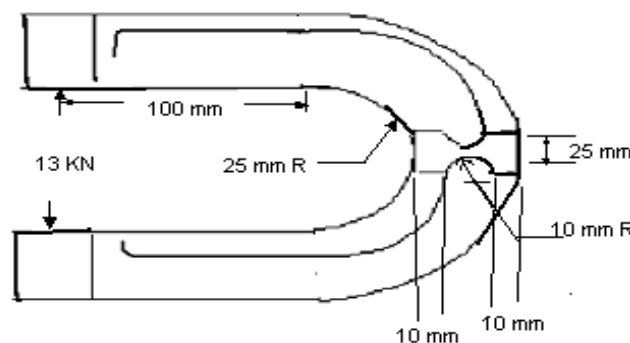
Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

Use of design data books is permitted in the examination hall

- 1 (a) Define the following terms:
 - (i) Attitude angle.
 - (ii) Bearing characteristic number.
 - (iii) Viscosity index.
- (b) The thrust of a propeller shaft in a marine engine is taken up by a number of collars integral with the shaft, 300 mm diameter. The thrust on the shaft is 200 kN and the speed of the shaft is 90 r.p.m. Assuming the coefficient of friction as 0.05 and bearing pressure 0.35 MPa, determine:
 - (i) Number of collars required. (ii) Thickness of the collars. (iii) Power lost in friction.
- 2 (a) What are the commonly used materials for connecting rods?
- (b) The connecting rod of a slow speed Diesel engine is 3 m long and is made of alloy steel 55. Determine the suitable dimensions for a circular section of the rod. The bore and stroke of the cylinder are 900 mm and 1200 mm respectively. The maximum combustion pressure is 4.8 MPa
- 3 (a) List the various liner materials.
- (b) How a piston is cooled and what are the advantages of cooling?
- (c) How will you fix the size of the piston rings?
- 4 A cast-steel frame as shown in the figure below has a rectangular cross section of 25 mm by 40 mm with a 10 mm radius semicircular notch on both sides that forms mid flank fluting as shown below. Estimate the inner and outer surface stresses at the throat, to withstand a load of 13 kN.



Contd. in page 2

R07

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- 5 A leather belt 120 mm wide and 6 mm thick, transmits power from a pulley 750 mm diameter which runs at 500 r.p.m. the angle of lap is 150° and $\mu = 0.3$. If the mass of 1 m^3 of leather is 1 kg and the stress in the belt is not to exceed 2.75 MN/m^2 , find the maximum power that can be transmitted.
- 6 A pair of parallel helical gears consists of an 18 teeth pinion meshing with a 64 teeth gear. The normal module is 3 mm. The helix angle is 23° , while the normal pressure angle is 20° . Calculate: (i) The transverse module. (ii) The transverse pressure angle. (iii) The axial pitch.
- 7 (a) Define the following terms, with respect to screw threads:
 - (i) Pitch.
 - (ii) Pitch diameter.
 - (iii) Nominal diameter.
 - (iv) Root diameter.
 - (v) Lead.
 (b) Distinguish between the following:
 - (i) Metric and BSW threads.
 - (ii) Square and ACME threads.
 - (iii) Pitch and lead of a screw thread.
- 8 A rectangular box type cast-iron column of height 2 m, section 30 cm x 30 cm and wall thickness 30 mm is loaded as shown in figure below. Calculate the maximum deflection of the column. How the deflection would be affected by an aperture of 10 cm x 30 cm in the loaded wall?

