Code No: 56019

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B. Tech III Year II Semester Examinations, May - 2015
DESIGN OF MACHINE MEMBERS II
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

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1.a) A bearing for an axial flow compressor is to carry a radial load of 2500N and thrust of 1500N the service imposes light shock and the bearing will be in use for 40 hours/week for 5 years. The speed of the shaft is 1000 rpm. Select suitable ball bearing for the purpose and give the required tolerances on the shaft and the housing. Assume diameter of the shaft is 50mm.

   b) Write a note on:
   i) Bushed journal bearing
   ii) Pedestal bearing.

[9+6]

2.a) A journal bearing 160 mm long and 45mm diameter supports a radial load of 8000N , the shaft speed is 160 r/min, oil used is SAE 60 at 25^0c inlet temperature. Using clearance ratio of 600 find the rise in temperature, maximum film pressure and minimum film thickness.

   b) Why is spherical roller bearing capable of taking up higher load than self-aligning ball bearing of same I.D and O.D ?

[12+3]

3.a) Design a overhung crank for the following Data . Maximum load on the crank pin, when the crank and connecting rod are at right angle is 44kN.The crank radius is 16mm and the distance between centers of the crank pin and the main bearing is 240mm, the crank pin is hydraulically pressed in position and the web is keyed to the crank shaft.

   b) Why are connecting rods made of I section of rectangular section instead of round or square section. Justify your answer with neat sketches.

[12+3]

4.a) A compressor receives power from a motor rated at 30kW at 22rps by means of V belts. The driving pulley diameter is 300mm and driven pulley is 750mm. center distance is 1.4m. Select suitable belts for the above drive and indicate relevant dimensions in a sketch.

   b) Sketch and describe any three configurations of belt drives.

[11+4]

5.a) Design a spur gear to transmit 1.5 kW at 1440 rpm from an electric motor to an air Compressor running at 720 rpm. List the relevant parameters of the gears.

   b) Differentiate between external bevel, internal bevel and crown gears.

[12+3]

6. Design a bevel gear drive to transmit 4 kW. Speed ratio = 4 driving shaft speed = 225 rpm. The drive is non reversible. Assume life of 26,000 hours.

[15]

7. Design a suitable worm drive to provide a reduction of 40 while transmitting 10 hp at 1400 r/min of the worm. [15]

8.a) A sluice gate weighing 600KN is raised and lowered by means of two square threaded screws. The coefficient of friction between the thrust collar and screw is 0.003 and that between the screw and nut is 0.05. Design the screw and the nut.

b) Discuss in brief with neat sketches about different types of thread profiles stating their applications. [10+5]

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