Code No: 56019 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B. Tech III Year II Semester Examinations, December-2014/January-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) What are the various non dimensional terms used in journal bearings analysis and design? Give their definitions in brief.

b) A journal bearing is proposed for a steam engine. The load acting on the journal is 3 kN, diameter 50 mm, length 75 mm, speed 1600 rpm, diametral clearance 0.001 mm, ambient temperature 15.5^{0}C. Oil SAE 10 is used and the film temperature is 60^{0}C. Determine the heat generated and heat dissipated. Take absolute viscosity of SAE10 at 60^{0}C = 0.014 kg/m-s.

2.a) Suggest a suitable rolling contact bearing for the given applications.
i) Shafts with angular misalignment
ii) Precision machine tools
iii) Condition of dry environment.

b) A single row deep groove ball bearing operating at 2000 r.p.m. is acted by a 10 kN radial load and 8 kN thrust load. The bearing is subjected to a light shock load and the outer ring is rotating. Determine the rating life of the bearing.

3.a) Explain the design for a centre crank shaft when the crank is at an angle of maximum twisting moment.

b) What is the function of a connecting rod of an internal combustion engine?

4. The following data is given for a flat belt drive transmitting 6 kW or power at 1400 rpm. Speed of the driven pulley is 450 rpm and the maximum permissible peripheral speed is 16 m/s. Assume 3% of creep; load factor 1.2; density of the belt material = 980 kg/m^3; modulus of elasticity for the belt = 100 MPa, ultimate strength = 25 MPa; centre distance = 2.8 m and endurance limit for the belt material is 4 MPa. Design for belt as well as for the pulley. Estimate the life of the belt in hours.

5.a) Explain the different causes of gear tooth failures and suggest possible remedies to avoid such failures.

b) A bronze spur pinion rotating at 600 rpm drives a cast iron spur gear at a transmission ratio of 4: 1. The allowable static stresses for the bronze pinion and cast iron gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 20^0 full depth involute teeth of module 8 mm. The face width of both the gears is 90 mm. Find the power that can be transmitted from the standpoint of strength.