



Reg. No. :

Name :

Seventh Semester B.Tech. Degree Examination, November 2013
(2008 Scheme)

08.705 : DESIGN OF MACHINE ELEMENTS – II (M)

Time : 3 Hours

Max. Marks : 100

Instructions : 1) Answer **all** questions from Part **A** and **one** full question from **each** Module in Part **B**.

2) Assume any **missing** data suitably.

3) **Use** of approved Design Data Handbook **permitted**.

PART – A

1. Explain with neat sketches the condition for constant velocity ratio of Gears.
2. Explain the classification of worms and worm gears.
3. Explain interference in involute gears.
4. Explain the forces acting on a Bevel gear with neat sketches.
5. What is meant by Hydrodynamic lubrication ?
6. What are rolling contact bearings ? Discuss their advantages over sliding contact bearings.
7. Explain the causes of bearing failures.
8. Discuss the various types of stresses induced in a fly wheel rim.
9. What are the advantages and drawbacks of cone clutch ?
10. Name different types of clutches. Give one practical application of each.

(10×4=40 Marks)



P.T.O.



PART – B
MODULE – I

11. A pair of straight teeth spur gears, having 20° involute full depth teeth is to transmit 22 hp at 300 rpm of the pinion. The speed ratio is 2:1. The gear is of cast iron and pinion is of steel. Design the pair.
12. A pair of bevel gears is required to transmit 30 kW at 500 rpm. The output shaft is running at 200 rpm and is at 60° to the input shaft. The gear is phosphor bronze and the pinion is of cast steel. Design the gear set.

MODULE – II

13. Following data refer to a 360° hydrodynamic bearing : radial load = 3 kN, journal speed = 1500 rpm, journal diameter = 50 mm, bearing length = 50 mm, radial clearance = 0.05 mm, viscosity of lubricant = 25 cp. Assuming that the total heat generated in the bearing is carried by total oil flow in bearing, calculate i) the coefficient of friction, ii) power lost in friction, iii) minimum oil film thickness, iv) flow requirement and v) temperature rise.
14. A bearing is to carry radial load 250 kgf and axial thrust of 140 kgf. The load imposes light shock. The desired 90% life is 10 hrs/day service for 5 years at 3000 rpm. a) select a deep groove ball bearing for this service and compute its 90% life b) what is the probability of the bearing surviving the specified life ?

MODULE – III

15. Design a overhung crank shaft for a steam engine to the following specifications :
Diameter of piston = 400 mm, stroke of piston = 600 mm, maximum steam pressure = 10 N/mm^2 , speed of the engine = 100 rpm, distance of bearing from crank = 350 mm. Design shear stress for crank shaft and crank pin = 35 N/mm^2 . Design tensile stress for crank shaft and key = 66 N/mm^2 .
16. A single plate clutch is used to connect a machine shaft to a driver shaft at 800 rpm. The uniform pressure is 0.15 N/mm^2 and co-efficient of friction is 0.30. The inner and outer radii of disc are 60 and 110 mm. The inertia of machine is 1 kgm^2 . Calculate a) axial force required, b) power capacity, c) time for acceleration, d) energy dissipation and e) torque capacity.

(3×20=60 Marks)