



(Pages : 3)

A – 3798

Reg. No. :

Name :

**Seventh Semester B.Tech. Degree Examination, June 2016
(2008 Scheme)**

08.705 : DESIGN OF MACHINE ELEMENTS – II (M)

Time : 3 Hours

Max. Marks : 100

- Instructions :**
- 1) Answer **all** questions from Part – A. **Each** question carries 4 marks.
 - 2) Answer **one full** question from **each** Module in Part – B. **Each full** question carries 20 marks.
 - 3) Assume **any** missing data suitably.
 - 4) **Use** of approved design data hand book is permitted.

PART – A

(10×4=40 marks)

1. Briefly describe the different regimes of lubrication based on Stribeck curve.
2. Define virtual number of teeth in bevel gears.
3. What are the materials commonly used for worm and worm wheel ? Why is material selection more important with worm gear drives than the other gears ?
4. State the assumptions made in obtaining Lewis equation for gear.
5. Compare rolling and sliding contact bearings with respect to :
 - i) magnitude of load
 - ii) nature of load
 - iii) speed
 - iv) life.
6. Why is heat balance important in journal bearing design ?
7. What are the design requirements of piston ?
8. What types of stresses are developed in the walls of an IC engine cylinder ?
9. Explain the functions of flywheel in an engine.
10. What are the most usual causes of crank shaft failures ?



P.T.O.



PART - B
Module - I

11. The following data is given for a pair of helical gears :

	Gear	Pinion
Material	50C4	60C4
Ultimate strength, MPa	660	750
Hardness (BHN)	241	255
Normal pressure angle	20°	20° (involute)
Number of teeth	70	35
Module of elasticity, GPa	205	200

Taking service factor as 1.5, factor of safety as 3 and helix angle as 30°, design the gear pair and check for dynamic and wear strength. The speed of pinion is 720 rpm.

OR

12. A pair of bevel gears is required to transmit 6 kW from a pinion shaft rotating at 450 rpm with a reduction ratio of 3. The angle between the shafts is 80° and the drive is subjected to moderate shock, operating for 12 hours per day. Assuming suitable material, design the gear pair based on bending and wear strength consideration.

Module - II

13. Following data refer to a 360° hydro-dynamic bearing of babbitt material : Radial load = 8 KN, Journal speed = 1450 rpm, Journal diameter = 75 mm, Journal length = 50 mm, Minimum oil film thickness = 20 microns, Inlet temperature = 38°C. Determine the length of the bearing and select suitable oil for machine tool application.

OR



14. Select a single row deep groove ball bearing for a shaft of 75 mm diameter. The bearing should be operated for 300 millions of revolutions. The 35 minutes operating load cycles are as follows :

Load condition	Radial load (kN)	Thrust load (kN)	Speed (rpm)	Duration (minutes)
Static	11.5	-	720	9
Heavy shock	2.4	1.9	900	15
Moderate shock	10	1.5	1440	11



Module - III

15. Design a cast iron piston for a single acting cylinder four-stroke engine from following data : Cylinder bore : 100 mm, Stroke : 120 mm, Maximum gas pressure : 5 N/mm², Speed : 2200 rpm, Brake mean effective pressure : 0.65 MPa, Fuel consumption : 0.227 kg/kWh, Higher calorific value of fuel : 47000 KJ/kg.

OR

16. Design a connecting rod for a four stroke petrol engine with the following data : Piston diameter : 100 mm, Stroke : 140 mm, Distance between connecting rod centres : 320 mm, Weight of reciprocating parts : 19.6 N, Speed : 1500 rpm, Explosion pressure : 2.45 MPa. Assume suitable factor of safety.
-