Reg. No. : ....

Name : ....

Seventh Semester B.Tech. Degree Examination, November 2015
(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** carries **4** marks
and **one full** question from **each** Module of Part – **B. Each**
carries **20** marks.
2) Assume **any missing** data **suitably.**
3) **Use** of approved design data hand book **is permitted.**
4) Make **neat** sketches **wherever** necessary.

PART – A

(10×4=40 Marks)

1. Explain interference phenomenon in involute gears and state the condition to avoid interference.

2. How the bevel gears are classified ? Explain with neat sketches.

3. What are the advantages and disadvantages of worm gear drives ?

4. Explain the formation of hydrodynamic oil film in a hydrodynamic bearing.

5. Bring out the important properties of a good lubricant.

6. How do you express the life of a bearing ? What is median life ?

7. Why modern I.C. Engine pistons are made of Aluminium alloy ?

8. Show the forces acting on an I.C. Engine connecting rod.

9. Distinguish clearly the functions of a 'Fly wheel' and a 'Governor'.

10. What are the advantages and disadvantages of cone clutches ?

PART – B
MODULE – 1

11. A compressor running at 300 rpm is driven by a 15 kW, 1200 rpm motor through a 14½° full depth gears. The centre distance is 0.375 m. The motor pinion is to be C-30 forged steel hardened and tempered, and the driven gear is to be of cast steel. Assuming medium shock condition (a) Determine the module, the face width, and the number of teeth on each gear (b) Check the gears for dynamic load and wear.

20

OR

12. Two helical gears are used in a speed reducer. The rated power is 75 kW at a pinion speed of 1200 rpm. The speed ratio is 3 : 1. Assume medium shock conditions and 24 hr. operation. Take helix angle as 29°.

   a) Determine the module, face width, number of teeth in each gear, and the material and heat treatment if the teeth are 20° full depth in the normal plane.

   b) And check for wear strength.   **20**

MODULE – 2

13. Design a journal bearing with diameter of 100 mm for a centrifugal pump. Load on the bearing 20 kN; speed of the journal 900 rpm. Type of oil is SAE-10 for which the absolute viscosity at 55°C is 0.017 kg/m-s. Ambient temperature of oil 15.5°C. Maximum bearing pressure for the pump 1.5 N/mm^2. Calculate also mass of the lubricating oil required for artificial cooling, if rise of temperature of oil be limited to 10°C. Heat dissipation coefficient 1232 W/m^2/°C.   **20**

OR

14. A bearing for an axial flow compressor is to carry an axial thrust of 1500 N and a radial load of 2500 N. The bearing will be in use for 40 hrs./week for 5 years. The speed of the shaft is 1000 rpm. Select a suitable bearing for a shaft diameter of 50 mm and calculate its probability of survival.   **20**

MODULE – 3

15. Design a connecting rod for an I.C. Engine running at 1800 rpm and developing a maximum pressure of 3.15 N/mm^2. Diameter of piston is 100 mm; Mass of reciprocating parts per cylinder 2 kg ; Length of connecting rod 380 mm; Stroke length 190 mm;
With proper assumptions design the section, big end and small end of the connecting rod.   **20**

OR

16. Design a cast iron piston for a single acting four stroke engine for the following data :
Cylinder bore : 125 mm; Stroke : 125 mm; Maximum gas pressure : 5 N/mm^2 ; Indicated mean effective pressure : 0.75 N/mm^2. Mechanical efficiency : 80%. Fuel consumption : 0.20 kg per brake power per hour. Higher calorific value of fuel : 42 kJ/kg; Speed : 2000 rpm. Any other data required for the design may be assumed.   **20**