



Reg. No. :

Name :

**Seventh Semester B.Tech. Degree Examination, June 2018
(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

1. Write short notes on stub-tooth system.
2. In what ways helical gears are differed from spur gears ?
3. Suggest one material for the following and giving the reason.
A) Worm
B) Worm wheel
C) Bevel gear
4. What are the various losses in the worm gear ?
5. List the basic assumptions used in the theory of hydrodynamic lubrication.
6. Write down the formula to calculate the heat generated and heat dissipated in journal bearings.
7. Define co-efficient of fluctuation of speed and energy.
8. What is a clutch ? Discuss the various types of clutches.
9. Explain about the merits and demerits of positive clutches.
10. Discuss the forces acting on the connecting rod. **(10×4=40 Marks)**

P.T.O.



PART – B

Module – 1

11. A pair of 20° full depth spur gears are required to transmit 22.5 kW. The speed of the pinion is 3000 rpm and the gear ratio of the drive is 10. The pinion is made of steel with a Brinell number of 250 and the gear is made of ordinary cast iron. The number of teeth of the pinion should be approximately 75 mm. Design the spur gear drive. 20

OR

12. Design a worm gear drive to transmit 22.5 kW at a worm speed of 1440 rpm. Velocity ratio is 24 : 1. An efficiency of atleast 85% is desired. The temperature rise should be restricted to 40° C. Determine the required cooling area. 20

Module – 2

13. A journal bearing with a diameter of 200 mm and length 150 mm carries a load of 20 kN, when the journal speed is 150 rpm. The diametral clearance ratio is 0.0015.

If possible, the bearing is to operate at 35° ambient temperatures without external cooling with a maximum oil temperature of 90° C. If external cooling is required, it is to be as little as possible to minimise the required oil flow rate and heat exchanger size :

- 1) What type of oil do you recommend ?
- 2) Will the bearing operate without external cooling.
- 3) If the bearing operates without external cooling, determine the operating oil temperature.
- 4) If the bearing operates with external cooling, determine the amount of oil in kg/min required to carry away the excess heat generated over heat dissipated, when the oil temperature rises from 85° C to 90° C, when passing through the bearing. 20

OR

14. A ball bearing for drilling machine spindle of 40 mm diameter is rotating at 3000 rpm. It is subjected to a radial load of 2000 N and an axial thrust of 750 N. It is work at 45 hrs. per week for one year. Select and specify ball bearing. 20



Module – 3

15. Design a connecting rod for four stroke petrol engine, with the following :

Piston diameter = 0.10 m stroke = 0.14 m

Length of connecting rod, centre to centre = 0.315 m

Weight of reciprocating parts = 18.2 N

Speed = 1500 re/min with possible overspeed of 2500

Compression ratio = 4 : 1

Probable maximum explosion pressure = 2.45 MPa.

20

OR

16. A single plate clutch, effective on both sides, is required to transmit 25 kW at 1500 rpm. Determine the inner and outer diameter of friction surface if the coefficient of friction is 0.25; the ratio of diameter's is 1.5 and the maximum pressure is not to exceed 0.2 N/mm². Also determine the axial thrust to be provided by springs. Assume the theory of uniform wear ?

20
