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Reg. No. : .....

Name : .....

Seventh Semester B.Tech. Degree Examination, May 2012
(2008 Scheme)
08.705 : DESIGN OF MACHINE ELEMENTS II (M)

Time : 3 Hours Max. Marks : 100

Instructions : 1) *Answer **all** questions from Part **A**.*
2) *Answer **one** full question from **each** Module in Part **B**.*
3) *Assume **any** missing **data** suitably.*
4) ***Use** of approved design data handbook **permitted**.*

PART – A

1. State and explain law of gearing.
2. Explain the reasons for gear failures.
3. What is meant by equivalent number of teeth in a helical gear ? Derive expression for the same.
4. Explain the forces acting on worm gear with neat sketches.
5. Derive Stribeck's equation.
6. Explain the advantages of rolling contact bearings.
7. Explain the development of hydrodynamic film in journal bearing.
8. What are the types of machines which require the use of flywheel ?
9. Why connecting rods are made of I Section instead of round or square section ?
10. What is the advantage of conical clutch over plate clutch ? Give its limitations.

(10×4=40 Marks)

P.T.O.

PART – B

MODULE – I

11. A 20 kW, 1440 rpm induction motor is to drive a compressor at 900 rpm through a pair of spur gears. Design the pair and check the design for safety.

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 pair.

MODULE – II

13. A hydrodynamic full journal bearing is to carry a load of 25 kN at a speed of 3000 rpm. The journal diameter is 150 mm and the length of bearing is 75 mm. Assume an operating temperature of 60°C. If the radial clearance is 0.075 mm. Design the journal bearing. Also calculate the power lost in friction, minimum oil film thickness and the rise in temperature.

14. The operating schedule of a ball bearing is as follows :

    Radial load of 1650 N at 2000 rpm for 5% of life time.

    Radial load of 1140 N at 3300 rpm for 15% of time.

    Radial load of 560 N at 1750 rpm for 35% of time and

    Radial load of 445 N at 2200 rpm for 45% of the time.

    The inner ring rotates and the loads are steady. The life is to be 10 years at 2 hours per day operation. Select a suitable ball bearing.

MODULE – III

15. The following data refer to a four stroke single cylinder vertical diesel engine :
    Piston diameter = 125 mm, stroke = 150 mm, length of connecting rod = 800 mm, maximum gas pressure of 5% of stroke = 500 N/cm^2, speed of the engine = 1200 rpm, weight of the reciprocating parts = 45 N, Design stress for material = 80 N/mm^2, Design bearing stress = 10 N/mm^2, Design stress for bolts = 30 N/mm^2, Design a suitable connecting rod.

16. Design a centrifugal clutch having four shoes to transmit 15 kw at 1000 rpm. The speed at which engagement begins is $\frac{3}{4}^{th}$ of running speed. The inside radius of the pulley rim is 140 mm. The shoes are lined with Fernodo lining. Assume $\mu = 0.25$.

(3×20=60 Marks)