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SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, NOVEMBER 2013

Mechanical Engineering

ME /PTME/AM 09 701—MACHINE DESIGN—II

(2009 Scheme)

Time : Three Hours

Maximum : 70 Marks

Assume data wherever necessary.
Use of design handbook is permitted.

Part A

*Answer **all** questions.*

1. What are the types of failure in roller chain ?

2. What are the applications of silent chains ?

3. What is quill bearing ?

4. What are the drawbacks of worm gear drives ?

5. What is the need for rounding all external corners during manufacturing process ?

(5 × 2 = 10 marks)

Part B

*Answer any **four** questions.*

6. What is creep in belts ?

7. A taper roll bearing has a dynamic load capacity of 30 kN and the shaft rotates at 400 r.p.m. Find the desired life of 90% of bearing, if the radial load on bearing is limited to 6kN.

8. What is hydrostatic lubrication ?

9. State and prove law of gearing.

10. For a worm gearing, take pressure angle as 20° and lead angle 22°. Find the power lost in friction if 2kW power is supplied to the worm shaft with rubbing velocity of 5m/s.

11. What are the advantages of using forging as manufacturing method ?

(4 × 5 = 20 marks)

Part C

12. A multiple disc plate consists of five steel plates and four bronze plates. The inner and outer diameters of the friction disks are 75 mm and 150 mm respectively. The coefficient of friction is 0.1 and the intensity of pressure on friction lining is limited to 0.3 N/mm². Calculate the force to engage clutch and power transmitting capacity at 750 r.p.m.

Or

Turn over

13. A V-belt drive system transmits 100 kW at 475 r.p.m. The belt has a mass of 0.6 kg/m. The maximum permissible tension in the belt is 900 N. The groove angle is 38° and the angle of contact is 160°. Find minimum number of belts and pulley diameter. The coefficient of friction between belt and pulley is 0.2.

14. Design a journal bearing for a centrifugal pump running at 1440 r.p.m. The diameter of the journal is 100 mm and load on each bearing is 20 kN. The factor ZN/p may be taken as 28 for centrifugal pump bearings. The bearing is running at 75°C temperature and the atmosphere temperature is 30°C. The energy dissipation coefficient is 875 W/m²/°C. Take diametric clearance as 0.1 mm.

Or

15. A ball bearing is subjected to a radial force of 2500 N and an axial force of 1000 N. The dynamic load carrying capacity of the bearing is 7350N. The values of X and Y factors are 0.56 and 1.6 respectively. The shaft is rotating at 720 r.p.m. Calculate the life of bearing.

16. A steel pinion with 200 full depth involute teeth is transmitting 7.5 kW power at 1000 r.p.m. from an electric motor. The starting torque of the motor is twice the rated torque. The number of teeth on the pinion is 25 and module is 4mm. The face width is 45mm. Calculate the effective load and bending stresses on gear tooth.

Or

17. A pair of straight bevel gears is required to transmit 10 kW at 500 r.p.m. from the motor shaft to another shaft at 250 r.p.m. The pinion has 24 teeth. The pressure angle is 20°. If the shaft axes are at right angles to each other, find the module, face width, addendum, outside diameter and slant height. The gears are capable of withstanding a static stress of 60 MPa. The face width may be taken as ¼ of the slant height of the pitch cone.

18. Discuss the general design considerations for welded assemblies.

Or

19. What are the design recommendations for machined parts.

(4 × 10 = 40 marks)