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SEVENTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE  
EXAMINATION, NOVEMBER 2016

ME/PTME/AM 09 701—MACHINE DESIGN—II

Time : Three Hours

Maximum : 70 Marks

*Assume missing data wherever necessary.  
Use of approved design data book is permitted for reference.*

**Part A**

*Answer all questions.*

1. What is the criterion used in designing of clutches ?
2. What is crowning of belt pulley ? State its purpose.
3. Mention any four hydraulic oils for lubrication purpose in industries.
4. What is dynamic load in gear drive ? How it could be avoided ?
5. Specify some of screw machined products and turned parts.

(5 × 2 = 10 marks)

**Part B**

*Answer any four questions.*

6. Discuss the effect of centrifugal tension on power transmission in belt drive.
7. Explain the effect of temperature, pressure and shear rates on viscosity of the lubricant.
8. Compare the hydrodynamic lubrication with hydrostatic lubrication.
9. Discuss the modes of gear failures.
10. What is virtual number of teeth in bevel gear and state its significance ?
11. What are specifications to be made available while preparing working drawing ?

(4 × 5 = 20 marks)

**Part C**

12. Design a flat belt drive for a stone crushing machine. The power is transmitted from a 20 kW motor running at 1200 r.p.m. to the machine running at 260 r.p.m. The diameter of machine pulley is 1 m.

*Or*

13. A multiple disc wet clutch is to be designed for a machine tool driven by an electric motor of 12.5 kW running at 1440 r.p.m. Outside disc diameter is restricted to 100 mm. Obtain the approximate values for disc inside diameter, total number of discs and clamping force.

**Turn over**

14. The radial reaction on a bearing is 8000 N. It also carries a thrust of 5000 N. The shaft diameter is 140 mm and it rotates at 1440 r.p.m. load is smooth, 8 hours/day for a life of 17,000 hours :
- Select a deep groove ball-bearing.
  - What is the rated 90% life of the selected bearing ?

Or

15. The following data is given for a  $360^\circ$  hydrodynamic journal bearing :

Radial load = 30 kN

Journal diameter = Bearing length = 75 mm

Journal speed = 3600 r.p.m.

Radial clearance = 0.15 mm

Inlet temperature =  $45^\circ\text{C}$

Assume that the total heat produced in bearing is carried by the total oil flow. The specific gravity and specific heat of the lubricant are 0.86 and  $1.76\text{ kJ/kg}^\circ\text{C}$  respectively. Calculate the power lost in friction and requirement of oil flow.

16. A pair of helical gears is to transmit 37.5 kW at 3000 r.p.m. of the pinion. The velocity ratio is to be 5 and helix angle  $23^\circ$ . If the minimum PCD of the pinion is to be 12 cm, determine the pitch, face width and number of teeth. Check gears for dynamic load and wear. The material is cast steel and teeth are  $20^\circ$  full depth involute.

Or

17. Design a suitable gear drive to transmit 2 kW at 1,440 r.p.m. between two shafts at right angles. Select suitable materials for the gears.
18. Discuss the guide lines to be followed while designing for manufacture with illustration.

Or

19. Describe the design recommendations for forging and rolled sections.

(4 × 10 = 40 marks)