(DME 322)

B.Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the End of Third Year)

MECHANICAL ENGINEERING

Paper - II : Design of Transmission Elements

Time : 3 Hours   **Maximum Marks : 75**

Answer question No.1 compulsorily   **(15)**

Answer ONE question from each unit   **(4 × 15 = 60)**

1)   a)   What is hydrostatic lubrication?

      b)   In a worm gear only wheel is designed. Why?

      c)   Derive an expression for face width of helical gears.

      d)   Explain the various materials used for the belts.

      e)   Advantages of gear drives.

      f)   Function of a key.

      g)   What is crowing of belt pulley?

UNIT - I

2)   A flexible coupling is used to transmit 15 kW power at 100 rpm. There are 6 pins and their pitch circle diameter is 200 mm. The length of pin in contact with the left hand flange, the gap between the two flanges and the length of bush in contact with the right hand flange are 23, 5 & 35mm respectively. The permissible shear and bending stresses in the pin are 35 and 152 N/mm^2 respectively. The permissible pressure for the rubber brush is 1N/mm^2. Calculate

      a)   Pin diameter by shear consideration.

      b)   Pin diameter by bending consideration.

      c)   Outer diameter of the rubber brush.

<div align="center">OR</div>

3)   a)   Explain the effect of keyways.

      b)   Design the rectangular key for a shaft of 50mm diameter. The shearing and crushing stresses for the key material are 42 MPa and 70MPa respectively.

UNIT - II

4) Design a journal bearing for the following data :

Journal diameter = 70 mm

Journal speed = 450 rpm

Clearance = 0.0025 mm/mm

Viscosity of the oil = 10 centipoise at 75°C

Ambient temperature = 27°C

Specific gravity of oil = 0.9

OR

5) a) Discuss selection of parameters for Journal bearing design.

b) Why are ball and roller bearings described as anti-friction bearings.

UNIT - III

6) a) Derive an expression for centrifugal tension for belt.

b) A v-belt drive is required for a 15 kW, 1440 rpm electric motor. Which drives a centrifugal pump running at 360 rpm for a service of 24 hrs per day. From space considerations the centre distance should be approximately 1m. Determine
   i) Belt specifications.
   ii) Number of belts.
   iii) Pulley diameters.

OR

7) Design a chain drive to actuate a compressor from 15 kW electric motor running at 1000 r.p.m, the compressor speed being 350 r.p.m. The minimum centre distance is 500 mm. The compressor operates 16 hours per day. The chain tension may be adjusted by shifting the motor on slides.

UNIT - IV

8) a) Explain desirable properties of a gear material.

b) A pair of spur gears with centre distance of 495 mm is used for a speed reduction of 4.5:1. The module is 6mm. Calculate the number of teeth on the pinion and the gear.

OR

9) A cast iron helical gear with 30° helix angle has to transmit 20 kW at 1200 rpm. The safe static stress for cost iron is 55 MPa. The width of face is 3.5 times circular pitch. If the gear has 24 teeth determine the following for 20° full depth teeth.

a)   Module.

b)   Pitch diameter.

c)   Width of face.

d)   End thrust.

Assume lubrication factor = 1.15.

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