APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M. TECH DEGREE EXAMINATION

Mechanical Engineering

(Machine Design)

04 ME 6507—Design of Power Transmission Elements

Max. Marks: 60 Duration: 3 Hours

Use of approved data books are permitted.

PART A

Answer All Questions

Each question carries 3 marks

1. What are the advantages of V-belt drive?
2. Explain the major advantages and disadvantages of a Chain drive?
3. What is meant by crowning of pulley?
4. What do you mean by a servo motor? Where are they being used?
5. Compare disc and band brakes.
6. What are the properties of a brake lining material? Briefly explain the thermal considerations.
7. What are the methods to reduce wear in friction clutches?
8. Explain the working of Cone Clutch?

PART B

Each question carries 6 marks

9. Design a belt drive to transmit 150 HP for a system consisting of 2 pulleys of diameter 80 cm and 120 cm. Centre distance of 360 cm, belt speed 25 m/s. Co-efficient of friction 0.3, slip of 1.2% at each pulley and 5% friction loss at each shaft and 20% overload.

OR

10. Derive the expression for length of Belt for Open & Crossed Belt Drive?
11. Select a roller chain drive to transmit a power of 10 kW from a shaft, running at 750 rpm, to another shaft, to run at 450 rpm. The center distance may be taken as 35 pitches.

OR

12. A roller chain is to transmit 40 kW from a 17-teeth sprocket to a 34-teeth sprocket, at a speed of 900 rpm (smaller sprocket), assume the center to center distance as 25 times the pitch. Select a suitable roller chain.
13. Design a nine-speed gear box for a grinding machine with a minimum speed of 100 rpm and a maximum speed of 700 rpm. The motor aped is 1400 rpm. Determine the speed at which the input shaft is to be driven.

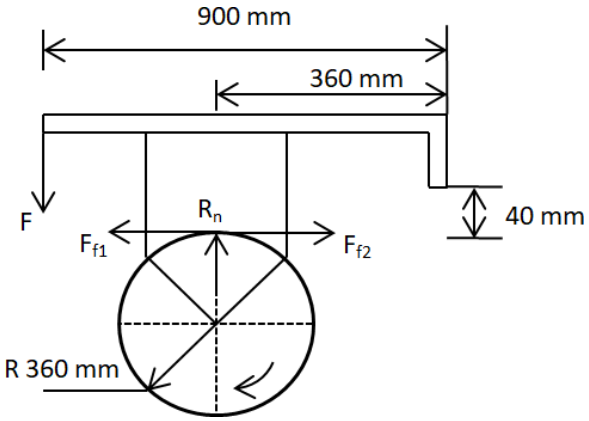
OR

14. Design a gear box for a drilling machine to give a speed variation between 100 and 560 rpm in six steps. The input shaft speed is 560 rpm. The intermediate shaft is to have three speeds.

15. Explain the importance of lubrication in machining and what are the standards and types of lubrication.

OR

16. Explain Timing belts. What are the major advantages and disadvantages?
17. A 360 mm radius brake drum contacts a single shoe. As shown and resists a torque of 225 Nm at 500 rpm. The coefficient of friction is 0.3. Determine,
    - The normal reaction on the shoe
    - The force to be applied at the lever end for clockwise rotation of the drum
    - The force to be applied at the lever end for counter-clockwise rotation of the drum
    - Dimension required to make brake self-locking
    - The heat generated



OR

18. Differentiate the working of Differential band brake & Band and Block brakes with a neat sketch.
19. Design a single plate clutch to transmit 30 kW at 1200 rpm. The outside diameter of the friction lining is 1.5 times the inside diameter. It is lined with asbestos, having an allowable pressure of 0.24 MPa, and a coefficient of friction of 0.3.

OR

20. Design a cone clutch to transmit 7.5 kW at 900 rpm. The face angle is 12.5º. The cone face is lined with leather and the normal pressure between contact faces is not to exceed 0.9 MN/m^2. Determine the main dimensions of the clutch and the axial force required to engage the clutch.