

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M. TECH DEGREE EXAMINATION

M. Tech Program in Machine Design

04 ME 6507-Design of Power Transmission Elements

(Design data books may be permitted)

Max. Marks: 60

Duration: 3 Hours

PART A

Answer All Questions

Each question carries 3 marks

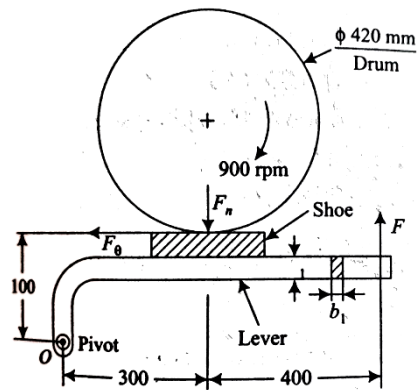
1. What do you understand by single-ply and double-ply belts?
2. What is creep in belts?
3. Explain chordal action in chains drives?
4. What is progression ratio of a gear box and its significances?
5. Compare disc and band brakes.
6. What are the applications of band brakes?
7. Compare centrifugal and cone clutches.
8. Name the different types of clutches. Give at least one practical application of each?

PART B

Each question carries 6 marks

9. Select a V- belt drive to transmit 1.18kW at 1500rpm to another pulley to run at 750rpm and center to center distance is 400mm and diameter of driver is 100mm.
OR
10. Compare open belt drive and cross belt drive. Derive an expression for the length of an open belt drive.
11. Select a roller chain to actuate a compressor from a 9 kW motor, running at 960 rpm. The speed of the compressor is to be 350 rpm.
OR
12. Design a chain drive to actuate a compressor from a 10 kW electric motor at 960 rpm. The compressor speed is to be 350 rpm. Minimum center distance should be 0.5 m. Motor is mounted on an auxiliary bed. Compressor is to work 8 hrs per day.
13. Design the layout of a 12-speed gear box, for a lathe. The minimum and maximum speeds are 100 and 1200 rpm, respectively. The input shaft has a power of 5 kW at 1440 rpm. Construct the speed diagram, and sketch the arrangement of the gear box
OR
14. Design a nine-speed gear box for a machine to provide speed ranging from 100 to 1500rpm. The input is from a motor of 5KW at 1440rpm. Assume any alloy steel for the gear.
15. Explain the working of Stepper motors and the selection process of stepper motors
OR
16. Explain the importance of lubrication in gear box and what standards and types of lubrications

17. Figure shows a single shoe brake. Assuming the coefficient of friction as 0.35, determine the operating force required to stop the rotation of the drum and amount of heat generated. Also design the shoe and the brake lever of rectangular cross section. The drum transmits 12 KW.



OR

18. Explain the working of Internal expanding brake 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 12.5° . 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.