

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. Derive the expression for Velocity Ratio of a Belt drive?
2. Explain the major advantages and disadvantages of a Chain drive?
3. What is mean by crowning of pulley?
4. What are the applications of servo and stepper motors??
5. Calculate the progression ratio of a 12-speed gear box, with maximum and minimum speeds of 1200 and 100 rpm, respectively
6. Explain the Condition for a brake to be self-actuating?
7. What are the applications of band brakes?
8. What are the thermal aspects in braking systems?

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. What are the methods of tensioning in belt drives with a neat sketch?
11. 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

OR

12. Design a chain drive to actuate a compressor from 15kW electric motor running at 1000rpm, the compressor speed being 350rpm. The minimum center distance is 500mm. The compressor operates 16 hrs per day. The chain tension may be adjusted to shifting the motor on slides.
13. A 4 speed: 1×4 gear box is too designed with a speed ranging from 60rpm and $\Phi = 1.25$. Find the number of teeth of all the gears. Also calculate shaft size, gear size; when it transmits a power of 10Hp. Draw the speed table also.

OR

14. Design a nine-speed gear box for a machine to provide speed ranging from 100 to1500rpm.The input is from a motor of 5KW at 1440rpm.Assume any alloy steel for the gear.
15. Explain the working of Servo motors and the selection process of Servo motors?

OR

16. Explain the importance of lubrication in gear box and what standards and types of lubrications

17. An internally expanding brake has drum diameter 0.5m and absorbs 12kW at 1500 rpm. Distance between the effort and the fulcrum is 400mm and distance between the fulcrums is 100mm. The included angle of the friction lining is 120° . Design the brake. Assume $\mu=0.4$, maximum pressure $P_a=0.18\text{MPa}$, $\theta_1=300$.

OR

18. Explain the working of Internal expanding brake with a neat sketch

19. Design a cone clutch, whose face is lined with asbestos, to transmit 9 kW at 600 rpm. The mean diameter of friction lining is 270 mm.

OR

20. Centrifugal clutch consist of 4 shoes each having a mass=1.5 kg in the engaged position the distance of center of gravity of the shoe from axis is 112mm. inner radius of pulley rim 135mm. $\mu=0.25$, pre load on the spring is adjusted so the spring force at the start of engagement is 700N. The running speed=1440rpm. Determine the speed at which the engagement begins, power transmitted by clutch at 1440rpm.