

Question Paper Code : 31044

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Sixth Semester

Mechanical Engineering

080120034 — DESIGN OF TRANSMISSION SYSTEMS

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

PSG Design data book permitted for the calculation purpose.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Name the types of belts used for transmission of power.
2. List out the various stresses induced in the wire ropes.
3. State the advantage of herringbone gear.
4. State some materials used for manufacturing of gears.
5. In which gear drive, self-locking is available?
6. What is a crown gear?
7. What are preferred numbers?
8. Draw the ray diagram for 12 speed gear box.
9. What is meant by a self-energizing brake?
10. What are the effects of temperature rise in clutches?

PART B — (5 × 16 = 80 marks)

11. (a) Design a V-belt drive to drive a machine at 40 rpm from a motor running at 1440 rpm. Assume suitable parameters.

Or

- (b) Select a wire-rope for a vertical mine hoist to lift a load of 30 kN from a depth of 600m. A rope speed of 3 m/s is to be attained in 10 seconds.

12. (a) Design a straight spur gear drive to transmit 8 kW. The pinion speed is 720 rpm and the speed ratio is 2. Both the gears are made of the same surface hardened carbon steel with 55 RC and core hardness less than 350 BHN. Ultimate strength is 720 N/mm² and yield Strength is 360 N/mm².

Or

- (b) Design a general purpose enclosed gear train is based on parallel helical gears, specified life is 36,000 hours. Torque at driven shaft is 411 Nm. Driving shaft speed is 475 rpm. Velocity ratio is 4. It is desired to have standard centre distance.

13. (a) Design a bevel gear to transmit a power of 9 kW at 20 rpm of the pinion. Gear Ratio is 3 material used is C20 Ultimate tensile strength is 500 N/mm², Yield strength is 260 N/mm².

Or

- (b) Design a worm gear drive to transmit a power of 22.5 kW. The worm speed is 1440 rpm. and the speed of the wheel is 60 rpm. The drive should have a Minimum efficiency of 80% and above. Select suitable materials for worm and wheel and decide upon the dimensions of the drive.

14. (a) Design the layout of a 9 speed gear-box for a machine-tool. The minimum and maximum speeds are 10 and 90 rpm. Power is 5 kW from 1200 rpm. Induction motor. Draw the ray diagram and kinematic layout.

Or

- (b) In a machine tool application, 12 different speeds are required from 125 rpm to 450 rpm in the output shaft. The motor speed is 630 rpm.

- (i) Determine the 12 standard speed in G.P
(ii) Draw the ray diagram and kinematic layout.
(iii) Determine the number of teeth on the gears to be used.

15. (a) Draw the displacement time, velocity time and the acceleration time curves for the follower in order to satisfy the following conditions
- (i) Stroke of the follower 25 mm
 - (ii) Outstroke takes place with SHM during 90° of cam rotation
 - (iii) Return stroke takes with SHM during 75° of cam rotation
 - (iv) Cam rotates with a uniform speed of 800 rpm.

Or

- (b) A rope drum of an elevator having 650 mm diameter is fitted with a brake drum of 1 m diameter. The brake drum is provided with four cast iron brake shoes each subtending an angle of 45° . The mass of the elevator when loaded is 2000 kg and moves with a speed of 2.5 m/s. The brake has a sufficient capacity to stop the elevator in 2.75 metres. Assuming the coefficient of friction between the brake drum and shoes as 0.2, find :
- (i) Width of the shoe, if the allowable pressure on the brake shoe is limited to 0.3 N/mm^2 ,
 - (ii) Heat generated in the stopping the elevator.