

B.E. DEGREE EXAMINATIONS: APRIL / MAY 2010

Sixth Semester

MECHANICAL ENGINEERING

U07ME601: Design of Transmission Systems

(Usage of PSG design data book is permitted)

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions

PART A (10 x 1 = 10 Marks)

1. In a horizontal flat belt drive, it is customary to use
 - (a) bottom side of the belt as slack side
 - (b) top side of the belt as slack side
 - (c) crossed-belted
 - (d) idler in between
2. A chain drive is used for
 - (a) short distances
 - (b) longer distances
 - (c) medium distances
 - (d) distance is no criterion for chain drive
3. The part of tooth between the pitch circle and dedendum circle is called
 - (a) half tooth
 - (b) flank
 - (c) face
 - (d) upper tooth
4. Lewis equation for gears is used to find the
 - (a) tensile stress
 - (b) compressive stress in bending
 - (c) contact stress
 - (d) fatigue stress
5. Compared to spur gears, helical gears
 - (a) run more smoothly
 - (b) run with more vibration
 - (c) consume more power
 - (d) consume less power
6. Miter gears are
 - (a) right angled bevel gears having same number of teeth
 - (b) spur gears of equal diameter and pitch
 - (c) helical gears of same module
 - (d) a kind of worm wheel and gear
7. For proper meshing of worm and worm wheel, normal pitch of worm compared to normal pitch of worm wheel should be
 - (a) more
 - (b) less
 - (c) equal
 - (d) depends on module
8. The material used for manufacturing worm wheel is
 - (a) Bronze
 - (b) Stainless steel
 - (c) Silver
 - (d) Plastics
9. Friction radius for new clutches compared to worn-out will be
 - (a) same
 - (b) more
 - (c) less
 - (d) depends on overall size of clutch

10. In order to prevent the brake arm from grabbing, the moment of friction force about the brake arm pivot point should be
- (a) less than the total braking effort (b) equal to the total braking effort
(c) greater than the total braking effort (d) zero

PART B (10 x 2 = 20 Marks)

11. What are the types of belt drives?
12. What do you mean by 6x19 wire rope?
13. Define module.
14. What is meant by herring-bone gears?
15. What is backlash?
16. State the purpose of bevel gear drives.
17. What is the function of gear box?
18. What is kinematic layout?
19. What is meant by ray diagram?
20. Draw the neat sketch of a single plate clutch and name its parts.

PART C (5 x 14 = 70 Marks)

21. (a) Select a flat belt to drive a mill at 250rpm from a 10kW, 730rpm motor. Center distance is to be around 2m. The mill shaft pulley is of 1m diameter.

(OR)

- (b) Select a suitable wire-rope from 6x37 group to lift a maximum load of 10kN through a height of 60m. The weight of bucket is 2kN. Maximum lifting speed is 2m/s which is attained in 3 seconds. Drum diameter is 30 times the rope diameter. Factor of safety is 6.
22. (a) A speed reducing unit using spur gear is to be designed. Power to be transmitted is 44kW and is continuous with moderate shock loads. The speed of the shafts are 720rpm and 144rpm respectively. The centre distance is kept small as possible. Select a suitable material and design the gears. Give the details of the gears.

(OR)

- (b) Design a pair of helical gears to transmit to 10kW at 1000rpm of the pinion. Reduction ratio of 5 is required. Give details of the drive in a tabular form.

23. (a) Design a bevel gear to transmit 7kW at 1600rpm for the following data:

Gear ratio = 3

Material for pinion and gear = C 45 steel

Life = 10,000 hours.

(OR)

- (b) The input to worm gear shaft is 18kW and 600rpm. Speed ratio is 20. The worm is to be of hardened steel and the wheel is made of chilled phosphor bronze. Considering wear and strength, design worm and worm wheel.

24. (a) Explain the speed diagram and kinematic layout of a 6 speed gear box with a neat sketch.

(OR)

- (b) A radial cam rotating at 150rpm is driving a 15mm diameter translating roller follower to produce the following motions, rise of 25mm with SHM in 150° degrees of cam rotation, dwell for 60° , fall of 25mm with SHM in 120° of cam rotation, and dwell for remaining 30° . Construct the cam contour with the pressure angle limited to approximately 20° .

25. (a) A multiplate clutch is to be designed to transmit a power of 50 kW at 500rpm. Assuming suitable materials and data, determine the main dimensions of friction lining used in that clutch.

(OR)

- (b) Calculate the average bearing pressure and the initial and average braking powers for the block brake as shown in fig.1. The diameter of the drum is 500mm and it rotates at 250mm. Coefficient of friction is 0.25 and drum width is 80mm.

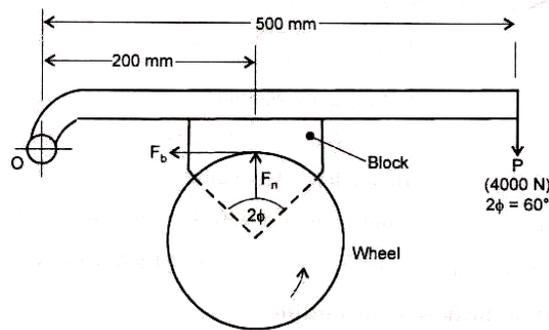


Fig.1
