2012

THEORY AND DESIGN OF TEXTILE MACHINES

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words

as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) A deep groove ball bearing will support

a) only axial load

b) only radial load

c) both axial and radial loads

d) none of these.

ii) Variable speed friction drive is used in

a) draw frame   b) speed frame

c) ring frame   d) none of these.

iii) Most suitable way of transferring motion to many shafts

with least slippage is to use

a) *V*-belt drive   b) chain drive

c) flat belt drive   d) none of these.

iv) In epicyclic gearing

a) the driving gear is eccentric

b) the driven gear is eccentric

c) locus of any point on driving gear is an ellipse

d) locus of any point on driven gear is an ellipse.

v) Modern cards are equipped with auto levellers of

a) open loop type

b) closed loop type

c) combination of open and closed loop type

d) none of these.

vi) Fly wheel is used in weaving machine to control

a) speed variation

b) beat up force

c) vibration of the machine

d) turning moment of the crank shaft.

vii) The knife edge follower is used in

a) weft knitting cam

b) box changing mechanism

c) warp knitting cam

d) winding traversing.

viii) The vibration in the crank shaft is described by

a) transverse vibration

b) torsional vibration

c) longitudinal vibration

d) combined transverse and torisonal vibrations.

ix) As sley eccentricity increases

a) machine vibration increases

b) smart bear up occurs

c) more time at back zone

d) all of these.

x) Geneva wheel mechanism

a) converts continuous rotation to intermittent

rotation

b) provides high speed reduction ratio

c) changes the direction of motion

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Show a gear train of a modern draw frame and mark change pinion.

3. Distinguish between chain drive and belt drive. In a driving system, driver pulley rotates at 120 rpm and has a diameter of 30 cm. Driven pulley has diameter of 50 cm. If the belt is 0·6 cm thick, estimate the number of rpm of driven pulley [ignore slippage]. $2 + 3$

4. What are the basic elements of control mechanism ? Compare the open loop and closed loop control systems. $1 + 4$

5. a) Classify different types of cams used in textile machines.

b) A heart shaped cam lifts its follower at a constant velocity and allows it to fall at constant velocity for half revolution. If the maximum follower displacement is 9·0 cm and the cam rotates at 30 rpm, find the follower speed. $3 + 2$

6. Discuss about different types of bearings stating their advantages and disadvantages.

7. Explain the principle of Vernier ratchet and Pawl mechanism. Name the motion where such attachment is successfully employed in a textile machine. $4 + 1$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. a) Explain the versatility of belt drive with reference to

actual use in any textile machine.

b) Explain in detail the limitations of flat belts for power transmission due to slippage.

c) Explain why a *V*-belt is more effective in power transmission. 3 + 8 + 4

9. a) Describe with sketch a simple epicyclic gear train and show the magnitude of rotational movements of the different components.

b) Discuss with figures the principles of open and closed loop auto levellers. 6 + 9

10. a) Write the condition of Four-Bar linkage to develop a rocker link when smallest link is rotating continuously.

b) Define with suitable example the degree of freedom of mechanism.

c) Calculate the displacement, velocity and acceleration of sley drive with the help of 4-bar link mechanism.

d) Write the effects of crank-arm ratio on dwell of the 4-bar link mechanism. 2 + 2 + 9 + 2

11. a) Describe the roller follower knife edge follower and flat faced follower used in textile machines.

b) Define parabolic and linear cam.

c) Explain the displacement, velocity and acceleration diagram of the parabolic cam from its equation.

d) What are the cams suitable for very high acceleration required in picking ? 4 + 2 + 7 + 2

12. a) Explain how the combined cam, link and gear mechanism is used to achieve desired motion in comber machine.

b) What is the effect of alacrity on follower movement in

picking motion ?

c) Explain the dynamics of projectile picking mechanism.

$$7 + 3 + 5$$

13. a) Define an involute teeth gear and a cycloid teeth gear.

b) In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 200 rpm in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 450 revolutions in the clockwise direction, what will be the speed of gear B ?

c) What is Hooke's joint and where is it applied in a textile machine ? $3 + 8 + 4$

14. Define longitudinal and transverse vibrations. Discuss the effect of vibration on textile machines. State the measures to be taken to reduce loom vibration. What do you mean by loom eccentricity ? $4 + 3 + 6 + 2$

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