TIME-3HOUR
MARK-60

Note: Section A Is Compulsory. Attempt Any Four Questions From Section B And Any Two From Section C.

SECTION A MARKS 2 EACH

1. (a) Define Turning pair and Screw pair. Give examples.

(b) What is SLIP in a belt drive?

(c) List some applications of CAMS.

(d) What is the difference between a DYNAMOMETER and BRAKE?

(e) Why balancing is required in rotating machinery?

(f) Define Lift, Effort and Power as applied to Governors.

(g) Discuss merits and demerits of CHAIN DRIVE.

(h) Compare flat belt drive and Vee belt drive.

(i) What is HOOKE's joint?

(j) How are chains classified?

SECTION B MARKS 5 EACH

2. Sketch mechanism of OLDHAM COUPLING and explain how the motion is transmitted from one shaft to another which are parallel but not co-axial.

3. Derive the equation $(T_1 - T_c) / (T_2 - T_c) = \exp(\mu \times \theta)$ for belt drive.

4. A reciprocating engine has a stroke of 36 cm and connecting rod four times the crank. At the instant, the crank has turned through an angle of 30 degree from the inner dead centre. The crank rotates at 200 rpm clockwise and has an acceleration of 1140 cm/sec/sec. Determine:

(a) Velocity and acceleration of piston.

(b) The angular velocity and angular acceleration of the connecting rod.

5. A shaft which rotates at a constant speed of 150 rpm is connected by belting to a parallel shaft 120 cm apart which has to run at 60, 80 and 100 rpm. The smallest pulley on the driver shaft is 30 cm. Determine the remaining diameters of the two stepped pulleys for cross belt and open belt.

6. Derive an equation for the friction moment of a collar thrust bearing.
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SECTION C MARKS 10 EACH

7. Draw the profile of a cam with a flat faced follower as per following specification: Cam to rotate in an anticlockwise direction. Follower to move outward through a distance of 3 cm during 120 degree of cam rotation. Follower to dwell for 60 degree of cam rotation; follower to return to its initial position during 120 deg. Of cam rotation; follower to dwell for the remaining period of cam rotation.The minimum radius of the cam is 1.75 cm and the flat face of the follower is at right angle to the line of stroke of follower. The outward and return stroke

are to take place with modified uniform velocity and SHM respectively.

8. A shaft carries four masses A, B, C and D weighing 200, 300, 240 and 260 kg and revolving at radii 9, 7, 10 and 12 cm n planes measured from A at 27, 42 and 72 cm. The angle between the cranks are A to B 45 degree; B to C 75 degree; C to d 135 degree. The balancing weights are to be placed in planes at 12 cm and 10 cm from A and D respectively, the distance between them being 50 cm. Find the balancing weight and angular position.

9. A Hartnell type spring loaded Governor rotates about a vertical axis. The two rotating masses weigh 1.2 kg each and move at a radius of 12 cm when the speed is 550 rpm. At this speed the arms 10 cm and 7.5 cm effective length are respectively, vertical and horizontal. The equilibrium speed is 575 rpm when the rotating masses are at their maximum radius of 14.4 cm. Determine the stiffness, the compression of the spring at 550 rpm and the radius at which the weights rotate when the equilibrium speed is 525 rpm.