SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

ROLL No:

Total number of pages:2
Total number of questions:6

B.Tech. || ME || 3rdSem
Theory of Machines - I
Subject Code:BTME-302A
Paper ID: (for office use)

Time allowed: 3 Hrs   **Max Marks: 60**

Important Instructions:
- All questions are compulsory
- Assume any missing data

PART A (2×10)

Q.1. (a) Differentiate between machine and structure.
(b) What is loose and fast pulleys arrangement? Where is it employed?
(c) What are V-Belts? Of what materials are they made?
(d) Explain the term sensitiveness and hunting in connection with governors.
(e) Discuss the various types of brakes.
(f) Write the functions of flywheel?
(g) What is a Hooke's joint and where is it used?
(h) Differentiate between brakes and dynamometers.
(i) What is a Kinematic Chain?
(j) List various types of followers?

PART B (8×5)

Q. 2. What is inversion of mechanism? Sketch and explain various inversion of slider crank

chain.   **OR**

What is kinematic pair? Give the classification of kinematic pair. Also explain various types

of constrained motions with neat sketches.   [CO1]

Q. 3.(i) Derive an expression for the ratio of shafts velocities for Hooke's Joint.

(ii) The angle between the axis of two shafts connected by Hooke's joint is 18°. Determine
the angle turned through by the driving shaft when the velocity ratio is maximum and unity.

OR

(i)   Derive an expression for Davis steering gear.

(ii)   In a Davis steering gear, the distance between the pivots of the front axle is 1.2 metres and the wheel base is 2.7 metres. Find the inclination of the track arm to the longitudinal axis of the car, when it is moving along a straight path.   [CO2]

Q. 4. (i) Derive an expression for driving tensions for flat belt drive.

(ii) Find the power transmitted by a belt running over a pulley of 600 mm diameter at 200 r.p.m. The coefficient of friction between the belt and pulley is 0.25, angle of lap 160° and maximum tension in the belt is 2500 N.

OR

Derive an expression for length of an Open Belt Drive and Cross Belt Drive.   [CO3]

Q. 5. Discuss various types of the brakes. Explain with neat sketch, the difference between absorption and transmission dynamometers?

OR

A cam is to be designed for a knife edge follower with the following data :

(i)   Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion.

(ii)   Dwell for the next 30°.

(iii)   During the next 60° of cam rotation, the follower returns to its original positions with simple harmonic motion.

(iv)   Dwell during the remaining 180°.

Draw the profile of the cam when

a) the line of stroke of follower passes through the axis of cam shaft, and

b) the line of stroke is offset 20 mm from the axis of cam shaft.

The radius of the base circle of the cam is 40 mm.   [CO4]

Q. 6. (i) Derive an expression for a energy stored in a flywheel.

(ii) The mass of flywheel of an engine is 6.5 tonnes and the radius of gyration is 1.8 metres. It is found from the turning moment diagram that the fluctuation of energy is 56 kN-m. If the mean speed of the engine is 120 r.p.m., Find the maximum and minimum speeds.

OR

A Porter Governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor.   [CO5]