Seat No.

OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Theory of Machines - I

Sub. Code: 63363/79122/79410

Day and Date: Thursday ,04-12-2025 **Total Marks: 70**

Time: 10:30 AM To 01:30 PM

Instructions:
1. **All questions are compulsory**
2. **Assume suitable data wherever necessary and mention it boldly**
3. **Draw neat labelled diagrams wherever necessary**
4. **Figures to the right indicate full marks**
5. **Use of Scientific calculator is allowed**

Q1) Attempt the following. **[11]**

a. Explain the following terms **[5]**

i. Types of Constrained Motion
ii. Mechanism
iii. Inversion of Mechanism

OR

a. What is a four-bar chain and explain any two inversions of four bar chain.

b. The crank of an I.C engineis rotating at 300 rpm as shown in fig 1.b. Crank OCis 60 mm and connecting rod CP is 180 mm in length.Find velocity and ac celeration of the piston by using Klein's construction method. **[6]**

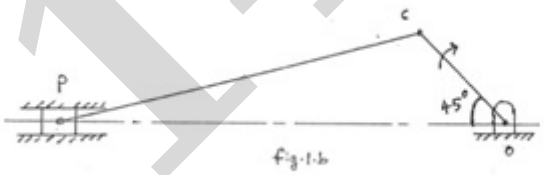

Fig.1.b

Q2) In the mechanism, as shown in Fig.2, the crank OA rotate sat 20 r.p.m. anticlockwise and gives motion to the sliding blocks B and D. The dimensions of the various links are OA = 300 mm; AB = 1200 mm; BC = 450 mm and CD = 450 mm. For the given configuration, determine:1. velocities of sliding at B and D, 2. Angular velocity of CD, 3. linear acceleration of D, and 4. angular acceleration of CD. **[13]**

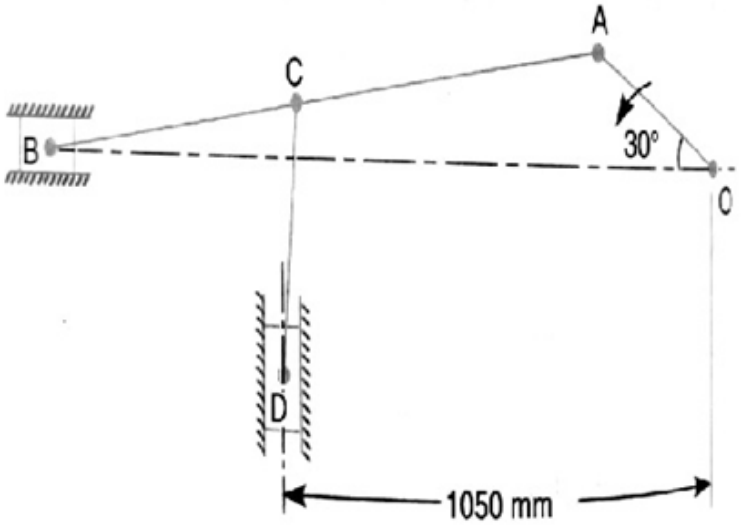

Fig. 2

Q3) Attempt the following. **[11]**

a. Derive the equation for friction torque in case of conical pivot bearing assuming uniform wear with usual notations. **[5]**

OR

Derive an expression for torque required to lower the load by a screw jack.

b. The mean diameter of a square threaded screw jack is 50 mm. The pitch of the thread is 10 mm. The coefficient of friction is 0.15. What force must be applied at the end ofa 0.7 m long lever, which is perpendicular to the longitudinal axis of the screw to raise a load of 20 KN and to lower it? **[6]**

Q4) Attempt the following. **[13]**

a. Draw Displacement, Velocity and Acceleration Diagrams when the Follower Moves with Simple Harmonic Motion. **[4]**

OR

Classify the Followers with neat sketch.

b. A cam, with a minimum radius of 50 mm, rotating clockwise at a uniform speed, is required to give a knife edge follower the motion as described below, **[9]**

1. To move outwards through 40 mm during 120° rotation of the cam;
2. To dwell for next 80°;

3. To return to its starting position during next 90°, and
4. To dwell for the rest period of a revolution i.e., 90°. Draw the profile of the cam when the line of stroke of the follower is off-set by 15 mm. The displacement of the follower is to take place with uniform acceleration and uniform retardation.

Q5) Attempt the following. **[11]**

a. Explain various important factors upon which the selection of a belt drive depends **[4]**

OR

Discuss merits and demerits of belt drive for transmission of power.

b. 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 the pulley is 0.25, angle of lap 160° and maximum tension in the belt is 2500 N. **[7]**

Q6) Attempt the following. **[11]**

a. Explain Hartnell Governor with neat sketch. **[4]**

OR

Define stability and Hunting of governor.

b. 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 the 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 range of speed, sleeve lift, governor effort and power of the governor when the friction at the sleeve is neglected **[7]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (1154) B.Tech. CBCS (79122) Theory of Machines - I Part 2 SEM 4
2] (101) Bachelor of Engineering (63363) Theory Of Machines-I Part 2 SEM 4
3] (101) Bachelor of Engineering (79410) Theory of Machines - I Part 2 SEM 4