



**VIT**<sup>®</sup>  
Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)

**SLOT: C2+TC2**

**SCHOOL OF MECHANICAL ENGINEERING**

**CONTINUOUS ASSESSMENT TEST – I**

**WINTER SEMESTER 2022-2023**

**Programme Name & Branch: B.Tech (Mechanical Engineering)**

**Course Code: BMEE207L**

**Course Name: Kinematics and Dynamics of Machines**

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**Class Number(s): VL2022230501025, VL2022230501022, VL2022230501031, VL2022230501028.**

**Exam Duration: 90 minutes**

**Maximum Marks: 50**

**General instruction(s): Draw the velocity and acceleration diagrams with a suitable scale.**

Q.No	Question	Marks
1.	Explain the inversions of four-bar chain with suitable applications.	10
2.	a) Determine the mobility of the mechanism shown in Fig.1 (5 Marks)	10

Fig.1

b) Determine the mobility of the mechanism shown in Fig.2 (5 Marks)

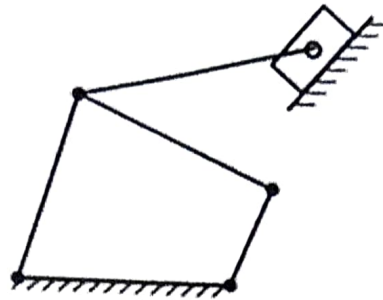


Fig.2

a) Find the inversions of the chain shown in Fig.3 (5marks)

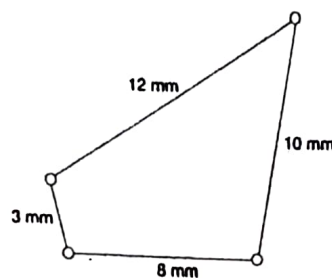


Fig.3

b) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centers and the length of the driving crank are 200mm and 100 mm respectively. If the length of the slotted bar is 400 mm find the inclination of the slotted bar with the vertical in the extreme position. (5 Marks)

PQRS is a four bar chain with link PS fixed. The lengths of the links are PQ= 62 mm ; QR = 175 mm ; RS = 112 mm ; and PS = 200 mm. The crank PQ rotates at 10 rad/s clockwise. Find the angular velocity and of link QR when angle QPS = 60°.

The engine mechanism as shown in Fig.4 has crank OB = 50 mm and length of connecting rod AB= 225 mm. The centre of gravity of the rod is at G which is 75 mm from B. The engine speed is 200r.p.m.

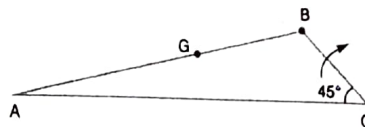
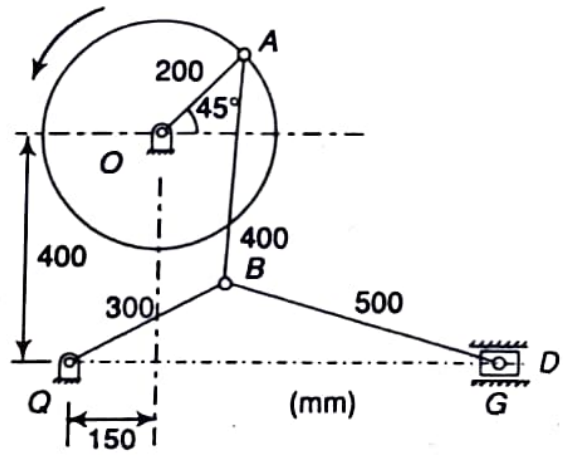


Fig.4

For the position shown, in which OB is turned 45° from O A, Find the velocity and acceleration of G.

**WINTERSEMESTER 2022-2023**

**Maximum Marks: 50**

Q.No	Question	Marks
1.	<p>A. Classify kinematic pairs based on relative motion.(4)</p> <p>B. In a crank and slotted lever quick return motion mechanism, the length of the fixed link is 300 mm and that of the driving crank is 150 mm. Determine the maximum angle the slotted lever will make with the fixed link. Also determine the ratio of the time of cutting and the return strokes, If the length of the slotted lever is 700 mm, what would be the length of the stroke, assuming that the line of the stroke passes through the extreme positions of the free end of the slotted lever? (6)</p>	10
2.	Briefly explain the inversions of a mechanism consisting of two turning and two sliding pairs with suitable applications.	10
3.	<p>In the toggle mechanism shown in Fig.1. The crank OA rotates at 210 rpm counter clock-wise increasing at the rate of <math>60 \text{ rad/s}^2</math>. For the given configuration determine Velocity of slider D and angular velocity of link BD.</p>  <p style="text-align: center;">Fig.1</p>	10
4.	For Fig.1. find the acceleration of the slider D and angular acceleration of link BD.	10

5.	<p>A cam operating a knife edged follower has the following data:</p> <ul style="list-style-type: none"> <li>(a) Follower moves outwards through 40 mm during <math>60^\circ</math> of cam rotation.</li> <li>(b) Follower dwells for the next <math>45^\circ</math>.</li> <li>(c) Follower returns to its original position during next <math>90^\circ</math>.</li> <li>(d) Follower dwells for the rest of the rotation.</li> </ul> <p>The displacement of the follower is to take place with uniform velocity during the both outward and return strokes. The least radius of the cam is 40 mm. Draw the profile of the cam, the axis of the follower passes through the cam axis.</p>	10
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