000161

PRN:		Course Code :	UME 401

Second Year B. Tech End Semester Examination Winter 2024

Theory of Machines-I

Day and Date: Fri 22 NOV 2024 Max Marks: **100**

Time : 02:00PM To 05:00PM Duration: **04** hrs

Instructions: All questions are compulsory.

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	Explain the term kinematic link. Also explain the classification of kinematic link	08	02	CO1
	b)	Sketch and explain any two inversions of a single slider crank chain	08	03	CO1
		OR			
	b)	Explain the crank and slotted lever mechanism	08	02	CO1
Q.2		**Attempt the following**			
	a)	In four bar mechanism, as shown in Fig. 1, AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm. The angle BAD = 60°. The crank AB rotates uniformly at 100 r.p.m. Find the velocity of link BC and CD and also the angular velocity of the link BC by relative velocity method.	08	03	CO1

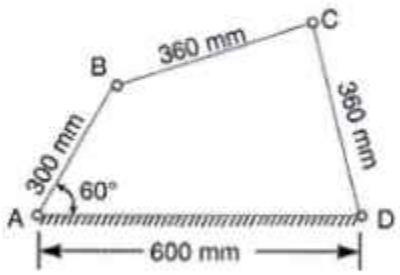


Fig. 1.

	b)	The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine: angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead center position.	08	03	CO2
		OR			
	b)	Explain the types of Instantaneous centers.	08	02	CO2
Q.3		**Attempt any two from the following**			
	a)	Explain the types of friction.	08	02	CO2
	b)	Find the expression for frictional torque of flat pivot bearing by uniform pressure consideration.	08	03	CO3

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c)	A shaft of 80 mm diameter running in a bearing carries a load of 5000 N. If the coefficient of friction between the shaft and bearing is 0.03, find the power transmitted when it runs at 1440 r.p.m.	08	03	CO3

Q.4 **Attempt any two from the following**

a)	Explain the creep phenomena in the belt drive.	08	02	CO3
b)	Describe the different types of belt drive.	08	02	CO4
c)	The power is transmitted from a pulley 1 m diameter running at 200 r.p.m. to a pulley 2.25 m diameter by means of a belt. Find the speed lost by the driven pulley as a result of creep, if the stress on the tight and slack side of the belt is $1.4*10^6$ Pa and $0.5*10^6$ Pa respectively. The Young's modulus for the material of the belt is $100*10^6$ Pa.	08	03	CO4

Q.5 **Attempt any Two of the following**

a)	Explain the classification of cams	09	03	CO4
b)	Explain Displacement, Velocity and Acceleration diagrams when the follower moves with uniform velocity.	09	03	CO4
c)	Draw the cam profile for following conditions: Follower type = roller follower, in-line; lift = 25mm; base circle radius = 20mm; roller radius = 5mm; out stroke with uniform acceleration and retardation, for 120^0 cam rotation; dwell for 60^0 cam rotation; return stroke with uniform acceleration and retardation, for 90^0 cam rotation; dwell for the remaining period.	09	03	CO5

Q.6 **Attempt any Two of the following**

a)	Explain the working of centrifugal governor	09	02	CO5
b)	Explain the working of Porter Governor	09	02	CO5
c)	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 minimum and maximum speeds and range of speed of the governor.	09	03	CO5

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