Code No: P18MET08

HALL TICKET NUMBER

PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)
III B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS MARCH/APRIL – 2023
THEORY OF MACHINES
(ME Branch)

Time: 3 hours Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

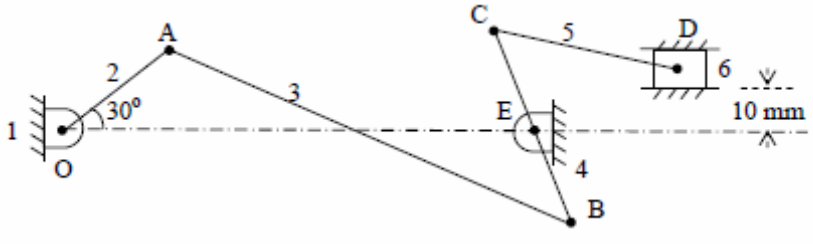
PART-A

Answer all the questions in Part-A (5X2=10M)

Q.No.		Questions	Marks	CO	KL
1.	a)	Distinguish between a structure and a Machine.	[2M]	1	2
	b)	What is meant by instantaneous centre?	[2M]	2	1
	c)	List the types of followers according to the shape	[2M]	3	2
	d)	What are the three types of precision motions for a ship?	[2M]	4	2
	e)	What is meant by static balancing	[2M]	5	1

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.		Questions	Marks	CO	KL
		UNIT-I			
2.	a)	Describe different types of kinematic pair.	[5M]	1	3
	b)	Explain the inversions of four bar mechanism with applications.	[5M]	1	3
		OR			
3.	a)	Explain different types of constrained motion.	[5M]	1	3
	b)	Explain Elliptical trammel with neat sketch.	[5M]	1	3
		UNIT-II			
4.		In a slider crank mechanism the crank is 220 mm long and rotates at 30 rad/sec in a CCW direction. The length of the connecting rod is 8500 mm. When the crank turns through 60° from Inner-dead centre. Determine (i) the velocity and acceleration of the slider (ii) Velocity and acceleration of point E located at a distance of 250 mm on the connecting rod extended.	[10M]	2	3
		OR			
5.		For a mechanism in figure, crank OA rotates at 100 rpm clockwise. Using Instantaneous Center method determine the linear velocity of slider D OA = 200 mm AB = 1500 mm BC = 600 mm CD = 500 mm BE = 400 mm OE = 1350 mm 	[10M]	2	4
		UNIT-III			

6.		Draw the profile of a cam to give the following motion to the reciprocating follower with a flat face: Follower to move outward through a distance of 30mm during 90^0 of cam rotation. Follower to dwell for the next 60^0 of cam rotation. Follower to return to its initial position during 90^0 of cam rotation. Follower to dwell for the remaining 120^0 of cam rotation. The minimum radius of the cam is 30 mm and the flat face of the follower is at right angle to the line of stroke of the follower. The outward and return strokes of the follower are to take place with SHM.	[10M]	3	3
		OR			
7.		Draw the profile of a cam with roller follower for the following data: Base circle radius of cam = 14 mm; Roller radius = 4 mm; Outward stroke of follower through 30 mm during 180^o of cam rotation with SHM. Dwell after outstroke for 20^o of cam rotation. Return stroke during the remaining 160^o of cam rotation with uniform acceleration and retardation. Also, find the velocity and acceleration of the follower during the return stroke, if the cam is rotating at 1500 rpm clockwise.	[10M]	3	3
		UNIT-IV			
8.		In a single-acting four stroke engine, the work done by the gases during the expansion stroke is three times the work done during the compression stroke. The work done during the suction and exhaust strokes is negligible. The engine develops 14 kW at 280 rpm. The fluctuation of speed is limited to 1.5% of the mean speed on either side. The turning moment diagram during the compression and the expansion stroke may be assumed to be triangular in shape. Determine the moment of inertia of the flywheel	[10M]	4	4
		OR			
9.		The rotor of a marine turbine has a moment of inertia of 750 $kg.m^2$ and rotates at 3000 rpm clockwise when Viewed from aft. If the ship pitches with angular simple harmonic motion having a periodic time of 16 seconds and an amplitude of 0.1 radian, find the (i) maximum angular velocity of the rotor axis (ii) maximum value of the gyroscopic couple (iii) gyroscopic effect as the bow dips.	[10M]	4	4
		UNIT-V			
10.	a)	Derive the expression for the stiffness of spring of the hartnell governor.	[5M]	5	3
	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 15 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.	[5M]	5	3
		OR			
11.		Four masses A, B, C and D revolve at equal radii and are equally spaced along a shaft. The mass B is 7 kg and the radii of C and D make angles of 90° and 240° respectively with the radius of B. Find the magnitude of the masses A, C and D and the angular position of A so that the system may be completely balanced	[10M]	5	4

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