Code No: P18MET08

HALL TICKET NUMBER

PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)
III B.TECH I SEMESTER END REGULAR EXAMINATIONS, DEC/JAN – 2022/23
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

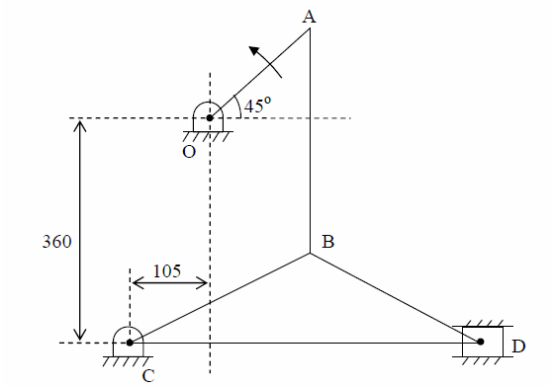
Answer all the questions in Part-A (5X2=10M)

Q.No.		Questions	Marks	CO	KL
1.	a)	Draw the neat sketch of double Hook's joint	[2M]	1	L2
	b)	Determine the number of instantaneous centres in a five bar mechanism.	[2M]	2	L2
	c)	What is meant by dwell of the follower operated by cam	[2M]	3	L1
	d)	What is the function of fly wheel?	[2M]	4	L2
	e)	What are the different types of governors?	[2M]	5	L2

PART-B

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

Q.No.		Questions	Marks	CO	KL
		UNIT-I			
2.	a)	Explain crank and slotted lever mechanism with neat sketch	[5M]	1	L3
	b)	Sketch the peaucellier mechanism and show the tracing point describes a straight line.	[5M]	1	L3
		OR			
3.	a)	Derive the equation to determine the degrees of freedom of a mechanism	[5M]	1	L3
	b)	Two inclined shafts are connected by means of a universal joint. The speed of the driving shaft is 800 r.p.m. If the total fluctuation of speed of the driven shaft is not to exceed 12.5% of this, what is the maximum possible inclination between the two shafts?	[5M]	1	L3
		UNIT-II			
4.		In a four bar mechanism, the dimensions of the links are as given below: AB = 60 mm,CD = 66 mm,BC = 76 mm, AD = 100 mm and at a given instant when angle DAB 60^{o} , the angular velocity of link AB is 12 rad/sec in CW direction. Determine Velocity of joint C and angular velocity of link CD.	[10M]	2	L4
		OR			
5.		In the toggle mechanism shown in figure the slider D is constrained to move in a horizontal path the crank OA is rotating in CCW direction at a speed of 180 rpm the dimensions of various links are as follows: OA = 180 mm CB = 240 mm AB = 360 mm BD = 540 mm. Find Velocity of slider	[10M]	2	L4

					
		UNIT-III			
6.		Draw the profile of a cam operating a knife edged follower from the following data. a)It lifts the follower through 4 cm during its 120 ^{0} rotation with Simple Harmonic Motion. b) The follower remains at rest for next 70^{0}rotation of the cam. c)The follower then descents to its original position during 100^0 rotation of the cam with Simple Harmonic Motion. d) The follower remains at rest for the rest of the revolution. The least radius of the cam is 5 cm. If the cam rotates at 3000 RPM, also find the maximum velocity and acceleration of the follower during ascent and descent. The axis of the follower passes through the axis of the cam shaft.	[10M]	3	L3
		OR			
7.		A cam rotating clockwise at a uniform speed of 200 r.p.m. is required to move an offset roller follower with a uniform and equal acceleration and retardation on both the outward and return strokes. The angle of ascent, the angle of dwell (between ascent and descent) and the angle of descent is 120°, 60° and 90° respectively. The follower dwells for the rest of cam rotation. The least radius of the cam is 50 mm, the lift of the follower is 25 mm and the diameter of the roller is 10 mm. The line of stroke of the follower is offset by 20 mm from the axis of the cam. Draw the profile of the cam	[10M]	3	L3
		UNIT-IV			
8.		The turning moment diagram for a four stroke gas engine may be assumed for simplicity to be represented by four triangles, the areas of which from the line of zero pressure are as follows : Suction stroke = 0.45×10^{-3} m^2; Compression stroke = 1.7×10^{-3} m^2; Expansion stroke = 6.8×10^{-3} m^2; Exhaust stroke = 0.65×10^{-3} m^2. Each m^2 of area represents 3MN-m of energy. Assuming the resisting torque to be uniform, find the mass of the rim of a flywheel required to keep the speed between 202 and 198 r.p.m. The mean radius of the rim is 1.2 m.	[10M]	4	L4
		OR			
9.		The turbine rotor of a ship has a mass of 20 tones and a radius of gyration of 0.75m. Its speed is 2000 rpm. The ship pitches 6° above and below the horizontal position. One complete oscillation takes 18 seconds and the motion is simple harmonic. Determine (i) The maximum couple tending to shear the holding down bolts of the turbine (ii) The maximum angular acceleration of the ship during pitching and (iii) The direction in which the bow will tend to turn while rising, if the rotation of the rotor is clockwise when looking from rear.	[10M]	4	L3

UNIT-V					
10.	a)	Derive the expression for height of the porter governor	[5M]	5	L3
	b)	Calculate the minimum speed of a Proell governor, which has equal arms each 200mm and are pivoted on the axis of rotation. The mass of each ball is 4kg and the central mass on the sleeve is 20kg. The extension arms of the lower links are each 60mm long and parallel to the axis when the minimum radius of the ball is 100mm.	[5M]	5	L3
OR					
11.		Find the unbalanced primary and secondary forces and couples when the cranks of a six cylinder diesel engines are spaced at 120^0 .The firing order is 1-3-6-5 - 4-2and and the cranks. The connecting rod length 300 mm and the crank is 60mm. The reciprocating mass per line is 2.1 kg and the rotating mass is 1.4 kg. The speed is 175 r.p.m. if cylinders are placed at 0.85 m apart	[10M]	5	L4

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