

COER University

END SEMESTER EXAMINATION, EVEN SEMESTER, 2023-24

Time : 3 hour

Semester : IV

Total Marks : 100

Program Name : B.Tech

Branch/Specialization : ME

Course Code : BTME 402

Course Name : Theory of Machines

Note: All questions are compulsory. No student is allowed to leave the examination hall before the completion of the time.

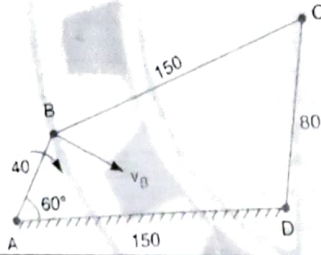
Q. No 1	Attempt Any Four Parts. Each Question Carries 5 Marks.	CO	BL
(a)	What do you understand by the instantaneous center of rotation in kinematic of machines? Answer briefly.	CO 1	2
(b)	Explain with sketch the instantaneous center method for determination of velocities of links and mechanisms.	CO 1	2
(c)	Discuss the three types of instantaneous centers for a mechanism.	CO 1	2
(d)	Differentiate between a machine and a structure.	CO 1	3
(e)	What is the significance of degrees of freedom of a kinematic chain	CO 1	3

Q. No 2	Attempt Any Four Parts. Each Question Carries 5 Marks.	CO	BL
(a)	Write short notes on cams and followers.	CO 2	2
(b)	Why a roller follower is preferred to that of a knife-edged follower	CO 2	2
(c)	What are the different types of motion with which a follower can move?	CO 2	2
(d)	Draw the displacement, velocity and acceleration diagrams for a follower when it moves with uniform acceleration and retardation.	CO 2	3
(e)	What is the function of a governor? How does it differ from that of a flywheel?	CO 2	3

Q. No 3	Attempt Any Four Parts. Each Question Carries 5 Marks.	CO	BL
(a)	Explain the term height of the governor. Derive an expression for the height in the case of a Watt governor.	CO 3	3
(b)	Define and explain the following terms relating to governors (1) Stability, (2) Sensitiveness, (3) Hunting, (4) Isochronism,	CO 3	2
(c)	Prove that the sensitiveness of a Proell governor is greater than that of a Porter governor	CO 3	2
(d)	Write short note on 'coefficient of insensitiveness' of governors.	CO 3	3
(e)	State the different types of governors. What is the difference between centrifugal and inertia type governors?	CO 3	3

Q. No 4	Attempt Any Two Parts. Each Question Carries 10 Marks.	CO	BL
(a)	A cam is to give the following motion to a knife-edged follower : 1. Outstroke during 60° of cam rotation; 2. Dwell for the next 30° of cam rotation 3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the pro- file of the cam when the axis of the follower passes through the axis of the cam shaft,	CO 4	3

(b)	A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in plane measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measure anticlockwise are A to B 45° , B to C 70° and C to D 120° . The balancing masses are to be place in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions.	CO 4	2
(c)	Explain any two inversions of a four-bar mechanism	CO 4	2

Q. No 5	Attempt Any Two Parts. Each Question Carries 10 Marks.	CO	BL
(a)	<p>In a four-bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 RPM clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°</p> 	CO 5	3
(b)	Derive an expression for length of arc of contact in a pair of meshed spur gears.	CO 5	3
(c)	The mass of flywheel of an engine is 6.5 tonnes and the radius of gyration is 1.8 metres. It is found from the turning moment diagram that the fluctuation of energy 56 kN-m. If the mean speed of the engine is 120 r.p.m., find the maximum and minimum speeds.	CO 5	3

-----End of Paper-----