

Code: 23ME3403

**II B.Tech - II Semester – Supplementary Examinations
DECEMBER 2025****THEORY OF MACHINES
(MECHANICAL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

-
- Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.
-

PART – A

1.a)	State Grashof's law.
1.b)	Classify different types of kinematic links?
1.c)	What is the Coriolis component of acceleration?
1.d)	State Kennedy's theorem?
1.e)	Explain the term Module.
1.f)	Explain about Gyroscopic couple.
1.g)	Explain about Static balancing.
1.h)	What is Pitch point in Cam?
1.i)	Explain about coefficient of fluctuation of speed.
1.j)	What are different types of damped vibrations?

PART – B

			Max. Marks
UNIT-I			
2	a)	Explain different types of constraint motion.	6 M
	b)	Sketch any two inversions of Double slider crank chain.	4 M
OR			
3	a)	Explain any one of the exact straight line mechanisms.	5 M
	b)	Explain construction of Universal joint.	5 M
UNIT-II			
4	The crank and connecting rod of a theoretical steam engine are 0.5 m and 2 m long respectively. The crank makes 180 r.p.m. in the clockwise direction. When it has turned 45° from the inner dead centre position, determine: 1. velocity of piston, 2. angular velocity of connecting rod, 3. velocity of point E on the connecting rod 1.5 m from the gudgeon pin.		10 M
OR			
5	PQRS is a four bar chain with link PS fixed. The lengths of the links are $PQ = 62.5 \text{ mm}$; $QR = 175 \text{ mm}$; $RS = 112.5 \text{ mm}$; and $PS = 200 \text{ mm}$. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity and acceleration diagram when angle $QPS = 60^\circ$ and Q and R lie on the same side of PS.		10 M
UNIT-III			
6	a)	State and prove law of gearing.	6 M

	b) Deduce an expression for velocity of sliding in a gear drive.	4 M
OR		
7	In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B.	10 M
UNIT-IV		
8	Four masses m_1 , m_2 , m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45° , 75° and 135° . Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.	10 M
OR		
9	A Cam is to be designed for a knife edge follower with following data: 1. Cam lift =40 mm during 90 deg of cam rotation with simple harmonic motion. 2. Dwell for next 30 deg. 3. During the next 60 deg of cam rotation, the follower returns to its original position with simple harmonic motion. 4. Dwell during the remaining 180 deg. Draw the profile of the cam when, the line of stroke of	10 M

		the follower passes through the axis of the cam shaft. The radius of the base circle of the cam is 40 mm. determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.	
UNIT-V			
10	a)	Derive natural frequency of free Torsional vibrations.	5 M
	b)	What are different types of Vibrations?	5 M
OR			
11	a)	Explain and Draw Turning moment diagram of steam engine.	6 M
	b)	A punching machine carries out 6 holes per minute. Each hole of 40mm diameter in 35mm thick plate requires 8 N-m of energy/mm ² of the sheared area. The punch has a stroke of 95mm. Find the power of the motor required if the mean speed of the flywheel is 20m/s.	4 M