Total No. of Printed Pages: 02

PRN No.	

PAPER CODE	U315-2112(RE)

(AY:2025-26) December 2025 (ENDSEM) EXAM

TY/B.TECH (SEMESTER - I)

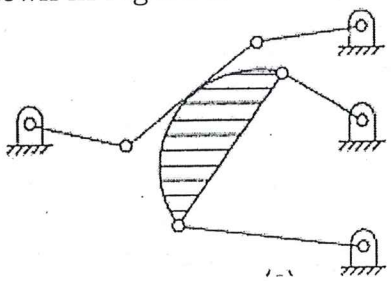
COURSE NAME: Kinematics and Theory of Machines **Branch: Mechanical** **COURSE CODE: ME31232**

T.Y (Pattern 2023)

Time: [1Hr 30 Min] **[Max. Marks: 40]**

(*) Instructions to candidates:

1) **Figures to the right indicate full marks. Use of scientific calculator is allowed**
2) **Use suitable data wherever required**
3) **All questions are compulsory. Solve any two-sub question each from Questions 1, 2 ,3 and 4**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Elaborate the differences between lower pairs and higher pairs in terms of their characteristics, functions, and applications?	[5]	CO1	Apply
	b) Calculate the degrees of freedom (DOF) for the following mechanism shown in Figure 1.  **Figure 1.**	[5]	CO1	Evaluate
	c)Elaborate "Grashof's Law". State how it is useful in classifying the four-link mechanisms into different types.	[5]	CO1	Evaluate
Q2	a) The crack and connecting rod of a steam engine are 0.5m and 2m long respectively. The crack makes 180rpm in clockwise direction. When it has turned through 45^0 from inner dead center, find the velocity of piston and angular velocity of connecting rod by ICR method.	[5]	CO2	Apply
	b) The crack and connecting rod of steam engine are 0.3 m and 1.5 m in length. The crack rotates at 250 rpm clockwise. Determine by analytical method the velocity and acceleration of the piston when the crack is 50^0 from I.D.C. position.	[5]	CO2	Evaluate
	c)Summarize the procedure to construct Klein's construction to determine the velocity of a piston in an I.C engine mechanism.	[5]	CO2	Evaluate

Q3	a) Discuss conjugate action and conjugate gear tooth profile.	[5]	CO3	Apply
	b)Elaborate the difference between 14 ½^0 Full depth involute tooth system and 20^0 Full depth involute tooth system	[5]	CO3	Apply
	c)The number of teeth on each of the two equal spur gears in mesh are 40. The teeth have 20^0 involute profile and module is 6 mm. If the arc of contact is 1.75 times the circular pitch. Estimate the addendum.	[5]	CO3	Evaluate
Q4	a) Discuss "Gear Train" and explain in brief "Reverted Gear Train" with neat sketch	[5]	CO4	Apply
	b) Calculate the speed of driven shaft in compound gear train, if the drivers have 40, 70, 100, and 150 teeth and followers have 15, 44, 60, 100 teeth. Speed of driving shaft is 150 rpm	[5]	CO4	Evaluate
	c) The arm of an epicyclic gear train rotates at 100rpm in an anticlockwise direction. The arm carries two-wheel A and B having 36 and 45 teeth respectively. The wheel A is fixed and the arm rotates about the centre of wheel A. find the speed of wheel B. if the wheel A makes 200 rpm. Clockwise?	[5]	CO4	Evaluate