Course Code: 1940315 **Roll No:** **MLRS- R19**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

II B.Tech II Sem Supply End Examination, March 2022
Kinematics of Machinery
(MECH)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Answer any FIVE questions.
2. Each question carries 14 marks and may have a, b as sub questions.

1	a)	In detail discuss various types of constrained motion.	7M	CO1	BL2
	b)	Define 'kinematic pair' and 'degree of freedom'. Sketch 'Spherical pair' and state its degree of freedom.	7M	CO1	BL1
2	a)	Distinguish between incompletely constrained motion and successfully constrained motion, with examples.	7M	CO1	BL2
	b)	How machines are classified? Explain.	7M	CO1	BL1
3	a)	Locate all the Instantaneous centers of slider crank mechanism with crank length of 25mm rotating clockwise at a uniform speed of 100 rpm. The crank makes 45^0 with IDC and the connecting rod is 400 mm long .Determine the velocity of the slider and the angular velocity of connecting rod?	7M	CO2	BL3
	b)	Draw and explain the Klein's construction for the velocity diagram of a Reciprocating Engine Mechanism? With this construction, how do you find the velocities of the piston and connecting rod in terms of the uniform angular velocity of the crank?	7M	CO2	BL3
4	a)	Draw the acceleration diagram of a slider crank mechanism and Explain	7M	CO2	BL4
	b)	Give a neat sketch of the straight line motion 'Hart mechanism.' Prove that it produces an exact straight line motion	7M	CO3	BL3
5	a)	A car with a wheel track of 147.2 cm and wheel base of 274 cm is fitted with an Ackerman"s steering mechanism. The distance between the axis of the pivot pins is 122 cm and the tie–rod is 110.6 cm long. The track arm is 15.25 cm long. Find the turning circle radius of the car, so that true rolling motion is there for all the wheels.	7M	CO3	BL3
	b)	Show that in Watt's straight line motion mechanism, the tracing point P on the coupler divides it in the ratio of the length of the oscillating links which are connected by it.	7M	CO3	BL3
6	a)	The follower of a tangent cam is operated through a roller of 50 mm diameter and its line of stroke intersects the axis of the cam. Minimum radius of the cam is 40 mm, nose radius is 12 mm, and the lift is 25 mm. If the speed of rotation of the cam is 800 rpm, find the velocity and acceleration of the follower at the instant when the cam is 250 from the full – lift position	7M	CO4	BL3
	b)	Derive relations for velocity and acceleration for a convex cam with a flat-faced follower.	7M	CO4	BL6
7	a)	The following data is related to a symmetrical circular arc cam operating a flat-faced follower. Least radius of the cam=27.5 mm, total lift= 12.5 mm, angle of lift=550,nose radius=3mm speed of cam=600 rpm. Find i).Distance between cam centre and nose centres, ii). radius of circular flank, iii). angle of contact on the circular flank	7M	CO4	BL3
	b)	Define the 'Law of Gearing'. Derive the expression for the same.	7M	CO5	BL6
8	a)	Derive the expression for the velocity ratio of a compound gear train.	7M	CO5	BL6
	b)	Derive an expression for Length of path of contact and Arc of contact?	7M	CO5	BL6

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