Code No: R2021034 **R20** SET - 1

II B. Tech I Semester Regular Examinations, Feb/March - 2022
KINEMATICS OF MACHINERY
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

1	a)	Define 'kinematic pair' and 'degree of freedom'. Sketch 'Spherical pair' and state degree of freedom.	[8M]
	b)	Distinguish between incompletely constrained motion and successfully constrained motion, with examples.	[6M]
		Or	
2	a)	Explain with a neat sketch, the double slider crank chain mechanism and its inversions.	[8M]
	b)	Explain Rolling pairs?	[6M]
3	a)	What is pantograph? Explain.	[7M]
	b)	Determine the greatest permissible angle between the axes of the two shafts which are connected by a Hooke's joint if the maximum variation in the speed of the driven shaft is ± 6 % of the mean speed. The driving shaft is rotating at a uniform speed of 500 rpm.	[7M]
		Or	
4	a)	What is an automobile steering gear? What are its types? Which steering gear is preferred and why?	[6M]
	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.	[8M]
5	a)	Assuming suitable proportions determine the velocity and acceleration of a slider in Toggle mechanism.	[6M]
	b)	Draw the acceleration diagram of a slider crank mechanism and Explain.	[8M]
		Or	
6	a)	What is the practical significance of evaluating velocity and acceleration of members of a mechanism?	[6M]
	b)	Determine the velocity and acceleration of the link QR and RS in a four bar mechanism in which PQRS is a four bar mechanism with fixed link PS. Crank PQ rotates uniformly and makes an angle of 600 with PS in anti-clockwise direction.. The length of the links are PQ=62.5 mm, QR= 175 mm, RS= 112.5 mm and PS= 200 mm. Crank PQ rotates at 10 radians/ second?	[8M]
7	a)	Deduce expressions for the velocity and acceleration of the follower when it moves with simple harmonic motion.	[6M]
	b)	Draw the profile of a cam to give the following motion to a flat – faced follower: i) Follower to rise through 36 mm during 1200 of cam rotation with uniform velocity ii) Follower to dwell for 500 of cam rotation iii) Follower to return to its initial position during 900 of cam rotation with SHM iv) Follower to dwell for the remaining period of cam rotation The minimum radius of cam is 50 mm. Also find the minimum width of the Follower from the cam profile diagram.	[8M]
		Or	
~~~~~~~~~~~~~~~~~~~~~~~~~

8 a) Derive relations for velocity and acceleration for a convex cam with a flat-Faced follower. [6M]

b) A symmetrical circular cam operates a roller follower with a lift of 30 mm. The minimum radius of the cam is 50 mm, the roller radius is 18 mm, and the nose radius is 12 mm. The angle of lift is 80^0. If the speed of the cam is 210 rpm, find the main dimensions of the cam and the acceleration of the follower at (i) the beginning of the lift, and (ii) the apex of the nose. [8M]

9 a) State and prove law of gearing. [6M]

b) Two spur gear wheels with 18 and 26 teeth gear together. The addendum of each wheel is equal to one module, and pressure angle is 20^0. Find the length of the arc of contact. [8M]

Or

10 Figure .1. Shows an epicyclic gear train. Two planet gears B and C having 30 teeth each are attached to the arm E and Gear A is having 40 teeth instead of 50, then find the number of revolutions made by the arm when: [7+7 M]

i) gear A makes one revolution Clockwise and D makes half a revolution anticlockwise and

ii) gear A makes one revolution clockwise and D is stationary.

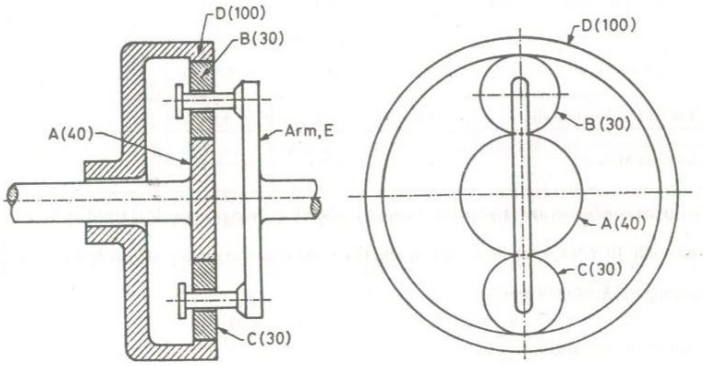

Figure: 1.