Model Question Paper with effect from 2019-20(CBCS Scheme)

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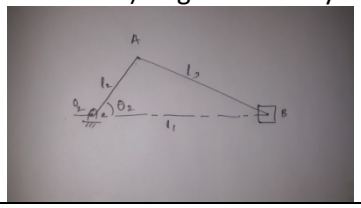
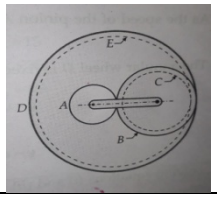
Fourth Semester B.E. Degree Examination
Kinematics of Machines

TIME : 03 Hours Max. Marks : 100

Note: 01. Answer any **FIVE** full questions, choosing **ONE** question from each **MODULE**

		Module-1	**Bloom's Texanomy Level**	**Marks**
Q.01	a	Define the following terms i) Kinematic Link ii) Kinematic Pair iii) Kinematic chain iv) Inversion v) Mechanism	L1	10
	b	Sketch and explain crank and slotted lever mechanism	L1	05
	c	Sketch and explain peaucellier's mechanism	L1	05
Q.02	a	Explain with neat sketch Ackerman's steering gear mechanism	L1	10
	b	Sketch and explain Ratchet and Pawl mechanism	L1	10
		Module-2		
Q.03		The crank of a slider crank mechanism rotates at a constant speed of 300 rpm. The crank is 150 mm and the connecting rod is 600 mm long. Determine: angular velocity and angular of the connecting rod, when the crank makes an angle of 45^{o} from inner dead center position.	L3	20
Q.04	a	State and prove Kennedy's theorem.	L2	08
	b	For a pin jointed four bar mechanism having following dimensions. Fixed link AD = 4m, Driving link AB = 1.5m, Driven link CD = 2.5m, Connecting rod BC = 3m and angle BAD = 60, Link AB rotates at 25 rpm. Determine using instantaneous centre method i) Angular velocity of link CD and ii) Angular velocity of link BC.	L3	12
		Module-3		
Q.05	a	Obtain the loop closure equation for a four bar mechanism	L2	08
	b	For a single slider mechanism shown, determine the velocity and acceleration of the piston, angular acceleration of connecting rod. Take crank length = 50 mm, connecting rod = 200 mm, Crank speed = 300 rpm (const.), Crank angle 30^{o}	L3	12
Q.06	a	Using complex algebra derive the expression for velocity and acceleration of the piston for the in-line slider crank mechanism	L2	12
	b	In a slider crank mechanism shown in Fig. the crank OA = 300 mm and connecting rod AB = 1200 mm. The crank OA is turned 30o from inner dead centre. Locate all instantaneous centers. If the crank rotates at 15 rad/sec clockwise, find i) velocity of slider B and ii) Angular velocity of connecting rod AB 	L3	08

		Module-4		
Q.07		The following data relate to cam profile in which the roller follower moves with SHM during ascent and UARM during descent. Minimum radius of cam = 30 mm Roller radius = 20 mm Lift = 28 mm Offset of follower axis = 12 mm towards right Angle of ascent = 90^o Angle of descent = 60^o Angle of dwell between ascent and descent = 45^o Draw the profile of the cam.	L3	20
Q.08		Draw the profile of a cam operating a knife-edge follower having a lift of 30 mm. The cam raises the follower with SHM for 150^o of the rotation followed by a period of dwell for 60^o. The follower descends for the next 100o of the cam rotation with uniform velocity, again followed a dwell period. The cam rotates in a.c.w sense at 120 rpm and has least radius of 25 mm. Determine maximum velocity and acceleration of the follower during the lift.	L3	20
		Module-5		
Q.09	a	Derive an equation to determine the length of path of contact by a pair of mating spur gears.	L2	08
	b	Two mating spur gears have 30 and 40 involute teeth of module 12 mm and 20^o obliquity. The addendum on each wheel is to be made of such a length that the link of contact on each side of pitch point has the maximum possible length. Determine the addendum height for each gear wheel and length of line of contact.	L4	12
Q.10		Figure shows an epicyclic Gear Train. Pinion A has 15 teeth and is rigidly fixed in the motor shaft. The wheel B has 20 teeth and gears with A, and also with annular fixed wheel D. Pinion C has 15 teeth an is integral with B (C, B being a compound gear wheel). Gear C meshes with annular wheel E, which is keyed to the machine shaft. The arm rotates about the same shaft on which A is fixed and carries the compound wheel B, C. If the motor runs at 1000 rpm, find the speed of machine shaft. Find the torque exerted on the machine shaft if motors develops a torque of 100 Nm. 	L3	20