

Model Question Paper-2 with effect from 2019-20 (CBCS Scheme)

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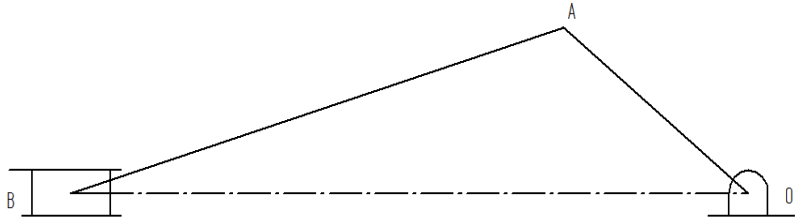
Fourth Semester B.E. Degree Examination

KINEMATICS OF MACHINES

TIME: 03 Hours

Max. Marks: 100

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

Module -1					
			Marks	CO	BT/CL
Q.01	a	With neat sketch explain Ratchet and Pawl mechanism.	07	CO ₁	L1, L2, L3
	b	Briefly explain condition for correct steering in motor car.	06	CO ₁	L1, L2, L3
	c	With neat sketch explain Elliptical trammel and oldhaum's coupling.	07	CO ₁	L1, L2, L3
OR					
Q.02	a	Explain inversions of four bar chain mechanism	10	CO ₁	L1, L2, L3
	b	Mention inversions of single slider crank chain and explain any two.	10	CO ₁	L1, L2, L3
Module-2					
Q. 03	a	A four bar mechanism ABCD is made up of four links, pin jointed at the ends. AD is fixed link which is 180mm long. The links AB, BC and CD are 90mm, 120mm and 120mm long respectively. At certain instant the link AB makes an angle of 60° with the link AD. If the link AB rotates at a uniform speed of 100rpm clockwise determine, I. Angular velocity of the links BC and CD and II. Angular acceleration of the links CD and CB	15	CO ₃	L1, L2, L3
	b	What is Corolis component of acceleration? Explain with an example and neat sketch.	05	CO ₃	L1, L2, L3
OR					
Q.04	a	In a slider crank mechanism shown in fig 4(a) the crank OA = 300mm and connecting rod AB =1200mm. the crank OA is turned 30° from inner dead centre. Locate all the instantaneous centres. If the crank rotates at 15rad/sec clock wise, find (i) velocity of slider B and (ii) Angular velocity of connecting rod AB.	10	CO ₃	L1, L2, L3
					
	b	Define instantaneous centre and state types of instantaneous centre.	04	CO ₃	L1, L2, L3
	c	State and prove Kennedy's Theorem.	06	CO ₃	L1, L2, L3
Module-3					
Q. 05	a	Determine the velocity and acceleration of the piston by Klein's construction to the following specification. Stroke = 300mm, Ratio of length of connecting rod to crank length = 4, Speed of engine = 300rpm, Position of crank = 45° with inner dead centre.	10	CO ₃	L1, L2, L3
	b	Explain Klein's construction for slider crank mechanism	10	CO ₃	L1, L2, L3
OR					

Q. 06	a	Derive an expression for velocity and acceleration of the piston in a reciprocating mechanism by using complex algebra method.	10	CO ₃	L1, L2, L3
	b	In a 4 bar mechanism ABCD link AB =300mm, BC=360mm, CD=360mm and the fixed link AD=600mm. the angle of link AB with fixed link AD is 60 degree. The AB has an angular velocity of 10rad/sec and angular acceleration of 30rad/sec ² both clockwise. Determine the angular velocity and angular acceleration of link BC and CD by Raven's approach.	10	CO ₃	L1, L2, L3
Module-4					
Q. 07	a	Derive an expression for Minimum number of teeth on a gear to avoid interference and Minimum number of teeth on a pinion to avoid interference.	10	CO ₅	L1, L2, L3
	b	The following are particulars of a pair of spur gears. Number of teeth on pinion =19. Number of teeth on gear = 47. Pressure angle = 20 ⁰ . Module=6.5mm Addendum = 6.5mm. Determine, I. Number of pairs of teeth in contact. II. Angle turned through by pinion and gear when one pair of teeth is in contact. III. Ratio of velocity of sliding to rolling velocity at the instant the engagement begins, the engagement terminates and at pitch point.	10	CO ₅	L1, L2, L3
OR					
Q. 08	a	An epicyclic gear train is compound of fixed annular wheel A having 150 teeth. Meshing with A is wheel B, which drives wheel D through idler wheel C. 'D' being concentric with A wheel B and C are carried on an arm which rotates clockwise at 100rpm about the axis of A and D. If the wheels B and D have 25 and 40 teeth respectively, find the number of teeth on C and the speed and sense of rotation of C.	10	CO ₅	L1, L2, L3
	b	In an internal wheel B with 80 teeth is keyed to a shaft E. A fixed internal wheel C with 82 teeth is concentric with B. A compound wheels revolve freely on a pin which projects from a disc keyed to a shaft A co-axial with F. if all the wheels have the same pitch and shaft A makes 800rpm what is the speed of shaft F? Sketch the arrangement.	10	CO ₅	L1, L2, L3
Module-5					
Q. 09	a	A vertical spindle supplied with a plane horizontal face at its lower end is actuated by a cam keyed to a uniformly rotating shaft. The spindle is raised through a distance of 30mm in one fourth remains at rest in one fourth is lowered in one third and remains at rest for the remainder of a complete revolution. Draw the profile assuming the least radius of the cam profile as 25mm and that the spindle moves with UARM on both during ascent and descent. However during decent deceleration period is half the acceleration period. The axis of the spindle passes through cam axis. The cam rotates in anti clockwise direction.	20	Co ₄	L1, L2, L3
OR					
Q. 10	a	A push rod operated by a cam is to rise and fall with SHM along an inclined straight path. The least radius of the cam is 50mm and the push rod is fitted at its lower end with a roller of 30mm diameter. When it its lower position the roller center is vertically above the cam axis. The maximum displacement of the roller is 50mm in the direction inclined 30 ⁰ to the right of vertical. The cam rotates at 100rpm in clockwise direction. The time of lift is 0.15 second and the time of fall is 0.1 second with a period of rest 0.05 second at the upper position. Draw the cam profile	20	Co ₄	L1, L2, L3