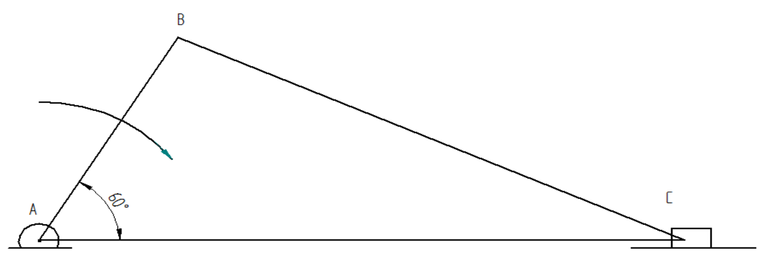
Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN | | | | | | | | | | |

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	Define Kinematic chain, Kinematic Pair, Mechanism, Inversion, Structure, Machine.	**06**	**CO_1**	**L1, L2, L3**
	b	With neat sketch explain Crank and Slotted lever mechanism.	**07**	**CO_1**	**L1, L2, L3**
	c	With neat sketch explain Whitworth quick return motion mechanism.	**07**	**CO_1**	**L1, L2, L3**
		OR			
Q.02	a	With neat sketch explain Peaucellier Mechanism.	**06**	**CO_1**	**L1, L2, L3**
	b	With neat sketch explain Geneva mechanism.	**06**	**CO_1**	**L1, L2, L3**
	c	With neat sketch explain Ackermann steering gear mechanism.	**08**	**CO_1**	**L1, L2, L3**
		Module-2			
Q. 03	a	Define the following I. Linear and Angular velocity. II. Linear and Angular Acceleration.	**06**	**CO_2**	**L1, L2, L3**
	b	In a slider crank mechanism the crank OB=30 mm and the connecting rod BC=120 mm. the crank rotates at a uniform speed of 300rpm clock wise. For the crank position shown in fig 3(b) find (i) Velocity of piston C and angular velocity of connecting rod BC. (ii) Acceleration of piston C and angular acceleration of connecting rod BC. 	**14**	**CO_3**	**L1, L2, L3**
		OR			
Q.04	a	State and prove kennedy's Theorem.	**08**	**CO_3**	**L1, L2, L3**
	b	Locate all the instantaneous centres for the toggle mechanism shown in fig4(b). O_2 A =180mm CB =240mm AB =360mm BD = 540mm	**12**	**CO_3**	**L1, L2, L3**

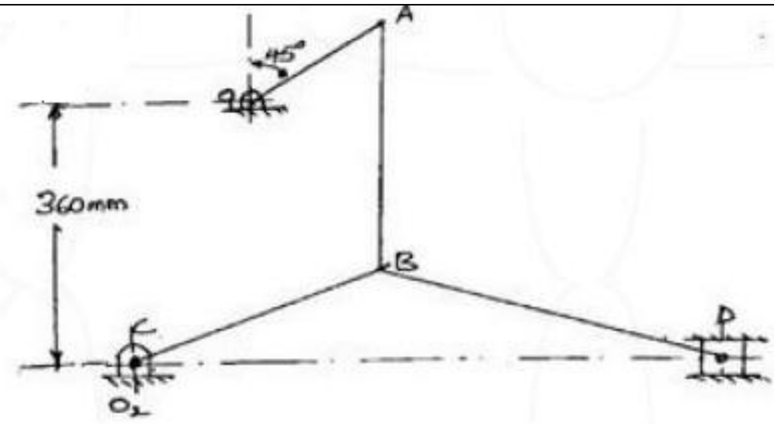


Fig4(b)

		Module-3			
Q. 05	a	Explain Klein's construction for slider crank mechanism.	**10**	**CO_3**	**L1, L2, L3**
	b	In a reciprocating engine the length of crank is 250mm and length of connecting rod is 1000mm. The crank rotates at an uniform speed of 300rpm in clock wise direction and the crank is inclined at 30^0 with inner dead centre. The centre of gravity of the connecting rod is 400mm away from the crank end. By Klein's construction determine (i) Velocity and acceleration of piston. (ii) Angular velocity and angular acceleration of connecting rod and (iii) Velocity and acceleration at the centre of gravity of the connecting rod.	**10**	**CO_3**	**L1, L2, L3**
		OR			
Q. 06	a	Using complex algebra derive expression for velocity and acceleration of the piston, angular acceleration of connecting rod of a reciprocating engine mechanism. With these expression determine the above quantities, if the crank length is 50mm, connecting rod 200mm, crank speed is constant at 3000rpm and angle is 30^0.	**20**	**CO_3**	**L1, L2, L3**
		Module-4			
Q. 07	a	Derive an expression to determine length of arc of contact for a pair of mating gears.	**10**	**CO_5**	**L1, L2, L3**
	b	The following data refers to two mating involute gears of 20^0 pressure angle. Number of teeth on pinion is 20. Gear ratio = 2. Speed of pinion is 250rpm. Module = 12mm. if the addendum on each wheel is such that the path of approach and the path of recess on each side are half of the maximum permissible length. Find (i) The addendum of pinion and gear. (ii) The length of arc of contact. (iii) The maximum velocity of sliding during approach and recess.	**10**	**CO_5**	**L1, L2, L3**
		OR			
Q. 08	a	Sketch and explain I. Simple gear train. II. Compound gear train.	**08**	**CO_5**	**L1, L2, L3**
	b	In an epicyclic gear train, the internal wheels A, B and the compound wheels C and D rotates independently about axis 'O'. The wheels E and F rotates on a pin fixed to arm G. E gears with A and C, and F gears with B and D. All the wheels have same pitch and number of teeth on E and F are 18, C =28, D=26. (i) Sketch the arrangement (ii) Find the number of teeth on A and B. (iii) If the arm G makes 150rpm cw and A is fixed find speed of B (iv) If the arm G makes 150rpm cw and wheel A makes 15 rpm ccw, find the speed B.	**12**	**CO_5**	**L1, L2, L3**

		Module-5			
Q. 09	a	A cam rotating clockwise at uniform speed of 300rpm operates a reciprocating follower through a roller 1.5cm diameter. The follower motion is defined as below. I. Outward during 150^0 with UARM II. Dwell for next 30^0 III. Return during next 120^0 with SHM IV. Dwell for the remaining period. Stroke of the follower is 3cm. minimum radius of the cam 3cm. draw the cam profile a) Follower axis passes through cam axis b) Follower axis is offset to the right by 1cm. Also find the maximum velocity and acceleration during outward and inward stroke.	**20**	**Co_4**	**L1, L2, L3**
		OR			
Q. 10	a	Draw to full size the profile of cam which will give a lift of 38mm to a follower carrying a roller of 25mm diameter. The axis of the follower is off-set by 18mm to the right of the axis of cam. Ascent of the follower takes place with SHM in 0.05 second followed by a period of rest 0.0125second. the follower by then descent with UARM during 0.125 second the acceleration being 3/5 times retardation. The cam rotates in clockwise direction at a constant speed of 240rpm and the base circle radius is 50mm.	**20**	**Co_4**	**L1, L2, L3**