Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–II EXAMINATION – WINTER 2015

Subject Code: X21902 **Date:28/12/2015**

Subject Name: Kinematics of Machines

Time: 02:30pm to 05:00pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

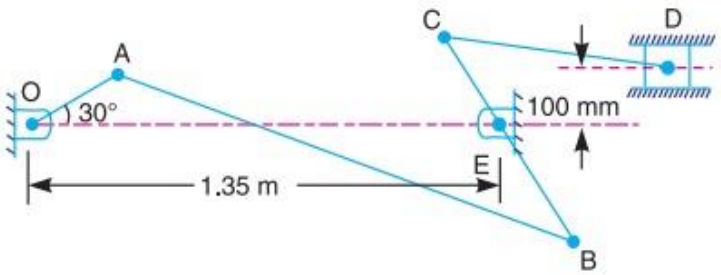
Q.1 **(a)** What is a machine? Giving example, differentiate machine and structure. **07**

(b) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centers is 240 mm and the length of the driving crank is 120mm. find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. **07**

If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme position of the free end of the lever.

Q.2 **(a)** What do you understand by the instantaneous center of rotation in kinematic of machines? Answer briefly. **07**

(b) A mechanism, as shown in fig has the following dimensions. OA= 200mm: AB =1.5m : BC= 600 mm: CD = 500 mm and BE= 400mm. locate all the instantaneous centers. If the crank OA rotates uniformly at 120 rpm. Clockwise, find 1. The velocity of B, C and D, 2. The angular velocity of the link AB, BC and CD. **07**



Q.3 **(a)** Obtain an expression for the length of a belt in an open belt drive. **07**

(b) What is centrifugal tension in a belt? How does it affect the power transmitted? **07**

Q.4 **(a)** Derive an expression for the length of the arc of contact in a pair of meshed spur gears **07**

(b) Differentiate between Involute and Cycloidal gear tooth profile. Explain law of gearing **07**

Q.5 **(a)** Derive an expression for the minimum number of teeth required on the pinion in order to avoid interference in involute gear teeth when it meshes with wheel. **07**

(b) What do you understand by " gear train"? discuss the various types of gear trains. **07**

Q.6 **(a)** Classify cams and followers with figure. **07**

(b) Define and explain with neat sketch Base circle , Prime circle , Pressure angle ,Pitch curve and Pitch point related to cam and follower. **07**

Q.7	**(a)**	Derive maximum efficiency of screw jack.	**07**
	(b)	An effort of 1500N is required to just move a certain body up an inclined plane of angle 12°, force acting parallel to the plane. If the angle of inclination is increased to 15° , then the effort required is1720N. find the weight of the body and the coefficient of friction.	**07**

****