

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC SEM-II Examination-Dec-2011

Subject code: X21902**Date: 24/12/2011****Subject Name: Kinematics of machines****Time: 10.30 am -1.00 pm****Total marks: 70****Instructions:**

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

- Q.1** (a) Differentiate between the following: (1) mechanism and machine (2) higher pair and lower pair and (3) link and linkage **07**
(b) What is meant by inversion of a mechanism ? Sketch a double slider crank chain and draw its inversions (any one). **07**

- Q.2** (a) Explain the instantaneous center method for finding out the velocity of a point on a link. **07**
(b) Write a short note on : Velocity and acceleration diagram. **07**
OR
(b) Describe Klein's construction with an example. **07**

- Q.3** (a) Discuss the types of belts and belt drive used for transmission of power. **07**
(b) Two parallel shaft 6m apart are to be connected by a belt running over a pulley of diameter 600 mm and 400 mm respectively. Find exact and approximate lengths of belt
When (1) belt is open and (2) belt is crossed **07**

- OR**
Q.3 (a) Explain the types of rope drives and discuss the advantages and limitation of rope drives over other drive. **07**
(b) With the help of neat sketches discuss the types of chains. **07**

- Q.4** (a) Two involute gears of 20° pressure angle are rotating in mesh. The speed of smaller gear is 1440 rpm. The number of teeth on pinion is 20 and gear ratio is 2. If the addendum of a pinion and wheel is standard and equal to one module and module is 5 mm find : (1) length of path of approach (2) length of path of recess (3) length of path of contact and (4) length of arc of contact. **07**
(b) State and prove law of gearing. **07**

- OR**
Q.4 (a) With the help of neat sketches explain the types of cams and followers. **07**

- (b) Draw the profile of a cam operating a knife edge follower from the following data : (1) follower lifts through 3.8 cm during its 60° rotation with simple harmonic motion (2) the follower remains at rest for next 40° rotation of cam. (3) the follower then descends to its original position during 90° rotation of the cam with simple harmonic motion and (4) the follower remains at rest for the rest of the revolution. The least radius of the cam is 5 cm. **07**

- Q.5 (a)** Find the force required to be applied at the end of 500 mm long lever of a screw jack. The threads are single start and square with 12 mm pitch and 65 mm mean diameter. The load does not rotate with screw spindle. The co efficient of friction for thread is 0.15 and for collar is 0.12 which is having 40 mm mean radius. Also find the efficiency of the screw jack if the load to be lifted is 8000 N. **07**

- (b) Draw with neat sketch the following types of pivot bearings. Explain any one in detail (1) flat pivot bearing (2) flat collar pivot bearing and (3) conical pivot bearing **07**

OR

- Q.5 (a)** A single band brake is operated by a lever of length 500 mm. The brake drum has a diameter of 500 mm and the brake band embraces $5/8$ of circumference. One end of the band is attached to the fulcrum of the lever, while the other end is attached to a pin on the lever 100 mm from the fulcrum. If the effort applied to the end of the lever is 2kN and the co efficient of friction is 0.25, find the maximum braking torque on the drum. **07**

- (b) Explain any one type of clutch with neat sketch. **07**
