Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC- SEMESTER–II - EXAMINATION – SUMMER 2017

Subject Code: X21902 **Date:01/06/2017**

Subject Name: KINEMATICS OF MACHINES

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

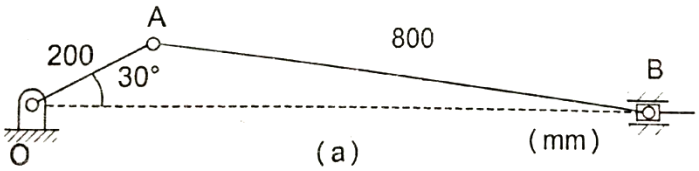
Instructions:

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

Q.1 **(a)** Define: Kinematic Inversion. Explain about Kinematic Inversions of Single and Double slider crank Chain. **07**

(b) An engine running at 1440 rpm, drives a line shaft by means of a belt. The engine pulley and line shaft pulley diameters are 500 mm and 800 mm respectively. A 450 mm diameter pulley on line shaft drives a 650 mm diameter pulley keyed to the counter shaft. There is 2% slip on each drive. Find the speed of counter shaft when (1) Neglecting slip, and (2) Considering slip. **07**

Q.2 **(a)** Locate all the i-centers of a slider crank mechanism for the position of the crank when it has turned 30^0 from the inner dead centre and rotates at 40 rad/sec. The length of the crank and the connecting rod are 200 mm and 800 mm respectively. Find the velocity of the slider and the angular velocity of the connecting rod. **07**



(b) (1) Give classification of Kinematic pairs. **07**
(2) Give classification of Gears.

Q.3 **(a)** Write a short note on Davis steering gear mechanism. **07**

(b) Describe various types of belts and various types of belt drives. Also explain the importance of crowning for flat belt drive. **07**

Q.4 **(a)** State and prove the law of gearing. **07**

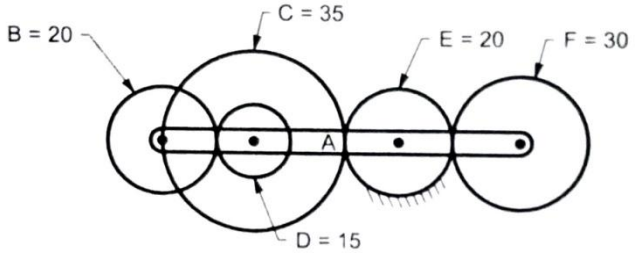
(b) For single slider mechanism having a crank rotating with uniform velocity, derive analytical expression of velocity and acceleration of piston. **07**

Q.5 **(a)** List various straight line motion mechanisms and explain any one in detail. **07**

(b) A single plate clutch, with both sides effective, has inner and outer diameters of friction surface 250mm and 350mm respectively. The maximum intensity of pressure is not to exceed 0.15 MPa. The coefficient of friction is 0.3. Determine the power transmitted by the clutch at a speed of 2400 rpm for (a) uniform wear and for (2) uniform pressure **07**

Q.6 **(a)** Explain various types of cams and followers with the help of neat sketches. **07**

(b) For a given epicyclic gear train arrangement as shown in fig, Wheel E is fixed wheel and wheel C and D are integrally cast and mounted on one pin. If the arm A makes one revolution per second counter clockwise. Determine the speed and direction of rotation of wheels B and F. **07**



Q.7 **(a)** Construct the profile of a cam to give the following motion to the reciprocating follower with a knife edge follower without any offset: **07**

(i) Follower to have a stroke of 40 mm during 90° of cam rotation with simple harmonic motion;

(ii) Follower to dwell for 30° of cam rotation ;

(iii) Follower to return to its initial position during 60° of cam rotation with Uniform velocity;

(iv) Follower to dwell for remaining 180° of cam rotation.

The base circle diameter of the cam is 100 mm.

(b) For a single plate clutch, Derive an expression for the maximum torque transmitted considering uniform pressure theory and uniform wear theory both. **07**

****