Code No. : 5179

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/AE) II Semester (Supple.) Examination, January 2012

KINEMATICS OF MACHINES

Time: 3 Hours] [Max. Marks: 75

Note: *Answer* ***all*** *questions from Part* ***A****. Answer* ***any five*** *questions from Part* ***B****.*

PART – A **(25 Marks)**

1. Differentiate mechanism and machine. **3**
2. What is inversion of a mechanism ? **2**
3. Differentiate Davi's and Ackermann steering gear mechanism. **3**
4. Define body centrode and space centrode. **2**
5. What is Coriolis component of acceleration ? Give its magnitude and direction. **3**
6. What are the laws of friction ? **2**
7. What is the condition for maximum power transmitted by a belt drive ? **3**
8. What is self 'energizing' and 'self locking' brake ? **2**
9. Classify the cams and followers. **3**
10. What is law of gearing ? **2**

PART – B **(5×10=50 Marks)**

11. a) Derive an expression for degree of freedom of a mechanism using Grubler's criterion. **5**

    b) Explain inversions of double slider crank mechanism. **5**

12. Locate all the instantaneous centres of the mechanism shown in Fig. 1. The lengths of the links are : AB = 150 mm; BC = 300 mm; CD = 225 mm ; CE = 500 mm. When the crank rotates (AB) in the anticlockwise direction at a uniform speed of 240 r.p.m.; find the velocity of the slider E, and angular velocity of links BC and CE. **10**

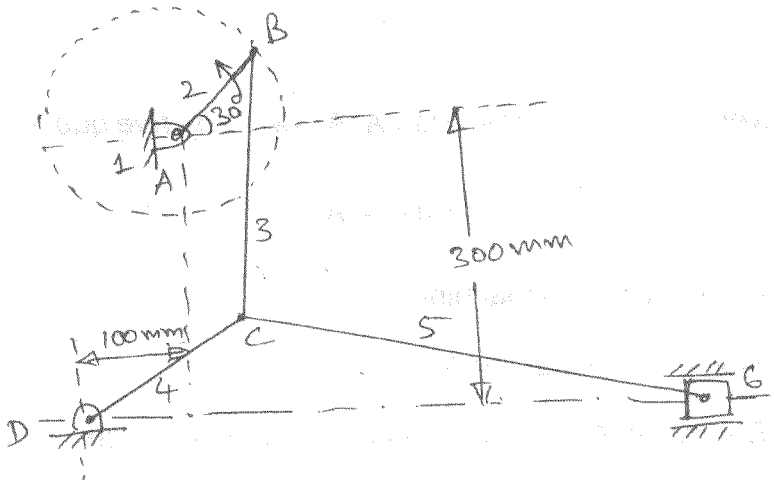

Fig. 1

13.a) What is 'creep' in belt-drive ? **2**

b) A shaft rotating at 200 r.p.m. drives another shaft at 300 r.p.m. and transmits 6 kW through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5 m in diameter. Calculate the stress in the belt if it is an open belt drive. **8**

14. A cam with 30 mm as maximum diameter is rotating clockwise at a uniform speed by 1200 r.p.m. and has to give the following motion to a roller 10 mm in diameter.

a) Follower to complete outward stroke of 25 mm during 120° of cam rotation with equal uniform acceleration and deceleration.

b) Follower to dwell for 60° of cam rotation.

c) Follower to return to its initial position during 90° of cam rotation with SHM.

d) Follower to dwell for the remaining 90° of rotation.

Draw the profile if the axis of the roller follower passes through the axis of the cam. **10**

15. a) What is interference and undercutting in gears ? 3

    b) Determine the maximum number of teeth required on a pinion, inorder to avoid interference which is to gear with 7

    i) a wheel to give a gear ratio of 3 to 1 ; ii) an equal wheel.

16. In a band and block brake, the band lined with 14 blocks, each of which subtends an angle of 20° at the drum centre. One end of the band is attached to the fulcrum of the brake lever and the other to a pin 150 mm from the fulcrum. Find the force required at the end of the lever 1 m long from the fulcrum to give a torque of 4 kN-m. The diameter of the brake drum is 1m and coefficient of friction between the blocks and drum is 0.25. 10

17. Write short notes on the following : 10

    a) Hart mechanism.

    b) Rope brake dynamometer.

    c) Gear trains.