

B.Tech Even Semester (CBCS) Exam., April—2017

AGRICULTURAL ENGINEERING

(4th Semester)

Course No. : AECC-12

(Kinematics and Dynamics of Machines)

Full Marks : 50

Pass Marks : 15

Time : 2 hours

Note : 1. Attempt *any five* questions.

2. Begin each answer in a new page.

3. Answer parts of a question at a place.

4. Assume reasonable data wherever required.

5. The figures in the margin indicate full marks for the questions.

1. (a) Define the following : 5

(i) Lower pair and higher pair

(ii) Kinematic chain

(iii) Machine

(iv) Link

(v) Position vector

(b) Discuss the four laws of mechanics. 5

2. (a) State Grubler's criterion. Find the degrees of freedom of the mechanisms shown in Fig. 1 below : 5

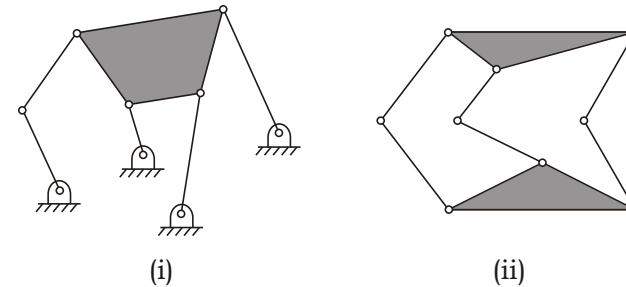


Fig. 1

(b) Find the force with which the 1000 N press against the floor shown in Fig. 2 (Draw the free body diagram) : 5

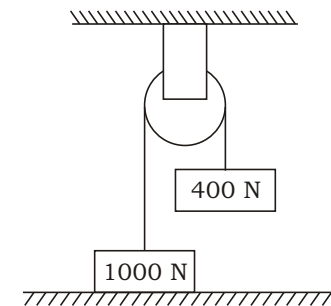


Fig. 2

(3)

3. Discuss the different types of motions with example. Particles start with velocity V_0 . Its acceleration and velocity are related by the equation $a = kV$, where k is the constant, V is the velocity of particle, a is the acceleration of the particle. Find the displacement-time relationship. 10

4. What is resultant? From the Fig. 3 given below, find F and : 10

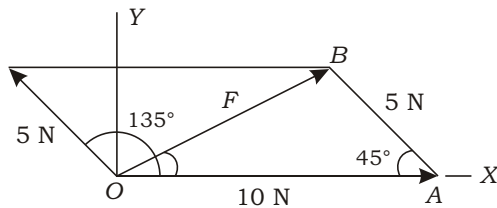


Fig. 3

5. Find the resultant of the following forces from the Fig. 4 : 10

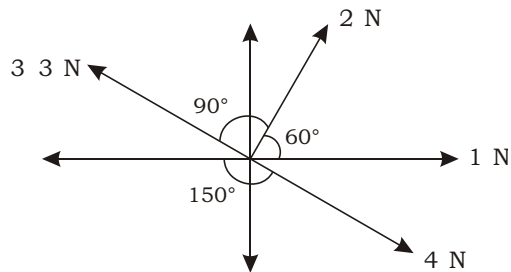


Fig. 4

(4)

6. What is Grashoff's law? Discuss four-bar mechanism and slider-crank mechanism and double slider crank mechanism with proper diagram. 10

7. The motion of a particle is described by the following relations :

$$X = t^2 - 8t + 4$$

$$Y = t^3 - 3t^2 - 8t + 4$$

Determine the following : 10

- (a) Initial velocity of particle
(b) Velocity of particle at $t = 2$ sec
(c) Acceleration of particle at $t = 2$ sec
(d) Position of the particle at $t = 2$ sec
8. A sphere of radius r and weight W is projected along a horizontal plane surface with initial linear velocity V_0 and initial angular velocity as shown in Fig. 5 :

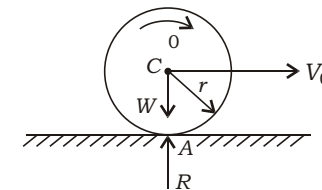


Fig. 5

Discuss the subsequent motion of the sphere assuming that the coefficient of friction at the point of contact is . 10
