R16

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year I Semester Supplementary Examinations Nov/Dec 2019
KINEMATICS OF MACHINERY
(Mechanical Engineering)

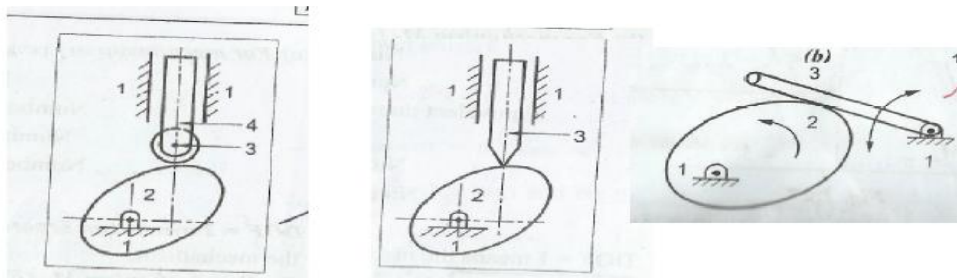Time: 3 hours   Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 Define the term 'Degrees of Freedom'. And find the degrees of freedom for the following linkages   **12M**

OR

2 **a** Explain the working of beam engine with neat sketch.   **4M**
   b Explain the inversions of double slider crank chain with neat sketch and list. out the practical applications of inversions.   **8M**

UNIT-II

3 **a** With neat sketch, explain the Davis steering gear of an automobile.   **8M**
   b Sketch and Describe the Tchebichef mechanism.   **4M**

OR

4 **a** Sketch and Describe the Scott-Russell and Robert's straight-line motion mechanisms   **8M**
   **b** What is the condition for correct steering? Write fundamental equation of it. **4M**

UNIT-III

5 The dimensions of the mechanism, as shown in Fig, are as follows :   **12M**
AB = 0.45 m; BD = 1.5 m: BC = CE = 0.9 m. The crank AB turns uniformly at 180 r.p.m. in the clockwise direction and the blocks at D and E are working in frictionless guides. Draw the velocity diagram for the mechanism and find the velocities of the sliders D and E in their guides. Also determine the turning moment at A if a force of 500 N acts on D in the direction of arrow X and a force of 750 N acts on E in the direction of arrow Y.
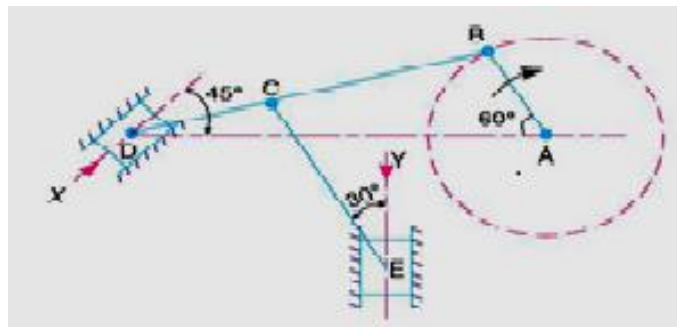
OR

6 Locate the entire instantaneous Centre's of the slider crank mechanism as shown in Fig. **12M**
The lengths of crank OB and connecting rod AB are 100 mm and 400mm respectively.
If the crank rotates clockwise with an angular velocity of 10 rad/s, find:
1. Velocity of the slider A, and 2. Angular velocity of the connecting rod AB.
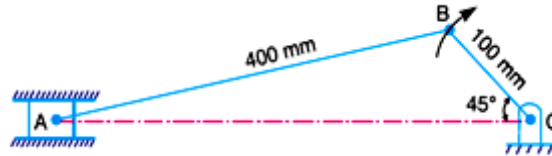
UNIT-IV

7 A cam is to be designed for a knife edge follower with the following data : **12M**
1. Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion.
2. Dwell for the next 30°.
3. During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.
4. Dwell during the remaining 180°.
Draw the profile of the cam when
(a) the line of stroke of the follower passes through the axis of the cam shaft, and
(b) the line of stroke is offset 20 mm from the axis of the cam shaft.
The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.
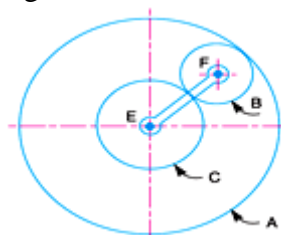
OR

8 It is required to set out the profile of a cam to give the following motion to the **12M**
reciprocating follower with a flat mushroom contact face :
(i) Follower to have a stroke of 20 mm during 120° of cam rotation.
(ii) Follower to dwell for 30° of cam rotation.
(iii) Follower to return to its initial position during 120° of cam rotation and
(iv) Follower to dwell for remaining 90° of cam rotation.
The minimum radius of the cam is 25 mm. The out stroke of the follower is performed with simple harmonic motion and the return stroke with equal uniform acceleration and retardation.

UNIT-V

9 **a** What do you understand by the term 'interference' as applied to gears? **6M**
b Write advantages and disadvantages of gears. **6M**

OR

10 An epicyclic gear consists of three gears A, B and C as shown in Fig. The gear A has 72 **12M**
internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried on an arm EF which rotates about the centre of A at 18 r.p.m.. If the gear A is fixed, determine the speed of gears B and C.

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