Q.P. Code: 16ME304 **R16**

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations November-2020

KINEMATICS OF MACHINERY

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	**a**	Explain the classification of the kinematics pairs in detail with neat sketch	**8M**
	b	What is pantograph? Show that it generates a path similar to the path traced by a point on the mechanism.	**4M**

OR

2	**a**	Explain the inversions of single slider crank chain with neat sketch and list out the practical applications of inversions.	**8M**
	b	Explain about the Kutzbach criterion and why it is used? Show the proof?	**4M**

UNIT-II

3	**a**	With neat sketch, explain the Ackerman steering gear of an automobile.	**6M**
	b	Sketch and Describe the working of Peaucellier mechanism.	**6M**

OR

4	**a**	With neat sketch, explain the working of Universal joint. And write applications also	**6M**
	b	Sketch and Describe the watt mechanism	**6M**

UNIT-III

5 In Fig. 7.9, the angular velocity of the crank OA is 600 r.p.m. Determine the linear velocity of the slider D and the angular velocity of the link BD, when the crank is inclined at an angle of 75° to the vertical. The dimensions of various links are: OA = 28 mm ; AB = 44 mm ; BC 49 mm ; and BD = 46 mm. The centre distance between the centres of rotation O and C is 65 mm. The path of travel of the slider is 11 mm below the fixed point C. The slider moves along a horizontal path and OC is vertical. **12M**

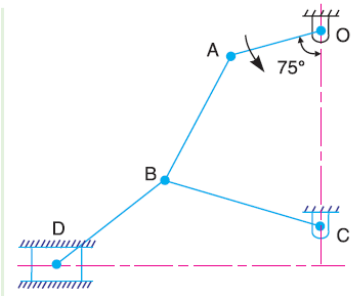

Fig. 7.9

OR

6 An engine mechanism is shown in Fig. 8.5. The crank CB = 100 mm and the connecting rod BA = 300 mm with centre of gravity G, 100 mm from B. In the position shown, the crankshaft has a speed of 75 rad/s and an angular acceleration of 1200 rad/s2. Find: **12M**

i). velocity of G and angular velocity of AB, and

ii). Acceleration of G and angular acceleration of AB.

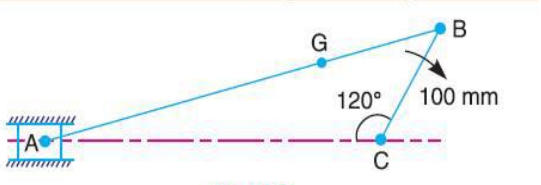

Fig. 8.5

UNIT-IV

7 A cam is to give the following motion to a knife-edged follower : **12M**

1. Outstroke during 60° of cam rotation ;
2. Dwell for the next 30° of cam rotation ;
3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation.

The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when

(a) The axis of the follower passes through the axis of the cam shaft, and

(b) The axis of the follower is offset by 20 mm from the axis of the cam shaft.

OR

8 A cam rotating clockwise at a uniform speed of 1000 r.p.m. is required to give a roller follower the motion defined below : **12M**

1. Follower to move outwards through 50 mm during 120° of cam rotation,
2. Follower to dwell for next 60° of cam rotation,
3. Follower to return to its starting position during next 90° of cam rotation,
4. Follower to dwell for the rest of the cam rotation.

The minimum radius of the cam is 50 mm and the diameter of roller is 10 mm. The line of stroke of the follower is off-set by 20 mm from the axis of the cam shaft. If the displacement of the follower takes place with uniform and equal acceleration and retardation on both the outward and return strokes, draw profile of the cam and find the maximum velocity and acceleration during out stroke and return stroke.

UNIT-V

9 **a** Explain the terms :(i) Module, (ii) Pressure angle, and (iii) Addendum. **6M**

b State and prove the law of gearing. Show that involute profile satisfies the conditions for correct gearing. **6M**

OR

10 In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D - E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise. **12M**

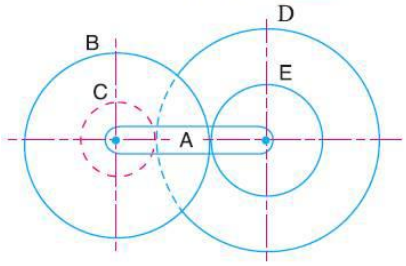

Fig. 13.8

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