SE MECHTX SEM-IV sub: KOM. DT- 19-5-2017.
(CBSGS)

Q.P.Code:13204

(3 Hours) [Total Marks: 80

N.B. (1) Question No. 1 is compulsory
(2) Attempt any **three** questions out of the remaining **five** questions.
(3) Figures to the **right** indicate **full marks**.
(4) Assume suitable data wherever required but justify the same.

1. Write short note on any 4 of the following [20]

a) Mobility of Mechanisms
b) Law of belting and slip in belt
c) Types of follower
d) Mechanisms used in 3D printer
e) Compliant mechanisms

2. (a) A cord is wrapped on a 2 m diameter disc, which weighs 250 N. if the cord is pulled upwards with a force of 400 N, determine the acceleration of the centre of the disc, the angular acceleration of the disc, and the acceleration of the cord. [6]

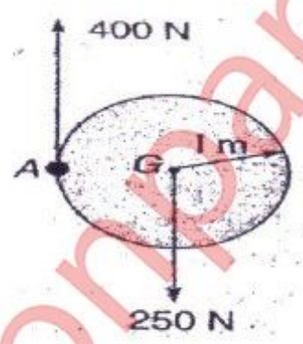

Figure 1

(b) Fig. 2 shows the mechanism of a sewing machine needle box. For yhe given configuration, find the velocity of the needle fixed to the slider D when the crank OA rotates at 40 rad/s. [8]

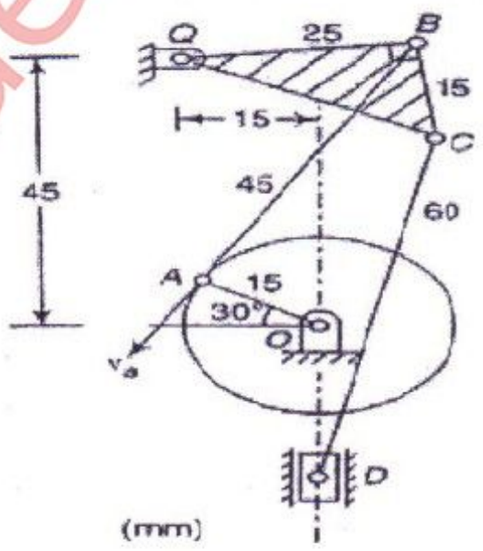

Figure. 2

(c) Explain four bar chain and its anyone inversion. [6]

Turn Over

3. (a). In the mechanism shown in figure 3, the crank OA rotates at 210 rpm counter-clockwise for the given configuration, determine [14]

(i) velocity of slider D and the angular velocity of link CD

(ii) acceleration of slider D and the angular acceleration of link CD

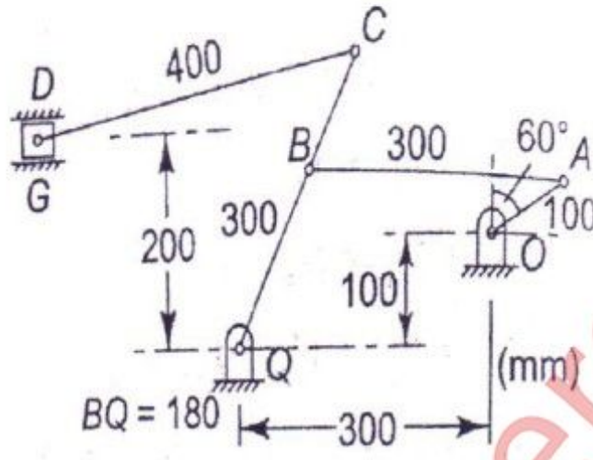

Figure 3

(b) How can you ensure that a Paucellier mechanism traces an exact straight line. [6]

4 (a) Design a slider-crank mechanism to coordinate three positions of the input and of the slider for the following data by inversion method: [12]

$\theta_{12} = 30^\circ$ $S_{12} = 40$ mm

$\theta_{13} = 60^\circ$ $S_{13} = 96$ mm

Eccentricity = 20 mm

(b) Two 20° involute spur gears mesh externally and give a velocity ratio of 3. The module is 3 mm and the addendum is equal to 1.1 module. If the pinion rotates at 120 rpm., determine the [8]

(i) minimum number of teeth on each wheel to avoid interference

(ii) contact ratio

5 (a) In an open-belt drive, the diameters of the larger and the smaller pulleys are 1.2 m and 0.8 respectively. The smaller pulley rotates at 320 rpm. The centre distance between the shafts is 4 m. when stationary, the initial tension in the belt is 2.8 kN. The mass of the belt is 1.8 kg/m and the coefficient of friction between the belt and the pulley is 0.25. determine the power transmitted. [10]

(b) Explain the term: function generation, path generation and motion generation. [6]

(c) Make a comparison of cycloidal and involute tooth forms [4]

6 (a) Draw the profile of a cam operating a knife edge follower having a lift of 30mm. The cam raises the follower with SHM for 150° of the rotation followed by a period of dwell for 60°. The follower descends for the next 100° rotation of the cam with uniform velocity, again followed by a dwell period. The cam rotates at uniform velocity of 150 rpm and has a least radius of 30mm. What will be the maximum velocity and acceleration of the follower during lift and return? [14]

(b) What do you mean by dimensional synthesis of a pre-conceived type mechanism [6]