

Total No. of Questions : 4]

SEAT No. :

P5115

[Total No. of Pages : 3

[6187]-522

T.E. (Robotics and Automation) (Insem)
ROBOT KINEMATICS AND DYNAMICS
(2019 Pattern) (Semester - I) (311503(A))

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

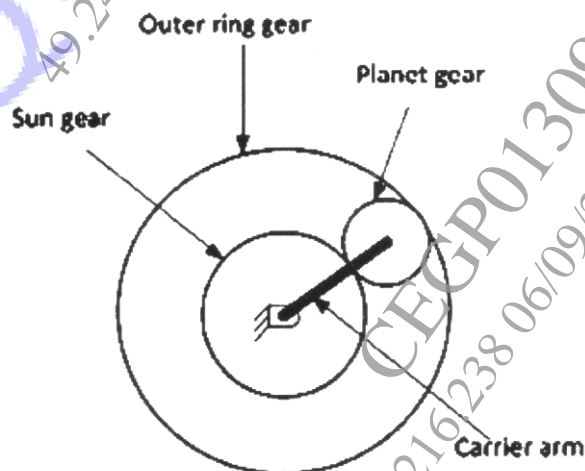
- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Use of calculator is allowed.
- 4) Assume suitable data if necessary.

Q1) a) A cam is to give the following motion to a knife-edged follower : [9]

- i) Outstroke during 60° of cam rotation
- ii) Dwell for the next 30° of cam rotation
- iii) Return stroke during next 60° of cam rotation
- iv) 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 the axis of the follower passes through the axis of the cam shaft

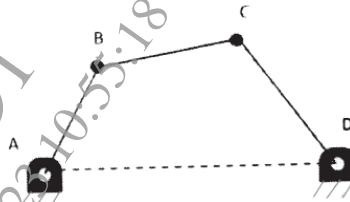
b) In an epicyclic gear train shown below, outer ring gear has 72 teeth and sun gear has 32 teeth. Determine the speed of sun and planet gear if outer ring gear is locked and carrier arm rotates at 18 rpm. [6]



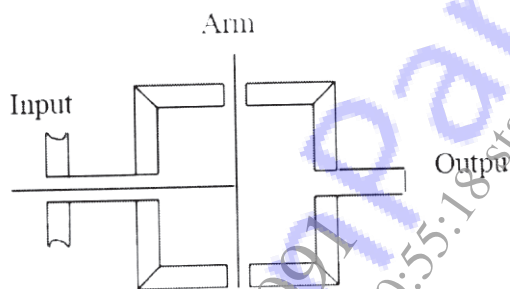
OR

P.T.O.

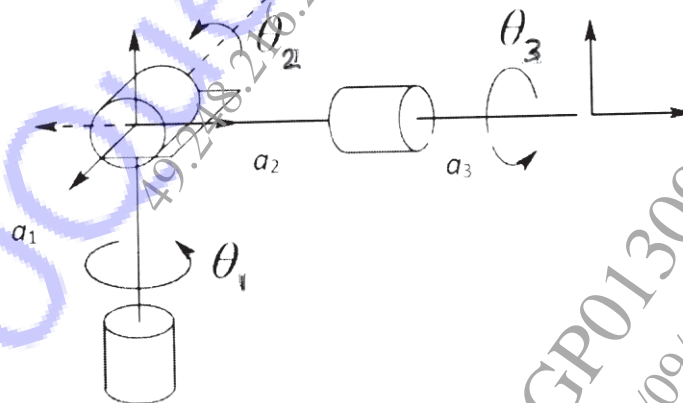
- Q2) a)** A four bar mechanism shown in Fig. below has the input link of 60mm, coupler link of 80mm, output link of 85mm, and fixed link of 90mm. Determine the co-ordinates of point C on the coupler link for 30° angle of input length. [9]



- b) In a four level planetary block used in a robot, arm rotates at 40 rpm. Determine the output rpm if the input rotates at 100 rpm. [6]



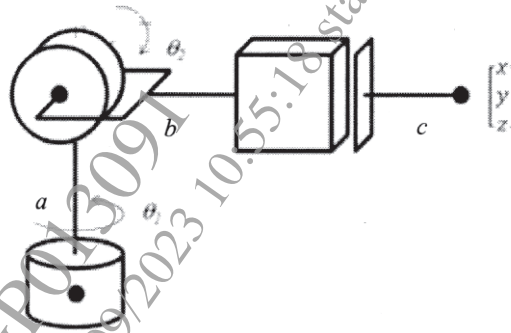
- Q3) a)** Obtain the DH parameters for the robot configuration shown in Fig. below. Also determine the position of end effector if the link lengths are : $a_1 = 100$, $a_2 = 110$, $a_3 = 70$ mm and the joint parameters are : $\theta_1 = 55^\circ$, $\theta_2 = 40^\circ$ and $\theta_3 = 30^\circ$. [8]



- b) With neat sketch, explain the forward kinematics of spherical co-ordinate robot using 3D transformation method. [7]

OR

- Q4) a) Obtain the DH parameter table for the robot configuration shown below
 a, b, c are the link lengths. [9]



- b) Write note on : Forward kinematics of cylindrical co-ordinate robot. [6]

