Total No. of Questions : 4]

SEAT No. :

PF255

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Apr-26/SE/Insem-314

S.E. (Automobile &Mechanical Engg.)/(Mechanical S.W.)/ (Automation & Robotics Engg.) (Insem)

KINEMATICS OF MACHINERY

(2019 Pattern) (Semester - IV) (202047)

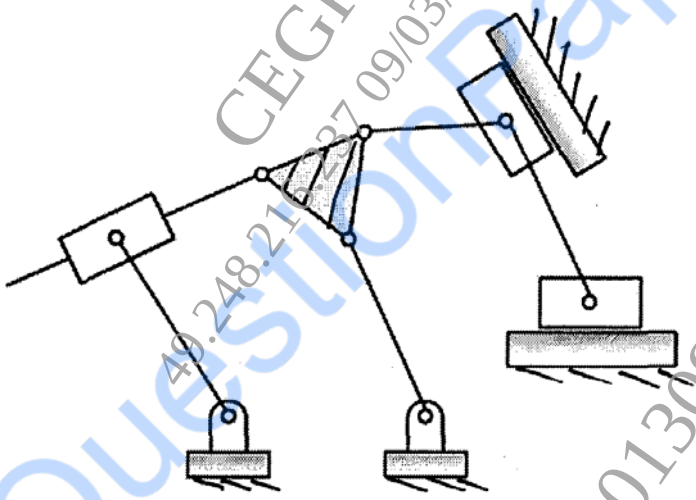
Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Answer Q1 or Q2 and Q3 or Q4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data wherever necessary.***

Q1) a) Classify the kinematic pairs according to nature of relative motion between the links in a pair. **[8]**

b) Explain Degrees of freedom of a planer mechanism and find the degrees of freedom of the mechanism shown in figure below. **[7]**



OR

Q2) a) State and explain Grashoff's law for class-I four bar linkages. **[7]**

b) Explain the inversion of single slider crank chain to obtain quick return motion mechanism. State its applications. **[8]**

P.T.O.

Q3) a) Explain the concept of loop closure equation for four bar chain. Also explain how the complex number theory is used to analyze the link motion. **[7]**

b) In an IC engine mechanism a crank of 200 mm length with obliquity ratio 4 is rotating clockwise at 700 rpm. Using analytical method determine velocity and acceleration of piston as well as angular velocity and angular acceleration of connecting rod when piston has completed one third of its stroke from TDC. **[8]**

OR

Q4) a) Derive analytical expression for the displacement, velocity and acceleration of piston in I.C. engine mechanism in terms of mechanism dimensions, crank angle and angular velocity of crank. Also derive the expression for acceleration of piston when the crank rotates with some velocity which is changing at the rate, $\alpha = d\omega/dt$. **[7]**

b) The driving shaft of a Hooke's joint runs at a speed of 400 rpm. The angle between the shafts is 25°. The driven shaft with attached masses is equivalent to a rotor of mass of 50 kg and radius of gyration 200 mm. If a steady torque of 900 N m resists the rotation of driven shaft, find the torque required at the driving shaft, when it has turned through 45° from positive X axis. **[8]**