BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)
B.Tech.Sem - IV MECHANICAL :SUMMER- 2022
SUBJECT : MECHANISMS OF MACHINES

Day : Tuesday
Date : 14-06-2022

S-12735-2022

Time : 10:00 AM-02:00 PM
Max. Marks : 60

N.B.

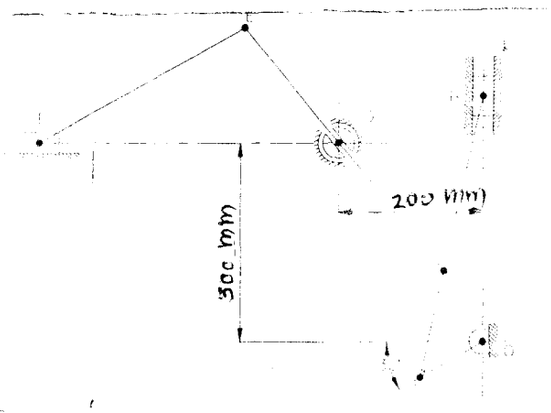
1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non – programmable **CALCULATOR** is allowed
4) Assume suitable data if necessary.
5) Draw neat and labelled diagrams **WHEREVER** necessary.

Q.1 State and prove the condition of correct steering for a four wheeled vehicle. **(10)**
Sketch and explain Ackermann steering Gear.

OR

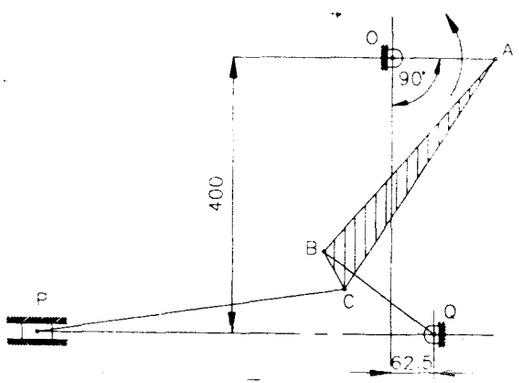
Explain with neat sketches different types of Kinematic pairs.

Q.2 Following figure shows a crank OA, 100 mm long, rotating clockwise about O at 130 rpm. AB is connecting rod 400 mm long. At a point C on AB, 150 mm from A, the rod CE, 350 mm long is attached. This rod CE slides in a slot in a trunnion at D. The end E is connected by a link FE, 300 mm long, to the horizontally moving slides F. For the mechanism in the position shown, determine using theorem of three centers in line, the velocity of F. **(10)**



OR

As shows in the following figure,the crank OA makes 150 rpm. Find for the given configuration, the velocity and acceleration of piston P and the angular velocities and angular accelerations of links ABC and CP.



OA = 150 mm
AB = 375 mm
AC = 400 mm
BC = 62.5 mm
BQ = 200 mm
CP = 450 mm

P.T.O.

Q.3 Link PQ is 200 mm long. End P moves along a vertical path with SHM, the frequency of oscillating being 10 Hz. The travel of the end P, between the extreme positions, is 50 mm. The link slides through a block pivoted at R which is 75 mm below and 75 mm to the right of the centre of the line of stroke at P. **(10)**

Determine the magnitude of the velocity and acceleration of end Q at an instant when end P, while moving down words, is 12.5 mm below the upper limit of its travel.

OR

In a slider crank mechanism, crank radius = 150mm, connecting rod length = 650mm and crank shaft speed = 240 r.p.m. By using Klien's construction method, determine the following at the instant when the slider has zero acceleration.

i) The velocity and acceleration of the mid – point of the connecting rod.

ii) The angular velocity and angular acceleration of the connecting rod.

iii) The velocity of slider.

Q.4 Explain the complex number method of velocity analysis and acceleration analysis with a suitable example. **(10)**

OR

Two shafts are connected by means of a Hooke's joint. The angle between shafts is 20^0. What will be the angle turned by the driving shaft when:-

i) Velocity ratio is maximum, minimum and unity.

ii) Acceleration of the driven shaft is maximum and zero.

Q.5 In a slider crank mechanism, the crank AB = 100 mm and the connecting rod BC = 400 mm. The line of stroke of the slider is offset by a perpendicular distance of 25 mm. If the crank rotates at an angular velocity of 20 rad /sec and angular acceleration of 12 rad / sec^2 when the crank is inclined at an angle of 30^0, determine the following **(10)**

i) The linear velocity and acceleration of the slider

ii) The angular velocity and angular acceleration of the connecting rod.

OR

Determine the chebychev spacing for function $y = 2x^3 - x$ for the range $0 \leq x \leq 4$ where four precision points are required for the these precision points, determine $\theta_2, \theta_3, \theta_4$ and Φ_2, Φ_3, Φ_4 if $\Delta\theta = 45^0$ and $\Delta\Phi = 90^0$.

Q.6 Derive the frequency equation, for trifilar suspension. **(10)**

OR

The length of a connecting rod of an engine is 500 mm measured between the centers and its mass is 18 Kg. The center of gravity is 125 mm from the crank pin centre and crank radius is 100 mm .Determine the dynamically equivalent system keeping one mass at the small end. The frequency of oscillations of the rod when suspended from the center of the small end is 43 vibrations per minute.

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