B.Tech. SEM -IV Mechanical 2014 Course (CBCS) : SUMMER - 2019
SUBJECT: MECHANISMS OF MACHINES

Day: Thursday
Date: 23/05/2019

Time: 10.00 AM TO 02.00 PM
Max. Marks: 60

S-2019-2622

N.B:

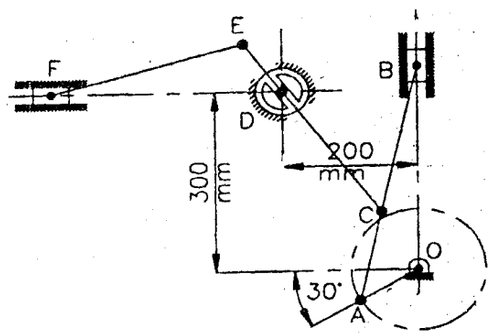
1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Draw near labeled diagrams **WHEREVER** necessary.
4) Assume suitable data if necessary.

Q.1 Explain with neat sketches 'Pantograph' and 'Oldham's coupling'. **(10)**

OR

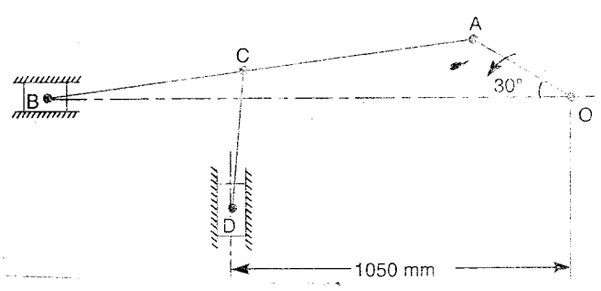
Q.1 State and prove the condition of correct steering for a four wheeled vehicle. Compare Davis steering gear with Ackermann steering gear. **(10)**

Q.2 Following figure shows a crank OA, 100 mm long, roating clockwise about O at 130 rpm. AB is connecting rod 400 mm long. At a point C on AB, 150mm 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 EF, 300mm 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

Q.2 In the mechanism, as shown in fig, 8.12 the crank OA rotates at 20r.p.m. anticlockwise and gives motion to the sliding blocks B and D. The dimensions of the various links are OA = 300 mm, AB = 1200mm, BC = 450mm and CD = 450mm. **(10)**



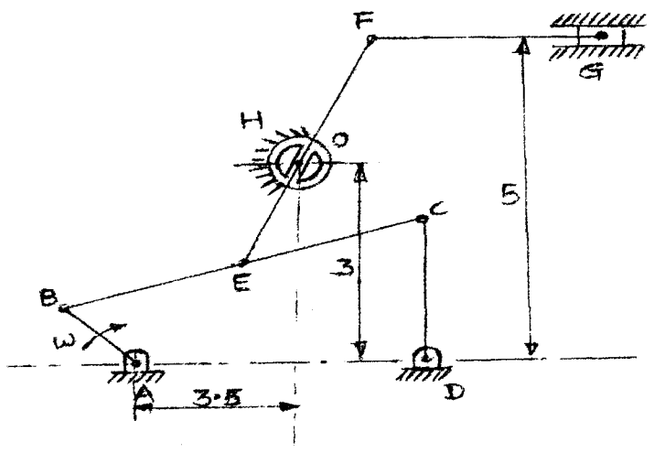
P.T.O.

For the given configuration, determine:

i) Velocities of sliding at B and D
ii) Angular velocity of CD
iii) Linear acceleration of D
iv) Angular acceleration of CD

Q.3 In the mechanism shown in Fig use, AB = 1cm, BC = 7 cm, CD = 2.5cm, AD = 6cm, EF = 4cm and FG = 4cm, E is the middle point of BC. When the crank AB rotates at 200 rpm. Find: **(10)**

i) Velocity of G
ii) The angular velocity of EF
iii) Velocity of sliding of EF in the swivel block and
iv) The acceleration of G



OR

Q.3 The crank of an engine is 225 mm long and the connection rod 900mm long. When the crank has turned through 120^0 from the I.D.C, it has an instantaneous speed of 240rpm clockwise, decreasing at the rate of 100 rad/sec^2 (retarding). Find by using klein's construction: **(10)**

i) The piston acceleration
ii) The location of point X on the connecting rod which has minimum acceleration and
iii) The angular acceleration of connecting rod

Q.4 The angle between the axes of two shafts joined by Hooke's joint is 25^0. The driving shaft rotates at a uniform speed of 180rpm. The driving shaft carries a steady load of 7.5Kw. Calculator the mass of the flywheel on the driven shaft as its radius of gyration is 150mm and the output torque of the driven shaft does not vary more than 15% of the input shaft. **(10)**

OR

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

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Q.5 A four bar mechanism is to be designed, by using three precision points to generate the function. **(10)**

$y = x^{1.5}$, *for the range* $1 \leq x \leq 4$

Assuming 30^0 starting position and 120^0 finishing position for the input link and 90^0 starting position and 180^0 finishing position for the output link find the values of x, y, θ and ϕ corresponding to the three precision points.

OR

Q.5 What is coupler curves? Describe the method of obtaining the Co-ordinates of a coupler points in a four bar mechanism and a slider crank, mechanism. **(10)**

Q.6 A connecting rod has a mass of 3Kg. It needs 40 seconds for 50 oscillations when suspended from the small end and 35 seconds when suspended from big end. The distance between the points of suspension is 200mm. Find the moment of inertia of connecting rod and the position of centre of gravity from the small end. **(10)**

OR

Q.6 The connecting rod of an oil engine has mass 52.5Kg. Its length between the centers is 857 mm. The big end and small end diameters are 120mm and 76mm respectively. When it is suspended vertically on a knife edge through the small end it makes 100 oscillations in 181 seconds. With the knife edge through the big end it makes 100 oscillations in 166 seconds. Find the moment of inertia of the rod and distance of its Center of Gravity from the small end centre. **(10)**

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