BACHELOR OF TECHNOLOGY (C.B.C.S.) (2020 COURSE)
B.Tech.Sem - III MECHANICAL : : SUMMER - 2022
SUBJECT : MECHANISMS OF MACHINES

Day : Tuesday
Date : 31-05-2022

S-24488-2022

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Draw neat Assume suitable data **wherever** necessary.
4) Draw neat diagrams **WHEREVER** necessary.

Q.1 What is condition for correct steering? Derive with sketch Davis steering gear mechanism. **(10)**

OR

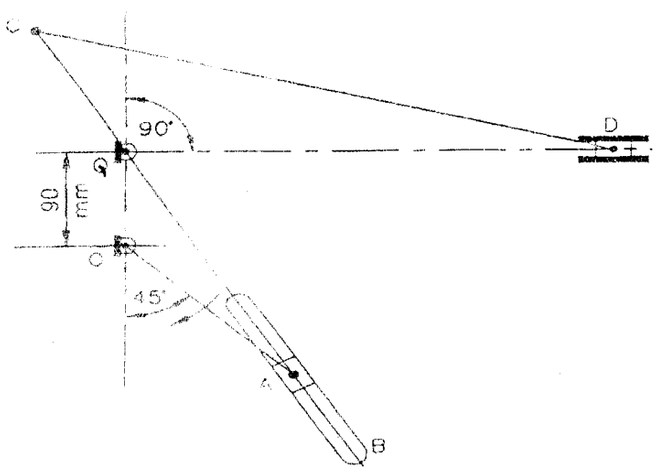
Q.1 A connecting rod has a mass of 3 Kg. It needs 40 seconds for 50 oscillations when suspended from the small end and 35 seconds when suspended from big end. The distance between the points of suspension is 200 mm. Find the mass moment of inertia of connecting rod and the position of centre of gravity from the small end. **(10)**

Q.2 The crank and connecting rod of steam engine are 0.3 m and 1.5 m length. The crank rotates at 250 rpm clockwise. Determine by analytical method the velocity and acceleration of the piston when the crank is 50^0 from inner dead centre position. Also determine the position of crank for zero acceleration of the position. **(10)**

OR

Q.2 Derive an expressions for Dynamic Force Analysis of I.C. Engine mechanism by analytically. **(10)**

Q.3 For the mechanism shown in figure, enumerate and locate all the instantaneous centers of velocity and hence, find the velocity of slider D and angular velocity of link CD. **(10)**



OQ = 90 mm, OA = 180 mm, QC = 135 mm, CD = 450 mm.
Speed of OA about O is 240 rpm uniform in the clockwise direction.

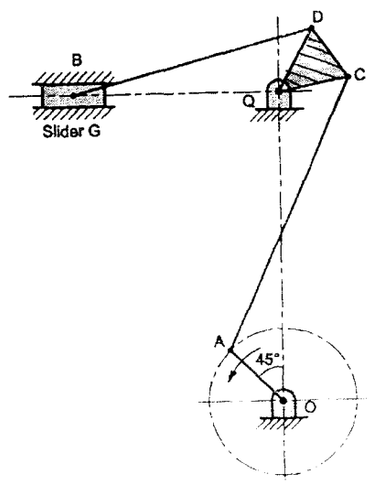
OR

Q.3 In the mechanism shown in fig. , the crank OA rotates at 60 rpm. Determine **(10)**

i) The linear acceleration of slider at B

ii) The angular acceleration of links AC, CQD and BD.

BD = 500 mm
CD = 125 mm
CQ = 145 mm
AC = 600 mm
OA = 150 mm
OQ = 625 mm
DQ = 145 mm



Q.4 A power of 60 kW is transmitted by a multi-plate clutch at 1500 r.p.m. Axial intensity of pressure is not to exceed 0.15 N/mm^2. The coefficient of friction for the friction surface is 0.15. The external radius of friction surface is 120 mm. Also the external radius is equal to 1.25 times the internal radius. Find the number of plates needed to transmit the required power. Assume uniform wear. **(10)**

OR

Q.4 The external and internal radii of a friction plate of a single clutch are 120 mm and 60 mm respectively. The total axial thrust with which the friction surface are held together is 1500 N. For uniform wear, find the maximum, minimum and average pressure on the contact surfaces. **(10)**

Q.5 Derive the expression for the braking torque of an internal expanding shoe brake and what are the leading and trailing shoes of them. **(10)**

OR

Q.5 In a simple band brake applied to a shaft carrying a flywheel of mass 250 Kg and radius of gyration of 350 mm, one end of the band is attached to the fulcrum and the other at a distance 80 mm left from the fulcrum. The force is applied to the brake lever at a distance 300 mm from the fulcrum. The angle embraced by the band is 225^0 and the brake drum diameter is 220 mm, coefficient of friction 0.25 and shaft speed is 300 rpm clockwise. Determine **(10)**

i) The brake torque when a force of 150 N is applied.

ii) The number of revolutions of the flywheel before it comes to rest

iii) Time taken by the flywheel to come to rest.

Q.6 Derive the expressions i) Energy stored in a flywheel ii) Dimensions of the flywheel rim. **(10)**

OR

Q.6 A punching press is required to punch 40 mm diameter holes in a plate of 15 mm thickness at the rate of 30 holes per minute. It requires 6 N-m of energy per mm^2 of sheared area. If the punching takes $1/10^{th}$ of a second and the r.p.m. of the flywheel varies from 160 to 140; determine the mass of the flywheel having radius of gyration of 1 metre. **(10)**

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