BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - III MECHANICAL : WINTER- 2022
SUBJECT : MECHANISMS OF MACHINES

Day : Tuesday | Time : 10:00 AM-01:00 PM

Date : 13-12-2022 | **W-25349-2022** | 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 With the help of neat schematic diagram, derive frequency equation of Trifilar Suspension System. **(10)**

OR

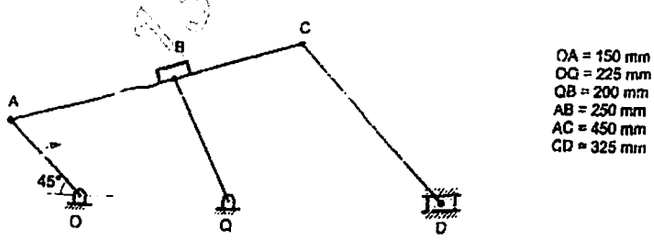
Q.1 In a Hookes coupling connecting a pair of shafts the angle between the axes of the shaft is $22\frac{1}{2}^0$. The power supplied to the driving shaft is 8 kW and uniform speed of the driving shaft is 300 rpm. If the output torque on the driving shaft is not to exceed 30% of the input torque, what is the necessary radius of gyration of flywheel of 40 Kg mass? **(10)**

Q.2 A reciprocating engine has a crank 60 mm long and the connecting rod is 240 mm long. It runs at 1200 r.p.m., find by analytical method i) maximum velocity of piston and the corresponding crank angle ii) acceleration of piston when the crank is at 120^0 past inner dead centre. **(10)**

OR

Q.2 Derive an expression for static force analysis of I. C. Engine Mechanism by analytically. **(10)**

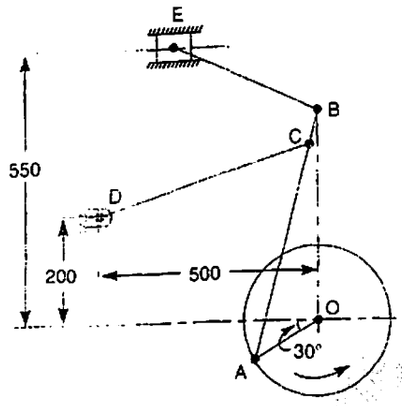
Q.3 For the configuration shown in Fig. locate all the possible instantaneous centres of velocities and hence, find the velocity of slider D, if the link OA rotates at 1000 rpm in the clockwise direction. **(10)**



OR

PTO

Q.3 Figure shows the mechanism of a radial valve gear. The crank OA turns uniformly at 150 r.p.m. and is pinned at A to rod AB. The point C in the rod is guided in the circular path with D as centre and DC as radius. The dimensions of various links are : **(10)**
OA = 150 mm : AB = 550 mm : AC = 450 mm : DC = 500 mm : BE = 350 mm.
Determine velocity and acceleration of the ram E for the given position of the mechanism.



All dimensions in mm.

Q.4 A single plate clutch transmits 25 kW at 900 rpm. The maximum pressure intensity is 85 KN/m^2. The outer diameter of plate is 360 mm with both sides effective and coefficient of friction is 0.25, find the inner diameter of plate. **(10)**

OR

Q.4 The load of 25 kN is to be supported by a truncated conical pivot, the semi-angle of cone is 70^0 and the intensity of pressure is 3.5 bar. The external radius is 3.5 times the internal radius. Find the diameters of the bearing surfaces. Take μ=0.06 and speed of shaft is 1440 rpm. What is the maximum power absorbed in friction. **(10)**

Q.5 A band and block brake having 12 blocks, each of which subtends and angle of 16^0 at the centre, is applied to a rotating drum of diameter 600 mm. the blocks are 75 mm thick. The drum and flywheel mounted on same shaft have a mass of 1800 kg and have a combined radius of gyration of 600 mm. the two ends of the band are attached to pins on the opposite sides of the brake fulcrum at a distance of 40 mm and 150 mm from the fulcrum. if a force of 250 N is applied at a distance of 900 mm from the fulcrum, find **(10)**

i) the maximum braking torque
ii) the angular retardation of the drum
iii) the time taken by the system to be stationery from the rated speed of 300 rpm.

Take coefficient of friction between the blocks and the drum as 0.3.

OR

Q.5 Explain with neat sketch of an internal expanding shoe brake. Derive the expression for the braking torque. **(10)**

Q.6 Explain with neat sketch of turning moment diagram for single cylinder Four Stroke I.C. Engine and for multi-cylinder engine. **(10)**

OR

Q.6 An engine develops 200 kW at a mean speed of 100 rpm. The coefficient of fluctuation of speed is ± 2% of mean speed and coefficient of fluctuation of energy is 0.10. Knowing the mean diameter of flywheel rim as 2 metres, density of flywheel material as 7200 Kg/m^3 and the hub and spokes provide 5 % of the rotational inertia of the flywheel, find the mass and cross-sectional area of the flywheel rim. **(10)**

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