SV - 81

Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, May - 2018

THEORY OF MACHINES - I

Sub. Code: 63363

Day and Date : Monday, 14 - 05 - 2018 **Total Marks : 100**

Time :9.30 a.m. to 1.30 p.m.

Instructions :
1) **Attempt all questions.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume suitable data, if necessary and state clearly.**
5) **Use of non-programmable calculator is allowed.**

Q1) a) Write a note on different types of kinematic pairs with the help of neat sketches. **[8]**

OR

A Hooke's joint connects two shafts having an angle of 15° between them. The driving shaft rotates at 1200 r.p.m. The driven shaft has a flywheel of mass 7 kg and radius of gyration 90 mm. Find the maximum angular acceleration of the driven shaft and the maximum torque required. **[8]**

b) A four bar mechanism is as shown in fig. 1. b. Lengths of various links are: OA = 225 mm, AB = 375 mm, BC = 350 mm and OC = 650 mm. Crank OA rotates at 320 r.p.m. Locate all the instantaneous centres and find: **[8]**

i) velocity of B and

ii) angular velocities of AB and BC.

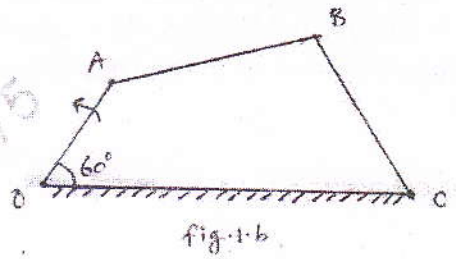

fig. 1. b

P.T.O.

Q2) The dimensions of the various links of a mechanism shown in fig. 2 are: OA = 30 mm, AB = 80 mm, BC = 45 mm and BD = 120 mm. **[18]**

The crank OA rotates uniformly in clockwise direction at 120 r.p.m. For the given configuration, find

a) velocity of D,

b) acceleration of D and

c) angular acceleration of link BD.

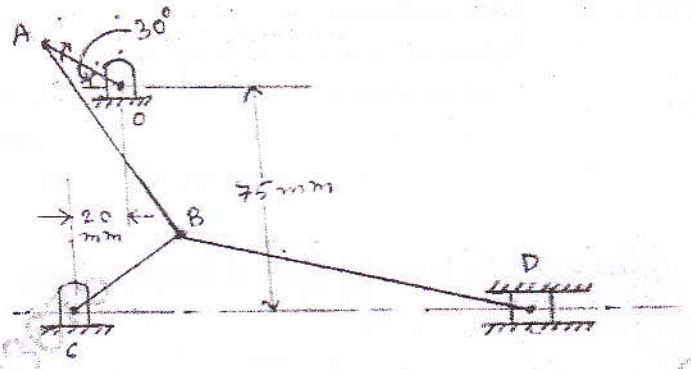

fig. 2

Q3)a) Derive the equation for friction torque in case of flat collar pivot bearing assuming the condition of uniform pressure. **[8]**

OR

Derive the equation for friction torque in case of conical pivot bearing assuming uniform wear with usual notations. **[8]**

b) A conical pivot supports a shaft having an axial load of 15 kN and has an angle of cone equal to 90°. The shaft is rotating at 150 r.p.m. The intensity of pressure is equal to 0.3 MN/m^2 and the coefficient of friction is 0.05. Determine the power lost in friction assuming the condition of uniform pressure. **[8]**

Q4) a) With neat sketches write classification of followers. [4]

b) Construct the cam profile for the following specifications;

Least radius of cam = 25 mm; Diameter of roller = 25 mm; Angle of rise 120°; Angle of fall = 150°; Angle of dwell in between = 45°; Lift of follower = 40 mm;

During the lift follower moves with SHM and during the fall it moves with uniform acceleration and deceleration. The line of stroke of follower is off set by 12.5 mm towards right of centre of cam. [14]

Q5) a) Explain law of belting: [6]

OR

Explain initial tension in belt drive. [6]

b) An open belt drive connects two pulleys 1200 mm and 500 mm diameters, on parallel shafts 4 m apart. The maximum tension in the belt is 1855.3 N. The coefficient of friction is 0.3. The driver pulley of 1200 mm diameter rotates at 200 rpm. Calculate the power transmitted by the drive and torque on each pulley. [10]

Q6) a) Derive the equation for relation between speed and height of Porter governor. [6]

OR

Explain effort and power of governor. [6]

b) In a spring loaded Hartnell governor, the extreme radii of rotation of balls are 80 mm and 120 mm. The weight arm and sleeve arm of bell crank lever are equal in length. Mass of each ball is 2 kg. The speeds at the two extreme positions are 400 and 420 rpm. Determine spring stiffness and initial compression of spring. Neglet the sleeve mass. [10]

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