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17AU52

Fifth Semester B.E. Degree Examination, July/August 2022
Dynamics of Machines

Time: 3 hrs.
Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain equilibrium of two force member, three force member and members with two forces and torque. **(08 Marks)**

   b. A slider crank machanism is shown in Fig Q1(b). The force applied to the piston is 1000N when the crank is at 60° from IDC. Calculate the driving torque T_2.
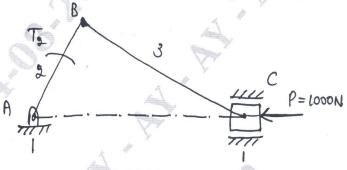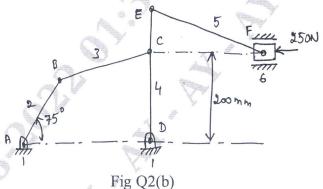

Fig Q1(b) **(12 Marks)**

OR

2 a. State and explain D'Alembert's principle. **(08 Marks)**

   b. For the static equilibrium of the mechanism shown in Fig Q2(b). Find the required input torque. The dimensions are AB = 150mm, BC = AD = 500mm DC = 300mm, CE = 100mm and EF = 450mm.

Fig Q2(b) **(12 Marks)**

Module-2

3 a. Explain balancing of single revolving mass in two different planes. **(08 Marks)**

   b. Why is balancing of Reciprocating masses necessary? **(04 Marks)**

   c. A shaft carries 4 rotating masses A, B, C and D in this order along the axis. The mass A may be assumed to be concentrated at 160mm radius, B at 180mm, C at 200mm and D at 120mm radius. The masses B, C and D are 40, 30 and 50Kg respectively. The planes containing B and C are 300mm apart. The angular spacing of C and D are 90° and 210° respectively with respect to B measured in the same direction. If the shaft and masses are to be in complete dynamic balance, determine :

   i) Mass and angular position of A and

   ii) Position of planes A and D **(08 Marks)**

OR

4 a. What are the effects of unbalances rotating masses? (06 Marks)
   b. The pistons of a 4 cylinder vertical inline engine reach their uppermost position at 90° interval in order of their axial position. Pitch of cylinder = 0.35m, Crank radius = 0.12m, length of C.R = 0.42m. The engine runs at 600rpm. If the reciprocating parts of each engine has a mass of 2.5Kg, find the unbalanced primary and secondary forces and couples. Take central plane of engine as reference plane. (14 Marks)

Module-3

5 a. Compare between function of Flywheel and governor. (08 Marks)
   b. A porter governor has all four arms 300mm long the upper arms are pivoted on the axis of rotation and lower arms are attached to the sleeve at a distance 35mm from axis. The mass of each ball is 7Kg and the load on the sleeve is 540N. Determine the equilibrium speed for the two extreme radii of 200mm and 260mm of rotation of governor balls. (12 Marks)

OR

6 a. Define : i) Sensitiveness ii) Hunting ii) Isochronous governor iv) Effort of governor. (08 Marks)
   b. Derive expression for height of porter governor. (12 Marks)

Module-4

7 a. Discuss laws of Solid friction. (08 Marks)
   b. Derive expression for frictional torque of Flat pivot beating, considering uniform pressure and uniform wear. (12 Marks)

OR

8 a. With a neat figure, explain Jockey pulley. (08 Marks)
   b. Derive an expression for ratio of belt tensions. (12 Marks)

Module-5

9 Discuss the gyroscopic effect on Aeroplane. (20 Marks)

OR

10 a. Discuss the applications of cams in automobiles. (06 Marks)
   b. Derive the expression for displacement, velocity and acceleration of follower when the roller is in contact with straight flank. (14 Marks)

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