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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations July-2021

DYNAMICS OF MACHINERY

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

- 1 a Explain the effect of Gyroscopic couple on a Naval ship during pitching. 7M
b Explain the effect of gyroscopic couple on a Aeroplane. 5M

OR

- 2 A horizontal gas engine running at 210 rpm has a bore of 220 mm and a stroke of 440 mm. The connecting rod is 924 mm long the reciprocating parts weight 20kg. When the crank has turned through an angle of 30° from IDC, the gas pressure on the cover and the crank sides are 500KN/m^2 and 60KN/m^2 respectively. Diameter of the piston rod is 40 mm. Determine, 1. Turning moment on the crank shaft 2. Thrust on bearing 3. Acceleration of the flywheel which has a mass of 8kg and radius of gyration of 600 mm while the power of the engine is 22KW. 12M

UNIT-II

- 3 a Explain function of absorption type dynamometer. 6M
b Describe with sketches one form of torsion dynamometer and explain in detail the 6M calculations involved in finding the power transmitted. 6M

OR

- 4 A multi clutch internal and external diameter as 300 and 450 mm. maximum intensity pressure as 0.075 N/mm^2 . the first disc had three plates and second disc had two disc the coefficient of frictional surface shaft and plate surfaces as 0.02 N/mm^2 . power absorbed by disc is 5kw. Assuming uniform wear. Shaft rotating with speed of 580 rpm, then find out torque developed on the plate. 12M

UNIT-III

- 5 A porter governor has equal arms each 250mm long and pivoted on the axis of rotation. Each ball has a mass of 5kg and mass of the central load on the sleeve is 25kg. The radius of rotation of the ball is 150mm when governor is at maximum speed. Find the maximum and minimum speed and range of speed of the governor. 12M

OR

- 6 The length of the upper and lower arms of a porter governor are 200 mm and 250 mm respectively. Both the arms are pivoted on the axis of rotation. The central load is 150N, the weight of the each ball is 20N and the friction of the sleeve together with the resistance of the operating gear is equivalent to a force of 30N at the sleeve. If the limiting inclinations of the upper arms to the vertical are 30° and 40° taking friction in to account. Find the range of speed of the governor. 12M

UNIT-IV

- 7 A shaft is rotating at a uniform angular speed. Four masses M_1 , M_2 , M_3 and M_4 of magnitudes 300kg, 450kg, 360kg, 390kg respectively are attached rigidly to the shaft. The masses are rotating in the same plane. The corresponding radii of rotation are 200mm, 150mm, 250mm and 300mm respectively. The angle made by these masses with horizontal are 0° , 45° , 120° and 255° respectively. Find (i) the magnitude of balancing mass (ii) the position of balancing mass if its radius of rotation is 200mm. **12M**

OR

- 8 Four masses A, B, C, and D are completely balanced masses C and D makes angles of 90° and 195° respectively with B in the same sense. The rotating masses have the following properties: $m_A=25\text{kg}$ $r_A=150\text{mm}$ $m_B=40\text{kg}$ $r_B=200\text{mm}$ $m_C=35\text{kg}$ $r_C=100\text{mm}$ $r_D=180\text{mm}$ Planes B and C are 250mm apart. Determine (i) the mass A and its angular position (ii) the position of planes A and D. **12M**

UNIT-V

- 9 A cantilever shaft 50mm diameter and 300mm long has a disc of mass 100kg at its free end. The young's modulus for the shaft material is 200GN/m^2 . Determine the frequency of longitudinal and transverse vibration of the shaft. **12M**

OR

- 10 The barrel of a large gun recoils against a spring on firing. At the end of the firing, a dashpot is engaged that allows the barrel to return to its original position in minimum time without oscillation. Gun barrel mass is 400kg and initial velocity of recoils 1m. Determine spring stiffness and critical damping coefficient of dashpot. **12M**

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