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

B.Tech II Year II Semester Regular Examinations October-2020

THEORY OF MACHINES
(MECHANICAL ENGINEERING)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

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| 1 | a | What is the function of a flywheel? | 2M |
| | b | Write the principle of Dynamometer. | 2M |
| | c | What is meant by Isochronous condition in Governors? | 2M |
| | d | Define hammer blow. | 2M |
| | e | A vibrating system consist of a mass of 200 kg, a spring of stiffness 80 N/mm and a damper with a damping coefficient of 800 N/ms. Determine the frequency of the vibration system. | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

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|---|---|--|----|
| 2 | a | Explain the effect of Gyroscopic couple on a Naval ship during pitching. | 5M |
| | b | Explain the effect of gyroscopic couple on a Aero plane. | 5M |

OR

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| 3 | 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 20 kg. When the crank has turned through an angle of 30° from IDC, the gas pressure on the cover and the crank sides are 500 kN/m ² and 60 kN/m ² respectively. Diameter of the piston rod is 40 mm. Determine, i) Turning moment on the crankshaft ii) Thrust on bearing iii) Acceleration of the flywheel which has a mass of 8 kg and radius of gyration of 600 mm while the power of the engine is 22 kW. | 10M |
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UNIT-II

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| 4 | a | Explain function of absorption type dynamometer | 5M |
| | b | Describe with sketches one form of torsion dynamometer and explain in detail the calculations involved in finding the power transmitted. | 5M |

OR

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| 5 | In a vertical belt transmission dynamometer the diameter of the driving pulley rotating at 1500 rpm is 80 mm. The centre distance of the intermediate pulleys from the fulcrum is also 80 mm each. The weighing pan on the lever is at a distance as 250 mm. Find the power transmitted when a mass of 20 kg is required in the pan, including its own mass. | 10M |
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UNIT-III

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| 6 | A governor of hartnell type has equal balls of mass of 3 kg, set initially at a radius of 200 mm. The arms of the bell crank lever are 110 mm vertically and 150 mm horizontally. Find (i) the initial compressive force on the spring at a radius of 200 mm at 240 rpm and (ii) the stiffness of the spring required to permit a sleeve movement of 4 mm on a fluctuation of 7.5 percent in the engine speed. | 10M |
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OR

- 7 Calculate the minimum speed of proell governor, which has equal arms each of 300 mm and are provided on the axis of rotation. The mass of each ball is 5 kg and the central mass on the sleeve is 25 kg. The extension arms of the lower links are each 70 mm long and parallel to the axis when minimum radius of the ball is 120 mm of load. **10M**

UNIT-IV

- 8 Derive the following expression of effects of partial balancing in two cylinder locomotive engine (i) Variation of attractive force (ii) Swaying couple (iii) Hammer blow. **10M**

OR

- 9 A,B,C and D are four masses carried by a rotating shaft at radii 100 mm, 125 mm, 200 mm and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg and 4 kg respectively. Find the required mass A and the relative angular setting of the four masses so that the shaft be in complete balance. **10M**

UNIT-V

- 10 A vibrating system consists of a mass of 8 kg, spring stiffness of 5.6 N/m and dashpot of damping coefficient of 40 N/m/s. Find (i) critical damping coefficient (ii) the damping factor (iii) the natural frequency of damped vibration (iv) the logarithmic decrement (v) the ratio of two consecutive amplitudes (vi) the number of cycle after which the original amplitude is reduced to 20 percent. **10M**

OR

- 11 An instrument vibrates with a frequency of 1 Hz when there is no damping. When the damping is provided, the frequency of damped vibration was observed to be 0.9 Hz. Find (i) damping factor (ii) logarithmic decrement. **10M**

END