GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

SM19002030

Registration No: | | | | | | | | | | |

Total Number of Pages :1 **M.TECH**

M.TECH 2ND SEMESTER (AR 17) SUPPLEMENTARY EXAMINATIONS, APRIL/MAY 2019

STRUCTURAL DYNAMICS

Branch: SE, Subject Code:MSEPC2020

Time: 3 Hours **Max Marks : 70**

PART-A **(10 X 2=20 MARKS)**

1. Answer the following questions.

a) State the consequences of vibration in a structure.
b) Define damping.
c) Describe D-Alembert's principle.
d) Illustrate magnification factor.
e) Define Eigen vectors.
f) Generalize decoupling equation.
g) What do you mean by harmonic and periodic loading?
h) Write the mathematical equation for equivalent stiffness for springs in parallel and springs in series.
i) Write the characteristic equation for free vibration of undamped system.
j) Enumerate Orthogonality and normality principles.

PART-B **(5 X 10=50 MARKS)**

Answer any five questions from the following.

2. (a) A mass of 2 kg is suspended by a spring having stiffness at 700 N/m. The mass is displaced downward from its equilibrium position by a distance of 0.02 m. Estimate [5]
   i. Equation of motion
   ii. Normal frequency
   iii. The response of the system
   iv. Total energy
   (b) Write about transient vibration. [5]
3. (a) Briefly explain the types of vibration. [5]
   (b) A harmonic motion has a maximum velocity of 6 m/s and it has a frequency of 12cps. Determine its amplitude and maximum acceleration. [5]
4. (a) Derive the equation of motion for viscous damping. [5]
   (b) In a two storey building frame, the mass M1 = M2 = 1000 Kg and stiffness are K1 = K2 = 1 MN/m. If a horizontal force of 20 KN is applied at the top of ground storey level, Estimate the displacement of the masses M1, M. [5]
5. (a) Assess the equation of motion for a damped two degree of freedom system. [5]
   (b) State and prove Orthogonality property of mode shapes. [5]
6. (a) A vibrating system consists of a mass of 5 kg, spring of stiffness 120 N/m and a damper with a damping co-efficient of 5 N-s/m. Calculate [5]
   i. Damping factor
   ii. Natural frequency of the system
   iii. Logarithmic decrement
   iv. The ratio of two successive amplitude
   v. The number of cycles after which the initial amplitude reduces to 25% [5]
   (b) Describe the mathematical modeling of an SDOF system. [5]
7. (a) State and elaborate D'Alemberts Principle. [5]
   (b) Describe the solution of equation of motion.
8. Write short notes on [5]
   (a) The natural frequency and mode of vibration of the system [5]
   (b) Steady State Response

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