Reg. No. : | | | | | | | | | | |

Question Paper Code: 53U01

M.E. DEGREE EXAMINATION, DEC 2020

Third Semester

Structural Engineering

15PSE301 – STRUCTURAL DYNAMICS

(Regulation 2015)

Duration: 1.15 hrs Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Result of equal excitation and natural frequency is CO1- R

   (a) Forced frequency (b) Damping (c) Resonance (d) Natural period

2. If ω is forcing frequency and ω_n is the natural frequency then resonance occurs when CO1- R

   (a) $\omega>\omega_n$ (b) $\omega=\omega_n$ (c) $\omega_n>\omega$ (d) $\omega\neq\omega_n$

3. The process of dividing all the components in a modal vector by the largest component is called CO2 -R

   (a) Orthogonalisation (b) Diagonalisation (c) Normalisation (d) Unification

4. The number of natural frequencies in a 2-DOF system will be CO2 -R

   (a) Only one (b) α (c) Two (d) As required

5. The first orthogonality of eigen vectors is with respect to CO3- R

   (a) Mode vectors (b) Damping matrix (c) Stiffness matrix (d) Mass matrix

6. An n-degree of system will have CO3- R

   (a) n+1 coordinates (b) n-1 coordinates (c) n coordinates (d) 2n coordinates

7. If Φ is the mode shape, when an end is fixed it may be assumed CO4 -R

   (a) $\Phi^{ii} = 0$ (b) $\Phi^{iv} = 0$ and $\Phi^{iii} = 0$ (c) $\Phi^{ii} = 0$ and $\Phi^{iii} = 0$ (d) $\Phi^{i} = 0$ and $\Phi= 0$

8. If the stiffness matrix is not diagonal, the structure is said to be CO4 -R

(a) Dynamically coupled (b) Statically coupled

(c) Both statically and dynamically coupled (d) None of these

9. Damping constant is generally CO5- R

(a) a variable (b) assumed (c) a fraction of mass (d) a fraction of stiffness

10. Principle of mode superposition applies only when the system is CO5- R

(a) Linear (b) Nonlinear (c) Dynamic (d) Static

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11.	Derive the equation of motion by (a) Simple Harmonic Motion principle	CO1- U	(8)
12.	Derive the general equation of motion for damped forced vibration with 2-DOF.Indicate the solution for the characteristic equation.	CO2-App	(8)
13.	Explain the coupled state of equations of motion and demonstrate how they are uncoupled.	CO3-U	(8)
14.	Derive the equations of motion for forced vibration of an undamped continuous system in terms of principal coordinates.	CO4-App	(8)
15.	Write down the algorithm for step-by-step solution using Wilson-Θ method	CO5-U	(8)