Exam. Code: 1015
Sub. Code: 35219

2055
M.E. (Mechanical Engineering)
Second Semester
MME-204: Structural Dynamics

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: ***Attempt <u>five</u> questions in all, selecting atleast two questions from each Part. Supplement your answer with suitable sketches wherever required. Assume any missing data suitably.***

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Part-A

1	Define "eigenvalue" and "eigenvector" in the context of structural dynamics. How are these related to "natural frequencies" and "mode-shapes" of a vibrating multi-degree-of-freedom damped mechanical system?	(10)
2	Analyze the differences between real modes and complex modes in structural dynamics. How do they affect the interpretation of vibration responses?	(10)
3	Analyze the force transmission to the foundation in a damped SDOF system under harmonic loading. How does damping influence the transmitted force compared to an undamped system?	(10)
4	Design a step-by-step experimental procedure to determine damping ratio using the bandwidth method for a damped SDOF system excited at resonance. Include the setup, measurements needed, and data processing steps.	(10)

Part-B

5	Explain the concept of element connectivity and its role in assembling the global stiffness matrix by giving an example.	(10)
6	Analyze how different types of shape functions (linear, quadratic, cubic) affect the accuracy and convergence of finite element solutions.	(10)
7	Analyze the differences in natural frequencies and mode shapes for a beam with different boundary conditions: both ends fixed, one end fixed and the other free, and both ends simply supported. How does the mode shape change with boundary conditions?	(10)
8	Evaluate the effectiveness of using MATLAB for solving the equation of motion of beams for structural dynamic analysis compared to traditional analytical methods. What are the key advantages and limitations?	(10)

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