

**Master of Technology**  
**Second Semester Examination, June-2021**  
**Structural Dynamics [MTSE201]**

**Time: 3:00 Hrs**

**Max Marks 70**

**Note: Attempt any five questions. All question carry equal marks.**

- Q.1 (a) What Is Laplace Transformation and its Applications?  
(b) Explain The Coulomb-Damped Free Vibration With Derivation. And Discuss Practical Application Of Coulomb Damped Free Vibration.
- Q.2 (a) Explain the Rayleigh's Method of Estimating Fundamental Frequency of Continuous System and Explain Modifications Made in Rayleigh Ritz Approach.  
(b) Explain The Method Of Matrix Iteration.
- Q.3 (a) Explain Any Two of the Following:  
(i) Steady State Vibration  
(ii) Critical Dumping  
(iii) Matrix Formulation  
(b) A Three Story Single Bay Structure The Masses Lumped At Storey Levels. The Spring Constants Are Noted In The Fig. Obtain A Characteristic Equation. Whose Roots Will Give Natural Frequencies Or Vibration?
- Q.4 (a) Discuss Step, Ramp And Pulse Excitations.  
(b) Discuss:  
(A) Time Stepping Methods  
(B) Analysis of Non Linear Response
- Q.5 (a) Discuss The D'Alembert's Principle.  
(b) Discuss Newmark's Method For Numerical Evaluation of Dynamic Response of Single Degree Of Freedom System.
- Q.6 (a) Derive An Expression For Motion Of A Concentrated Mass Having Free Viscously Damped Vibration. Show That the Decay in Amplitude of Vibration Is Exponential.  
(b) Explain:-  
(i) Central Difference Method And  
(ii) New Mark's Method for Numerical Evaluation of Dynamic Response of Single Degree Of Freedom System.
- Q.7 (a) Discuss Vibration Isolation and Transmissibility  
(b) Write A Short Note On Viscous Dampers.
- Q.8 (a) Discuss Critical Dumping.  
(b).Obtain A Frequency Equation for Free Vibration of Slender Beam Fixed At One and Simply Supported At the Other.

**Master of Technology**  
**Second Semester Examination, June-2021**  
**FEM in Structural Engineering [MTSE202]**

**Time: 3:00 Hrs**

**Max Marks 70**

**Note: Attempt any five questions out of eight.**

**Assume suitable data if necessary and state them clearly.**

- Q.1 (a) Explain the difference finite element method and finite difference method.  
(b) What is the use of Hermitian interpolation function? Derive shape functions for a six noded quadrilateral element.

- Q.2 (a) Discuss applications of FEM in structural engineering.  
(b) Solved a fixed beam problem for free vibration using finite element method by discretizing the beam in to three elements.

- Q.3 (a) Explain Jacobi or power method for finding Eigen values and eigen Vectors. Find the Eigen values and eigenvectors of following matrix.

$$A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & 2 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

- (b) What are the factors to be considered in the selection of interpolation function? Derive the interrelation function for a rectangular element with coordinate of four corners as (1,1,1) (4,5,1) (4,5,3,5) and (1,3,5)
- Q.4 (a) Derive shape function for a 6 noded quadrilateral element.  
(b) What are Eigenvalue problems and discuss its use in FEM
- Q.5 (a) Write notes on the following  
(i) Static condensation  
(ii) Discretization of domain  
(iii) Numerical integration  
(b) Discuss the merits and demerits of FEM.
- Q.6 (a) Describe the application of FEM in solving the proration problems.

(b) Describe the Gauss elimination approach for the solution of large system of simultaneous equations.

Q.7 (a) Obtain the element stiffness matrix for a plane frame element.

(b) Write a short note on:-

(i) Primary, secondary and internal nodes

(ii) Iterative method of solution

(iii) Aspect ratio

(iv) Hermite interpolation function

(v) Discretization domain

Q.8 (a) Compare finite element method with other methods.

(b) Describe the steps involved in the finite element analysis procedure.

**Master of Technology**  
**Second Semester Examination, June-2021**  
**Advance Concrete Technology [MTSE203]**

**Time : 3:00 Hrs**

**Max Marks 70**

**Note : Attempt any five questions. All questions carry equal marks.**

- Q.1 (a) Describe Ferro cement and fiber reinforced concrete.  
(b) Discuss various factors influencing the choice of mix design. Discuss any one method of mix design
- Q.2 (a) What is the difference between workability and consistency “Explain the method or determination?  
(b) Explain stability mobility and compatibility of concrete.
- Q.3 (a) Describe different manufacturing steps for concrete.  
(b) Discuss various factors influencing the choice of mix design. Discuss any one method of mix design.
- Q.4 (a) What is high performance concrete? Discuss.  
(b) Write notes on the following:-  
(i) Shrinkage and creep of hardened concrete  
(ii) Concrete at low temperature
- Q.5 (a) Write short notes on only two of the following:-  
(i) Non destruction testing of concrete.  
(ii) Special concrete and their properties.  
(iii) Compaction of concrete.  
(b) What is the effect of water cement ratio on strength of concrete? What is Abram’s law? What are its limitations?
- Q.6 (a) Discuss the properties of special concrete  
(b) How does the strength of concrete vary with age? What is modulus of Rapture? How can the modulus and rapture of concrete be determined?
- Q.7 (a) What for the non-Destructive testing (NDT) of concrete is required? State the various method of NDT and explain any two of them in details.  
(b) Write short note on  
(i) Effect of temperature on curing of concrete  
(ii) Effect of temperature on strength and permeability of concrete  
(iii) Air entrained concrete  
(d) Method of concrete mix design.

- Q.8 (a) what is concrete what its main components are? What is the function of binding material in concrete? What factors control the proportion of concrete Mix?
- (b) List the principal requirements of good aggregate? Explain the significance of grading of combined aggregate. Why Reactive aggregates should normally not be used in concrete? What is the maximum size if aggregate permitted in reinforced concrete work? Importance in networking

**Master of Technology**  
**Second Semester Examination, June-2021**  
**Experimental Stress Analysis [MTSE204]**

**Time: 3:00 Hrs.**

**Max Marks 70**

**Note: Attempt any five questions. All questions carry equal marks.**

- Q.1 (a) Explain how you would make circular polariscope identify all its components and derive an expression for the intensity of light wave in the dark field arrangement?  
(b) Discuss the Griffith or Irwin concept in detail?
- Q.2 (a) Discuss mechanical strain gauge in detail. What is the advantage of mechanical strain gauge over all other strain gauge?  
(b) Explain the moiré fringe pattern that results from the relative rotation of two grids?
- Q.3 (a) Discuss the strain gauge location for various measured quantities.  
(b) Discuss the requirement of strain sensitive material?
- Q.4 (a) Explain the advantage of semiconductor strain gauge?  
(b) Explain and classify the polarization of light?
- Q.5 (a) Discuss the different conditions for crack growth?  
(b) Discuss the integral variation principle in crack theory?
- Q.6 (a) Discuss the calculation of the stress intensity factor for double cantilever beam specimens by finite element method?  
(b) Write notes on temperature compensation of circuitry?
- Q.7 (a) Explain the shell with a crack trajectory?  
(b) Write short note on calculation of stress intensity factor by FEM?
- Q.8 Discuss stress analysis by photoelasticity?  
(a) Explain in detail optical relationship?  
(b) Explain material characteristics used for evaluation of cracks propagation resistance?

**Master of Technology**  
**Second Semester Examination, June-2021**  
**Theory of Plates and Shells [MTSE205]**

**Time: 3:00 Hrs**

**Max Marks 70**

**Note : Attempt any five questions. All questions carry equal marks.  
Any data required but not provided may be assumed.**

- Q.1 a) Discuss the Slope and curvature of slightly bent plates?  
b) A circular plate of radius  $a$  with simply supported edges carries a load of intensity  $q$  UDL over the entire surface of the plate derivation the expression for the maximum deflection of the plate?
- Q.2 a) Write the various assumption made in thin plates with small deflection?  
b) Derive the moment curvature relationship in the case of pure bending of plates?
- Q.3 a) Discuss the general theory of cylindrical shell loaded symmetrical with respect to its axis?  
b) Compare membrane theory and bending theory of cylindrical shell in detail?
- Q.4 a) Discuss the membrane theory of density curved shell and thus obtain the expression for membrane force along meridional and circumferential directions?  
b) Write short note on Gaussian curvature?
- Q.5 a) Discuss in detail the boundary condition?  
b) Explain the use of infinite integrals and transforms?
- Q.6 a) Discuss Fourier loading ?  
b) Write short note hyperbolic parabolic shells?
- Q.7 a) Explain differential equation for cylindrical bending of plates?  
b) Explain cylindrical bending of uniformly loaded rectangular plates with simply supported edges?
- Q.8 a) Write relation between bending moment and curvature in pure bending of plates?  
b) Write short note Strain energy in pure bending of plates?