Code No.: **81105** | **MR18**

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

M. Tech. II SEMESTER (MR18) REGULAR END EXAMINATIONS, MAY-2019

Subject: **Finite Element Method**
Branch: **Structural Engineering**

Time: 3 hours **Max. Marks: 70**

PART – A

Answer **ALL** questions of the following **5x4Marks=20 Marks**

1. Discuss about concepts of FEM.
2. Define shape function and write the properties of shape functions.
3. Distinguish between CST and LST element.
4. List the characteristics of shell element.
5. Discuss about geometric non linearity.

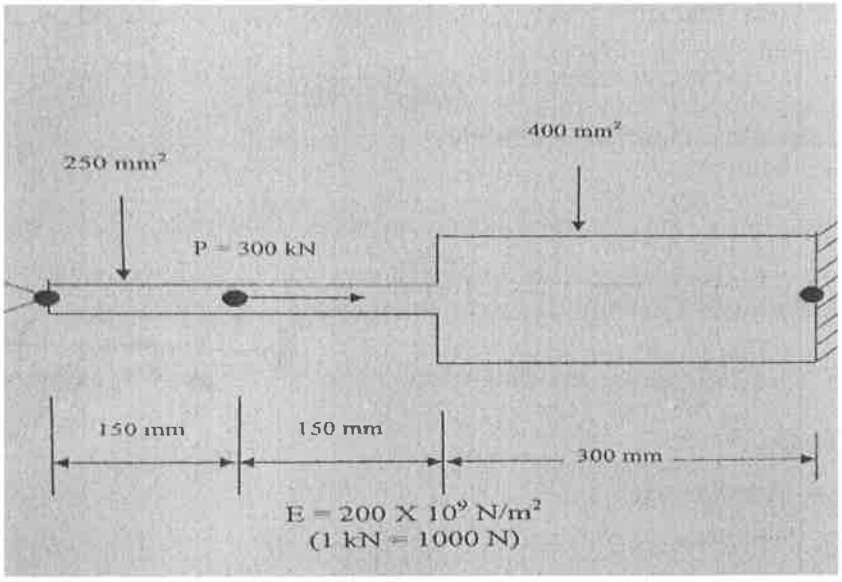
PART-B

Answer **ALL** questions of the following **5x10Marks=50Marks**

1. Define Rayleigh Ritz method and using this method find the displacement of the midpoint of the rod. The length of rod along X-axis is 2units. No point load and surface traction. Assume E=1unit and A=1unit.

(OR)

2. Determine the nodal displacements, element stress and support reactions for the given bar.



3. Two dimensional simple elements are used to find the pressure distribution in a fluid medium. The (x, y) coordinates of nodes i, j and k of an element are given by (2,4), (4,0) and (2,6) respectively. Find the shape functions N_i, N_j and N_k of the element and area of the triangular element.

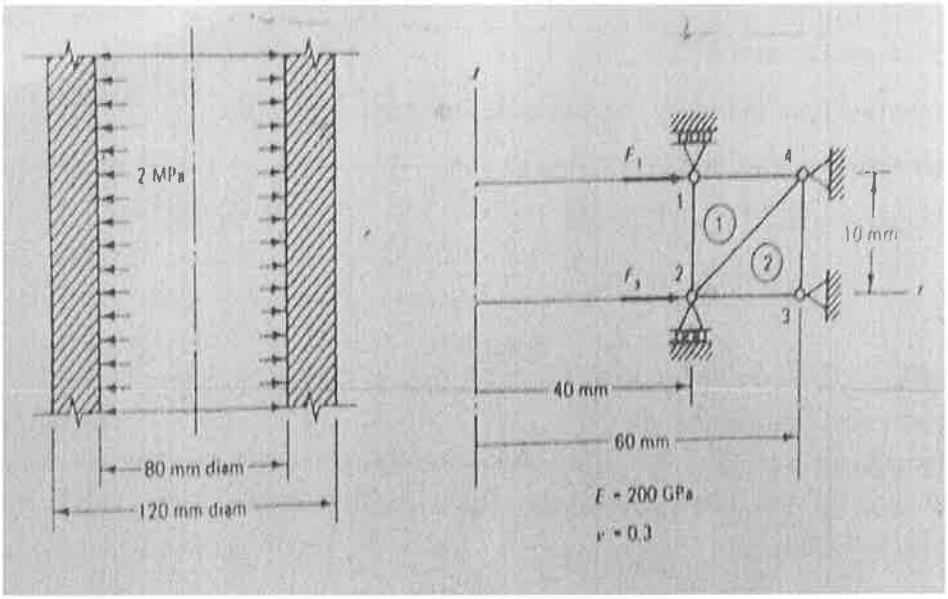
(OR)

4. A beam of length 1000cm fixed at one end and supported by a roller at the other end is supporting a concentrated load of 20000N at its center of the span. Calculate the deflection under the load and construct the Shear Force and Bending Moment diagrams for the beam.

5. Give the Finite element formulation of 2-D elements. Describe the various 2D elements.

(OR)

6. A long cylinder of inside diameter 80mm and outside diameter 120mm snugly fits in a hole over its full length. The cylinder is then subjected to any internal pressure of 2MPa. Using two elements on the 10mm length shown, find the displacements at the inner radius.



7. Give the basic equations and Finite element formulation for bending of plates. Describe the 12DOF rectangular plate bending element.

(OR)

8. Discuss the generation of stiffness matrix and load vector for a beam element.

9. What are the various categories of non linear problems? How do you solve non linear problems?

(OR)

10. Discuss about Degree of Freedom, Jacobian matrix and Area coordinates.

Code No.: **81123** MR18

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M. Tech. II SEMESTER (MR18) REGULAR END EXAMINATIONS, MAY-2019

Subject: **Ground Improvement Techniques**

Branch: **Structural Engineering**

Time: 3 hours **Max. Marks: 70**

PART – A

Answer **ALL** questions of the following **5x4Marks=20 Marks**

1. Name the various soil deposits found in India.
2. Write about vibro-displacement?
3. Explain types of soil reinforcement
4. Discuss about well point system.
5. What is soil-cement or soil-lime coloumn

PART-B

Answer **ALL** questions of the following **5x10Marks=50Marks**

1. a. What are the objectives of ground improvement Technique?
   b. What are the favorable ground conditions for construction?

(OR)

2. Explain the factors influencing the selection of ground improvement techniques?
3. What are compaction piles? Discuss the installation procedure of compaction piles

(OR)

4. Discuss in detail the installation procedure of the vibrocompaction
5. Explain the procedure of seepage control with geosynthetics

(OR)

6. a. Differentiate open drains, closed drains and horizontal drains.
   b. What are the parameters considered in well installation technique?
7. Describe in detail about the various methods of grouting with neat sketches.

(OR)

8. Write a detailed note on (a) Portland cement stabilization (b) Bituminous stabilization
9. Define rock bolting and explain the role in ground modification

(OR)

10. Explain the different applications of soil reinforcement for ground Improvement

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M. Tech. II SEMESTER (MR18) REGULAR END EXAMINATIONS, MAY-2019

Subject: **Structural Dynamics**

Branch: **Structural Engineering**

Time: 3 hours **Max. Marks: 70**

PART – A

Answer **ALL** questions of the following **5x4Marks=20 Marks**

1. What is the difference between a static and dynamic force?
2. State and explain (i) Newton's 2nd law of motion and (ii) d' Alembert's principle
3. Write a short note on single degree of freedom (SDOF) systems.
4. What is meant by two degree of freedom and multi degree of freedom system?
5. State and prove orthogonality property of mode shapes.

PART-B

Answer **ALL** questions of the following **5x10Marks=50Marks**

1. **a)** Write the mathematical equation for springs in parallel and springs in series Springs in parallel

   b) A machine foundation weighs 60 KN. The spring constant is 11000KN/m and dash pot constant (C) = 200KN/s/m. Determine

   a. Whether the system is over damped, under tamped or critically damped.
   b. Logarithmic decrement
   c. Ratio of two successive amplitudes
   d. If the initial displacement is 10mmand initial velocity is zero displacement at t =0.1s

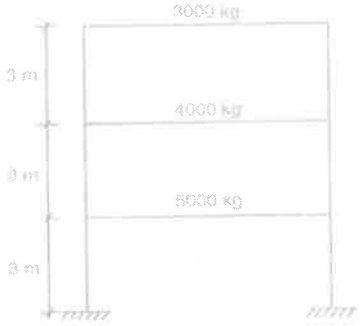
(OR)

2. A single degree of freedom system having a mass of 2.5mis set into motion with a viscous damping and allowed to oscillate freely. The frequency of oscillation is found to be 20 Hz, and measure of the amplitude of vibration shows two successive amplitude to be 6mm and 5.5mm. Determine the viscous damping co-efficient.
3. Find the expressions for dynamic magnification factor and phase angle for a damped SDOF system subjected to dynamic load Po. Sin Cot. Sketch their variation.

(OR)

4. Find the response for a damped SDOF system subjected to free vibration, for the three cases: Over damped, under damped and critically damped.

5. Determine the natural frequency and mode shape for the MDOF system. EI = 4.5 x 10^6N-m^2 for all columns.



(OR)

6. a) Find the 3 natural frequencies of vibration and the mode shapes for a fixed beam of span L, flexural rigidity EI and mass per unit length m sketch the shapes.

   b) Write the characteristic equation for free vibration of undamped system.

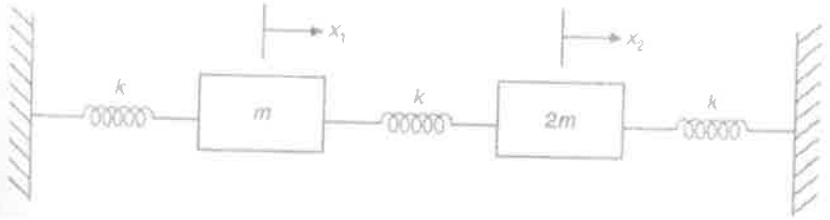
   c) State and prove orthogonality property of mode shapes.

7. Using STODOLA method, find the fundamental natural frequencies of vibration and mode shapes for an idealized 3-storeyed shear building whose lumped mass and stiffness (from top to bottom) are :

m 1	= 1		m 2	= 2		m	= 2.5
k 1	= 500	k 2	= 1000		k3	= 1200	

(OR)

8. Find the natural frequency and mode of vibration for the system shown.



9. a) Write notes on Excitation by rigid base translation and explain the I.S. Code procedure of obtaining the response of a MDOF system.

   b) Find the response for a damped SDOF system subjected to free vibration, for the three cases: Over damped, under damped and critically damped.

(OR)

10. Write short notes on any THREE:-

    a) Flexural vibration of Beams

    b) Impulsive loading

    c) Lumped mass approach

    d) Rules of modal combination