Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16MSE101

M.Tech - I Semester Regular and Supplementary Examinations, Dec-2018.

ADVANCED MATHEMATICS

(SE)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions.

All questions carry EQUAL marks of 12.

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1. (a) . The index number of prices of two articles A and B for six consecutive weeks are given below : [6]

A :	314	326	336	368	404	412
B :	330	331	320	318	321	330

Find which has a more variable price ?

(b). The two regression equations of the variables x and y are x = 19.13 – 0.87y and x = 11.64 – 0.50 x . Find i). mean of x 's, ii). mean of y ' s and iii). the correlation coefficient between x and y . [6]

2. (a). By the method of least squares , find the straight line that best fits the following data : [6]

x :	1	2	3	4	5
y :	14	27	40	55	68

(b). Write a short notes on analysis of variance and explain analysis of variance for one criterion of classification. [6]

3. (a). Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5$, $t \geq 0$ given that $u(x, 0) = 20$, $u(0, t) = 0$, $u(5, t) = 100$. Compute u for the time step with h = 1 by Crank Nicholson method. [6]

(b). Solve the boundary value problem $u_{tt} = u_{xx}$ with the conditions $u(0, t) = u(1, t) = 0$, $u(x, 0) = [x(1 - x)]/2$ and $u_t(x, 0) = 0$, taking h = k = 0.1 for $0 \leq t \leq 0.4$. Compare your solution with the exact solution at x = 0.5 and t = 0.3 . [6]

4. Solve the heat equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the conditions $u(0, t) = u(1, t) = 0$ and $u(x, 0) = 2x$ for $0 \leq x \leq \frac{1}{2}$, $u(x, 0) = 2(1 - x)$ for $\frac{1}{2} \leq x \leq 1$. Take h = ¼ and k according to Bendre – Schmidt equation . [12]

5. (a) Solve the following equations by Gauss – Seidel method . [6]

$10x + y - z = 11.19$, $x + 10y + z = 28.08$, $-x + y + 10z = 35.61$
correct to two decimal places.

(b) Solve the boundary value problem [6]

$$y'' + y + x = 0 \quad (0 \le x \le 1),\ y(0) = y(1) = 0$$

by Rayleigh – Ritz method.

6. (a) Solve the Differential equation $x\frac{d^2y}{dx^2} - 2\frac{y}{x} = x + \frac{1}{x^2}$. [6]

(b) Solve $y'' + 4y' + 4y = 3\sin x + 4\cos x, \quad y(0) = 1 \text{ and } y'(0) = 0$ [6]

7. A homogenous rod of conducting material of length 100 cm has its ends kept at zero temperature and the temperature initially is [12]

$$u(x, 0) = \begin{cases} x, & 0 \le x \le 50 \\ 100 - x, & 50 \le x \le 100 \end{cases}$$

. Find the temperature u (x , t) at any time.

8. (a) Solve the Euler's equation for the functional $\int_{x_0}^{x_1} (x + y')\, y\, dx$. [6]

(b) Find the geodesics on a right circular cylinder of radius a . [6]

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Subject Code: R16MSE102

M.Tech - I Semester Regular and Supplementary Examinations, Dec-2018.

THEORY OF ELASTICITY

(SE)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions.
All questions carry EQUAL marks of 12.

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1. (a) Derive the compatibility conditions for strain in 3D.
   (b) Define principal stresses and principal directions . Show that the determination of principal stresses and principal directions reduces to the solution of an Eigen value problem. Discuss the existence of three real valued solutions for principal stresses.

2. (a) what is Airy's stress function? Explain its significance.
   (b) A cantilever beam of uniform length *L*, depth *d* and thickness *b* carries a concentrated force *P* at free end. Determine the stress distribution in the beam by stress function approach.

3. Determine the magnitude and direction of the principal stresses and the maximum shear stress when σx = 1000Mpa, σy= -800Mpa and σz= 800Mpa , τxy = -100Mpa, τyz=0 and τzx=80Mpa.

4. Derive Lame's equations for a thick walled cylinder subjected to internal and external pressures.

5. (a) Discuss the effect of a circular hole in stress distribution of plates.
   (b) Derive the stress components of a rotating circular disc of uniform thickness with a central hole of radius 'a'.

6. (a) Derive the expressions for shear stress and angle of twist per unit length for a uniform bar of equilateral triangular section subjected to a twisting moment *T*.

7. The strain components at a point are given by
   ϵx = 0.02, ϵy = -0.03, ϵz = 0.003, γxy = 0.018, γyz = 0.022, γxz = -0.012. Determine the normal and shearing strains on the octahedral plane.

8. (a)Write about the following
   (i) Generalised Hook's law
   (ii) St.Venant Principle
   (iii) 3-D Mohr circle

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Subject Code: R16MSE103

M.Tech - I Semester Regular/Supplementary Examinations, Dec - 2018

MATRIX ANALYSIS OF STRUCTURES

(SE)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions.
All questions carry EQUAL marks of 12.

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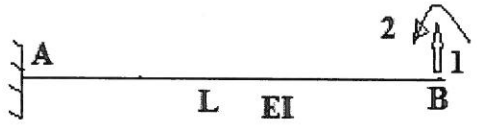
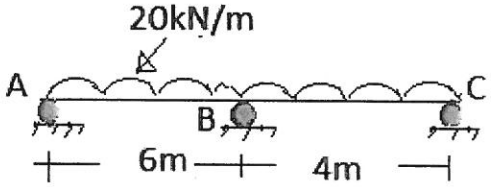
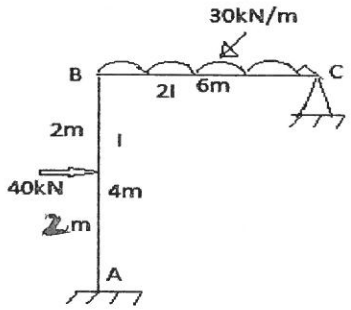
1. Define flexibility and stiffness, develop flexibility and stiffness matrix for the beam shown in Figure.



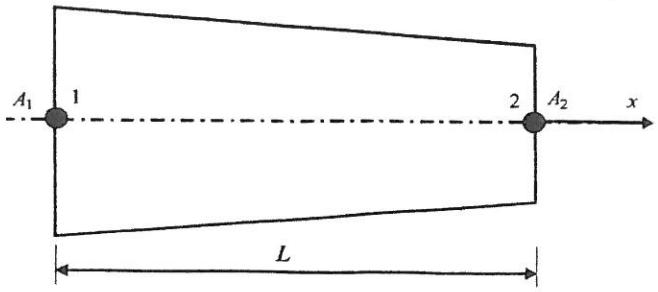
2. Analyse the beam shown in Figure using stiffness method. Take E = 210Gpa and MOI as $3x10^6mm^4$.



3. Analyse the Frame shown in Figure using Stiffness method and draw the Bending moment diagram

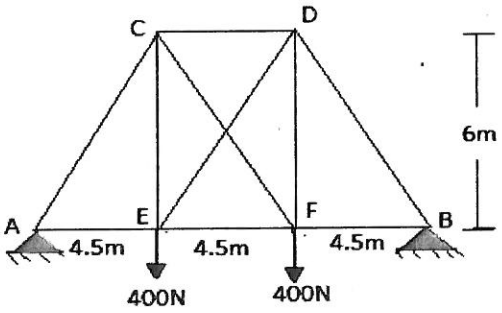


4. Consider a bar element whose area of cross section varies linearly along the longitudinal axis as shown in Figure. Derive its stiffness matrix. How will this compare with the stiffness matrix obtained assuming that the bar is of uniform cross sectional area equal to that at its mid-length.



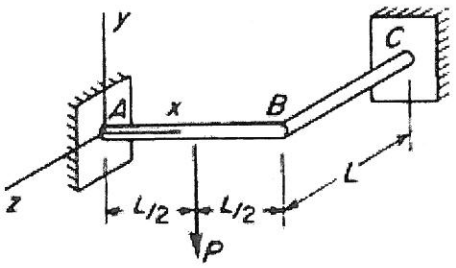
5.Develop the stiffness matrix for space frame element.

6.Analyse the truss is loaded as shown in figure using stiffness method. All the members of the truss have same cross sectional area.



7. Write the steps involved in the analysis of structures using STAAD PRO

8. Analyse the grid structure shown in Figure using Stiffness method.



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Subject Code: R16MSE104

M.Tech - I Semester Regular and Supplementary Examinations, Dec-2018.

STRUCTURAL DYNAMICS

(SE)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions.
All questions carry EQUAL marks of 12.

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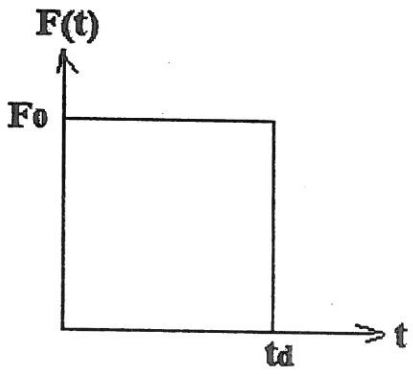
1. (a) Define logarithmic decrement method to find out damping

   (b) Write the equations that govern the motion in 2 DOF system.

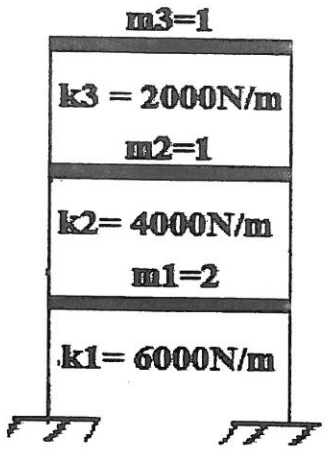
2. A SDOF system is subjected to a suddenly applied load with a limited duration t_d as shown in Figure. Use Duhamel integral, determine the response of the un-damped system if the system starts at rest.



3. Differentiate D'Alembert's principle and principle of virtual displacement.

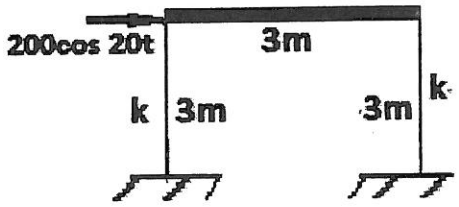
4. State and prove orthogonality property of mode shapes.

5. Determine the frequencies and mode shapes of the system shown in Figure



6. Determine the natural frequencies and mode shapes for flexural vibration of a beam having both ends fixed.

7. A building frame is subjected to an excitation force as shown in Figure. Determine its steady state response and maximum dynamic stress in the columns. Assume 5% damping, Take EI = 100kN-m^2, Z= 1400 mm^3. Total mass = 220Kg.



8. Discuss about any two Mass Matrix Construction Methods

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Subject Code: R16MSE107

M.Tech - I Semester Regular & SupplementaryExaminations, Dec- 18 /Jan - 19

REPAIR & REHABILITATION OF STRUCTURES

(SE)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions.
All questions carry EQUAL marks

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1. As a Site Engineer, what are the factors you would check during the day of concreting to assure quality in construction? Explain in detail. [12]

2. (a) Explain with a flow chart about the manufacturing process of fusion bonded epoxy coating of rebars [8+4]
   (b) State the quality of workmanship and materials

3. (a) Discuss briefly about the fields tests and laboratory tests to be conducted for retrofitting and repair [8+4]
   (b) Describe ultrasonic test of concrete members with sketch

4. (a) Explain briefly about Ferro cement and fibre reinforced concrete [8+4]
   (b) Distinguish between distress in steel / distress in concrete

5. (a) Explain any one method of repairs in RCC slab [6+6]
   (b) State the any four non-conventional materials required for repairs.

6. (a) Discuss the following: [4+4+4]

   (a) Shotcrete
   (b) Shoring
   (c) Underpinning

7. Explain the demolition process of damaged structure [12]

8. Discuss in detail about the prevention aspects of maintenance [12]

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Subject Code: R16MSE110

M.Tech - I Semester Regular and Supplementary Examinations, Dec-2018.

SPECIAL CONCRETES

(SE)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions.
All questions carry EQUAL marks

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1. What is polymer modified concrete and mention the constituent materials of it and their properties

2. Explain the effect of fly ash and silica fume on the hardened properties of concrete

3. (a) Explain the role of light weight concrete in structures
   (b) Discuss about the materials and their properties for preparing high density concrete

4. Explain the behaviour of Ferro cement in tension, compression and shear

5. Explain in detail about the orientation of fibres and aspect ratio of fibres in Fiber reinforced concrete

6. Explain in detail about Reactive powder concrete and bacterial concrete, mention its applications

7. Discuss about plasticizers(water reducers) and super plasticizers(high range water reducers) and their effect on fresh and harden properties of concrete.

8. Discuss in detail about the BIS method of Mix proportioning of Concrete:

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