R-14

Code: 4PT621

M. Tech. II-Semester Regular Examinations Oct/Nov 2015

Structural Dynamics

(Structural Engineering)

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)

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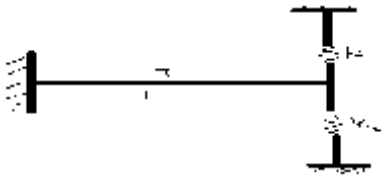
UNIT-I

1. a) What are the three elementary parts of vibration? 4M

   b) For the given system find the effective stiffness. Beam is of length 4m and each spring has stiffness constant of 100 N/m. EI of beam is $2*10^8$ kN-mm^2



8M

OR

2. a) Write a short note on logarithmic decrement and derive the expression for it. 6M

   b) A body of mass 10kg is supported on a spring of stiffness 300N/m and has a dash Pot connected to it which produces a resistance of 0.002N at a velocity of 2cm/sec. In what ratio will the amplitude of vibration be reduced after 5 cycles? 6M

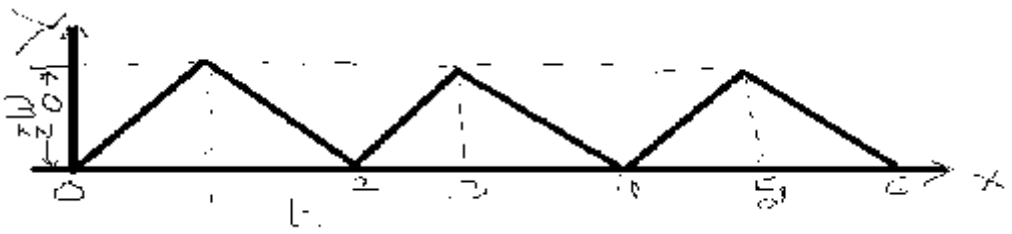
UNIT-II

3. a) Derive the equation of motion for a damped free vibration system and write the solution for displacement if the system is critically damped. 6M

   b) A system consists spring of stiffness of 6kN/m and a dash pot of damping coefficient 150N-s/m in parallel. If the initial displacement of the system is zero and initial velocity of the system is 0.1m/s, Compute the amplitude of motion and find the displacement at the end of 1sec. 6M

OR

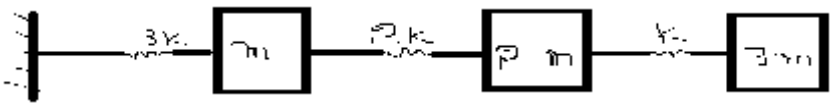
4. Find the steady state response of the given periodic force which is acting on a system of mass 100kg and stiffness 40N/m at t=1sec.(Take 2 values only for finding the constants and neglect the damping)



12M

UNIT-III

5. Calculate natural frequencies and draw mode shapes of the given multi degree of freedom system consisting mass of m1=4m, m_2=2m, m_3=6m and stiffness of k_1=k_2=3k and k_3=6k.mass in kg and stiffness is in N/m.

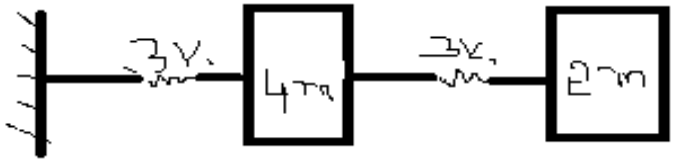


12M

OR

6. Using modal analysis of, find the free vibration response of a two degree of freedom system given below and the initial conditions of displacement x(0) and initial velocity x'(0).

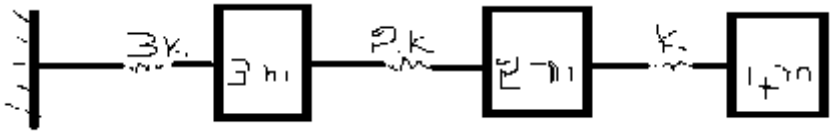
$$x(0) = \begin{Bmatrix} x_1(0) \\ x_2(0) \end{Bmatrix} = \begin{Bmatrix} 1 \\ 0 \end{Bmatrix}, \qquad x'(0) = \begin{Bmatrix} x_1'(0) \\ x_2'(0) \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix},$$



12M

UNIT-IV

7. Find the lowest natural frequency of the following system using stodola method



12M

OR

8. Calculate the natural frequencies of the given system as shown above by Holzer"s method. 12M

UNIT-V

9. Calculate first four natural frequencies and draw mode shape of a beam for which both ends are fixed. 12M

OR

10. a) Derive the equation of motion for earthquake excitation. 4M

    b) Explain lumped mass idealization with respect to multi degree of freedom system. 4M

    c) Explain the IS code methods for analyzing earthquake excitation for a single degree of freedom system 4M

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Mr. T.N.K HOD of CE

Code: 4PT622

R-14

M. Tech. II-Semester Regular Examinations Oct/Nov 2015

Finite Element Analysis of Structures

(Structural Engineering)

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)

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UNIT-I

1. a) Explain the basic steps involved in FEM 6M

   b) Describe the stress strain displacement relationships in matrix forms for plane stress, plane strain and axis metric problems 6M

OR

2. a) Bring out the differences between continuum methods and FEM 6M

   b) Using the Rayleigh - Ritz method determine maximum deflection for cantilever beam subjected to UDL and concentrated load at end of beam. 6M

UNIT-II

3. a) Derive shape function for bar element using global coordinates. 6M

   b) Explain convergence requirements for a polynomial displacements ~~modal~~ model. 6M

OR

4. a) What are the considerations for choosing the order of polynomial functions? 6M

   b) Derive the interpolation function at the bar element using local coordinates. 6M

UNIT-III

5. a) What are different types of elements used for plane stress and plane strain problems in FEM 6M

   b) Derive shape function for Linear Strain 2D-Triangular element using area co-ordinates. 6M

OR

6. a) Describe static condensation. 6M

   b) Determine the relationship between strains and nodal displacements for three node and six node triangular element. 6M

UNIT-IV

7. a) Explain the Lagrange and Serendipity elements. 6M

   b) Derive shape function for quadratic bar element using Lagrange interpolation function. 6M

OR

8. a) Describe the convergence criteria for ISO-parametric elements. 6M

   b) Derive the shape function of 4 noded rectangular element using natural coordinate system. 6M

UNIT-V

9. a) Explain with neat sketches of different 3 D elements used to analyze 3D problem in FEM 6M

   b) What are the properties of ~~share~~ Shape functions? 6M

OR

10. Explain the method of finding ~~share~~ Shape functions for hexahedral element to be used for plane stress and plane strain problems. 12M

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Code: 4PT623

R-14

M. Tech. II-Semester Regular Examinations Oct/Nov 2015

Stability of Structures

(Structural Engineering)

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)

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UNIT-I

1. Find the maximum deflection in case of a beam-column subjected to continuous lateral load 'q' and longitudinal compressive force 'P'? 12M

OR

2. Derive the deflection equation for a beam-column subjected to several concentrated loads. 12M

UNIT-II

3. Find the critical load of a bar shown in figure-1, whose one end is fixed and the other end is free?

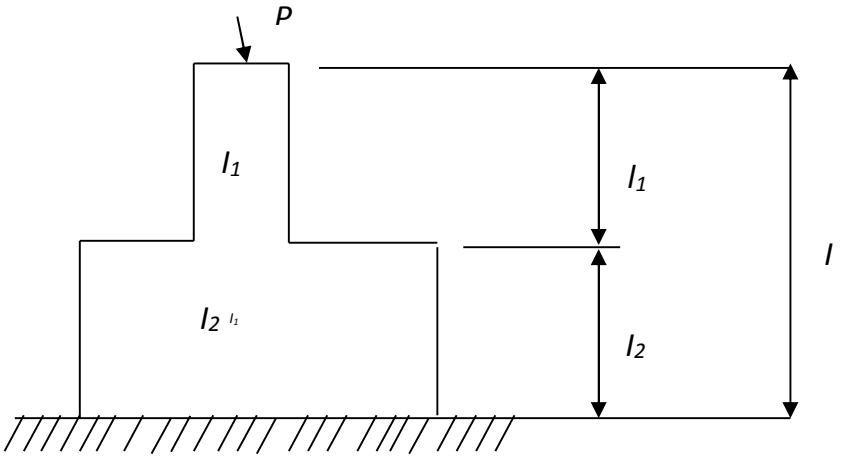

Figure - 1 12M

OR

4. Explain in detail about the buckling of a bar on elastic foundation. 12M

UNIT-III

5. What is double modulus theory? Obtain an expression for the critical load of a column using this theory. 12M

OR

6. Explain in detail about the non-uniform torsion of thin walled bar of open cross section. 12M

UNIT-IV

7. a) Explain orthogonality relation. 5M

   b) Explain in detail about the Timoshenko method and its applicability. 7M

OR

8. a) Enumerate the limitations of general equation of Galerkin. 4M

   b) For a cantilever column of uniform section, the Galerkin's trial function ϕ is given by $\phi = ¢\left[1 - \frac{Cos\,\Pi x}{2l}\right]$.

      (i) Examine whether the function meets the requirements.

      (ii) Obtain an expression for the critical load of the column using Galerkin's general equation. 8M

UNIT-V

9. Assuming the differential equation for plate buckling, obtain critical load for a rectangular plate, simply supported on all edges and carrying a uniformly distributed compressive force 'N' per Unit length in one direction. 12M

OR

10. Explain the lateral buckling of a simply supported I – beam subjected to pure bending. 12M

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Hall Ticket Number :

Code: 4PT624 **R-14**

M. Tech. II-Semester Regular Examinations Oct/Nov 2015

Analysis of Shells and Folded Plates

(Structural Engineering)

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)

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UNIT-I

1. a) What are the various theories on the analysis of shell? Discuss their merits and demerits 6M

   b) Derive the equilibrium equations 6M

OR

2. How do you find a solution for the membrane forces? Indicate how you derive the differential equation for solving stresses and displacements in a shell. Indicate the nature of the differential equation with reference to a circular cylindrical shell. 12M

UNIT-II

3. Derive SCHORERS equation for simply supported cylindrical shells 12M

OR

4. Explain why the beam method of analysis is not suitable for short shells. What approximate method can be used for these shells and also explains it in detail. 12M

UNIT-III

5. What are oblique hyperbolic paraboloids? Sketch two types of roofs using oblique hyper shells. Sketch hyperbolic parabolic shell that can be built on a hexagonal plan. What are the forces acting on each of its members? 12M

OR

6. a) What are the three types of popular paraboloids and how are they formed. How are they named? 6M

   b) Give the general equation for elliptical paraboloid and obtain the equation for obtaining the stress resultants. 6M

UNIT-IV

7. a) What is meant by correction analysis 6M

   b) What are the methods available for correction analysis in addition to Simpson's method? 6M

OR

8. a) What is meant by Transverse beam analysis and longitudinal beam analysis used in the analysis of folded plates structures. 6M

   b) What are the differences between Whitney's and Simpsons methods to analysis the folded plates. 6M

UNIT-V

9. Derive the governing differential equations for membrane analysis of double curvature shells other than shell of revolution 12M

OR

10. Write a short note on
    i. Shell of Translation
    ii. Shell of Revolution
    iii. Double curved shells
    iv. Advantages of folded plates 12M

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Hall Ticket Number :

Code: 4PT626 **R-14**

M. Tech. II-Semester Regular Examinations Oct/Nov 2015

Advanced Concrete Technology

(Structural Engineering)

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)

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UNIT-I

1. a) Explain in detail the constituents of concrete? State their relative proportions. 6M
   b) Describe the bogue chemical compound composition of Portland cement. 6M

OR

2. a) List out different types of cement and explain any four types of cement in detail. 6M
   b) What do you mean by special aggregate and explain briefly about
      (i) High density aggregates 3M
      (ii) Aggregates for refractory concrete 3M

UNIT-II

3. a) Distinguish between plasticizers and super plasticizers and why do super plasticizers perform better then surface-active agents. 6M
   b) What are the different chemicals used to obtain the desired colours on a concrete surface explain. 6M

OR

4. a) What is the importance of air-entraining agents and explain the activity of air-entraining agents with help of neat sketches. 6M
   b) Write a short notes for the following mineral admixtures
      (i) Fly ash (ii) Ground Granulated Blast Furnace Slag 6M

UNIT-III

5. Describe any one method of mix proportioning for high-strength concrete and explain the significant difference between mix proportioning for conventional concrete and that for high-strength concrete. 12M

OR

6. a) List the aspects of HPC that are related to strength and durability separately and also write the important approaches for achieving durable concrete? 6M
   b) Explain in detail the factors which control the performance of HPC 6M

UNIT-IV

7. a) Explain the need for evaluation of a structure under use. 6M
   b) What is resistance factor and differentiate between cracking, spalling and straining. 6M

OR

8. Why Non-destructive testing method is used for concrete and explain about rebound hammer test with help of neat sketch. 12M

UNIT-V

9. a) What are the functions of formwork and list out forces that act on the form work? 6M
   b) How is lateral pressure on wall form work assessed? Explain. 6M

OR

10. a) What are the reasons for the failure of form work? 6M
    b) Explain different types of shoring and their relative merits. 6M

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Hall Ticket Number :

Code: 4PT628

R-14

M. Tech. II-Semester Regular Examinations Oct/Nov 2015

Advanced Steel Design

(Structural Engineering)

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)

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UNIT-I

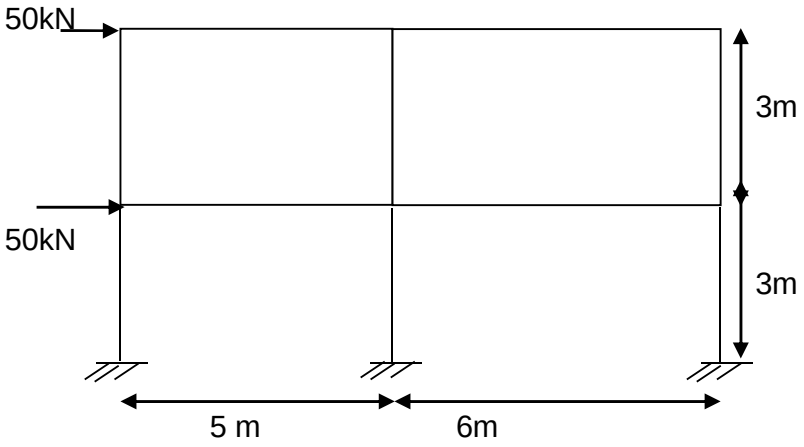
1. What are various types' chimneys and explain the forces acting on self-supported steel chimneys?

OR

2. A self-supporting steel chimney is 80 meters high and its diameter is 3 meters at its base. Design the steel chimney?

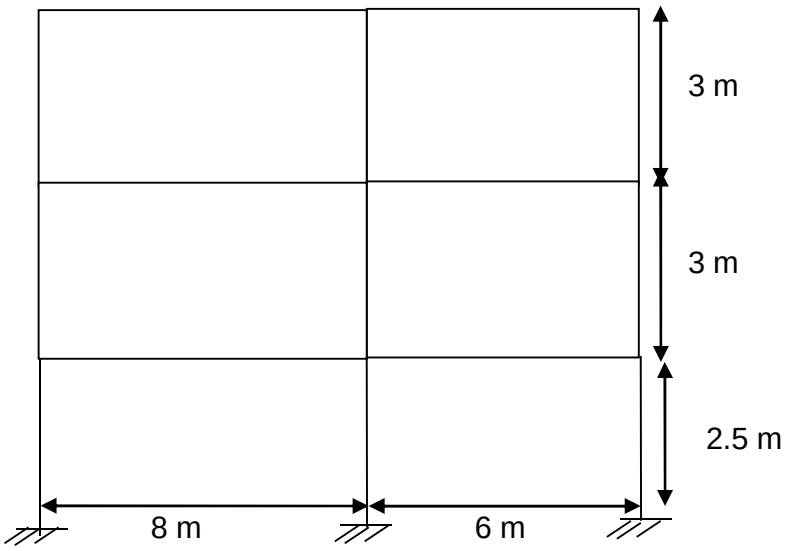
UNIT-II

3. Determine the end moments in the columns and beams of the two storied building frame as shown by cantilever method?



OR

4. Determine the maximum shear force in the given frame by portal method. Dead load is 3 kN/m^2, Live load is 2.5 kN/m^2 and self weight of beam for 8 meters span is 5 kN/m and for 6 meters span is 4 kN/m. Spacing of frame is 3.6 meters.



UNIT-III

5. Sketch the various forms of gantry girders and crane rails and explain various loads they act on gantry girders.

OR

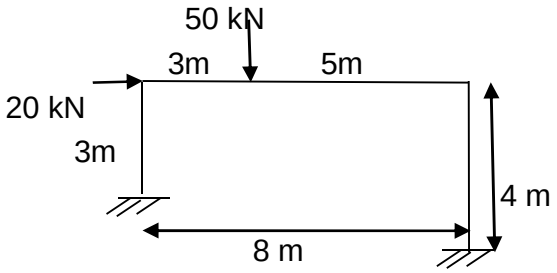
6. A gantry girder is composed of ISMB 600 @ 122.6 kg/m and a channel section ISLC 300 @ 33.1 kg/m placed on top of beam with its flange down. Compute (i) maximum compressive stress, (ii) maximum bending tensile stress and (iii) maximum shear stress, given the following:

Span of girder	**:** 6 m
Crane capacity	: 250 kN
Distance between centers of gantry girder	: 15 m
Weight of crane girder	: 120 kN
Weight of crab	: 70 kN
Maximum approach of crane hook	: 1 m
Distance between centers of wheels	: 3.80 m
Mass of rail section	**:** 30 kg/m

Are the above stresses are within the safe limits?

UNIT-IV

7. Explain theorems of plastic analysis. Find out the fully plastic moment of given frame?



OR

8. Explain the principles of optimization and concept of minimum weight design in plastic design of structures?

UNIT-V

9. Explain the methods of plastic design, combining mechanics method and plastic moment distribution method?

OR

10. Find out the plastic moment of given frame by plastic moment distribution method.