Hall Ticket Number :										

R14

Code: 4PT621

M.Tech. II Semester Regular & Supplementary Examinations Aug/Sep 2016

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) Explain about free vibration and forced vibration.
   b) A dynamics system has maximum velocity of 200 mm/s and the natural period is 1s. If the initial displacement is 10 mm, determine the amplitude, the initial velocity and the maximum acceleration.

OR

2. a) Explain about methods of discretization.
   b) A one kg mass is suspended by a spring having a stiffness of 1N/mm. Determine the natural frequency and static deflection of the spring.

UNIT-II

3. a) Explain about dynamic magnification factor.
   b) A vibrating system consists of a mass 5 kg, spring stiffness 120 N/M and a damper with a damping coefficient of 5 N-s/m. Determine
      i. Natural frequency.
      ii. Damping factor.
      iii. Logarithmic decrement.
      iv. Ratio of two successive amplitudes and
      v. No. of cycles after which the initial amplitude is reduced to 25%.

OR

4. a) Explain about Duhamel integral.
   b) A machine of 200 kg mass is supported on four parallel springs of total stiffness 750 N/M has an unbalanced rotating component which result is a disturbing force of 350 N at a frequency of 2100 rpm. If damping ratio is 0.2. Determine
      i) Amplitude of motion due to the unbalance.
      ii) Transmissibility.
      iii) Transmitted force.

UNIT-III

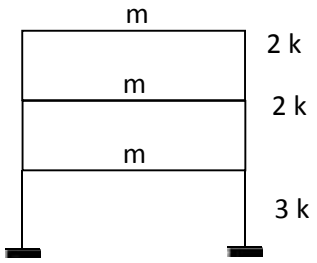
5. a) Derive an equation of free un damped vibration analysis of MDOF systems.
   b) Explain about Eigen valve and Eigen vector is MDOF systems.

OR

6. Determine the natural frequencies and mode shapes of the given MDOF system. EI=$4.5 * 10^6$ N-m^2 for all columns.

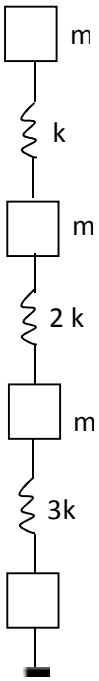
UNIT-IV

7. Determine the natural frequencies and mode shapes for the framed structure shown in Fig.



OR

8. Determine the natural frequencies and mode shapes shown in Fig by Holzer's method.



UNIT-V

9. Determine the frequencies of beams subjected to flexural vibration with one end fixed and one end free.

OR

10. A three storeged symmetrical RC school building situated BHUJ with the following data:

Plan dimensions – 6.0 m,
Storey height – 3.0m,
Total weight of beams in a storey – 120 kN,
Total weight of slab in a storey – 200 kN,
Total weight of column is a storey – 50 kN,
Total weight of walls in a storey – 500 kN,
Live load – 120 kN,
Weight of terrace floor – 650 kN.

The structure is resting on hand rock. Determine the total base shear and lateral loads at each floor levels for 5% of damping using IS method.

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Hall Ticket Number :										

R14

Code: 4PT622

M.Tech. II Semester Regular & Supplementary Examinations Aug/Sep 2016

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 Rayleigh –Ritz method of functional approximation. 6M
   b) What are the advantages, disadvantages and limitations of finite element analysis? 6M

OR

2. a) Explain finite element modeling and discretization. 6M
   b) Explain plane stress analysis. 6M

UNIT–II

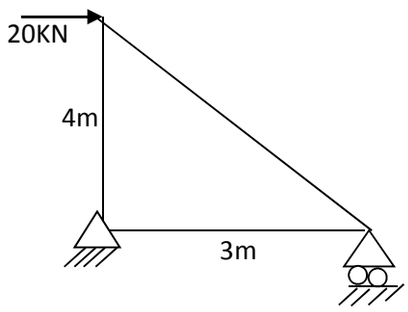
3. Explain the following
   (i) Bar element
   (ii) beam element
   (iii) boundary conditions
   (iv) Assembly of elements. 12M

OR

4. Derive the element stiffness matrices for bar and beam elements. 12M

UNIT–III

5. Find the nodal displacements, stresses and forces in the members of the truss shown in figure? Take E=200 GPa and the area of each member is 400mm^2.



12M

OR

6. a) Draw and briefly explain different types of elements used for plane stress and plane strain analysis. 6M
   b) Explain convergence and compatibility requirements of a displacement model. 6M

UNIT–IV

7. a) Draw the typical iso-parametric elements for one and two dimensional elements. 6M
   b) What are iso-parametric elements? Explain co-ordinate transformation. 6M

OR

8. Write the steps involved in the formulation of element stiffness matrix for four noded iso-parametric quadrilateral element. 12M

UNIT–V

9. a) Draw typical solid elements to be used for three – dimensional stress analysis. 6M
   b) Explain hexahedral iso-parametric elements. 6M

OR

10. a) Explain stress strain relationship of 8-noded iso-parametric solid element. 6M
    b) Derive the strain displacement matrix for hexahedral iso-parametric elements. 6M

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Hall Ticket Number :											R14

Code: 4PT623

M.Tech. II Semester Regular & Supplementary Examinations Aug/Sep 2016

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 subject to moment (M_0) at both the ends and a longitudinal compressive force (P)? 12M

OR

2. a) Derive the basic differential equation for beam-column. 5M

   b) Derive the equation for a beam–column whose one end is simply supported and the other end is fixed subjected to an u.d.l of intensity q/m and also a constant longitudinal force 'P'. 7M

UNIT-II

3. Using energy method, derive the expression for critical load of a column whose both ends are hinged. 12M

OR

4. Derive the expression for critical load of a column considering the effect of shear force. 12M

UNIT-III

5. a) Enumerate the assumptions made in double modulus theory. 4M

   b) Explain in detail about the tangent modulus theory and its applicability. 8M

OR

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

UNIT-IV

7. a) Derive an expression for critical load of cantilever column under a constant load 'P' using Rayleigh Ritz method. 8M

   b) Explain briefly the principle of stationary potential energy. 4M

OR

8. a) Compare galerkin's method with Rayleigh Ritz method. 4M

   b) Verify whether the given function $¤ = \frac{¢}{2l^3}(3lx^2 - x^3)$ represents a suitable galerkin trial function for a cantilever column. Take the origin at the fixed end. 8M

UNIT-V

9. Assuming the differential equation for a plate buckling, obtain critical load for a rectangular plate simply supported on all edges and carrying constant compressive force in two directions. 12M

OR

10 Explain the lateral buckling of a simply supported deep narrow rectangular beam subjected to pure bending. 12M

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Hall Ticket Number :										

R14

Code: 4PT624

M.Tech. II Semester Regular & Supplementary Examinations Aug/Sep 2016

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) Give a short account of the classification of shells 6M
   b) Define Gauss curvature. What is its importance in the shell? 6M

OR

2. a) Explain briefly the membrane and bending theories for the analysis of shell 6M
   b) Derive the equilibrium equations for the bending analysis of a cylindrical shell element 6M

UNIT-II

3. Derive the governing DKJ equation for bending theory of cylindrical shells 12M

OR

4. a) How do you classify long and short shells? 6M
   b) Explain the method of design of a cylindrical shells using ASCE method 6M

UNIT-III

5. a) Explain the BIS Classification of shells 6M
   b) Derive the governing equations for shell of double curvature 6M

OR

6. a) Explain how the hyperbolic paraboloid can be generated as a ruled surface. What is meant by oblique hypar shells? 6M
   b) How do you design the edge member of a hypar shell? 6M

UNIT-IV

7. a) Explain the terms plate rotation and joint rotation 6M
   b) Explain the Simpsons method of analysing folded plates in detail 6M

OR

8. a) Explain the differences between plate and slab action in the analysis of folded plates. 6M
   b) Explain step by step procedure of analysis of folded plates by Whitney's method. 6M

UNIT-V

9. a) Derive the general equation for hyperboloid of revolution 6M
   b) With neat sketches explain how the elliptical paraboloid is generated. 6M

OR

10. Write short note on
    i. Structural behaviour of folded plates
    ii. Diaphragms for shell roof systems
    iii. Shells of developed and non-developed surfaces
    iv. Lines of curvature in a shell and their significance 12M

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Hall Ticket Number :										

R14

Code: 4PT626

M.Tech. II Semester Regular & Supplementary Examinations Aug/Sep 2016

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) What are the factors that affect the shrinkage and creep of concrete? 6M
   b) Explain bogue's compound and also explain the structure of hydrated cement paste. 6M

OR

2. a) Describe the role played by gypsum in the hydration reaction of cement. 6M
   b) What are the effects of the shape and texture of aggregates on the strength and workability of concrete? 6M

UNIT-II

3. a) How does a surface-active agent increase workability and what method will you adopt to cure concrete in areas of water shortage? 6M
   b) Classify the various concrete chemicals based on their use and explain in detail any two commonly used chemical admixture in concrete. 6M

OR

4. a) How mineral admixtures are classified and explain the usage of any three mineral admixtures which are used in concrete. 6M
   b) How segregation and bleeding are reduced by using air-entraining agents. Justify. 6M

UNIT-III

5. a) What are the various techniques used to achieve high strength and describe the typical composition of high-strength concrete? 6M
   b) What are the important long-term properties of high-strength concrete? Compare them with those of conventional concrete. 6M

OR

6. a) How does the porous structure of rice husk ash influence the properties of hardened concrete? 6M
   b) What aspects are to be investigated for high performance in complex exposure conditions? 6M

UNIT-IV

7. a) Explain in detail what you understand by investigation plan. 6M
   b) What test will you use to determine the chloride content in concrete and how will you determine the hydration of hardened concrete. 6M

OR

8. Explain the following tests with the help of neat sketches
   (i) Pullout tests 6M
   (ii) Break off tests 6M

UNIT-V

9. a) Explain the role of formwork in the quality of concrete construction. 6M
   b) What are the requirements of structural timber formwork? Explain 6M

OR

10. a) What are the basic assumptions made in the design of formworks? 6M
    b) List out some of the common deficiencies in form work which lead to the failure of structures. 6M

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Hall Ticket Number :										

R14

Code: 4PT628

M.Tech. II Semester Regular & Supplementary Examinations Aug/Sep 2016

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

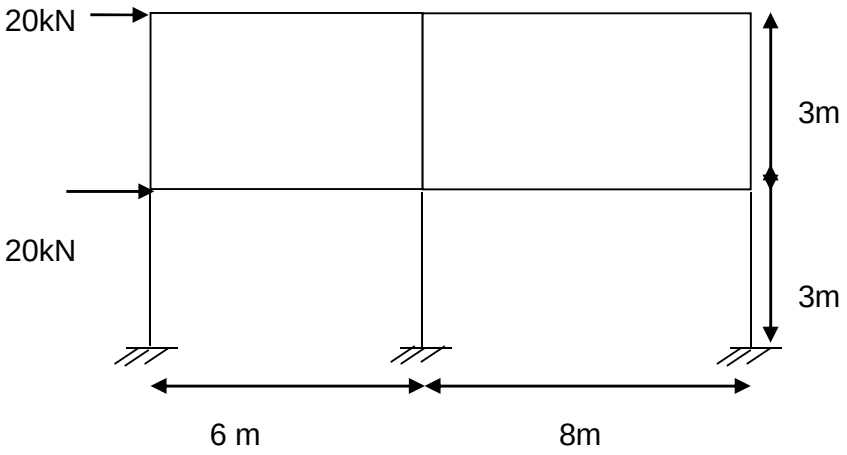
1. Explain various considerations to be made for design steel chimneys?

OR

2. A self-supporting steel stack is 100 meters high and 3.5 meters diameter at its base. Design the plates for stack. Also design the base plate, lugs and anchor bolts. Assume suitable data.

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. Explain with neat sketches the approximate methods of analysis of multi-storied buildings. What are the assumptions and limitations of portal and cantilever methods?

UNIT-III

5. What are the loads acting on gantry girder and explain design procedure of Gantry girder?

OR

6. Design the gantry for the following data

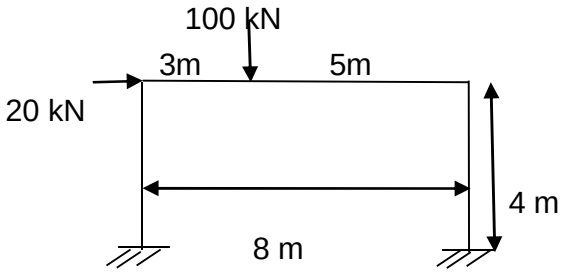
Crane load capacity	: 250 kN
Weight of crane girder excluding trolley	: 200 kN
Weight trolley, motor, hook etc.	: 50 kN
Distance between centers of gantry rails	: 12 m
Minimum hook approach	: 1.5 m
Distance between centers of crane wheels	: 4 m
Span of gantry girder	: 7 m
Weight of rail section	: 0.5 kN/m

UNIT-IV

7. a) Explain various theorems of plastic analysis?
   b) Describe collapse mechanisms of plastic analysis?

OR

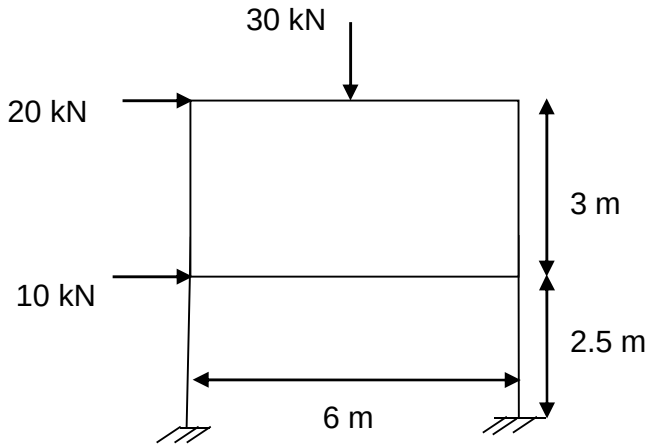
8. a) Find out the fully plastic moment of given frame?



   b) Explain the concept of minimum weight design in plastic design of structures?

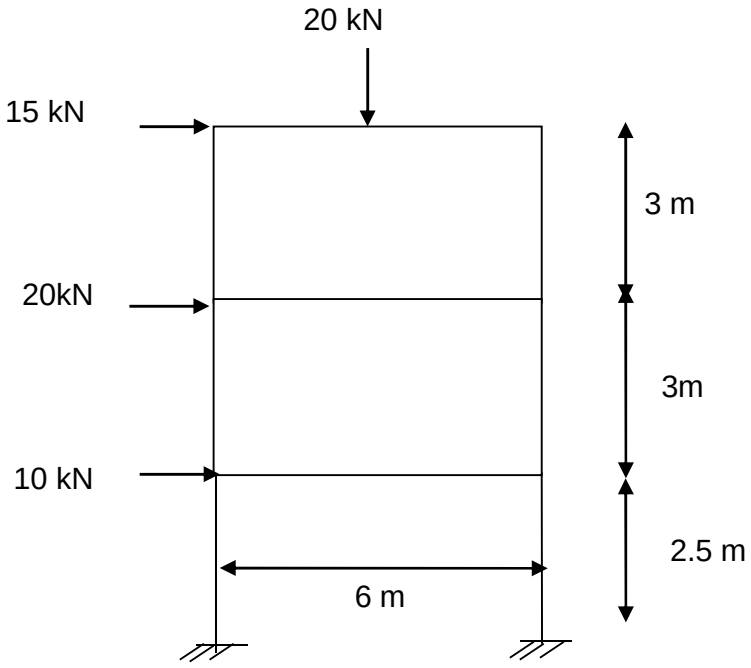
UNIT-V

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



OR

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



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