Hall Ticket Number :										

R-14

Code: 4PT626

M.Tech. II Semester Regular & Supplementary Examinations June 2017

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 = 60 Marks)

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UNIT–I

1. Explain the three phase microstructure of concrete and hence discuss the relative importance and contribution of each phase on the strength of concrete.

OR

2. Explain the effect of size, shape texture and grading of aggregates on the strength of concrete.

UNIT–II

3. There is an important debate between two Civil Engineers. The discussion is on the use of mineral admixture in general and fly ash in particular. One engineer says fly ash is only an addition in concrete whereas the other say it is an ingredient in concrete. Who is correct? Can you elaborate on your answer with specific inputs with justifications?

OR

4. Explain the mechanism of action of superplasticizer with the help of a sketch in modifying the fresh property of concrete. Also describe briefly the test to be conducted to determine the optimum dosage of superplasticizer.

UNIT–III

5. "High strength concrete is not a forgiving material"- Discuss the statement relevant to the quality control and testing.

OR

6. What are the characteristics of high performance Self Compacting Concrete? List out and discuss the advantages and disadvantages over conventional concrete.

UNIT–IV

7. Elaborate on break off test and the pull out test for the assessment of tensile strength of concrete.

OR

8. Discuss the radar technique used in detecting the deterioration of concrete structure and its limitations.

UNIT–V

9. What is the difference between form work and scaffolding? Explain the significance of various types of form works for concrete.

OR

10. Discuss the different materials used for form work and the various types of loads that act on the form work.

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Hall Ticket Number :										

R-14

Code: 4PT628

M.Tech. II Semester Regular & Supplementary Examinations June 2017

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 = 60 Marks)

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UNIT–I

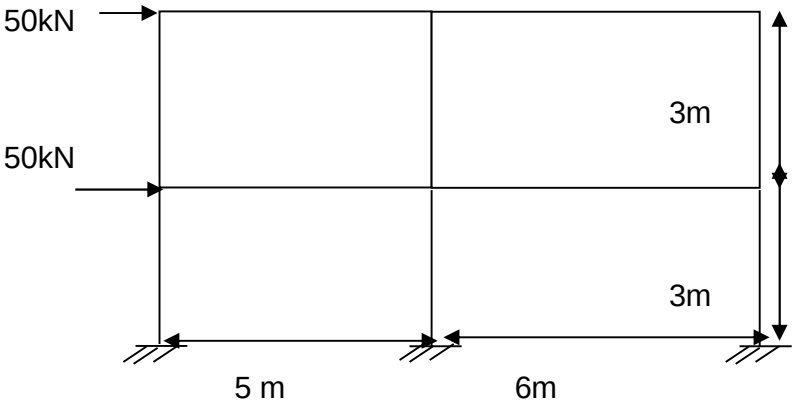
1. How do you arrive various types loads and its combinations on self supporting chimneys? Explain the analysis procedure. 12M

OR

2. Design a self supporting steel stack having a height of 75m and 3m in diameter. It is to be constructed in Gujarat. The SBC of soil is 150 kN/m^2. 12M

UNIT–II

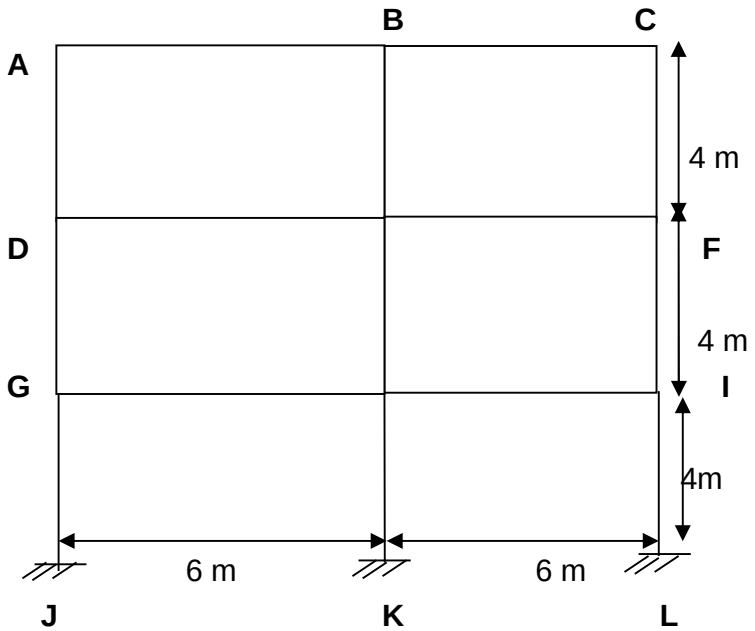
3. Determine the end moments in the columns and beams of the two storied building frame as shown by cantilever method?



12M

OR

4. In the frame shown in figure the wind loads transferred to joints A, D and G are 12 kN, 24kN and 24 kN respectively. Analyse the frame by Portal frame method.



12M

UNIT–III

5. What are various types of gantry girders and explain various loads they act on gantry girders. 12M

OR

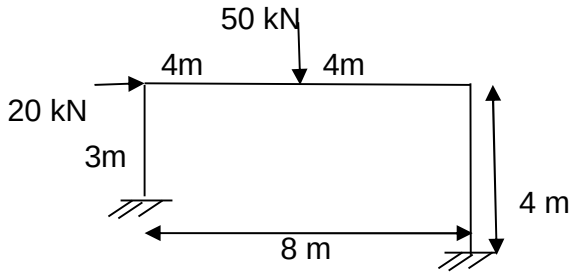
6. Design a simply supported gantry girder to carry an electric over head and Travelling crane for the following data:

Span of girder	**:** 4 m
Crane capacity	: 320 kN
Distance between centers of gantry girder	: 15 m
Weight of crane girder	: 180 kN
Weight of crab	: 120 kN
Maximum approach of crane hook	: 1.20 m
Distance between centers of gantries	: 16 m
weight of rail section	**:** 300 N/m
Height of rails	: 75mm
Yield stress of steel	: 280Mpa

12M

UNIT–IV

7. Find out the fully plastic moment of given frame? The frame has been made with uniform cross section and of same material.



12M

OR

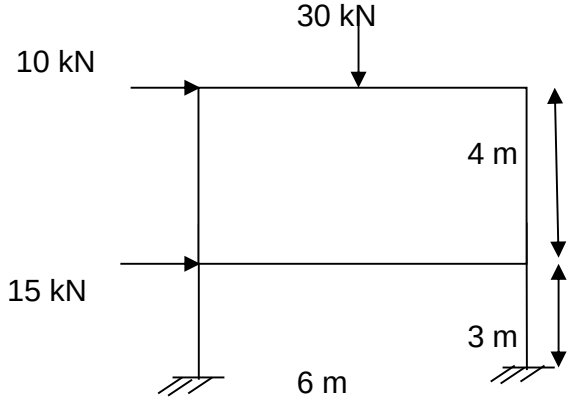
8. What is minimum weight design in plastic design of structures? Explain different theorems of Plastic analysis and its applications to portal frames. 12M

UNIT–V

9. Explain combining mechanism method and plastic moment redistribution method of plastic design? 12M

OR

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



12M

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Hall Ticket Number :										

R-14

Code: 4PT624

M.Tech. II Semester Regular & Supplementary Examinations June 2017

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 = 60 Marks)

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UNIT–I

1. a) How the shells are classified?
   b) Explain about structural superiority of shells?

OR

2. What are the Principles of Bending theory?

UNIT–II

3. Derive the Flugges simultaneous equations by using bending theory?

OR

4. Give the Assumptions made by Schorer and the theory proposed for Unloaded shell?

UNIT–III

5. Write short notes on the following:
   i. Different forms of Hyperbolic Paraboloid.
   ii. A cooling tower shell.

OR

6. Discuss the geometry of Elliptic Paraboloid and Rotational Paraboloid.

UNIT–IV

7. a) Give the classification of Folded Plates?
   b) Explain the slab and plate action of Folded Plates?

OR

8. Give the assumptions and explain the step by step procedure for the analysis of folded plates by Simpson's method?

UNIT–V

9. Analyze a Spherical dome with following details:
   a=30 m, b= 16m, Wg = 2150 N/m2 and Wp = 1500 N/m2

OR

10. Derive the equations of equilibrium for a Rotational hyperboloid by membrane theory?

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Hall Ticket Number :										

R14

Code: 4PT622

M.Tech. II Semester Regular & Supplementary Examinations June 2017

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 strain displacement relations. 5M
   b) Explain the stepwise procedure for analyzing a continuum using finite element technique. 7M

OR

2. a) Explain plane strain analysis. 6M
   b) Explain axi-symmetric bodies of revolution. 6M

UNIT–II

3. a) What is static condensation? Explain. 6M
   b) Derive the element stiffness matrix for a 2-noded beam element. 6M

OR

4. a) Derive the strain displacement matrix for one – dimensional bar element. 6M
   b) Derive the shape function for a beam element. 6M

UNIT–III

5. a) Explain local and global co-ordinate systems for plane truss element. 6M
   b) Explain displacement models and geometric invariance. 6M

OR

6. a) Explain element stiffness matrix and global stiffness matrix. 6M
   b) Explain area and volume co-ordinates. 6M

UNIT–IV

7. Derive the shape functions for an eight noded quadrilateral element with the help of iso-parametric element concepts. 12M

OR

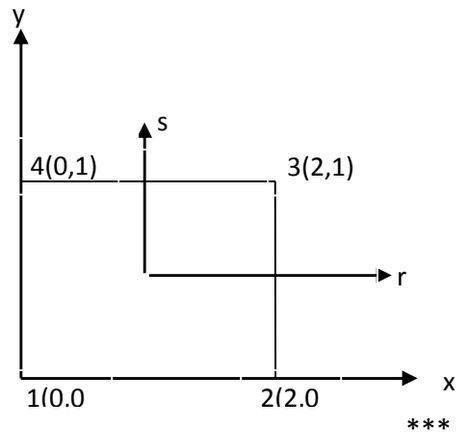
8. a) Explain Lagrangian and serendipity elements. 6M
   b) What is the use of Iso-parametric elements? Also differentiate them from the other type of elements? 6M

UNIT–V

9. Explain the formulation of hexahedral and iso-parametric solid element. 12M

OR

10. Consider a rectangular element as shown in figure below . Assume plane stress condition, E= 2.3×10^{11} N/mm^2, Poisson's ratio = 0.3, and the nodal displacements are q=[0,0, 0.002, 0.003,0.006,0.0032,0,0] in metres. Evaluate Jacobian matrix [J], Strain displacement matrix [B] and stresses at r=0 and s=0. 12M



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Hall Ticket Number :										

R14

Code: 4PT621

M.Tech. II Semester Regular & Supplementary Examinations June 2017

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) Define the degrees of freedom of a vibrating system? 3M

   b) What is the difference between discrete and continuous system? Is it possible to solve any vibration problem as a discrete one? 3M

   c) A spring-mass system has a natural frequency of 10 Hz. When the spring constant is reduced by 800N/m; the frequency is altered by 45 percent. Find the mass and spring constant of the original system? 6M

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

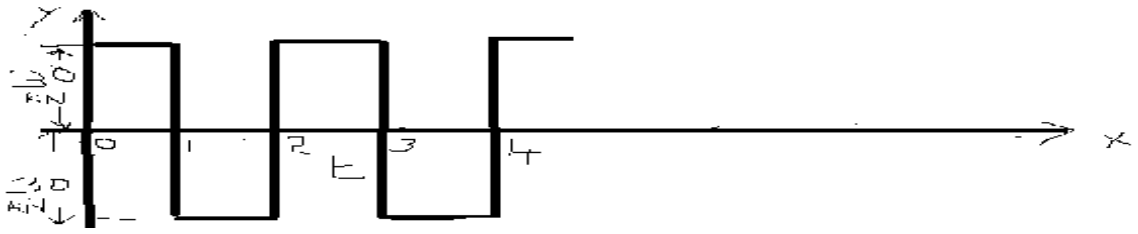
UNIT-II

3. a) Derive the equation of motion for a damped free vibration system. 4M

   b) Find the total response of a single degree of system with mass m=15kg, damping c=20N-s/m, stiffness k=4000N/m, initial displacement is 0.01m and initial velocity is zero .The external force $F(t)= F_0 \cos\omega t$ acts on the system where F_0=100N ω=10rad/s. 8M

OR

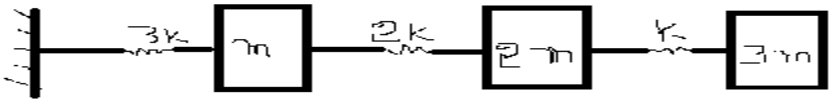
4. Find the steady state response of the given periodic force which is acting on a system of mass 100kg and stiffness 40N/m at t=1sec.(Take 2 values only for finding the constants and neglect the damping)



12M

UNIT-III

5. Calculate natural frequencies and draw mode shapes of the given multi degree of freedom system consisting mass of m1= m, m_2=2m, m_3=3m and stiffness of k_1=3k, k2=2k and k_3=k. mass is in kg and stiffness is in N/m.

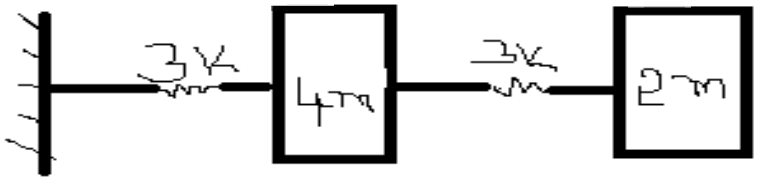


12M

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).

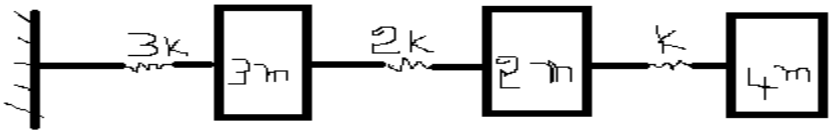
$$x(0) = \begin{Bmatrix} x_1(0) \\ x_2(0) \end{Bmatrix} = \begin{Bmatrix} 1 \\ 0 \end{Bmatrix}, \qquad x'(0) = \begin{Bmatrix} x_1'(0) \\ x_2(0) \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix},$$



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 three natural frequencies and draw mode shape of a beam for which one end fixed and other end free. 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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Hall Ticket Number :										

R-14

Code: 4PT623

M.Tech. II Semester Regular & Supplementary Examinations June 2017

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 = 60 Marks)

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UNIT–I

1. Derive the differential equation and expressions for deflection, bending moment and shear force in a long beam subjected to a single concentrated load. 12M

OR

2. Determine the maximum resulting bending moment and deflection at a section in between the first load and the second load for a rail road , rail subjected to three concentrated wheel loads of 120 kN each spaced at 1m apart. K = 1400 N/cm^2, I = 3640 cm^4, E = 2 x 10^7 N/cm^2. 12M

UNIT–II

3. Explain the behaviour of straight columns subjected to elastic buckling. 12M

OR

4. Derive the expression for bending moment of a bar pinned at both ends and subjected to an axial thrust P and a lateral uniformly distributed load of intensity w per unit run. 12M

UNIT–III

5. Derive the expression for Torque at a section of a Non-circular thin tubular sections. 12M

OR

6. Explain the tangent modulus theory of in-elastic buckling. 12M

UNIT–IV

7. a) Write the applications of Rayleigh-Ritz method. 6M

   b) Compute the deflection under the load of a simply supported beam of span L having constant EI subjected to a single concentrated load P at the centre. Assume shape function y = a sin (πx/L). Use Rayleigh-Ritz method. 6M

OR

8. Explain the following.
   a) Stable equilibrium.
   b) Neutral equilibrium. 12M

UNIT–V

9. Derive the expression for a beam of rectangular cross section subjected to pure bending. 12M

OR

10. Discuss the behaviour of a rectangular plate subjected to uniform compression in two directions. 12M

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