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Code : 1G672

R-11

IV B.Tech. I Semester Supplementary Examinations May 2016

Finite Element Methods

(*Civil Engineering*)

Max. Marks: 70

Time: 03 Hours

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

1. a) Explain the basic principle used in FEM.
b) What is potential energy? State and explain the principle of minimum potential energy.
2. What is constitutive law? Write the constitutive relationships for plane stress, plane strain and axi-symmetric states of stress.
3. Derive the stiffness matrix and nodal load vectors for one dimensional 3-noded quadratic element.
4. a) Derive the relation between the nodal displacements and generalized co-ordinates from basics.
b) A triangular element has nodal co-ordinates A (1, 3), B (6, 4) and C (4, 6). The x-coordinate at an interior point is 5.5 and $N_1 = 0.4$. Determine the y-coordinate of the point and other shape functions.
5. Derive the shape function matrix strain displacement matrix, stiffness matrix and nodal load vectors for a 4-noded rectangular element.
6. a) Explain the iso-parametric elements and their advantages.
b) Write short notes on Lagrangian and Serendipity elements
7. Derive the strain displacement matrix and stiffness matrix for 4-noded iso-parametric axi-symmetric element.
8. Write short notes on
 - a) Numerical integration.
 - b) Natural co-ordinate system
 - c) Static condensation.

Hall Ticket Number :

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R-11

Code : 1G676

IV B.Tech. I Semester Supplementary Examinations May 2016

Railway Docks and Harbor Engineering

(Civil Engineering)

Max. Marks: 70

Time: 03 Hours

Answer any five questions

All Questions carry equal marks (14 Marks each)

1. a) Discuss the necessity and effects of coning of wheels and tilting of rails. 7M
b) What is creep? Discuss the theories propound to explain probable causes of creep. 7M
2. a) Explain the necessity of gradients. Discuss all types of gradients giving their permissible values adopted on Indian Railways. 7M
b) What is meant by a crossing? What are the essential requirements of a good crossing? 7M
3. a) Explain briefly the different types of station yards. With the aid of neat – sketches, explain the function of a Marshalling yard. 7M
b) What are the objects of signaling? Explain the working principle of Absolute Block 'system of control of train movements. 7M
4. a) Describe the methods of underground tunnel construction in detail, giving advantages and disadvantages of each 7M
b) Explain the blowing and exhausting system provided for ventilation of tunnels by means of a neat sketch. 7M
5. Write short notes on;
i. Phoenician Harbours
ii. Roman Harbours
iii. Greek Harbours
iv. Bombay Port 14M
6. a) What are repair docks? Classify different types of repair docks. 7M
b) Define the following:
i. Breakwater
ii. Dolphins
iii. Mole
iv. Quay 7M
7. a) Write explanatory notes on:
i. Classification of fenders
ii. Tetrapad and tri-bars 7M
b) Differentiate between jetty and a wharf. State the condition Under which you will prefer their construction. 7M
8. a) Write an explanatory note on maintenance of Lock gates and Caissons. 7M
b) What are the factors which should be kept in mind while choosing a dredger for rock dredging and dredging of loose sediments? 7M

Hall Ticket Number :

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R-11

Code : 1G67A

IV B.Tech. I Semester Supplementary Examinations May 2016

Air Pollution and Control

(Civil Engineering)

Max. Marks: 70

Time: 03 Hours

Answer any five questions

All Questions carry equal marks (14 Marks each)

1. a) What are the sources Air pollution of SO₂ and NO_x, Hydrocarbons, particulates and lead into the atmosphere?
b) Define Air pollution. Differentiate between
 - (i) Primary air pollutants and secondary air pollutants
 - (ii) Stationary and mobile sources of air pollution.
2. Explain effects of following pollutants on human health, plants and property damage.
 - (a) Suspended particulate matter
 - (b) sulphur dioxide
 - (c) Carbon dioxide
 - (d) Lead
3. a) What is Air –Fuel ratio? Explain its role in formation of pollutants.
b) Explain thermodynamics of formation of NO_x.
4. a) Explain the importance of wind rose diagram for locating an industry which emits gaseous and particulate emissions.
b) Explain the role of Meteorological elements in the dispersion of air pollutants in the atmosphere.
5. a) Describe with neat sketches, how different atmospheric conditions give rise to different kinds of plumes. Mention the typical characteristics of each plume
b) List the factors that affect the transport, dilution and dispersion of air pollutants. Write the Gaussian dispersion models and explain its term.
6. a) Describe a typical bag house used for the control of air pollution.
b) Explain the construction and operation of an Electrostatic precipitator with help of neat sketches.
7. Give a list of methods available for removal of SO₂ and NO_x from Industrial gaseous stream. What is the principle of each method?
8. a) What is meant by Air pollution Management? Explain various steps involved in it.
b) How do you conduct ambient air quality survey in an Industrial zone?

IV B.Tech. I Semester Supplementary Examinations May 2016

Bridge Engineering
(Civil Engineering)

Max. Marks: 70

Time: 03 Hours

Answer any five questions

All Questions carry equal marks (14 Marks each)

1. Explain all the design loads to be considered for railway bridges. 14M
2. Design a box culvert for the following data. 14M
 Inside dimensions : 3.5 m x 3.5 m
 Culvert is subjected to a live load of IRC class A vehicle.
 Soil density = 18 KN/m³ and angle of repose = 30°
 Use M25 concrete and Fe415 steel.
3. Design a reinforced concrete deck slab for the following data: 14M
 Clear width of roadway = 7.5 m
 Clear span = 6.7 m
 Live load : IRC Class AA Tracked vehicle
 Use M25 grade of concrete and Fe 415 steel
4. Explain any one method of designing a interior longitudinal of a T-beam bridge. 14M
5. Design the cross sectional details at mid-span of a deck type plate girder Railway Bridge for a broad gauge main line loading over an effective span of 20 m. 14M
 Spacing of plate girders = 2 m c/c
 Weight of stock rails = 0.4 KN/m
 Weight of guard rails = 0.25 KN/m
 Weight of fastenings = 0.25 KN/m of track
 Sleepers (Timber) = 250 mm x 150 mm x 2.8 m @ 0.4 m c/c.
 Density of sleepers = 7.4 KN/m³
6. A composite bridge deck with reinforced concrete slab and steel plate girders has to cover a span of 19 m. 14M
 Clear width of road way = 7.5 m
 Footpath:1 m on both sides
 Spacing of main girders = 2 m
 Materials : concrete M30 grade and Fe415 grade steel, rolled steel sections with Yield stress of 250 N/mm².
 Design the steel plate girder.
7. Design a Rocker bearing for a plate girder bridge for the following details. 14M
 Vertical Load (DL+LL+IL) = 1140 KN
 Vertical Load due to wind = 190 KN
 Lateral Load at centre of the pin due to wind = 68 KN
 Longitudinal Load = 250 KN
8. Verify the stability of the abutment of a bridge with the following details. 14M
 Top width = 1.4 m
 Height = 6 m
 Back batter = 1 in 6
 Front face is vertical.
 Material: Stone masonry
 Unit weight of soil = 18 KN /m³ and Angle of repose = 30°
 Live load: IRC Class AA Tracked vehicle
