Rajarambapu Institute of Technology, Rajaramnagar
(An Autonomous Institute)
First Year M.Tech. Civil (Structures) Semester-II
**Finite Element Analysis   Subject Code: CES 502**

Day/Date: Tuesday,15/05/2012   Max.Marks-100
Time: 10.00am to 01.00pm

Instructions- i) All questions are compulsory
                    ii) Figures to the right indicate full marks
                    iii) Assume suitable data wherever necessary
                    iv) Use separate answer book for each section
                    v) Use of non-programmable calculator is allowed
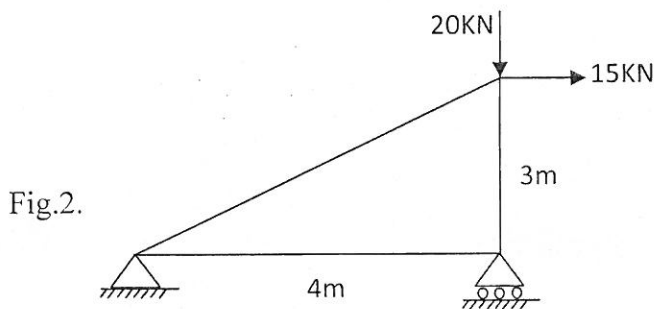
SECTION I

Q.1   bar uniform c/s section subjected to uniform axial load q as shown in fig.1.Find   16
          expression for stress by using,
          i) Rayleigh Ritz Method   ii) Principle of minimum P.E.

Fig.1.
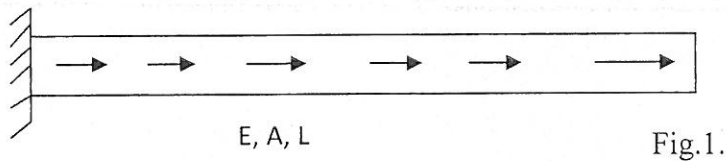
Q.2 a)   Derive element stiffness matrix for beam element by direct approach method   10
     b)   What is Half Band Width? Explain importance of node numbering in FEM   7

Q.3   Explain different types of 3D elements and Write detailed procedure to   17
          formulate element stiffness matrix [K] for any one 3-D element

          OR

Q.3   The truss is loaded and supported as shown fig. 2., by using finite element   17
          method i)Develop the overall stiffness matrix   ii) Using elimination approach
          solve for nodal displacement.   Take A=2000 mm^2 for all members and
          E= 2 x10^5 N/mm^2

Fig.2.

SECTION II

Q.4 a) Explain term-Isoperimetric element. Derive shape function for any quadrilateral   10
element with node at each corner

b) What are convergence requirement for F.E. displacement model   7

Q.5   What is axisymmetric problem? Explain detailed procedure to formulate element   16
stiffness matrix [K] for any one axisymmetric element

Q.6 a) What are different types of Shell element   5

b) Discuss BSF element and write down detailed procedure to obtain [K] for BSF   12
element

OR

Q.6 a) What is the difference between consistent mass matrix and lumped mass matrix   6

b) Determine the consistent mass matrix for one dimensional bar discretized into   11
two elements of length L, The bar has modulus of elasticity E, mass density ρ
and cross-sectional area A, throughout the length

Rajarambapu Institute of Technology, Rajaramnagar

(An autonomous Institute)

First year M. Tech. Civil, Construction and Management Semester II

Construction Equipments Subject Code: CEC-502

Day & Date: Tuesday,15/05/2012

Time: 10.00am to 01.00pm

Max Marks: 100

Instructions:

    i.   All questions are compulsory.

    ii.   Figures to the right indicate marks.

    iii.   Use separate answer sheet for each section

    iv.   Use of non-programmable calculators allowed

    v.   Assume suitable data wherever necessary

SECTION I

Q.1 a) Write a note on cost control and cost reduction of equipment.   6

OR

State the factors to be considered for selection of new equipment.

    b) State the causes of equipment idle time and ways to minimize it.   6

OR

Explain with examples advantages and disadvantages of using machines.

    c) Write a detailed note on equipment maintenance w.r.t. maintenance type, sample   6
checklist/log book, and merits of good maintenance.

Q.2 a) Following information about the shovel excavation job is available: 6
Shovel capacity = 3 cu.yard; Swing angle = 75 degree, Avg. Depth of cut = 17 feet;
Material = tough clay; Swing-Depth factor = 1.03; Ideal output = 350 cu.yard/hr;
Efficiency factor = 0.75.

Determine -

    (i)   How many trucks having capacity of 20 cubic yard would be required to
fully service the shovel? Assume truck travel time = 20 min.

    (ii)   How many cubic meters per hour will be produced by this combination?

OR

List the factors affecting cycle time of equipment. Find out the working cycle time
of an excavator. Consider the bucket capacity 1.5 M^3 and dumper capacity as $5M^3$.

    b) Compare shovel excavator family – Front shovel, back hoe, dragline and Clamshell   10
w.r.t. basic operation/mechanism, digging level, cycle time and suitability for
different types of soil. Draw line sketches of the rigs (boom attachments) for each of
the type.

Q.3 a) Classify pumps used in dewatering. Write suitability of each of the types.   6

OR

Classify piles. Compare end bearing pile with friction pile w.r.t. load transfer
mechanism. Suggest the most economical type of pile for very dense sand, loose soil
and for temporary works.

    b) Explain with suitable diagrams how Tunnel Boring Machine (TBM) can prove to be   6

useful in loose and collapsible soils.

OR

Enlist various pile driving hammers and explain any one in detail.

c) List out the heads to be included in finding out the cost per cubic meter of the rock   4
excavated.

SECTION II

Q.4 a) Classify material transporting equipments and state types of each.   6

OR

What are the various types of Conveyers used for industrial material handling? Sate
examples.

b) What parameters should be considered while selecting a material handling system   6

OR

As a manager on a busy cargo harbour; lot of loose materials has to be daily
unloaded and transported inland. State various alternative techniques available and
explain one you would prefer to adopt. Justify your decision?

c) Draw a labelled sketch of tower crane and explain function of each component.   4

Q.5 a) Explain basic functions of aggregate production and list equipments used for each.   8

OR

Maintenance of 5 miles of haul road requires cleaning of ditches and levelling and
reshaping the roadway. With efficiency factor of 0.60. estimate the total time
required if:
  i.   Cleaning the ditches require two passes (2.3 mph)
  ii.   Levelling the road requires two passes (3.7 mph)
  iii.   Road shaping requires three passes (9.7 mph)

b) Enlist various types of concrete mixers. Explain operation of one.   4

OR

State formula for calculating area of screen required for a given capacity.

c) Explain suitability of various concrete transporting equipments, state examples.   6

OR

Explain the process of road construction using automated paving system.

Q.6   • Write a note on   16
            i.   Cranes
            ii.   Crusher
            iii. RMC Plant
            iv.   Pavers

2

Enrol.
No.

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute)

First Year M. Tech. Civil-Str.(SEMESTER-II) Examination, May 2012

Advance Design of Concrete Structures (CES504)

Day and Date: Thursday, 17/05/2012   Time: 10.00am to 01.00pm   Max.Marks-100

Instructions: *i) All questions are compulsory.*

ii) Use separate answer book for each section.

iii) Figures to the right indicate full marks.

iv) Use of IS:456-2000, IS:1343-1980, IS:3370(Part IV)-1967, IS:1893-2002 is allowed.

v) Use of non-programmable calculator is allowed.

vi) Assume suitable data wherever necessary.

SECTION I

1. An interior panel of flat slab 5.2mX7.3 is subjected to a live load of $4KN/m^2$. The weight of the floor finish is 1.5 KN/m^2. The panel is supported on square columns of side 400mm. Design the reinforcement in column strip and middle strip in short direction. Check the section for two way action of shear (Design of shear reinforcement is not expected). Use concrete of grade M20 and steel of grade Fe415.   (17)

2. Design a longitudinal reinforcement for rectangular combined footing for two columns A and B of size 450mmX450mm carrying working loads of 820KN and 1025KN respectively. The columns are located at 4m centers. The safe bearing capacity of the soil is $200KN/m^2$. Check the footing for two way action of shear at column B. (Design of shear reinforcement is not expected).   (17)

OR

2. Design rib beams connecting columns A-D-E-H and B-C-F-G for a raft foundation for 8 columns spaced as shown in figure 1. All columns are 400mmX 400 mm in size. Columns A, D, E &H carry a load of 820KN each and columns B, C, F &G carry a load of 1025 KN each at service condition. The safe bearing capacity of soil is $100KN/m^2$.   (17)

3. Design an elevated circular water tank for a storage capacity of 360,000 liters with hinged joint at the base. Also design top dome and top ring beam. Use concrete of grade M20 and steel of grade Fe415.   (16)
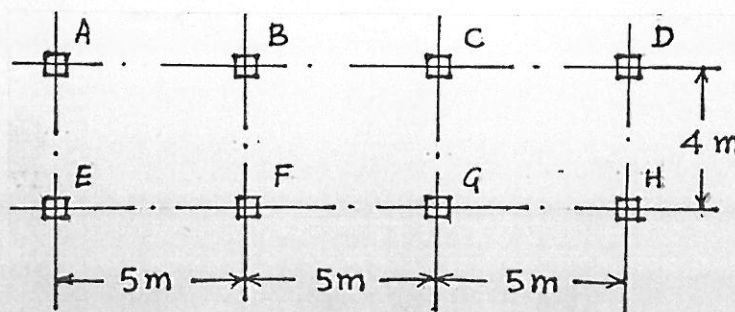

Figure 1

SECTION II

4. A circular overhead water tank has a diameter 10m and a height 4m. The tank is supported on a tower 12m in height which is braced at intervals of 4m. The R.C. columns have a circular cross section of diameter 600mm and braces are 400mmX450mm. The number of columns in the tower is 8. The total dead load due to self weight of concrete and weight of water acting on each column at the base is equal to 700KN. Calculate the design forces in the column due to earthquake. Assume raft foundation at the base. Consider earthquake zone III.   (17)

OR

4. a) Write on: shear stresses in prestressed concrete beam.   (05)

b) A simply supported prestressed concrete beam of cross section 400mmX600mm covers a span of 10m. It is subjected to a uniformly distributed load of 30KN/m in addition to its self weight and is prestressed with a force of 1740KN with a prestressing cable of parabolic profile. The cable has 160mm eccentricity at midspan and zero eccentricity at the support. Find extreme fiber stresses at midspan by using stress concept.   (12)

5. a) Write on: partial prestressing.   (04)

b) A concrete beam of size 200mmX400mm is pre-tensioned by 7 wires of 7mm diameters at an initial prestress of $1100N/mm^2$ with their centroid located at an eccentricity of 60mm below the centroid of the section. Find the losses of prestress due to elastic shortening of concrete, creep and shrinkage of concrete if there is relaxation of 8% of stress in steel. Find also the final stress in wires. Take, Creep coefficient =1.6, Grade of concrete = M40, E_s= 2.1X 10^5, $E_c = 5000\sqrt{fck}$.   (12)

6. a) Write on: linear transformation and concordancy of cables.   (05)

b) A prestressed concrete beam of uniform cross-section has a span of 12 m, supports udl of 15 KN/m over the entire span excluding the weight of beam. Determine i) The suitable dimensions of the beam, ii) the area of the tendon and iii) position of the tendon. Take permissible stresses as 16 N/mm^2 for concrete & 1050 N/mm^2 for tendon. Assume loss of prestress at 15%.   (12)

EM067

Rajarambapu Institute of Technology, Rajaramnagar

Enrol. No.

(An autonomous Institute)

First year M. Tech. Civil, Construction and Management Semester II

Construction Contracts and Administration Subject Code: CEC-504

Day & Date: Thursday ,17/05/2012

Time: 10.00am to 01.00pm

Max Marks: 100

Instructions:

- i. All questions are compulsory.
- ii. Figures to the right indicate marks.
- iii. Use separate answer sheet for each section
- iv. Use of non-programmable calculators allowed
- v. Assume suitable data wherever necessary

SECTION I

Q 1   Attempt any two:

    a. What are the provisions made in Indian Contract act?   **08**

    b. How the termination of the contracts takes place? Describe the ways of termination of contract in detail.   **08**

    c. Prepare a tender notice for the construction of junior college building. Assume necessary data.   **08**

Q 2   Attempt any one:

    1) Write down silent features of Arbitration & Cancellation Act 1996 & what are the advantages of the act over arbitration act 1940?   **16**

    2) Explain the ADR process & name the different process & brief about any one.   **16**

Q 3   Attempt any two:

    Enlist provisions made in Workman's compensation act.   **09**

    Write short note on Industrial dispute act.   **09**

    Write down silent features of Minimum wages act.   **09**

SECTION II

Q.4 a)   1) Define contract of Indemnity & contract of Guarantee and give example of each.   **16**

OR

    2) Consider yourself as project manager appointed for construction of bridge. Your shipment of dredger has been arrested by customs due to non compliance of contract document. Discuss your roll in above situation and use of contract of guarantee to clear your shipment.   **16**

Q.5 a) Attempt any two.

    1) Differentiate between Permanent Injunction & mandatory Injunction   **08**

    2) When mandatory injunction is preferred over other types of injunction and why?   **08**

    3) Explain the term injunction and its importance in construction industry.   **08**

Q.6 a) Explain the concept of bailment with reference to nature of transaction, delivery of bailee, bailee's responsibility, termination and bailment of pledge.   **18**

K.E.Society's

Rajarambapu Institute of Technology, Rajaramnagar.
(An Autonomous Institute)
Mid Semester Examination- September 2013
First Year M. Tech. Civil (Structure) SEMESTER – I
Design of foundation (CES-511)

Day and Date:

Time: Max Marks- 50

Instructions: 1)All questions are compulsory.
2)Use of non-programmable (FX 82 ES/MS) is allowed.
3)IS 456-2000 is permitted.
4)Assume suitable data wherever necessary.
5)Figure to the right indicate full marks

Q. No.1

    A. State briefly general design standard of foundation?   5

    B. State the formulae used in designing of foundation by both methods?   11

Q. No.2   18

    Design a raft slab using following data:-

        1. Net upward pressure 100 KN/M2.
        2. Dimensions (6.6X 9.5) m outside.
        3. Total No. of column 8 in No.
        4. 4 columns 1 at each corner. 450mm X450mm and carries 800 KN load each.
        5. 4 columns at intermediate position 1 on each side. 500mm X 500mm and carries 900 KN load.

    Use M20 and Fe415.Use limit state design.

        OR

Q. No.2   18

Design a combined footing (only longitudinal steel) using following data:-

        1. Net upward pressure 80 KN/M2.
        2. Dimensions: small side 2m.
        3. C/C distance of column not less than 3m.
        4. Total No. of column 8 in No.
        5. Column A (380mm X380mm) and carries 500 KN load each.
        6. Column B (450mm X450mm) and carries 600 KN load each.

Use M20 and Fe415.

Use limit state design.

Write short notes on
  A. Design concept of foundation under sea.
  B. Design parameters of foundation in multi-storied structure.

D·B·Kulkarni

Instructions:

   i)   *All questions are compulsory.*
   ii) *Figures to the right indicate full marks.*
   iii) *Assume suitable data wherever necessary.*
   iv) *Use separate answer book for each section.*
   v)   *Use of non-programmable calculator, IS code are allowed.*

SECTION I

Q.1. a) What is Fiber Reinforced Concrete? What are the different types of fibers usually used in the construction industries?   **(08)**

   b) What are the factors affecting properties of Fiber Reinforced concrete?   **(08)**

Q.2. a) Explain chemical admixtures and its classification. Describe the   mechanisms of superplasticizers in concrete.   **(08)**

   b) Enlist any two important construction projects in which self compacting concrete is used with reference to tests carried out in the fresh stage of Self Compacting Concrete to determine its properties?   **(08)**

Q.3. a) What is the difference between thermo-mechanically treated bars and cold twisted bars? What are the different types of steel reinforcement used for RCC work? **(10)**

   b) Explain aluminium formwork in construction of multistoried   buildings.   **(08)**

OR

Q.3. a) Differentiate between mild steel rods and HYSD bars? What are the different market forms of rolled steel sections?   **(08)**

   b) Describe briefly corrosion of steel and measures adopted for its prevention.   **(10)**

SECTION II

Q.4. a) Write properties of FRP. Mention applications of FRP in repairs and retrofitting works of structures.   **(08)**

   b) List the applications of PVC pipes. What are the advantages of commonly used PVC pipes over metal pipes?   **(08)**

Q.5. a) What is the difference between waterproofing and damp-proofing? Describe the basic components of a waterproofing system with neat sketches.   **(08)**

b) Explain how you will provide waterproofing treatment to the basement floor of a hospital building admeasuring 10 m x 25 m. The basement of the building is 2.0 m below and 0.5 m above the ground water level and the water infiltrates from all sides of the building. **(08)**

Q.6. Write notes on the following (Any THREE) **(18)**

(a) Smart materials

(b) Thermoplastics and thermosetting plastics

(c) Epoxy based coatings

(d) Superplasticizers

(e) J-ring test

OR

Q.6. Write notes on the following (Any THREE) **(18)**

(a) L box test on SCC

(b) Damp-proofing materials

(c) Fiber Reinforced Concrete

(d) Mechanisms of action of superplasticizers

(e) Smart concrete

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute)

First Year M. Tech. Civil Engineering (Structures) SEMESTER – II

CES 506 Earthquake Resisting Structures

Day and Date: Saturday,19/05/2012

Time: 10.00am to 01.00pm   Max. Marks- 100

Instructions- i) All questions are compulsory.
   ii) Figures to the right indicate full marks.
   iii) Assume suitable data wherever necessary.
   iv) IS 1893, SP16 permitted

Q. No. 01 a) Write detailed note on earthquake waves?   08

OR

a) Describe the two approaches followed for the prediction of earthquakes. Name and explain the major plates of the earthquake?   08

b) Discuss different types of plate boundaries and movement with the help of neat sketches.   10

Q. No. 02 a) Write short note on tripartite spectrum.   08

OR

a) Explain construction of design response spectrum.   08

b) Explain the concept of response spectrum of an earthquake. What is the significance of pseudo displacement, pseudo velocity and pseudo acceleration.
08

Q. No. 03 a) Show that for an undamped MDOF system in free vibration, the modal shape vectors are orthogonal.   08

b) Write short notes on any two: Soil structure interaction, Factors affecting liquefaction characteristics and Test of soil characteristics   08

Q. No. 04 a) A ten storey OMRF building has 4 bays of 6.0m in both directions. The storey height is 3.0 m. The dead load per unit area of the floor, consisting of the floor slab, finishes etc is 4KN/m^2 Weight of the partitions on the floor can be assumed to be 2 kN/m^2. The intensity of live load on each floor is 3.0 kN/m2. The soil

below the foundation is hard and the building is located in Delhi. Determine the seismic forces and shears at different floor levels.   12

b) Discuss how to increase the following for a building in an earthquake prone area (any two): period of vibration, energy dissipation capacity and ductility. 04

Q. No. 05 A RCC beam of rectangular section has to carry a distributed load of 20 kN/m in addition   to   its   own weight and a dead load of 25kN/m. The maximum bending moment and shear force due to the earthquake are 60 kN-m and 40 kN respectively. Centre to centre distance between supports is 6.0m Design the beam using M20 grade and Fe 415 steel.   16

Q. No. 06 Write notes on (any three)   18

a) P- Δ effect

b) Isolation devices.

c) Energy dissipation devices.

d) Properties of construction materials for earthquake resistance.

e) Timber supposed to be best materials for construction of earthquake resistant building.

f) Reasons for poor performance of masonry structures in seismic area.

-------- Good Luck ------------

Rajarambapu Institute of Technology, Rajaramnagar

Enrol. No.

(An autonomous Institute)

First year M. Tech. Civil, Construction and Management Semester II

Advanced Construction Techniques Subject Code: CEC-508

Day & Date: Tuesday,22/05/2012

Time: 10.00am to 01.00pm

Max Marks: 100

Instructions:

    i.   All questions are compulsory.

    ii.   Figures to the right indicate marks.

    iii.   Use separate answer sheet for each section

    iv.   Use of non-programmable calculators allowed

    v.   Assume suitable data wherever necessary

SECTION I

Q 1   **Attempt any two:**

    a.   Discuss the need of micro tunnelling in India?   **08**

    b.   Compare different methods of micro tunnel?   **08**

    c.   Write benefit & application of pipe jacking?   **08**

Q 2   **Attempt any one:**

    a.   Illustrate the procedure of vaccum dewatering flooring? Write application & advantage for V. D. F   **16**

    b.   Explain in detail with neat sketches the process of launching of girder.   **16**

Q 3   **Attempt any two:**

    a.   Write case study of construction of tall building?   **09**

    b.   Write shot note on box jacking?   **09**

    c.   Write short note on false work   **09**

SECTION II

Q.4 **a)** Explain in detail working of docks with reference to case study.   **16**

              OR

Explain with neat sketch construction of piles and platforms in off shore construction.

Q.5 **a)** Explain different methods of demolition of structure?   **16**

              OR

Explain in detail planning of demolishing of structures and post demolition precautions.

Q.6 **a)** Write short note on 1) screw anchor, 2) Sub grade waterproofing, 3) Underpinning   **18**

Rajarambapu Institute of Technology, Rajaramnagar | EM087 |

(*An Autonomous Institute*)
First Year M.Tech. Civil(Structures) Engineering SEMESTER – II
Structural Design of Concrete Bridges.   Subject Code: CES - 508

Day and Date: Tuesday,22/05/2012
Time: 10.00am to 01.00pm   Max Marks- **100**

Instructions:

    1) All questions are compulsory.
    2) Figures to the right indicate FULL marks.
    3) Assume suitable data wherever necessary
    4) Use separate answer book for each section
    5) Use of Non Programmable Pocket Calculator and IS Codes are allowed.

Section I

1. Write on (Any two)
   a) Open well foundation and pile foundation.
   b) Selection of type of bridge and economical span
   c) Various types of bridges
   d) Design procedure of T Beam with deck slab, longitudinal girders and cross girders   (16)

2. Design a reinforced concrete deck slab for a highway for the following data
   a) Carriage way width 7.5m (two lanes) with additional footpath of 1m width on either side.
   b) Clear span 6.2m
   c) Density of RCC – 24kN/m^3.
   d) Density of wearing coat - 22kN/m^3.
   e) Thickness of wearing coat – 80mm.
   f) Loading – IRC Class AA – Tracked vehicle.
   g) Width of support – 400mm.
   h) Adopt overall depth of deck slab – 500mm.
   i) Adopt K = 2.82 for width /span = 1.44.
   j) Use Concrete M25 steel Fe415.
   k) Adopt τ_{co} = 0.4 N/mm^2, σ_{cbc}= 8.3 N/mm^2 & m = 10.
   l) Adopt σ_{st}= 200 N/mm^2 (17)

3. Find the design moments and forces in top slab, bottom slab and side wall of a box culvert for following data:
   a) Square culvert with clear inside dimensions 3.1m x 3.1m (clear span 3.1m)
   b) Road width – 7.5m
   c) Thickness of top slab, bottom slab and vertical wall – 300mm
   d) Dead load (wt. of embankment) – 14000N/m^2.
   e) Live load – IRC Class AA – Tracked vehicle.
   f) Density of soil – 18000N/m^3.
   g) Angle of repose – Φ = 300.
   h) Density of RCC – 25000N/m^3.

i) Culvert is subjected to load case - I, i.e. Self wt. of culvert, Dead load, Live load, Lateral pressure of soil, Lateral pressure due to dead load and live load and no water pressure from inside.

j) For   width /span = 2.2 Use K = 2.6

Also draw BMD for this box culvert.   (17)

Section II

4. Write on (Any two)
   a) Construction Techniques of superstructures, cantilever method.
   b) Inspection, maintenance and repairs of bridges.
   c) Construction of reinforced earthed retaining wall and reinforced earth abutment.   (16)

5. a) Write on (Any one)-
   i.   Types of Piers.
   ii. Types of abutments   (5)

   b) Check the adequacy of dimensions of the concrete pier for the following data:
   i.   Height of pier up to springing level is 9m and HFL is 600 mm below springing level.
   ii.   Rectangular sides (dimensions in plan) of pier are 2200mm x 8600 mm at top to 3200mm x 8600 mm at bottom. Semi circular end portions (in plan) on both short sides of rectangle are of radius 1100 mm at top to 1600 mm at bottom. Side slope is 1 in 18. Thus out to out dimensions of pier are 2200 x 10,800 at top and 3200 x 11,800 at bottom.
   iii. Flow of water is parallel to longer dimension (8600mm) of pier.
   iv.   Centre to centre of bearing is 900 mm at the top of the pier.
   v.   Span of Bridge 20m
   vi.   Foundation - Well foundation
   vii. Reaction due to live load from each span = 1000 KN
   viii. Dead load reaction from each span = 2100 KN
   ix.   Max. Mean velocity of current – V = 3.6 m/sec.
   x.   Live load IRC class AA – Tracked vehicle.
   xi.   Coefficient of friction for bearings are 0.250 and 0.230
   xii. Area of super structure 80 m2 with 9.1 KN/m2 as wind pressure.
   xiii. Min wind pressure – 2.4 KN/m2
   xiv. 'K' factor for semi circular section in plan = 0.66
   xv.   Density of concrete - 25 KN/m3
   xvi. Intensity of water pressure - $0.5 \, KV^2$ (12)

6. a) Write on – (Any two)
   i) Types of bearing and forces on bearing
   ii) Expansion joints.
   iii) Basis for selection of bearings   (10)

6. b) Design a elastomeric unreinforced neoprene pad bearing to suit the following data

   Vertical load (sustained) – 210 KN

   Vertical load (Dynamic) – 50 KN

   Horizontal force – 60 KN

   Modulus of rigidity of elastomeric – 1 N/mm^2 (7)

Rajarambapu Institute of Technology

Thursday ,24/05/2012 End Semester Examination | 100 Marks
10.00am to 01.00pm   M. Tech. (Civil/Structures) | Theory of Plates and Shells

Instructions:

1) Question Q1 and Q2 are COMPULSORY and solve ANY ONE question from Q3 and Q4 from Section I.
2) Question Q5 and Q6 are COMPULSORY and solve ANY ONE question from Q7 and Q8 from Section II.
3) Due weight age will be given for appropriate neat sketches.

SECTION I

Q.1 a) Write clearly assumptions made in Kirchhoff's Classical Plate Theory (CPT) and hence derive displacement field for the same.   (06)

  b) Derive moment curvature relationship based on CPT in terms of transverse displacement (w) for simply supported rectangular plate.   (10)

Q.2 a) Obtain Navier's solution for rectangular simply supported plate subjected to transverse doubly sinusoidal load in terms of m and n harmonies.   (12)

  b) Derive q_{mn} for Patch Load   (06)

Q.3 a) Obtain general Levi's solution for rectangular plate subjected to transverse load q (12)

  b) Differentiate clearly between Levi's and Naviers' solutions   (04)

OR

Q.4 a) Derive moment curvature relationship for circular plate.   (12)

  b) State only solution for M_r and M_θ for general circular plate subjected to transverse load q (04)

SECTION II

Q.5 a) State equilibrium equations for spherical shells by membrane theory using neat diagram of membrane forces.   (11)

  b) State solution for membrane forces N_x , N_θ and $N_{x\theta}$ for circular cylindrical shells filled with liquid of density γ.   (05)

Q.6 a) Obtain approximate solution for cylindrical shells without edge beam   (09)

  b) Obtain approximate solution for cylindrical shells with edge beam   (09)

Q.7 Determine forces in simply supported cylindrical shells without edge beams using approximate method for following data   (16)
Length of shell (L) = 32 m, Radius of shell = 8 m, Thickness of shell = 0.075 m, Semicentral angle = 40^0 , Live Load = 0.7 kN/m^2

OR

Q.8 Obtain 8th order equilibrium equation for cylindrical shells considering membrane as well as bending and shear forces. Draw neat diagrams of all the membrane, bending and shear forces on the small element of shell.   (16)

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Rajarambapu Institute of Technology, Rajaramnagar

(An autonomous Institute)

First year M. Tech. Civil, Construction and Management Semester II

Human resource Management in construction Subject Code: CEC-520

Day & Date: Thursday ,24/05/2012

Time: 10.00am to 01.00pm

Max Marks: 100

Instructions:

i.   All questions are compulsory.
ii. Figures to the right indicate marks.
iii. Use separate answer sheet for each section
iv. Use of non-programmable calculators allowed
v.   Assume suitable data wherever necessary

SECTION I

Q 1   **Attempt any two:**

   a. Explain the personnel principles giving the significance of each in brief.   **08**

   b. Whether HRP is essential in construction industry? Justify. Also discuss steps in HRP w.r.t. to construction Industry.   **08**

   c. A multinational Indian construction company wants to recruit CEO for its overseas operations; how would you go about recruiting the right person for the job.   **08**

Q 2   **Attempt any two:**

   a. Matrix organisation is the recommended organisational structure for large construction projects. Justify. Give the details of Matrix organisation structure with its advantages and limitations.   **09**

   b. Recommend the type of the organisation structure with short description and sketch for the following type of companies. Justify
      i.   A medium scale housing construction company
      ii. Large construction company performing heavy constructions   **09**

   c. Explain the concept of "span of control". State how the right span of control is determined.   **09**

Q 3   **Attempt any two:**

   a. Enumerate the reasons for conflicts. What are the negative and positive aspects of conflicts? Also explain how to resolve the conflict.   **08**

   b. Explain the leadership styles. For CEO of small and medium enterprise in construction, what style do you recommend? Justify your answer.   **08**

   c. List the theories of Motivation. Explain any one theory specific to construction industry for motivating team leaders in different units of construction.   **08**

Q.4 **a)** Explain in detail welfare activities inside and outside the work place.   **6**

OR

"Group incentive plans" Why are they necessary? State their advantages and disadvantages.

b) What are the prerequisites for an effective incentive system?   **6**

OR

What are the effects of ill health of employee to industry? List health problems normally observed.

c) What, according to you, are the reasons why safety has often not been managed as effectively as other business functions? What may be done about this?   **6**

Q.5 **a)** Suppose you manage a small business with 30 employees. You discover that some employees are motivated by money, while others are motivated by security. For those who want more money you provide merit pay increase in which their income is determined by their productivity. The other employees have a fair salary. What problems might arise?   **10**

b) *ANSWER ANY TWO:*   **06**
   i. What are the consequences of pay dissatisfaction?
   ii. Explain "Wage policy in India"
   iii. Bring out various challenges of remuneration. Explain one in detail.

Q.6 **a)** On a construction project, bring out the linkage between incentive and productivity.   **6**

OR

Define performance appraisal? State objectives and applications.

b) As an in-charge of a construction project your span of control is 20 comprising technical and supervisory staff. One of your supervisors is good at work but he is not punctual. Explain how you will appraise him? Justify.   **6**

OR

Draw and explain in brief job evaluation process.

c) List job evaluation methods and explain any one.   **4**

F.Y.M.Tech Civil (Structure)-SEM-I

100 % Examination June-2012   CODE NO: **EM004-R**

Subject: Mechanics of Structures CES501

Day & Date: **Monday,18/06/2012**

Time: **10.00am to 01.00pm**   **Max Marks :100**

Instructions:

*i) All questions are **compulsory***

ii)Figures to the right indicate full marks.

iii)Use separate answer book for each section

iv)Use of non-programmable calculator is allowed.

v)Assume any suitable data if required and state it clearly.

SECTION I

Q.1.(a) State and explain Muller Breslau principle.   5

(b) A two span continuous beam ABC, is fixed at C and simply supported at A and B,   12
such that AB=BC=8m. Draw ILD for reaction at support A. Obtain the ordinates
of ILD at every quarter point of each span of the beam.

Q.2. A quadrant of a circle AB of radius R having uniform cross section is horizontal in   16
plan, fixed at B and free at A. It carries a uniformly distributed load, w over the
entire length of the beam. Determine the deflection of point A

Q.3.(a) State assumptions made in the analysis of beams on elastic foundation   3

(b) Derive expressions for deflection, foundation pressure, slope, bending moment   14
and shear force for long beam subjected to concentrated load 'Po' at center. Also
draw corresponding diagrams.

OR

Q.3. A rail supported on sleepers and ballast is subjected to three concentrated wheel   17
loads each of magnitude 120 kN, spaced at intervals of 1676mm.If the foundation
modulus is $16 N/mm^2$,the modulus of elasticity of material of the rail is 210
kN/mm^2 and the second moment of area of the rail section is 368×10^5 mm^4.
Compute the maximum deflection of the rail and bending moments developed
under each load.

SECTION II

Q.4 A beam column of circular section 100mm diameter is 2m long, hinged at both   17
ends. It supports an axial compression of 10KN, together with a lateral load of
20KN at centre. Determine the maximum deflection and maximum stress
developed in the column. Assume E = $200 KN/mm^2$

Q.5   Analyze a frame loaded as shown in fig.1 by using flexibility method. Also draw   17
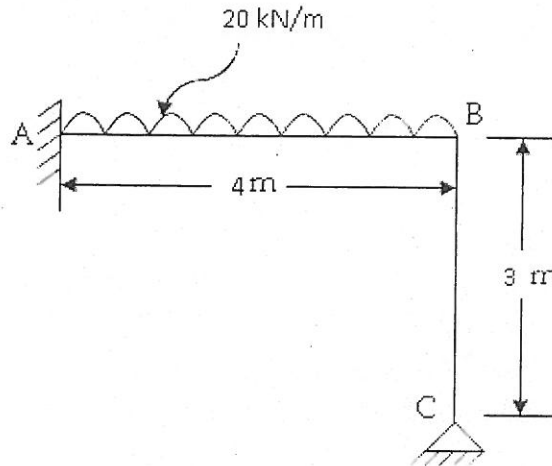   B.M.D.

20 kN/m

A ⌖ ⌒⌒⌒⌒⌒⌒⌒⌒⌒⌒ B

|← 4m →|

3 m

C

Fig.1

Q.6   Analyze a overhang beam loaded as shown in fig.2, by using stiffness matrix   16
       method. Also   draw B.M.D. Take E = 200Gpa & I = $2x10^{-4}m^4$

50 KN   20KN

10KN/m

A ⌖⌒⌒⌒⌒⌒⌒⌒⌒⌒⌒⌒⌒ B   C   D
                     2m   2m

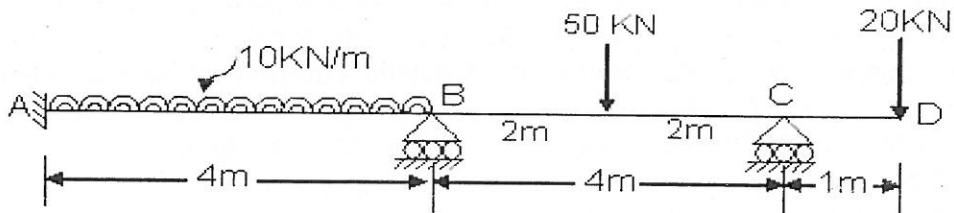|←—— 4m ——→|←——— 4m ———→|← 1m →|

Fig.2

OR

Q.6   a) Write the procedure to obtain structure oriented stiffness matrix for frame   6
       element   with   the help of transformation matrix

       b) Derive element stiffness matrix for beam element by using direct stiffness   10
       method

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute)

F.Y.M.Tech (Structure)-SEM-I

100 % Examination June-2012

CODE NO: **EM023-R**

Subject: Theory of Elasticity & Plasticity CES505

Day & Date: Wednesday, 20/06/2012

Time: **10.00am to 01.00pm**

Max Marks :100

Instructions- *i) All questions are compulsory.*
  ii) Figures to the right indicate full marks.
  iii) Assume suitable data wherever necessary.
  iv) Use separate answer book for each section.
  v) Use of non-programmable calculator is allowed.

SECTION- I

1. a) What are strain invariants? Write expressions for them. (06)

b) At a point in a continuum, the deformations are given as: $u_x = 3x^2z$; $u_y = 4y^2z$; $u_z = -x^3 - y^4$
Determine the strain components. Check whether the compatibility conditions are satisfied. (12)

2.a) What is Airy's stress function? Write the conditions that it should satisfy. (04)

b) Show that the Airy's stress function $\phi = A\left(xy^3 - \frac{3}{4}xyh^2\right)$ represents stress distribution in a cantilever beam loaded at the free end with load P. Find the value of A if $\tau_{xy} = 0$ at $y = \pm\frac{h}{2}$ where b and h are width and depth respectively of the cantilever. (12)

OR

2. a) Explain the phenomenon of stress concentration. (06)

b) A thick cylinder of inner radius 250mm and outer radius 410mm is subjected to internal pressure of 90 MPa. Find the stress distribution across the cylinder. (10)

3.a) Prove that $\frac{T}{\theta} = GI_p$ for circular cross section by membrane analogy, where membrane is subjected to large tension and small air pressure from the bottom. (10)

b) If it is intended to manufacture a circular bar of diameter '*d*' to transmit the torque, but is made elliptical during the process of manufacture, with major axis as '*d*' and minor axis '*kd*' *(k<1)*, determine by what factor is maxuimum shear stress increased? (06)

SECTION- II

4.a) The state of stress at a point is given by $\sigma_x = 66.7\ MPa$, $\sigma_y = 133.30\ MPa$, $\tau_{xy} = 33.30\ MPa$. If the yield strength in simple tension for the material is $133.30\ MPa$; determine whether yielding will occur according to Tresca's yield criterion or von-Mises yield criterion. **(06)**

b) Compute the first invariants of deviatoric-stresses given a state of stress at a point:

$$\sigma_{ij} = \begin{bmatrix} 50 & 50 & -40 \\ 50 & -30 & 30 \\ -40 & 30 & -100 \end{bmatrix}\ MPa \qquad (06)$$

c) Sketch von-Mises and Tresca yield surfaces in principal stress-space and draw their projection on $\pi-plane$. Also, draw their shapes in plane-stress condition. **(06)**

5. A rectangular-section beam has a depth of *200mm* and a width of *100mm*. The beam is made of a material with identical properties in tension and compression with a yield stress σ_o= *315MPa*; $E = 210GPa$ and Tangent Modulus *H= 700 MPa*. The beam has yielded upto a depth of *50mm*. Determine the magnitude of bending moment applied to the beam. **(16)**

OR

5. a) A closed end cylinder has internal diameter *400mm* and external diameter *1200mm*. The yield strength of the material is *300MPa*. Determine the pressure at which the inner surface just starts yielding. Also find at what pressure the cylinder bursts out. **(06)**

b) Find the collapse load for a simply supported circular plate of radius 'a' subjected to a udl of intensity q. Use Tresca's yield criterion. **(10)**

6. A cantilever beam of length L carries a point load P at the end. The stress-strain diagram for the beam material is given by $\sigma = H\varepsilon^n$ where H is the Tangent Modulus. Determine the deflection at the free end. **(16)**