K.E.Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute, affiliated to SUK)

Unit Test - 01

First Year M. Tech. Civil Structural Engineering, Sem.-II

Finite Element Analysis, Course Code: CES 1114

Enroll No

Q.P.Code
UT4005

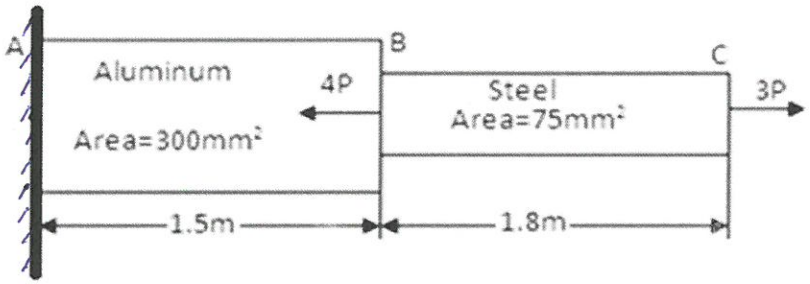
Day & Date: Thursday, 02/05/2022

Time: 10.30 am to 11.30 am. Max Marks- 25

Instructions: *1) Attempt all questions.* *2) Figures to the right indicates full marks*
3) Assume suitable data, if required *4) Use of nonprogrammable calculator is allowed*

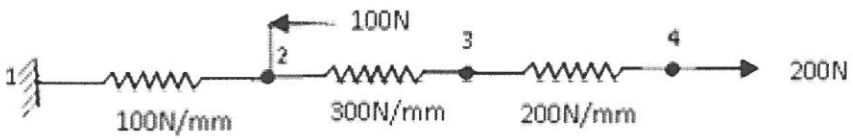
Q.1a) Explain role of displacement model in finite element method CO_1 3

b) Find nodal displacement and elemental stresses and strains for a stepped bar as shown in the figure. Take Es = $2x10^5$ N/mm^2 and Eal = $0.7x10^4$ N/mm^2. P = 4000N CO_1 10



OR

b) Determine the deflection at nodes and reaction at the support for a spring assemblage as shown in the figure. Use finite element method CO_1 10

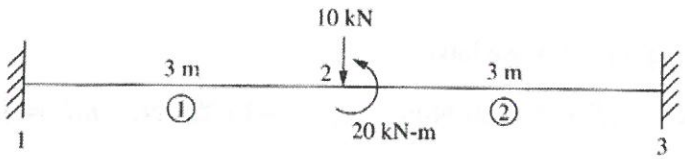


Q.2 i) Clearly point out the situations in which FEM is preferred over other methods CO_1 2

ii) Write note on- Global & Local coordinate system CO_2 2

OR iii) Derive element stiffness matrix [K] for beam element by variational approach CO_2 8

Q.2 Determine the displacement and rotation under the force and moment located at center of beam supported as shown in fig. Also compute the reactions at supports, by using FEM. Take E = 210 GPa, and I = 4 x 10^{-4} m^4 CO_2 12



K. E. Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute affiliated to SUK)

VT4022

UT1, 2022

First Year M. Tech Structural Engineering, Semester II

Course: Advanced Solid Mechanics, Course Code: CES 1124

Date & Day: Friday, 03-06-2022 Maximum Marks: 25

Time: 10.30 am to 11.30 am

Instructions: *1. All questions are compulsory.*
2. Use of non-programmable calculator is allowed.
3. Use any additional data required and mention it clearly

1 Draw the parallelepiped showing all the stress components and then derive differential equation of equilibrium in z-direction **08**

2 a The state of stress at a particular point relative to xyz coordinate system is given by the stress tensor

$$\sigma_{ij} = \begin{bmatrix} 15 & 10 & -10 \\ -10 & 10 & 0 \\ -10 & 0 & 40 \end{bmatrix} \text{MPa}$$

Determine the normal stress and shear stress on a surface intersecting the point and parallel to the plane given by the equation $2x - y + 3z = 9$. **09**

OR

a At a point in a continuum, the deformations are given as $u_x = 3x^2z$, $u_y = 4y^3z$ and $u_z = -x^3 - y^4$ Determine the strain components at (1, 2, 3). Check whether the compatibility conditions are satisfied. **09**

b Determine principal stresses and direction of principal plane containing maximum principal stress for the state of stress given as **08**

$$\sigma_{ij} = \begin{bmatrix} 200 & 500 & -100 \\ -10 & -300 & 300 \\ -100 & 300 & 50 \end{bmatrix} \text{MPa}$$

R.I.T. Rajaramnagar Exam. Centre

Enroll No	

K. E. Society's

Rajarambapu Institute of Technology, Rajaramnagar

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Unit Test-01 June 2022

First Year M. Tech. Structural Engineering SEMESTER-I

Q. P. Code
VT4056

DESIGN OF PRESTRESSED CONCRETE STRUCTURRES

(Program Elective -IV)

Course Code: CES1164

Day & Date: Sat., 04/06/2022

Time: – 3.30 to 4.30 pm.

Max Marks- 25

Instructions: *1) Figures to the right indicate full marks*
2) Assume suitable data if necessary and mention it
3) All questions are compulsory

Q.1. A pre-stressed concrete beam 250mmX300mm in section has an effective span of 7.5m and has to support an imposed load of 5kN/m. Find for the mid span section — 13 — CO1

i) the pre-stressing force in the concentric tension so as to just avoid tensile stress at the soffit.
ii) the pre-stressing force in the tendon placed at 100mm from the soffit so as to just avoid tensile stress at the soffit. Concrete weight is 24 kN/m^3.

OR

a) A prestressed concrete beam of rectangular section 120 mm wide and 360 mm deep and span 12 m is prestressed by cable in 3 alternatives profiles. In each case the area of the cable is 260 mm^2 and the initial pressure is 1250 N/mm^2. — 7 — CO1

Cable 1: straight with constant eccentricity 60 mm below CG axis
Cable 2: parabolic with zero eccentricity at each end and eccentricity of 60 mm below the CG axis at midspan
Cable 3: parabolic with an eccentricity of 60 mm above C.G. axis at each end and 60 mm below the C.G. axis at mid span

Taking $\mu = 0.35$ and $k = 0.0015$ per meter. Determine the loss of prestress in each case due to friction.

b) The initial prestressing force transmitted by a cable to a prestressed concrete beam is 390 kN. The sectional area of the prestressing wires is 325mm^2. Find the percentage loss of stress in the wires due to shrinkage of concrete only. Assume age of concrete at transfer = 7 days, $E = 2.1 \times 10^5$ N/mm^2. — 6 — CO1

i) If the beam is post tensioned
ii) If the beam is pre tensioned

Q. 2 A prestressed concrete beam of rectangular cross section is 300mmX600 mm and is simply supported on a span of 12m. It is provided with a parabolic tendon. The eccentricity of the tendon at mid span section is 120mm. The initial prestressing force is 1560kN which eventually reduces to 1330kN. The beam supports two concentrated loads of 45kN placed symmetrically 1.5m apart from the center of the beam. Determine extreme fiber stresses at — 12 — CO2

i) Under the action of initial prestress and no live load
ii) Under the action of final prestress with live load

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Rajarambapu Institute of Technology, Rajaramnagar

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Unit Test-01

Enroll No

Q.P.Code
UT4033

M .Tech. Civil – Structural Engineering SEMESTER- II

Year 2021- 22 Advanced Earthquake Engineering Course Code: CES 2062

Day & Date : Friday, 3/6/2022

Time : 3.30 to 4.30 pm. Max Marks- 25

Instructions: a) Solve any two sub questions.

b) Figures to the right indicate full marks.

c) Use of non- programmable calculators is permitted.

d) Assume suitable data if necessary and state it clearly.

1. A) Explain the clauses given in the IS 4326 to improve performance of load bearing masonry structures. Plan small masonry structure considering almost all clauses given in the code. CO3 12

   B) Explain with sketch different failure modes/ behavior of load bearing structures due to earthquakes. CO3 13

   C) Design for ductile detailing by taking example of beam or column of span/height 5m with appropriate loading and sizes and as per the clauses given in the IS 13920 to improve ductility performance of RCC flexural member or column member. CO2 12

----------GOOD LUCK----------

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