

Reg. No.

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**B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019**

Six Semester

**CE16601 – STRUCTURAL ANALYSIS II***(Civil Engineering)***(Regulation 2016)****Time: Three Hours****Maximum : 100 Marks**Answer **ALL** questions**PART A - (10 X 2 = 20 Marks)**

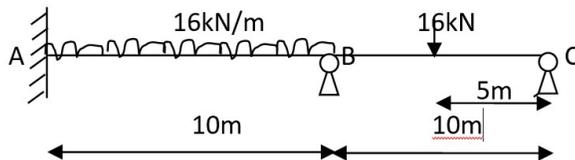
|  | <b>CO</b> | <b>RBT</b> |
|--|-----------|------------|
| 1. Distinguish determinate and indeterminate structures.           | 1         | U          |
| 2. What is meant by compatibility equations?                       | 1         | U          |
| 3. What is a rotation matrix? When is it used?                     | 2         | U          |
| 4. List the merits of stiffness matrix method.                     | 2         | R          |
| 5. Differentiate plane stress and plane strain.                    | 3         | U          |
| 6. Define Finite element analysis.                                 | 3         | R          |
| 7. State upper and lower bound theorems.                           | 4         | R          |
| 8. What is meant by shape factor?                                  | 4         | R          |
| 9. Differentiate plane and space trusses.                          | 5         | R          |
| 10. Sketch a suspension bridge indicating the force transfer flow. | 5         | R          |

**PART B - (5 X16 = 80 Marks)**

11. (a) Analyse the rigid jointed portal frame by flexibility matrix method. (16) 1 AN  
All the members are 3m long. The beam carries 10kN/m throughout.

**(OR)**

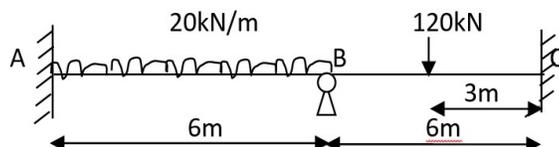
- (b) Analyse the continuous beam by flexibility method. (16) 1 AN



12. (a) A portal frame has two columns of 6m each. The beam is 6m long and carries an udl of 20kN/m. Analyse the frame by stiffness method. (16) 2 AN

**(OR)**

- (b) Analyse the continuous beam by stiffness method. (16) 2 AN



13. (a) Derive the stiffness matrix for a constant strain triangular element. (16) 3 AN

(OR)

- (b) Discuss in detail about finite element analysis and the steps followed to analyse a beam. (16) 3 AN

14. (a) A two span continuous beam ABC has span lengths AB = 6m and BC = 6m and carries an udl of 30kN/m completely covering the spans AB and BC. A and C are simple supports. If the load factor is 1.80 and the shape factor is 1.15 for the I section, find the section modulus needed. Assume yield stress of the material as 250N/mm<sup>2</sup>. (16) 4 AN

(OR)

- (b) A mild steel I section 200mm wide and 250mm deep has a mean flange thickness of 20mm and a web thickness of 10mm. Calculate the shape factor. Find the fully plastic moment if  $\sigma_y = 252\text{N/mm}^2$ . (16) 4 AN

15. (a) A suspension bridge of 100m span has two three hinged stiffening girders supported by two cables with a central dip of 10m. If three point loads of 20kN each are placed along the centre line of the roadway at 10, 15 and 20m from left hand hinge, find the shear force and bending moment in each girder at 30m from each end. Calculate the maximum tension in the cable. (16) 5 AN

(OR)

- (b) Using the method of tension coefficients, analyse the plane truss shown and find the forces in the members. (16) 5 AN

