

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-113
FACULTY OF SCIENCE AND TECHNOLOGY
B.E. (Civil)
Structural Mechanics
(REVISED)

[Time: Three Hours]

[Max. Marks: 80]

- N.B Please check whether you have got the right question paper.
- i) Question no 1 and question no.6 are compulsory.
 - ii) Solve any two questions from question no.2 to 5 and any two from question no.7 to 10.
 - iii) Figures to right indicate the maximum marks.
 - iv) Use of non-programmable calculator is permitted.
 - v) Assume suitable data if necessary and mention it clearly.

Section A

- Q.1 Write short notes on 10
- a. Plane strain problem and plain stress problem.
 - b. What is state of stress and state of strain?
 - c. Assumptions of Kirchoffs thin plate theory.
- Q.2 a. Explain different boundary conditions of thin plate? 08
 b. Given the following system of strains. 07
- $$\epsilon_x = x^3 + x^2 y^3 - xy^3 + y^2 - 05$$
- $$\epsilon_y = xy^2 + x^3 - y^5 - xy^2 - 02$$
- $$\gamma_{xy} = 5xy(x^4 - 5x - 5y) + 10$$
- $$\epsilon_z = \gamma_{zx} = \gamma_{zy} = 0$$
- Find the displacement components in terms of x and y, assuming that the displacement and rotation at the origin is zero. Boundary condition at (x, y)=0, displacement (2,3)=0
- Q.3 With usual notations, starting from slope curvature relations derive governing differential equation of thin rectangular plate subjected to transverse load 'q' per unit area. 15
- Q.4 Derive with usual notations, governing differential equation of bending of circular plates. Hence write the solution for circular plate subjected to point load at centre with simply supported edge over periphery. 15
- Q.5 a. Derive governing differential equations of equilibrium for a two dimensional state of stress in static condition. 08
 b. The strain components at a point in a body subjected to two dimensional state of stress are given by 07

$$\epsilon_{xx} = 2x^3 + x^2 y^2 - yz^2 - 3$$

$$\epsilon_{yy} = 4xy^3 + x^3z^2 + yz^2 - 6$$

$$\epsilon_{zz} = 4xy^3 + x^2y^2 + 2xz - 6xyz^3$$

$$\gamma_{xy} = x^3y^2, \gamma_{yz} = 5zy^2, \gamma_{xz} = 2x^2z^2$$

Determine the state of stress at point (2,-3, 2). Use $E = 2.1 \times 10^5 \text{ MPa}$ & $\mu = 0.20$

Section B

- Q.6 Any Two 10
- What is difference in between static indeterminacy and dynamic indeterminacy?
 - What is difference in between plates and shells?
 - Draw Pascal's triangle?
- Q.7 Explain membrane theory of thin spherical shells and hence derives expressions for the membrane forces in the spherical shells. 15
- Q.8
- Give stepwise procedure of analysis of structures using flexibility matrix method? 08
 - Write down stepwise procedure adopted in finite element method of structural analysis? 07
- Q.9 Draw the BMD of the continuous beam shown in fig.1 by stiffness matrix method. 15

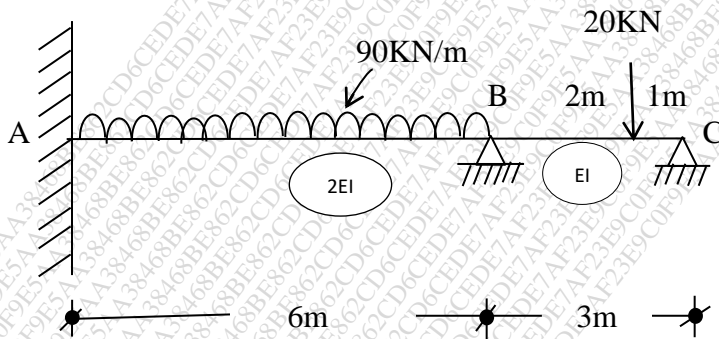


Fig .1

Q.10 Draw the BMD of the frame as shown in fig.2 by using stiffness matrix method.

15

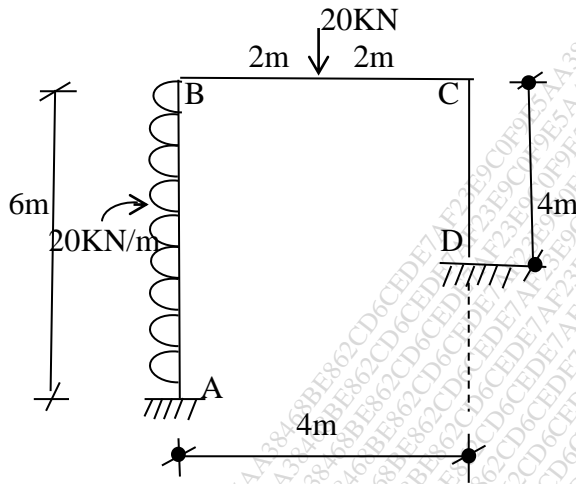


Fig.2