Total No. of Printed Pages:03

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

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
1. Questions no.1 and question no.6 are compulsory
2. Solve any two questions from question no.2 to 5 any two from question no.7 to 10
3. Figures to right indicate the maximum marks.
4. Use of non- programmable calculator is permitted
5. Assume suitable data if necessary and mention it clearly

Section A

Q.1 Any two 10
a) What is difference in between rectangular plate and circular plate?
b) What is difference in between thin plate and thick plate?
c) State the assumptions in Kirchhoff's thin plate theory.

Q.2 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.3 a) Explain plane strain problem and plain stress problem 08

b) The strain components at a point in a body subjected to two dimensional state of stress are given by 07

$$\boldsymbol{\varepsilon} xx = 2x^3 + x^2y^2 - z^2 - 3$$
$$\boldsymbol{\varepsilon} yy = 4y^3 + x^3z^2 + y^2 - 6$$
$$\boldsymbol{\varepsilon} zz = 4y^4 + 3x^2y^2 + xz^3 - 6y^3$$
$$\boldsymbol{\gamma} xy = 5x^3y^2, \boldsymbol{\gamma} yz = 5y^2, \boldsymbol{\gamma} xz = x^2z^2$$

Determine the state of stress at point (-2 , 3, 1). Use $E = 2 \times 10^5\ MPa$ & $\mu = 0.25$

Q.4 a) Derive governing differential equations of equilibrium for a two dimensional state of stress in static condition. 08

b) Given the following system of strains 07

$$\boldsymbol{\varepsilon} x = x^2y + y^2x^3 - xy^4 + y^3 - 15$$

$$\boldsymbol{\varepsilon} y = x^2 + xy^3 - xy^5 - y^2 - 06$$

$$\gamma xy = 5y\,(\,x^3 + y^4 - 5x - 5y\,) + 11$$

$$\varepsilon z = \gamma zx = \gamma zy = 0$$

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.5 Derive with usual notations, governing differential equation of bending of circular plates. Hence write the solution for circular plate subjected to point load at center with simply supported edge over periphery. 15

Section – B

Q.6 Any two 10

a) What is difference in between flexibility matrix method and stiffness matrix method?
b) What is difference in between plates and shells?
c) What is difference in between membrane theory and bending theory of shells?

Q.7 a) Explain static indeterminacy and dynamic indeterminacy? 08
b) Write down stepwise procedure adopted in finite element method of structural analysis? 07

Q.8 a) Derive equilibrium equations for spherical shell as membrane theory? 08
b) Draw Pascal's triangle? 07

Q.9 Draw the BMD of the continuous beam shown in fig.1 by stiffness matrix method. 15

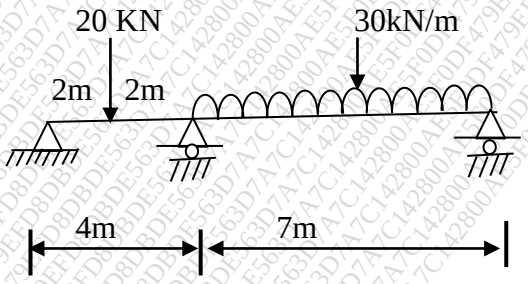

Fig no. 1

Q.10 Draw the BMD of the frame as shown in fig.2 by using stiffness matrix method. 15

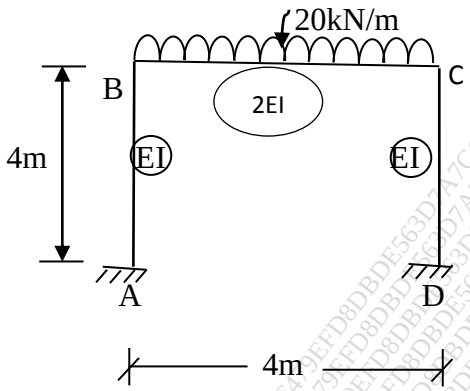

Fig no .2