Total No. of Printed Pages:2

SUBJECT CODE-12
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Civil) Examination Nov/Dec 2015
Structural Mechanics
(Revised)

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

"Please check whether you have got the right question paper."

N.B i)Answer any three questions from section A & B each
ii) Assume suitable data, if necessary.

SECTION-A

Q1. Derive an expression for compulsory principle stresses and their planes for an element of elastic body in 3-D state of stress. 14

Q.2 State the assumptions made in the theory of bending analysis of plates. Compute the deflection of a simply supported rectangle plate of size a× b subjected to uniformly distributed load. 13

Q.3 Derive the governing differential equation of circular plate subjected to lateral load in polar co-ordinates. 13

Q.4 a) Given the following system of strains 07

$$\in_x = x^2 + y^2 + x^4 + y^4 + 5$$

$$\in_y = 3x^2 + 3y^2 + x^4 + y^4 + 6$$

$$\gamma_{xy} = 4xy(x^2 + y^2 + z) + 10$$

$$\in_x = \gamma_{yz} = \gamma_{xz} = 0$$

Determine if this system of strain is possible. If yes, then 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 (4,4)=0

b) Derive the equilibrium equations when a body subjected to three dimensional state of stress for static and dynamic condition. 06

Q.5 Find the transverse deflection is for the simply supported circular plate with hole of radius a subjected to moments M_1 and M_2 distributed uniformly along inner and outer edges. 13

SECTION-B

Q.6 a) Derive stiffness Matrices for the member in a plane frame considering only flexural deformation 05

b) Write short note on characteristics of stiffness Matrices 04

c) State the points of difference between flexibility and stiffness matrix methods of analysis of structures. 05

Q.7 Derive equilibrium equations for spherical shell as membrane theory. Determine the stresses in the shell under its own weight 13

Q.8 Analyze the continuous beam shown in fig.1 by stiffness matrix method. 13

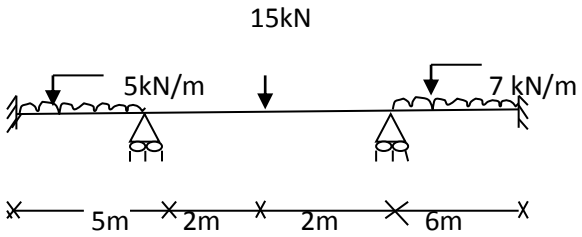

Fig.1

Q.9 a) Give stepwise procedure of analysis of structures using flexibility method 07

b) Explain convergence criteria in finite element method of analysis. 06

Q.10 Analyze the frame shown in fig.2 stiffness matrix method. Draw BMD 13

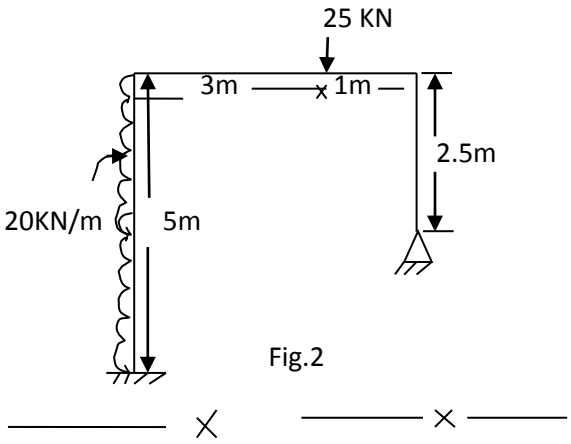

Fig.2