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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD – 402 103
Winter Semester Examination – December – 2018

Course: M. Tech. (Structural Engineering) **Semester: I**
Subject with Subject Code: Theory of Elasticity & Plasticity (CVSE 101)
Date:24/12/2018 **Marks: 60** **Time: 3Hrs.**

Instructions to the Students

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

(Marks)

Q.1. Solve any Two of the following Three Sub- Questions. (12)

(a)Describe the stress at point. (6)

(b)What do you understand by body forces and surface forces? (6)

(c) Explain plane stress & plane strain. (6)

Q.2. Solve any Two of the following Three Sub- Questions. (12)

(a)Derive the differential equation in two D. (6)

(b)What is stress invarients? (6)

(c)Write a note on Uniqueness of solution. (6)

Q.3. Solve any one of the following Two Sub- Questions. (12)

(a)Expain stress concentration due to circular hole in a stressed plate (Kirsh Problem)

(b) Derive all the equations related with thick cylinder

Q.4. Solve any Two of the following Three Sub- Questions. (12)

(a)Write a note on torsion of equilateral triangle. (6)

(b) Write a note on torsion of hallow cross sections. (6)

(c) Write a note on torsion of hallow elliptical cross sections. (6)

Q.5. Solve any Two of the following Three Sub- Questions. (12)

(a) Write on stress transformation laws. (6)

(b) What are the equilibrium equations for Cartesian co-ordinates, Cylindrical co-ordinates & spherical co-ordinates. (6)

(c) What is generalized Hook's Law & Elastic strain energy? (6)

Q.6. Solve any Two of the following Three Sub- Questions. (12)

(a) Explain Saint Venant's theory of plastic flow. (6)

(b) What is Drucker- Prager Yield Criteria. (6)

(c) Explain Von –Mises Hencky's yield criteria. (6)

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Winter Semester Examination – December – 2018

Branch: M. Tech. (Civil-Structure) | **Semester: I**
Subject with Subject Code: - (CVSE102) Matrix Methods of Structural Analysis | **Marks: 60**
Date: - 27/12/2018 | **Time: 3 Hrs.**

Instructions to the Students

1. Each question carries 12 marks.
2. **Attempt any five questions of the following.**
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q. 1. **(Marks) 12**

a) Draw deflected shape of the structures shown in **figures 1 (a), 1(b), and 1(c)** shown below and explain shortly in single sentence. Indicate the possible location of points of contra-flexure. **02 x 03 = 06**

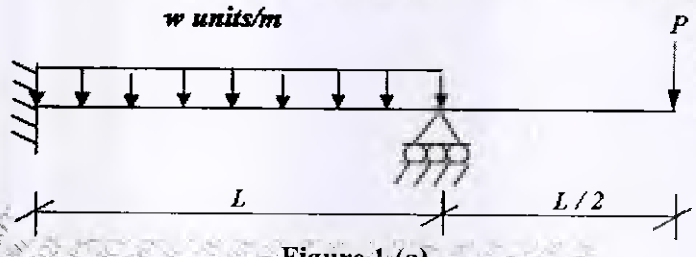

Figure 1 (a)

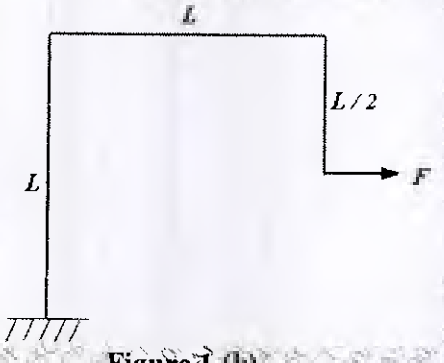

Figure 1 (b)

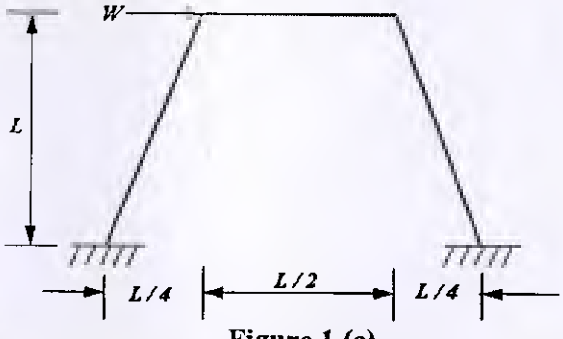

Figure 1 (c)

b) Analyse the beam as shown in the **figure 2** using **Conjugate Beam method** and hence find the maximum Slope and Deflection. Use ***E = 210 GPa, I = 5 x 10⁶ mm⁴***. Also, draw the deflected shape of the structure. **06**

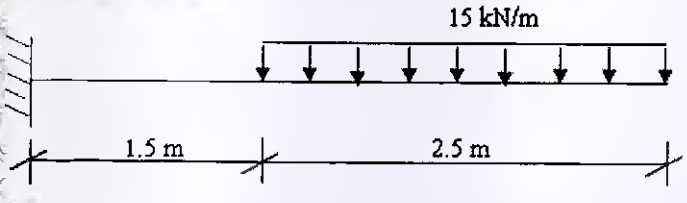

Figure 2

Q. 2. Analyse the structure as shown in **figure 3** using **Direct Flexibility method** and find the **12**

E 4

member forces in all members. *AE* is same in all the members.

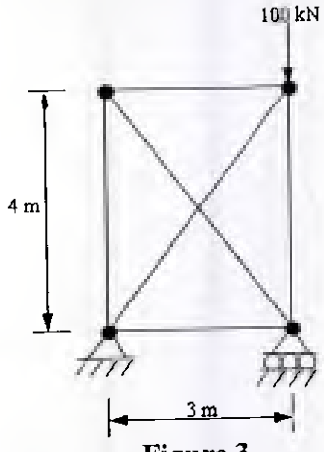

Figure 3

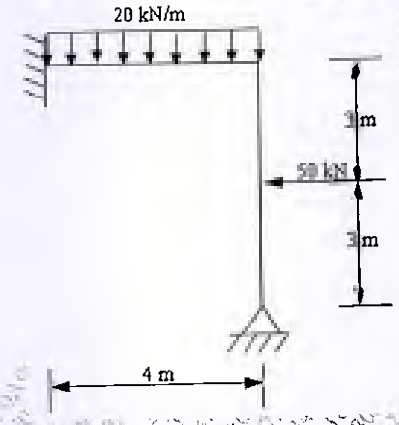

Figure 4

Q. 3. Analyse the structure as shown in **figure 4** using **Direct Stiffness method** and hence draw the SFD and BMD. **12**

Q. 4. Analyse the pin-jointed frame shown in **figure 5** using **Generalised Flexibility method** and hence find the forces in all the members. AE is same in all the members. **12**

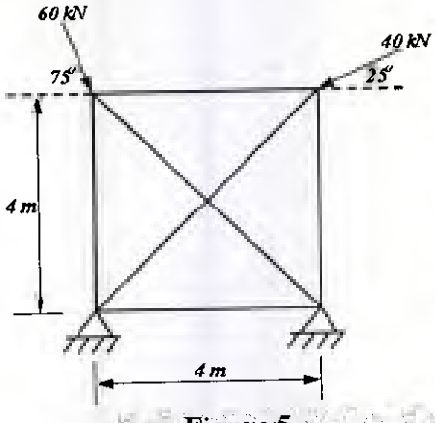

Figure 5

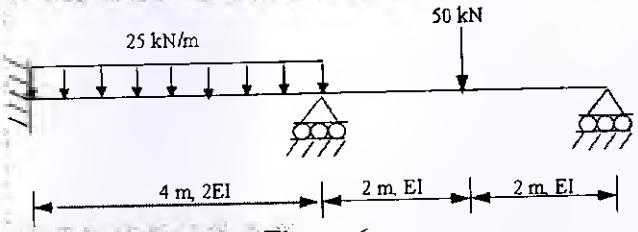

Figure 6

Q. 5. Analyse the beam as shown in **figure 6** using **Generalised Stiffness method** and hence draw the SFD and BMD.

Q. 6. What do you understand by Non-Linear Analysis? What are different sources of Non Linearity? **04**

(a)

(b) A cantilever beam shown in figure 7 (a) has a constant section for which the M-φ (moment-curvature) relationship is given approximately by $\varphi = 5 \times 10^{-5} M(1+0.009M)$ where φ is in rad/m and M is in kNm as shown in figure 7 (b). Find the deflection at the free end. **08**

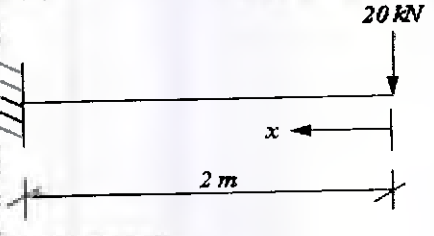

Figure 7 (a)

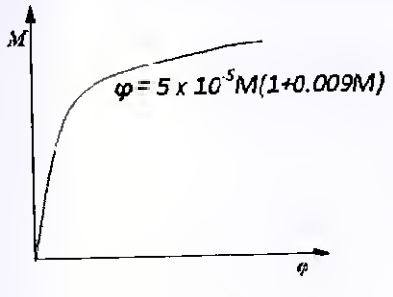

Figure 7 (b)

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD – 402103

Winter Semester Examination: – May-2018

Branch:-M. Tech.in Structural Engineering **Semester: I**

Subject with Subject Code: - Structural Dynamics (CVSE103) **Marks: 60**

Date: - 29/12/2018 **Time: 3 Hrs.**

Instructions to the Students

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q1.a) Derive an expression for displacement of a SDOF system subjected to free vibration with damping. **06**

Q1.b) Evaluate the natural frequency & natural period for a fixed beam subjected to a weight of 10kN at center which is connected to the beam with a spring having stiffness k=50kN/m. Take E= 22000MPa. L= 5m, beam size 0.23m x 0.45m. **06**

Q2.a) Explain Duhamel's integral approach to a linear differential equation. **04**

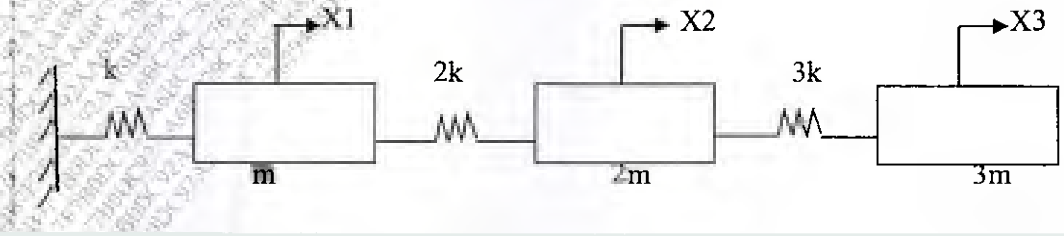
Q2.b) Discuss response analysis of half cycle sinusoidal force by Duhamel's integral approach. Also get the expressions for displacement for the conditions $T_d/T_n = 1/2$ and $T_d/T_n = ½$. **08**

Q3.a) Write down the procedure applied to evaluate the peak response of the tower to earthquake ground motion. **08**

Q3.b) Differentiate between distributed mass & lumped mass system. **04**

Q4. Determine natural frequency in terms of k and m, also modes for the system for the fig. shown below.

m = Mass , k = Stiffness , x = displacement **12**



Q5. Write down the step wise procedure to calculate dynamic response of MDOF system subjected to external force p(t) by Modal Analysis. **12**

OR

Q5. Discuss dynamic response factor with references to all four cases of $T_1/T = 0.75$, $T1/T = 2.75$, $T1/T = 3.5$, $T1/T = 4.3$.

Q6. Write a short notes on any three. **12**

a. Design spectrum

b. Response Quantities

c. Modal contribution factors

d. Rayleigh Ritz Method

*** End ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD – 402 103
Winter Semester Examination –Dec– 2018

Course: M. Tech. Civil (Structural Engineering) **Semester – II**
Subject with Subject Code : ELE-1 (Numerical Methods) (CVSE-E1B)
Date :- 01/01/2019. **Time : 3 Hrs** **Marks : 60**

Instructions to the Students
1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

(Marks)

Q.1. a) What are errors in representing numbers. 04
b) Write the short note on inverse error analysis. 04
c) Explain mantissa and exponent. 04

Q.2. a) Solve ,by Gauss Seidal method, the equations

$20x+y-2z = 17,\ 3x+20y-z = -18,\ 2x-3y+20z = 25.$ 04

b) Solve by LU decomposition method,
$x+5y+z = 14,\ 2x+y+3z = 13,\ 3x+y+4z = 17.$ 04
c) Find a root of the equation $x^3-2x-5 = 0$ using secant method correct to three decimal places. 04

Q.3. a) Fit the curve of the form $y = ab^x$ 06

X	1	2	3	4	5	6
Y	151	100	61	50	20	8

b) Find the missing term in the following table using Lagranges interpolation: 06

X	0	1	2	3	4
Y	1	3	9	-	81

Q.4. a) Use the Trapezoidal rule to estimate the integral $\int_0^2 e^{x^2} dx$ taking the number 10 intervals. 06

b) Evaluate the integral $\int_0^{0.5}\left(\frac{x}{\sin x}\right)dx$ using Romberg method ,correct to 3 decimal places. 06

Q.5 a) Apply Runge-Kutta method to find approximate value of y for x = 0.2 in steps of 0.1, if $\frac{dy}{dx} = x+y^2$, given that y = 1 where x = 0. 06

b) Write a short note on the Newmark Beta method. 06

Q.6 a) Find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ using power method. 06

b) Solve y"- xy = 0 given y(0) = -1 , y(1) = 2 by finite difference method taking n = 2. 06

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Semester Examination – December - 2018

Branch: M. Tech. (SE) **Semester: - I**

Subject with Subject Code: Advanced Prestressed Concrete CVSE-E2A **Marks: 60**

Date: - 03/01/2019 **Time: - 3 Hr.**

Instructions to the Students

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.
5. Use of IS 1343, IS 3370 and 784 are permitted.

(Marks)

Q.1. **(a)** The Govt. of Maharashtra has called for a tender for construction of fly over bridge at Mumbai. It consists of post tensioned girders. Explain in detail the system one shall adopt for prestressing with its advantages and disadvantages. **(06)**

OR

(a) Which are the advantages of prestressed concrete? Explain with justification for each of it. **(06)**

(b) A PSC beam, 200mm wide and 350mm deep is used over an effective span of 6.0m to support an imposed load of 4.5 kN/m. At the quarter span section of the beam, find the magnitude of ,

i) The concentric prestressing force necessary for zero fiber stress at the soffit when the beam is fully loaded.

ii) The eccentric prestressing force located at 110mm from the bottom of the beam which would nullify the bottom fiber stress due to loading. **(06)**

Q.2. **(a)** A post tensioned concrete beam 400mm wide and 800 mm wide is prestressed by an effective prestressing force of 1200kN at an eccentricity of 120 mm. The anchor plate is 400 mm wide by 400 mm deep Calculate the bursting force using IS 1343 code provisions and design the reinforcement to resist this force. Sketch the details of the reinforcement. **(06)**

(b) Draw a neat sketch showing stress distribution in end block in Guyon's method when concentric single and double anchor plate is used. Also explain various zones. **(06)**

Q.3 **(a)** A PSC beam having an unsymmetrical I section has a fiber stress distribution 13 N/mm^2 compression at top reducing to zero at the bottom. The top flange width and thickness are 2400 and 400mm respectively, the bottom flange width and thickness are 1200mm and 900mm respectively, depth and thickness of web are 1000mm and 600mm respectively. The total vertical service load shear in the

concrete at the section is 2350 kN. Compute and compare the principal tensile stresses at centroidal axis and junction of web and the lower flange. Consider $I_{xx} = 1.54 \times 10^{12} mm^4$

(06)

(b) A continuous concrete beam ABC comprises of two spans AB and BC each of length 10.0m has a uniform rectangular cross section 100mm wide and 300mm deep. A cable carrying an effective prestressing force of 360kN varies linearly with an eccentricity of 50mm towards the soffit at the end support to 50mm towards the top of the beam at mid support B.

i) Determine the resultant moment at B due to pretsressing only.

ii) If the eccentricity of the cable at B is (+25mm), show that the cable is concordant.

(06)

Q.4 A PSC composite beam section consists of a 500mm x 80mm cast in situ flange and 140mm x 250mm deep rectangular precast prestressed stem. The stress distribution for the precast section due to prestressing force alone is 16 N/mm^2 at bottom to zero at top. Find what uniformly distributed live load the composite beam can carry on a simply supported span of 6.50m for the condition that the stress at the bottom of the precast unit is zero for the following conditions.

i) The dead load of the slab and the weight of the shuttering are carried by the precast unit during casting and the shuttering is removed after the slab concrete is hardened.

ii) The dead load of the slab is supported independently at the time of casting.

Assume that the shuttering weighs 270 N/m and the ratio of (Elastic modulus for slab to elastic modulus for precast unit is 0.65)

(12)

Q.5 (a) An electric pole 9.50m high above ground level supports vertical load of 1.25 kN due to weight of wires. It has to carry the reversible horizantal force of 3.50 kN acting at a top. Design the pole. Assume that the losses due to shrinkage and creep as 15%. No tension is allowed. The safe compressive stress is 12.50 N/mm^2. Angle of repose is ($\Phi = 30^0$), density of soil is 20 kN/m^3, initial stress in steel = 950 N/mm^2 and m = 6

(10)

(b) Write down the design specifications for prestressed concrete pipes as per IS 784.

(02)

OR

Q.5 (a) A simply supported post tensioned prestressed concrete deck slab of a road bridge is600mm thick spanning over 10.50 m. The slab is prestressed by Freyssinet cables each containing 12 HT wires of 8 mm diameter. The cables are spaced at 500mm centers at an effective depth of 450mm. If f_{ck} = 40 N/mm^2 and f_p = 1600 N/mm^2, estimate,

i) Ultimate flexural strength of the slab for 1.0m width

ii) Maximum permissible uniformly distributed ultimate live load on the slab assuming a load factor of 1.50 for dead load.

(09)

(b) Write down any three basic assumptions along with its justification and explanation for design of flexural member in prestressed concrete.

(03)

Q.6 Answer the following.

(a) Which are the various defects possible in prestressed concrete structures? How it can be taken care of? Comment on any four.

(b) Write down the grout performance with reference to following points with its acceptable limits. (Flow ability, bleeding requirements, mechanical strength, setting time, volume change)

(c) Draw neat sketches for following types of shear failures with its short explanation. (Diagonal tension failure, shear tension failure, shear compression failure, and web compression failure)

(3 x 4 = 12)

End