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3rd Sem. / Civil Highway Engg.

Subject : Structural Mechanics

Time : 3 Hrs. M.M. : 100

SECTION-A

Note: Multiple choice Questions. All questions are compulsory (10x1=10)

Q.1 The point of contra flexure occurs at a point where. (CO-3)
a) Bending moment changes sign
b) Shear force changes zero
c) Loading becomes zero
d) Bending moment and shear force both are zero

Q.2 The ability of a material to deform without breaking is called. (CO-1)
a) Elasticity b) Plasticity
c) Creep d) None of these

Q.3 When shear force at a point is zero, the bending moments at that point will be. (CO-3)
a) Zero b) Minimum
c) Maximum d) Infinity

Q.4 Moment of inertia of a triangle about its vertex is given by: (CO-4)
a) $bh^3/36$ b) $bh^3/12$
c) $bh^3/4$ d) None of these

Q.5 The steel bars in a concrete beam are embedded. (CO-5)
a) Near top section b) Near bottom section
c) In the Centre d) None of these

Q.6 At the neutral axis of a beam, the shear stress is (CO-6)
a) Zero b) Minimum
c) Maximum d) None of these

Q.7 IN a cantilever beam maximum deflection occurs at (CO-7)
a) Fixed end
b) Free end
c) Middle of the beam
d) Depends upon loading pattern

Q.8 A Column of length 'l' is hinged at both ends; its equivalent length will be equal of (CO-8)
a) 2 L b) L
c) L/2 d) 0.707L

Q.9 If n >2j-3 then the frame is named as (CO-9)
a) Perfect frame b) Deficient frame
c) Redundant frame d) None of these

Q.10 The Euler's formula holds good only for (CO-8)
a) Long column b) Short column
c) Medium column d) Weak column

SECTION-B

Note: Objective type questions. All questions are compulsory. (10x1=10)

Q.11 Fatigue of metal is caused by _____. (CO-1)

Q.12 What is Pure Bending Equation _____? (CO-5)

Q.13 What is B.M.D.? (CO-3)

Q.14 the ratio of lateral strain to linear strain is known as _____. (CO-2)

Q.15 Radius of gyration is represented by ___. (CO-4)

Q.16 Neutral axis of a section always passes through its _____. (CO-5)

Q.17 The shear stress at the top of rectangular section is _____. (CO-6)

Q.18 What is permissible value of deflection for the simply supported beam. (CO-7)

Q.19 What is column? (CO-8)

Q.20 The stress caused by the shearing force at a section of a beam is gap called_____. (CO-6)

SECTION-C

Note: Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

Q.21 A steel bar 2m long and 30mm diameter is subjected to an axial pull of 30 KN. If the young's modulus of elasticity of material is $2 \times 10^5 N/mm^2$.
Find (CO-2)
i) Stress ii) Strain iii) Elongation of the bar

Q.22 Define mechanical properties of materials. (CO-1)

Q.23 Define theorem of perpendicular axis. (CO-4)

Q.24 Define theorem of parallel axis. (CO-4)

Q.25 Write the assumptions made in the theory of simple bending. (CO-5)

Q.26 What do you mean by slope and deflection of a beam? (CO-7)

Q.27 Write the classification of columns. (CO-8)

Q.28 What is Euler's formula? Write its limitations. (CO-8)

Q.29 Calculate the bucking load by using Euler's formula for a circular column of 16mm diameter and 8m length. When young's modulus, $E=2x10^5 N/mm^2$. (CO-8)

Q.30 Describe the types of frames. (CO-9)

Q.31 Calculate the BM and draw BMD for a cantilever beam carrying a point load at the free end. (CO-3)

Q.32 What do you mean by a composite section? (CO-2)

Q.33 What is difference between long column and short column. (CO-8)

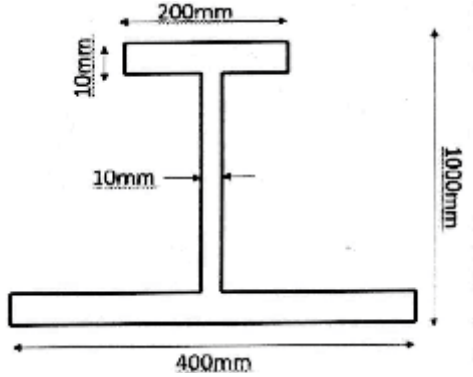
Q.34 Draw the detailed shear stress distribution diagram for a rectangular section. (CO-6)

Q.35 What is relationship between stress, strain and young's modulus of elasticity. (CO-2)

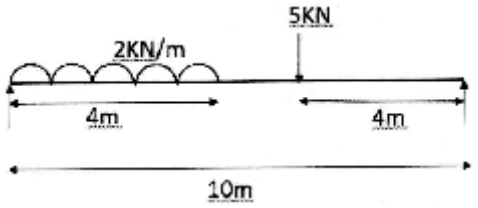
SECTION-D

Note: Long answer type questions. Attempt any two out of three questions. (2x10=20)

Q.36 Determine moment of Inertia of the given I-section about Horizontal and vertical axis passing through the C.G. of section. (CO-4)



Q.37 A simple supported beam is carrying a U.D.I. of 2KN/m over a length of 4m from the left end and a point load of 5KN at 4m from the right end. The length of beam is 10m. Draw S.F.D. and B.M.D. and also calculate max. Bending moment at section. (CO-3)



Q.38 Explain mechanical properties of materials. (CO-1)