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4th Sem, **Branch :** Civil Engineering
Subject : Structural Mechanics

Time : 3 Hrs.

M.M. : 100

SECTION-A

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

- Q.1 The modulus of elasticity is expected to have least value for
for
a) Wood b) Glass
c) Aluminium d) Copper (CO-1)
- Q.2 The unit of strain is
a) N/cm b) N/mm
c) mm d) No unit (CO-2)
- Q.3 The bending moment at the fixed end of a cantilever beam is
is
a) Minimum b) Maximum
c) Zero d) None of these (CO-3)
- Q.4 Moment of Inertia is also called second moment of area
a) True b) False (CO-4)
- Q.5 The strength of the beam mainly depends on
a) Its weight b) Section modulus
c) Bending moment d) C.G. Of the section (CO-5)
- Q.6 The ratio of average shear stress to maximum shear stress for a circular section is
for a circular section is
a) 2/3 b) 3/2
c) 3/4 d) 1/2 (CO-6)
- Q.7 A column that fails due to direct stress, is called
a) Long Column b) Short column
c) Weak column d) Medium (CO-8)

Q.8 The load at which the column just buckles, is known as
(CO-8)

- a) Critical load b) Buckling load
c) Crippling load d) Any of these
A structure consisting of a number of members connected to each other to support external load without going any geometrical distortion distortion is known as
(CO-9)

Q.10 For a perfect frame, the relation between number of joints 'J' and number of members "n" is
(CO-9)
a) $n = 2j - 3$ b) $n = 2j$
c) $n - 3 = 2j$ d) $n = 2j + 3$

SECTION-B

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

- Q.11 If a material regain its original position on the removal of the external forces. It is called an _____ material. (CO-1)
- Q.12 The areas under stress-strain curve indicates toughness. (True/False) (CO-1)
- Q.13 Modulus of elasticity is the ratio of stress to _____. (CO-2)
- Q.14 The rate of change of bending moment is equal to the _____ at the section. (CO-3)
- Q.15 Units of radius of gyration is _____. (CO-4)
- Q.16 Bending stresses are also known as _____. (CO-5)
- Q.17 The shear stress at the N.A. is _____. (CO-6)
- Q.18 The strength of the column depends upon the _____ and its end conditions. (CO-8)
- Q.19 Short column fail due to crushing whereas long column fail due to buckling and crushing. (True/False). (CO-8)
- Q.20 In a frame each joint is called _____. (CO-9)

SECTION-C

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

- Q.21 Draw and explain the salient features of stress-strain diagram for mild steel. (CO-1)
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- Q.22 Define temperature stresses and temperature strain for Yielding supports. (CO-2)
 Q.23 State and explain Hook's law. (CO-2)
 Q.24 A load of 5.75 KN is to be raised with the help of a steel wire. Find the minimum diameter of the steel wire, if the stress is not to exceed 150 Mpa. (CO-2)
 Q.25 Calculate the bending moment and draw the BMD for a simply supported beam carrying a uniformal distributed load over the whole span. (CO-3)
 Q.26 A cantilever beam of length 4 m carries a gradually varying load. Zero at free end to 2 kN/m at the fixed end. Draw the SF and BM diagrams for the cantilever. (CO-3)
 Q.27 Write the different types of load along with their neat sketches. (CO-3)
 Q.28 Find the moment of inertia of I-section as shown in fig-1 about vertical axis passing through the center of gravity of the section. (CO-4)

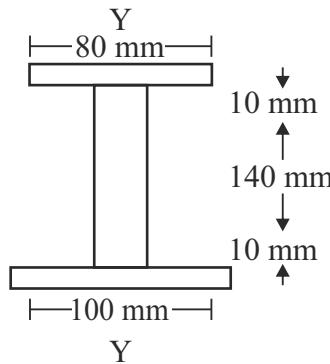


Fig. 1

- Q.29 Write the assumptions made in the theory of simple banding. (CO-5)
 Q.30 A steel plate of width 120 mm and of thickness 20 mm is bent into a circular arc of radius. 10m. Determine the maximum stress induced. Take $E=2\times 10^5 \text{ N/mm}^2$. (CO-5)
 Q.31 Draw the detailed shear stress distribution diagram for a circular section. (CO-6)

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- Q.32 A simply supported beam is of I-section. Span of the beam is 6 m and moment of inerita of the cross-section is $180\times 10^6 \cdot \text{mm}^4$.Calulate the point load at the center of the beam to produce a deflection of 6mm under the load. (CO-7)
 Q.33 Derive the expression for maximum slope and deflection for a simply supported beam carrying a UDL. (CO-7)
 Q.34 Write the various stresses responsible for the failure of a column. (CO-8)
 Q.35 Write down the steps to determine the forces in members of a truss as per methods of sections. (CO-9)

SECTION-D

Note : Long Answer type question. Attempt any two questions out of three questions. $(2\times 10=20)$

- Q.36 A brass bar, having cross-sectional area of 1000 mm^2 is subjected to axial forces as shown in fig-2 Calculate the force P necessary for equillbrium of bar and determine the total elongation of the bar. Take $E = 1.05 \times 10^5 \text{ N/mm}^2$.

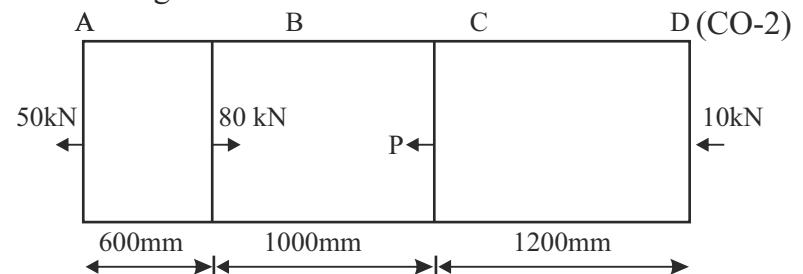


Fig. 2

- Q.37 Explain the different types of end supports of a beam along - with their neat sketches. (CO-3)
 Q.38 A simply supported beam 6m long is subjected to two point loads of 2.2 kN and 5.5 kn at 2 m and 4 m respectively from the left end. Draw the SF and BM diagrams for the beam. (CO-3)

Note Outcome (CO) mentioned in the question paper is for official purpose only.

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