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## STRUCTURAL MECHANICS

$4^{\text {th }}$ Exam/Civil/3510/May'18
Duration: 3Hrs.

## Q1. Fill in the blanks.

## SECTION-A

a. Cast iron is a $\qquad$ material.
b. About $80 \%$ of the failures in mechanics parts are caused by $\qquad$ .
c. If a material regains its original position on the removal of external forces, it is called a $\qquad$ material.
d. When a material can be drawn into wires, it is called $\qquad$ material.
e. Steel and rubber belong to elastic materials. (True/False)
f. The strain has $\qquad$ units.
g. The ratio of lateral strain to linear strain is known as $\qquad$ .
h. Effect of tensile is to $\qquad$ the length of the body.
i. A beam encastered at both the ends is called $\qquad$ _.
j. Load acting at a point is known as $\qquad$ —.
k. A load which is spread uniformly over the entire or small portion of the beam is known as $\qquad$ .
l. A beam which is fixed at one end and free at other end is known as $\qquad$ -.
m . Moment of Inertia of a circular section is $\qquad$
n. The unit of Moment of inertia is $\qquad$ .
o. Euler's formula is applicable for $\qquad$ -.

## SECTION-B

## Q2. Attempt any five questions.

$5 x 6=30$
i. Define the terms: Stress, Strain, Elasticity and Elastic limit.
ii. State and explain Hooke's law.
iii. What are temperature stresses and strains?
iv. Draw S.F and B.M diagram for a cantilever carrying a point load $W$ at the free end.
v. Define the terms: Moment of Inertia and Radius of gyration.
vi. What assumptions are made in Euler's theory?
vii. Define and explain the following terms: Shear force, Bending moment and point of contra flexure.

## SECTION-C

Q3. Attempt any three questions.
$3 \times 10=30$
a. Find the MOI of $I$ section of the following dimensions about $X-X$ axis:
(i) Top flange $=200 \mathrm{~mm} \times 80 \mathrm{~mm}$
(ii) Bottom flange $=100 \mathrm{~mm} \times 40 \mathrm{~mm}$
(iii) Central web $=280 \mathrm{~mm} \times 60 \mathrm{~mm}$
(iv) Overall depth $=400 \mathrm{~mm}$
b. A simply supported beam is carrying a udl of $2 \mathrm{KN} / \mathrm{m}$ over a length of 3 m from the right end. The length of the beam is 6 m . Draw the S.F.D and B.M.D for the beam and also calculate the max. BM at the section.
c. A column of timber section $150 \mathrm{~mm} \times 200 \mathrm{~mm}$ is 6 m long with both ends fixed. If the young's modulus for timber is $17500 \mathrm{~N} / \mathrm{mm}^{2}$, determine (i) crippling load, (ii) safe load if FOS = 3
d. For a material Young's modulus is given as $1.2 \times 10^{5} \mathrm{~N} / \mathrm{mm}^{2}$ and the Poisson's ratio is 0.25 . Calculate the Bulk modulus and Modulus of Rigidity.

