No. of Printed Pages : 5 **BAR-024**

00167

# BACHELOR OF ARCHITECTURE

## Term-End Examination

## December, 2010

## BAR-024 : THEORY OF STRUCTURE - III

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *Question No.1 is **compulsory**. Attempt **any four** questions from rest of the questions. Use of calculator is permitted.*

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**1.** Choose the most appropriate option from the given options in questions (a) to (g). **7x2=14**

(a) In case of a simply supported beam subjected to a concentrated point load at the centre -

(i) Bending moment is constant along the span.

(ii) Shear force is constant along the span.

(iii) Bending moment diagram is of parabolic shape.

(iv) Bending moment diagram is of triangular shape.

(b) For analysis of plane truss, Method of Joints is applicable only when the number of unknown forces at a joint under consideration is not more than

(i) one (ii) two

(iii) three (iv) four

(c) Buckling load for a given column depends upon

(i) length of column only.

(ii) least lateral dimension only.

(iii) both length and least lateral dimension.

(iv) none of the above.

(d) In theory of simple bending of beams

(i) plane sections are not always plane.

(ii) plane section remain plane even after application of loads.

(iii) plane sections remain plane until any load is applied and then they deform.

(iv) nothing can be said as it is a very complex process.

(e) Euler's formula for a mild steel long column hinged at both ends is not valid for slenderness ratio

(i) greater than 80

(ii) less than 80

(iii) greater than 180

(iv) greater than 120

(f) If a composite bar of steel and copper is heated, then the copper bar will be under

(i) tension (ii) compression

(iii) torsion (iv) shear

(g) Maximum shear stress intensity in a circular cross section is

(i) $\frac{9}{8} q_{av}$ (ii) $\frac{4}{3} q_{av}$

(iii) $\frac{3}{2} q_{av}$ (iv) $\frac{8}{3} q_{av}$

Where $q_{av}$ is the average shear stress.

2. (a) Derive the basic differential equation of theory of simple bending of beams. 7

(b) A simply supported beam of flexural rigidity 'ET' is subjected to a udl of intensity 'w' along the whole of its span. Draw the bending moment and shear force diagram for the beam. 7

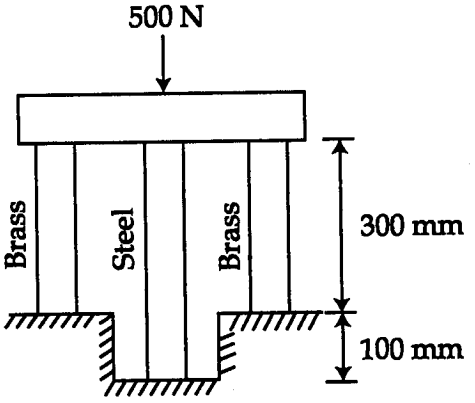
3. (a) What do you understand by buckling of columns? Derive the expression to calculate the Euler's buckling load for a column for the standard case of the column. 7

(b) What do you understand by effective length of a column? What are the factors affecting it? Give effective length of a column for the following two cases: 7

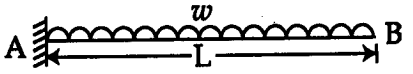
(i) the column is fixed at both the ends.

(ii) the column has a fixed support at one end and a hinged support at the other end.

4. A steel rod of cross-sectional area 2000 $mm^2$ and two brass rods each of cross-sectional area of 1200 $mm^2$ together support a load of 60 KN, as shown in Figure 1. Find the stresses in each rods. Take E for steel $= 2 \times 10^5 N/mm^2$ and E for brass $= 1 \times 10^5$ $N/mm^2$. **14**




5. A cantilever beam AB, of length 'L' is loaded with uniformly distributed load 'w' per unit length. Starting with basic differential equation for the deflection curve find the deflection of the free end(B). **14**




6. Describe different types of truss with sketches along with their use, suitability and limitations. **14**

7. Write short notes on ***any two*** of the following : **2x7=14**

(i) Composite sections.

(ii) Graphical method of analysis of a truss.

(iii) Importance of shear force and bending moment diagrams in selection of a structural system.