P P SAVANI UNIVERSITY

Third Semester of B. Arch. Examination

December. 2021

SAAR2052 Structural Design & Systems – III

29.12.2012, Wednesday **Time: 09:00 A.M. To 12:00 P.M.** **Maximum Marks: 100**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator and IS 456 is allowed.
5. Write the entire sentence for "Fill in the Blanks" type questions.

SECTION I

Q - 1 **MCQ/Short Question/Fill in the Blanks (Any Fifteen)** **[15]**

(i) Concrete is good in tension. State whether true or false.

(ii) Reinforced Cement Concrete is a _____ material.

(iii) Steel is only used in the tension zones of beams. State whether true or false.

(iv) A cantilever beam has the _____ fibre in tension.

(v) For a simply supported beam, the shear force is maximum at the supports. State whether true or false.

(vi) Beams are only designed in the double reinforced format. State whether true or false.

(vii) Among an over-reinforced and under-reinforced sections, an _____ section is more preferable.

(viii) _____ is also known as mild steel (Fe 415 / Fe 450 / Fe 500 / Fe 250)

(ix) The Elastic limit for Mild steel is _____ N/mm^2

(x) The ultimate yield stress for Fe 250 is _____ N/mm^2

(xi) Steel is an _____ (element / alloy / composite / compound)

(xii) Steel is good in _____ (compression / tension / both tension and compression / none)

(xiii) Concrete is identified by its using the

(xiv) What is the bending moment at the end supports of a simply supported beam?

(xv) A cantilever beam is one in which _____ (Both ends are supported either on rollers or hinges / One end is fixed and the other free / Both ends are fixed / Whose both or one of the ends has an overhang)

(xvi) Point of contraflexure is also called point of _____ (maximum shear / 0 shear / intersection / fixed end)

(xvii) In a shear force diagram, if no load acts between two sections, then it is represented by _____ (horizontal line / inclined line / vertical line / all of the stated)

Q - 2 (a) **Write a short note on Shear Stress and its visible effects in beams.** **[07]**

Q - 2 (b) **Write a short note on Reinforced Cement Concrete and its suitability as a construction material.** **[07]**

OR

Q - 2 (a) **Write a short note on the types of columns.** **[07]**

Q - 2 (b) **Explain what are short and long columns. Clearly tabulate the various end conditions and their subsequent impact on effective length of the columns.** **[07]**

Q - 3 (a) **A 5m long simply supported beam carries a uniformly distributed load of 3kN/m.** **[07]**

Draw the shear force and bending moment diagram for the same. Also draw the tentative bending shape for the same.

Q - 3 (b) **A 7m long cantilever beam carries a point load at the free end. Draw the shear force and bending moment diagram. Also show the tentative bending shape of the beam under the load.** [07]

OR

Q - 3 (a) **Write a short note on the permissible deflection limits in columns.** [07]

Q - 3 (b) **Write a short note on the variation of Shear stress in simply supported beam subjected to a uniformly varying load.** [07]

Q – 4 **Attempt any one** [07]

(i) Write a short note on the importance of IS:456

(ii) Write a short note on composite materials.

SECTION II

Q – 1 **MCQ/Short Question/Fill in the Blanks (Any Fifteen)** [15]

(i) Long columns are more susceptible to failure in _____

(ii) Short columns are more susceptible to failure in _____

(iii) Columns are linear elements more often than not under significant compression. State whether true or false.

(iv) Beams always deform bending downwards. State whether true or false.

(v) Positive bending moment in a simply supported beam means that the beam will bend _____ (forward / backward / down / up)

(vi) _____ is a common device deploying shear force as its major force of action. (lever / scissor / pencil / paper cutter)

(vii) Concrete is made up for _____ component materials. (2 /3 / 4 / 5)

(viii) SI unit for shear force is kN/m. State whether true or false.

(ix) SI unit for bending moment is _____

(x) Hogging is _____ bending moment. (negative / positive / neutral / none of the options)

(xi) Maximum shear force in a simply supported beam having concentrated load W at the centre with length L _____. (W/2 / indeterminate / depends on external factors / none)

(xii) Stress on neutral axis is maximum. State whether true or false

(xiii) According to the theory of pure bending, the material of the beam is considered to be isotropic. State whether true or false.

(xiv) According to the theory of pure bending, the material of the beam is not homogeneous. State whether true or false.

(xv) According to the theory of pure bending, the Young's modulus is considered different for tension and compression each. State whether true or flase.

(xvi) Neutral axis is the line of intersection of neutral layer with transverse section. State whether true or false.

(xvii) For a simply supported beam, the bending moment is zero at _____.

Q - 2 (a) **Write a short not on limit state for collapse.** [07]

Q - 2 (b) **Write a short note on limit state for deflection.** [07]

OR

Q - 2 (a)	**A simply supported beam 10m long is carrying a point load of 20kN at its center. Draw the shear force and Bending Moment diagrams. Also draw the tentative bending shape of the beam.**	[07]
Q - 2 (b)	**A Simply supported beam, 5m long is carrying a point load of 5kN at 1m from the left support. Draw the shear force and bending moment diagram and the tentative bending shape of the beam.**	[07]
Q - 3 (a)	**Write a short note on singly reinforced and doubly reinforced beam section.**	[07]
Q - 3 (b)	**Write a short note on the properties of steel**	[07]

OR

Q - 3 (a)	**Write a short note on deflected shapes of simple structures.**	[07]
Q - 3 (b)	**Write a short note on the contribution of steel in Reinforced Cement Concrete**	[07]
Q - 4	**Attempt any one**	[07]
(i)	Explain the steps involved in the Analysis of a Singly Reinforced Beam	
(ii)	List down the IS Provision limiting the deflection of beams under various support conditions.	

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