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Q :) A mild steel specimen is under uniaxial tensile stress. Young's modulus and yield stress for mild steel are 2×10^5 MPa and 250 MPa respectively. The maximum amount of strain energy per unit volume that can be stored in this specimen without permanent set is

A : 156 Nmm/mm^3

B : 15.6 Nmm/mm^3

C : 1.56 Nmm/mm^3

D : 0.156 Nmm/mm^3

Q :) A cantilever beam of tubular section consists of 2 materials, copper as outer cylinder and steel as inner cylinder. It is subjected to a temperature rise of 20^0 C and $\alpha_{copper} < \alpha_{steel}$. The stresses developed in the tubes will be

A : Compression is steel and tension in copper

B : Tension in steel and compression in copper

C : No stress in both

D : Tension in both the materials

Q :) The principle of superposition is made use of in structural computations when:

A : The geometry of the structure changes by a finite amount during the application of the loads

B : The changes in the geometry of the structure during the application of the loads is too small and the strain in the structure are directly proportional to the corresponding stresses.

C : The strain in the structure are not directly proportional to the corresponding stress, even though the effect of changes in geometry can be neglected.

D : None of the above conditions are met.

Q :) A metal bar of length 100 mm is inserted between two rigid supports and its temperature is increased by 10^0 C. If the coefficient of thermal expansion is 12×10^{-6} per^{0}C and the young's modulus is 2×10^5 MPa, the stress in the bar is

A : Zero

B : 12 MPa

C : 24 MPa

D : 2400 MPa

Q :) Two people weighing W each are sitting on a plank of length L floating on water at L/4 from either end. Neglecting the weight of the plank, the bending moment at the centre of the plank is

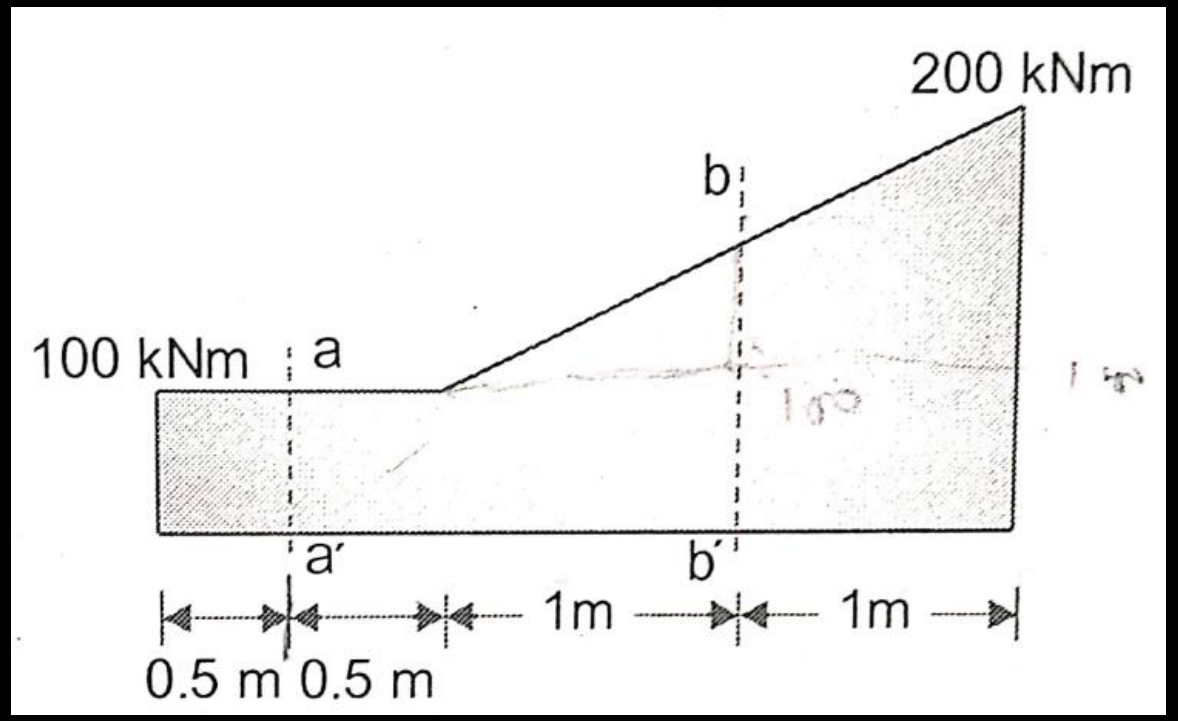
A : WL//8

B : WL/16

C : WL/32

D : Zero

Q :) The bending moment diagram for a beam is given below: The shear force at sections aa' and bb' respectively are of the magnitude



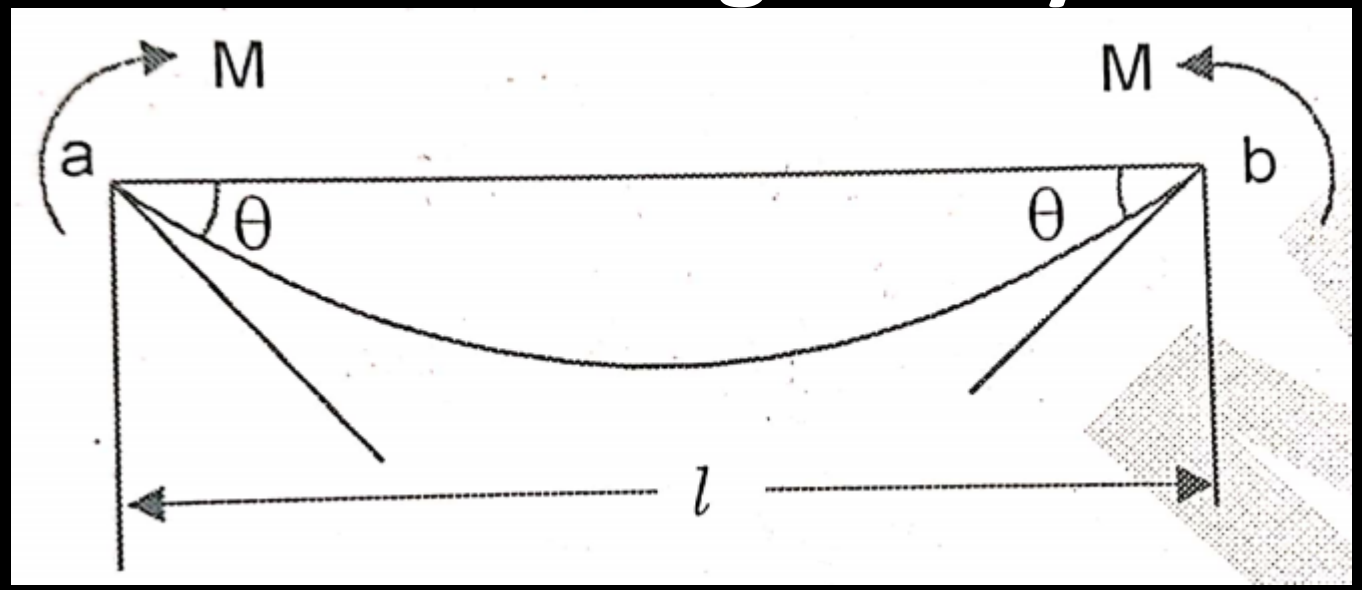
A : 100 kN, 150 kN

B : Zero, 100 kN

C : Zero, 50 kN

D : 100 kN, 100 kN

Q :) M–θ relationship for a simply supported beam shown below is given by



A : Ml/EI=2θ

B : Ml/EI=3θ

C : Ml/EI=4θ

D : Ml/EI=6θ

Q :) The maximum bending stress induced in a stress wire of modulus of elasticity 200 kN/ mm^2 and diameter 1 mm when would on a drum of diameter 1 m approximately equal to

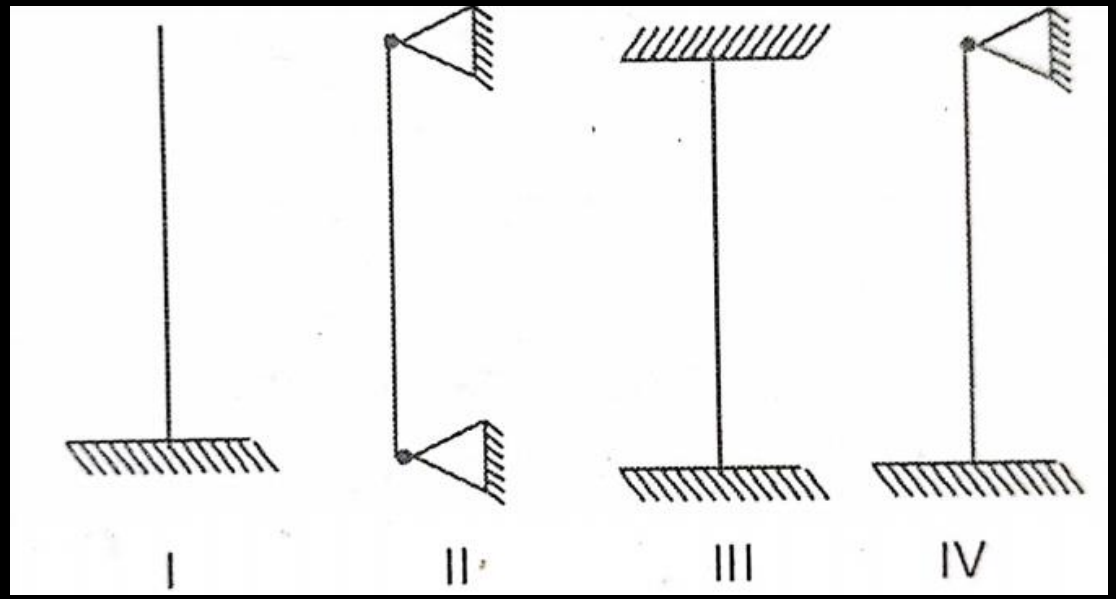
A : 50 N/mm^2

B : 100 N/mm^2

C : 200 N/mm^2

D : 400 N/mm^2

Q :) Four columns of the same material and having identical geometric properties are supported in different ways as shown below



It is required to order these four beams in the increasing order of their respective first bucking loads. The correct order is given by

A : I, II, III, IV

B : III, IV, II, I

C : II, I, IV, III

D : I, II, IV, III

Q :) Match the following:

List-I	List-II
P. Slope deflection method	1. Force method
Q. Moment distribution method	2. Displacement method
R. Method of three moments	
S. Castigliano's second theorem	

A : P-1, Q-2, R-1, S-2

B : P-1, Q-1, R-2, S-2

C : P-2, Q-2, R-1, S-1

D : P-2, Q-1, R-2, S-1

Q :) List-I contains some properties of concrete/ cement and List-II contains lift of some tests on concrete/cement. Match the property with the corresponding test.

List-I	List-II
A. Workability of concrete	1. Cylinder splitting test
B. Direct tensile strength of concrete	2. Vee-Bee test
C. Bond between concrete and steel	3. Surface area test
D. Fineness of cement	4. Fineness modulus test
	5. Pull out test

Codes:

A : (a): A-2, B-1, C-5, D-3

B : (b) A-4, B-5, C-1, D-3

C : (c) A-2, B-1, C-5, D-4

D : (d) A-2, B-5, C-1, D-4

Q :) A : Workability of concrete is measured by Vee Bee test.

B : Direct tensile strength of concrete is done by cylinder splitting test.

C : Bond between concrete and steel is tested by pull out test.

D : Fineness of cement is determined by surface area test.

Q :) The total compressive force at the time of failure of a concrete beam section of width 'b' without considering the partial safety factor of the material is

A : 0.36 fck b Xc0.36 fck b Xc

B : 0.54 fck b Xu0.54 fck b Xu

C : 0.66 fck b Xu0.66 fck b Xu

D : 0.8 fck b Xu0.8 fck b Xu

Where X_u is the depth of neutral axis, fck cube strength of concrete.

Q :) Read of the following two statements

(i) Maximum strain in concrete at the outermost compression fibre is taken to be 0.0035 in bending

(ii) The maximum compressive strain in concrete in axial compression is taken as 0.002. Keeping the provisions of IS 456-2000 on limit state design in mind, which of the following is true?

A : Statement I is true but II is false

B : Statement I is false but II is true

C : Both statement I and II are true

D : Both statement I and II are true

Q :) A steel section is subjected to a combination of shear and bending action. The applied shear force is V and shear capacity of the section is Vs. For such a section, high shear force (as per IS 800 - 2007) is defined as

A : $V<0.6Vs$

B : $V<0.7Vs$

C : $V<0.8Vs$

D : $V<0.9Vs$

Q :) The cross-section of a thermo-mechanically treated (TMT) reinforcing bar has

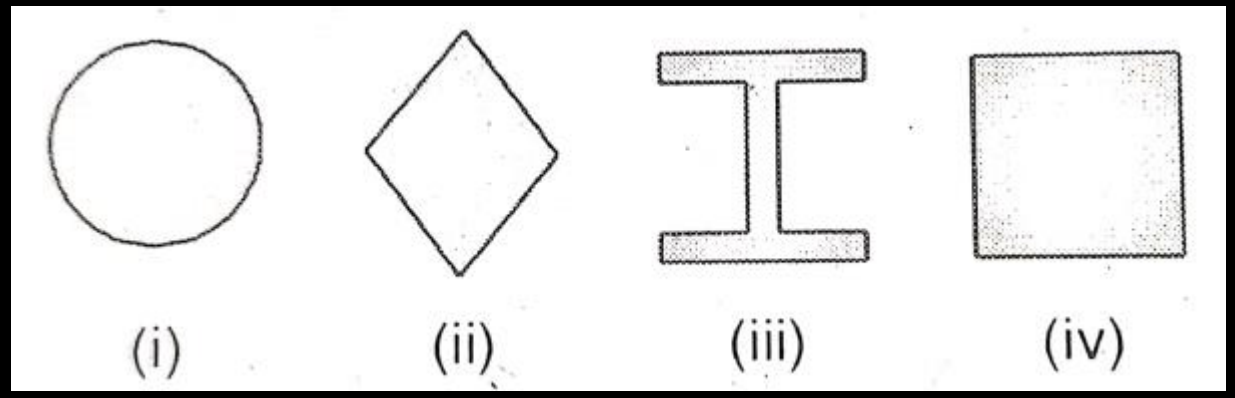
A : Soft-ferrite-pearlite throughout

B : Hard martensite throughout

C : A soft ferrite-pearlite core with a hard martensitic rim

D : A hard martensitic core with a soft pearlite-bainitic rim

Q :) The four cross sections shown below are required to be ordered in the increasing order of their respective shape factors.



Which of the following order correct?

A : III, I, IV, II

B : I, II, III, IV

C : III, IV, I, II

D : III, IV, II, I

Q :) In a static fluid, the pressure at a point is

A : Equal to the weight of the fluid above

B : Equal in all directions

C : Equal in all directions, only if its vicsosity is zero

D : Always directed downwards

Q :) One of the following statements is true with regards to bodies that float or are submerged in liquids:

A : For a body wholly submerged in a liquid the stability is ensured if the center of buoyancy is below the center of gravity of the body.

B : For a body floating in liquid the stability is ensured if the center of buoyancy is below the centre of gravity of the body.

C : For a body floating in a liquid the stability is ensured if the center of buoyancy is below he centre of gravity.

D : For a body floating in a liquid the stability is ensured if the centre of gravity and the metacentre is above both the centres of gravity and buoyancy.

Q :) A floating body with its center of gravity at 'G' centre of buoyancy at 'B' and meta centre at 'M' is stable when

A : G lies above B

B : B lies above M

C : B lies above M

D : G lies above M

Q :) A triangular gate, base 2 m height 1.5 m lies in a vertical plane The top vertex is 1.5 m below the surface of a tank which contains oil of specific gravity 0.8. Considering density pf water and acceleration due to gravity to be 1000 kg/m^3 and 9.81 m/s^2 respectively. The hydrostatic force (in kN) exerted by oil on the gate is ?

A : 21.25

B : 0

C : 29.45

D : 36.27