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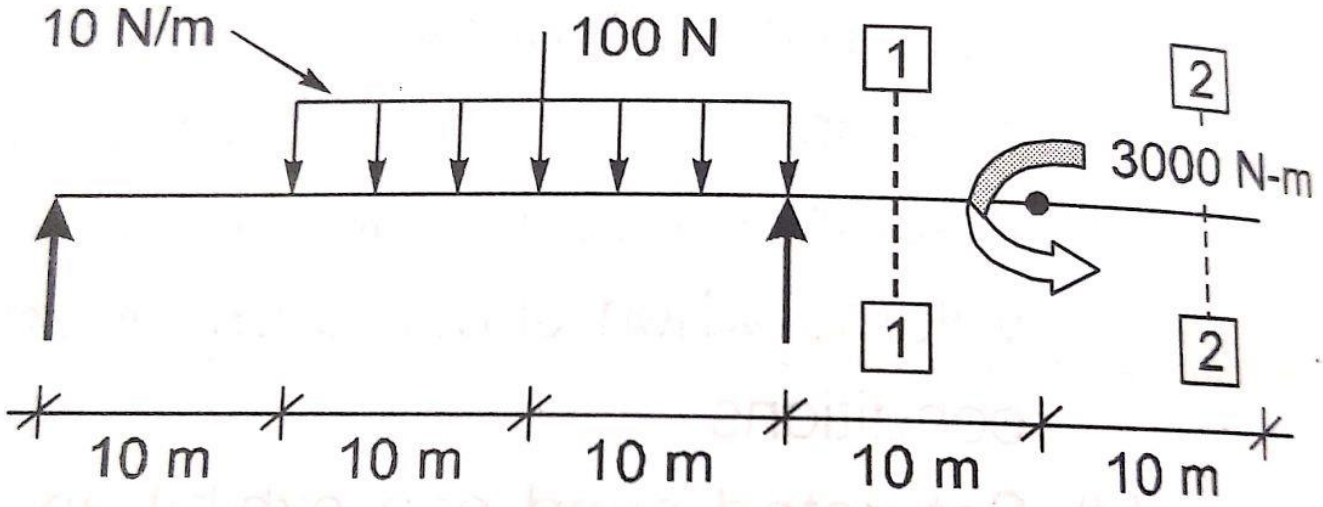
Q:) For the beam shown in figure, bending moment at sections 1-1 and 2-2 respectively are:



A : +3000 N-m, -3000 N-m

B : -3000 N-m, 0

C : -3000 N-m, +3000 N-m

D : +3000 N-m

Q:) Ductility depends on:

(i) Temperature of the structure

(ii) Size of the structure

(iii) Applied loading time

Which of the above is/are true?

A : (i) and (iii)

B : (i) and (ii)

C : (i) only

D : All of these

Q:) For a beam having cross-section as T, which is a correct statements?

A : Shear stress variation is parabolic below Neutral axis and normal stress is linear below Neutral axis.

B : Shear stress variation is linear and normal stress is parabolic below Neutral axis.

C : Both shear and normal stresses are linear along the cross-section.

D : Both shear and normal stresses are parabolic along the cross-section.

Q:) The ratio of modulus of rigidity and modulus of elasticity (G/E) for any elastic isotropic material is:

A : Less than 1/2

B : Less than 1/3

C : More than 1/3

D : Both (a) and (c)

Q:) Which quantity will not be zero for a plane strain problem in x-y plane?

A : Shear strain in x-z plane

B : Normal strain in z direction

C : Normal stress in z direction

D : Shear stress in y-z plane

Q:) If E, G, K and μ represent the elastic modulus, shear modulus, bulk modulus and Poisson's ratio respectively of a linear elastic, isotropic and homogeneous material, and if you need to express the stress-strain relationships completely for this material, at least:

A : All the four must be known

B : E, G and μ must be known

C : E, K and μ must be known

D : Any two of the four must be known

Q:) The displacement δ^i in line with force F^i is given by:

A : First derivative of total energy with respect to F^i

B : First derivative of potential energy with respect to F^i

C : First derivative of internal energy with respect to F^i

D : First derivative of complementary energy with respect to F^i

Q:) Two different sets of forcing systems are said to statically equivalent if,
(i) They produce same shear force and bending moment in a particular section.
(ii) They require same set of external forces to reduce each system to equilibrium.
(iii) They generate identical reactions with respect to direction and magnitude.
(iv) They produce same deflection in any given section of the beam.
Which of the above are true?

A : (i) and (ii)

B : (ii) and (iii)

C : (i) and (iv)

D : (iii) and (iv)

Q:) An external force of 1 N is applied on the block of 1 kg as shown in figure, The magnitude of the friction force F^s is (where, $\mu = 0.3$, $g = 10\ m/s^2$):

A : 0.3 N

B : 0.1 N

C : 3.0 N

D : 1.0 N

Q:) A deformable body is under the action of external forces (F_i).The external forces satify the following conditions with respect to an internal frame:

(i) $\sum F_i = 0$

(ii) $\sum r_i \times F_i = 0$

These conditions are:

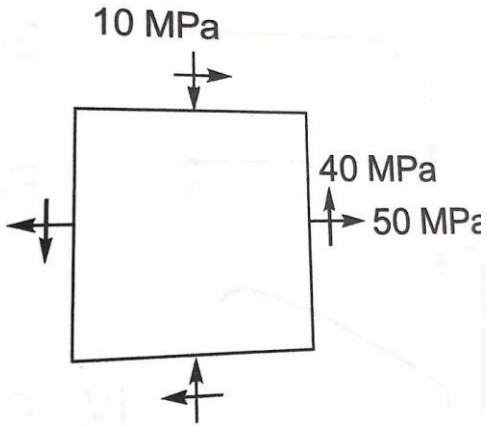
A : necessary and not sufficient for equilibrium

B : sufficient for equilibrium

C : necessary and sufficient for equilibrium

D : none of the above

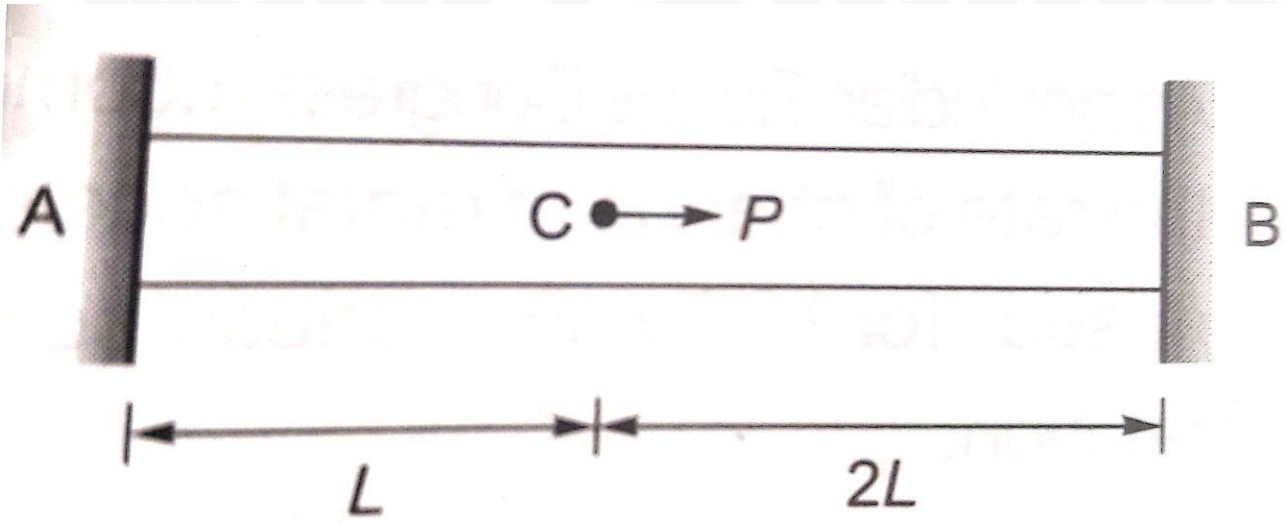
Q:) A material yields under the following state of plane stress shown in figure, as per Von Mises criterion, the yield stress of the material is:



A : 20 MPa **B :** 74.16 MPa

C : 50 MPa **D :** 88.88 MPa

Q:) A straight bar which is fixed at the ends A and B and having elastic modulus (E) and cross-sectional area (A), is subjected to a load P = 120 N at C as shown in figure. The reactions at the ends are:



A : 40 N at A, 80 N at B

B : 30 N at A, 90 N at B

C : 80 N at A, 40 N at B

D : 60 N at A, 60 N at B

Q:) A cantilever of length 1.5 m is loaded with a concentrated load W at the unsupported end. The bending moment at the centre of the beam is 2 kNm. What is the magnitude of the load 'W'?

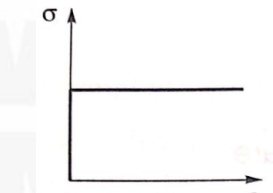
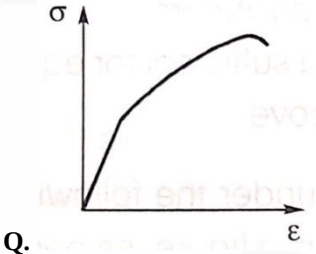
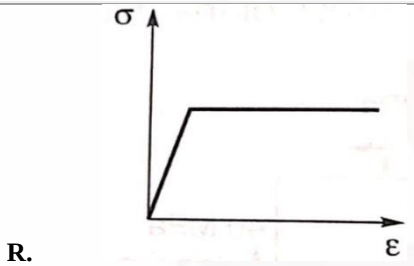
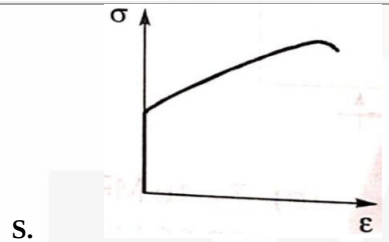
A : 11.333 kN

B : 3 kN

C : 2.666 kN

D : Zero

Q:) Choose the correct combination for the given Table:

Stress-strain Graph Material	
 P.	**I.** Elastic-Plastic
 Q.	**II.** Rigid Plastic
 R.	**III.** Elastic-Perfectly Plastic
 S.	**IV.** Perfectly Plastic

A : P-IV, Q-III, R-II, S-I

B : P-IV, Q-I, R-III, S-II

C : P-I, Q-II, R-III, S-IV

D : P-III, Q-I, R-IV, S-II

Q:) A beam shall be deemed to be a deep beam when the ratio of effective span to overall depth is less than _____ and _____ for simply supported beam and cantilever beam, respectively.

A : 7, 26

B : 2.5, 2.0

C : 2.0, 2.5

D : 26, 7.0

Q:) What fraction of volume of solid piece of metal of specific gravity 6.20 floats above the surface of a container of Mercury with specific gravity of 13.60?

A : 0.455

B : 0.545

C : 0.223

D : 1

Q:) A solid cylinder of diameter 3 m has a height of 2 m. What would be the metacentric height of cylinder when it is floating in water with its axis vertical? The specific gravity of cylinder is 0.7.

A : 0.1017 m

B : 0.30 m

C : 0.4017 m

D : 1.4 m

Q:) Pressure variation of air above sea level is:

A : linearly increasing with height

B : exponentially decreasing with height

C : parabolic with height

D : lineraly decreasing with height

Q:) The equation $\sum Fx = \rho Q(\Delta V_x)$ requires which of the following assumptions for its derivation:

A : The flow is steady and uniform

B : The flow is steady and velocity of flow is constant over the end cross-sections

C : The flow is uniform and fluid is frictionless

D : The fluid is frictionless and the velocity of flow is constant over the end cross-sections

Q:) For an inviscid flow, if the boundary is stationary and flow is assumed one-dimensional and if V is the velocity of flow then the velocity of layer just next to the boundary is:

A : Zero

B : V

C : V/2

D : $\frac{2}{2}V$

Q:) A suppressed sharp crested weir is 0.6 m high and discharge water at a head of 1.2 m. The coefficient of discharge of this weir is:

A : 0.611

B : 0.701

C : 0.736

D : 0.761

Q:) If D is D hours unit hydrograph and T relates the equilibrium discharge approximately at the end of the base period T hours of the unit hydrograph, then the number of unit hygrographs needed to produce the S-curve hydrograph is given by:

A : T/D

B : D/T

C : $\frac{(T+D)}{D}$

D : $\frac{D}{(T+D}$