



# SSC JE MAINS 2019

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**Q : 1) The necessary and sufficient condition for a surface**

**A : No stress should be acting on it**

**B : Tensile stress acting on it must be zero**

**C : Shear stress acting on it must be zero**

**D : No point on it should be under any stress**

**Q : 2) The symmetry of stress tensor at a point in the body under equilibrium is obtained from**

**A : Conservation of mass**

**B : Force equilibrium equations**

**C : Moment equilibrium equations**

**D : Conservation of energy**

**Q : 3) 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  $20^{\circ}\text{C}$  and  $\alpha_{\text{copper}} > \alpha_{\text{steel}}$ . The stresses developed in the tubes will be**

**A : Compression in steel and tension in copper**

**B : Tension in steel and compression in copper**

**C : No stress in both**

**D : Tension in both the materials**

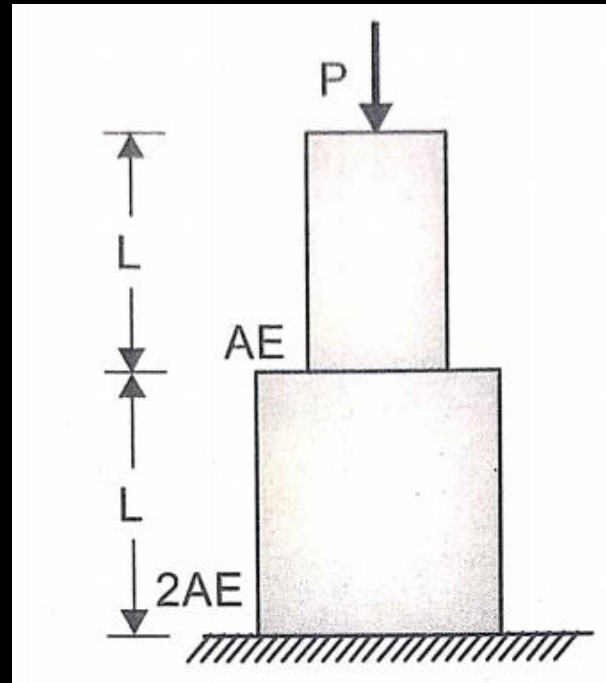
**Q : 4) The axial movement of top surface of stepped column as shown in figure is**

**A :  $2.5 PL/AE$**

**B :  $3 PL/AE$**

**C :  $1.5 PL/AE$**

**D :  $2 PL/AE$**



**Q : 5) A simply supported beam is subjected to a uniformly distributed load. Which one of the following statements is true?**

**A : Maximum or minimum shear force occurs where the curvature is zero.**

**B : Maximum or minimum bending moment occurs where the shear force is zero**

**C : Maximum or minimum bending moment occurs where the curvature is zero**

**D : Maximum bending moment and maximum shear force occur at the same section**

**Q : 6) 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 :  $\frac{WL}{8}$**

**B :  $\frac{WL}{16}$**

**C :  $\frac{WL}{32}$**

**D : Zero**

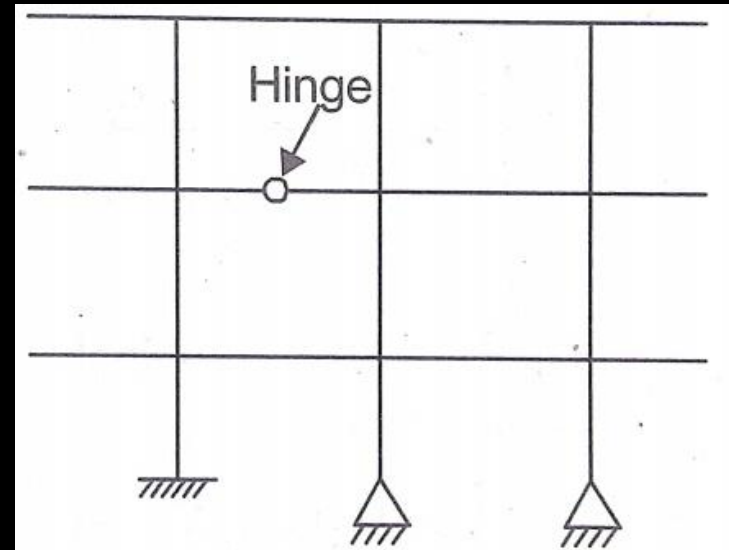
**Q : 7) The degree of static indeterminacy of the plane frame is shown in the figure is \_\_\_\_\_**

**A : 12**

**B : 13**

**C : 14**

**D : 15**





**Q : 8) Consider the following statements:**

**P. Walls of one brick thick are measured in square meters.**

**Q. Walls of one brick thick are measured in cubic meters.**

**R. No deduction in the brickwork quantity is made for openings in walls up to 0.1 m<sup>2</sup> area.**

**S. For the measurement of excavation from the borrow pit in a fairly uniform ground, deadmen are left at suitable intervals.**

**For the above statements, the correct option is**

**A : P – False; Q – True: R – False: S - True**

**B : P – False; Q – True: R – False: S - False**

**C : P - True; Q - False: R - True: S - False**

**D : P - True; Q – False: R – True: S - True**

**Q : 9) Consider the following statements for air-entrained concrete**

- (i) Air-entrainment reduces the water demand for a given level of workability**
- (ii) Use of air-entrained concrete is required in environments where cyclic freezing and thawing is expected**

**Which of the following is TRUE?**

- A : Both (i) and (ii) are True**
- B : Both (i) and (ii) are False**
- C : (i) is True and (ii) is False**
- D : (i) is False and (ii) is True**

**Q : 10) Consider the following statements:**

- 1. Modulus of elasticity of concrete increases with increase in compressive strength of concrete.**
- 2. Brittleness of concrete increases with decrease in compressive strength of concrete**
- 3. Shear strength of concrete increases with increase in compressive strength of concrete.**

**The true statements are**

**A : 2 and 3**

**B : 1, 2 and 3**

**C : 1 and 2**

**D : 1 and 3**

**Q : 11) According to IS 456-2000, which one of the following statements about the depth of neutral axis  $X_{u,bal}$  for a balanced reinforced concrete section is correct?**

**A :  $X_{u,bal}$  depends on the grade of concrete only**

**B :  $X_{u,bal}$  depends on the grade of steel only**

**C :  $X_{u,bal}$  depends on both the grade of concrete and grade of steel**

**D :  $X_{u,bal}$  does not depend on the grade of concrete and grade of steel**

**Q : 12) For avoiding the limit state of collapse, the safety of RC structures is checked for appropriate combination of Dead load (DL), Imposed load or Live Load (IL), Wind Load (WL) and Earthquake Load (EL). Which of the following load combinations is not considered?**

**A :  $0.9 \text{ DL} + 1.5 \text{ WL}$**

**B :  $1.5 \text{ DL} + 1.5 \text{ WL}$**

**C :  $1.5 \text{ DL} + 1.5 \text{ WL} + 1.5 \text{ EL}$**

**D :  $1.2 \text{ DL} + 1.2 \text{ IL} + 1.2 \text{ WL}$**

**Q : 13) Which one of the following set of values given the minimum clear cover (in mm) for the main reinforcements in the slab, beam, column and footing respectively, according to IS: 456-2000?**

**A : 20, 25, 40, 50**

**B : 5, 15, 25, 50**

**C : 15, 25, 40, 75**

**D : None**

**Q : 14) 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 : 15) Generally the maximum deflection/span ratio of a steel member should not exceed**

**A :  $\frac{1}{750}$**

**B :  $\frac{1}{500}$**

**C :  $\frac{1}{325}$**

**D :  $\frac{1}{250}$**



**Q : 16) Prying forces are:**

**A : Shearing forces on the bolts because of the joints.**

**B : Tensile forces due to the flexibility of connected ports.**

**C : Bending forces on the bolts because of the joints.**

**D : Forces due to friction between connected ports.**

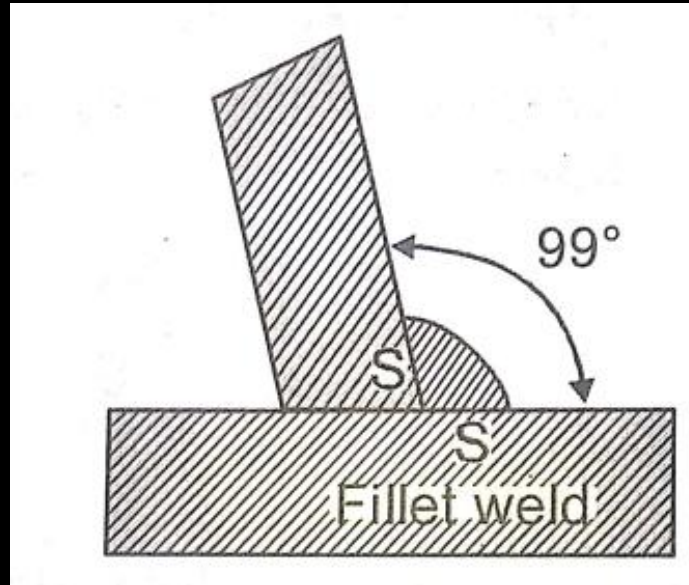
**Q : 17) For the fillet weld of size  $s$  shown in the adjoining figure, the effective throat thickness is**

**A :  $0.61 s$**

**B :  $0.65 s$**

**C :  $0.70 s$**

**D :  $0.75 s$**



**Q : 18) Maximum size of a plate of square edge is**

**A : 1.5 mm less than the thickness of the plate**

**B : One half of the thickness of the plate**

**C : Thickness of the plate itself**

**D : 1.5 mm more than the thickness of the plate**

**Q : 19) As per IS 800:2007, the cross-section in which the extreme fibre can reach the yield stress, but cannot develop the plastic moment of resistance due to failure by local buckling is classified as**

**A : Plastic section**

**B : Compact section**

**C : Semi-compact section**

**D : Slender section**

**Q : 20) A fixed-end beam is subjected to a concentrated load (P) as shown in the figure. The beam has two different segments having different plastic moment capacities ( $M_p$ ,  $2M_p$ ) as shown.**

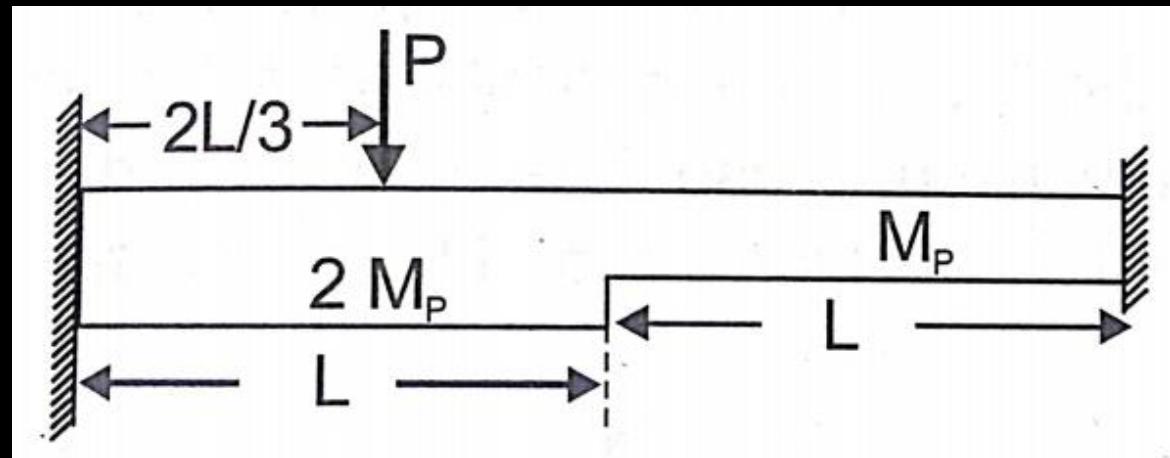
**The minimum value of load (P) at which the beam would collapse (ultimate load) is**

**A :  $7.5 M_p/L$**

**B :  $5.0 M_p/L$**

**C :  $4.5 M_p/L$**

**D :  $2.5 M_p/L$**



**Q : 21) The clay mineral, whose structural units are held together by potassium bond is**

**A : Halloysite**

**B : Illite**

**C : Kaolinite**

**D : Smectite**

**Q : 22) Group I list the type of gain or loss of strength in soils, Group II lists the property or process responsible for the loss or gain of strength in soils**

Group I	Ground II
P. Regain of strength with time	1. Boiling
Q. Loss of strength due to cyclic loading	2. Liquefaction
R. Loss of strength due to upward seepage	3. Thixotropy
S. Loss of strength due to remoulding	4. Sensitivity

**The correct match between Group I and Group II is**

**A : P-4, Q-1, R-2, S-3**

**B : P-3, Q-1, R-2, S-4**

**C : P-3, Q-2, R-1, S-4**

**D : P-4, Q-2, R-1, S-3**

**Q : 23) The volume of water that can be released by gravitational effects from a unit volume of an aquifer is its**

**A : Specific storage**

**B : Specific yield**

**C : Specific capacity**

**D : Specific porosity**



**Q : 24) A soil sample is subjected to a hydrostatic pressure  $\sigma$ . The Mohr circle for any point in the soil sample would be**

**A : A circle of radius  $\sigma$  and center at the origin**

**B : A circle of radius  $\sigma$  and center at a distance  $\sigma$  from the origin**

**C : A point at a distance  $\sigma$  from the origin**

**D : A circle of diameter  $\sigma$  and center at the origin**

**Q : 25) Consider the following statements related to the pore pressure parameters. A and B:**

**P. A always lies between 0 and 1.0**

**Q. A can be less than 0 or greater than 1.0**

**R. B always lies between 0 and 1.0**

**S. B can be less than 0 or greater than 1.0**

**For these statements, which one of the following options is correct**

**A : P and R**

**B : P and S**

**C : Q and R**

**D : Q and S**



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