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**CIVIL ENGINEERING**

# UPPSC AE

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**Q: ) As per the stress block defined in IS 456-2000, the limiting depth of neutral axis in a flexural member having effective depth 'd' reinforced with Fe 550 grade steel in tension side is**

**A : 0.48 d**

**B : 0.53 d**

**C : 0.42 d**

**D : 0.44 d**

**Q: ) The optimistic, most likely and pessimistic estimates for an activity are 4 days, 11 days and 12 days respectively. The expected completion time of this activity is**

**A : 9 days**

**B : 10 days**

**C : 11 days**

**D : 12 days**

**Q: ) According to IS 456-2000, the minimum grade of concrete with maximum free water to cement ratio of 0.5 and minimum cement content of 300 kg/m<sup>3</sup> is**

**A : M 20**

**B : M 30**

**C : M 25**

**D : M 35**

**Q: ) In the conjugate beam method, the fixed support in actual beam is considered as \_\_\_\_\_ support in the conjugate beam.**

**A : Free**

**B : Hinge**

**C : Fixed**

**D : Roller**

**Q: ) Power transmitted by a shaft in watts is given by the expression**

**Where, N = speed in rpm and T is torque**

**A :  $P = \frac{60}{2\pi NT}$**

**B :  $P = \frac{2\pi}{NT60}$**

**C :  $P = \frac{4\pi}{NT60}$**

**D :  $P = \frac{60}{4\pi NT}$**

**Q: ) For a discharge  $Q$ , the specific speed of the pump is  $N_s$ . For half discharge with the same head, the specific speed will be**

**A :  $N_s$**

**B :  $N_s\sqrt{2}$**

**C :  $\sqrt{2}/N_s$**

**D :  $2N_s$**

**Q: ) The base width of an elementary profile of a gravity dam of height H is b. The specific gravity of the material of the dam is G and uplift pressure coefficient is K. The correct relationship for no tension at the heel is given by**

**A:**  $\frac{b}{H} = \frac{1}{\sqrt{G-K}}$

**B:**  $\frac{b}{H} = \sqrt{G-K}$

**C:**  $\frac{b}{H} = \frac{1}{G-K}$

**D:**  $\frac{b}{H} = \frac{1}{\sqrt{KG-K}}$



**Q: ) If the temperature of a rod of length  $L$  is increased by  $T_0C$ , whose coefficient of linear expansion is  $\alpha$  and Young's modulus is  $E$ , then free expansion of the rod due to increase in temperature is given by which of the following expressions?**

**A :  $\alpha TE^2L$**

**B :  $\alpha T/L$**

**C :  $\alpha T/E$**

**D : None of the above**

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

**A. Pitot tube is used for measuring velocity of flow in the pipe**

**B. Manometer is used for measuring fluid pressure in a pipe**

**C. Venturimeter is used for measuring discharge in a pipe**

**Which of the above statements are correct?**

**Select the code for the correct answer from the options given below:**

**A : A and B only**

**B : B and C only**

**C : A and C only**

**D : A, B and C**

**Q: ) For a hydraulically efficient rectangular channel of bed width 5 m, the hydraulic radius is equal**

**A : 1.25 m**

**B : 2 m**

**C : 2.25 m**

**D : 1.75 m**

**Q: ) Grades of concrete for reinforced concrete shall not be lower than**

**A : M<sup>10</sup>**

**B : M<sup>15</sup>**

**C : M<sup>20</sup>**

**D : M<sup>7.5</sup>**

**Q: ) The Reinforcement in either direction in slabs shall not be less than**

**A : 0.12% of cross-sectional area**

**B : 0.15% of cross-sectional area**

**C : 0.2% of cross-sectional area**

**D : 0.25% of cross-sectional area**

**Q: ) For a pre-stressed concrete beam, a minimum clear spacing of the cable of group of cables should be**

**A : 25 mm**

**B : 25 mm or 6 mm plus the largest size of aggregate**

**C : 40 mm**

**D : 50 mm**

**Q: ) Flexural collapse in over-reinforced beams is due to**

**A : Primary compression failure**

**B : Secondary compression failure**

**C : Primary tension failure**

**D : Band failure**

**Q: ) Piezo metric head is the sum of**

**A : Velocity head and pressure head**

**B : Pressure head and datum head**

**C : Datum head and velocity head**

**D : Velocity head, pressure head and datum head**



**Q: ) As the depth of immersion of a vertical plane surface increase, the location of the centre of pressure**

**A : Comes closer to the centre of gravity of the area**

**B : Moves apart from the centre of gravity of the area**

**C : Ultimately coincides with the centre of gravity of the area**

**D : Remaining unaffected**

**Q: ) Rainfall stimulator is used for measuring**

**A : Discharge**

**B : Rainfall intensity**

**C : Infiltration**

**D : Precipitaion**

**Q: ) The hydrograph of short duration can be converted into hydrographs of longer duration by**

**A : Unit hydrograph**

**B : Synthetic unit hydrograph**

**C : S-curve method**

**D : Flood routing**

**Q: ) The basic equation which govern the motion of incompressible viscous fluid in laminar motion is**

**A : Hagen-Poiseuille equation**

**B : Stokes equation**

**C : Darcy-Weisbach equation**

**D : Navier-Stokes equation**

**Q: ) Wear of rails may be reduced by**

**A : Increasing the number of rail joints**

**B : Decreasing the number of rail joints**

**C : Using high carbon steel rail**

**D : Increasing the spacing of sleepers**

**Q: ) Composite sleeper index is employed to determine**

**A : Sleeper density requirement.**

**B : Number of fixtures requirement for a particular type of sleeper.**

**C : Durability of sleeper**

**D : Mechanical strength of wooden sleepers and thereby gives its suitability as to be used as sleepers.**

**Q: ) Sinking fund is**

**A : The fund for rebuilding a structure when its economic life is over.**

**B : Raised to meet maintenance costs.**

**C : The total sum to be paid to the municipal authorities by the tenants.**

**D : a part of the money is kept in reserve for providing additional structures and structural modifications.**

**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: ) If  $E$ ,  $G$ ,  $K$  and  $\mu$  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  $\mu$  must be known**

**C :  $E$ ,  $K$  and  $\mu$  must be known**

**D : Any two of the four must be known**

**Q: ) The displacement  $\delta^i$  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: ) A deformable body is under the action of external forces ( $F_i$ ). The external forces satisfy 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**

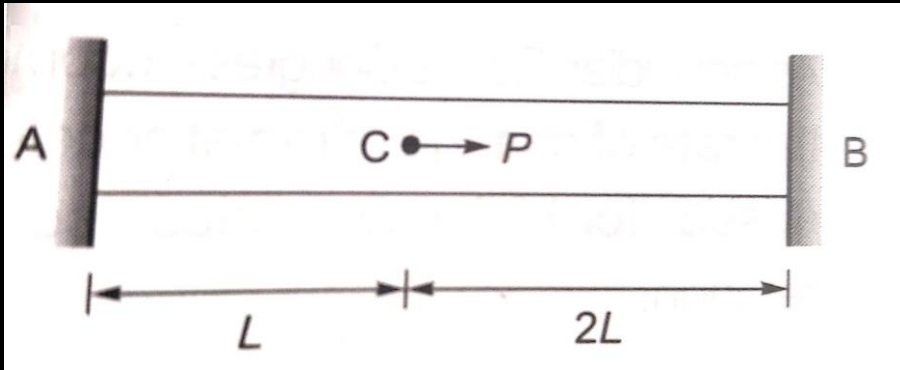
**B : Sufficient for equilibrium**

**C : Necessary and sufficient for equilibrium**

**D : None of the above**

**Q: ) A 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  $P = 120\text{ N}$  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: ) Shear failure at sections of beams without shear reinforcement normally occur on plane inclined at an angle \_\_\_\_\_ to the horizontal.**

**A : 30°**

**B : 45°**

**C : 60°**

**D : 20°**



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

**A : Linearly increasing with height**

**B : Exponentially decreasing with height**

**C : Parabolic with height**

**D : Linearly decreasing with height**

**Q: ) In a simply supported rectangular beam loaded transversely, the maximum tensile bending stress occurs at:**

**A : Top fiber**

**B : Bottom fiber**

**C : Neutral axis**

**D : Between top fiber and neutral axis**

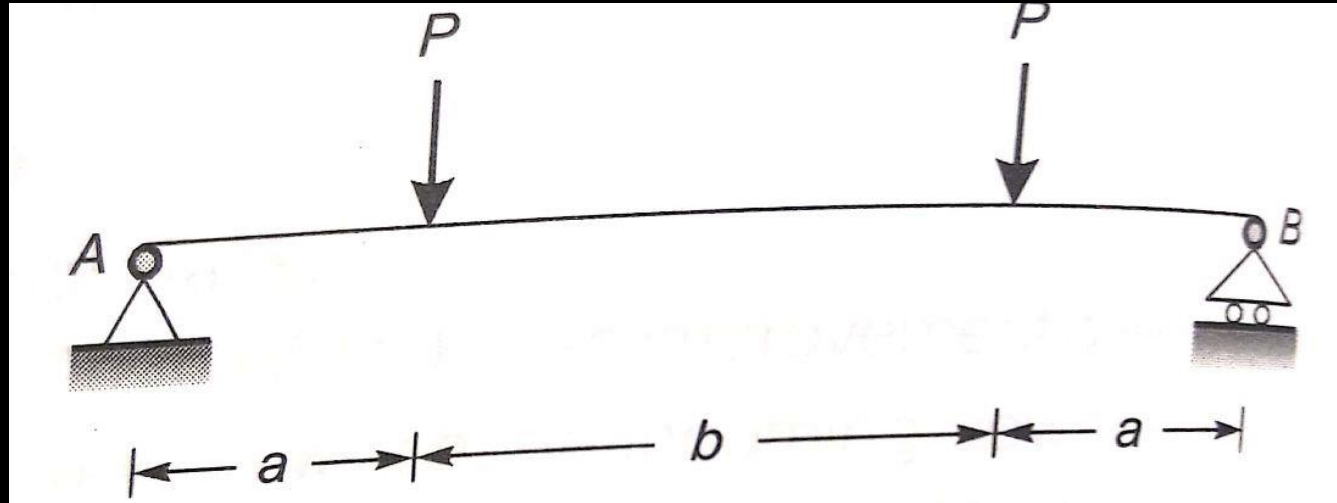
**Q: ) For a rectangular beam with cross-section having width  $b$  and depth  $d$  and loaded as shown in figure, choose the ratio of maximum shear stress to maximum bending stress:**

**A :  $d/4a$**

**B :  $d/2a$**

**C :  $b/4a$**

**D :  $b/2a$**



**Q: ) Yield strength is:**

**A : Stress required to produce certain arbitrary plastic deformation**

**B : Stress required to produce certain arbitrary elastic deformation**

**C : Stress required to cause fracture**

**D : Stress required to cause fatigue**

**Q: ) Pure torsion of a shaft produces:**

**A : Longitudinal normal stress in shaft**

**B : Only direct shear stress in the transverse section of the shaft**

**C : Circumferential shear stress on a surface element of shaft**

**D : A longitudinal shear stress and a circumferential shear stress on a surface element of shaft**

**Q: ) In a circular shaft subjected to pure twisting moment, the principal stress at a point close to the outer periphery of shaft act on a plane:**

**A :  $90^\circ$  to the axis of the shaft**

**B :  $45^\circ$  to the axis of the shaft**

**C :  $30^\circ$  to the axis of the shaft**

**D : Parallel to the axis of the shaft**

**Q: ) If the deflection at the free end of a uniformly loaded cantilever beam is 15 mm and the slope of deflection curve at free end is 0.02 radian, then the length of the beam is:**

**A : 0.8 m**

**B : 1.0 m**

**C : 1.13 m**

**D : 1.5 m**

**Q: ) Match List-I (Elastic constant) with List-II (Definition) and select the correct answer using the codes given below the lists:**

List-I (Elastic constant)	List-II (Definition)
A. Young's modulus	1. The ratio of lateral strain to linear strain within elastic limit
B. Poisson's ratio	2. The ratio of stress to strain within elastic limit
C. Bulk modulus	3. The ratio of shear stress to shear strain within
D. Rigidity modulus	4. The ratio of direct stress to corresponding volumetric strain

**A : A-3, B-1, C-4, D-2**

**B : A-2, B-1, C-4, D-3**

**C : A-2, B-4, C-1, D-3**

**D : A-3, B-4, C-1, D-2**



**Q: ) In two-way slabs, the torsional reinforcement is provided at:**

**A : Mid-depth only**

**B : Top face only**

**C : Bottom face only**

**D : Top and bottom face both**

**Q: ) If a rectangular under-reinforced section is subjected to bending moment equal to its moment carrying capacity and the stress in steel and extreme compression fiber of concrete at this moment are  $\sigma^s$  and  $\sigma^c$  respectively then which of the following is correct?**

**A :  $\sigma_c = f_c$**

**B :  $\sigma_s = f_y$   $\sigma_s = f_y$**

**C :  $\sigma_s$**

**D :  $\sigma_s = f_y$  and  $\sigma_c = f_c$**

**Q: ) Concrete is sea-water or exposed directly along the sea-coast shall be at-least \_\_\_\_\_ in case of reinforcement concrete.**

**A : M 20**

**B : M 30**

**C : M 25**

**D : M 40**

**Q: ) The buckling class associated with the built up compression member is \_\_\_\_\_.**

**A : Buckling class "a"**

**B : Buckling class "b"**

**C : Buckling class "c"**

**D : Buckling class "a" or "b"**

**Q: ) Which one of the following solid sections will have minimum shape factor?**

**A : Circular**

**B : Rectangular**

**C : Triangular**

**D : Diamond**

**Q: ) For the 16 mm nominal diameter rivets, the diameter of the rivet hole is kept equal to:**

**A : 14.0 mm**

**B : 14.5 mm**

**C : 17.5 mm**

**D : 18.0 mm**

**Q: ) As per IS:800-2007, the partial safety factor for materials, in which resistance is governed by the ultimate stress, is \_\_\_\_\_.**

**A : 1.1**

**B : 0.85**

**C : 1.25**

**D : 1.05**

**Q: ) The critical load for a column of length  $L$  will be minimum when:**

**A : Both end are hinged**

**B : Both ends are rigid**

**C : One end is fixed and other hinged**

**D : One end is fixed and other free**





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