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Q : 1) Rivets under combined stresses must be subjected to a limit as

Where, τ_v and σ_t = The actual shear and tensile stresses in the rivets, respectively.

τ_{vf} and σ_{tf} = Allowable shear and tensile stresses in the rivets, respectively.

A: $\frac{\tau_v}{\tau_{vf}} + \frac{\sigma_t}{\sigma_{tf}} \leq 2.0$

B: $\frac{\tau_v}{\tau_{vf}} + \frac{\sigma_t}{\sigma_{tf}} \leq 1.5$

C: $\frac{\tau_v}{\tau_{vf}} + \frac{\sigma_t}{\sigma_{tf}} \leq 1.0$

D: $\frac{\tau_v}{\tau_{vf}} + \frac{\sigma_t}{\sigma_{tf}} \leq 1.4$

Q : 2) Excavation was being carried out for a foundation on plastic caly with a unit weight of 22.5 kN/m^3 . Failure occurred when a depth of 8.10 m was reached. What is the value of cohesion if $\phi = 0^\circ$?

- A: 11.4 Kn/m^2 B: 22.8 kN/m^2**
C: 45.6 kN/m^2 D: None of these

Q : 3) Match List-I and List-II and select correct answer using the codes given below the list.

List-I	List-II
i. Dead load	1. IS : 875-2015 (Part – 4)
ii. Imposed load	2. IS : 875 – 2015 (Part – 3)
iii. Wind load	3. IS : 875 – 2015 (Part – 2)
iv. Snow load	4. IS : 875 – 2015 (Part – 1)

Codes:

A: 4, 3, 2, 1

B: 4, 3, 1, 2

C: 3, 4, 2, 1

D: 3, 4, 1, 2

Q : 4) The poison's ratio for soil sample 1 and 2 are μ_1 and μ_2 respectively. If $\frac{\mu_1}{\mu_2} = 1.5$ and $\frac{1 - \mu_1}{1 - \mu_2} = 0.875$, then ratio of coeff. Of earth pressure at rest for soil sample 1(K_1) to coeff. Of earth pressure at rest for soil sample 2 (K_2), $\frac{K_1}{K_2}$ will be

A: 1.3125

B: 1.7143

C: 1.9687

D: 1.8213

Q : 5) In the design of steel structure, for the purpose of designing any member, the load generated due to secondary effects include

- 1. Due to contraction or expansion from the temperature**
- 2. Due to differential settlement of structure**
- 3. Due to accidental loads**
- 4. Due to eccentric connections**

A: Only 1 and 3

B: Only 1, 2 and 3

C: Only 1, 2 and 4

D: 1, 2, 3 and 4

Q : 6) For sand of uniform spherical particles, the void ratio in the loosest and densest state, are respectively

A: 0.91, 0.35

B: 0.35, 0.91

C: 0.65, 0.09

D: 0.09, 0.65

Q : 7) Prying forces are

A: Forces due to the friction between connected parts

B: Bending forces on the bolts because of the joints

C: Shearing forces on the bolts because of joints

D: Tensile forces due to the flexibility of connected parts

Q : 8) The constant of proportionality between seepage velocity and hydraulic gradient is called

A: Seepage coefficient

B: Coefficient of transmissibility

C: Coefficient of percolation

D: Modified coefficient of permeability

Q : 9) In a steel plate with bolted connection the rupture of the net section is a mode of failure under

A: Tension

B: Compression

C: Flexure

D: Shear

Q : 10) A 300 mm square bearing plate settles by 21 mm in a plate load test on a cohesive soil, when the intensity of loading is 0.2 N/mm^2 . The settlement of a prototype shallow footing 1 m square ($1\text{m} \times 1\text{m}$) under the same intensity of loading (considering both plate and footing are placed at same depth) is

- A: 15 mm**
- B: 70 mm**
- C: 50 mm**
- D: 167 mm**

Q : 11) The flange splice in plate girders is preferably placed near about

A: Mid span section

B: Quarter span section

C: End section

D: Any section

Q : 12) In a drained triaxial compression test conducted on dry sand, failure occurred when the deviator stress was 218 kN/m^2 at a confining pressure of 61 kN/m^2 . The effective angle of shearing resistance and the inclination of failure plane to major principal plane will be

A: 34° , 62°

B: 34° , 28°

C: 40° , 25°

D: 40° , 65°

Q : 13) A steel section is subjected to a combination of shear and bending actions. The applied shear force is 'V' and shear capacity of the section is ' V_s '. For such sections, high shear force (as per IS: 800-2007) is defined as

A: $V > 0.6 V_s$

B: $V > 0.7 V_s$

C: $V > 0.8 V_s$

D: $V > 0.9 V_s$

Q : 14) Torsion resisting capacity of a given RC section

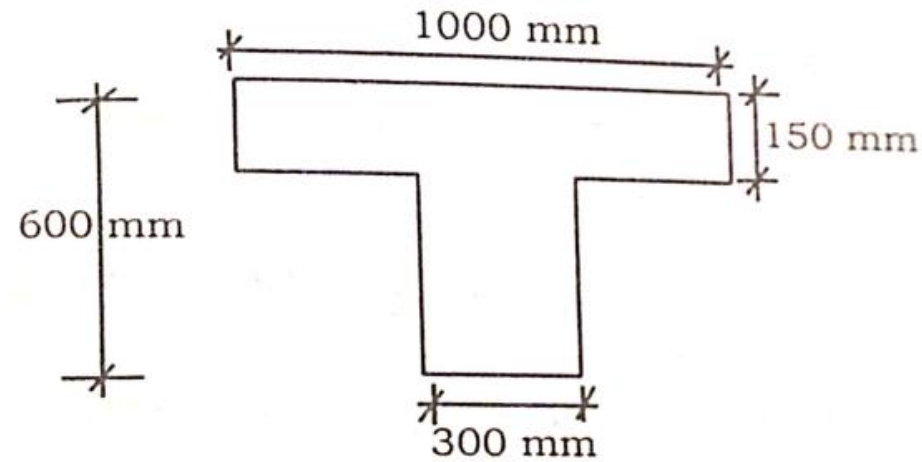
A: Decrease with decrease in stirrup spacing

B: Decrease with increasing the number of longitudinal bars

C: Does not depend upon stirrup and longitudinal steel

D: Increase with the increase in stirrup and longitudinal steel

Q : 14) An isolated T-beam is used as a walkway. The beam is simply supported with an effective span of 6 m. The effective width of the flange for the cross-section shown in figure is



A: 900 mm

B: 1000 mm

C: 1259 mm

D: 2200 mm

Q : 15) As per Rankine analysis, the minimum depth of foundation (D_{\min}) will be

Where, q = intensity of loading

γ = unit wt. of over-burden

ϕ = angle of internal friction of soil

A: $\frac{q}{\gamma} \left[\frac{1 - \sin \phi}{1 + \sin \phi} \right]^2$

B: $\frac{q}{\gamma} \left[\frac{1 - \sin \phi}{1 + \sin \phi} \right]$

C: $\frac{q}{\gamma} \left[\frac{1 + \sin \phi}{1 - \sin \phi} \right]$

D: $\frac{q}{\gamma} \left[\frac{1 + \sin \phi}{1 - \sin \phi} \right]^2$

Q : 16) Factored shear force of 140 kN is applied on a beam having breadth 250 mm. The beam is also subjected to factored torsional moment of 20 kN-m. The equivalent shear force on the beam is

A: 298 kN

B: 348 kN

C: 268 kN

D: 300 kN

Q : 17) The net ultimate bearing capacity of a purely cohesive soil

A: Depends on both, width and depth of footing

B: Depends on only width of footing

C: Depends on only depth of footing

D: Is independent of both, depth and width of footing

Q : 18) A reinforced concrete wall carrying vertical loads, is generally designed as per recommendations given for columns. The ratio of minimum reinforcement in the vertical and horizontal direction is

A: 2 : 1

B: 1 : 1

C: 5 : 3

D: 3 : 5

Q : 19) The test conducted on foundation soil gives SPT value ; $N \leq 5$ and density index, $I_D < 20$, the foundation will fail in

A: General shear

B: Local shear

C: Punching shear

D: Sinking shear

Q : 20) As per IS : 456-2000, the range of standard concrete is

A: $M_{25} - M_{55}$

B: $M_{20} - M_{55}$

C: $M_{25} - M_{50}$

D: None of these

Q : 21) For any applied stress, zone of influence refers to isobar corresponding to

A: 20%

B: 15%

C: 10%

D: 5%

Q :22) The optimum moisture content of a clay soil is 24%, when compaction test is conducted at 30% moisture content, its structure will be

A: Flocculated

B: Single grained

C: Honey comb

D: Dispersed

Q : 23) In a flow net drawn below a sheet pile wall, the number of flow channels and head drops is 4 and 12 respectively. If the difference in the upstream and downstream water level is 3 m, what is the discharge per meter width of a sheet?

A: $1 \text{ m}^3/\text{s}/\text{m}$

B: $0.1 \text{ m}^3/\text{s}/\text{m}$

C: $0.01 \text{ m}^3/\text{s}/\text{m}$

D: $0.001 \text{ m}^3/\text{s}/\text{m}$

Q : 24) In the design of reinforced concrete beam, the requirement for bond is NOT getting satisfied. The economical option to satisfy the requirement for bond is given by

A: Bundling of bars

B: Providing same diameter bars more in number

C: Providing larger diameter bars less in number

D: Providing smaller diameter bars more in number

Q : 25) Shrinkage limit of clay whose void ratio in dry state is 0.55 and Sp. Gravity is 2.75, will be

A: 20%

B: 5%

C: 5.5%

D: 10.0%

Q : 26) The flexural strength of M-30 concrete as per IS : 456-2000 is

A: 3.83 MPa

B: 5.47 MPa

C: 21.23 MPa

D: 30.00 MPa

Q : 27) The most useful geosynthetic physical property which is closely related to engineering performance is

A: Thickness

B: Mass per unit area

C: Strength

D: Stiffness

Q : 28) For a singly reinforced balanced section, $\mu_{u, \lim} = R_u, \lim \cdot B \cdot d^2$; for M-20 grade concrete and Fe-415 steel, the value of R_u, \lim will be

A: 1.995

B: 2.660

C: 2.761

D: 2.978

Q : 29) For the clay with an OCR of greater than 4 in a CD test, the A-factor at failure will be

A: Zero

B: Positive (less than 1)

C: Negative

D: Positive (More than 1)

Q : 30) A concrete beam of rectangular cross-section of 200 mm × 400 mm is prestressed with a force of 400 kN at an eccentricity 100 mm. The maximum compressive strength in concrete is

A: 2.5 N/mm²

B: 5.0 N/mm²

C: 7.5 N/mm²

D: 12.5 N/mm²

Q : 31) As per IS : 1892 – 1979 ; what should be the maximum thickness of cutting edge of sampling tube of 70 mm external diameter which is required for sampling in undisturbed stiff clay soil?

A: 2.15 mm

B: 3.05 mm

C: 3.95 mm

D: 6.10 mm

Q : 32) The lateral ties in reinforced concrete rectangular column under axial tension are used to

A: Avoid the buckling of the longitudinal steel under compression

B: Provide adequate shear capacity

C: Provide adequate confinement to concrete

D: Reduce the axial deformation of the column

Q : 33) What is the correct mathematical expression for the assumption 'consolidation is occurring under small changes in effective stress' made in arriving the differential equation for transient flow during one-dimensional consolidation?

A: $av = \text{constant}$

B: $\frac{1}{(1 + e_0)} dx \cdot dy \cdot Dz = \text{constant}$

C: $\gamma_w = \text{constant}$

D: $h = \frac{u}{\gamma_w}$

Q : 34) Fire resistance of RCC member depends upon

- 1. Member size**
- 2. Cover of steel reinforcement**
- 3. Type of aggregate**

A: Only on 2

B: Only on 1 and 2

C: Only on 2 and 3

D: 1, 2 and 3

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