ENGINEERS' EDUCARE COACHING CENTRE

NO 1 INSTITUTE FOR APPSC A.E & J.E

# APPSC

## ASSISTANT ENGINEER (AE)

## RECRUITMENT TEST - 2022

Held on: 12 June 2022

## Questions with Detailed Solution

**CIVIL ENGINEERING**

*For more details Call us at 84030 81436*

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# SUBJECT WISE WEIGHTAGE

| Sl. No. | Subject | Marks |
|---|---|---|
| 1. | Soil Mechanics | 19 |
| 2. | Strength of Materials | 12 |
| 3. | RCC | 12 |
| 4. | Steel | 10 |
| 5. | Estimating | 10 |
| 6. | Building Construction | 9 |
| 7. | Highway | 8 |
| 8. | Building Material | 6 |
| 9. | Sanitation | 4 |
| 10. | Water Supply | 4 |
| 11. | Concrete Technology | 4 |
| 12. | Bridge Engineering | 2 |
| | **Total** | **100** |

1. The plinth area of a building includes the

(A) area of the walls at the floor level

(B) lift and wall excluding landing

(C) area of cantilevered porch

(D) Both (A) and (B)

**Answer: A**

2. Pick up the correct statement regarding the centre line method of estimating a building.

(A) Product of the centre line of the walls and area of cross-section of any item, gives total quantity of the item

(B) The centre line is worked out together for different sections of walls of a building

(C) The centre line length is increased by half the layer of main wall joining the partition wall

(D) All of the above

**Answer: A**

3. The ____ area of a building along with area of its kitchen, pantry, lavatory, bathroom and glazed veranda is called ____ area.

(A) floor, carpet

(B) carpet, floor

(C) floor, built-up

(D) carpet, built-up

**Answer: B**

4. Box type section should preferably be used at places where ____ occurs.

(A) compression

(B) tension

(C) torsion

(D) None of the above

**Answer: C**

5. ____ in a steel column should be designed to resist shear force due to 2·5% of the column load.

(A) Shear lags

(B) Lacing bars

(C) Lug angles

(D) Ties

**Answer: B**

6. In moment resistant connections, the moment resistance of riveted connection depends upon

(A) shear in rivets

(B) compression in rivets

(C) tension in rivets

(D) strength of rivets in bearing

**Answer: A**

7. The maximum slenderness ratio of a steel compression member subjected to dead load and live load is

(A) 180

(B) 250

(C) 350

(D) 400

**Answer: A**

8. As per IS : 800, the efficiency of a ____ having the minimum pitch is 60%.

(A) butt joint

(B) bolted joint

(C) riveted joint

(D) welded joint

**Answer: C**

Min^m. pitch, $p_{min^m} = 2.5d$.

Efficiency, $\eta$ = $\frac{\text{Tearing Strength of plate}}{\text{Strength of solid plate}} \times 100\%$ in a riveted Connection.

$= \frac{(p-nd)\times t \times \sigma_{at}}{t \times p \times \sigma_{at}} \times 100\%$

$= \frac{p-d}{p} \times 100\%$; $n = 1$.

$= \frac{2.5d-d}{2.5d} \times 100\%$.

$= \frac{1.5d}{2.5d} \times 100\%$.

$= 60\%$.

Thus in a riveted Connection, efficiency is 60% with minm. pitch.

9. ____ web stiffeners are used in plate girder to avoid buckling of web plate.

(A) Horizontal

(B) Inclined

(C) Vertical

(D) Vertical and horizontal

**Answer: C**

10. High strength bolts are the most suitable type of bolt when the bolts are subjected to

(A) decrease in stresses

(B) increase in stresses

(C) reversal of stresses

(D) None of the above

**Answer: C**

11. A tri-axial shear test is preferred to direct shear test, because

(A) it can be performed under all three drainage conditions with complete control

(B) stress distribution on the failure plane is non-uniform

(C) precise measurement of pore pressure and change in volume during test is not possible

(D) None of the above

**Answer: A**

12. Load on connection is not eccentric for

(A) lap joint

(B) single cover butt joint

(C) welded joint

(D) None of the above

**Answer: D**

13. Effective diameter of rivet is equal to

(A) rivet hole diameter

(B) nominal diameter of rivet

(C) 1·5 times of rivet hole diameter

(D) 1·5 times of nominal diameter of rivet

**Answer: A**

14. The partial safety factor for strength of ____ at limit state of collapse is 1·15.

(A) steel

(B) concrete

(C) aggregate

(D) None of the above

**Answer: A**

15. If the ____ in an RCC beam is greater than ____, shear reinforcement shall be provided.

(A) nominal shear stress, design shear stress

(B) nominal shear stress, maximum shear stress

(C) design shear stress, nominal shear stress

(D) design shear stress, maximum shear stress

**Answer: A**

16. In a reinforced concrete beam, if the failure strain of concrete in bending compression reaches earlier than yield strain in steel, the beam section is called

(A) balanced section

(B) critical section

(C) overreinforced section

(D) underreinforced section

**Answer: C**

17. The spacing of transverse reinforcement of column is decided by which of the following considerations?

(A) Sixteen times the diameter of the transverse reinforcement

(B) Forty eight times the diameter of the smallest longitudinal bar in the column

(C) Forty eight times the diameter of the transverse reinforcement

(D) None of the above

**Answer: D**

18. A 300 mm×300 mm RC column is reinforced with eight bars. Four bars are 12 mm diameter and four bars are 10 mm diameter. The diameter of lateral ties is 6 mm. The pitch of lateral ties shall be kept as

(A) 300 mm

(B) 288 mm

(C) 192 mm

(D) 160 mm

**Answer: D**

Clm Size = 300mm × 300mm.

$A_{sc} = 4 \times \pi/4 \times 12^2 + 4 \times \pi/4 \times 10^2$

$= 766.55\ mm^2$

$\phi_{lt} = 6\ mm$

pitch of lateral ties is the lesser of the following

(i) least lateral dimension of Clm = 300mm.

(ii) 16× Dia of Smallest Dia. longitudinal bar

$= 16 \times 10 = 160\ mm$.

(iii) 300mm.

∴ spacing = 160mm.

19. As per IS : 456, the reinforcement in a ____ should not be less than 0·8% and not more than 6% of cross-sectional area.

(A) beam

(B) column

(C) slab

(D) rectangular beam

**Answer: B**

20. Tensile reinforcement bars of a rectangular beam are ____ at suitable places to serve as ____ reinforcement.

(A) bent down, shear

(B) bent up, shear

(C) bent down, compression

(D) bent up, compression

**Answer: B**

21. Pick up the correct statement from the following :

(A) Alternate bars are curtailed at $\frac{1}{7}$th of the span of simply supported beam

(B) Alternate bars are curtailed at $\frac{1}{7}$th of the span of simply supported slab

(C) Alternate bars are curtailed at $\frac{1}{5}$th of the span of simply supported beam

D) Alternate bars are curtailed at $\frac{1}{5}$th of the span of simply supported slab

**Answer: B**

22. The steel generally used in RCC work is

(A) stainless steel

(B) high carbon steel

(C) high tension steel

(D) mild steel

**Answer: C**

23. Limiting value of ratio of depth of neutral axis to effective depth for Fe-415 grade of steel as per IS : 456-2000 is

(A) 0·53

(B) 0·46

(C) 0·56

(D) 0·48

**Answer: D**

24. For RCC bridges, the smallest span beyond which the impact factor is same for class ____ loading (wheeled vehicles) is 12 m.

(A) A or B

(B) AA

(C) 70R

(D) All of the above

**Answer: D**

For class A & B

RCC Bridge $I.F = \frac{4.5}{6+L}$

$= \frac{4.5}{6+12}$

$= 0.25$

$= 25\%$

For class AA & 70 R

RCC Bridge (wheeled vehicle) is 25% as per IRC upto 12 m

25. The ____ gradient for vertical profile of a road is ruling gradient.

(A) maximum design

(B) minimum design

(C) exceptional design

(D) critical design

**Answer: A**

26. The equilibrium superelevation required to counteract the centrifugal force fully for a higher circular curve of radius $R$ and design speed $V$ is

(A) $\frac{V^2}{27{\cdot}5R}$

(B) $\frac{V^2}{75R}$

(C) $\frac{(0{\cdot}75V)^2}{127R}$

(D) $\frac{V^2}{127R}$

**Answer: D**

27. California bearing ratio is a

(A) method of soil identification

(B) measure to indicate the shear strength of lateral confinement

(C) measure to indicate the strength of soil

(D) measure to indicate the relative strengths of paving material

**Answer: D**

28. If the aggregate impact value is ____ percent, then it is classified as satisfactory for road surfacing.

(A) 10 to 20

(B) 20 to 30

(C) 30 to 40

(D) 40 to 50

**Answer: B**

29. A bitumen primer is a _____cutback.

(A) low viscosity

(B) medium viscosity

(C) high viscosity

(D) None of the above

**Answer: C**

30. The camber of shoulders in water bound macadam roads is

(A) zero

(B) less than the cross slope of pavement

(C) more than the cross slope of pavement

(D) None of the above

**Answer: D**

31. The ductility value of bitumen for suitability in road construction should _____ 50 cm.

(A) be equal to

(B) be less than

(C) not be less than

(D) None of the above

**Answer: C**

32. Which of the following piles is used to compact loose granular soil?

(A) Friction piles

(B) End bearing piles

(C) Tension piles

(D) None of the above

**Answer: D**

Compaction pile is used to compact loose granular soil

33. Bottommost layer of pavement is known as

(A) base course

(B) sub-base course

(C) subgrade

(D) wearing course

**Answer: C**

34. The measure of absorption or scattering of light by the _____ present in the water is known as turbidity.

(A) dissolved solids

(B) suspended solids

(C) total solids

(D) All of the above

**Answer: B**

35. Bearing capacity of soil should be calculated from the criteria of

(A) compaction only

(B) settlement only

(C) compaction and settlement

(D) shear and settlement

**Answer: D**

36. Which coagulant is generally used for sewage treatment?

(A) Alum

(B) Lime

(C) Ferric chloride

(D) Bleaching powder

**Answer: C**

37. Biological action is used in

(A) tricking filter

(B) grit chamber

(C) screens

(D) sedimentation tank

**Answer: A**

38. The gases given out of a septic tank are

(A) $CO_2 + SO_2 + N$

(B) $CO_2 + PH_3 + NH_3$

(C) $CO_2 + CH_4 + H_2S$

(D) $CH_4 + O_2 + H_2$

**Answer: C**

39. Detention time assumed while designing a ____ is 20 minutes.

(A) flocculator

(B) coagulation tank

(C) rapid sand filter

(D) slow sand filter

**Answer: A**

40. In sewage treatment plant, the oil and grease are removed by

(A) oxidation

(B) filtration

(C) screening

(D) skimming

**Answer: D**

41. In a centrifugal pump casing, the flow of water leaving the impeller is

(A) radial

(B) centrifugal

(C) rectilinear

(D) None of the above

**Answer: D**

**Answer is Free Vortex**

42. As per IS : 456-2000 for the design of reinforced concrete beam, the ____ depends on the grade of concrete.

(A) maximum allowable shear stress

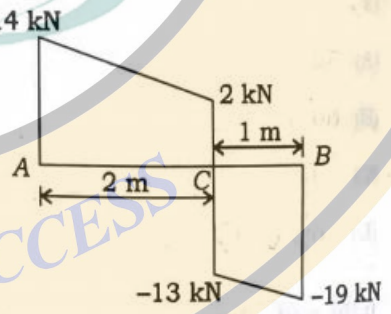
(B) maximum allowable bending stress

(C) maximum allowable normal stress

(D) minimum allowable bending stress

**Answer: A**

43. The shear force of diagram of a loaded simply supported beam is shown in the figure below. The maximum bending moment in the beam is




(A) 16 kNm

(B) 28 kNm

(C) 36 kNm

(D) 8 kNm

**Answer: A**

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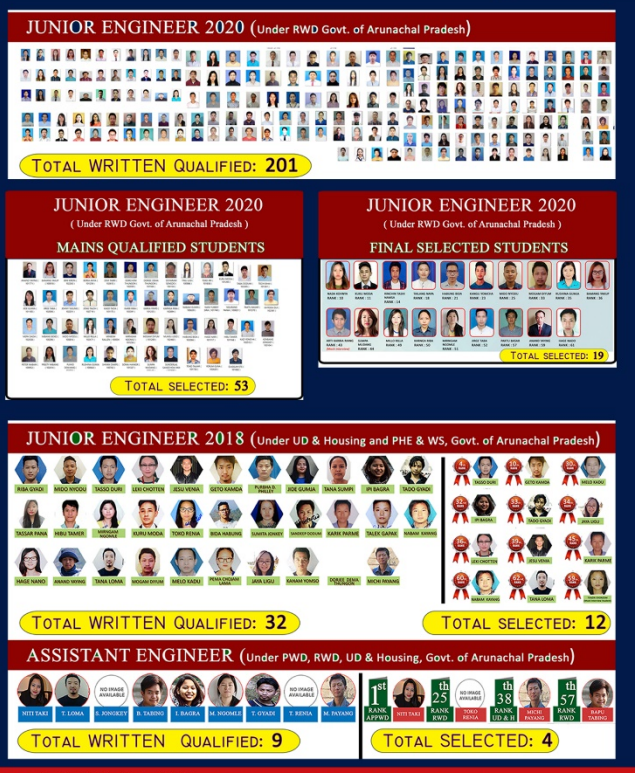


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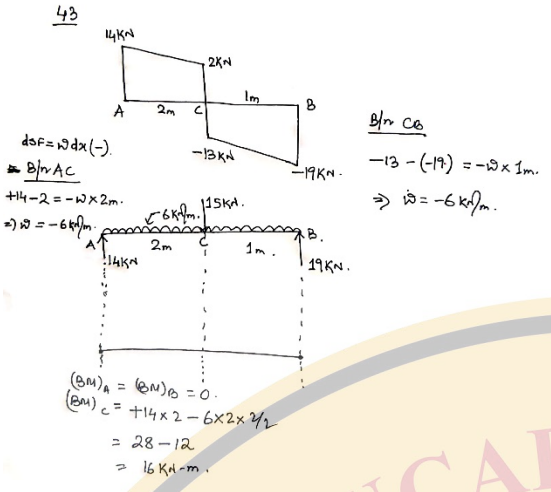
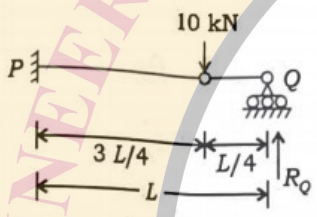



44. A vertical load of 10 kN acts on a hinge located at a distance of $L/4$ from the roller support Q of a beam of length $L$ (see figure). The vertical reaction at support Q is



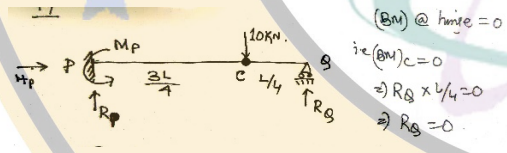

(A) 0·0 kN

(B) 2·5 kN

(C) 7·5 kN

(D) 10·0 kN

**Answer: A**




45. A structural member subjected to ____ has both translation and rotation restrained at one end, while only translation is restrained at the other end. As per IS : 465-2000, the effective length factor recommended for design is 0·8.

(A) tension

(B) compression

(C) shear

(D) torsion

**Answer: B**

46. As per the provisions of IS : 456-2000, if the long-term static modulus of elasticity is 10000 MPa, then the creep coefficient of M-25 concrete is

(A) 1·5

(B) 3·0

(C) 4·5

(D) 6·0

**Answer: A**

Long term elastic modulus of Concrete.

$E_\theta = \frac{E_c}{1+\theta}$

Where, $E_c = 5000\sqrt{f_{ck}}$

$\theta$ = creep co-efficient

$\therefore 10,000 = \frac{5000\times\sqrt{25}}{1+\theta}$

$\Rightarrow \theta = 1.5$

47. The highway bridges shall not be considered to be carrying any live load when the wind velocity at deck level exceeds

(A) 50 km/hr

(B) 70 km/hr

(C) 130 km/hr

(D) 150 km/hr

**Answer: C**

48. A wooden pile is being driven with a drop hammer weighing 30 kN and having a free fall of 2·0 m. The penetration in the last blow is 5 mm. The load carrying capacity of the pile as per Engineering News formula is

(A) 111·11 kN

(B) 222·22 kN

(C) 333·33 kN

(D) 444·44 kN

**Answer: C**

Weight of hammer = (W) = 30 kN.

Height of fall = 2 m = 200 cm

S = 5 mm = 0·5 cm.

For drop hammer, C = 2·5 cm.

∴ Load carrying capacity.

$$= \frac{W \cdot H}{6(S + 2.5)}$$

$$= \frac{30 \times 200}{6(0.5 + 2.5)}$$

$$= 333.33 \text{ kN}.$$

49. A saturated sand sample has a specific gravity of 2·65. If $\gamma_w = 9{\cdot}81$ kN/m$^3$ and water content of the soil = 0·167, then, what is the dry unit weight (in kN/m$^3$) of soil?

(A) 12

(B) 14

(C) 16

(D) 18

**Answer: D**

$G = 2.65$

$\gamma_w = 9.81 \text{ kN/m}^3$.

$w = 0.167$

$\gamma_d = ?$

$\because Se = wG$.

$\Rightarrow e = \frac{wG}{S}$

$= \frac{0.167 \times 2.65}{1}$

$= 0.442$.

$S = 1$ since soil is saturated

$\therefore \gamma = \frac{G + Se}{1 + e}\gamma_w$

$= \frac{2.65 + 1 \times 0.442}{1 + 0.442} \times 9.81$

$= 21.035 \text{ kN/m}^3$.

$\because \gamma_d = \frac{\gamma}{1 + w}$

$= \frac{21.035}{1 + 0.167}$

$= 18.024$

$\simeq 18 \text{ kN/m}^3$.

50. A soil has a bulk unit weight of 20·22 kN/m$^3$ and water content of 15%. Calculate the water content of the soil which partially dries to a unit weight of 19·42 kN/m$^3$ and voids ratio remains unchanged.

(A) 8%

(B) 11%

(C) 20%

(D) 23%

**Answer: B**

$\gamma_1 = 20.22\ kN/m^3 \quad \omega_1 = 0.15$

$\gamma_2 = 19.42\ kN/m^3 \quad \omega_2 = ?$

$\because \gamma_d = \frac{\gamma_1}{1+\omega_1} = \frac{\gamma_2}{1+\omega_2}$

$\Rightarrow \frac{20.22}{1+0.15} = \frac{19.42}{1+\omega_2}$

$\Rightarrow \omega_2 = 0.104 = 10.4\% \simeq 11\%$

51. Pick up the ***incorrect*** statement from the following :

(A) Permeability of soil is influenced by size of soil particles

(B) Permeability of soil increases with increase in degree of saturation.

(C) Permeability of soil is inversely proportional to the temperature.

(D) Permeability of soil is inversely proportional to the viscosity of the fluid

**Answer: C**

$K = C \frac{\gamma_w}{\mu} \cdot \frac{e^3}{1+e} D^2.$

$K \propto \frac{1}{\mu} \qquad \mu \propto \frac{1}{T}$

$\Rightarrow K \propto T$

52. The efficiency of the pump at half-load is

(A) 50%

(B) 60%

(C) 70%

(D) 80%

**Answer: B**

53. If the void ratio of a soil sample is 25%, the porosity is

(A) 20%

(B) 25%

(C) 50%

(D) 75%

**Answer: A**

$e = 25\% = 0.25$

$n = \frac{e}{1+e}$

$= \frac{0.25}{1+0.25}$

$= 0.2$

$= 20\%$

54. Which one of the following building materials should ***not*** absorb water more than 5%?

(A) Brick

(B) Stone

(C) Tiles

(D) None of the above

**Answer: B**

55. The disease of ____ in timber is caused due to lack of ventilation.

(A) dry rots

(B) burls

(C) callus

(D) rind galls

**Answer: A**

56. The presence of ____ in bricks prevents cracking.

(A) alumina

(B) lime

(C) silica

(D) iron oxide

**Answer: C**

57. The normal consistency of ordinary Portland cement is about

(A) 10%

(B) 20%

(C) 30%

(D) 25%

**Answer: C**

58. The phenomenon of increase in volume of sand due to ____ around the sand particles is known as bulking of sand.

(A) presence of moisture content

(B) presence of air

(C) presence of clay content

(D) None of the above

**Answer: A**

59. What happens to the strength of concrete on increasing loading rate?

(A) It increases

(B) It decreases

(C) It is unaffected by rate of loading

(D) None of the above

**Answer: A**

60. What is the approximate ratio of direct tensile strength to flexural strength of concrete?

(A) 1

(B) 0·75

(C) 0·5

(D) 0·25

**Answer: C**

Flexural strength of concrete = $0.7\sqrt{f_{ck}}$.

Direct tensile strength = $\frac{1}{2}$ × Flexural strength.

$\therefore \frac{\frac{1}{2} \times 0.7\sqrt{f_{ck}}}{0.7\sqrt{f_{ck}}} = \frac{1}{2} = 0.5$.

61. The crack propagation in high strength concrete may occur through the coarse aggregates.

(A) True

(B) False

(C) Can't say

(D) None of the above

**Answer: A**

62. Which of the following factors affects the mechanical properties of a material under applied loads?

(A) Grain size

(B) Imperfection and defects

(C) Content of alloys

(D) Shape of material

**Answer: D**

63. The time dependent deformation decreases as the aggregate content in the concrete

(A) decreases

(B) increases

(C) remains same

(D) Can't say

**Answer: B**

64. Principal planes are those on which normal stress is

(A) maximum

(B) minimum

(C) either maximum or minimum

(D) zero

**Answer: C**

65. A cantilever beam $AB$ of length $l$ carries a concentrated load $W$ at its midspan $C$. If the free end $B$ is supported on a rigid prop, then there is a point of contraflexure

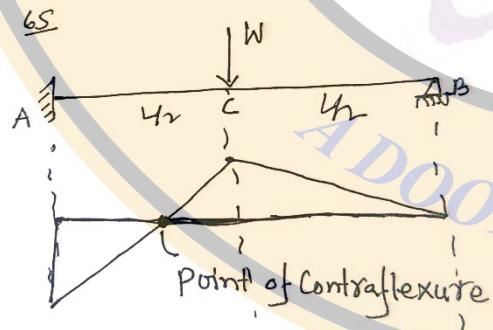
(A) between $A$ and $C$

(B) between $C$ and $B$

(C) one between $A$ and $C$, and other between $C$ and $B$

(D) Nowhere in the beam

**Answer: A**




66. For a beam of rectangular section of width $b$ and depth $d$, the maximum bending stress in the cross-section for a moment $M$ is

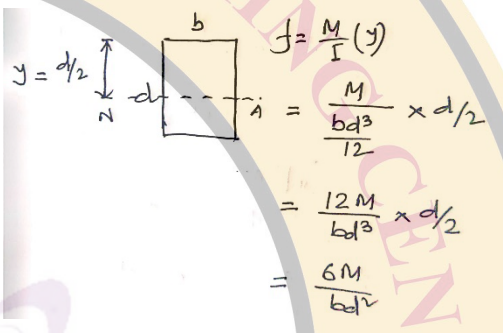
(A) $\frac{6M}{bd^3}$

(B) $\frac{M}{bd^2}$

(C) $\frac{12M}{bd^3}$

(D) $\frac{6M}{bd^2}$

**Answer: D**




67. Sudden changes in shear stress distribution diagram at a cross-section shows

(A) sudden change in depth of the section

(B) sudden change in width of the section

(C) Both (A) and (B)

(D) None of the above

**Answer: B**

68. The bending moment diagram for a simply supported beam carrying a uniformly distributed load $w$ per unit length, will be

(A) a horizontal line

(B) a vertical line

(C) an inclined line

(D) a parabolic curve

**Answer: D**

69. At a section of a beam, shear force is F with zero BM. The cross-section is square with side $a$. Point $A$ lies on neutral axis and point $B$ is mid-way between neutral axis and the top edge. If $\tau_A$ and $\tau_B$ denote shear stresses at points $A$ and $B$, then the value of $\tau_A/\tau_B$ is

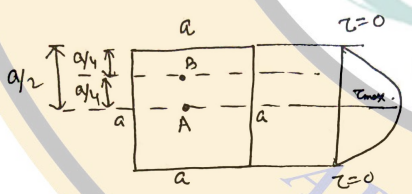
(A) 2/3

(B) 3/2

(C) 4/3

(D) 3/4

**Answer: C**




$\tau = \frac{V \cdot AY}{b \cdot I}$

$\tau_{max} = \tau_A = \frac{F \times (a \times a/4) \times a/4}{a \times a \times \frac{a^3}{12}} = \frac{12Fa^3}{2 \times 4 \times a^5}$

$= \frac{3}{2} \frac{F}{a^2}$.

$\tau_B = \frac{F(a \times a/4) \times (\frac{a}{4} + \frac{a}{8})}{a \times a \frac{a^3}{12}} = \frac{12Fa^3 \times 3/8}{4 \times a^5}$

$= \frac{9}{8} F/a^2$.

$\therefore \frac{\tau_A}{\tau_B} = \frac{3}{2} / \frac{9}{8} = 4/3$.

70. A portion of a beam between two sections is said to be in pure bending when there is

(A) constant bending moment and zero shear force

(B) constant shear force and zero bending moment

(C) constant bending moment and constant shear force

(D) None of the above

**Answer: A**

71. Up to which point on the stress-strain curve, the Hooke's law is valid?

(A) Elastic limit

(B) Yield limit

(C) Proportionality limit

(D) Fracture point

**Answer: C**

72. The neutral axis of the cross-section of a beam is that axis at which the ____ is zero.

(A) tensile stress

(B) bending stress

(C) compressive stress

(D) shear stress

**Answer: B**

73. For a beam of rectangular section of width $b$ and depth $d$, the maximum shear stress in the cross-section for a shear force $V$ is

(A) $V/bd$

(B) $1{\cdot}5V/bd$

(C) $2V/bd$

(D) $4V/bd$

**Answer: B**

74. The foundation is laid below the ground in such a way that a load of the structure is _____ to the ground to make the structure stable.

(A) concentrated

(B) varyingly distributed

(C) uniformly distributed

(D) eccentrically loaded

**Answer: C**

75. When a brick is cut along its length, making it two equal halves, then it is called

(A) King closer

(B) Mitred closer

(C) Beveled closer

(D) Queen closer

**Answer: D**

76. The process of making background rough before plastering is

(A) dubbing

(B) hacking

(C) blistering

(D) peeling

**Answer: B**

77. _____ door is generally provided in cinema halls.

(A) Louvered

(B) Flush

(C) Sliding

(D) Revolving

**Answer: D**

78. If height of the first storey of building is 3·2 m and riser is 13 cm, the number of treads required is

(A) 12

(B) 18

(C) 24

(D) 30 0

**Answer: C**

Height = 3.2 m.

Riser Height = 13 cm = 0.13 m.

No. of Risers = $\frac{3.2}{0.13}$ = 24.6 ≈ 25

∴ No. of Tread = 25 − 1 = 24.

79. The _____ which help in securing the head of door frame to the masonry are called horns.

(A) horizontal projections

(B) vertical projections

(C) inclined projections

(D) None of the above

**Answer: A**

80. The slope of stairs should never exceed _____ and should not be flatter than _____.

(A) 50°, 25°

(B) 40°, 25°

(C) 40°, 20°

(D) 50°, 20°

**Answer: B**

81. The triangular upper part of a wall formed at the end of a ____ is called a gable.

(A) curved roof

(B) flat roof

(C) shed roof

(D) pitched roof

**Answer: D**

82. In one day brick masonry should not be raised by more than

(A) 0·5 m

(B) 1·5 m

(C) 2·0 m

(D) 2·5 m

**Answer: B**

83. A brick masonry bond consisting of alternative courses of headers and stretchers, is called

(A) stretcher bond

(B) Flemish bond

(C) header bond

(D) English bond

**Answer: D**

84. The shear strength of a soil

(A) is directly proportional to the angle of internal friction of the soil

(B) is inversely proportional to the angle of internal friction of the soil

(C) decreases with increase in normal stress

(D) decreases with decrease in normal stress

**Answer: D**

$S = c + \sigma \tan\phi$

$S \propto \sigma$

85. The water content between the plastic state to semi-solid state is called

(A) plastic limit

(B) liquid limit

(C) shrinkage limit

(D) None of the above

**Answer: A**

86. A sample of silty clay is allowed to absorb water and the saturated water content is observed to be 30%. Also the saturated unit weight of the soil is found to be 19 kN/m$^3$. Determine the void ratio of the sample. Assume unit weight of water is 10 kN/m$^3$.

(A) 0·53

(B) 0·62

(C) 0·78

(D) 0·85

**Answer: C**

$w = 30\% = 0.3$

$\gamma_{sat} = 19\ kN/m^3$

$\gamma_w = 10\ kN/m^3$.

$\because$ soil is saturated,

$S \cdot e = w G$.

$\Rightarrow 1 \times e = 0.3 \times G$.

$\Rightarrow G = \frac{e}{0.3}$

Also,

$\gamma_{sat} = \frac{G + e}{1 + e} \gamma_w$

$\Rightarrow 19 = \frac{\frac{e}{0.3} + e}{1 + e} \times 10$

$\Rightarrow e = 0.78$

87. The bearing capacity of a soil depends upon the

(A) size of the particles

(B) shape of the particles

(C) cohesive properties of the particles

(D) All of the above

**Answer: D**

88. The minimum water content at which the soil just begins to crumble when rolled into a thread of 3 mm in diameter, is known as the

(A) liquid limit

(B) plastic limit

(C) shrinkage limit

(D) None of the above

**Answer: B**

89. A partially saturated sample of soil has a unit weight of 2·0 g/cm$^3$ and specific gravity of soil particles is 2·6. If the moisture content in the soil is 20%, the degree of saturation is

(A) 20%

(B) 77%

(C) 92%

(D) None of the above

**Answer: C**

$\rho = 2\ g/cm^3$.

$G = 2.6$

$w = 20\% = 0.2$.

$S = ?$

$\because \rho = \frac{G + Se}{1+e}\rho_w$

$= \frac{G + wG}{1+e}\rho_w \quad [\because Se = wG]$

$\Rightarrow 2 = \frac{2.6 + 0.2 \times 2.6}{1+e} \times 1$

$\Rightarrow e = 0.56$

$\because Se = wG.$

$\Rightarrow S = \frac{wG}{e}$

$= \frac{0.2 \times 2.6}{0.56}$

$= 0.92$

$= 92\%$

90. The effective angle of shear resistance ____ as the size of particles ____.

(A) increases, increases

(B) increases, decreases

(C) decreases, increases

(D) None of the above

**Answer: A**

91. The vane shear test is used for the in-situ determination of the undrained strength of the intact fully saturated

(A) sands

(B) clays

(C) gravels

(D) highly organic soils

**Answer: B**

92. If the water table rises up to ground surface, then the effective stress is ____ due to ____ in pore water pressure but total stress ____.

(A) reduced, decrease, does not change

(B) reduced, increase, does not change

(C) reduced, decrease, decreases

(D) reduced, increase, decreases

**Answer: B**

93. Coefficient of permeability of soil ____ with the ____ in temperature.

(A) increases, increase

(B) decreases, increase

(C) increases, decrease

(D) None of the above

**Answer: A**

94. While preparing a detailed estimate

(A) dimension should be measured correct to 0·01 m

(B) area should be measured correct to 0·01 sq.m

(C) volume should be measured correct to 0·01 cum

(D) All of the above

**Answer: D**

95. While estimating a reinforced cement structure the omitted cover of concrete is assumed at the end of reinforcing bar, not less than ____ or ____ the diameter of the bar.

(A) 12 mm, twice

(B) 25 mm, thrice

(C) 12 mm, thrice

(D) 25 mm, twice

**Answer: D**

96. For 12 mm thick cement plastering 1 : 6 on 100 sq.m new brickwork, the quantity of cement required, is

(A) 0·200 $m^3$

(B) 0·247 $m^3$

(C) 0·274 $m^3$

(D) 0·295 $m^3$

**Answer: C**

Dry volume

$= 100 \times 0.012 \times 1.3 \times 1.25$

$= 1.95\ m^3$

∴ Qty of Cement

$= \frac{1.95}{1+6} = 0.278\ m^3$

97. In analysis of rate, the quantity of dry mortar for 10 cubic metre brickwork is taken as

(A) 3 $m^3$

(B) 10 $m^3$

(C) 1 $m^3$

(D) 0·3 $m^3$

**Answer: A**

Qty of Brickwork = $10\ m^3$.

No. of Bricks $= \frac{10}{0.2 \times 0.1 \times 0.1}$

$= 5000$

∴ Qty of mortar

$= 10 - 5000(0.19 \times 0.09 \times 0.09)$

$= 2.303\ m^3$.

∴ Qty of dry mortar

$= 1.3 \times 2.303$

$= 2.99\ m^3$

$\approx 3\ m^3$.

98. The quantity of partition walls and honeycomb walls are worked out in

(A) m

(B) $m^2$

(C) $m^3$

(D) lump sum

**Answer: B**

99. For 100 sq.m cement concrete (1 : 2 : 4) 4 cm thick floor, the quantity of cement required is

(A) 0·90 $m^3$

(B) 0·94 $m^3$

(C) 0·98 $m^3$

(D) 1·00 $m^3$

**Answer: B**

Qty of cement concrete

$= 100 \times 0.04$

$= 4\ m^3$.

Dry volume of mix

$= 4 \times 1.5 \times 1.1$

$= 6.6\ m^3$.

∴ Qty of cement

$= \frac{6.6}{1+2+4}$

$= 0.94\ m^3$.

100. The _____ includes the area of the balcony up to 50%.

(A) carpet area

(B) built-up area

(C) floor area

(D) plot area

**Answer: C**

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