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CIVIL ENGINEERING

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1. The hydraulic radius of a circular sewer of internal diameter 100 cm, running in fully occupied cross section is given by:

(a) 100 cm

(b) 25 cm

(c) 50 cm

(d) 75 cm

$$R = \frac{A}{P} = \frac{\frac{\pi}{4}D^2}{\pi D}$$

$$= \frac{D}{4} = \frac{100}{4} = 25$$

$$T_u = \frac{\alpha A_n f_u}{Y_{m_1}}$$

$$A_n = \frac{T_u Y_{m_1}}{f_u}$$

$$= \frac{T_u}{f_u/1.25}$$

2. According to IS 800 - 2007, in the design of a tension member using bolted connections, the net area required to carry the design load t is given by equation____..

Where

A_n = net cross sectional area required f_u = yield stress in steel

(a) $A_n = T_u/(f_u/1.5)$

(b) $A_n = T_u/(f_u/1.25)$

(C) $A_n = T_u \times f_u/1.5$

(D) $A_n = T_u \times f_u/1.25$

3. The machines which transform a power input (e.g. from an electric motor) into a hydraulic power output are:

(a) turbines

(b) pumps

(c) dams

(d) jets

4. Consider the following statements regarding standard measurement book and ordinary measurement book. Which of the following options is/are true?

i. Standard measurement books show only the measurement of building works.

ii. Ordinary measurement books are used for the purpose of checking the bills of contractor while standard measurement books are helpful in preparing repair estimates.

iii. Ordinary measurement books are numbered alphabetically while standard measurement books are numbered numerically

(a) Both i and ii   (b) Both ii and iii

(c) Only I   (d) Both i and iii
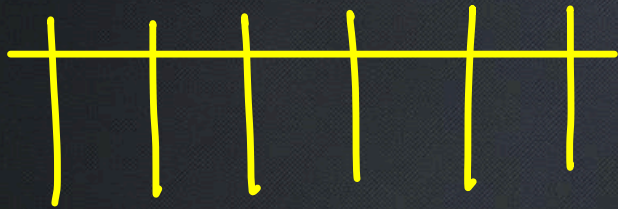
5. The length of one rail is 15 m and the number of sleepers per rail length is 22. Find the expression for sleeper density and also find the number of sleepers required for the construction of 525 m of track.

(a) 770, (M +9)

(b) 888, (M +7)

(c) 888, (M + 9)

(d) 770, (M +7)

sleeper density

$= M + x$

$M + x = 22$

$15 + x = 22$

$x = 7$

$(M + 7)$

$= \dfrac{525}{15} \times 22$

$= 770$

$$\tau = \mu \frac{dv}{dy}$$

$$1.5 = \mu \times \frac{0.8}{3 \times 10^{-5}}$$

$$\mu = 56.25 \frac{N\text{-}S}{m^2} \times 10^{-6}$$

6. A plate at a distance of 0.03 mm from a fixed plate moves at 0.8 m/s and requires a force of 1.50 N/m² area of plate. Determine the dynamic viscosity of liquid between the plates.

(a) 50.25×10^{-6} N-S/m²

(b) 56.25×10^{-6} N-S/m²

(c) 6.25×10^{-6} N-S/m²

(d) 66.25×10^{-6} N-S/m²

7. Flat, gravitational and hump yard are the types of:
(a) locomotives yard
(b) marshalling yard
(c) coaching yard
(d) passenger yard

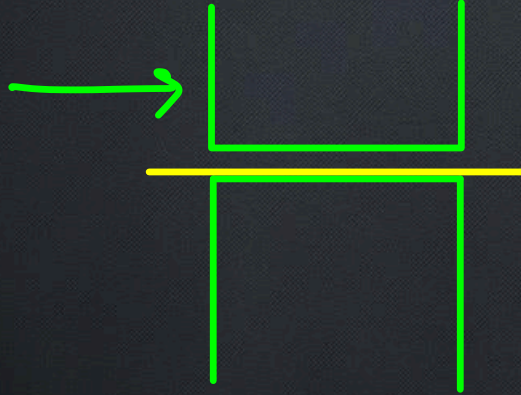✓ Flat yard
✓ Hump yard ✓
✓ Gravity yard

8. While designing a concrete mix, if 5 % of the results are allowed to fall below the characteristic strength and if the assumed standard deviation is 6 MPa, then what will be the Target mean strength (TMS) (MPa) of M40 grade of concrete?

(a) 60 (b) 53

(c) 50 (d) 56

$f_m = f_{ck} + 1.65 \, S$

$= 40 + 1.65 \times 6$

$= 49.9$

9. The failure plane in direct shear test is the _.
(a) weakest major plane
(b) horizontal plane
(c) principal vertical plane
(d) major vertical plane

steel

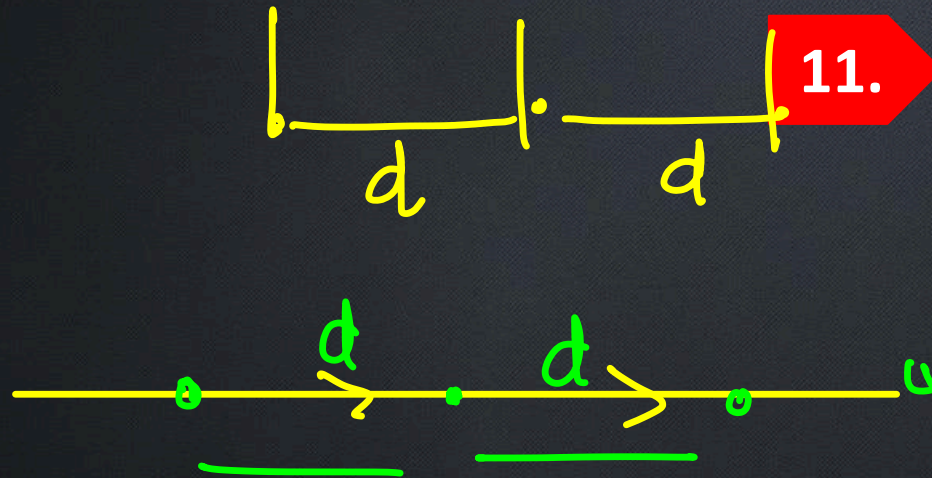**10.** According to IS 800:2007, beams shall be designed and checked for:
(a) stiffness, bending strength, and buckling
(b) buckling only
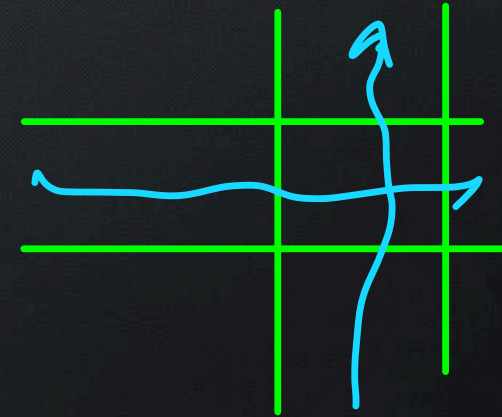(c) bending strength only
(d) stiffness only

11. Levelling in which staff and readings and the distance between the points is required is called:

(a) profile levelling

(b) fly levelling

(c) trigonometric levelling

(d) auto levelling

12. In a level crossing, the canal and the drainage meet each other at __ level.

(a) the same

(b) a cross

(c) a parallel

(d) a different

13. For a closed pentagonal traverse, the sum of measured angles came out be 545°. Angle A calculated by measured bearings was 50°. What will be the corrected angle A?
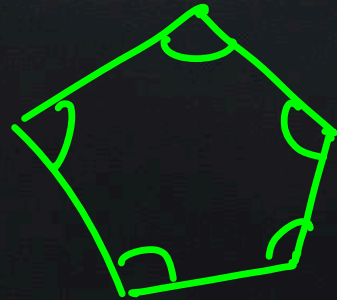
(a) 55°

(b) 49°

(c) 45°

(d) 51°

$n = 5$

internal angle

$= (2n-4)90$

$= (2 \times 5 - 4) \times 90$

$TV = 540°$

$c = \frac{-5}{5} = -1°$

$\text{MV} = 545°$

$c = TV - mr$

$= 540 - 545°$

$= -5°$

14. The process of stones which includes excavating, wedging, heating and blasting is called:
(a) placing
(b) quarrying
(c) dressing
(d) seasoning

15. With respect to plane table surveying, the terms 'triangle of error', 'great circle', 'great triangle' are related to:
(a) Bessel method
(b) two-point problem
(c) Lehmann method (Very accurate)
(d) graphic triangulation

16. If the pessimistic estimate of a project is Rs. 12 Cr, the optimistic is Rs. 9 Cr and the most likely estimate is Rs. 10 Cr, then the expected value (Rs. in Cr) would be

(a) 10.16 (b) 10

(c) 11.42 (d) 12

$$T_E = \frac{T_0 + 4T_m + T_P}{6} = \frac{9 + 4 \times 10 + 12}{6}$$

$$= 10.16$$

17. As per IS (383-1970), in how many zones are the Grading limits of fine aggregates distributed?

(a) 6   (b)4

(c) 2   (d)7

18. According to IS 287 : 1993, in classifying timber, the average annual relative humidity (%) of Zone IV region of India is more than:

(a) 40

(b) 67

(c) 60

(d) 50

Zone I < 40%

Zone II 40-50%

Zone III 50-67%

Zone IV > 67%

19. Which of the following statements in the context of a circular sewer of full depth 'D' is correct?

(a) Maximum velocity is 20% higher than that when running full.

(b) Maximum discharge is obtained when depth of flow is 0.95 D.

(c) Maximum velocity is obtained when depth of flow is 0.95 D.

(d) Maximum discharge is obtained when depth of flow is 0.81 D.

20. Long wall-short wall method is also called_.
(a) single wall method
(b) general method
(c) separate or individual wall method
(d) centre line method

21. There are two types of energy losses through pipes, major losses and minor losses. Major losses through pipes are due to_.
(a) leakage of pipe
(b) friction
(c) contraction of pipe
(d) sudden enlargement of pipe

22. Which of the following methods is used to calculate average precipitation over a catchment area?
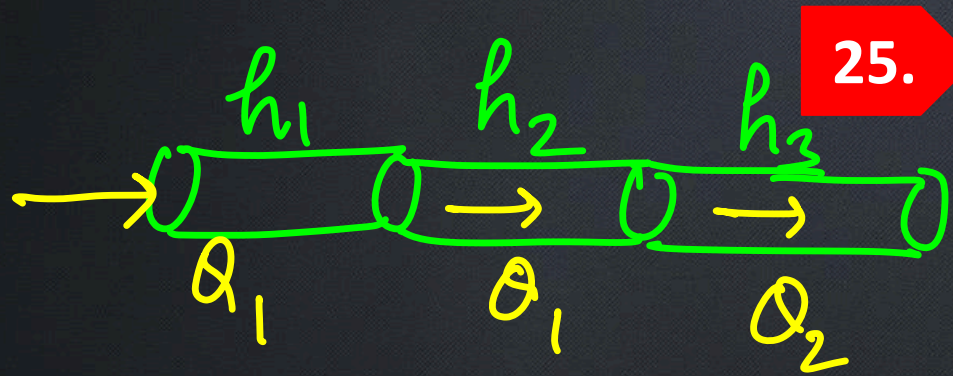
(a) Isohyetal method
(b) Iso-erodent method
(c) Isochrone method
(d) Isopleth method

① Arithmetic mean method

② Thiessen Poly. method.

③ Isohyetal method.

h_1 h_2 h_3

Q_1 Q_1 Q_2

$$h_L = h_1 + h_2 + h_3$$

25. A combination of two or more pipes connected end-to-end (series) is known as pipe in series. For pipes in series, the discharge through the pipe is_.
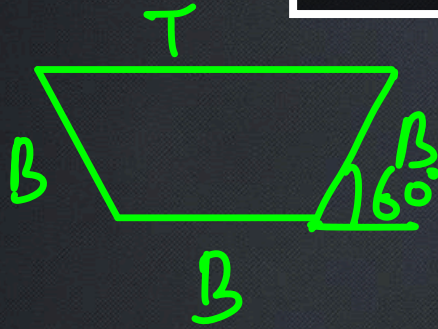
(a) constant

(b) sum of discharge through each pipe

(c) not constant

(d) constant for a particular section of the pipe

24. Corrosion in reinforced concrete structures affects the structural durability due to:
(a) poor aggregate quality
(b) chlorination and carbonation
(c) poor concrete compaction
(d) less cement content

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$R = \dfrac{y}{2\sqrt{2}}$

T

B

$60°$

B

$B = \dfrac{T}{2}$

$R = \dfrac{y}{2}$

Rectangular →

$R = \dfrac{y}{2}$

$B = 2y$

25. A channel is said to be the most economical section when, it gives maximum discharge for a given area and slope. What is the relation between hydraulic radius and depth for the most economical trapezoidal section?

(a) Hydraulic radius = 2 times depth

(b) Hydraulic radius = 1.5 times depth

(c) Hydraulic radius = depth/2

(d) Hydraulic radius = depth/3

26. Which of the following physical inspection test apparatus is used for determining the Cement Initial and final setting times?
(a) Flow cone apparatus
(b) Vicat apparatus → consistency
(c) Blain apparatus
(d) Le-Chatelier apparatus

27. As per IS : 2386 (part - III) - 1963, the following formula of aggregates is given for: Net weight of aggregate in kg Capacity of container on litre

(a) Absorption Capacity

(b) Specific Gravity

(c) Density

(d) Bulk Density

$$\frac{wt \ in \ kg}{\text{lit.}}$$

28. A circular beam section is subjected to a shear force of **40π** kN. The maximum shear stress allowed in the material is **6 MPa**. Calculate the safe diameter of the section, assuming a factor of safety equal to **2.**

(a) 266.66 mm

(b) 133.33 mm

(c) 533.33 mm

(d) Cannot be predicted using the given data

80π KN

Max Shear $= \dfrac{4}{3}$ avg.

$6 = \dfrac{4}{3} \times \dfrac{80\pi \times 10^3}{\dfrac{\pi}{4} D^2}$

$D^2 = 71.1 \times 10^3$

$D = 266.6 \, mm$

29. As per Indian Standard (IS 383 : 2016), the grading of fine aggregates is divided into how many zones?
(a) Five
(b) Four
(c) Three
(d) Two

30. The Indian Parliament passed a Central Legislation named Air Pollution Control Act in the year:
(a) 1983
(b) 1980
(c) 1982
(d) 1981

31. Which of the following is an **INCORRECTLY** stated assumption in the theory of simple bending of beams?

(a) The radius of curvature is small compared to beam dimensions

(b) Young's modulus is same in compression and tension

(c) Plain section remains plain before and after bending

(d) The material of beam is isotropic and homogeneous

32. The junk or demolition value of a structure, calculated at the end of its utility span, that has lost all of its structural strength and is near to its demolition is called:
(a) market value
(b) scrap value
(c) assessed value
(d) book value

33. Which of the following statements is correct with respect to modulus of rigidity?

(a) It depends only on modulus of elasticity and has no relation with Poisson's ratio.

(b) It is not known as shear modulus of elasticity.

(c) It is also known as bulk modulus of elasticity.

(d) It is a ratio between shear stress and shear strain.

$30 - \dfrac{3}{4}$

③

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Elasticity

Bulk mod

$\dfrac{29}{33} \times 100\%$

85+