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$\frac{w}{c}$  constant

$\frac{\text{aggregate}}{\text{Cement}} \propto \frac{1}{St}$

st  $\uparrow$  Cement

$\left(\frac{w}{c}\right) \uparrow$  aggregate  
workability  $\uparrow$

**Q : 1) For a satisfactory workable concrete with a constant water cement ratio, increase in aggregate cement ratio:**

**A : <sup>a</sup> Decrease the strength of concrete**

**B : Does not change the strength of concrete**

**C : Increase the strength of concrete**

**D : None of these**



**Q: 2) The strength of concrete is directly proportional:**

~~A : Water cement ratio~~

~~B : Cement water ratio~~

B C : Sand cement ratio

D : Water aggregate ratio

$$\frac{w}{c} \uparrow \text{ strength}$$

$$\frac{c}{w} \uparrow \text{ strength}$$

damp proofing -  
Course  
(Measurement)  
 $= m^2$

Q: 3) In ordinary residential buildings,

D.P.C. may be provided:

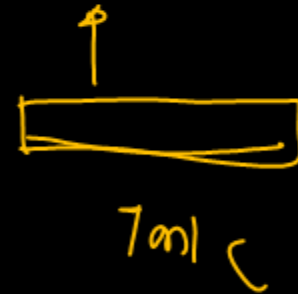
A : At ground level

B : Between ground level and water table level

C : At water table level

~~D : At plinth level~~

(D)



**Q: 4) The slump recommended for mass concrete is about:**

**A : 50 mm to 100 mm**

**B : 25 mm to 75 mm**

**C : 100 mm to 125 mm**

**D : None of these**

→ R C construction  
Low Heat Cement  
25 to 50 mm  
trench



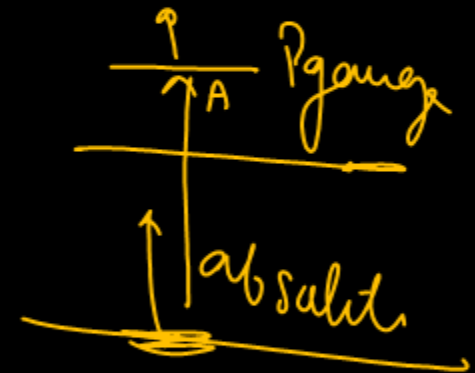
Q: 5) The pressure of a liquid measured with the help of a piezometer tube is:

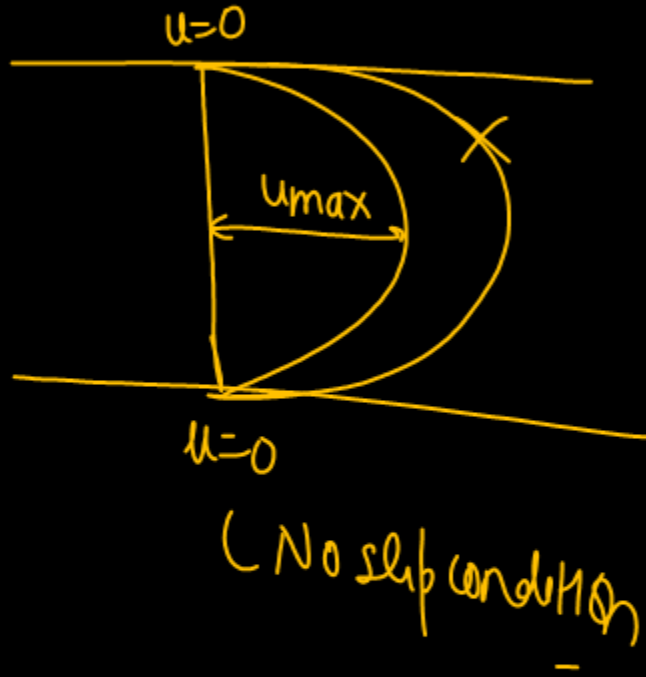
A : Vacuum pressure Barometer

~~B : Gauge pressure~~

C : Absolute pressure

D : Atmospheric pressure





**Q: 6) When a fluid is flowing through a pipe, the velocity of the liquid is:**

**A : Maximum at the center and minimum near the walls**

**B : Minimum at the center and maximum near the walls**

**C : Zero at the center and maximum near the walls**

**D : Maximum at the center and zero near the walls**

Q: 7) The power developed by a turbine is:

A : Directly proportional to  $H^{1/2}$

B : Inversely proportional to  $H^{1/2}$

☒ C : Directly proportional to  $H^{3/2}$

D : Inversely proportional to  $H^{3/2}$

$$\gamma_w Q H$$

$$Q = AV$$

$$\gamma_w A V \times H$$

$$\frac{V = \sqrt{2gh}}{\gamma_w \sqrt{2} g H^{3/2}}$$

C



**Q: 8) Which of the following pumps is suitable for small discharge and high head?**

**A : Centrifugal pump**

**B : Axial flow pump**

**C : Mixed flow pump**

**D : Reciprocating pump**

Qd H<sup>1</sup>

(

Reciprocating

Axial & Centrifuge

Q7 H<sub>1</sub>

impeller mixed

①



**Q: 9) The ratio between the area of crop irrigated and quantity of water required during its entire period of the growth, is known as:**

$$\text{duty} = \frac{\text{area}}{\text{cumec}}$$

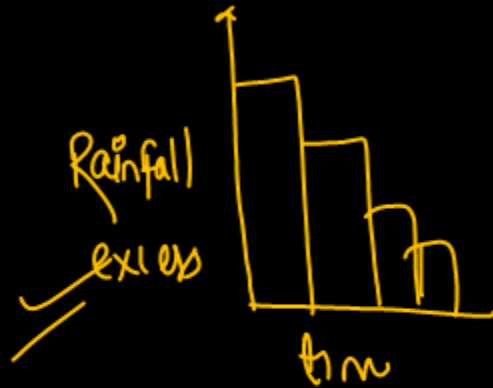
**A : Delta**

**~~B : Duty~~**

**C : Base period**

**D : Crop period**

Filled → Heads



**Q: 10) The graphical representation of average rainfall and rainfall excess (i.e., rainfall minus infiltration) rates over specified areas during successive unit time intervals during a storm is known as:**

**A : Hydrograph**

**~~B : Unit hydrograph~~**

**C : Hyetograph**

**D : None of the above**





**Q: 11) According to Lacey's equation, the scour depth is equal to:**

**A :  $0.47 \left( \frac{Q}{f} \right)^{1/2}$**

**B :  $0.47 \left( \frac{Q}{f} \right)^{1/3}$**

**C :  $0.47 \left( \frac{Q}{f} \right)^{1/4}$**

**D :  $0.47 \left( \frac{Q}{f} \right)^{1/5}$**

Scour depth =  $1.35 \left( \frac{Q^2}{f} \right)^{1/3}$   
 $= 0.47 \left( \frac{Q}{f} \right)^{1/3}$

dia-20um

**Q: 12) The standard height of a standard rain gauge is:** *Sumon Patengam*

Symon' Ranyan

**A : 10 cm**

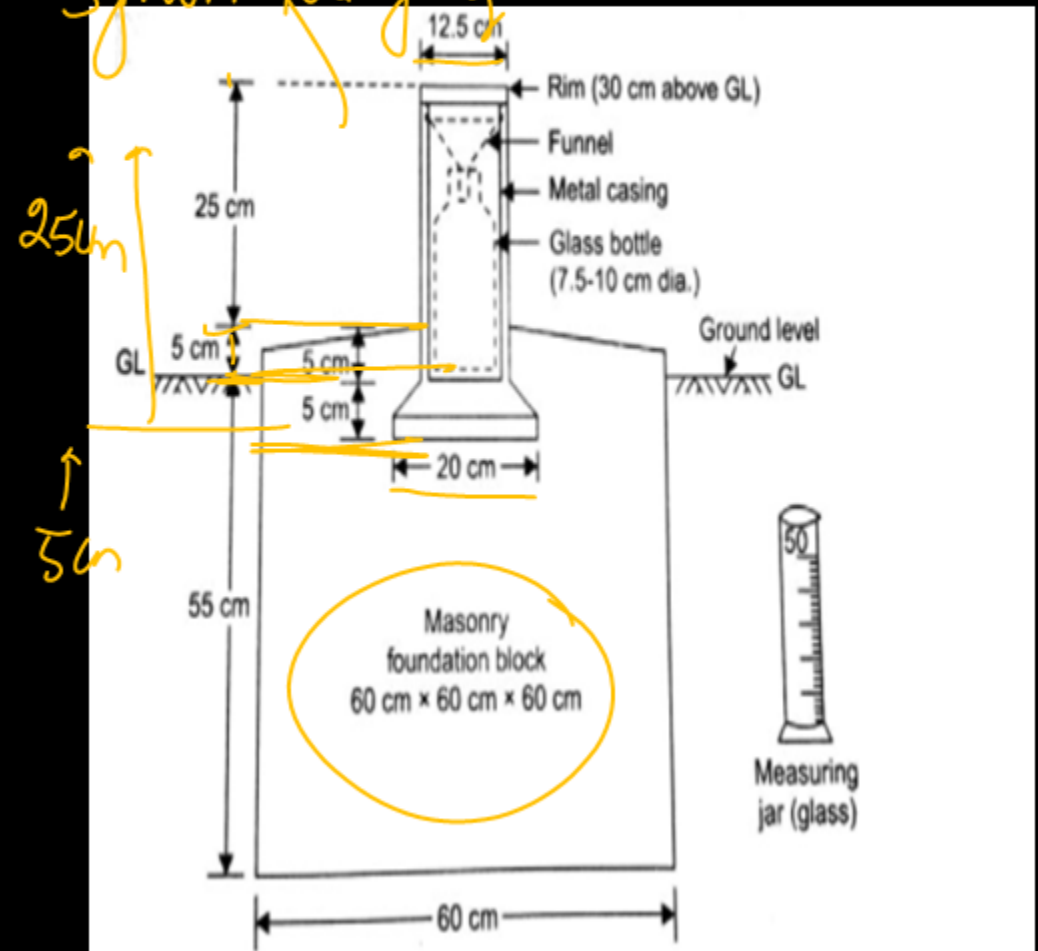
**B : 20 cm**

C

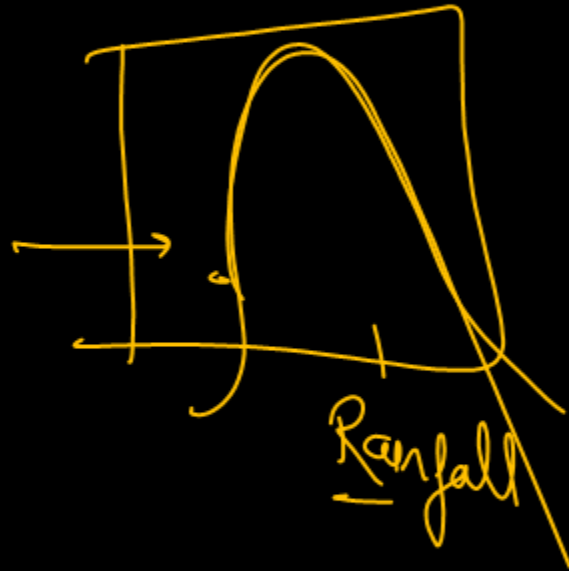
**C : 30 cm**

**D : 40 cm**

60x60x60



*Hydrology*



**Q: 13) For determination of average annual precipitation in a catchment basin, the best method is:**

**A : Arithmetical Method**

**B : Thiessen's mean Method**

**C : Isohyetal Method**

*Rainfall Const*

**D : None of the above**

**Q: 14) Isohytes are the imaginary lines joining the points of equal:**

**A : Pressure**

**B : Height**

**C : Humidity**

**D: Rainfall**



**Q: 15) Most commonly used pump for lifting water in water supply mains, is:**

**A : Reciprocating pump**

**B : Axial flow pump**

**C : Rotary type pump**

**D : Centrifugal pumps**

Q113

$$Z_{cr} = \frac{4c}{\gamma \sqrt{K_a}}$$

$$\phi = 0$$

$$K_a = 1$$

$$\gamma = \frac{\gamma \times C}{19}$$

$$C = 19 \text{ kN/m}^2$$

Q: 16) A vertical cut in a clayey soil with unit weight of 19 kN/m<sup>3</sup> failed when the depth of cut was 4.0 m. The cohesive strength of clay is:

A : 76.0 kN/m<sup>2</sup>

B : 8.5 kN/m<sup>2</sup>

C : 38 kN/m<sup>2</sup>

~~D : 19.0 kN/m<sup>2</sup>~~

D

**Q: 17) According to IS classification, the range of silt size particles is:**

75 $\mu$  - 2 $\mu$  silt

< 2 $\mu$  - clay

1 $\mu$  =  $10^{-3}$  mm

**A : 4.75 mm to 2.00 mm**

**B : 2.00 mm to 0.425 mm**

**C : 0.425 mm to 0.075 mm**

**D : 0.075 mm to 0.002 mm**

①

$$e = \frac{V_v}{V_s} \text{ fixed}$$

$e > 0$

①

①

**Q: 18) Void ratio of soil mass can:**

**A: Take any value greater than zero**

**B : Be zero**

**C : Never be greater than unity**

**D : Take values between 0 and 1 only**





Q: 19) Relative density of a compacted dense sand is approximately equal to:

A : 0.4

B : 0.6

C : 0.95

D : 1.2

$$e_{max} - e$$

$$\frac{e_{max} - e_{min}}{e_{max} - e_{min}}$$

$$e_{max} = 0.95$$

$$e_{min} = 0.35$$

Ⓒ



$$q_u = C N_c + q N_q + \frac{1}{2} \gamma B N_\gamma$$

$\phi = 0$

$q_u = 5.7 C$

**Q: 20) According to Tezaghi's theory, the ultimate bearing capacity at the ground surface for a purely cohesive soil with cohesion  $c$  and for a smooth base of a strip footing is:**

**A : 2.57  $c$**

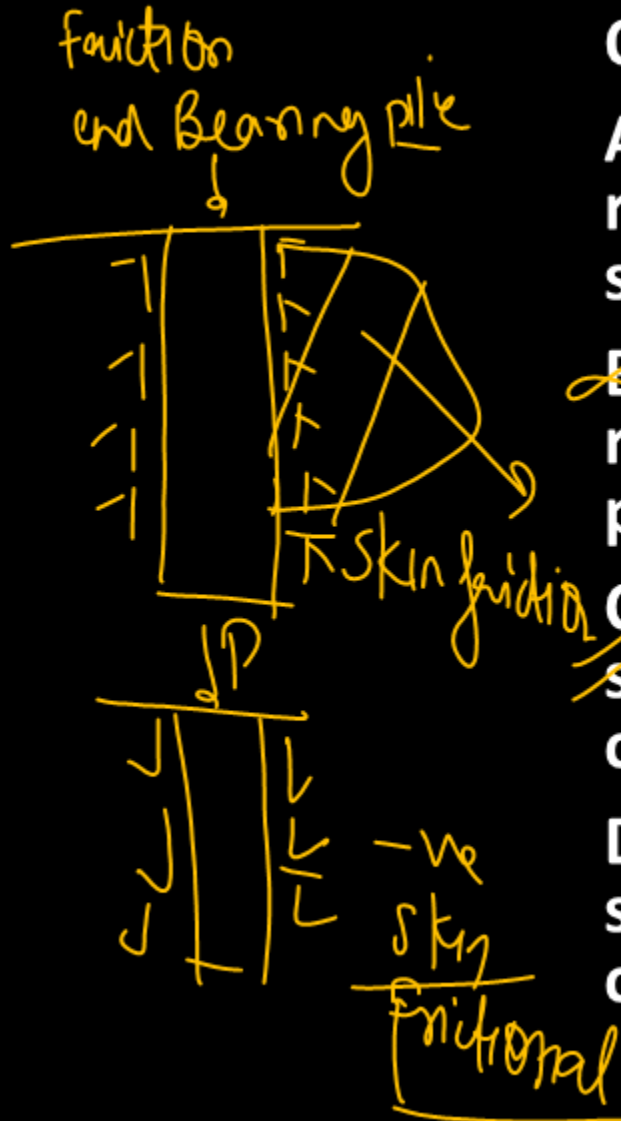
**B : 5.14  $c$**

**C : 6.2  $c$**

**~~D : 5.7  $c$~~**

**(D)**





**Q: 21) Select the correct statement:**

**A : Both negative skin friction and skin frictional resistance are caused by relative settlement of soil**

**B : Both negative skin friction and skin frictional resistance are caused by relative settlement of pile**

**C : Negative skin friction is caused by relative settlement of soil and skin frictional resistance is caused by relative settlement of pile**

**D : Negative skin friction is caused by relative settlement of pile and skin frictional resistance is caused by relative settlement of soil.**

**Q: 22) The effective size of particles of soil is denoted by:**

~~A :  $D_{10}$~~

B :  $D_{20}$

C :  $D_{30}$

D :  $D_{60}$





$$\frac{\Delta H}{H} = \frac{Cc}{1+e_0} \log_{10} \left( \frac{\sigma' + \sigma}{\sigma'} \right)$$

$$\Delta H < H$$

**Q: 23) The ultimate settlement of a soil is directly proportional to:**

- ~~A~~ : Depth of the compressible soil strata
- ~~B~~ : Compressive index
- C : Void ratio
- ~~D~~ : Both (a) and (b)

(D)

$$e = 0.75$$

$$G_s = 2.75$$

$$i_{cr} = \frac{G_s - 1}{1 + e}$$

$$= \frac{1.75}{1.75}$$

$$= 1$$

**Q: 24) A coarse-grained soil has a voids ratio 0.75 and specific gravity as 2.75. The critical gradient at which quick sand condition occurs, is:**

**A : 0.25**

**B : 0.5**

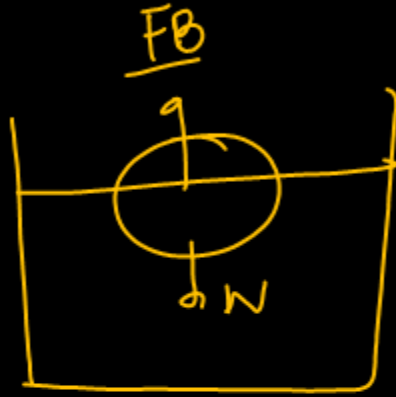
**C : 0.75**

**D : 1**

$$i_{crmax} \approx 1$$

$$i = \frac{h}{L}$$

$i > i_{cr} \rightarrow$  Quick Sand Cond.



**Q: 25) Buoyant unit weight equals the saturated density:**

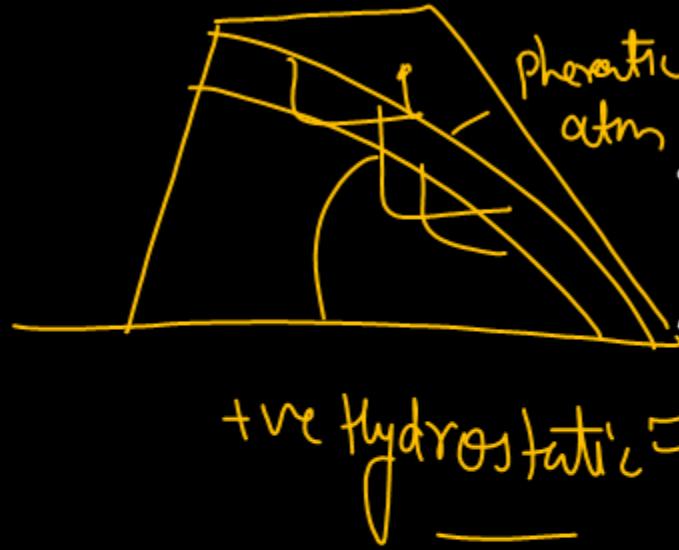
**A : Multiplied by unit weight of water**

**B : Divided by unit weight of water**

**C : Plus unit weight of water**

**D : Minus unit weight of water**

①  $\boxed{\gamma_{sat} - \gamma_w} = \text{Submerge}$



**Q: 26) A phreatic line is defined as the line within a dam section below which there are:**

**A : Positive equipotential lines**

**B : Positive hydrostatic pressure**

**C : Negative hydrostatic pressure**

**D : Negative equipotential lines**

**(B)**



End Bearing = 2.5D

friction = 3D

fill material = 2D

**Q: 27) The minimum centre to centre distance of friction piles of 1 m diameter, is:**

**A : 1.0 m**

**B : 2.0 m**

**C : 3.0 m**

**D : 4.0 m**



Q: 28) The ultimate bearing capacity of a soil, is:

→ Shear  
→ Settlement

A : Load at which soil consolidates

~~B~~ : Load at which soil fails

(B)

C : Total load on the bearing area

D : Safe load on the bearing area

Ans

Raft - floating foundation

**Q: 29) Raft foundation are generally preferred to when the area required for individual footing, is more than:**

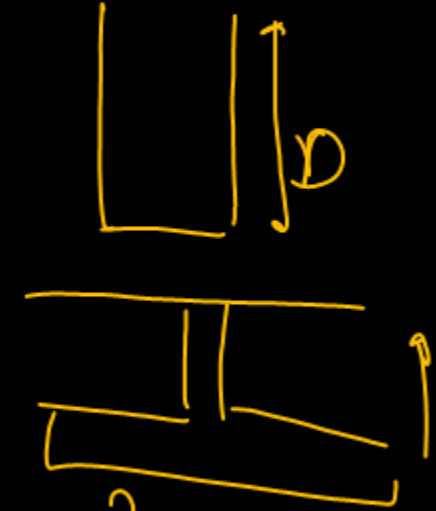
**A : 25% of total area**

**B : 30% of total area**

**C : 40% of total area**

**D : 50% of total area**

✓



$$q_n = \frac{P}{B^2} \text{ (Bolt)}$$

$$q_n = \frac{P}{B^2} - \text{soil df}$$

**Q: 30) The arrangement of supporting an existing structure by providing supports underneath, is known as:**

**A : Shoring** — vertical

~~**B : Underpinning**~~

**C : Jacking** — underneath pipe

pile foundation — **D : Piling**



# Survey

**Q: 31) The optical square is used to measure angles by:**

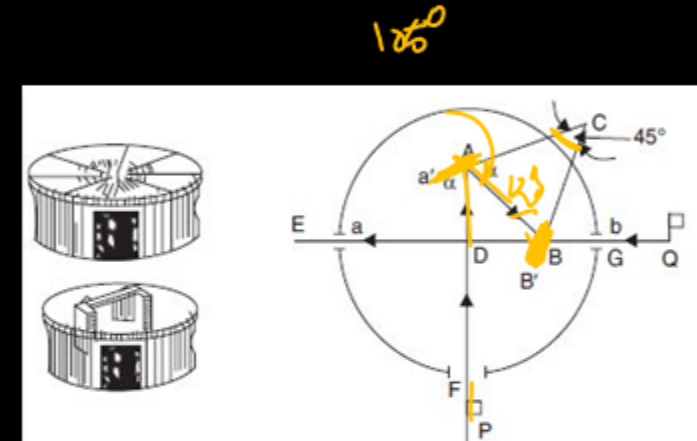
## A : Refraction

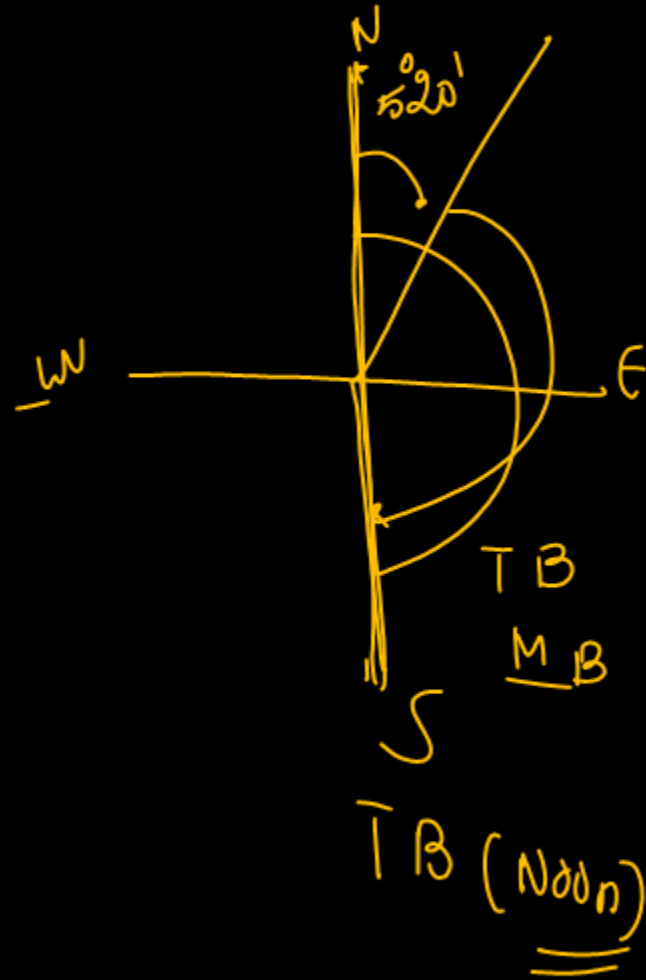
## B : Reflection

## C : Double refraction

## D: Double reflection

①





**Q: 32) When the magnetic declination is  $5^{\circ}20'$  east, the magnetic bearing of the sun is at noon will be:**

**A :  $95^{\circ}20'$**

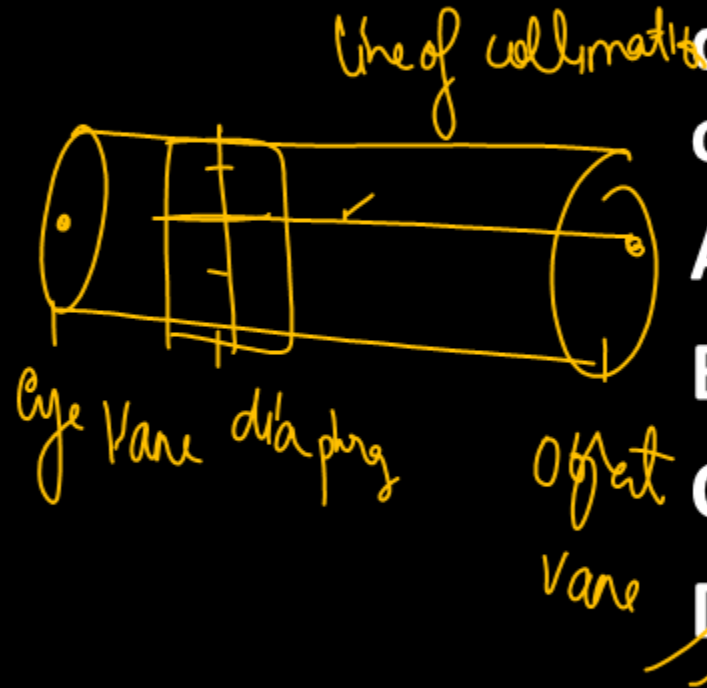
**~~B :  $174^{\circ}40'$~~**  (B)

**C :  $185^{\circ}20'$**

**D :  $354^{\circ}40'$**

$$MB = 180^{\circ} - 5^{\circ}20'$$





**Q: 33) A line joining the point of intersection of the cross-hairs of the diaphragm and the optical center of the object glass, is known as:**

**A : Fundamental line**

**B : Axis of telescope**

**C : Axis of level tube**

**~~D~~ : Line of collimation**

(B) KD

Q: 34) The error which is not completely eliminated in reciprocal leveling, is:

~~A~~ : Error due to curvature

~~B~~ : Error due to refraction (Air)

~~C~~ : Error due to non-adjustment of line of collimation

D : Error due to non-adjustment of bubble tube

**Q: 35) The contour lines can; cross one another on map only in the case of:**

**A : An overhanging cliff**

**B : A valley**

**C : A ridge**

**D : A vertical cliff**



**Q: 36) A curve of varying radius is known as:**

**A : Varying curve**

**B : Compound curve**

**C : Transition curve**

**D : Reverse curve**



**Q: 37) The method of finding out the difference in elevation between two points for eliminating the effect of curvature and refraction, is:**

**A : Precise leveling**

**B : Differential leveling**

**C : Reciprocal leveling**

**D : Fly leveling**

+ve Error  
Curvature Correction = Negative  
Reading 9 &  
IMV - TV  
Refraction Rare → densen

Q: 38) The horizontal angle between true meridian and magnetic meridian, is known as:

A : Convergence

Ⓑ B : Magnetic declination

C : Bearing

D : Dip





**Q: 39) A relatively fixed point of known elevation above datum, is called:**

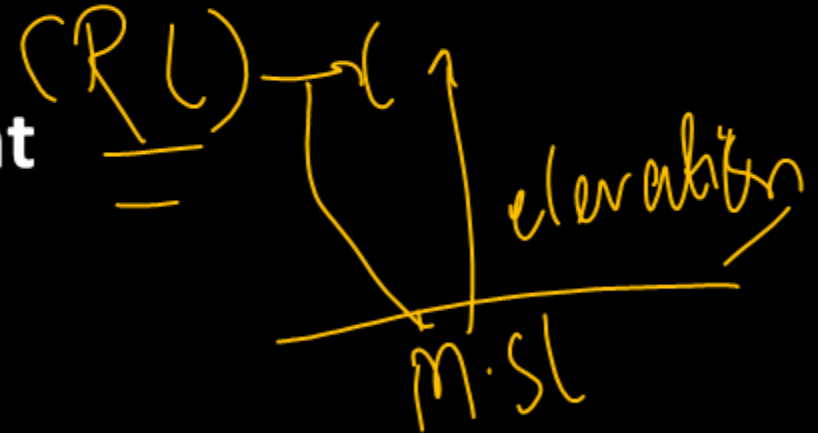
**(A)**

**A : Bench mark**

**B : Datum point**

**C : Reduced level**

**D : Reference point**



Plan  
Geodetic

**Q: 40) The curvature of the Earth's surface, is taken into account only if the extent of survey is more than**

$> 195.5 \text{ km}^2$

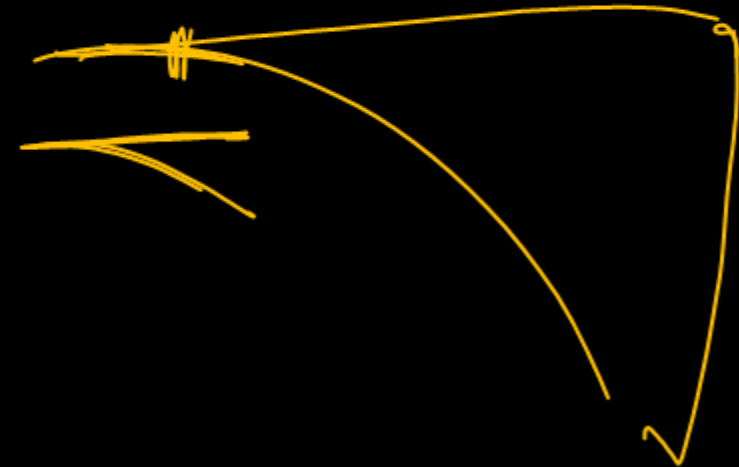
**A : 100 sq km**

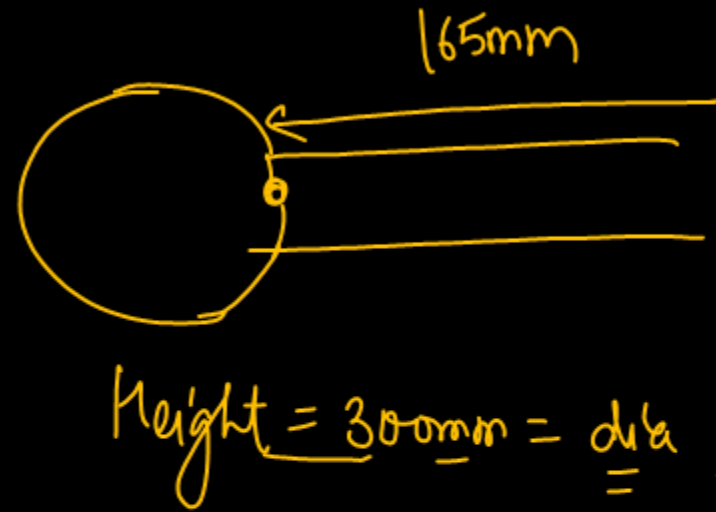
**B : 160 sq km**

**C : 200 sq km**

**D : 260 sq km**

$260 \text{ km}^2$





Q: 41) Which of the following is not a test for measuring the workability of concrete?

- ☒ A: Slump Test
- ☒ B: Flow Test
- ☒ C: Le Chatelier's Test
- ☒ D: Compaction Factor Test

Soundness test  
5mm, 10mm  
ex/perm

**Q: 42) Which of the following is a field test for measuring the consistency of plastic concrete?**

**A : Le Chatelier's Test**

**B : Compaction Factor Test**

**C : Elongation Index Test**

**D : Kelly Ball Test**

**Q: 43) Which is an example of caused cast-in-situ concrete pile?**

**A : Raymond pile**

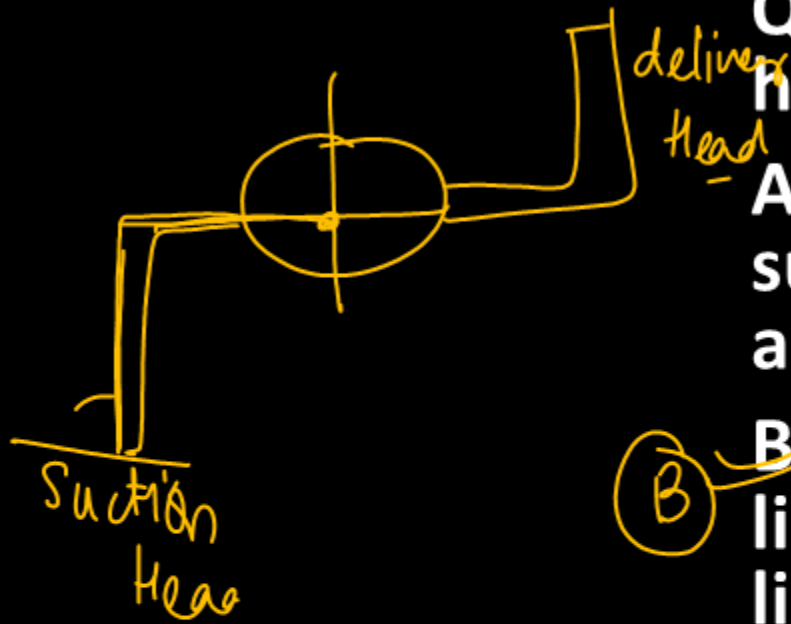
**B : Watson pile**

**C : Reynold pile**

**D : Boston pile**

} driven pile





**Q: 44) For a centrifugal pump, suction lift head is the**

**A : vertical distance between the top surface of liquid level in the discharge tank and pump center line**

**(B) B : Vertical distance between free surface of liquid level in the sump and pump center line**

**C : Head for overcoming friction loss in the suction pipe, entry loss at entrance to the friction pipe and during fluid in the suction pipe**

**D : None of the above**



Speed Ratio =  $\frac{\text{tangential wheel}}{\sqrt{2gh}}$

**Q: 45) What is the range of the speed ratio for a Francis Turbine?**

**A : 0.10 to 0.30**

**~~B : 0.60 to 0.90~~ (B)**

**C : 0.85 to 0.00**

**D : 1.40 to 2.25**

**Q: 46) For high head, the suitable turbine is**

**A : Pelton**

**B : Francis**

**C : Kaplan**

**D : None of the above**

Impulse & Pelton  
↳ high head  
dish

(A)

Q 1

**Q: 47) The discharge through a single-acting reciprocating pump is**

**A :  $Q = \frac{ALN}{60}$**  ✓✓

**B :  $Q = \frac{2ALN}{60}$**  *doubl*

**C :  $Q = ALN$**

**D :  $Q = 2ALN$**

**Q: 48) The specific speed ( $N_s$ ) of a pump is given by the expression**

**A :**  $N_s = \frac{N\sqrt{Q}}{H_m^{5/4}}$

**B :**  $N_s = \frac{N\sqrt{P}}{H_m^{3/4}}$

**C :**  $N_s = \frac{N\sqrt{Q}}{H_m^{3/4}}$

**D :**  $N_s = \frac{N\sqrt{P}}{H_m^{5/4}}$

↓ r

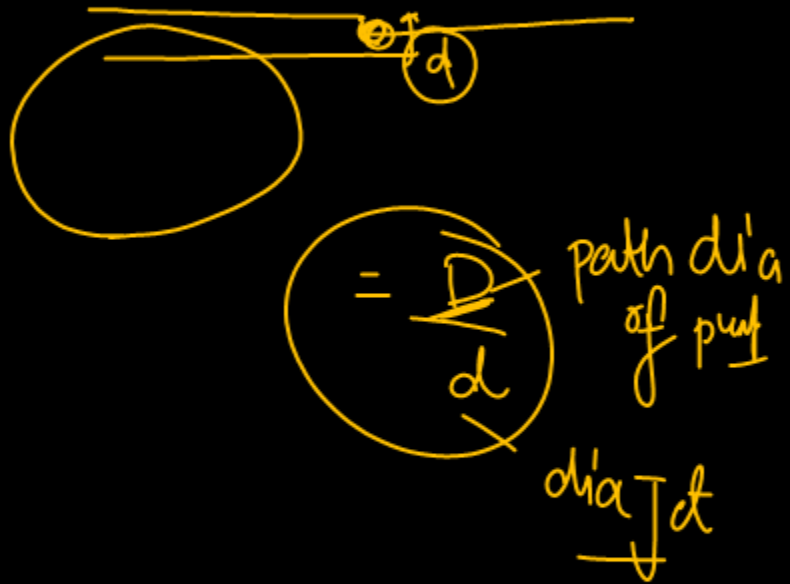
**Q: 49) Jet ratio (m) is denned as the ratio of**

**A : Diameter of the jet of water to diameter of the Pelton wheel**

**B : Velocity of vane to velocity of the jet of water**

**C : Velocity of flow to velocity of the jet of water**

**D : Diameter of Pelton wheel to diameter of the jet of water**



Q: 50) A turbine is called impulse if at the inlet of the turbine

atm  
(A)

~~A~~ : Total energy is only kinetic energy

B : Total energy is only pressure energy

C : Total energy is the sum of kinetic energy and pressure energy

D : None of the above

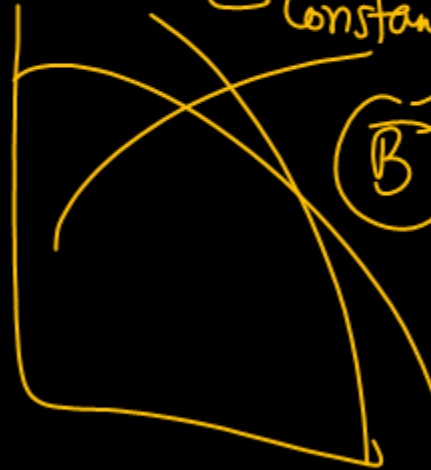


Main characteristics curve

operating curve

Speed

Constant



Q: 51) Which of the following statements is correct?

A: Curves at constant speed are called main characteristics curves.

B: Curves at constant head are called main characteristics curves.

C: Curves at constant efficiency are called operating characteristics curves.

D: Curves at constant efficiency are called main characteristics curves.

$H_m$

**Q: 52) The manometer head ( $H_m$ ) of a centrifugal pump is given by**

- ~~A : Pressure head at outlet of pump-  
pressure head at inlet~~**
- B : Total head at inlet total head at outlet**
- C : Total head at outlet-total head at inlet**
- D : None of the above**

*Hydrology*

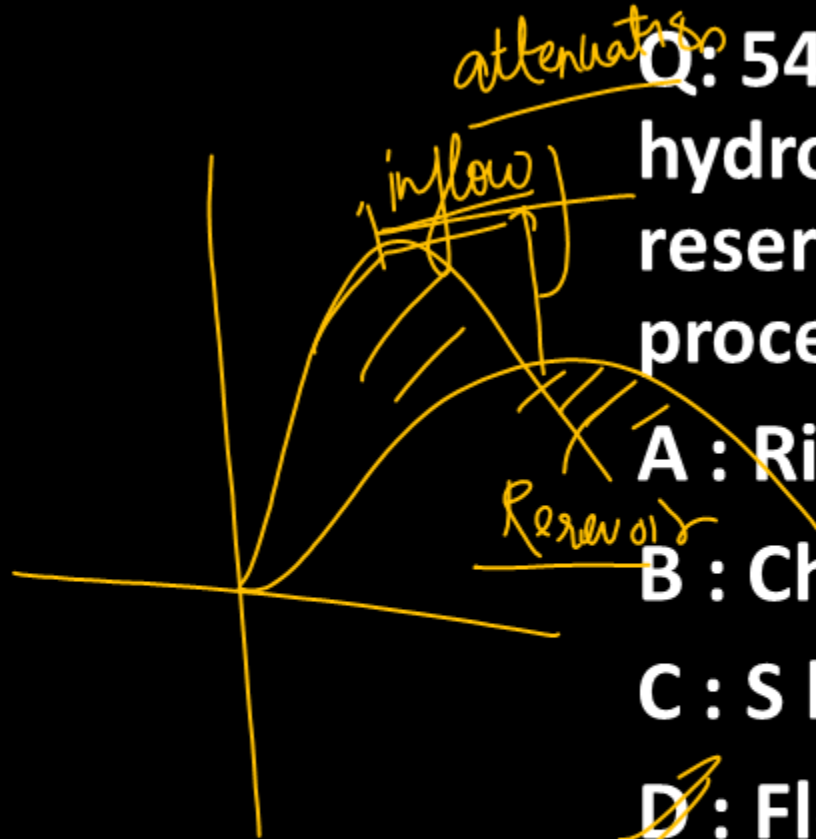
**Q: 53) The Goodrich method is used for**

**A : Determining reservoir capacity**

**B : Flood routing**  $(I + \frac{DS}{\Delta t} - I_2)$

**C : Reservoir sediment evaluation**

**D : Trap efficiency**



**Q: 54) The extent by which the inflow hydrograph gets modified due to the reservoir storage can be computed by a process known as**

**A : River routing**

**B : Channel routing**

**C : S hydrograph**

**D : Flood routing or reservoir routing**

① D

$$I - Q = \frac{dS}{dt}$$

Sto.

$$\frac{dS}{dt} = 0$$

$$I = Q$$

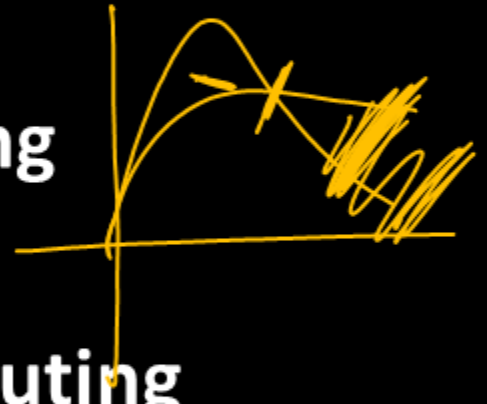
**Q: 55) In routing a flood through a reach, the point of intersection of inflow and outflow hydrographs coincides with the peak of outflow hydrograph**

**A : In all cases of flood routing**

**B : In channel routing only**

**C : In all cases of reservoir routing**

**D : When the inflow is into a reservoir with an uncontrolled outlet**



(B)

*irrigation*

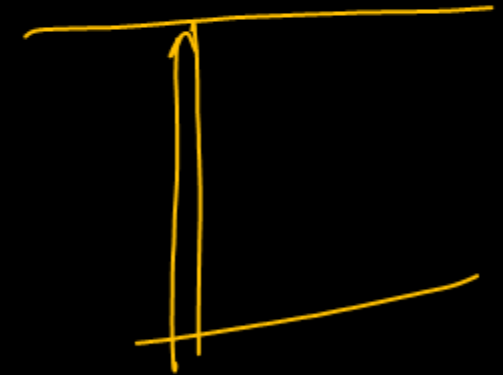
**Q: 56) The volume of groundwater extracted by gravity drainage from a saturated water bearing material is known as**

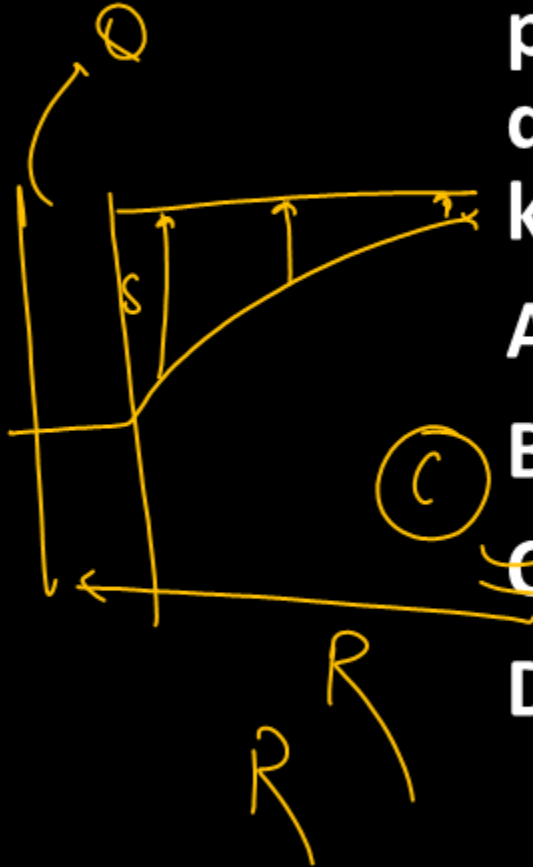
**A : Field capacity**

**B : Specific retention**

**C : Specific capacity**

**D : Yield**





**Q: 57) The distance from the center of a pumped well to the point, where the drawdown is zero or is inappreciable, is known as**

**A : Drawdown**

**B : Cone of pressure**

**C : Radius of influence**

**D : Piezometric surface**





**Q: 58) If within a zone of saturation, an impervious deposit below a pervious deposit is found to support a body of saturated material, then this body of saturated material is known as**

**A : Plowing well**

**B : Aquiclude**

**C : Artesian aquifer**

**D : Perched aquifer**



**Q: 59) Match the following:**

List-I	List-II
A. Primary survey	I. Collect general characteristics of an arena
B. Map Study	II. Improvement in horizontal and vertical alignments
C. Realignment of highway	III. Collect physical information
D. Reconnaissance	IV. Alignment avoiding valleys, ponds or lakes

*Rough*  
A : A-I, B-IV, C-II, D-III

~~B : A-III, B-II, C-IV, D-I~~

~~C : A-I, B-II, C-IV, D-III~~

~~D : A-III, B-IV, C-II, D-I~~

D

$$SSD = vt + \frac{v^2}{2gf}$$

$$= 14 \times 2 + \frac{14 \times 14}{2 \times 9.81 \times 0.28}$$

$$28 = \frac{196}{0.56}$$

$$= 350$$

**Q: 60) Determine the safe stopping flight distance for design speed of 14 m/s for two-way traffic on a two lane road assuming the coefficient of friction as 0.28 and a reaction time of 2 seconds.**

**A: 63.67 m**

**B: 61.47 m**

**C: 53.27 m**

**D: 73.57 m**

(A)

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