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Q :) The apparatus used for determining the Soundness of cement is

A : Slump cone – workability

B : Le Chatelier apparatus ✓

C : Vicat's needle

D : UTM

Setting

↓
vol change
– free lime
magnesia

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Daily Class – 8:00 PM

Q :) Cement used for railway sleepers is designated as

A : 40-S

B : 53-S

C : 46-S

D : 48-S

Handwritten notes in red ink:

- A box containing the following text:
 - ~~OPC-43~~
 - OPC-53
 - OPC-33
- An arrow points from the text "High grade" to the box.
- The word "prurstran" is written to the right of the box.

Q :) The main constituent of cement which is responsible for initial setting of cement is

A : Dicalcium silicate

B : Tricalcium silicate

C : Tricalcium aluminate

D : none of the given answers

mass concrete

Setting (C_3A) \rightarrow (St)
 (C_3S)

(C)

Q :) For testing compressive strength of hydraulic cement other than masonry cement as per IS 4031 - Part 6, the size of cube used is

A : 150 mm ✓ Concrete

B : 100 mm

C : 70.6 mm ✓ (B)

D : 50 mm

Q :) Inadequate compaction during concrete casting results in

A : Honey combing ✓

B : Bleeding ✓

C : Segregation ✓

D : Bleeding and segregation



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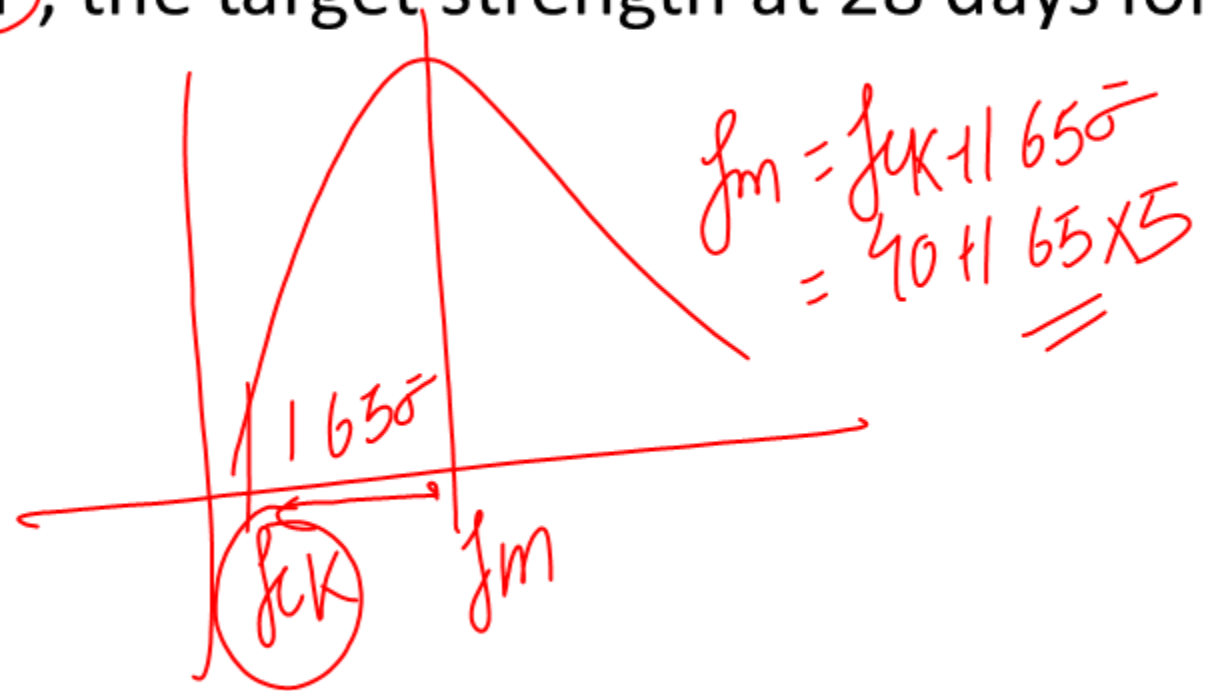
Q :) If characteristic compressive strength at 28 days is 40 N/mm^2 and the standard deviation is 5 N/mm^2 , the target strength at 28 days for concrete mix proportioning

A : 40 N/mm^2

B : 45 N/mm^2

C : 43.25 N/mm^2

D : 48.25 N/mm^2



Q :) As per IS 4987, $N = (C_v/P)^2$ where N = optimum number of raingauge staions in a basin, C_v = Coefficient of variation of the rainfall values of the existing raingauge stations, then P is

(Hydrology)

A : Highest discharge at the basin outlet

B : Annual average rainfall of the basin

C : ~~Desired~~ degree of percentage error in the estimate of the basin mean rainfall. (C)

D : Highest rainfall recorded in the basin

$E = 10\%$ (tolerate)

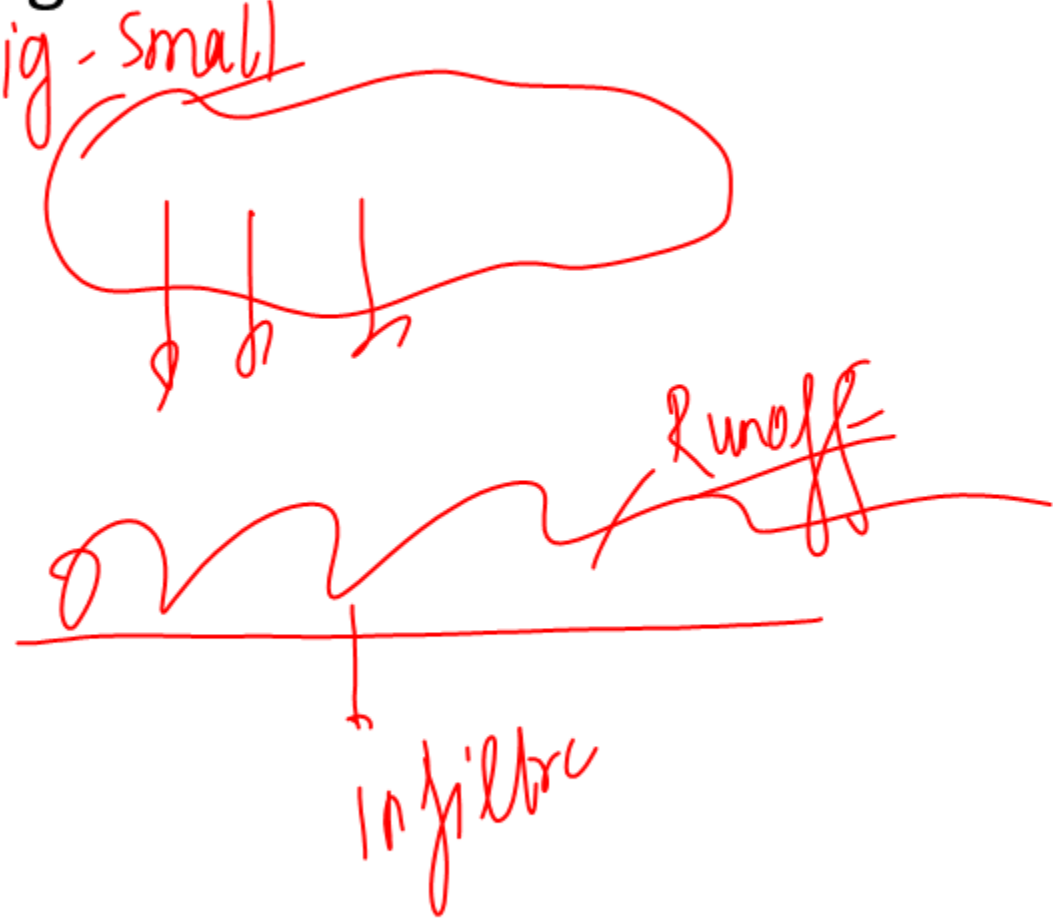
Q :) The best method of estimating runoff is

A : Unit Hydro graph ✓ *small - big - small*

B : Runoff-Coefficient Method

C : Rational formula

D : Infiltration index method



Q :) The collapsible soil is associated with

A : Dune sands

B : Laterite soils

C : Loess ✓

D : Black cotton soils

Aeolian = Compressibility

Q :) Lacustrine soils according to geological classifications are

A : Transported ice

B : Transported by wind

C : Deposited in seas

D : Deposited in lakes

varved clay

*silt
clay*



Q :) If two soils S1 and S2 tested in the laboratory are having liquid limits 38% and 60% and plastic limits 18% and 20% respectively. If natural moisture content for S1 and S2 is 40% and 50% respectively, which soil is a better foundation material when remoulded.

A : S1

B : S2 ✓ (B)

C : S1 and S2

D : Neither S1 nor S2

~~S1~~
 $w_L = 38$
 $w_P = 18$
 $w_N = 40$
 $IC = 38 - 40$
 $-ve$

S2
 $w_L = 60$
 $w_P = 20$
 $= 50$
 IC

Consistency limit

$$IC = \frac{w_L - w_P}{w_L - w_P}$$

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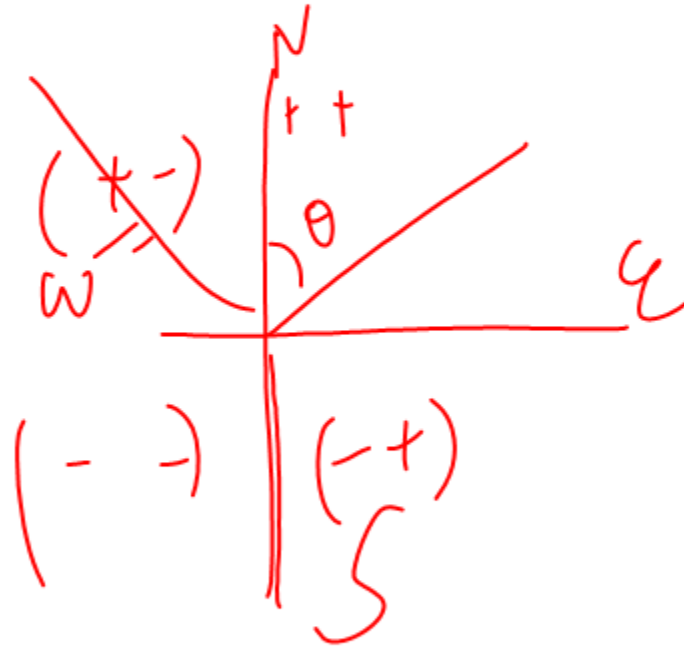
Q :) The latitude and departure of a line AB are + 78 m and -45.1 m respectively. The whole circle bearing of the line AB is

A : 30°

B : 150°

C : 210°

D : 330°



(D)

Q :) Boussinesque's for the stresses in soil caused by a point load at the surface is based on some assumptions. One of which is

A : Soil medium is finite medium

B : Soil medium is plastic

C : Soil medium obeys Hook's law

D : Soil medium is not homogeneous

notical

Q :) When retaining wall is stationary, the coefficient of earth pressure at rest is equal to (taking Poisson's ratio of soil as μ)

A : $\mu/(1-\mu)$ ✓ (A)

B : $\mu/(1+\mu)$

C : $2\mu/(1-\mu)$

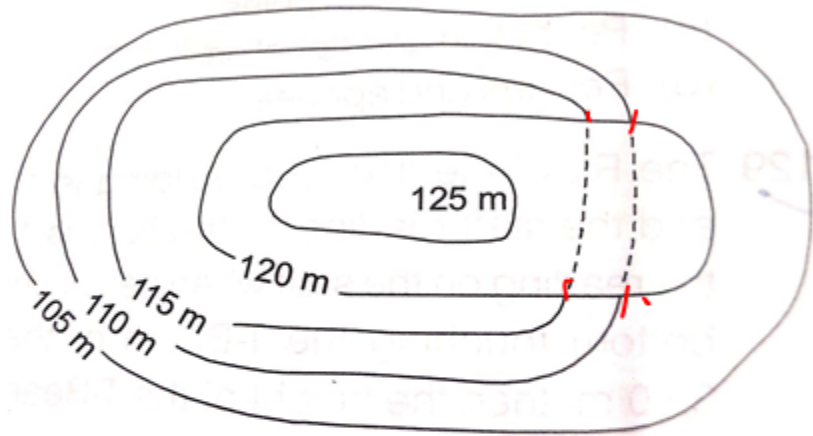
D : $\mu/(1-\mu)^2$

$(K_0 = \frac{\mu}{1-\mu})$ elastic
 $K_0 = 1 - \sin \phi$ nc-clay
 Basement - at Rest

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Q :) The contours given below represent

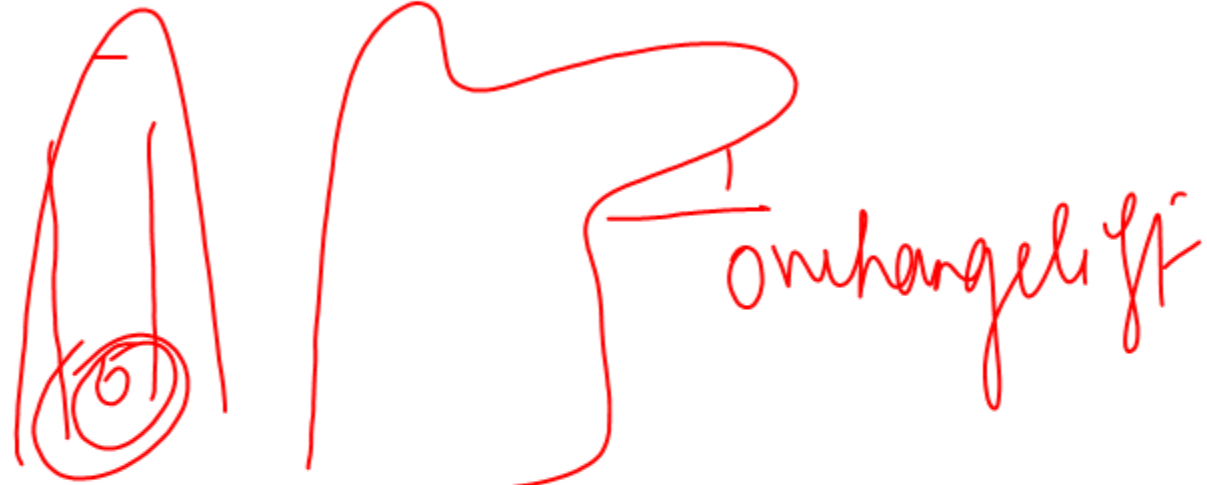


A : Depression

B : Summit

C : Saddle

D : Over hanging cliff



Q :) An error in observations of either fore or back bearing or both may be due to

A : Magnetic declination

B : Dip

C : Local attraction

D : Inclination

F.B - B.B \neq $\pm 180^\circ$ Local attraction

Q :) In a theodolite, if line of altitude bubble is not parallel to the line of collimation when verniers of vertical circle read zero, the error is known as

A : Vertical axis error

B : Lateral collimation error is

C : Horizontal axis error

D : Vertical collimation error D

Q :) The plane table method which is suitable for locating inaccessible points is

A : Resection method

B : Intersection method

C : Radiation method

D : Traversing method



Q :) If L denotes latitude and D denotes departure, then the direction of closing error is given by

A : $\tan^{-1}(\sum D / \sum L)$ ✓ (A)

B : $\operatorname{Cosec}^{-1}(\sum D / \sum L)$

C : $\cos^{-1}(\sum D / \sum L)$

D : $\sin^{-1}(\sum D / \sum L)$

$\sum L \neq 0 = \text{by}$
 $\sum D \neq 0 = \text{by}$
 $\tan^{-1}\left(\frac{\sum D}{\sum L}\right)$

Q :) The multiplier applied to convert the number of commercial vehicles of different axles loads and axle configuration to the number of standard axle load repetitions is called

A : Lane distribution factor

B : Vehicle damage factor

C : Safe load factor

D : Load distribution factor

(Highway)
80kN
B

Q :) The unit of coefficient of consolidation is

A : cm^2/gm

B : cm^2/sec ✓

C : $\text{gm}/\text{cm}^2/\text{sec}$

D : $\text{gm-cm}/\text{sec}$

$$C_v = \frac{c_v \times t}{d^2} \quad \text{sec}$$

$\frac{\text{cm}^2}{\text{sec}}$

Q :) Which of the following gives the correct decreasing order of the densities of a soil sample?

A : saturated, submerged, wet, dry

B : saturated, wet, submerged, dry ✓

C : saturated, wet, dry, submerged ✓

D : wet, saturated, submerged, dry

Q :) For sampling natural sands and other soft and wet soils satisfactorily, the most suitable soil sampler is

A : open drive thin-walled tube sampler

B : Standard split-spoon sampler

C : Stationary piston sampler

D : Rotary sampler

(C) Best Natural Sand -

Q :) According to Indian Standards, the number of rain gauge stations for an area of 5200 km^2 in planes should be

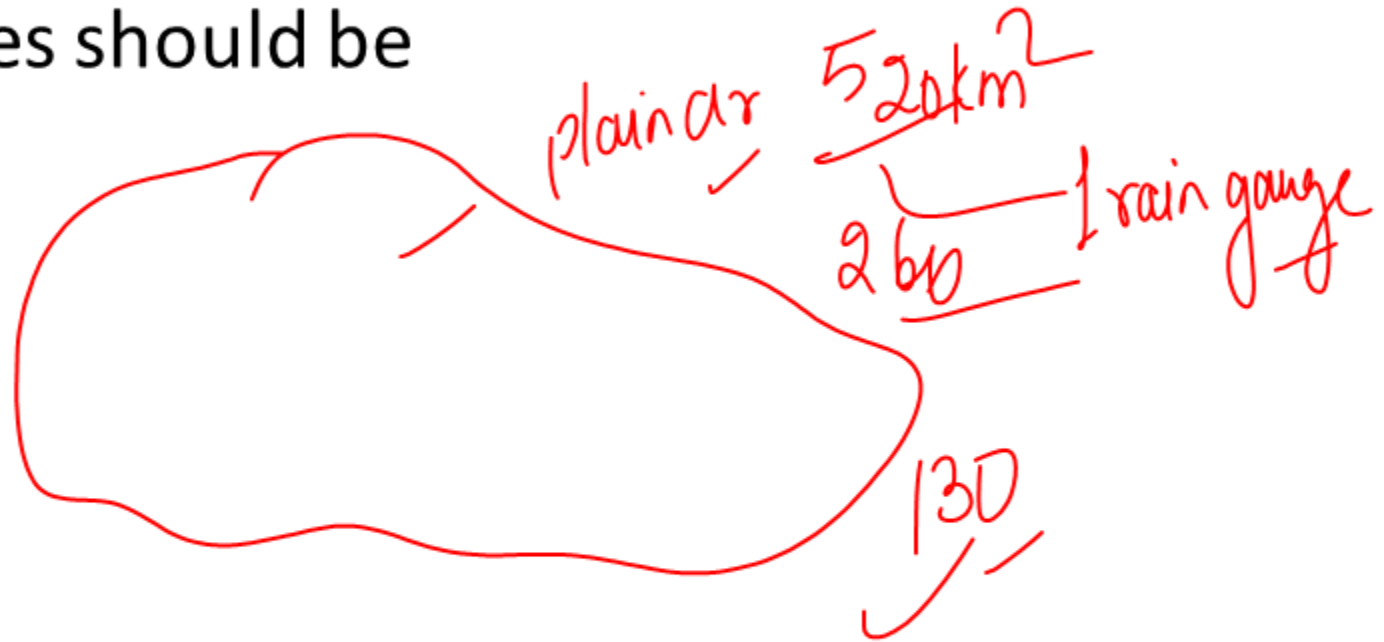
A : 10 //

B : 15

C : 20

D : 40

$$\frac{5200}{520}$$



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Daily Class – 8:00 PM

Q :) Impact value of stone for road work specified is ~~40%~~

A : wearing coat 30%

B : bituminous macadam 35%

C : water-bound macadam 40%

D : All of the above

B

Q :) Rotary kiln used in manufacturing cement rotates at a speed of

A : 1 r.p.m. - 3 r.p.m. ✓ (A)

B : 10 r.p.m. - 12 r.p.m.

C : 18 r.p.m. - 22 r.p.m.

D : more than 25 r.p.m.

Q :) By calcining and smelting iron ores, a crude and impure form of iron obtained is known as

A : cast iron

B : wrought iron

C : steel

D : pig iron

(3-5%) Carbon Content

Q :) The dose of copper sulphate in water treatment varies from

A : 0.3 p.p.m. to 0.6 p.p.m. ✓ (a)

B : 1 p.p.m. to 1.5 p.p.m.

C : 2 p.p.m. to 2.5 p.p.m.

D : 3 p.p.m. to 3.0 p.p.m.

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Q :) The most commonly used sewer under culvert is

A : circular sewer ✓

B : semi-shaped sewer

C : egg-shaped sewer

D : horseshoe-type sewer

outfall Sewer

Q :) In Euler's equation

A : no force is neglected

B : only force of compressibility is neglected

C : both force of compressibility and force of turbulence are neglected

D : forces of compressibility, turbulence and viscosity are neglected

$T_g + F_p$

①

Q :) In Navier-Stoke equation

$$R_c = F_p + F_g + F_T + F_v + F_{\omega}$$

A : no force is neglected

B : only force of compressibility is neglected

C : both force of compressibility and force of turbulence are neglected

D : forces of compressibility, turbulence and velocity are neglected

$$F_p + F_g + F_v$$

C

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Q :) The term z in total energy expansion $\frac{p}{\rho g} + \frac{v^2}{2g} + z$ is

A : potential energy

B : pressure energy

C : potential energy per unit weight

D : None of the above

$$\frac{p}{\rho g}$$

$$\frac{p}{\rho g} + \frac{v^2}{2g} + z$$

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Q :) Bernoulli equation finds its application in

A : Pitot tube ✓

B : venturi meter ✓

C : orifice meter ✓

D : All of the above //

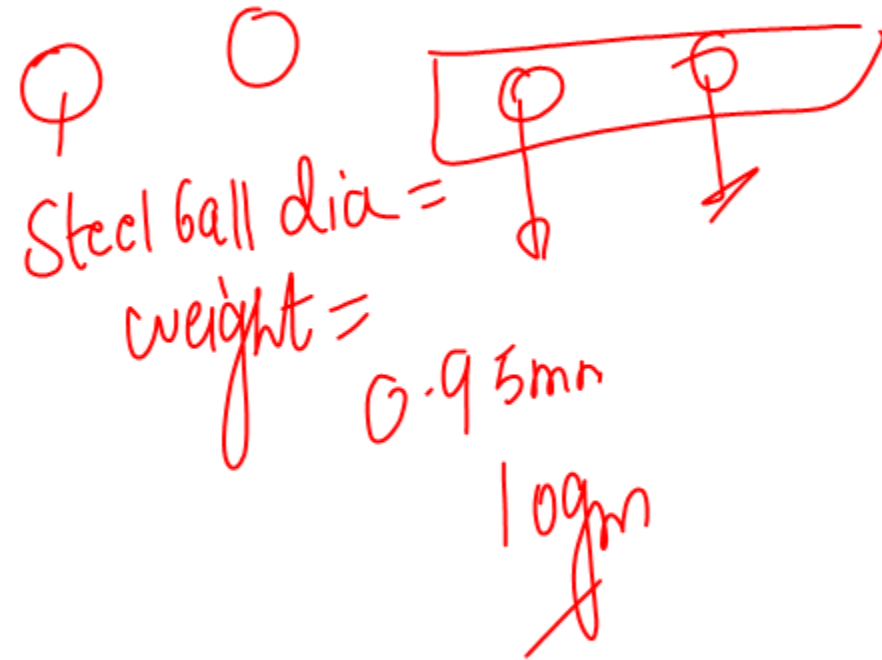
Q :) Ring and Ball apparatus is used for the following test of bitumen:

A : Penetration

B : Viscosity

C : Ductility

D : Softening point ✓ (temp)



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Q :) Error due to bad ranging is:

A : Cumulative positive

B : Cumulative negative

C : Compensative

D : Never serious

A.

Q :) Imaginary line joining the points of zero declination on the surface of earth is known as:

- A :** Isogonic line — *same declination*
- B :** Isoclinic line — *0 to 90 dip*
- C :** Magnetic declination line
- D :** Agonic lines ✓ *(5)*

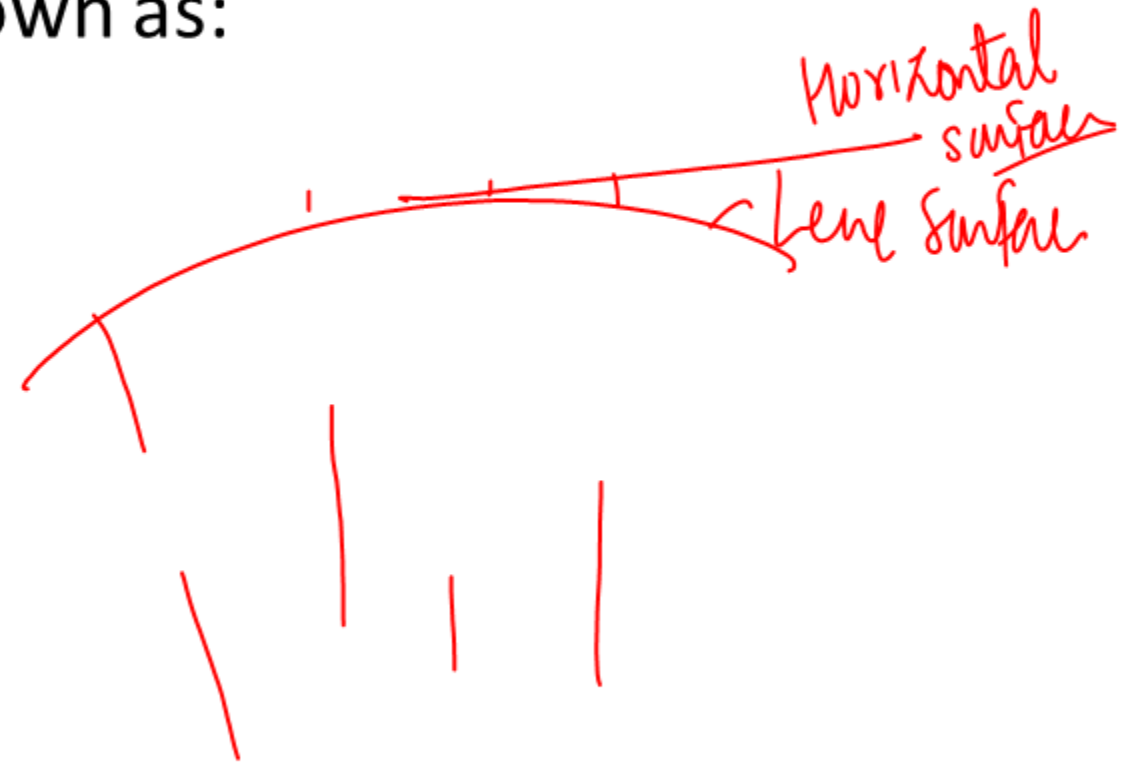
Q :) The curved surface which at every point is perpendicular to the direction of gravity at that point is known as:

A : A level plane

B : A level surface

C : A horizontal surface

D : A vertical surface



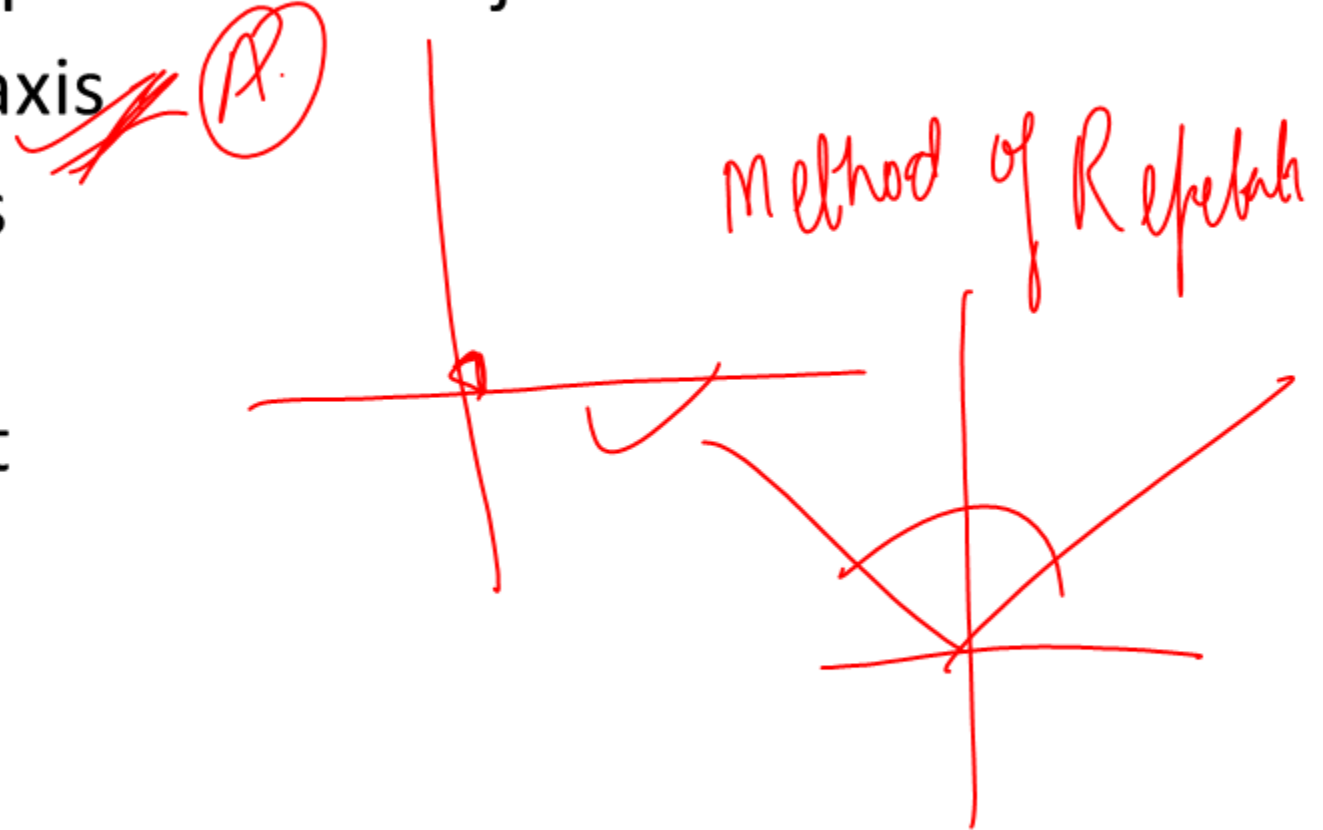
Q :) Spire test is used for the permanent adjustment of a theodolite for:

A : Adjustment of horizontal axis

B : Adjustment of vertical axis

C : Adjustment of plate levels

D : Adjustment of line of sight



Q :) Axis method of traverse correction is used when:

A : Then lengths are measured very accurately

B : ~~The~~ angle are measured very accurately (B)

C : The percentage error in angles and lengths is same

D : Neither angles nor lengths are measured accurately

Bowditch
Transit
Axis

Length → all
Angle →

Q :) If the R.L. of a B.M. is 100.00 m, the back-sight is 1.215 m and the foresight is 1.870 m, the R.L. of the forward station is:

A : 99.345 m

B : 101.215 m

C : 100.655 m

D : 101.870 m

$$RL_f = 100 + 1.215 - 1.870$$

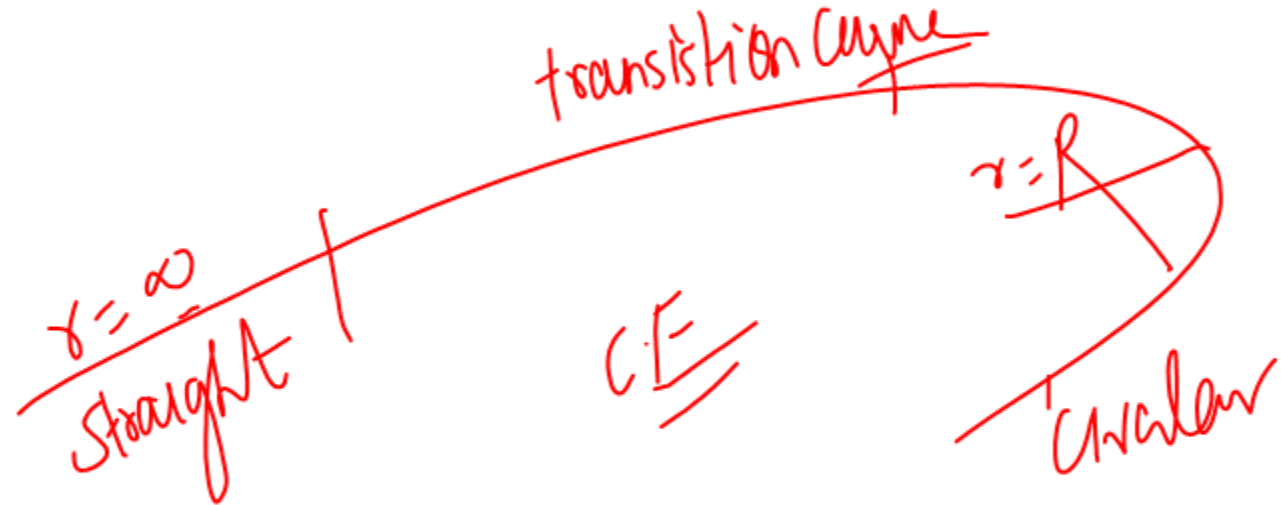
Q :) A curve of varying radius introduced between two branches of a compound curve is known as:

A : Mean curve

B : Base curve

C : Common curve

D : Transition curve



Q :) Contour lines of different elevation can unite to form one line only in the case of:

A : Plane ground

B : Cave

C : Vertical cliff

D : Valley



Q :) The method which gives more accurate results in the measurement of areas is:

A : Average ordinate rule

B : Mid ordinate rule

C : Trapezoidal rule

D : Simpson's one third rule

odd no of ordinate (D)

Q :) Discharge through the body of an earth dam may be calculated using flow net as
 where, k is coefficient of permeability, h is head, N_f is number of flow fields and N_d is number of potential drops.

A : $q = (k/h) (N_f/N_d)$

B : $q = (k/h) (N_d/N_f)$

C : $q = (k \cdot h) (N_f/N_d)$

D : $q = (k \cdot h) (N_d/N_f)$

*(C) $q = k h \frac{N_f}{N_d}$ - Shape factor
 Boundary condil*

Q :) The phenomenon when soil loses its shear strength due to oscillatory motion is known as:

A : Consolidation

B : Shear failure

C : Liquefaction

D : Sloughing

*Sudden loading
Sakmatel*

C

Q :) Degree of consolidation is:

$\uparrow U \propto \frac{C_v \times t}{d^2} = \frac{\pi}{4} (U^2)$ degree of consol

A : directly proportional to time and inversely proportional to drainage path

$U^2 \propto \frac{t}{d^2}$

B : directly proportional to time and inversely proportional to square of drainage path

B

C : directly proportional to drainage path and inversely proportional to time

D : directly proportional to square of drainage path and inversely proportional to time

Q :) 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

$$\tau = C + \sigma \tan \phi$$

Q :) A vertical retaining wall retains a $C-\phi$ (ϕ) backfill with a surcharge of uniform intensity q per unit area. The depth Z_0 where the active earth pressure is zero, is given by

A : q/γ

B : $(2C'/\gamma) \tan \alpha' - q/\gamma$

C : $(2C'/\gamma) \tan \alpha' + q/\gamma$

D : $(2C'/\gamma) \tan \alpha'$

B

$$K_a(q + \gamma z) = 2C\sqrt{K_a}$$

~~$$K_a(q + \gamma z) = 2C\sqrt{K_a}$$~~

$$K_a(\gamma z) = 2C\sqrt{K_a} - K_a q$$

$$Z = \frac{2C}{\gamma\sqrt{K_a}} - \frac{q}{\gamma}$$



$$p_a = K_a(q + \gamma z) - 2C\sqrt{K_a}$$

$$0 = K_a(q + \gamma z) - 2C\sqrt{K_a}$$

Q :) A vertical rectangular plane surface is submerged in water such that its top and bottom surfaces are 1.5 m and 6.0 m respectively below the free surface. The position of center of pressure below the free surface will be at a distance of:

A : 3.75 m

B : 4.0 m

C : 4.2 m

D : 4.5 m

(Home work) – fluid

degree of complete

$$T_v = \frac{C_v \times t}{d^2}$$

$$\frac{\pi}{4} (U^2) = \frac{C_v \times t}{d^2}$$

$$U = \sqrt{\frac{C_v \times t}{d^2}}$$

$U \propto \frac{t}{d^2}$

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