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Q : 1) The fixed end moment of a uniform beam of span l and fixed at the ends, subjected to a central point load P is

A: $\frac{Pl}{2}$

B: $\frac{Pl}{8}$

C: $\frac{P}{8}$

D: $\frac{P}{16}$

Q : 2) In a real beam, at an end, the boundary condition of zero slope and zero vertical displacement exists. In the corresponding conjugate beam, the boundary conditions at this end will be:

A: Shear forces = 0 and bending moment = 0

B: Slope = 0 and vertical displacement = 0

C: Slope = 0 and bending moment = 0

D: Shear force = 0 and vertical displacement = 0 n

Q : 3) The moments at the end 'A' and 'B' of a beam 'AB' where end A is fixed and B is hinged, when the end B sinks by an amount D are given as-

M_{AB}

A: $\frac{6El\Delta}{l^2}$

B: $\frac{6El\Delta}{l^2}$

C: $\frac{3El\Delta}{l^2}$

D: $\frac{3El\Delta}{l^2}$

M_{BA}

$\frac{6El\Delta}{l^2}$

0

$\frac{3El\Delta}{l^2}$

0

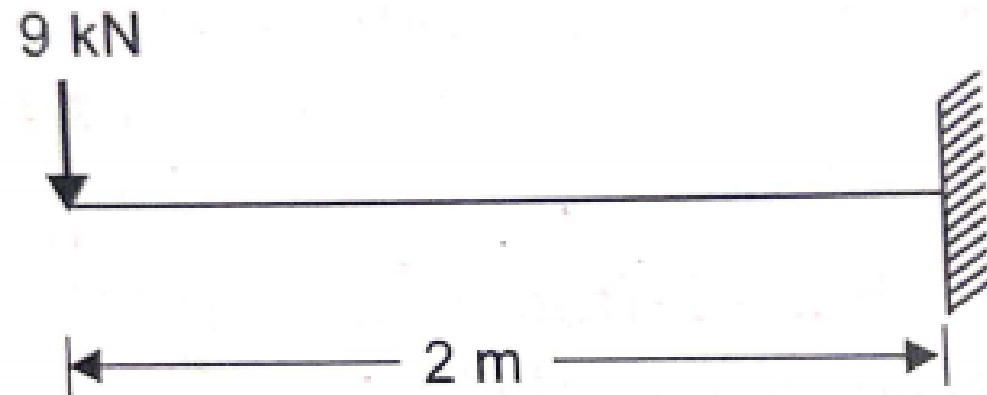
Q : 4) A cantilever beam is shown in the figure. The moment to be applied at free end for zero vertical deflection at the point is

A: 9 kN-m clockwise

B: 9 kN-m anti-clockwise

C: 12 kN-m clockwise

D: 12 kN-m anti-clockwise



Q : 5) Consider the following statements:

- I. On a principal plane, only normal stress acts.**
- II. On a principal plane, both normal and shear stresses act.**
- III. On a principal plane, only shear stress acts.**
- IV. Isotropic state of stress is independent of frame of reference.**

The TRUE statements are

A: I and IV

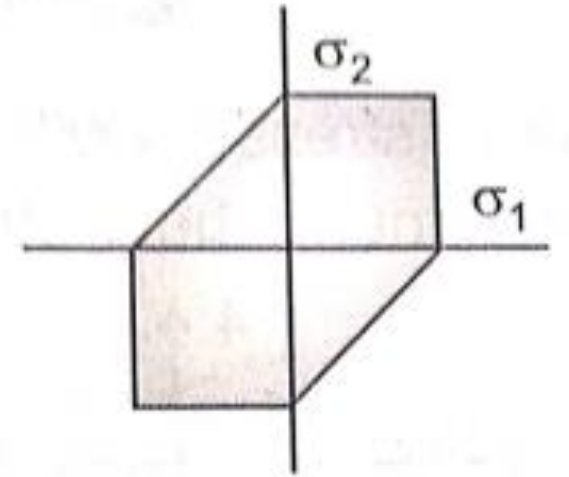
B: II

C: II and IV

D: II and III

Q : 6) A failure theory postulated for metals is shown in a two dimensional stress plane. The theory is called

- A: Maximum distortion energy theory**
- B: Maximum normal stress theory**
- C: Maximum shearing stress theory**
- D: Maximum strain theory**



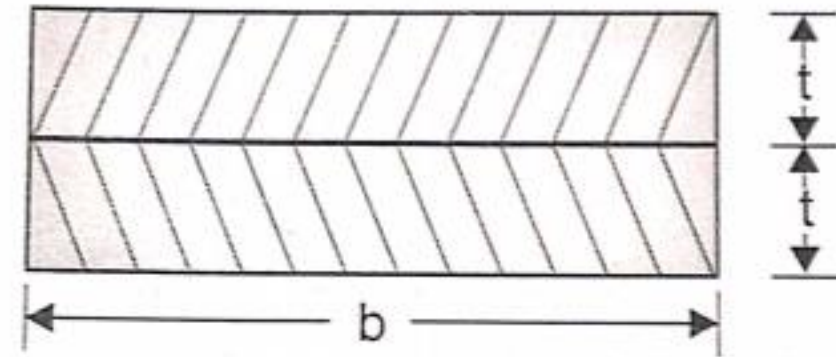
Q : 7) Cross-section of a column consisting of two steel strips, each of thickness t and width b is shown in the figure below. The critical loads of the column with perfect bond and without bond between the strips are P and P_0 respectively. The ratio P/P_0 is

A: 2

B: 4

C: 6

D: 8



Q : 8) In a section, shear centre is a point through which, if the resultant load passes, the section will not be subjected to any

A: Bending

B: Tension

C: Compression

D: Torsion

Q : 9) For a given shear force across a symmetrical 'I' section the intensity of shear stress is maximum at the

A: Extreme fibres

B: Centroid of the section

C: At the junction of the web, but on the web

D: At the junction of the flange and the web, but on the flange.

Q : 10) A long shaft of diameter d is subjected to twisting moment T at its ends. The maximum normal stress acting at its cross-section is equal to

A: Zero

B: $\frac{16T}{\pi d^3}$

C: $\frac{32T}{\pi d^3}$

D: $\frac{64 T}{\pi d^3}$

Q : 11) Consider the planar truss shown in the figure (not drawn to the scale)

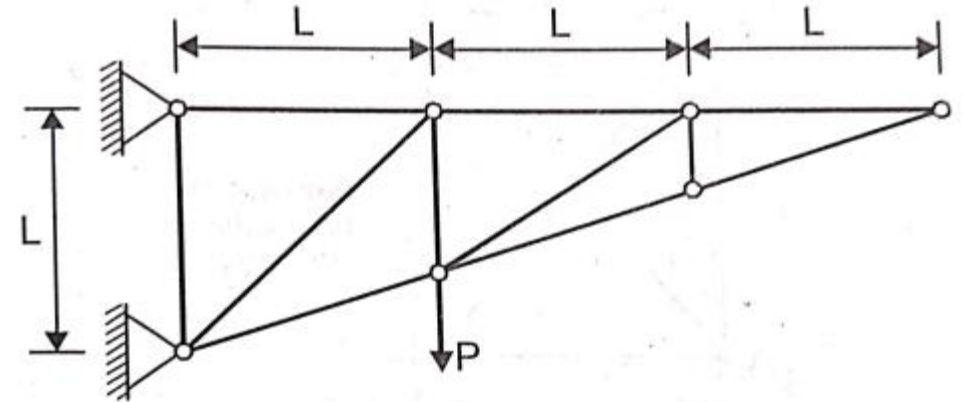
Neglecting self-weight of the Members, the number of zero-Force member in the truss under the action of the load P , is

A: 8

B: 6

C: 9

D: 7



Q : 12) As per IS 456-2000 for the design of reinforced concrete beam, the maximum allowable shear stress ($\tau_{C_{max}}$) depends on the

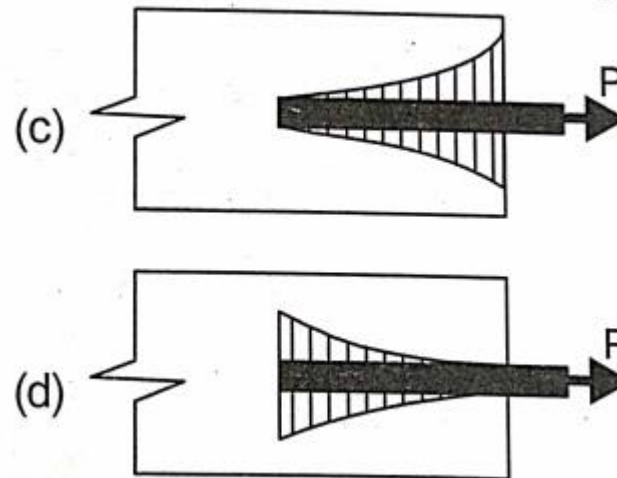
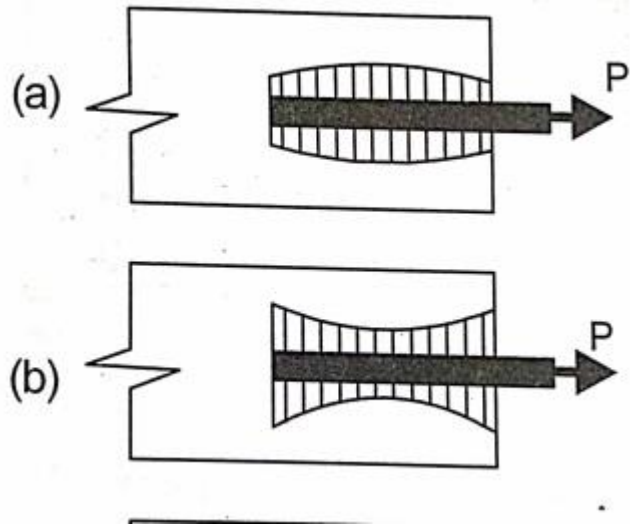
A: Grade of concrete and grade of steel

B: Grade of concrete only

C: Grade of steel only

D: Grade of concrete and percentage of reinforcement

Q : 13) A reinforcing steel bar, partially embedded in concrete, is subjected to a tensile force P . The figure that appropriately represents the distribution of the magnitude of bond stress (represented as hatched region) along the embedded length of the bar, is



Q : 14) A structural member subjected to compression; has both translation and rotation restrained at one end, while only translation is restrained at the other end. As per IS 456:2000, the effective length factor recommended for design is

A: 0.50

B: 0.65

C: 0.70

D: 0.80

Q : 15) A steel section is subjected to a combination of shear and bending action. The applied shear force is V and shear capacity of the section is V_s . For such a section, 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 : 16) As per IS: 800-1984, the maximum allowable slenderness ratio of compression members carrying forces resulting from dead load and superimposed load is

A: 180

B: 250

C: 300

D: 400

Q : 17) A steel beam supporting loads from the floors slab as well as from wall is termed as

- A: Stringer beam**
- B: Lintel beam**
- C: Spandrel beam**
- D: Header beam**

Q : 18) Which of the following elements of a pitched roof industrial steel building primarily resists lateral load parallel to the ridge?

A: Bracings

B: Purlins

C: Truss

D: Columns

Q : 19) As per IS 800:2007, the cross-section in which the extreme fibre can reach the yield stress, but cannot develop the plastic moment of resistance due to failure by local buckling is classified as

A: Plastic section

B: Compact section

C: Semi-compact section

D: Slender section

Q : 20) In the theory of plastic bending of beams, the ratio of plastic moment to yield moment is called

A: Shape factor

B: Plastic section of resilience

C: Modulus of resilience

D: Rigidity modulus

Q : 21) The shape of the cross-section, which has the largest shape factor, is

A: Rectangular

B: I-section

C: Diamond

D: Solid circular

Q : 22) Which one of the following statements is NOT correct?

A: When the water content of soil lies between its liquid limit and plastic limit, the soil is said to be in plastic state.

B: Boussinesq's theory is used for the analysis of stratified soil.

C: The inclination of stable slope in cohesive soil can be greater than its angle of internal friction.

D: For saturated dense fine sand after applying overburden correction, if the standard penetration test value exceeds 15, dilatancy correction is to be applied.

Q : 23) A borrow pit soil has a dry density of 17 kN/m^3 . How many cubic meters of this soil will be required to construct an embankment of 100 m^3 volume with a dry density of 16 kN/m^3 .

A: 94 m^3

B: 106 m^3

C: 100 m^3

D: 90 m^3

Q : 24) The consistency of a saturated cogsive soil is a affected by

A: Water content

B: Particle size distribution

C: Density index

D: Coefficient of permeability

Q : 25) The notation “SC” as per Indian standard soil classification system refers to

A: Clayey silt

B: Sandy clay

C: Clayey sand

D: Silty clay

Q : 26) The following two statements are made with respect to different sand samples having the same relative density. Identify if they are TRUE or FALSE.

- I. Poorly graded sands will have lower friction angle than the well graded sands.**
- II. The particle size has no influence on the friction angle of sand.**

A: II is TRUE but I is FALSE

B: Both are FALSE statements

C: Both are TRUE statements

D: I is TRUE but II is FALSE

Q : 27) A soil having particles of nearly the same size is known as

A: Well graded

B: Uniformly graded

C: Poorly graded

D: Gap graded

Q : 28) The range of void ratio between which quick sand condition occurs in cohesionless granular soil deposits is

A: 0.4 – 0.5

B: 0.6 – 0.7

C: 0.8 – 0.9

D: 1.0 – 1.1

Q : 29) To provide safety against piping failure, with a factor of safety of 5, what should be the maximum permissible exit gradient for soil with specific gravity of 2.5 and porosity of 0.35?

A: 0.155

B: 0.167

C: 0.195

D: 0.213

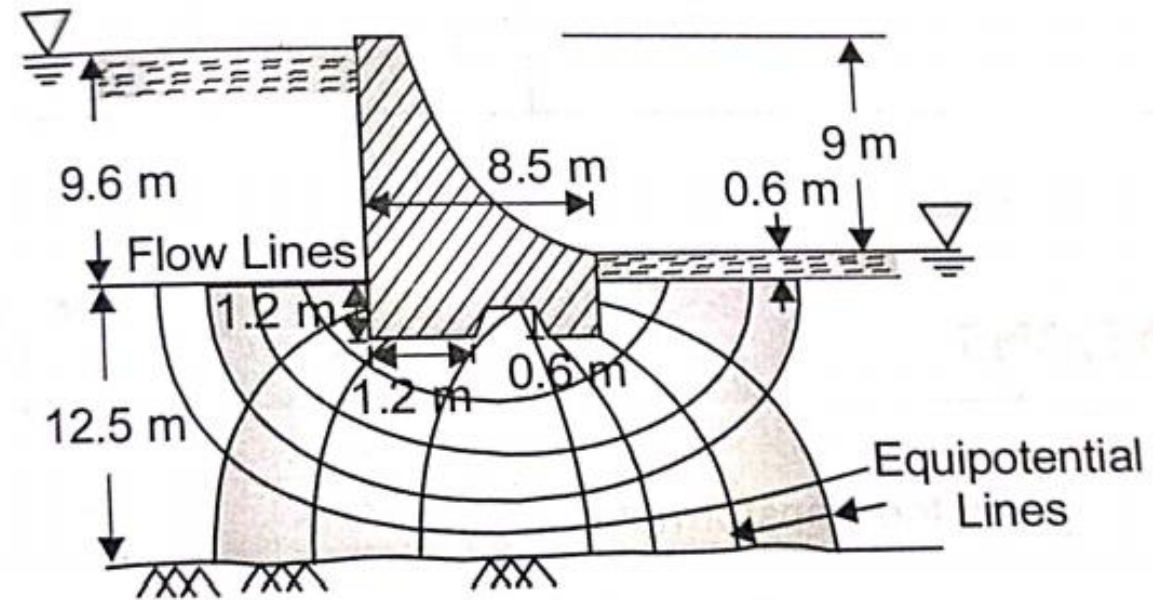
Q : 30) The proposed dam shown in the figure is 90 m long and the coefficient of permeability of the soil is 0.0013 mm/second. The quantity of water (m^3) that will be lost per day by seepage is (rounded to the nearest number):

A: 55

B: 57

C: 59

D: 61



Q : 31) A clay soil sample is tested in a triaxial apparatus in consolidated-drained conditions at a cell pressure of 100 kN/m^2 . What will be the pore water pressure at a deviator stress of 40 kN/m^2 ?

A: 0

B: 20 kN/m^2

C: 40 kN/m^2

D: 60 kN/m^2

Q : 32) Test is consolidated drained test so pure water pressure is always zero.

List-I	List-II
(A) Base failure	1. Soils above and below the toe have same strength
(B) Face failure	2. Soil above the toe is comparatively weaker
(C) Toe failure	3. Soil above the toe is comparatively stronger

Codes:

A: 1, 2, 3

B: 2, 3, 1

C: 2, 1, 3

D: 3, 2, 1

Q : 33) Surcharge loading required to be placed on the horizontal backfill of a smooth retaining vertical wall so as to completely eliminate tensile crack is

A: $2c$

B: $2cK_a$

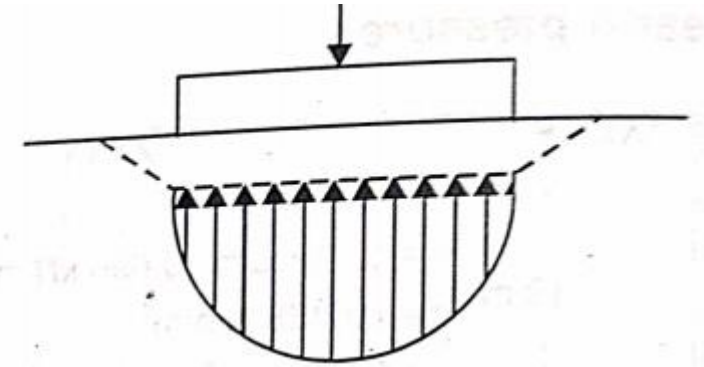
C: $2c\sqrt{K_a}$

D: $2c/\sqrt{K_a}$

Q : 34) The contact pressure and settlement distribution for a footing are shown in the figure.

The figure corresponds to a

- A: Rigid footing on granular soil**
- B: Flexible footing on granular soil clay**
- C: Flexible footing on saturated clay**
- D: Rigid footing on cohesive soil.**



Q : 35) The reading of differential manometer of a venturimeter, placed at 45° to the horizontal is 11 cm. If the venturimeter is turned to horizontal position, the manometer reading will be

A: Zero

B: $\frac{11}{\sqrt{2}}$ cm

C: 11 cm

D: $11\sqrt{2}$

Q : 36) The relation that must hold good for the flow to be irrotational is

A: $\frac{\partial u}{\partial u} - \frac{\partial u}{\partial u} = 0$

B: $\frac{\partial u}{\partial y} - \frac{\partial v}{\partial y}$

C: $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 v}{\partial y^2}$

D: $\frac{\partial u}{\partial y} = - \frac{\partial v}{\partial x}$

Q : 37) “Eddy viscosity” means that it is

A: A physical property of the fluid

B: Same as the kinematic viscosity

C: Always associated with laminar flow

D: An apparent viscosity due to turbulent nature of flow

Q : 38) For subcritical flow in an open channel, the control section for gradually varied flow profile is

A: At the downstream end

B: At the upstream end

C: At both upstream and downstream ends

D: At any intermediate section

Q : 39) An impulse turbine

A: Always operates submerged

B: Makes use of a draft tube

C: Operates by initial completed conversion of pressure energy to kinetic energy

D: Converts pressure head into velocity head throughout the vanes

Q : 40) Water turbines may be put in the decreasing order of specific speed as

A: Propeller turbine, Reaction turbine, Impulse turbine

B: Pelton turbine, Francis turbines, Kaplan turbine

C: Reaction turbine, Impulse turbine, Propeller turbine

D: None of the above

Q : 41) Isopleths are lines on a map through points having equal depth of

A: Rainfall

B: Infiltration

C: Evapotranspiration

D: Total runoff

Q: 42) An isochrones is a line on the basis map

- A) Joining rain gauge stations having equal rainfall duration**
- B) Joining points having equal rainfall depth in a given time interval**
- C) Joining points having equal time travel of surface runoff to the catchment outlet**
- D) Joining points which are at equal distance from the catchment outlet**

Q: 43) In a syphon aqueduct, the most severe condition of uplift on the floor occurs when

- A) The canal and drainage run full**
- B) The canal runs full; the drainage channel is dry, and the water table is at the stream bed**
- C) The canal is dry, the drainage floor is at HFL, and the water table is at the HFL of the drainage flow**
- D) The canal runs full; and the drainage is dry**

Q: 44) Biochemical oxygen demand (BOD) of wastewater is a measure of

- A) Total concentration of biochemical**
- B) Total concentration of organic matter**
- C) Concentration of biodegradable organic matter**
- D) Concentration of chemically oxidizable matter**

Q: 45) High COD to BOD ration of an organic pollutant represents

- A) High biodegradability of the pollutant**
- B) Low biodegradability of the pollutant**
- C) Presence of free oxygen for aerobic decomposition**
- D) Presence of toxic material in the pollutant**

Q: 46) A rapid test to indicate the intensity of pollution in river water is

- A) Biochemical Oxygen Demand**
- B) Dissolved Oxygen**
- C) MPN**
- D) Total Dissolved Solids**

Q: 47) A trickling filter is designed to remove

- A) Settleable Solids**
- B) Colloidal Solids**
- C) Dissolved Organic Matter**
- D) None of the above**

Q: 48) The unit in which both sedimentation and digestion processes of sludge take place simultaneously is

- A) Skimming Tank**
- B) Imhoff Tank**
- C) Detritus Tank**
- D) Digestion Tank**

Q : 49) According to BIS method of measurement, the order of the sequence is

- (a) Length, breadth, height**
- (b) Breadth, length, height**
- (c) Height, length, breadth**
- (d) Length, height, breadth**

Q : 50) Assertion (A) : Earnest money deposit is usually 1% to 2% of the total estimated cost of the work.

Reasoning (R) Earnest money deposit prevents unnecessary competition.

- (a) Both (A) and (R) are true**
- (b) Both (A) and (R) are false**
- (c) (A) is true and (R) is false**
- (d) (A) is false and (R) is true**

Q : 51) The technique of finding the fair price of an existing building or property is known as

- (a) Pricing**
- (b) Estimating**
- (c) Costing**
- (d) Valuation**

Q : 52) Match list-I with list-II and select the correct answer using code given below the two list in each question.

List-I	List-II
A. Valuation B. Mortgage C. Taxation D. Specification	1. Determining price of property 2. Charges levied on property 3. Security taken for giving load 4. Mode of describing nature and class of work

Codes:

A, B, C, D

(a) 1, 2, 3, 4

(b) 1, 3, 2, 4

(c) 4, 3, 2, 1

(d) 3, 4, 2, 1

Q : 53) While submitting a tender, the contractor is required to deposit some amount with the department, as guarantee of the tender, known as-

- (a) Bank Guarantee**
- (b) S.D.**
- (c) EMD**
- (d) F.D**

Q : 54) For calculating floor area, area of balcony is considered up to:

- (a) 75%**
- (b) 100%**
- (c) 50%**
- (d) 25%**

Q : 55) Unit of measurement of damp proof course (D.P.C.) is_

- (a) sq. m.**
- (b) Meters**
- (c) cub. m.**
- (d) cm**

Q : 56) The measurement of brick work is not counted in cu.m if it is:

- (a) Brick work in arches**
- (b) Reinforced brick work**
- (c) One or more than one brick wall**
- (d) Half brick wall**

Q : 57) In building estimate, cornice are measured in

- (a) Number (nos.)**
- (b) Square meter**
- (c) Running meter**
- (d) Cubic meter**

Q : 58) The height of extra quantity of earth filled is known as

- (a) settlement allowances**
- (b) additional settlement**
- (c) extra height allowances**
- (d) embankment allowances**

Q : 59) Type of crane used in a congested area is

- (a) Gantry cranes**
- (b) Climbing crane**
- (c) Tower crane**
- (d) Mast crane**

Q : 60) Which of the following is best suited for the Compaction of concrete in rigid pavements?

- (a) Formwork vibrator**
- (b) Screed board vibrator**
- (c) Needle vibrator**
- (d) Table vibrator**

Q : 61) Which of the following it NOT a critical parameter to control cracking and rutting in a flexible pavement?

- (a) Tensile strain near the surface close to the edge of the wheel**
- (b) Vertical sub-base strain**
- (c) Vertical subgrade strain**
- (d) Tensile strain at the bottom of bituminous layer**

Q : 62) Deval attrition test is used to determine which of the following?

- (a) aggregate abrasion value**
- (b) aggregate impact value**
- (c) aggregate roughness value**
- (d) aggregate crushing value**

Q : 63) Artificial harbours are constructed by providing structures which extend from the land to the sea so as to create a calm area for the berthing of vessels. Such structures are known as

- (a) Groin**
- (b) breakwater**
- (c) Jetty**
- (d) wharf**

Q : 64) Which one out of four options below is NOT the purpose of vertical shaft in tunnel ?

- (a) To make use of it as a quarry to obtains tones for masonry works.**
- (b) To pump out the water in case it is found during the construction of tunnel**
- (c) To speed up excavation from many working faces.**
- (d) To provide natural ventilation during and after the construction of tunnel.**



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