1. For border strip method of irrigation, discharge in an area from tube well was 0.01 cumec. The infiltration capacity of the soil may be taken as 6 cm/hour and the average depth of the flow on the field as 10 cm. The maximum area that can be irrigated from this tube well (in ha, round off to two decimal places) will be _____.

A. 0.001 ha

B. 0.02 ha

C. 0.06 ha

D. 0.2 ha

Ans - C

2. A sandy loam soil has a water holding capacity of 140 mm/m between field capacity and wilting point. The area to be irrigated is 60 ha and depth of effective root zone is 0.30 m. The management allowed soil moisture depletion as 40% and the consumptive use is 5 mm/day. The conveyance and application efficiency are obtained to be 80% and 50% respectively. There are no leaching requirements as well as no rainfall and ground water contributions to the crop water requirement. The frequency of irrigation (in days) and the field irrigation requirement (in m^3) will be

A. 3 and 18000

B. 2 and 14400

C. 3 and 20160

D. 2 and 20160

Ans - A

3. Two different channels, M and N, in two different sites are designed based on Lacey's theory, to carry same quantum of discharge. But the bed material of M is found to be finer than that of N.

A. Channel M will have steeper longitudinal slopes

B. Channel N will have steeper longitudinal slope

C. Channel M and N can have same longitudinal slopes

D. Silting is more in M than in N.

Ans - B

4. At a horizontal joint of width 70 m in a gravity dam, the factor of safety against sliding is 1.05. If the sum of all the horizontal forces above the joint is 40 MN, and the average shear strength of the joint is 1.40 MPa, the shear friction factor at the joint is

A. 1.85

B. 2.30

C. 3.24

D. 3.50

Ans - D

5. Workability of fresh concrete is most appropriately defined by

A. the composite property satisfying the requirements of mixability, stability, transportability, place ability, mobility, compact ability and finish ability.

B. ease and homogeneity with which it can be mixed, placed, compacted and finished

C. its consistency and plasticity

D. its slump and compaction factor values

Ans - A

6. The concrete sample is cured at 20 degrees Celsius for 28 days. If the origin temperature is taken as (-11) degree Celsius, what is the maturity (degree Celsius days) of concrete sample?

A. 252

B. 560

C. 728

D. 868

Ans - D

7. Consider the following particulars in respect of a concrete mix design:

What shall be the weight of the Fine aggregates?

A. 520 kg/m^3 B. 570 kg/m^3

C. 690 kg/m^3 D. 1000 kg/m^3

	Weight	Specific Gravity
Cement	400 kg/m^3	3.2
Fine aggregates	–	2.5
Coarseaggregates	1040 kg/m^3	2.6
Water	200 kg/m^3	1.0

Ans - C

For a certain project, the cost estimates by the contractor are as follows:

Average monthly stock = Rs. 30 lakh

Average outstanding = Rs. 250 lakh

Average unadjusted advance = Rs. 80 lakh

The estimated average monthly working capital required for the project (in Rs. Round off to nearest integer) will be _____ .

Ans - 200 Lakhs

What is the actual area covered by a 30 cm × 30 cm size vertical aerial photograph, at an average scale of 1cm=100m having 60% forward overlap and 30% side overlap?

A. 1.12 km^2

B. 2.52 km^2

C. 4.48 km^2

D. 6.72 km^2

Ans - B

The tacheometer focal length of object glass is 20 cm, the distance between the object glass and trunnion axis is 10 cm and the spacing between the outer lines of diaphragm axis is 4 mm. If the staff intercepts are 1.000 (top) and 2.500 (middle) when the line of collimation is perfectly horizontal, then the horizontal distance between the staff station and instrument station will be

A. 75.3 m

B. 78 m

C. 150.3 m

D. 153 m

Ans - C

The deflection angle between the tangents drawn at the ends of a transition curve is 7°. The radius of the curve at the end is 400 m. What is the length of the transition curve?

A. 60.00 m

B. 97.74 m

C. 120.00 m

D. 150.00 m

Ans - B

A summit vertical curve is to be set joining +2 per cent grade with -3 per cent grade. If the tangents intersect at an elevation of 60 m and the rate of change of grade is -1% per 100 m, then elevation of beginning point of vertical curve will be

A. 58.5 m

B. 57.5 m

C. 55.0 m

D. 52.5 m

Ans - C

A four-lane divided highway, with each carriageway being 7.0 m wide, is to be constructed in a zone of high rainfall. In this stretch, the highway has a longitudinal slope of 3% and is provided a camber of 2%. What is the hydraulic gradient on this highway in this stretch?

A. 2.0%

B. 3.0%

C. 3.6%

D. 5.0%

Ans - C

The sequent depth ratio in a rectangular channel is 14. The Froude number of the supercritical flow will be

A. 6.62

B. 7.55

C. 8.45

D. 10.25

Ans - D

Flow depths across a sluice gate are 2·0 m and 0.5 m. What is the discharge (per meter width)?

A. 1.0 m^2/s

B. 1.4 m^2/s

C. 2.0 m^2/s

D. 2.8 m^2/s

Ans - D

Q. An incompressible fluid flows over a flat plate with zero pressure gradient. The BL thickness is 1mm at a location where Reynold No is 1000. If the velocity of the fluid alone is increased by a factor of 4, then BL thickness at the same location will be

A. 4mm

B. 2mm

C. 0.5mm

D. 0.25mm

Ans - C

Q. What is the value of gradient for which the resistance due to it together with 3° curve in a B.G. equal to the resistance due to ruling gradient of 1 in 200?

A. 1 in 183

B. 1 in 173

C. 1 in 192

D. 1 in 263

Ans - D

Q. What will be the ratio of weight of solid and hollow circular shaft of same length and subjected to same torque,. Diameter ratio of hollow shaft is 1/2.

A. 1.17

B. 1.24

C. 0.76

D. 1.32

Ans - A

Q. What is the length of transition curve for balancing the centrifugal force on B.G. track for the actual cant 13 cm and cant deficiency 76 mm. The maximum speed of train is 80 kmph?

A. 83 m

B. 48 m

C. 100 m

D. 94 m

Ans - A

Q. Determine the safe load for a circular column which is 1.5 meter long and is fixed at one end and hinge at the other end. If this column is used as a simply supported beam subjected to uniformly distributed load of 6.5 KN/m the deflection measured at the centre is 2.5 mm. (factor of safety = 2.5).

A. 642.3 KN
B. 631.2 KN
C. 601.4 KN
D. 582.5 KN

Ans - C

Q. In a contrary flexure of B.G. track. If the Maximum speed in Main line is 80 kmph. What will be the maximum speed of train on branch line. [Radius of curve = 750 m]

A. 42 kmph

B. 80 kmph

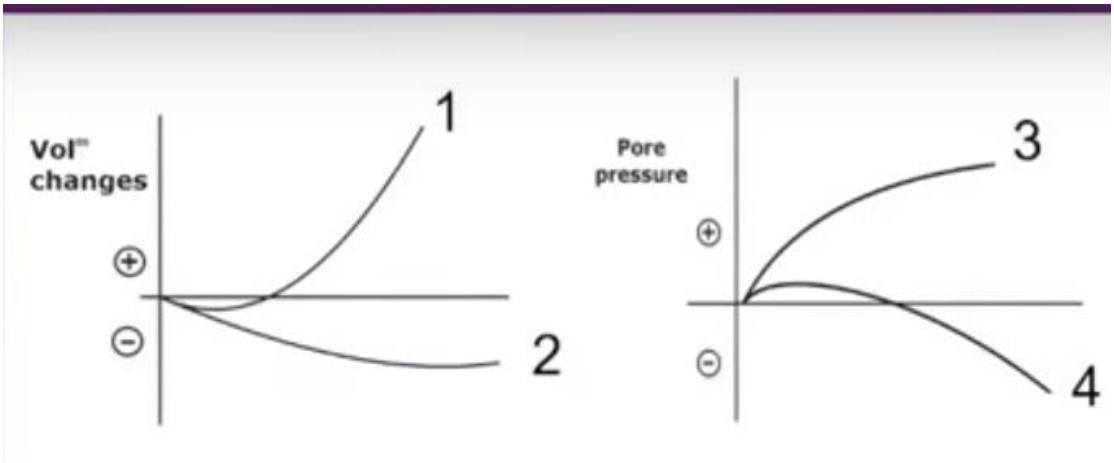
C. 60 kmph

D. 55 kmph

Ans - A

Q. Curves for Volume change and pore pressure variation is given with axial strain as shown in figure. Which of the following is correct. (NC – Normally Consolidated Soil and OC – Over consolidated soil).

	1	2	3	4
A	NC	OC	NC	OC
B	NC	NC	OC	OC
C	OC	NC	OC	NC
D	OC	NC	NC	OC



Ans - D

Q. An airport is to be constructed at 700 m altitude, mean of the average temperature is 25°C and mean of the maximum daily temperature is 40°C. How much correction will be done for temperature rise on runway length of 2400 m.

A. 432.5 m

B. 469.2 m

C. 562 m

D. 2869.2 m

Ans - B

Q. A strut of cross section 200 X100 and length 3 meter is subjected to a gradually increasing axial compressive load till buckling takes place. Using Euler's formula determine the critical load. The two ends of the column may be assumed as hinge
E = 210 Gpa
A. 3838.2 KN
B. 3624.3 KN
C. 2876.5 KN
D. 4132.3 KN

Ans - A

Q. A strut of cross section 200 X100 and length 3 meter is subjected to a gradually increasing axial compressive load till buckling takes place. If yield point stress for the given material is 250 MPA determine the maximum central deflection. The two ends of the column may be assumed as hinge
E = 210 Gpa.
A. 5.05 mm
B. 6.1 mm
C. 3.4 mm
D. 4.2 mm

Ans - A

Q. A solid shaft of 100 mm diameter is subjected to tensile stress of and torque as 20 N/mm^2 and 10 π KN-m. The maximum shear stress induced in the shaft approximately

A. 40

B. 160

C. 120

D. 130

Ans - B

Q. In a BG track of contraflexure the negative super elevation of branch line is 2.5 cm. What will be the theoretical super elevation of maximum speed of train which can run on Main line.

A. 2.5 cm

B. 16.5 cm

C. 10 cm

D. 12 cm

Ans - C

Q. The thickness of laminar BL on a flat plate at point A is 2 cm and at a point B, 1 m downstream of A is 3 cm then distance of point A from leading edge of plate is.

A. 0.66

B. 0.44

C. 0.37

D. 0.80

Ans - D

Q. A spherical object of 1.5 m dia is completely immersed in water reservoir and chained to the bottom. If the chain has a tension of 5.3 KN, find the weight of object when it is taken out of reservoir.

A. 15 KN
B. 14 KN
C. 13 KN
D. 12 KN

Ans - D

Q. A soil specimen have dry density of 16 kN/m^3, degree of saturation 80%. If specific gravity is 2.65, what would be the water content?

A. 15.86%
B. 20.86%
C. 18.86%
D. 22.86%

Ans - C

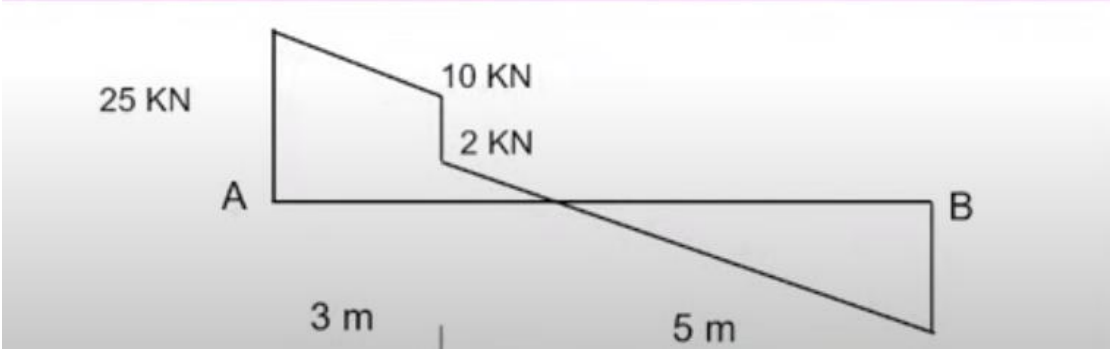
Q A simply supported beam has Shear force diagram as shown in figure. Which of the statement is correct for loading diagram

I) 8 KN is acting downward on the beam

II) Udl of 5 KN-m is acting on the beam

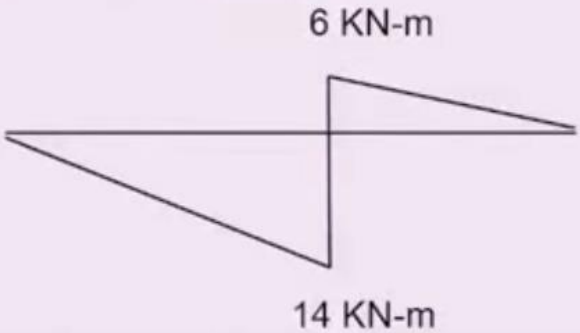
III) Reaction at support A is 25 KN

A. I and II B. II and III C. I and III D. All



Ans - D

Q. A simply supported beam of 10m has bending moment diagram as shown in figure. Which of the statement is correct.



A. Beam subjected to only concentrated load

B. Beam subjected to 20 KN-m clockwise moment

C. Beam subjected to 20 KN-m anti clockwise moment

D. None

Ans - B

Q. Which of the following statement is/are not correct for Bearing capacity of Shallow foundation.

A. Ultimate bearing capacity is not well defined for general shear failure.

B. Meyerhof has considered the failure plane till ground level.

C. Skempton did the analysis for Cohesive soil.

D. Tilting and large settlement can be observed in local shear failure

Ans - A, D

Q. Which of the following statement is/are correct.

A. Adhesive factor for load carrying capacity of group of pile is 1

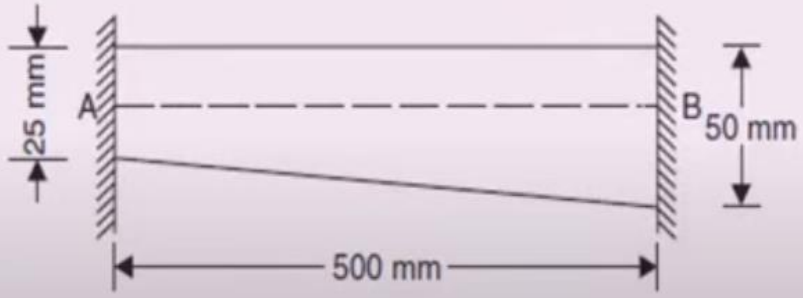
B. Providing the sand drains will increase the settlement of pile

C. Fender pile is used in harbor and the pile which takes lateral load known as batter pile.

D. Minimum spacing between piles in group of pile for friction is 3X diameter of pile

Ans - A, C, D

Q. The steel bar AB shown varies linearly in diameter from 25 mm to 50 mm in a length 500 mm. It is held between two unyielding supports at room temperature. What is the force induced in the bar, if temperature rises by 25°C? Take $E_s = 2 \times 10^5$ N/mm2 and $\alpha_s = 12 \times 10^{-6}$/°C.



Ans - 58.9 KN