Q1 Consider the following statements:
Liquefaction is a phenomenon

1• observed in fine sands
2• associated with development of positive pore pressure.
Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Q2 Which one of the following conditions is valid in case of unconfined compression test in comparison to triaxial test?

(a) Minor principal stress = 0

(b) Minor principal stress = 0.5 x major principal stress

(c) Minor principal stress = major principal stress

(d) Major principal stress = 3 x minor principal stress

Q3 If the coefficient of permeability is doubled and the coefficient of volume compressibility is simultaneously halved, the coefficient of consolidation

(a) increases by 2 times

(b) decreases by 2 times

(c) increases by 4 times

(d) decreases by 4 times

Q4 A retaining wall retains a sand strata with $\varphi = 300$ upto its top. If a uniform surcharge of 12 tlm2 is subsequently put on the sand strata, then the increase in the lateral earth pressure intensity on the retaining wall will be

(a) 1 tlm2

(b) 2 tlm2

(c) 4 tlm2

(d) 8 tlm2

Q 5 No tension should develop at the base of the rectangular well foundation or at any horizontal section within the well. For no tension at the base, the resultant of 'P a' (Total active thrust) and 'W' (Weight of soil and well above the base) must pass through middle

(a) half of the base

(b) third of the base

(c) quarter of the base

(d) of the base

Q 6 A retaining wall with vertical back retains a cohesionless dry backfill at an inclination of β with the horizontal. The backfill has an angle of internal friction φ unit weight y and height of the wall is H. The passive earth pressure on the wall is given by (where P p = Total passive earth pressure)

(a) $P_p = \frac{1}{2}\gamma H^2 \cos\beta \left[\frac{\cos\beta - \sqrt{\cos^2\beta - \cos^2\Phi}}{\cos\beta + \sqrt{\cos^2\beta - \cos^2\Phi}} \right]$

(b) $P_p = \frac{1}{2}\gamma H^2 \cos\beta \left[\frac{\cos\beta - \sqrt{\cos^2\beta + \cos^2\Phi}}{\cos\beta + \sqrt{\cos^2\beta + \cos^2\Phi}} \right]$

(c) $P_p = \frac{1}{2}\gamma H^2 \cos\beta \left[\frac{\cos\beta + \sqrt{\cos^2\beta - \cos^2\Phi}}{\cos\beta - \sqrt{\cos^2\beta - \cos^2\Phi}} \right]$

(d) $P_p = \frac{1}{2}\gamma H^2 \cos\beta \left[\frac{\cos\beta + \sqrt{\cos^2\beta + \cos^2\Phi}}{\cos\beta - \sqrt{\cos^2\beta + \cos^2\Phi}} \right]$

Q 7 In the following figure, if

H = height of wall above dredge line,

q = effective vertical stress at any depth,

c = unit cohesion,

and passive pressure is shown hatched in the figures, then the earth pressure distribution diagram used for analysis of a cantilever sheet pile embedded to a depth D in a purely cohesive soil will be as in

Q 8

Earth pressure

X

Away from backfill ← → Towards backfill

Lateral movement of retaining wall
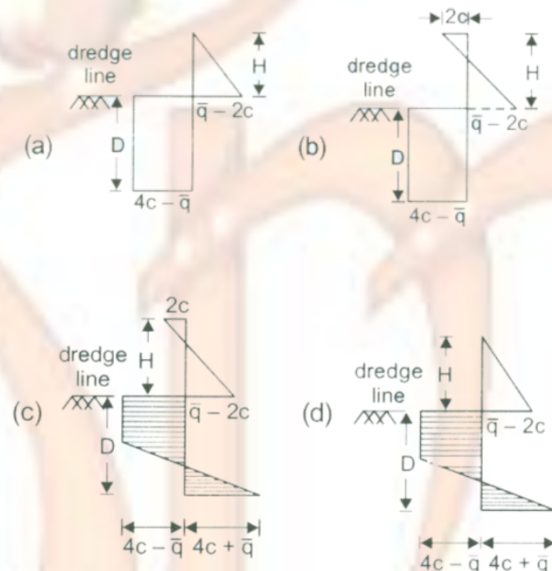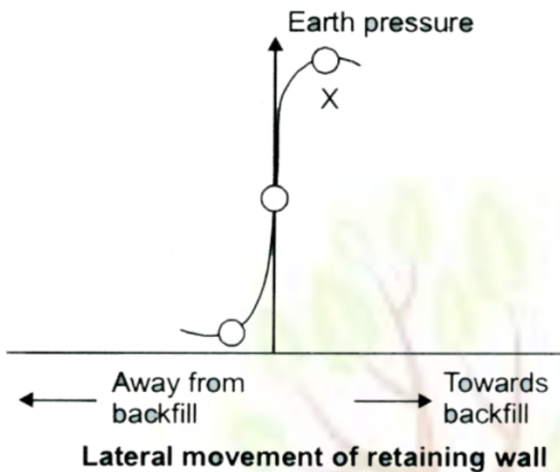
Earth pressure and resultant possibilities of wall movement are shown in the above diagram. The point marked 'x' in the diagram denotes

(a) Earth pressure at rest

(b) Active earth pressure

(c) Arching active pressure

(d) Passive earth pressure

Q 9 Given that for a soil deposit,

KO = earth pressure coefficient at rest,
KA = active earth pressure coefficient,

KP = passive earth pressure coefficient and
u = Poisson's ratio, the value of (- μ)/1J is given by

(a) Ka / Kp

(b) K0 / Ka

(c) Kp / Ka

(d) 1 / K0

Q 10 Consider the following statements:

1• Coulomb's earth pressure theory does not take the roughness of wall into consideration.
2• In case of non-cohesive soils, the coefficients of active earth pressure and earth pressure at rest are equal.
3• Any movement of retaining wall away from the fill corresponds to active earth pressure condition.

Of these statements

(a) 1 alone is correct

(b) 1 & 2 are correct

(c) 2 alone is correct

(d) 3 alone is correct

Q 11 Given that $c = 2t/m2$, $\varphi = 00$ and $y = 2t / m3$ the depth of tension crack developing in a cohesive backfill would be

(a) 1 M

(b) 2 M

(c) 3 M

(d) 4 M

Q 12 The correct sequence of the given parameters. in descending order of earth pressure intensity is

(a) Active, passive, at rest

(b) Passive, active, at rest

(c) Passive, at rest, active

(d) At rest, passive, active

Q 13 For a sand having an internal friction of 30°, the ratio of passive to active lateral earth pressure will be

(a) 1

(b) 3

(c) 6

(d) 9

Q 14 A vertical cut is to be made in saturated clay with C = 15 kN/m2, $\varphi = 0$, and y = 20 kN/m3. What is the theoretical depth to which the clay can be excavated without side collapse?

(a) 6 m

(b) 2 m

(c) 2.5 m

(d) 3 m

Q 15 What is the intensity of active earth pressure 38. at a depth of 10.0 m in dry sand with an angle of shearing resistance of 30° and unit weight of 18 kN/m3?

(a) 50 kN/m2

(b) 60 kN/m2

(c) 70 kN/m2

(d) 80 kN/m2

Q 16 The lateral earth pressure coefficients of a soil, KA for active state, KP for passive state and KO for at-rest condition, compare as :

(a) K0 < KA < KP

(b) KA < K0 < KP

(c) KA < KP < K0

(d) KP < K0 < KA

Q 17 Consider the following statements regarding Coulomb's theory of earth pressure:

1• It is based on wedge theory of earth pressure.
2• It assumes the wall surface to be rough.
3• It mayor may not satisfy the static equilibrium condition occurring in nature.

Which of these statements are correct?

(a) 1, 2 and 3

(b) 1 and 2 only

(c) 2 and 3 only

(d) 1 and 3 only

Q 18 Given that c = 2t/m2 , φ = 00 and y = 2t I m3 the depth of tension crack developing in a cohesive backfill would be

(a) Active

(b) Passive

(c) At rest

(d) Constant always and

Q 19   Directions: The following items consist of two statements, one labelled the 'Assertion A' and the other labelled the 'Reason R' you are to examine these two statements carefully and decide if the Assertion A and the Reason R are individually true and if so, whether the Reason is a correct explanation of the Asseretion. Select your answers to these items using the codes given below and mark your answer sheet accordingly.

Assertion (A) : The safe height $(2z_o)$ to which an unsupported vertical cut in clay can be made is $4c/y$.

Reason (R): Active earth pressure of cohesive backfill shows that the negative pressure (tension) is developed at top level. This tension decrease to zero at depth $2 Z_O$ and total net pressure up to a depth $2z_o$ is zero,

(a)   Both A and R are true and R is correct explanation of A

(b)   Both A and R are true but R is not a correct explanation of A

(c)   A is true but R is false

(d)   A is false but R is true

Q 20   The wall friction of the retaining wall :

(a) Decreases active earth pressure but increases passive earth pressure

(b) Decreases passive earth pressure but increases active earth pressure

(c) Decreases both active and passive earth pressures

(d) Increases both active and passive earth pressures