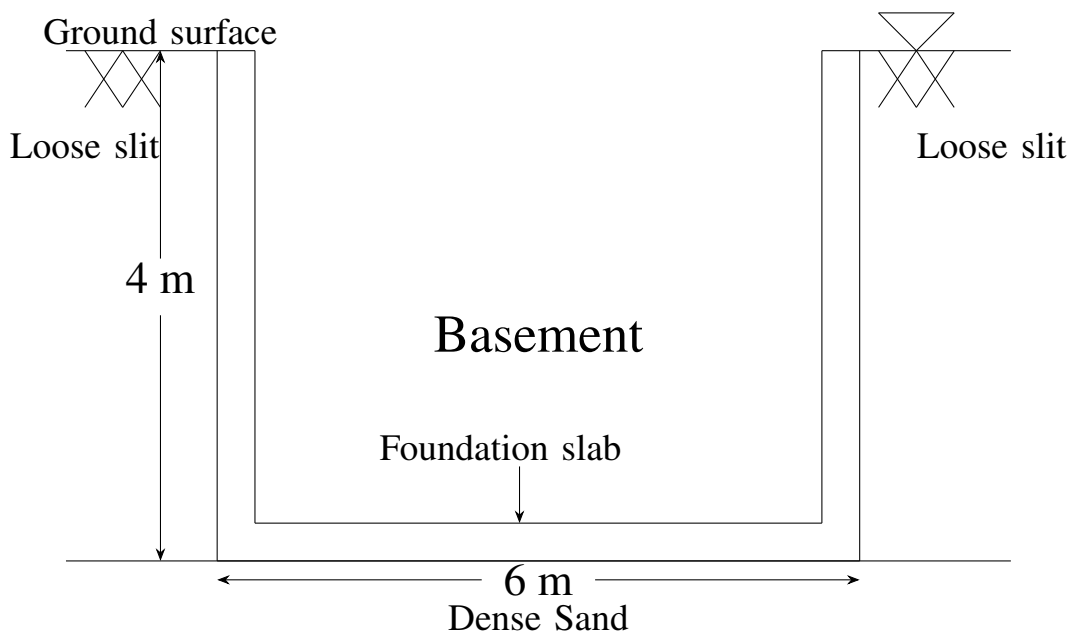# 2013-CE-'53-65'

EE24BTECH11007 - Arnav Makarand Yadnopavit

A multistory building with a basement is to be constructed. The top $4m$ consists of loose silt, below which dense sand layer is present up to a great depth. Ground water table is at the surface. The foundation consists of the basement slab of $6m$ width which will rest on the top of dense sand as shown in the figure. For dense sand, saturated unit weight = $20kN/m^3$, and bearing capacity factors $N_q = 40$ and $N_\gamma = 45$. For loose silt, saturated unit weight = $18kN/m^3$, $N_q = 15$ and $N_\gamma = 20$. Effective cohesion $c\prime$ is zero for both soils. Unit weight of water is $10kN/m^3$. Neglect shape factor and depth factor.
Average elastic modulus E and Poisson's ratio μ of dense sand is $60 \times 10^3 kN/m^2$ and 0.3 respectively.

52) Using factor of safety = 3, the net safe bearing capacity (in kN/m^2) of the foundation is:

    a) 610   b) 320   c) 983   d) 693

53) The foundation slab is subjected to vertical downward stresses equal to net safe bearing capacity derived in the above question. Using influence factor $I_f = 2.0$, and neglecting embedment depth and rigidity corrections, the immediate settlement of the dense sand layer will be:

    a) 58 mm b) 111 mm c) 126 mm d) 179 mm

At a station, Storm I of 5 hour duration with intensity 2 cm/h resulted in a runoff of 4 cm and Storm II of 8 hour duration resulted in a runoff of 8.4 cm. Assume that the ϕ-index is the same for both the storms.

54) The ϕ-index (in cm/h) is:

    a) 1.2   b) 1.0   c) 1.6   d) 1.4

55) The Intensity of storm II (in cm/h) is:

a) 2.00   b) 1.75   c) 1.50   d) 2.25

56) A number is as much greater than 75 as it is smaller than 117. The number is:

a) 91   b) 93   c) 89   d) 96

57) The professor ordered to the students to go out of the class.
    I   II   III   IV

Which of the above underlined parts of the sentence is grammatically incorrect?

a) I   b) II   c) III   d) IV

58) Which of the following options is the closest in meaning to the word given below:
Primeval

a) Modern   c) Primitive
b) Historic   d) Antique

59) Friendship, no matter how ——————— it is, has its limitations.
a) cordial
b) intimate
c) secret
d) pleasant

60) Select the pair that best expresses a relationship similar to that expressed in the pair:
Medicine: Health
a) Science: Experiment
b) Wealth: Peace
c) Education: Knowledge
d) Money: Happiness

61) X and Y are two positive real numbers such that $2X + Y \leq 6$ and $X + 2Y \leq 8$. For which of the following values of (X, Y) the function $f(X, Y) = 3X + 6Y$ will give the maximum value?

a) $\left(\frac{4}{3}, \frac{10}{3}\right)$

b) $\left(\frac{8}{3}, \frac{20}{3}\right)$

c) $\left(\frac{8}{3}, \frac{10}{3}\right)$

d) $\left(\frac{4}{3}, \frac{20}{3}\right)$

62) If $|4X - 7| = 5$ then the values of $2|X| - |-X|$ is:

a) $2, \frac{1}{3}$ b) $\frac{1}{2}, 3$ c) $\frac{3}{2}, 9$ d) $\frac{2}{3}, 9$

63) Following table provides figures (in rupees) on annual expenditure of a firm for two years - 2010 and 2011.

Category	2010	2011
Raw material	5200	6240
Power & fuel	7000	9450
Salary & wages	9000	12600
Plant & machinery	20000	25000
Advertising	15000	19500
Research & Development	22000	26400

In 2011, which of the following two categories have registered increase by same percentage?

a) Raw material and Salary & wages
b) Salary & wages and Advertising
c) Power & fuel and Advertising
d) Raw material and Research & Development

64) A firm is selling its product at Rs. 60 per unit. The total cost of production is Rs. 100 and firm is earning total profit of Rs. 500. Later, the total cost increased by 30%. By what percentage the price should be increased to maintained the same profit level.

a) 5   b) 10   c) 15   d) 30

65) Abhishek is elder to Savar.
Savar is younger to Anshul.
Which of the given conclusions is logically valid and is inferred from the above statements?
a) Abhishek is elder to Anshul
b) Anshul is elder to Abhishek
c) Abhishek and Anshul are of the same age
d) No conclusion follows