

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B. Tech.-5<sup>th</sup> Semester (Civil)

COURSE CODE (CREDITS): 18B11CE514(3)

MAX. MARKS: 25

COURSE NAME: Foundation Engineering

COURSE INSTRUCTORS: Dr. Saurabh Rawat

MAX. TIME: 1 Hour and 30 Minutes

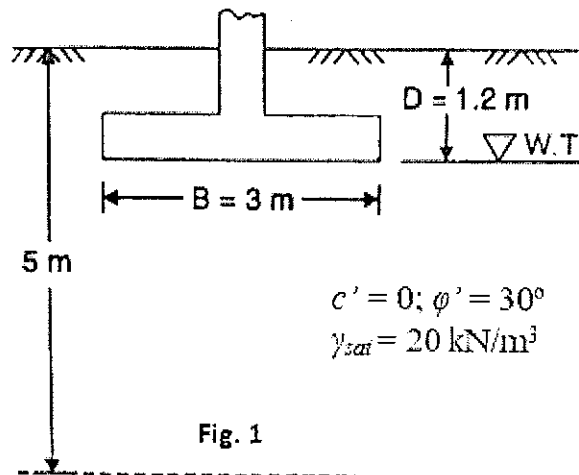
*Note: All questions are compulsory. Marks are indicated against each question in square brackets. Kindly assume data wherever necessary as per the IS codes.*

- Q1.** A square footing 2.5 m by 2.5 m is built in a homogeneous bed of sand of unit weight 20 kN/m<sup>3</sup> with  $\phi = 36^\circ$ . The depth of the base of footing is 1.5 m below the ground surface. Calculate the **safe load** that can be carried by a footing with a **FoS = 3** against complete shear failure using Terzaghi's analysis. Use:  $N_c = 65.4$ ;  $N_q = 49.4$  and  $N_\gamma = 54.0$ .

(CO-2, CO-3) [5 marks]

- Q2.** A footing 3 m square carries a gross pressure of 350 kN/m<sup>2</sup> at a depth of 1.2 m with  $\gamma$  above the water table = 17 kN/m<sup>3</sup>. For  $\phi' = 30^\circ$ ,  $N_q = 22$  and  $N_\gamma = 20$ . Determine the **Factor of safety** with respect to shear failure for the location of water table (W. T.) as given in Fig. 1 using IS code method.

(CO-2, CO-3) [5 marks]



- Q3.** With the help of a neat and labelled diagram, derive the Terzaghi's bearing capacity equation. Also state the assumptions considered by Terzaghi is determining the bearing capacity equation.

(CO-2) [5 marks]

**Q4.** A footing  $2\text{m} \times 2\text{m}$  in plan is founded at 1m depth below the ground level (G. L.) in sand having  $\phi = 36^\circ$ . The GWT is located at a depth of 1 m below the G.L and the soil above the GWT is considered as dry. The saturated and dry unit weight values for sand are  $2 \text{ t/m}^3$  and  $1.6 \text{ t/m}^3$ , respectively. If the load on the footing is eccentric with  $e_x = e_y = 0.25 \text{ m}$ , calculate the allowable load using Terzaghi's method at the base of the footing taking  $\text{FoS} = 3$ ;  $N_c = 50$ ;  $N_q = 42$  and  $N_\gamma = 46$ .  
(CO-2, CO-3) [5 marks]

**Q5.** Describe the 'Plate Load Test', elaborating the codal provisions given for the plate use, test set – up, loading increment for cohesive and cohesionless soils. Also, with the help of plots, define the identification of different type of soils and the parameters determined by PLT.  
(CO-4) [5 marks]