

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI(NEW) EXAMINATION – WINTER 2022****Subject Code:3164016****Date:17-12-2022****Subject Name:Design of Foundations****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

	MARKS
Q.1 (a) What are the factors that affect the selection of a particular foundation type? Discuss any of the factors in detail.	03
(b) Differentiate between shallow and deep foundations.	04
(c) A square footing is subjected to a 5000 kN. The density of soil is 2000 kg/m ³ . The depth of the foundation is 1 m. The factor of safety is assumed to be 1.5. Determine the size of the footing. $c= 20$ kPa and $\phi = 35^\circ$. $N_c=7$, $N_q= 38$, $N_\gamma= 42$.	07
Q.2 (a) Write down the objectives of soil exploration.	03
(b) What are the factors that affect the selection of a particular foundation type? Discuss any one of the factors in detail.	04
(c) Discuss in brief the corrections required for overburden and dilatancy of a Standard Penetration Test (SPT) as per IS 2131-1981.	07
OR	
(c) Elaborate on various modes of shear failures of soil associated with shallow foundations.	07
Q.3 (a) As per the IS 1892-1972, what are the prescribed depth of foundation for: (a)Isolated footings, (b)Raft foundation, and (c)Road cuts.	03
(b) Discuss the utility of an under-reamed pile with a neat diagram.	04
(c) Discuss the steps involved in apportioning of a shallow foundation considering only shear failure criterion.	07
OR	
Q.3 (a) What are the different types of soil samples?	03
(b) Based on their design and use, classify soil samplers (give the names only without describing them).	04
(c) With a neat diagram, define the following terms of a typical soil sampler: (a) Inside Clearance, (b)Outside Clearance, and (c) Area Ratio	07
Q.4 (a) Write down three main advantages of geophysical exploration.	03
(b) Discuss the advantages and disadvantages of seismic refraction method.	04
(c) Write down the major types of machines and their suitable foundations.	07
OR	
Q.4 (a) What are the major disadvantages of geophysical exploration?	03
(b) Discuss the advantages and disadvantages of electric resistivity method.	04
(c) Draw the pressure diagram below the rigid and flexible footings resting on cohesive and cohesionless soils.	07

- Q.5 (a)** Write down at least three factors affecting the bearing capacity of a shallow foundation. **03**
- (b)** Define ultimate bearing capacity, net ultimate bearing capacity, net safe bearing capacity, and safe bearing capacity **04**
- (c)** With a neat diagram, discuss the Terzaghi's theory on bearing capacity. **07**

OR

- Q.5 (a)** Discuss very briefly the design principles of a foundation of a reciprocating machine. **03**
- (b)** Determine the spacing of 4×3 piles group to carry 1000 kN load and installed in cohesionless soils with $\phi = 35^\circ$. The diameter and length of piles are 0.75 m and 12 m. Assume $N_\gamma = 35$. **04**
- (c)** Discuss the classification of piles based on (a) load carrying capacity, (b) method of installation, and (c) materials of construction. **07**
