

M.E. CIVIL ENGINEERING FIRST YEAR
FIRST SEMESTER EXAM 2024
SUBJECT: SUB SOIL INVESTIGATION
 (Name in full)

PAPER ××××

Time: Three hours

Full Marks –100

No. of Question	CO	Marks
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- 1) Answer question number 1, question number 2, question number 3 and question number 4.
No question should be non-attempted among this 4 questions.
- 2) Assume reasonable values of data if it is not supplied.
- 3) There is no need of any code etc. for answering Part-II.
- 4) In the cases where excess number of questions will be answered exceeding the required number of questions, the first required number of questions will be evaluated only.

Sl. No.	Question
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Answer any one between 1 (a) to 1 (b)

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|--------|---|------|-----|
| 1. (a) | Write down the expression of Area Ratio. | [NA] | [2] |
| (b) | Write down the expression of inside clearance | [NA] | [2] |

Answer any one between 1 (c) to 1 (d)

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|-----|--|------|-----|
| (c) | Write on types of structure in view of its orientation with respect to soil. | [NA] | [4] |
| (d) | Give a general guiding table in relation with depth of exploration at the start of work, having the following columns in it: | [NA] | [4] |

Type of foundation	Depth of Exploration.
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Answer any one between 1 (e) to 1 (f)

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|-----|--|------|-----|
| (e) | Areas/locations suitable for extensive use of Soundings & probing. | [NA] | [3] |
| (f) | Objectives of sub soil exploration | [NA] | [3] |

Answer any two between 1 (g) to 1 (i)

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|-----|--------------------------------|------|-----|
| (g) | Influence of GWT on foundation | [NA] | [5] |
| (h) | Standard split spoon sampler. | [NA] | [5] |
| (i) | Pressure bulb. | [NA] | [5] |

Answer any one between 1 (j) to 1 (k)

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|-----|---|------|-----|
| (j) | What should be the responsibilities of designer to ensure the proper execution of sub soil exploration? | [NA] | [6] |
| (k) | Discuss about the information required from sub soil exploration. | [NA] | [6] |

Answer any one between 2 (a) to 2 (b)

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|-------|--------------------------------|------|-----|
| 2 (a) | Write about “Vane shear test” | [NA] | [2] |
| 2 (b) | Write about “Plate load test”. | [NA] | [2] |

Answer any one between 2 (c) to 2 (d)

- | | | | |
|-------|-------------------|------|-----|
| 2 (c) | Write about DCPT. | [NA] | [4] |
|-------|-------------------|------|-----|

[Turn over

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- 2 (d)** *Choose the correct alternative answers in the following MCQs:* [NA] [4× 1 =4]
- i) The methods of site investigation are dependent upon _____
- Climatic condition
 - Nature of engineering project
 - Local topography
 - All of the mentioned
- ii) The feature that helps to estimate the relative density of coarse-grained soil is _____
- Soundings
 - Shallow test pits
 - Exploratory borings
 - Geophysical method
- iii) In detailed exploration, the field test is conducted to determine _____
- Tensile strength
 - Rigidity
 - Permeability
 - Water content
- iv) Exploratory borings in general exploration is carried out by using _____
- Auger
 - Bore equipment
 - Well curb
 - All of the mentioned
- Answer any one between 2 (e) to 2 (f)*
- 2 (e)** Sampling from trial pits [NA] [3]
- 2 (f)** Required safety measures to examine test pits [NA] [3]
- Answer any two between 2 (g) to 2 (i)*
- 2 (g)** Semi-direct and indirect methods of exploration [NA] [5]
- 2 (h)** Representative & non-representative samples [NA] [5]
- 2 (i)** Mode of operation of “shell & auger” method [NA] [5]
- Answer any one between 2 (j) to 2 (k)*
- (j)** What information should a good soil test report contain? [NA] [6]
- ((k)** In preparing a soil investigation report for a mega project (which will cover a long stretch), help of which professionals and experts from which specializations, may be required? Discuss in your own languages. [NA] [6]

Answer any one between 3 (a) to 3 (b)

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3. (a) Discuss about percussion boring. [NA] [10]
(b) Discuss about wash boring. [NA] [10]

Answer any one between 3 (c) to 3 (d)

- (c) (i) Discuss about the requirements of good sampling process. [NA] [3×5=15]
(ii) What precautions should be taken during SPT test?
(iii) “Will the result be more realistic if Seismic Refraction Method is being applied in combination with Electrical Resistivity Method to assess the probable picture of the soil below GL?” - give your view with proper logic.
(d) Discuss in detail about each phase out of the four phases of the subsoil investigation for a mega project. [NA] [15]

Answer 4 (a)

- 4 (a) Choose the correct alternative answers from any 10 MCQs among following 12 MCQs: [NA] [10×1=10]

i) Hand auger can be used for depths up to _____

- (a) 7 m
(b) 6 m
(c) 2 m
(d) 10

ii) Auger boring is used in _____ type of soil.

- (a) Cohesion less soil
(b) Cohesive soil
(c) Coarse-grained soil
(d) Pervious soil

iii) Wash boring cannot be used for _____ type of soil strata.

- (a) Cohesive soil
(b) Cohesion less soil
(c) Boulder
(d) All of the mentioned

iv) The type of boring method that can be used for both rock and soils are _____

- (a) Shell boring
(b) Wash boring
(c) Auger boring
(d) Rotary boring

v) _____ Samples contain all the mineral constituents of the soil, but the structure of the soil may be significantly disturbed.

- (a) Undisturbed
(b) Non-Representative

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- (c) Representative
- (d) All of the above

vi) The penetration resistance N for designing of raft should be taken at _____ intervals.

- (a) 50 cm
- (b) 60 cm
- (c) 75 cm
- (d) 20 cm

vii) If the penetration resistance N is less than 5, which of the following measures can be adopted?

- (a) Using piles and piers and Compacting sand
- (b) Using an inverted flat slab
- (c) None of the mentioned
- (d) All of the mentioned

viii) The average depth of a test pit generally, is

- (a) 1.50 m
- (b) 3.0 m
- (c) 4.5 m
- (d) 6.0 m

ix) It eliminates the entrance of excess soil and is suitable only in hard or dense coarse soil.

- (a) Fast pushing, Single heavy blow, shooting
- (b) Slow jacking
- (c) Slow pushing, Single heavy blow, shooting
- (d) Hammering

x) Soil samples are generally belongs to

- (a) 2 classes
- (b) 3 classes
- (c) 4 classes
- (d) 5 classes

xi) _____ has stated that soundings often reveal the presence of strata that are not recovered or observed in sampling operations

- (a) Terzaghi
- (b) Hvorslev
- (c) Mayerhof
- (d) None of the above

xii) The mode of operation of measuring the intensity of scattered radiation from a system at desired elevation, is observed in

- (a) Gamma ray logging

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- (b) Neutron logging
- (c) Electrical logging
- (d) None of the above

Answer any one between 4 (b) to 4 (c)

- 2 (b)** Discuss the Seismic Refraction Method in detail.
- 2 (c)** Discuss the Electrical Resistivity Method in detail.

[NA] [15]
[NA] [15]

End of Questions