R20 Regulation *Subject code:3P5AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech V Semester Supplementary Examinations, June/July 2023

SOIL MECHANICS

(Civil Engineering)

Maximum Marks: 70 Date:01.07.2023 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 List the main Types of Soils.
2 Define porosity.
3 Define Capillarity and permeability.
4 Differentiate seepage velocity and discharge velocity.
5 Write the Westergaard's equation for the vertical stress for a point load.
6 What is compaction equipment? List the types.
7 Distinguish the primary and secondary consolidation.
8 What are the types of compressibility?
9 Write down the coulomb's expression for shear strength.
10 What is meant by critical void ratio?

Part-B

Answer All the following questions. (5x10M=50Marks)

11 A. Derive the relation between dry density and void ratio. (4 Marks)
B. Explain the classification of soils as per Indian Standard Soil Classification System. (6 Marks)

OR

12 A.A partially saturated soil has a bulk density of 15.6 kN/m^3 and a water content of 20 %. If the specific gravity of solids is 2.6 and unit weight of water is 10 kN/m^3, Calculate the degree of saturation, void ratio and water content at full saturation. (6 Marks)
B. Derive an expression to calculate dry density of soil knowing wet density and moisture content. (4 Marks)

13 A. Explain with a neat diagram a method to determine the coefficient of permeability of medium sand in the laboratory. (7 Marks)
B. What are the various factors affecting the coefficient of permeability? (3 Marks)

OR

14 A. Explain the seepage through homogenous soils. (4 marks)
B. In a falling head permeability test, head causing flow was initially 50 cm and it drops 2 cm in 5 minutes. How much time is required for the head to fall to 25 cm? (6 Marks)

15 A concentrated load of 350 kN is applied vertically on a horizontal ground surface. Determine the vertical stress at a depth of 5 m and at a radial distance of 3 m from the point of loading using Boussinesq's and Westergaard's theory and comment on the result. (10 Marks)

OR

16 Explain factors affecting compaction and effects of compaction on soil properties. (10 Marks)

17 Explain the step by step procedure for calculating the coefficient of consolidation by using Taylor's square root time method with the help of neat sketch. (10 Marks)

OR

18 A. Explain stress history of clay with e-σ and e-log σ curves. (5 Marks)
B. Differentiate the compaction and consolidation. (5 Marks)

19 A cylinder of soil fails under an axial vertical stress of 160 kPa when it is laterally unconfined. Calculate the cohesion and angle of internal friction of the soil, if the failure plane makes an angle of (i) 45° with the vertical (ii) 40° with the vertical. Draw the Mohr's circle and strength envelope (not to scale) for both the cases. (10 Marks)

OR

20 Explain about the shear strength of sands. (10 Marks)