JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

B.Tech-IV Semester (CE)

COURSE CODE (CREDITS): 25B11CE411 (3) MAX. MARKS: 15

COURSE NAME: Geotechnical Engineering

COURSE INSTRUCTOR: Dr. Ashok Kumar Gupta MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory.*
(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems
(c) Use of calculators is allowed

Q.No	**Question**	**CO**	**Marks**
Q1	**a)** *Define* the **Liquid Limit** and **Plasticity Index** of soils. **b)** *Explain* the **engineering significance** of Liquid Limit and Plasticity Index in soil mechanics. **c)** *Apply* the concept of **Atterberg limits** to *classify* fine-grained soils using the **plasticity chart**. **d)** *Analyze* how variations in Liquid Limit and Plasticity Index influence **compressibility and volume change behavior** of soils.	1	4
Q2	A soil sample has a **total unit weight of 20 kN/m³**, a **dry unit weight of 17.4 kN/m³**, and a **specific gravity of 2.65**. **a)** *Recall* the basic **soil phase relationships** and relevant equations. **b)** *Determine* the **water content** of the soil. **c)** *Calculate* the **void ratio and porosity** using fundamental relationships. **d)** *Compute* the **degree of saturation** of the soil. **e)** *Illustrate* the soil **phase diagram** and *analyze* the soil condition based on the computed values.	1	5
Q3	**a)** *Define* **grain size distribution** of soils. **b)** *Describe* the **mechanical sieve analysis method** for determining grain size distribution of coarse-grained soils. **c)** *Explain* the *use* of the **grain size distribution curve** in soil classification and engineering applications **d)** *Differentiate* between **well-graded** and **poorly-graded** soils with suitable criteria. **e)** *Justify* the suitability of **well-graded soils** for construction.	2	3.5
Q4	**a. In the plasticity chart, the A-line is defined by the equation:** a) PI = 0.73 (LL – 20) b) PI = 0.73 (LL – 10) c) PI = 0.67 (LL – 20) d) PI = 0.67 (LL – 10) **b. A soil sample has a liquid limit of 45% and plastic limit of 25%. The plasticity index of the soil is:**	2	2.5

(194)

	a) 20% b) 25% c) 45% d) 70% **c. Which of the following soils is classified as coarse-grained?** a) More than 50% passing 75-micron sieve b) Less than 50% passing 75-micron sieve c) More than 30% passing 4.75-mm sieve d) Less than 30% retained on 75-micron sieve **d. If the bulk unit weight of a soil is 18 kN/m³ and the water content is 10%, the dry unit weight of the soil is approximately:** a) 16.2 kN/m³ b) 16.4 kN/m³ c) 17.0 kN/m³ d) 17.5 kN/m³ **e. Uniformity coefficient (Cu) in grain size distribution is given by:** a) D10 / D60 b) D30 / D10 c) D60 / D10 d) D50 / D30		