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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2026

B.Tech-IV Semester (CE)

COURSE CODE (CREDITS): 25B11CE411 (3)

MAX MARKS: 25

COURSE NAME: Geotechnical Engineering

COURSE INSTRUCTOR: Dr. Ashok Kumar Gupta

MAX. TIME: 1 Hour 30 Min

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is allowed

Q.No	Question	CO	Marks
Q1	<p>I. Soil compaction mainly results in:</p> <p>a) Increase in void ratio b) Increase in air voids c) Increase in dry density d) Increase in permeability</p> <p>II. The moisture content at which maximum dry density occurs is called:</p> <p>a) Liquid limit b) Plastic limit c) Optimum moisture content d) Shrinkage limit</p> <p>III. Standard Proctor Test was developed by:</p> <p>a) Darcy b) Terzaghi c) Proctor d) Rankine</p> <p>IV. Compaction of soil is mainly achieved by:</p> <p>a) Expulsion of water b) Expulsion of air c) Compression of solids d) Chemical reaction</p> <p>V. The unit of coefficient of permeability is:</p> <p>a) <math>m^2/s</math> b) <math>m/s</math> c) <math>m/s^2</math> d) <math>m^3/s</math></p> <p>VI. Darcy's law is valid for:</p> <p>a) Turbulent flow b) Laminar flow c) Both flows d) No flow</p> <p>VII. Constant head permeability test is suitable for:</p> <p>a) Clay b) Silt</p>	CO-2	10X0.5 = 5

	<p>c) Sand d) Peat</p> <p>VIII. Falling head permeability test is suitable for: a) Coarse gravel b) Sand c) Clay and silty soils d) Boulders</p> <p>IX. The compaction curve is a plot between: a) Void ratio vs moisture content b) Dry density vs moisture content c) Permeability vs moisture content d) Density vs void ratio</p> <p>X. Increase in compactive effort generally: a) Decreases dry density b) Increases maximum dry density c) Increases OMC d) Has no effect</p>														
Q2	<p>i. Define <b>soil compaction</b>. How is it different from consolidation? How will you compact clay soil in the field?</p> <p>ii. State <b>Darcy's Law</b> and write its equation.</p> <p>iii. Write <b>two important factors affecting permeability of soils</b>.</p> <p>iv. Define <b>Optimum Moisture Content (OMC)</b>.</p> <p>v. Explain the <b>Zero Air Void Line</b> in a compaction curve.</p>	CO-2	5X2 = 10												
Q3	<p>The following results were obtained from a <b>Standard Proctor compaction Test</b>.</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;">Water Content (%)</th> <th style="text-align: left;">Bulk Density (g/cm<sup>3</sup>)</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>1.82</td> </tr> <tr> <td>10</td> <td>1.92</td> </tr> <tr> <td>12</td> <td>2.01</td> </tr> <tr> <td>14</td> <td>1.98</td> </tr> <tr> <td>16</td> <td>1.90</td> </tr> </tbody> </table> <p>a) Calculate the <b>dry density</b> for each water content. b) Plot the <b>dry density vs water content curve</b>. c) Determine the <b>Maximum Dry Density (MDD)</b> and <b>Optimum Moisture Content (OMC)</b>. d) Draw the <b>Zero Air Void Line</b> assuming <b>specific gravity G = 2.70</b>.</p>	Water Content (%)	Bulk Density (g/cm <sup>3</sup> )	8	1.82	10	1.92	12	2.01	14	1.98	16	1.90	CO-3	5
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Q4	<p>In <b>permeability test on coarse sand</b>, the following data were obtained: <b>(5 Marks)</b> Length of soil sample = <b>15 cm</b> Cross-sectional area = <b>50 cm<sup>2</sup></b> Head difference = <b>40 cm</b> Quantity of water collected in <b>4 minutes = 480 cm<sup>3</sup></b> Determine the <b>coefficient of permeability (k)</b> of the soil sample.</p>	CO-3	5												