

Roll No.

3206

**B. Tech. (Civil Engg.) 5th Semester
Examination – February, 2022**

ENGINEERING GEOLOGY

Paper : PCC-CE-311-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any five questions. Question No. 1 is compulsory. Attempt one question from each Unit. All questions carry equal marks.

1. Answer the following questions : $1.5 \times 10 = 15$
- (a) Define the term soil profile
 - (b) Describe briefly the anticline and syncline.
 - (c) Define weathering.
 - (d) What is meant by seismic zone?
 - (e) Explain in short the term stratigraphy.
 - (f) Explain in detail about chemical weathering.

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- (f) Write the finite difference approximations to partial derivatives in x and y directions.
 (g) What is interpolation?
 (h) What is curve fitting? What is the need for such an exercise?

SECTION - A

2. (a) Determine $f(x)$ as a polynomial in x for the following data:

x :	-4	-1	0	2	5
$f(x)$:	1245	33	5	9	1335

by using Divided Diff. Table.

- (b) Find the cubic splines to fit the data and evaluate $y(1.5)$ and $y'(3)$:

x :	1	2	3	4
y :	1	2	5	11

3. (a) Find the iterative formulae for finding $\sqrt[3]{N}$, where N is a real number, using Newton-Raphson formula. Hence evaluate $\sqrt[3]{10}$ to four decimal places.
 (b) Find a real root of the equation $\tan x = x$ by fixed point method.

SECTION - B

4. (a) Solve the system:

$$9x - 2y + z = 50$$

$$x + 5y - 3z = 18$$

$$-2x + 2y + 7z = 19$$

by using Iterative method.

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- (b) Solve the equations:

$$2x + y + z = 10;$$

$$3x + 2y + 3z = 18;$$

$$x + 4y + 9z = 16$$

by Gauss elimination method.

5. (a) Given that:

$$x: \quad 1.96 \quad 1.98 \quad 2.00 \quad 2.02 \quad 2.04$$

$$f(x): \quad 0.7825 \quad 0.7739 \quad 0.7651 \quad 0.7563 \quad 0.7473$$

find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 2.03$

- (b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using

(i) Trapezoidal rule taking $h = \frac{1}{4}$

(ii) Simpson's rule taking $h = \frac{1}{6}$

SECTION - C

6. (a) Find the largest Eigen value of the matrix, using power method:

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -4 & 2 \\ 0 & 0 & 7 \end{bmatrix}$$

- (b) Using modified Euler's method, obtain a solution of the equation $\frac{dy}{dx} = \log(x+y)$, with initial conditions

$y = 2$ at $x = 0$, at $x = 1.2$ and 1.4 in steps of 0.2 .

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