B.Tech (Civil Engg.) 3rd Semester (G-Scheme)

Examination, November–2023

MATHEMATICS–III

Paper–BSC-MATH-205 G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in total by selecting **one** question from each unit. **Question No. 1 is compulsory.***

1. (a) Solve $y^2zp + x^2zq = y^2x$. 15

(b) Write Lagrange's formulae for interpolation.

(c) Define Laplace Transform and state Convolution theorem.

(d) Find the number of permutations of the letters of the word ALLAHABAD.

Unit–I

2. (a) Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$. 15

(b) Solve $2xz - px^2 - 2qxy + pq = 0$ by Charpit's method.

3. A tightly stretched string with fixed end points $x = 0$ and $x = \ell$ is initially in a position given by $y = y_0 \sin^3 \frac{\pi x}{\ell}$. If it is released from rest from this position, find the displacement y (x, t). 15

Unit–II

4. Find a root of $x^3 - x^2 - 1 = 0$ by using

(i) Bisection method

(ii) Newton Raphson method. 15

5. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using

(i) Trapezoidal Rule

(ii) Simpson's $\frac{1}{3}$rd rule 15

Unit–III

6. Find Laplace Transform of 15

(i) $t^3 e^{-3t}$

(ii) Periodic function $f(t) = \sin wt, \quad 0 < t < \frac{\pi}{w}$

$= 0 \quad , \frac{\pi}{w} < t < \frac{2\pi}{w}$.

(iii) $\frac{1 - e^t}{t}$

7. (a) Find inverse Laplace Transform of $\frac{4s + 5}{(s-1)^2 (s+2)}$. 15

(b) Apply Convolution theorem to evaluate inverse Laplace Transform of $\frac{1}{(s^2 + 1)(s^2 + 9)}$.

Unit–IV

8. Write short note on : 15

(i) Pigeon-hole principle

(ii) Group

(iii) Permutations

9. Explain the following with the help of suitable examples : 15

(i) Cyclic group

(ii) Normal subgroup.