

9. Explain the following with the help of suitable example :

- (i) Monoid
- (ii) Lagrange's theorem

Roll No.

3026

**B. Tech 3rd Semester (Civil Engg.)
Examination – December, 2019**

MATHEMATICS – III

Paper : BSc. -MATH-205 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 *five* questions in total by selecting one from each unit. Question No. 1 is *compulsory*.

1. (a) Solve : $p\sqrt{x} + q\sqrt{y} = \sqrt{z}$. 15
- (b) Write Newton's divided difference formula..
- (c) Define Laplace Transform and state convolution th^m.
- (d) How many 4-digit numbers can be formed by using the digits 1 to 9 if repetition of digits is not allowed ?

UNIT - I

2. (a) Solve $(mz - ny) \frac{\partial z}{\partial x} + (nx - lz) \frac{\partial z}{\partial y} = ly - mx$. 15

(b) Solve $z^2 = pqxy$ by Charpit's method.

3. A tightly stretched string of length l with fixed ends is initially in equilibrium position. It is set vibrating by giving each point a velocity $V_0 \sin^3 \frac{\pi x}{l}$. Find the displacement $y(x,t)$. 15

UNIT - II

4. Find a root of $x^3 - 5x + 3 = 0$ by using 15

(i) Bisection method.

(ii) Newton Raphson method.

5. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using 15

(i) Trapezoidal rule

(ii) Simpson's $\frac{3}{8}$ th rule

3026-1,550 -(P-4)(Q-9)(19) (2)

UNIT - III

6. Find Laplace Transform of : 15

(i) $e^{3t} \sin^2 t$

(ii) Periodic function

$$f(t) = \begin{cases} t & , 0 < t < \pi \\ \pi - t & , \pi < t < 2\pi \end{cases}$$

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

7. (a) Evaluate : 15

$$L^{-1} \left(\frac{1-7s}{(s-3)(s-1)(s+2)} \right)$$

(b) Evaluate :

$$L^{-1} \left(\frac{s}{(s^2 + a^2)^2} \right) \text{ by using Convolution theorem.}$$

UNIT - IV

8. Write short note on : 15

(i) Combination

(ii) Semi-group

(iii) Pigeon-hole principle

3026-1,550 -(P-4)(Q-9)(19) (3)