[No. of Printed Pages – 4]

MATH242 Enrol. No. A2305220448

[ST]

END SEMESTER EXAMINATION : APRIL-MAY 2022

APPLIED MATHEMATICS – IV

Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed. Use of Non Programmable Scientific calculator & Probability Distribution table is allowed.***

SECTION – A (24 Marks)

Attempt any **four** *questions out of* **five**.
Each question carries **06** *marks.*

1. Find the smallest positive root of the equation $x - e^{-x} = 0$ using Regula-Falsi method correct to three decimal places.

2. Solve the following system of equations by Gauss Seidal Method (three steps):

   $9x + 4y + z = -17$,

   $x - 2y - 6z = 14$,

   $x + 6y = 4$

P.T.O.

3. The distance covered by an athlete for the 50 meter race is given in the following table :

Time (sec)	0	1	2	3	4	5	6
Distance (meter)	0	2.5	8.5	15.5	24.5	36.5	50

Determine the speed of the athlete at t=5 sec correct to two decimal places.

4. In a normal distribution 30.5% of items are under 42 and 6.5% are over 70. Find the mean and standard deviation of the distribution.

5. By the method of least square, fit a second degree parabola of the form $y = a + bx + cx^2$ in the given data :

x	0	1	2	3	4
y	1	4	10	17	30

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**
Each question carries **10** *marks.*

6. (a) Prove $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1+\frac{\delta^2}{4}}$ and $\mu^2 = 1+\frac{\delta^2}{4}$. (5)

(b) Find a positive value of $(17)^{1/3}$ correct to four places of decimal by Newton Raphson method.

(5)

7. (a) Find the unique polynomial P(x) of degree 2 such that :

$P = (1) = 1,\ P(3) = 27,\ P(4) = 64$ (5)

(b) Calculate $\int_0^{\pi/2} \sin x\ dx$ using Simpson's 3/8th rule by taking $h = \pi/18$. (5)

8. (a) A continuous random variable has the probability. density function

$$f(x) = \begin{cases} kx^2 e^{-x} & \text{if } x \geq 0 \\ 0 & \text{elsewhere} \end{cases}$$

Determine the constant k, mean and variance.

(5)

(b) Find out the kurtosis of the data given below :

Class interval	0-10	10-20	20-30	30-40
Frequency	1	4	3	2

(5)

P.T.O.

SECTION – C (16 Marks)

(Compulsory)

9. (a) From the following data, find the number of students who obtained less than 45 marks :

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

(8)

(b) Using fourth order Runge Kutta method, find the approximate value of y for $x = 0.1$ and $x = 0.2$, taking $h = 0.1$, if

$$\frac{dy}{dx} = -y, \quad y(0) = 1 .$$ (8)