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MATH242 Enrol. No. 755

[ST]

END SEMESTER EXAMINATION : APRIL-MAY, 2024

APPLIED MATHEMATICS – IV

Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed. Use of Scientific and non programmable calculator is allowed.***

SECTION – A (24 Marks)

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

1. Find the cube root of 24, by Newton Raphson method correct to four decimal places.

2. Solve the following equation using Gauss-Jacobi method

$$27x_1 + 6x_2 - x_3 = 85$$

$$x_1 + x_2 + 54x_3 = 110$$

$$6x_1 + 15x_2 + 2x_3 = 72$$

P.T.O.

3. Evaluate the integral $\int_0^6 \frac{dx}{(1-x)^2}$ by using

(i) Trapezoidal Rule

(ii) Simpson's one – third rule

4. A firm owns two cars and hires out everyday. The number of demands for car on each day is distributed as Poisson distribution with mean 1.5. Calculate the proportion of days

(i) On which there is no demand

(ii) On which demand is refused

5. Calculate the mean deviation from the median for the following distribution :

x	10	15	20	25	30	35	40	45
f	7	3	8	5	6	8	4	9

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**

Each question carries **10** *marks.*

6. (a) Prove the following relation (5)

$$\Delta+\nabla=\frac{\Delta}{\nabla}-\frac{\nabla}{\Delta}$$

(b) From the following table, find $e^{1.17}$, using Gauss forward formula (5)

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
e^x	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

7. Solve the equation $10\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$ to evaluate $y(0.2)$ and $y(0.4)$ by Runge Kutta Method of forth order.

8. (a) Fit a binomial distribution to following data, when tossing 5 coins. (4)

x	0	1	2	3	4	5
f	2	14	20	34	22	8

(b) For the following distribution, find the first four moments about the mean. Also find the value of β_1. Is it a symmetrical distribution?

x	2	3	4	5	6
f	1	3	7	3	1

(6)

P.T.O.

SECTION – C (16 Marks)

(Compulsory)

9. (a) Using Lagrange's interpolation formula, find the unique polynomial P(x) of degree 2 such that $P(1) = 1$, $P(3) = 27$, $P(4) = 64$. (6)

(b) Find $f'(1.5)$ from the table given below : (6)

x	0.0	0.5	1.0	1.5	2.0
$f(x)$	0.3989	0.3521	0.2420	0.1295	0.0540

(c) A random variable X has the following probability distribution : (4)

X:	0	1	2	3	4	5	6	7
P(X):	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

Determine :

(i) K

(ii) $P(X < 3)$

(iii) $P(X > 6)$