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MATH242 Enrol. No. .....

[ST]

END SEMESTER EXAMINATION : April-May, 2023

APPLIED MATHEMATICS – IV

Time : 3 Hrs. *Maximum Marks : 60*

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

SECTION – A (24 Marks)

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

1. Estimate the missing term in the table by using relation between operators :

Year	1961	1962	1963	1964	1965	1966	1967
Production	200	220	260	?	350	?	430

2. Find the real root of the equation $x \log_{10} x - 1.2 = 0$ correct to three decimal places by Newton- Raphson method.

P.T.O.

3. Solve the following by Gauss Seidal Method (Perform three iterations)

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

4. Using Euler's method obtain a solution of the differential equation

$$\frac{dy}{dx} = x + |\sqrt{y}|$$

with die boundary conditions $y = 1$ when $x = 0$ for the range $0 \leq x \leq 0.6$ in steps of 0.2.

5. Fit a straight line to the following data :

x :	71	68	73	69	67	65	66	67
y :	69	72	70	70	68	67	68	6

SECTION – B (20 Marks)

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

6. (a) Find $\frac{dy}{dx}$ at $x = 3.5$ and $\frac{d^2y}{dx^2}$ at $x = 4$ by considering the following values :

$f(0) = 2,\ f(1) = 3,\ f(2) = 12,\ f(5) = 147.$ (5)

(b) The probability that a pen manufactured by a company will be defective is 1/10. If 12 such pens are manufactured, find the probability that (i) exactly 2 will be defective, (ii) none will be defective, (iii) at least two will be defective. (5)

7. (a) Given: Sin 45° = 0.7071, Sin 50° = 0.7660, Sin 55° = 0.8192. Sin 60° = 0.8660, find Sin 52° using Newton's forward interpolation formula. (5)

(b) Using Newton's Divided Difference formula, calculate the value off(6) from the following data : (5)

x	1	2	7	8
f(x)	1	5	5	4

8. (a) A market survey was conducted in four cities to find ont the preference for brand A soap. The responses are shown below : (4)

	Delhi	*Kolkata*	*Chennai*	*Mumbai*
Yes	45	55	60	50
No	35	45	35	45
No opinion	5	5	5	5

(i) What is the probability that a consumer preferred brand A, given that he was from Chennai?

(ii) Given that a consumer preferred brand A, what is the probability that he was from Mumbai?

P.T.O.

(b) A random variable X has the following probability distribution : (6)

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 > 6)

(iii) P(0 < X < 3)

SECTION – C (16 Marks)

(Compulsory)

9. (a) Evaluate the integral $\int_0^1 \frac{1}{1+x^2} dx$ by taking six sub intervals by

(i) Trapezoidal rule

(ii) Simpsons $1/3^{rd}$ rule

(iii) Simpsons $3/8^{th}$ rule

and calculate the approximate value of π in each case. (8)

(b) Calculate the mean deviation from the median of the following data : (8)

Wages per week (in Rs):	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of workers :	4	6	10	20	10	6	4