R.N.G.PATEL INSTITUTE OF TECHNOLOGY-RNGPIT
(An Autonomous College U/s UGC Act 1956)

B.Tech. SEMESTER-II, SEMESTER END EXAMINATION – WINTER 2025

SUBJECT CODE: 1SH204	**DATE: 06-01-2026**
SUBJECT NAME: APPLIED MATHEMATICS	
TIME: 11:00 AM to 02:00 PM	**TOTAL MARKS: 70**

Instructions
1. It is **compulsory** for students to write **Enrolment No. /Seat No.** on the question paper.
2. Write answers of **Section A** and **Section B** in **separate answer books**.
3. Attempt all questions from both **Section A** and **Section B**.
4. Each section carries **35 marks**, with a total of **70 marks** for the examination.
5. The figures to the right of each question indicate full marks, make suitable assumptions with justification.
6. BL - Bloom's Taxonomy Levels (R-Remember, U-Understanding, A –Application, N –Analyze, E – Evaluate, C -Create), CO - Course Outcomes.

SECTION A

		Marks	BL	CO
Q.1	**Multiple-Choice Questions**	**[05]**		
(a)	In a symmetric distribution, mean, median and mode are connected by ___.	**1**	**R**	**5**

      (i) Mode = 2 Median – 3 Mean   **(ii)** Mean = 3 Median – 2 Mode

      (iii) Mode = 3 Median – 2 Mean   **(iv)** Median = 3 Mode – 2 Mean

		Marks	BL	CO
(b)	The arithmetic mean of the observation 9, 12, 16, 22, 37 and 42 is _____.	**1**	**U**	**5**

      (i) 21   **(ii)** 22

      (iii) 23   **(iv)** 24

		Marks	BL	CO
(c)	In a discrete probability distribution the sum of all the probabilities is always equal to_____.	**1**	**U**	**4**

      (i) 0   **(ii)** 1

      (iii) undefined   **(iv)** infinite

		Marks	BL	CO
(d)	A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?	**1**	**A**	**4**

      (i) 10/21   **(ii)** 10/20

      (iii) 2/7   **(iv)** 5/7

		Marks	BL	CO
(e)	A and B are two events such that $P(\bar{A}) = 0.4$ and $P(A \cap B) = 0.2$ Then $P(A \cap \bar{B})$ is equal to _____.	**1**	**A**	**4**

      (i) 0.4   **(ii)** 0.2

Q.2   **Attempt Any Two**   **[10]**

(a) If A and B are two events such that $P(A) = \dfrac{3}{8}$, $P(B) = \dfrac{5}{8}$ and $P(A \cup B) = \dfrac{3}{4}$,   **5   A   4**

find $P(A/B)$ and $P(B/A)$. Check whether A and B are independent.

(b) In a bolt factory, machines A, B and C manufacture 25%, 35% 40% of the   **5   A   4**
total output and out of the total manufacturing, 5%, 4% and 2% bolts are
defective. A bolt is drawn at random form the product and it is found to be
defective. Find the probability that it is manufactured by machine A.

(c) A discrete random variable has the probability mass function given below: **5   A   4**

X	-2	-1	0	1	2	3
$P(X = x)$	0.2	k	0.1	2k	0.1	2k

Find k, mean and variance.

Q.3   **Attempt Any Two**   **[10]**

(a) Fit a curve $y = a + bx$ to the following data: **5   A   3**

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

(b) Fit a least square second degree quadratic curve $y = a + bx + cx^2$ to the   **5   A   3**
following data:

x	1	2	3	4
y	1.7	1.8	2.3	3.2

(c) Fit a curve $y = ab^x$ to the following data: **5   A   3**

x	1	2	3	4	5	6	7	8
y	1	1.2	1.8	2.5	3.6	4.7	6.6	9.1

Q.4   **Attempt Any Two**   **[10]**

(a) Calculate the first four moments from the following data: **5   A   5**

x	0	1	2	3	4	5	6	7	8
f	5	10	15	20	25	20	15	10	5

Also, calculate the values of β_1 and β_2.

(b) Calculate the standard deviation of the following data: **5   A   5**

x	10	11	12	13	14	15	16	17	18
f	2	7	10	12	15	11	10	6	3

(c) The runs scored by two batsmen A and B in 9 consecutive innings are given   **5   A   5**
below:

A	85	20	62	28	74	5	69	4	13
B	72	4	15	30	59	15	49	27	26

Which batsman is more consistent?

SECTION B

	Marks	BL	CO

Q.5 **Multiple-Choice Questions** **[05]**

(a) Interpolation is a method of _____ . **1** **R** **2**

   (i) Interrelating   **(ii)** Estimating

   (iii) Integrating   **(iv)** combining

(b) Which method can be used for both equal and unequal intervals? **1** **R** **2**

   (i) Newton's method   **(ii)** Cubic spline method

   (iii) Lagrange's Method   **(iv)** None of the above

(c) $\nabla \log x =$ _____ **1** **R** **2**

   (i) $\log \dfrac{x}{x-h}$ **(ii)** $\log \dfrac{x-h}{x}$

   (iii) $\log \dfrac{x}{x+h}$ **(iv)** $\log(x-h)$

(d) The complete solution of $z = px + qy + pq$ is _____ . **1** **R** **4**

   (i) $z = ax + by$ **(ii)** $z = ax + by + ab$

   (iii) $z = ax + by + \log(ab)$ **(iv)** none of these

(e) What is the nature of Lagrange's linear partial differential equation? **1** **R** **4**

   (i) First order, Third degree   **(ii)** Second order, First degree

   (iii) First order, Second degree   **(iv)** First order, First degree

Q.6 **Attempt Any Two** **[10]**

(a) Use Newton's forward difference method to find the approximate value of $f(2.3)$ from the following data: **5** **A** **2**

x	2	4	6	8
$f(x)$	4.2	8.2	12.2	16.2

(b) The population of a town is given below. Estimate the population for the year 1930 using suitable interpolation. **5** **A** **2**

Year x	1891	1901	1911	1921	1931
Population y (in thousand)	46	66	81	93	101

(c) By using Lagrange's formula, find *y* when *x* = *10*.　　　　　　　　5　　A　　2

x	5	6	9	11
y	12	13	14	16

Q.7　**Attempt Any Two**　　　　　　　　　　　　　　　　　　　　**[10]**

(a) Using Newton's divided difference interpolation, compute the value of　　5　　A　　2
f(6) from the table given below:

x	1	2	7	8
y	1	5	5	4

(b) Construct Newton's forward interpolation polynomial for the following　　5　　A　　2

data:

x	4	6	8	10
y	1	3	6	16

(c) Use Lagrange's formula to fit a polynomial to the data:　　　　　　　5　　A　　2

x	-1	0	2	3
y	8	3	1	12

and hence, find y (2).

Q.8　**Attempt Any Two**　　　　　　　　　　　　　　　　　　　　**[10]**

(a) Eliminate the function *f* from the relation $f(xy + z^2, x + y + z) = 0$.　　5　　A　　1

(b) Solve $yzp - xzq = xy$.　　　　　　　　　　　　　　　　　　5　　A　　1

(c) Solve (i) $p + q^2 = 1$ (ii) $p^2 - q^2 = x - y$.　　　　　　　　　5　　A　　1

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