SECTION A (40 MARKS)
(Attempt all questions from this Section.)

Question 1

Choose the correct answers to the questions from the given options.   [15]

(Do not copy the questions, write the correct answers only.)

(i) For an Intra–state sale, the CGST paid by a dealer to the Central government is ₹120. If the marked price of the article is ₹2000, the rate of GST is

(a) 6 %

(b) 10 %

(c) 12 %

(d) 16.67%

(ii) What must be subtracted from the polynomial $x^3 + x^2 - 2x + 1$, so that the result is exactly divisible by $(x - 3)$?

(a) – 31

(b) – 30

(c) 30

(d) 31

(iii) The roots of the quadratic equation $px^2 - qx + r = 0$ are real and equal if:

(a) $p^2 = 4qr$

(b) $q^2 = 4pr$

(c) $-q^2 = 4pr$

(d) $p^2 > 4qr$

(iv) If matrix $A = \begin{bmatrix} 2 & 2 \\ 0 & 2 \end{bmatrix}$, $A^2 = \begin{bmatrix} 4 & x \\ 0 & 4 \end{bmatrix}$, then the value of x is :

(a) 2

(b) 4

(c) 8

(d) 10

(v) The median of the following observations arranged in ascending order is 64. Find the value of x:

27, 31, 46, 52, x, x+4, 71, 79, 85, 90

(a) 60

(b) 61

(c) 62

(d) 66

(vi) Points A(x, y), B(3, – 2) and C(4, –5) are collinear. The value of y in terms of x is

(a) 3x – 11

(b) 11 – 3x

(c) 3x – 7

(d) 7 – 3x

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(vii) If A = [- 1, 2] and B = $\begin{bmatrix} 1 & -2 \\ 0 & 3 \end{bmatrix}$. Which of the following operation is possible?

(a) A – B

(b) A + B

(c) AB

(d) BA

(viii) The 7th term of the given Arithmetic Progression (A.P.)

1/a, (1/a + 1), (1/a + 2)……… is

(a) (1/a + 6)

(b) (1/a + 7)

(c) (1/a + 8)

(d) (1/a + 7^7)

(ix) If x^2 + kx + 6 = (x – 2) (x – 3) for all values of x, then the value of k is

(a) – 5

(b) – 3

(c) – 2

(d) 5

(x) A retailer purchased an item for ₹1500 from a wholesaler and sells it to a customer at 10% profit. The sales are intra-state and the rate of GST is 10%. The amount of GST paid by the customer is

(a) ₹ 15

(b) ₹ 30

(c) ₹ 150

(d) ₹ 165

(xi) If the roots of equation x^2 – 6x + k = 0 are real and distinct, then value of k is

(a) > – 9

(b) > – 6

(c) < 6

(d) < 9

(xii) Which of the following is/are an Arithmetic Progression (AP)?

1. 1, 4, 9, 16, …………

2. $\sqrt{3}, 2\sqrt{3}, 3\sqrt{3}, 4\sqrt{3}$

3. 8, 6, 4, 2

(a) Only 1

(b) Only 2

(c) Only 2 and 3

(d) All 1, 2, 3

(xiii) **Assertion (A):** A die is thrown once and the probability of getting an even number is 2 / 3.

Reason (R) : The sample space for even numbers on a die is {2, 4, 6}.

(a) A is true, R is False

(b) A is false, R is true

(c) Both A and R are true

(d) Both A and R are false

(xiv) The table shows the values of x and y, where x is proportional to y

x	6	12	N
y	M	18	6

What are the values of M and N?

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(a) M = 4, N = 9

(b) M = 9, N = 3

(c) M = 9, N = 4

(d) M = 12, N = 0

(xv) **Event A** The sun will rise from east tomorrow.

Event B It will rain on Monday.

Event C February month has 29 days in a leap year.

Which of the above event(s) has probability equal to 1?

(a) All events A, B, and C.

(b) Both events A and B.

(c) Both events B and C.

(d) Both events A and C.

Question 2

(i) $A = \begin{bmatrix} x & 0 \\ 1 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 0 \\ y & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 4 & 0 \\ x & 1 \end{bmatrix}$ **[4]**

Find the values of x and y, if **AB = C**.

(ii) If a, b and c are in continued proportion, then prove that $\dfrac{3a^2 + 5ab + 7b^2}{3b^2 + 5bc + 7c^2} = \dfrac{a}{c}$. **[4]**

(iii) 15, 30, 60, 120… are in **G.P.** (Geometric Progression). **[4]**

(a) Find the nth term of this **G.P.** in terms of **n**.

(b) How many terms of the above **G.P.** will give the sum **945**?

Question 3

(i) In a recurring deposit account for 2 yr, the total amount deposited by a person is ₹9600. If the interest earned by him is one-twelfth of his total deposit, then find **[4]**
(a) the interest he earns.
(b) his monthly deposit.
(c) the rate of interest

(ii) There are three positive numbers in a Geometric Progression (GP) such that **[4]**

(a) their product is 3375

(b) the result of the product of first and second number added to the product of second the third number is 750. Find the numbers.

(iii) Use graph sheet for this question. Take 2 cm = 1 unit along the axes. **[5]**

(a) Plot A(0, 3), B(2, 1) and C(4, - 1).

(b) Reflect point B and C in **y-axis** and name their images as B' and C' respectively. Plot and write coordinates of the points B' and C'.

(c) Reflect point A in the line BB' and name its images as A'.

(d) Plot and write coordinates of point A'.

(e) Join the points ABA'B' and give the geometrical name of the closed figure so formed.

SECTION B (40 MARKS)

(Attempt any **four questions** from this Section.)

Question 4

(i) Suresh has a recurring deposit account in a bank. He deposits ₹2000 per month and the bank pays interest at the rate of 8% per annum. If he gets ₹1040 as interest at the time of maturity, find in years total time for which the account was held. **[3]**

(ii) The following table gives the duration of movies in minutes. [3]

Duration (in minutes)	100 – 110	110 – 120	120 – 130	130– 140	140 –150	150 – 160
No. of movies	5	10	17	8	6	4

Using step-deviation method, find the mean duration of the movies.

(iii) If $\dfrac{(a+b)^3}{(a-b)^3} = \dfrac{64}{27}$ [4]

(a) Find $a + b / a - b$

(b) Hence using properties of proportion, find $a : b$.

Question 5

(i) The given graph with a histogram represents the number of plants of different heights grown in a school campus. Study the graph carefully and answer the following questions: [5]

(a) Make a frequency table with respect to the class boundaries and their corresponding frequencies.
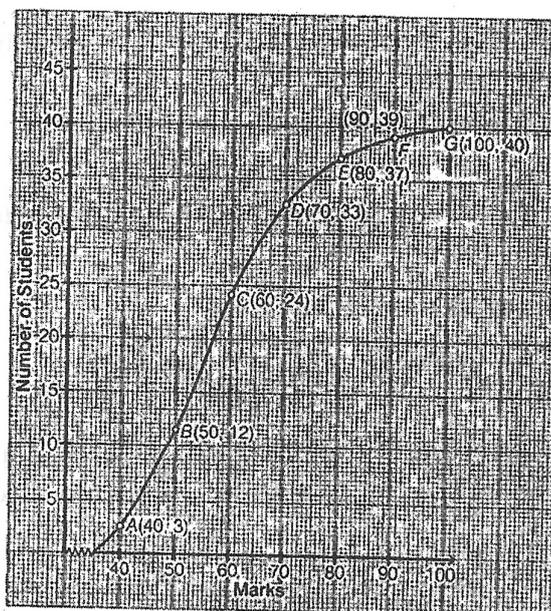
(b) State the modal class.
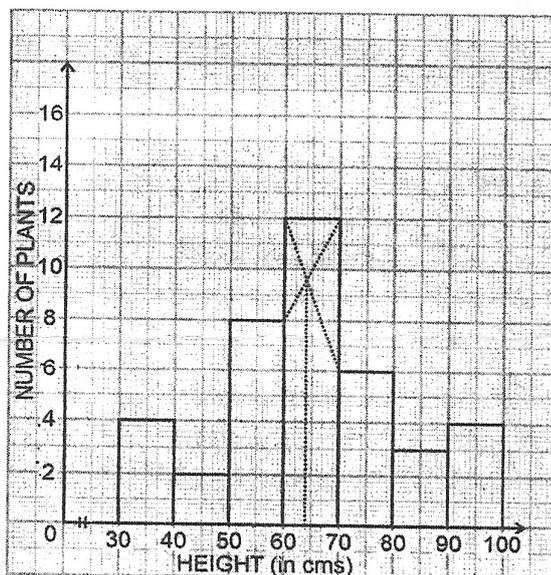
(c) Identify and note down the mode of the distributions.

(d) Find the number of plants whose height range is between 80 cm to 90 cm.

(ii) Study the graph and answer each of the following. [5]

(4)

(a) Name the curve plotted.

(b) Total number of students.

(c) The median marks.

(d) Number of students scoring between 50 and 80 marks.

Question 6

(i) Solve the following quadratic equation $2x^2 - 10x + 5 = 0$ for x and give your answer correct to three significant figures. **[3]**

(Use mathematical tables if necessary)

(ii) The **nth** term of an Arithmetic Progression (A.P.) is given by the relation $T_n = 6\,(7 - n)$. **[3]**

Find :

(a) its first term and common difference.

(b) sum of its first **25** terms.

(iii) Using remainder and factor theorem, factorize completely, the given polynomial **[4]**

$$2x^3 - 9x^2 + 7x + 6$$

Question 7

(i) If $A = \begin{bmatrix} 4 & -4 \\ -4 & 4 \end{bmatrix}$, find A^2. If $A^2 = pA$, then find the value of p. **[3]**

(ii) Solve the following inequation, write down the solution set and represent it on the real number line.

$$-3 + x \le \frac{7x}{2} + 2 < 8 + 2x, \; x \in I$$ **[3]**

(iii) In the given diagram, ABC is a triangle, where B (4, – 4) and C (- 4, - 2). D is a point on AC. **[4]**

(a) Write down the coordinates of A and D.

(b) Find the coordinates of the mid-points of A & D.

(c) Find the coordinates of the centroid of ∆ABC.

(d) If D divides AC in the ratio **k : 1**, find the value of **k.**
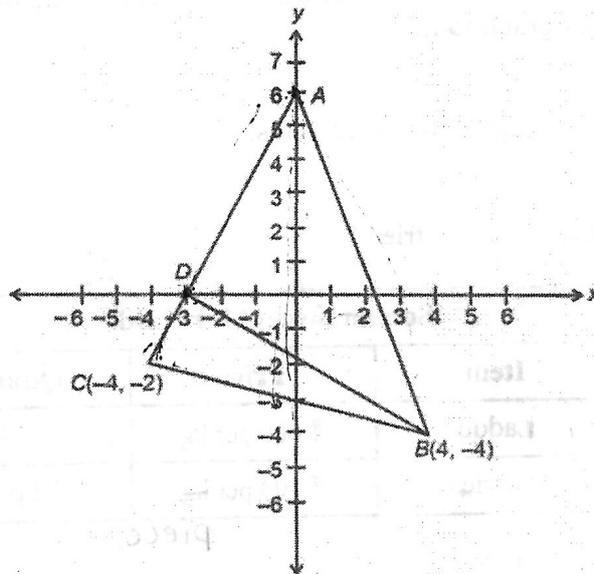
Question 8

(i) The polynomial $3x^3 + 8x^2 - 15x + k$ has (x – 1) as a factor. Find the value of **k**. Hence factorize the resulting polynomial completely. **[3]**

(ii) The following letters **A, D, M, N, O, S, U, Y** of the English alphabet are written on separate cards and put in a box. The cards are well shuffled and one card is drawn at random. What is the probability that the card drawn is a letter of the word, **[3]**

(iii) Use graph sheet for this question. Take 2 cm = 1 unit along the axes. **[4]**

    (a) Plot A(1, 2), B (1, 1) and C(2, 1)

    (b) Reflect A, B and C about Y-axis and name them as A', B' and C'.

    (c) Reflect A, B, C, A', B' and C' about X-axis and name them as A'', B'', C'', A''', B''' and C''' respectively.

    (d) Join A, B, C, C'', B'', A'', A''', B''', C''', C', B', A' and A to form a closed figure.

Question 9

(i) Solve the following inequation write the solution set and represent it on the real number line. **[3]**

$$3 - 2x \geq x + \frac{1-x}{3} > \frac{2x}{5}, \; x \in R$$

(ii) Solve the given equation $x^2 - 4x - 2 = 0$ and express your answer correct to two places of decimal. (You may use mathematical tables for this question). **[3]**

(iii) A life insurance agent found the following data for distribution of ages of 100 policy holders; **[4]**

Age in years	Policy Holders (frequency)	Cumulative frequency
20 – 25	2	2
25 – 30	4	6
30 – 35	12	18
35 – 40	20	38
40 – 45	28	66
45 – 50	22	88
50 – 55	8	96
55 – 60	4	100

On a graph sheet draw an ogive using the given data. Take 2 cm = 5 years along one axis and 2 cm = 10 policy holders along the other axis. Use your graph to find:

    (a) the median age

    (b) number of policy holders whose age is above 52 years.

Questions 10

(i) Rohan bought the following eatables for his friends : **[3]**

Soham Sweet Mart : Bill				
S. No.	Item	Price	Quantity	Rate of GST
1	Laddu	₹ 500 per kg	2 kg	5%
2	Pastries	₹ 100 per piece	12 pieces	18%

Calculate:

    (a) Total GST paid.

    (b) Total bill amount including GST.

(ii) The total expense of a trip for certain number of people is ₹18000. If three more people join them, then the share of each reduces by ₹3000. Taking x to be the original number of people, form a quadratic equation in x and solve it to find the value of x. **[3]**

(iii) A(a, b), B(- 4, 3) and C(8, - 6) are the vertices of a ΔABC. Point D is on BC such that BD : DC is 2 : 1 and M(6, 0) is mid-point of AD. Find **[4]**

    (a) coordinates of point D   (b) coordinates of A.

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