MATHEMATICS (M009)

Maximum Marks: 40

Time allowed: ***75 minutes***

Answers to this Paper must be written on the paper provided separately.

You will ***not*** *be allowed to write during first* ***10*** *minutes.*

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers

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Attempt ***all*** *questions from* ***Section A*** *and* ***any two*** *questions from* ***Section B****.*

All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.

Omission of essential working will result in loss of marks.

The intended marks for questions or parts of questions are given in brackets [ ]

Mathematical tables and graph papers are provided

SECTION A (20 marks)

(Attempt ***all*** *questions from this* ***Section****)*

Question 1

Choose the correct answers to the questions from the given options. [7]
(Do not copy the questions, write the correct answers only.)

(i) Mukesh deposited ₹ 150 per month in a recurring deposit account for 2 years. Find the amount payable to him on maturity if the rate of interest is 8% per annum.

(a) ₹ 3900

(b) ₹ 4200

(c) ₹ 4500

(d) ₹ 5000

(ii) To solve the linear inequation $5x + 7 < 27, x \in \mathbb{I}$, we add -7 to both sides. With this opeartion, the sign of inequality.

(a) Reverses

(b) Remains same

(c) Data insufficient

(d) None of the above

(iii) The two natural numbers which differ by 3 and whose squares have the sum 117, are:

(a) 4,7

(b) -6, 9

(c) 8, 11

(d) 5, 8

(iv) If $A = \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$, then $A^2 - 4A =$

(a) $\begin{bmatrix} -3 & -3 \\ 60 & 5 \end{bmatrix}$

(b) $\begin{bmatrix} -3 & -3 \\ 8 & 3 \end{bmatrix}$

(c) $\begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$

(d) $\begin{bmatrix} 8 & 3 \\ 24 & 14 \end{bmatrix}$

(v) If $\sin\theta = \dfrac{7}{15}$, find the value of $(1 + \tan^2\theta)$.

(a) $\dfrac{24}{25}$

(b) $\dfrac{625}{576}$

(c) $\dfrac{49}{625}$

(d) None of these

(vi) Given that $(x + 2)$ and $(x + 4)$ are the factors of $3x^3 + ax^2 - 6x - b$. The values of a and b respectively are:

(a) 4,2

(b) 2,4

(c) 40, 13

(d) 13, 40

(vii) If $\dfrac{x^2 + 2x}{2x + 4} = \dfrac{y^2 + 3y}{3y + 9}$, then the value of $2x : 3y$ is:

(a) 16 : 27

(b) 1 : 1

(c) 2 : 3

(d) 4 : 9

Question 2

(i) Solve: $2\cos^2\theta + \sin\theta - 2 = 0$ [4]

(ii) The string of a kite is 150 m long and it makes an angle of 60° with the horizontal. Determine the height of the kite from the ground. [4]

(iii) Find the mean wage of a worker from the following data: [5]

Wages (in ₹)	Number of workers
1400	15
1450	20
1500	18
1550	27
1600	15
1650	3
1700	2

SECTION B (20 marks)

*(Attempt **any two** questions from this **Section**)*

Question 3

(i) Form a quadratic equation whose roots are: $\sqrt{3}$ and $3\sqrt{3}$. [3]

(ii) Construct a 2x2 matrix whose elements are given by: [3]

$$a_{ij} = \frac{(i+2j)^2}{2}$$

(iii) If $(x-2)$ is a factor of $2x^3 - x^2 - px - 2$ [4]

(a) Find the value of p

(b) With the value of p, factorize the above expression completely.

Question 4

(i) David opened a RD account in a bank and deposited ₹ 300 per month for two years. If he received ₹ 7,725 at the time of maturity, then what is the rate of interest per annum? [3]

(ii) What number must be added to each of the numbers 6, 15, 20 and 43 to make them proportional? [3]

(iii) Solve the inequation and represent the solution on a number line. [4]

$$(x-5) - 7(x-2) \geq 4x + 9 \textbf{ and } 2(x-3) - 7(x+5) \leq 3x - 9$$

Question 5

(i) A shopkeeper purchases a certain number of books for ₹ 960. If the cost per book was ₹ 8 less, the number of books that could be pruchased for ₹ 960 would be 4 more. Write an equation, taking the original cost of each book to be ₹ x, and solve it to find the original cost of the books. [4]

(ii) If $A = \begin{bmatrix} 9 & 1 \\ 5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 5 \\ 7 & -11 \end{bmatrix}$, find matrix X such that [6]

$$3A + 5B - 2X = 0$$