MATHEMATICS (M008)

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) The following table represents the weights of 12 boxes. Find the average weight.

Weights (kg)	70	72	75	76	80
No. of boxes	3	2	3	2	2

(a) 74.25 kg

(b) 76.75 kg

(c) 77.15 kg

(d) 79.25 kg

(ii) Evaluate $\sin^6\theta + \cos^6\theta + 3\sin^2\theta\cos^2\theta$

(a) $\sin^2\theta$ (c) 1

(b) $\cos^2\theta$ (d) 0

(iii) Given that $2x+7$ is a fator of the expression $2x^3+5x^2-11x-14$. The other factors of the expression are:

(a) $(x+1)(x+2)$ (c) $(x-1)(x+1)$

(b) $(x+1)(x-2)$ (d) $(x-1)(x-2)$

(iv) The solution set of the following equation is:

$$-2\frac{2}{3} < x + \frac{1}{3} \leq 3\frac{1}{3}, x \in \mathbb{R}$$

(a) $\{x : -3 < x < 3, x \in \mathbb{R}\}$ (c) $\{x : -3 \leq x \leq 3, x \in \mathbb{R}\}$

(b) $\{x : -3 \leq x < 3, x \in \mathbb{R}\}$ (d) $\{x : -3 < x \leq 3, x \in \mathbb{R}\}$

(v) Reeta deposited ₹ 80 pwe month in a cumulative deposit account for 5 years. If the bank pays interest at a rate of 6% per annum, find the amount payable to her at the time of maturity.

(a) ₹ 5,325 (c) ₹ 5,235

(b) ₹ 5,532 (d) ₹ 5,352

(vi) The roots of the quadratic equation $2x^2 - 5x - 4 = 0$ are:

(a) 3,5 (c) 7, -2

(b) 4.84, -1.98 (d) 3.14, -0.64

(vii) If $x = \dfrac{\sqrt{a+1}+\sqrt{a-1}}{\sqrt{a+1}-\sqrt{a-1}}$, then using properties of proportion, $x^2 - 2ax + 1 =$

(a) a (c) 0

(b) 1 (d) 2a

Question 2

(i) Naseem has a 5 year Recurring Deposit and desposit ₹ 240 per month. If she receives ₹ 17,694 at the time of maturity, find the rate of interest. [4]

(ii) Given that $A = \begin{bmatrix} 3 & 0 \\ 0 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} a & b \\ 0 & c \end{bmatrix}$ and that $AB = A + B$, find the values of a, b, and c. [4]

(iii) Using step-deviation method, calculate the mean. [5]

Class	Frequency (f)
50 – 55	5
55 – 60	20
60 – 65	10
65 – 70	10
70 – 75	9
75 – 80	6
80 – 85	12
85 – 90	8

SECTION B (20 marks)

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

Question 3

(i) Solve the inequality: [3]

$$-3(x-7) \geq 15-7x > \frac{x+1}{3}, x \in \mathbb{R}$$

(ii) Determine the roots of the equation: [3]

$$ax^2 + (4a^2 - 3b)x - 12ab = 0$$

(iii) Using properties of proportions, solve for x. Given that x is positive. [4]

$$\frac{2x+\sqrt{4x^2-1}}{2x-\sqrt{4x^2-1}} = 4$$

Question 4

(i) What quantity must be added to each term of the ratio $a+b : a-b$ to make it equal to $(a+b)^2 : (a-b)^2$? [3]

(ii) Prove that: [3]

$$\frac{\sin\theta \tan\theta}{1-\cos\theta} = 1 + \sec\theta$$

(iii) Rekha opened a recurring deposit account for 20 months. The rate of interest is 9% per annum and Rekha receives ₹ 441 as interest at the time of maturity.

Find the amount Rekha deposited each month. [4]

Question 5

(i) If $(x-2)$ is a factor of the expression $2x^3 + ax^2 + bx - 14$ and when the expression is divided by $(x-3)$, it leaves a remainder 52, find the values of a and b. [4]

(ii) From the top of church spire 96 m high, the angle of depression of two vehicles on a road at the same level as the base of the spire and on the same side of it are x° and y°, where $\tan x^\circ = \frac{2}{3}$ and $\tan y^\circ = \frac{1}{5}$.

Find the distance between the two vehicles. [6]