MATHEMATICS (M011)

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

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 roots of the equation $21x^2 - 8x - 4 = 0$ are:

(a) $-\frac{1}{2}, \frac{1}{7}$

(b) $\frac{1}{3}, \frac{4}{9}$

(c) $\frac{2}{3}, -\frac{2}{7}$

(d) $\frac{4}{7}, -\frac{2}{3}$

(ii) If the fifth and sixth terms of an A.P. are 6 and 5 respectively, then the first term is:

(a) -1 (c) 10

(b) 1 (d) 20

(iii) If $\sin\theta = \frac{1}{3}$, then find the value of $2\cot^2\theta + 2$:

(a) 16 (c) 20

(b) 18 (d) 12

(iv) What number should be added to the polynomial $2x^3 - 3x^2 - 8x$ so that the resulting polynomial leaves the remainder 12 when divided by $2x + 1$?

(a) 3 (c) 9

(b) 6 (d) 12

(v) If $4x = 7y = 9z$, then $x : y : z =$

(a) 24 : 31 : 19 (c) 4 : 7 : 9

(b) 63 : 36 : 28 (d) 16 : 49 : 81

(vi) The equation $x^2 + 2x + 1 = (4 - kx)^2 + 3$ will be quadratic, if the value of k is:

(a) $k = 1$ (c) Any number

(b) $k \neq \pm 1$ (d) Insufficient data

(vii) Mohan deposits ₹ 80 per month in a cumulative deposit account for six years. Find the amount payable to him on maturity, if the rate of interest is 6% per annum.

(a) ₹ 6,118.50 (c) ₹ 6,811.20

(b) ₹ 6,818.20 (d) ₹ 6,818.50

Question 2

(i) Amol needs ₹ 4,000 after 72 months. What least amount per month must he save and put in a recurring deposit scheme to get the required amount at rate of interest 12.78%. [4]

(ii) Solve for x the quadratic equation $x^2 - 4x - 8 = 0$. Give your answer correct to three significant figures. [4]

(iii) The weights of 50 apples were recorded as given below. Calculate the mean weight, to the nearest gram, by Step Deviation Method. [5]

Weight in gms	No. of apples
80 – 85	5
85 – 90	8
90 – 95	10
95 – 100	12
100 – 105	8
105 – 110	4
110 – 115	3

SECTION B (20 marks)

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

Question 3

(i) Solve the following ineuqation and represent the solution on a number line: [3]

$$\frac{3x}{2} + \frac{1}{4} > \frac{5x}{8} - \frac{1}{2}$$

(ii) The income of a person is ₹ 3,00,000, in the first year and he receives an increase of ₹ 10,000 to his income per year for the next 9 years. Determine the total amount he received in 10 years. [3]

(iii) In X standard, there are three sections A, B and C with 25, 40 and 35 students, respectively. The average marks of section A is 70%, section B is 65% and of section C is 50%.

Find the avrage marks of the entire X standard. [4]

Question 4

(i) Using A.P. determine how many two digit numbers are divisible by 5. [3]

(ii) Solve $|2x + 3| \geq -6, x \in \mathbb{R}$ and represet the solution on a number line. [3]

(iii) Determine the value of x and y if: [4]

$$2\begin{bmatrix} x & 7 \\ 9 & y-5 \end{bmatrix} + \begin{bmatrix} 6 & -7 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 10 & 7 \\ 22 & 15 \end{bmatrix}$$

Question 5

(i) Prove that: [4]

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

(ii) The horizontal distance between two towers is 120 m. The angle of elevation of the top and angle of depression of the bottom of the first tower as obseved from the second tower is 30°and 24°respectively. Find the height of two towers correct to three decimal places. Use $\tan 25^\circ = 0.4452$ [6]