

MATHEMATICS (M004)

Maximum Marks: 40

Time allowed: 90 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) Kishan deposited ₹ 360 per month in a cumulative time deposit account for 2 years. If the rate of interest is 7% per annum, then the amount he gets at the time of maturity is:

(a) ₹ 2790

(c) ₹ 9270

(b) ₹ 9720

(d) ₹ 7290

(ii) If $x^2 + 4y^2 = 4xy$, then $x : y$ is:

(a) 1:4

(c) 2:1

(b) 4:1

(d) 1:2

(iii) If $(x - 2)$ is a factor of $2x^3 - x^2 - px - 2$, then the value of p is:

(a) 5

(c) 10

(b) 4

(d) 8

(iv) If $25 - 4x \leq 16, x \in \mathbb{N}$, then the smallest value of x is:

(a) $\frac{9}{4}$

(c) 3

(b) 2

(d) None of these

(v) The roots of the quadratic equation $x^2 - 7x + 3 = 0$, are:

(a) -6.54, -0.46

(c) 6.54, -0.46

(b) 6.54, 0.46

(d) -6.54, 0.46

(vi) If $\sin \theta = \frac{15}{17}$, find the value of $\frac{3 \cos \theta - 2 \sin \theta}{3 \cos \theta + 2 \sin \theta}$

(a) $-\frac{1}{9}$

(c) $\frac{1}{7}$

(b) $\frac{1}{19}$

(d) $-\frac{1}{17}$

(vii) If $x \begin{bmatrix} -1 \\ 2 \end{bmatrix} + 4 \begin{bmatrix} 2 \\ -y \end{bmatrix} = \begin{bmatrix} 7 \\ -8 \end{bmatrix}$, then the respective values of x and y , are:

(a) $-1, \frac{3}{2}$

(c) $1, \frac{5}{2}$

(b) $15, \frac{19}{2}$

(d) $-1, \frac{5}{2}$

Question 2

(i) Simplify [4]

$$\sin A \begin{bmatrix} \sin A & -\cos A \\ \cos A & \sin A \end{bmatrix} + \cos A \begin{bmatrix} \cos A & \sin A \\ -\sin A & \cos A \end{bmatrix}$$

(ii) Prove that: [4]

$$\frac{1 + \sin \theta}{1 - \sin \theta} = 1 + 2 \frac{\tan \theta}{\cos \theta} + 2 \tan^2 \theta$$

(iii) Solve the following equation and represent the solution set on the number line [4]

$$-3 + x \leq \frac{8x}{3} + 2 \leq \frac{14}{3} + 2x, x \in \mathbb{I}$$

SECTION B (20 marks)

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

Question 3

- (i) Kiran deposited ₹ 200 per month for 36 months in a bank's recurring deposit account. If the bank pays interest at the rate of 11% per annum, find the amount she gets on maturity. [3]
- (ii) Solve $x^{\frac{2}{3}} + x^{\frac{1}{3}} - 2 = 0$ [3]
- (iii) ₹ 7500 were divided equally amongst a certain number of children. Had there been 20 less children, each would have received ₹ 100 more. Find the original number of children. [4]

Question 4

- (i) The following numbers, $K + 3$, $K + 2$, $3K - 7$ and $2K - 3$ are in proportion. Find K . [3]
- (ii) What must be added to the polynomial $2x^3 - 3x^2 - 8x$, so that it leaves a remainder 10 when divided by $2x + 1$? [3]
- (iii) Determine x and y , if: [4]

$$\begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 2x \\ 1 \end{bmatrix} + 2 \begin{bmatrix} -4 \\ 5 \end{bmatrix} = 4 \begin{bmatrix} 2 \\ y \end{bmatrix}$$

Question 5

- (i) Prove that [4]

$$\left(\frac{1 - \cos^2 \theta}{\cos \theta} \right) \left(\frac{1 - \sin^2 \theta}{\sin \theta} \right) = \frac{1}{\tan \theta + \cot \theta}$$

- (ii) Solve and represent the solution on a number line. [6]

$$-2 \leq \frac{1}{2} - \frac{2x}{3} \leq 1\frac{5}{6}, \quad x \in \mathbb{N}$$