MATHEMATICS (M018)

Maximum Marks: 50

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 three*** *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. [10]
(Do not copy the questions, write the correct answers only.)

(i) Find the capacity (in litres) of a conical vessel with radius 5 cm and slant height 13 cm. Take $\pi = \frac{22}{7}$.

(a) 0.314

(b) 0.267

(c) 3.14

(d) 314

(ii) The value of $\sin^2\theta + \dfrac{1}{1+\tan^2\theta}$ is:

(a) 0

(b) 1

(c) 2

(d) None of these

(iii) The mean of first five prime numbers is:

(a) 6.5 (c) 4.5

(b) 5.6 (d) 4.6

(iv) In histogram, the width of the bars is proportional to:

(a) Frequency (c) Class interval

(b) Number of classes (d) None of the above

(v) If the height of a right circular cylinder is equal to the diameter of the base, then its total surface area is:

(a) $\frac{4}{3}\pi h^2$ (c) $\frac{3}{2}\pi h^2$

(b) $\frac{2}{3}\pi h^2$ (d) $4\pi h^2$

(vi) Point P(a,b) is reflected in the x-axis to P'(5,-3). The point P(a,b) is:

(a) $(-3, 5)$ (c) $(-5, -3)$

(b) $(-5, 3)$ (d) $(5, 3)$

(vii) If $\sin\theta + \sin^2\theta = 1$, then $\cos^2\theta + \cos^4\theta =$

(a) $\frac{1}{2}$ (c) 2

(b) 1 (d) 3

(viii) If the mode of data 64, 60, 48, x, 43, 48, 43, 34 is 43, then $x + 3$ is:

(a) 44 (c) 46

(b) 45 (d) 48

(ix) If $\frac{5a}{7b} = \frac{4c}{3d}$, then by componendo and dividendo:

(a) $\frac{5a+7b}{5a-7b} = \frac{4c-3d}{4c+3d}$ (c) $\frac{5a+7b}{5a-7b} = \frac{4c+3d}{4c-3d}$

(b) $\frac{5a-7b}{5a+7b} = \frac{4c+3d}{4c-3d}$ (d) $\frac{5a+7b}{5a-7b} = \frac{4c-3d}{4c-3d}$

(x) If a matrix has 4 elements, then which of the following cannot be the order of the matrix.

(a) 2×2

(b) 1×4

(c) 2×3

(d) 4×1

Question 2

(i) Find the values of a and b, if $(x-1)$ and $(x-2)$ are factors of $x^3 - ax + b$. [3]

(ii) Find the matrix X such that $-A + 3B + X = 0$, where: [3]

$$A = \begin{bmatrix} -2 & 6 \\ 5 & 8 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 2 \\ -2 & 3 \end{bmatrix}$$

(iii) Given a G.P. with $a = 729$ and 7^{th} term 64, determing S_7. [4]

SECTION B (30 marks)

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

Question 3

(i) A solid cone of radius 5 cm and height 9 cm is melted and made into small cylinders of radius 0.5 cm and height 1.5 cm. Find the number of cylinders so formed. [3]

(ii) Using properties of proportion, find $x : y$, given: [3]

$$\frac{x^2 + 2x}{2x + 4} = \frac{y^2 + 3y}{3y + 9}$$

(iii) Find the sum of first 5 terms of the geometric series [4]

$$1 + \frac{2}{3} + \frac{4}{9} + \ldots$$

Question 4

(i) If $\sec\theta = \sqrt{2}$, evaluate [3]

$$\frac{1 + \tan\theta + \text{cosec }\theta}{1 + \cot\theta - \text{cosec }\theta}$$

(ii) Solve the following equation and give your answer to two decimal places. [3]

$$x^2 - 7x + 3 = 0$$

(iii) The points A(2,1), B(0,3) and C(-3,-2) are the vertices of a triangle. [4]

- Draw the points on the graph paper.
- Draw the triangle formed by reflecting these points on the x-axis.

Question 5

(i) A consumer buys a T.V. for ₹ 50,000. The rate of GST is 18%. Find: [3]

- The amount of tax received by state government.
- The amount of tax received by central government.
- The total GST paid by consumer.

(ii) Prarthna deposited ₹ 200 per month for 36 months in a bank's recurring deposit account. If the bank pays interest at the rate of 11% p.a., then find the amount she gets at the time of maturity. [3]

(iii) From a solid wooden cylinder of height 28 cm and diameter 6 cm, two conical cavities are hollowed out at each end. The diameters of the cones are of 6 cm and height 10.5 cm. Taking $\pi = \frac{22}{7}$, find the volume of the remaining solid. [4]

Question 6

(i) A vertical tower stands on a horizontal plane and is surmounted by a flagstaff of height 9 m. From a point on the ground the angles of elevation of the top and bottom of the flagstaff are 60 °and 30 °respectively.

Find the height of the tower and the distance of the point from the tower. [4]

$[\sqrt{3} = 1.732]$

(ii) In annual day of a school, age-wise, participation of students is shown in the following frequency distribution: [6]

Age of students (years)	Num workers
5-7	20
7-9	18
9-11	22
11-13	25
13-15	20
15-17	15
17-19	10

Draw a 'less than type' ogive for the above data and from it find the medial age.