Maths Paper - II

SECTION - I (Marks : 5 × 2 = 10)

Note : 1. Answer **ANY FIVE** questions. choosing at least **TWO** from each of the following **Groups**.

2. E   question carries **TWO** marks.

Group - A

(Geometry, Analytical Geometry and Statistics)

1. Two poles of heights 6 mts. and 11 mts. stand vertically on a plane ground. If the distance between their feet is 12 mts., determine the distance between their tops.

2. Find the equation of the line passing through the point (3, 4) and is parallel to $4x + 7y = 8$.

3. Find the area of the triangle formed by the line $2x - 4y - 7 = 0$ with the co-ordinate axes.

4. The mean of 20 observations is 12.5. By an error, one observation is registered as – 15 instead of 15. What is the correct mean ?

Group - B

(Trigonometry, Matrices and Computing)

5. Show that $\sin^2 A + \cos^2 A = 1$.

6. If $B = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$, show that $B + B^{-1} = 4I$.

7. Explain the structure of a Computer by means of a block diagram.

8. Write the characteristics of a Computer.

SECTION - II (Marks : 4 × 1 = 4)

Note : 1. Answer **ANY FOUR** questions from the following Six questions.

2. Each question carries **ONE** mark.

9. Find the intercepts of line $2x - y + 7 = 0$.

10. A laddder 25 m long reaches a window of a building 24 m above the ground. Determine the distance of the foot of ladder from the building.

11. Observations of some data are, $\frac{x}{5}$, x, $\frac{x}{4}$, $\frac{x}{2}$ and $\frac{x}{3}$. If the median of the data is 8, find the value of x.

12. Eliminate θ from $x = a \sec \theta$, $y = b \tan \theta$.

13. If $\begin{bmatrix} 2a & 5 \\ 6 & 3 \end{bmatrix}$ has no Multiplicative Inverse, find a.

14. State any four languages you have known, that are used in Computers.

SECTION - III (Marks : 1 × 5 = 5)

Group - A

(Geometry, Analytical Geometry and Statistics)

15. State and prove the "Thales theorem".

16. Find the equation of a line passing through the point (5, – 3) and whose sum of the intercepts on the co-ordinate axes is $\frac{5}{6}$.

17. Two vertices of a triangle are A (– 4, 4), B (6, 12) and centroid is G (0, 6). Find co-ordinates of third vertex 'C' and show that area of Δ ABC = 3 [area of Δ AGB]

18. The following distribution of 100 individuals, according to their age, is shown in the following table. Find the Median.

Age (Years)	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79
Frequency	15	16	38	15	9	7

Group - B

(Trigonometry, Matrices and Computing)

19. Prove that $\cos^6\theta + \sin^6\theta = 1 - 3\sin^2\theta\cos^2\theta$.

20. Solve the following equations using Matrix Inversion method : $2x + 5y = 11$; $4x - 3y = 9$.

21. If $A = \begin{bmatrix} 7 & 4 \\ 5 & 3 \end{bmatrix}$, find A^{-1} and show that $A . A^{-1} = A^{-1} . A = 1$.

22. Draw a flow chart to find the value of the product of the first 'n' natural numbers.

SECTION - IV (Marks : 4 × 4 = 16)

23. From the ground and first floor of a building, the angles of elevation of the top of the spire of a church were found to be 60^0 and 45^0 respectively. The first floor is 5 mts. high. Find the height of the spire of the church.

24. Construct the circum-circle of the triangle ABC, when AB = 4 cms., BC = 4 cm., AC = 6 cm.

Time : 30 Minutes   **PART - B**   Marks : 15

Note :   *1. Each question carries 1/2 mark. 2. Answers are to be written in the question paper only.*
3. All questions are to be answered.
4. Marks will NOT be awarded in case of any overwriting or re-written, or erased answers.

I. **Write the CAPITAL LETTERS showing the answer in the brackets provided against each question.   10 × 1/2 = 5**

1. $\triangle ABC \sim \triangle DEF$ if $\angle A = 50^0$, then $\angle E + \angle F =$ [   ]
   A) 90^0 B) 40^0
   C) 130^0 D) 50^0

2. In $\triangle ABC$, $BC^2 + AB^2 = AC^2$, then .... is a right angle. [   ]
   A) $\angle A$ B) $\angle B$
   C) $\angle C$ D) None

3. The centroid of the triangle, whose sides are given by $x = 0$, $y = 0$ and $x + y = 6$ is   [   ]
   A) (0, 0)   B) (2, 2)
   C) (3, 3)   D) (6, 6)

4. Distance between the points $(a\cos\theta, 0)$ $(0, a\sin\theta)$ [   ]
   A) a B) $\sqrt{a}$
   C) a^2 D) 0

5. The line $x = my + c$, cuts the Y - axis at   [   ]
   A) $\left(0, \dfrac{c}{m}\right)$ B) $\left(0, \dfrac{-c}{m}\right)$
   C) $\left(\dfrac{m}{c}, 0\right)$ D) $\left(\dfrac{-m}{c}, 0\right)$

6. The median of $\dfrac{3}{4}, \dfrac{1}{2}, \dfrac{2}{3}, \dfrac{1}{6}, \dfrac{7}{12}$ is   [   ]
   A) 1/6   B) 2/3
   C) 7/12   D) 3/4

7. If $\tan(A + B) = \sqrt{3}$, $\tan A = 1$, then $\angle B =$ [   ]
   A) 15^0 B) 30^0
   C) 60^0 D) 45^0

8. If a wheel makes 360 revolutions in one minute, then through how many radians does it turn in one second ?
   A) 12π B) 9π [   ]
   C) 36π D) 6π

9. Determinant of $\begin{bmatrix} 3 & -1 \\ 1 & 2 \end{bmatrix}$ is   [   ]
   A) 7   B) 5
   C) 4   D) 6

10. In second generation computers, ...were used.   [   ]
   A) Vacuum tubes
   B) Transistors
   C) Large scale Integrated Circuits
   D) Electronic circuits

II. Fill in the blanks.   10 × 1/2 = 5

11. If two circles touch externally, then number of their common tangents is ....

12. If a line divides any two sides of a triangle in the same ratio, then the line is ......to the third side.

13. The angle between the lines $x - 2 = 0$, $y + 3 = 0$ is ....

14. The line $2x - 3y = K$ is passing through the origin, then the K is ....

15. The mode of $4, 5, 6, 7, 8, 9, 6$ is ....

16. The mean of 9, 11, 13, P is 7; then the value of P is ....

17. $A = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$, $B = [x \ \ y]$, then $AB = $ ....

18. If $\sin \theta = \cos \theta$, $0^0 < \theta < 90^0$, then the value of θ (in degrees) = ...

19. An example for input unit is ....

20. If $P = \begin{bmatrix} 3 & 0 \\ 0 & \lambda \end{bmatrix}$ is a Scalar Matrix, then the λ = ...

III. Match the following.

i) Group - 'A'

21. The slope of a line perpendicular to $x - 2y + 5 = 0$ [   ]

22. $y = 2x - 3$ and $y = 2x + 1$ are   [   ]

23. $x - 2y$ and $x + y = -2$ intersect at   [   ]

24. Class length of $10 - 20$, $20 - 30$ [   ]

25. Class middle value is used in ....   [   ]

Group - 'B'   5 × 1/2 = 2 1/2

(A) $(-2, 0)$

(B) 10

(C) Perpendicular lines

(D) -2

(E) Arithmetic Mean

(F) Parallel lines

(G) 2

(H) $(0, -2)$

ii) Group - 'A'

26. $\begin{vmatrix} \tan\theta & \sec\theta \\ \sec\theta & \tan\theta \end{vmatrix} = $ [   ]

27. If $\begin{pmatrix} x & 3 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} 2 \\ -1 \end{pmatrix} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$, then the value of x is [   ]

28. Inverse of the identity matrix I, is   [   ]

29. If $\operatorname{cosec} \theta - \cot \theta = 4$, then $\operatorname{cosec} \theta + \cot \theta$ [   ]

30. The point which is equidistance from the vertices of a triangle.   [   ]

Group - 'B'   5 × 1/2 = 2 1/2

(I) $\begin{bmatrix} 4 \\ 0 \end{bmatrix}$

(J) 1/4

(K) Circum-centre

(L) $\tan^2 \theta + \sec^2 \theta$

(M) B^{-1}

(N) 4

(O) 1

(P) -1 (Q) In centre

PART - B : ANSWERS

I. (1) C   (2) B   (3) B   (4) A   (5) B   (6) C   (7) A   (8) A   (9) A   (10) B

II. (11) 3 (12) parallel (13) 90^0 (or right angle) (14) 0^0 (15) 6 (16) -5 (17) $\begin{pmatrix} 5x & 5y \\ 2x & 2y \end{pmatrix}$ (18) 45^0

(19) Key board (or any input unit) (20) 3

III. i) (21) D   (22) F   (23) H   (24) B   (25) E   **ii)** (26) P   (27) N   (28) O   (29) J   (30) K