16E(A)

MATHEMATICS, Paper - II

(English version)

Parts A and B

Time : 2½ Hours]   *[Maximum Marks : 50*

Instructions :

1. *Answer the questions under **Part-A** on a separate answer book.*

2. *Write the answers to the questions under **Part-B** on the question paper itself and attach it to the answer book of **Part-A**.*

Part - A

Time : 2 Hours   **Marks : 35**

<u>SECTION - I</u>   *(Marks : 5×2=10)*

NOTE :

1. *Answer **ANY FIVE** questions, choosing at least **TWO** from each of the following **Groups**, i.e., **A** and **B** .*

2. *Each question carries 2 marks.*

GROUP - A
(Geometry, Analytical Geometry, Statistics)

1. Write the conditions that are required for "Two polygons are said to be similar to each other".

2. In what ratio, does P(4, 6) divide the join of A(– 2, 3) and B(6, 7).

3. Find the area of the triangles formed by the points (– 2, 3), (– 7, 5) and (3, – 5).

4. The Mean and Median of a Uni-modal grouped data are 36.5 and 38.5 respectively. Find the Mode of the data.

GROUP - B
(Trigonometry, Matrices, Computing)

5. Show that $\sqrt{\dfrac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta.$

6. If $A = \begin{bmatrix} 1 & 4 \\ 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$; find $A^2 + BC.$

7. List the essential components of a Computer.

8. What are the different boxes used in a Flow Chart ? Describe their functions in detail.

SECTION - II
(Marks 4×1=4)

NOTE :

1. Answer **ANY FOUR** of the following **SIX** questions.

2. *Each question carries **1** mark.*

9. State the converse of Pythagorean Theorem.

10. Find the equation of a line making an angle 60° with the positive direction of X-axis and having y-intercept 3 units.

11. The sum of 15 observations of a data is 420. Find the Mean.

12. Find the value of $\sin^2 30° + \cos^2 60°$.

13. Find the matrix X, given that $X + 2I = \begin{bmatrix} 3 & -1 \\ 1 & 2 \end{bmatrix}$.

14. What is an Algorithm ?

NOTE :

1. Answer **ANY FOUR** of the following questions, choosing at least **TWO** from each group, *i.e.*, Group **A** and **B**.

2. Each question carries **4** marks.

GROUP - A

(Geometry, Analytical Geometry and Statistics)

15. State and prove the Basic Proportionality Theorem (Thales Theorem).

16. Find the equation of the line which passes through the point (1, – 6) and whose product of the intercepts on the co-ordinate axes is one.

17. Find the ratio in which P(3, 0) divides the join of A(1, a) and B(7, – 4). Hence find a.

18. Find the A.M for the following distribution table, using Deviation method.

Class Interval	0 -9	10-19	20-29	30-39	40-49	50-59	60-69
Frequency	8	10	22	26	18	9	7

GROUP - B

(Trigonometry, Matrices and Computing)

19. Prove that $\dfrac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \dfrac{1 + \sin \theta}{\cos \theta}$

20. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then show that $A^2 - (a + d) A = (bc - ad) I$.

21. Solve the following equations using Matrix Inversion method.

$2x - 3y + 6 = 0$ and $6x + y + 8 = 0$

22. Draw a Flow Chart to compute the sum of the first 100 natural numbers.

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SECTION - IV   *(Marks 1×5=5)*

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NOTE :

   1.   Answer **ANY ONE** *of the following questions.*

   2.   *The question carries **5** marks.*

23. Construct a triangle ABC, in which BC = 7 cm, ∠A = 70° and foot of the perpendicular D on BC from A is 4.5 cm away from B.

24. The upper part of a tree, broken by wind in two parts, makes an angle of 30° with the ground. The top of the tree touches the ground at a distance of 20 mts from the foot of the tree. Find the height of the tree before it was broken.

16E(B)

MATHEMATICS, Paper - II

(English version)

Parts A and B

Time : 2½ Hours]   *[Maximum Marks : 50*

Part - B

Time : 30 minutes   **Marks : 15**

NOTE :-

1. Answer **all** the questions.
2. Each question carries ½ mark.
3. Answers are to be written in the question paper only.
4. Marks will **not** be awarded in case of any over-writing and rewriting or erased answers.

I. Write the CAPITAL LETTER showing the correct answer for the following questions in the brackets provided against them. $10 \times ½ = 5$

1. In a triangle ABC, if the internal bisector of ∠A meets BC in D, then ..... [........]

(A) $\dfrac{AB}{AC} = \dfrac{BD}{DC}$ (B) $\dfrac{AB}{DC} = \dfrac{AC}{BD}$

(C) $\dfrac{AB}{AC} = \dfrac{DC}{AD}$ (D) $\dfrac{AC}{AB} = \dfrac{BD}{BC}$

2. $\triangle ABC \sim \triangle PQR$; if AB = 3.6; PQ = 2.4 and PR = 5.4, then AC = ... [........]

(A) 3.6

(B) 8.1

(C) 5.4

(D) 7.8

3. The slope of line $3x + 4y = 5$ is .....   [........]

(A) $\dfrac{3}{4}$ (B) $\dfrac{4}{5}$

(C) $-\dfrac{4}{5}$ (D) $-\dfrac{3}{4}$

4. Range of the values 20, 18, 37, 42, 3, 12, 15, 26 is ....   [........]

(A) 63   (B) 42

(C) 39   (D) 6

5. If two lines are parallel, then their slopes are .....   [........]

(A) Zero   (B) Different

(C) Equal   (D) Not defined

6. To find out Mode, $\Delta_1 = $ ....   [........]

(A) $f_1 - f_2$ (B) $f - f_1$

(C) $f - f_2$ (D) $f_1 - f$

7. Value of $\cos 45°$ is ....   [........]

(A) $\dfrac{1}{2}$ (B) $\dfrac{\sqrt{3}}{2}$

(C) $\dfrac{1}{\sqrt{2}}$ (D) 1

8. The value of 1 radian (approximately) is ......   [........]

(A) $56° \, 16'$ (B) $57° \, 16'$

(C) $58° \, 16'$ (D) $59° \, 16'$

9. If the determinant of a matrix $A = \begin{bmatrix} 2 & 3 \\ 4 & t \end{bmatrix}$ is zero, then the value of t is ......   [.......]

(A) 2   (B) 4

(C) 6   (D) 8

10. .... were used in fourth generation Computers.   [.......]

(A) Vacuum tubes.   (B) Small transistors.

(C) Large scale integrated circuits.   (D) Electronic circuits.

II. *Fill in the blanks with suitable answers.*   10 × ½ = 5

11. The number of direct common tangents that can be drawn to a pair of internally touching Circles is ....

12. A Quadrilateral, whose four vertices lies on the circumference of a Circle is called as ....

13. The slope of the line parallel to X-axis is ....

14. The straight line $y = mx$ is passing through the ....

15. The formula to find out median in a grouped data is ....

16. The mean of 9, 11, 13, p, 18, 19 is p. Then the value of p is ....

17. The value of $\dfrac{\pi}{3}$ in Sexagesimal measure is ....

18. Pascal is one of the .... used in Computers.

19. If $A = \begin{bmatrix} 5 & 2 \end{bmatrix}$, $B = \begin{bmatrix} x \\ y \end{bmatrix}$, then $AB = $ ....

20. If $\cos \theta = \dfrac{12}{13}$, then $\sin \theta = $ ....

III. *Find the correct answer for the questions given under **Group-A** selecting them from **Group-B** and write the indicating letter in the brackets provided against each question.* $10 \times \frac{1}{2} = 5$

(i) **Group - A**   **Group - B**

21. In a $\triangle ABC$, if $AB^2 + AC^2 = BC^2$, [.......]   (A) X-axis
then the right angle is ......

                                                                       (B) $A^{-1} B^{-1}$

22. The line parallel to $y = 5$ is ...... [.......]

                                                                       (C) $\angle A$

23. $\left(A^T\right)^T = ...$ [.......]   (D) -1

                                                                       (E) 0

24. $\begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix} = ...$ [.......]   (F) A

                                                                       (G) $B^{-1}A^{-1}$

25. $(AB)^{-1} = ...$ [.......]

                                                                       (H) 1

(ii) **Group - A**   **Group - B**

26. Value of $2\tan^2 45°$ is ...... [.......]   (I) $\dfrac{n(n+1)}{2}$

27. The mean of first 'n' natural [.......]   (J) 2

numbers is ....   (K) Power

                                                                       (L) Processing

28. In C.P.U., 'P' stands for ...... [.......]

                                                                       (M) Programming
                                                                              language.

29. The language understandable [.......]
by a Computer is ......

                                                                       (N) $\dfrac{n+1}{2}$

30. Pictorial representation of [.......]
an Algorithm is ....

                                                                       (O) Flow Chart

                                                                       (P) Hardware

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