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**

SECTION - I   *(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.   If ABCD is a Rhombus, then prove that

   $AB^2 + BC^2 + CD^2 + AD^2 = AC^2 + BD^2$.

2.   Show that the points A(1, 2), B(–3, 4) and C(7, –1) are collinear.

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

4.   Write the de-merits and merits of A.M.

GROUP - B
(Trigonometry, Matrices, Computing)

5. If $8 \tan A = 15$, then find $\sin A - \cos A$.

6. If $A = \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$, then find $2A - 3B$.

7. What are the different boxes used in a Flow Chart ?

8. What are the essential parts of a Computer ?

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 slope of the line perpendicular to the line $5x - 2y + 4 = 0$.

11. Express $\tan \theta$ in terms of $\sec \theta$.

12. Find the Arithmetic mean of first "n" numbers.

13. Expand C.P.U.

14. If $A = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$, then find AB.

NOTE :-

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

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

GROUP - A
(Geometry, Analytical Geometry, Statistics)

15. State and prove Alternate Segment Theorem.

16. Find the area of triangle enclosed between the co-ordinate axis and line passing through (8, – 3) and (– 4, 12).

17. Find the co-ordinates of the points of trisection of a segment joining A(– 3, 2) and B(9, 5).

18. Find the median of marks scored by 50 students in a 50 marks test.

Marks	1-10	11-20	21-30	31-40	41-50
No. of students	3	12	16	14	5

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 $A = \begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 2 & m \\ 0 & -\dfrac{1}{2} \end{bmatrix}$ and AB = BA, then find value of m.

21. Solve the equation $3y = 4 - 2x$ and $x = \dfrac{y+1}{4}$ by using Cramer's method.

22. Draw the Flow Chart for solving $ax^2 + bx + c = 0$ by considering all possible cases.

SECTION - IV

NOTE :-

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

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

23. Construct a triangle ABC, in which AB = 4.4 cm, $\angle C = 65°$ and median through C is 2.7 cm.

24. Two boys are on opposite of sides of a tower, which is 100 metres tall. They measure the angle of elevation of top of the tower as 30° and 45° respectively. Find the distance through which the boys are separated.

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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.   If in $\triangle ABC$, $AB^2 + BC^2 = AC^2$, then $\angle B = $ ....   [.......]

   (A) $30°$

   (B) $60°$

   (C) $90°$

   (D) $120°$

2.   The line $y = mx + c$ intersect the X-axis at the point ....   [.......]

   (A) $(0, c)$

   (B) $(c, 0)$

   (C) $\left(\dfrac{-c}{m}, 0\right)$

   (D) $\left(0, \dfrac{-c}{m}\right)$

3. The line parallel to Y-axis through (h, k) is .... [.......]

    (A) $x = h$ (B) $x = k$

    (C) $y = h$ (D) $y = k$

4. If Mean $= 12.5$ and Median $= 12$, then Mode = ... [.......]

    (A) 13.5   (B) 11

    (C) 11.5   (D) 10.5

5. The range of the first "n" natural numbers is .... [.......]

    (A) $\dfrac{n+1}{2}$ (B) $\dfrac{n-1}{2}$

    (C) $n + 1$ (D) $n - 1$

6. If $\cos \theta = \dfrac{12}{13}$, then $\sin(90° + \theta) = $ .... [.......]

    (A) $\dfrac{-12}{13}$ (B) $\dfrac{12}{13}$

    (C) $\dfrac{5}{13}$ (D) $\dfrac{-5}{13}$

7. If $\begin{bmatrix} 3 & 0 \\ 0 & P \end{bmatrix}$ is scalar matrix, then P = ... [.......]

    (A) 0   (B) 1

    (C) $- 3$ (D) 3

8. The value of the determinant $\begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix} = $ .... [.......]

    (A) 0   (B) 1
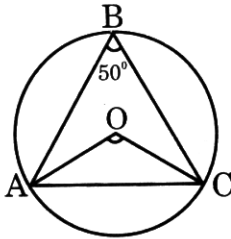
    (C) $\sqrt{2}$ (D) $- 1$

9. Vacuum tubes were used in .... generation computers. [.......]

   (A) I   (B) II

   (C) III   (D) IV

10. .... is used as processing operation box in a Flow Chart. [.......]

   (A) Rectangle   (B) Circle

   (C) Ellipse   (D) Rhombus

II. *Fill in the blanks with suitable answers.* $10 \times \frac{1}{2} = 5$

11. 'O' is the centre of the circle.
    If $\angle ABC = 50°$, then $\angle AOC =$ ....

12. If two circles having the radii 3 cm and 5 cm touch each other internally, then

    the distance between their centres is (in cms) ....

13. The slope of the line joining the points (4, –1) and (5, 6) is ....

14. If 1-8, 9-16, 17-24, ... are the classes of a frequency distribution,

    then the class interval is ....

15. For grouped data, formulae for Mode = ...

16. $\sin^2 45° + \cos^2 45° =$ ....

17. $120° =$ .... radians .

18. If $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, then $A^{-1} =$ ....

19. Expand A.L.U. = ...

20. Example for Input device in Computers is ....

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. The number of common   [.......]   (A) 1
         tangents for two externally
         touching circles is ....   (B) 2

22. In $\triangle ABC$, if $\angle B = 90°$,   [.......]   (C) 3
         AB = 3, AC = 5, then BC = ...   (D) 4

23. If mid point of (1, 4), (3, 6)   [.......]   (E) 5
         is (K, 5), then K = ...
                                                         (F) 6

24. Slope of the line $x - y + 7 = 0$ is ...... [.......]   (G) 7

25. Arithmetic mean of   [.......]   (H) 8
                3, 4, 5, 6, 7 is ....

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

26. $\tan \frac{\pi}{4} = $ ....   [.......]   (I) 2

27. $\cos^2 0° + \sin^2 90° = $ ....   [.......]   (J) 3

28. $\begin{vmatrix} 3 & -1 \\ 4 & 0 \end{vmatrix} = $ ....   [.......]   (K) 6

                                                         (L) 1

29. If $\begin{bmatrix} 2 & K \\ 1 & 3 \end{bmatrix}$ is singular matrix,   [.......]
                then K = ...
                                                         (M) 5

30. The number of major parts   [.......]   (N) 4
                in a Computer is ......

                                                         (O) 7