

**16E(A)**

**MATHEMATICS Paper – II**

**MARCH 2008**

**Parts A and B**

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

**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**.

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**PART – A**

**Time: 2 Hours**

**Marks: 35**



*(Marks: 5x2=10)*

**Note:**

1. Answer **ANY FIVE** questions, choosing **at least TWO** from each of the following two groups i.e., **A and B**.
2. Each question carries 2 marks.

**GROUP – A**

*(Geometry, Analytical Geometry, Statistics)*

1. ABC is an obtuse angled triangle.  $\angle B$  is obtuse angle,  $AD \perp CB$ , then show that  $AC^2 = AB^2 + BC^2 + 2BC \cdot BD$ .
2. Find the point on X-axis which is equidistant from (2, 3) and (4,-2).
3. Find the equation of the line passing through (4, -3) and is perpendicular to the line  $2x - 5y + 4 = 0$ .
4. The mean marks scored by 50 students is 80. On verification of data, it was found that the marks of one student were shown as 73 instead of 37. If corrected, find the new mean.

**GROUP – B***(Trigonometry, Matrices, Computing)*

5. Find the value of  

$$32 \cot^2 \frac{\pi}{4} - 8 \sec^2 \frac{\pi}{3} + 8 \cot^3 \frac{\pi}{6}.$$
6. The angle of elevation of the top of a tree from a point 100 m. from the foot of the tree is  $60^\circ$ . Find the height of the tree.
7. What are the different boxes used in an Flow Chart?
8. What are the types of operations, a Computer performs?

**SECTION – II***(Marks 4x1=4)***Note:**

1. Answer **ANY FOUR** of the following **SIX** questions.
2. Each question carries 1 mark.
9. There is a circle of radius 3 cms. From a point 'P' which is at a distance of 5 cms. From the centre of the circle, a tangent is drawn to the circle. Find the length of the tangent?
10. Find the slope of a line perpendicular to the line  $5x - 2y + 4 = 0$ .
11.  $x = a \sin \theta, y = a \cos \theta$ . Eliminate ' $\theta$ '.
12. If  $\begin{bmatrix} 2a & 5 \\ 6 & 3 \end{bmatrix}$  has no multiplicative inverse. Find ' $a$ '.
13. Find the median of the observations  
1.8, 4.0, 2.7, 1.2, 4.5, 2.3 and 3.7
14. What are the essential components of a Computer?

**SECTION – III***(Marks 4x4=16)***Note:**

1. Answer **ANY FOUR** questions, choosing **TWO** from each of the following groups i.e., **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 equation of the line passing through (4, 3) and making intercepts on the co-ordinate axes whose sum is -1.
17. Two vertices of a triangle are A(-4, 4); B(6, 12) and Centroid is G(0, 6). Find the co-ordinates of the third vertex 'C' and show that area of  $\Delta ABC = 3[\text{area of } \Delta AGB]$ .
18. Find the mean of the following distribution by deviation method.

Class Interval	0-9	10-19	20-29	30-39	40-49
Frequency	8	15	20	45	12

**GROUP – B***(Trigonometry, Matrices and Computing)*

19. If  $\sec \theta + \tan \theta = p$ , show that  $\sin \theta = \frac{p^2-1}{p^2+1}$ .
20. Solve the following linear systems using Cramer's method, if a solution exists for the system.  
 $7x - 2y + 5 = 0$ ,  $11x - 6y + 25 = 0$ .
21. If  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ ,  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$   
 Prove that  $A^2 - (a + d)A = (bc - ad)I$ .
22. Write an Algorithm and draw a Flow Chart to pick largest number of the three given numbers.

**SECTION – IV***(Marks 1x5=5)***Note:**

1. Answer **ANY ONE** question from the following.
2. It carries 5 marks.

23. Construct a cyclic quadrilateral ABCD, where AB = 5 cm., BC = 6 cm., AC = 4 cm. and AD = 2 cm.  
 Write the construction.
24. An aeroplane at an altitude of 2500 m. observes the angles of depression of opposite points on the two banks of the river to be  $41^\circ 20'$  and  $52^\circ 10'$ . Find the width of the river.

*(Required Natural Tangents Table)*

Minutes	0'	6'	12'	18'	24'	30'	Mean Differences				
							1'	2'	3'	4'	5'
Degrees	0'	6'	12'	18'	24'	30'	1'	2'	3'	4'	5'
$41^\circ$	0.8693	0.8724	0.8754	0.8785	0.8816	0.8847	5	10	16	21	26
$52^\circ$	1.2799	1.2846	1.2892	1.2938	1.2985	1.3032	8	16	24	31	39

## 16E(B)

## PART – B

Time: 30 minutes

Marks: 15

## Note:

- Each question carries  $\frac{1}{2}$  mark.
- Answers are to be written in the question paper only.
- All questions are to be answered.
- Marks will not be given for over-written, re-written (or) erased answers.

I. Write the CAPITAL LETTERS of the correct answer in the brackets provided against each question.

- If a parallelogram is cyclic, then it is  
(A) Rhombus (B) Rectangle (C) Trapezium (D) Square
- If  $\triangle ABC \sim \triangle PQR$ , then  $\overline{AB} : \overline{AC} =$   
(A) PR : PQ (B) PQ : PR (C) PQ : PR (D) QR : PR
- The slope of a straight line which is perpendicular to  $5x - 2y + 4 = 0$  is  
(A)  $\frac{2}{5}$  (B)  $\frac{5}{2}$  (C)  $-\frac{5}{2}$  (D)  $-\frac{2}{5}$
- Distance between the points  $(a \cos \theta, 0)$  and  $(0, a \sin \theta)$   
(A)  $a$  (B)  $\sqrt{a}$  (C)  $a^2$  (D) 0
- The class interval of the frequency distribution having the classes 1-8, 9-16, 17-24 is  
(A) 8 (B) 9 (C) 7 (D) 3
- $A \cdot A^{-1} =$   
(A) Null matrix (B) Identity matrix (C)  $A$  (D)  $A^{-1}$
- A minute hand of a clock is 3 cm. long. How far its tip moves in 20 minutes?  
(A) 3 cm. (B) 9 cm. (C)  $\frac{22}{7}$  cm. (D)  $\frac{44}{7}$  cm.
- If  $\theta$  is eliminated from  $x = \sec \theta + \tan \theta$ ,  $y = \sec \theta - \tan \theta$ , then  
(A)  $x^2 - y^2 = 1$  (B)  $x - y = 1$  (C)  $x + y = 1$  (D)  $xy = 1$
- If  $A = \begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$ , then  $A^{-1} =$   
(A)  $-A$  (B)  $A^2$  (C)  $A$  (D)  $2A$
- A sexagesimal measure of  $72^\circ$  is equal in circular measure to  
(A)  $\frac{\pi}{5}$  (B)  $\frac{2\pi}{5}$  (C)  $\pi$  (D)  $\frac{2\pi}{3}$

**II. Fill in the blanks with suitable answers.**

11. In a histogram, the breadths of rectangles represent the .....
12. The distance between the centres of two circles is 'd'. If the radii are ' $r_1$ ' and ' $r_2$ ', then the length of transverse common tangent is .....
13. The language known to computers is called .....
14. The line  $2x - 3y = K$  is passing through the origin, then the K is .....
15. The rhombus shaped box is used in a Flow Chart for .....
16. Value of  $\sin 420^\circ$  is .....
17. If A.M. of 3, 5, 9, x, 11 is 7, then x = .....
18. .... is used in Second Generation Computer.
19. Large amount of information is stored in ..... unit of a computer.
20.  $\cos 90 - \theta =$  .....

**III. For the following questions under Group-A, choose the correct answer from the master list Group-B and write the letter of the correct answer in the brackets provided against them.**

**(i) Group – A**

21.  $\sec \theta - \tan \theta = 2$ ,  
then  $\sec \theta + \tan \theta =$
22.  $\operatorname{cosec} \theta + \cot \theta = 3$ ,  
then  $\operatorname{cosec} \theta - \cot \theta =$
23.  $\sin \theta = \cos \theta$ , then  $\theta =$
24.  $\sin 30^\circ = \cos A$ , then  $A =$
25. Two circles touch externally at 'O'. AB is their direct common tangent, then  $\angle AOB =$

**Group – B**

- [.....] (A)  $45^\circ$   
 [.....] (B)  $60^\circ$   
 [.....] (C)  $1/2$   
 [.....] (D)  $0^\circ$   
 [.....] (E) 6  
 (F)  $1/3$   
 (G)  $2^2$   
 (H)  $90^\circ$

**(ii) Group – A**

26. Number of common tangents that can be drawn to two circles touching externally
27.  $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$  is an example of
28.  $P = \begin{pmatrix} x & y \\ z & a \end{pmatrix}$ ,  $Q = \begin{pmatrix} b & c \\ d & 2 \end{pmatrix}$  and  $P = Q$   
then a = ?

**Group – B**

- [.....] (I) 2  
 [.....] (J)  $3 \times 4$   
 [.....] (K) 3

29.  $A \times \begin{pmatrix} 1 & 1 \\ 0 & 2 \end{pmatrix} = (1 \ 2)$ , [.....] (L) 1 x 2  
then the order of A is

30. Mode of data 2, 3, 3, 2, 3, 1, P is P, [.....] (M) 1  
then P is

- (N) Unit matrix
- (O) 5
- (P) Singular matrix

\*\*\*\*\* END \*\*\*\*\*

