

This Question Paper contains 4 printed pages.

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'**.
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Part A

Time : 2 Hours

Marks : 35

SECTION I

5 x 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 **two** marks.

Group - A

(Geometry, Analytical Geometry and Statistics)

1. Prove that the lengths of the two tangents drawn from an external point to a circle are equal.
2. Find the coordinates of the point which divides the join of (2, -4) and (5, 6) in the ratio 5 : 3 externally.
3. Find the equation of the straight line passing through (4, 3) and having a slope 3.
4. The mean of a data is 9. If each observation is multiplied by 3 and then 1 is added to each result, find the mean of the new observations so obtained.

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Group - B
(Trigonometry, Matrices and Computing)

5. Prove that $\sqrt{\frac{1 + \cos\theta}{1 - \cos\theta}} = \operatorname{Cosec}\theta + \cot\theta$.
6. If $A \times \begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix} = (1 \ 2)$, find the order of matrix A and determine matrix A .
7. Define an Algorithm.
8. What are the different boxes used in a flowchart?

SECTION II

4 x 1 = 4

Note : 1. Answer **any four** of the following six questions.
2. Each question carries **one** mark.

9. State the converse of the Pythagoras theorem.
10. Find the slope and y-intercept for the line $\frac{x}{a} + \frac{y}{b} = 1; a, b \neq 0$.
11. Define a Radian.
12. Write two demerits of an Arithmetic mean.
13. Given that $A = \begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$, find $(A + B)(A - B)$.
14. What is meant by stepwise refinement?

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SECTION III

4 x 4 = 16

- Note: 1. Answer **any four** questions, choosing at least **two** from each of the following groups, i.e. Group **A** and **B**.
2. Each question carries **four** marks.

Group - A

(Geometry, Analytical Geometry and Statistics)

15. State and prove the Basic Proportionality theorem.
16. Find the equation of the line which passes through the point (1, -6) and whose product of the intercepts on the coordinate axes is one.
17. If the area of the triangle formed with the vertices (t, 2t), (-2, 6), (3, 1) is 5 square units, find 't'.
18. Find the mean of the following frequency distribution by the shortcut method.

Class interval	0-19	20-39	40-59	60-79	80-99	100-119
Frequency	9	16	24	15	4	2

Group - B

(Trigonometry, Matrices and Computing)

19. Solve $\frac{\cos^2\theta - 3\cos\theta + 2}{\sin^2\theta} = 1$
20. If $A = \begin{pmatrix} -2 & 1 \\ 3 & -1 \end{pmatrix}$; $B = \begin{pmatrix} 2 & 0 \\ 5 & -3 \end{pmatrix}$, show that $(AB)^{-1} = B^{-1} \cdot A^{-1}$
21. Solve the following equations using Cramer's method.
 $4x - y = 16$, $\frac{3x - 7}{2} = y$.
22. Execute the flowchart to obtain the total amount to be paid at the end of 6 years if $P = \text{Rs. } 1,000$ and $R = 12\%$.

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SECTION IV

1 x 5 = 5

Note : 1. Answer **any one** of the following questions.

2. The question carries **five** marks.

23. Construct a triangle similar to a given $\triangle ABC$ such that each of its side is $\frac{2}{3}$ of the corresponding sides of $\triangle ABC$. Given that $AB = 4.5$ cm, $BC = 6$ cm and $AC = 6.5$ cm.
24. From the ground and first floor of a building, the angle of elevation of the top of the spire of a church was found to be 60° and 45° respectively. The first floor is 5 mts high. Find the height of the spire.

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