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MATHEMATICS — Paper IITime Allowed : $2\frac{1}{2}$ Hours]

[Maximum Marks : 100

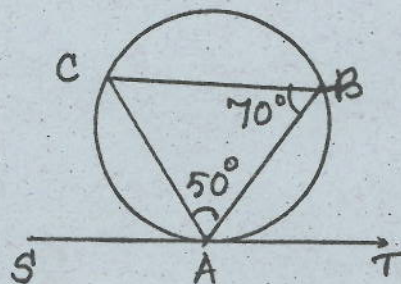
- Note : i) Read the instructions under each Section before you start answering.
- ii) Diagrams should be drawn, wherever necessary.
- iii) Rough work and calculations should be shown legibly at the bottom of the pages in the answer-book.

SECTION - A

Note : Answer all the ten questions.

 $10 \times 1 = 10$

1. In the diagram, SAT is a tangent at A. If $\angle ABC = 70^\circ$ and $\angle BAC = 50^\circ$, then $\angle BAT$ is equal to



- 1) 50° 2) 60° 3) 70° .

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2. The corresponding sides of two similar triangles are in the ratio 4 : 5. The ratio of their areas is
- 1) 4 : 5
 - 2) 5 : 4
 - 3) 16 : 25.
3. The mid-point of the line joining (- 2, 3) and (2, 5) is
- 1) (0, 4)
 - 2) (2, - 4)
 - 3) (4, 0).
4. The intercept of the line $5x - 6y - 24 = 0$ on Y-axis is
- 1) 4
 - 2) $\frac{6}{5}$
 - 3) - 4.
5. If $\sin x = \cos 65^\circ$, then the value of x is
- 1) 65°
 - 2) 35°
 - 3) 25° .
6. The value of $\cos^2 A - 1$ is
- 1) $-\sin^2 A$
 - 2) $\sin^2 A$
 - 3) 1.

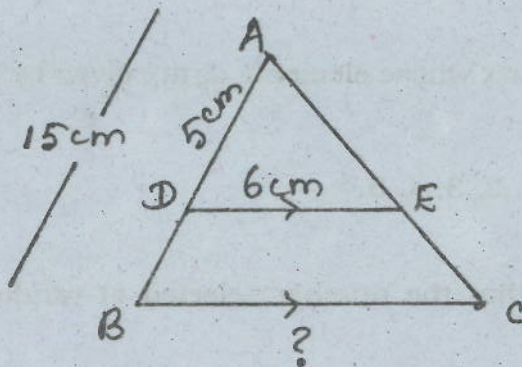
7. The variance of a distribution is 81. Then the standard deviation is
- 1) 9 2) 0 3) $(81)^2$.
8. A is a matrix of order 3×2 and B is of order 2×4 . Then in the product AB, the number of elements is
- 1) 6 2) 8 3) 12.
9. The probability of getting a prime number in throwing a die once is
- 1) $\frac{1}{2}$ 2) $\frac{1}{3}$ 3) $\frac{2}{2}$.
10. The BASIC statement which is used to assign a value to a variable is
- 1) LET
- 2) REM
- 3) INPUT.

SECTION - B

Note : Answer any ten of the following questions.

$10 \times 3 = 30$

11. In the diagram, DE is parallel to BC. If AB = 15cm, AD = 5cm and DE = 6cm, find BC.



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12. A chord of a circle of radius 13 cm is of length 24 cm. Find the distance of the chord from the centre.
13. In triangle ABC , $\angle A$ is a right angle and AD is perpendicular to BC . If $BC = 20$ units, $DC = 5$ units, find AD .
14. Prove that $(\sin \theta - \cos \theta)^2 + (\sin \theta + \cos \theta)^2 = 2$.
15. Simplify : $\frac{3 \sin 65^\circ}{\cos 25^\circ} + \frac{2 \cos 51^\circ}{\sin 39^\circ}$.
16. Find the length of the shadow of a flagpole of height 30m when the altitude of the sun is 30° .
17. Find the slope of the line joining $(-4, 3)$ and $(4, 9)$ and also the slope of the line perpendicular to it.
18. Find the equation of the line joining $(-3, 5)$ and $(2, -4)$.
19. The centroid of a triangle whose two vertices are $(4, 4)$ and $(6, 6)$ is $(4, 5)$. Find the third vertex.
20. If $\begin{bmatrix} -3 & -2 & 4 \\ 5 & -6 & -3 \end{bmatrix} + 2y = \begin{bmatrix} -5 & 4 & 6 \\ 3 & -4 & 5 \end{bmatrix}$, find y .
21. Construct a 3×3 matrix whose elements a_{ij} are given by $a_{ij} = 3i - 4j$.
22. Find the variance of 1, 2, 3, 4, 5.
23. Find the probability that the number selected at random from 5 to 13 will be divisible by 3.

24. A card is drawn from a well shuffled pack of 52 cards. What is the probability that the card drawn is a court card ?
25. Write the output for the expression,
 $A^2 + B - C$ if $A = 10$, $B = 5$, $C = 2.5$.

SECTION - C

Note : Answer all the questions, choosing either (a) or (b) in each question.

$$4 \times 5 = 20$$

26. a) State and prove Basic Proportionality theorem.

OR

- b) If two triangles are equiangular to one another, the two triangles are similar. Prove it.

27. a) In a triangle ABC , AD is drawn perpendicular to BC . Prove that

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

OR

- b) Two chords PQ and RS of a circle intersect externally at T . Prove that

$$\frac{\Delta PRT}{\Delta QST} = \frac{PR^2}{QS^2}.$$

28. a) Find the equation of the line passing through $(4, 3)$ and making equal and positive intercepts on both the axes.

OR

- b) Find the equation of the altitude through B of triangle ABC whose vertices are $A(-5, -3)$, $B(4, -2)$ and $C(-1, 8)$.

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29. a) Find the co-ordinates of the points of trisection of the line joining the points (3, 5) and (2, -1)

OR

- b) Find the area of the triangle whose vertices are (-1, 6), (-3, -9) and (3, 9).

SECTION - D

Note : Answer all questions, choosing either (a) or (b) in each question.

$$4 \times 5 = 20$$

30. a) Prove that $(\operatorname{cosec} \theta - \sin \theta)(\sec \theta - \cos \theta)(\tan \theta + \cot \theta) = 1$.

OR

- b) On walking 40m away from the foot of a tower, the angle of elevation of its top changes from 45° to 30° . Find the height of the tower.

31. a) Find x and y if $\begin{bmatrix} 3 & 2 \\ 5 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 6 \\ 8 \end{bmatrix}$.

OR

- b) If $A = \begin{bmatrix} 2 & -2 \\ -1 & 3 \end{bmatrix}$, prove that $A^2 - 5A + 4I = 0$.

32. a) Calculate Standard Deviation for the following data :
20, 80, 60, 70, 30, 50, 40.

OR

- b) A number is chosen from 1 to 30. What is the probability that it is an odd number or a multiple of 5?

33. a) Draw a flow chart to find the circumference of a circle.

OR

- b) Write a BASIC program to find the simple interest given the principal, number of years and rate of interest.

SECTION - E

Note : Answer the question, choosing *one* of the alternatives (a) or (b).

$$1 \times 10 = 10$$

34. a) Construct a pair of tangents to a circle of radius 3 cm from a point 7 cm away from the centre of the circle.

OR

- b) Construct an equilateral triangle of side 5 cm and enlarge it three times of its area.

SECTION - F

Note : Answer the question, choosing *one* of the alternatives (a) or (b).

$$1 \times 10 = 10$$

35. a) Draw "less than Ogive" and find the median for the following data :

C.I.:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
f:	4	8	15	20	12	5

OR

- b) Calculate median using greater than Ogive for the following data :

C.I.:	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79
f:	6	9	12	18	14	10	4