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MATHEMATICS — Paper II

Time Allowed : $2\frac{1}{2}$ Hours]

[Maximum Marks : 100

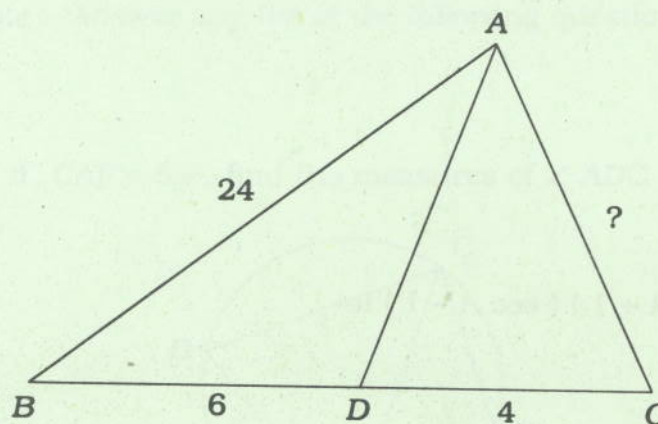
- Note :**
- The question paper consists of six Sections A, B, C, D, E and F.
 - Read the instructions under each Section before you start answering.
 - Diagrams should be drawn, wherever necessary.
 - Rough work and calculations should be shown legibly at the bottom of the pages in the answer-book.

SECTION - A

Note : Answer all the ten questions.

$10 \times 1 = 10$

1. In the given figure, AD bisects $\angle BAC$. If $AB = 24$, $BD = 6$, $DC = 4$, then AC is equal to



- 1) 16 2) 22 3) 36.

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2. Two chords PQ and RS intersect internally at M such that $PM = 9$, $MQ = 2$ and $RM = 3$. Then MS is equal to
- 1) 9
 - 2) 6
 - 3) 8.
3. AB and CD are two perpendicular lines. The slope of AB is $\frac{2}{3}$. Then the slope of CD is
- 1) $-\frac{3}{2}$
 - 2) $\frac{2}{3}$
 - 3) $\frac{3}{2}$.
4. The centroid of the triangle whose vertices are $(-3, 4)$, $(6, 2)$ and $(3, 6)$ is
- 1) $(4, 2)$
 - 2) $(2, 4)$
 - 3) $(4, 4)$.
5. If $\sin x = \cos 2x$, then x is
- 1) 30°
 - 2) 45°
 - 3) 60° .
6. The value of $(\sec A + 1)(\sec A - 1)$ is
- 1) $\cot^2 A$
 - 2) $\tan^2 A$
 - 3) $\cos^2 A$.

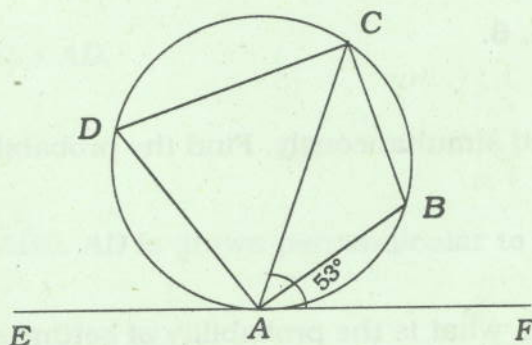
7. The order of $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$ is
- 1) 2×3 2) $(3, 2)$ 3) 0×0 .
8. The range of 8, 12, 16, 36, 40, 32, 20 is
- 1) 8 2) 32 3) 40.
9. The probability of drawing a white ball from a box containing 6 white and 4 red balls is
- 1) $\frac{4}{6}$ 2) $\frac{3}{5}$ 3) $\frac{5}{3}$.
10. Which one of the following is a valid expression ?
- 1) $\frac{PNR}{100}$
- 2) $7 - 2 + - 5$
- 3) $A^{**} 5$.

SECTION - B

Note : Answer any ten of the following questions.

$10 \times 3 = 30$

11. In the figure, if $\angle CAF = 53^\circ$, find the measures of $\angle ADC$ and $\angle ABC$.



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12. A ladder 25 m long rests on a wall of a house 20 m above the ground. Determine the distance of the foot of the ladder from the house.
13. ABC is an equilateral triangle and D is the mid-point of BC . If $AB = 10$ cm, find the length of AD .
14. Show that $\sin \theta \cdot \sec (90^\circ - \theta) - \cot \theta \cdot \cot (90^\circ - \theta) = 0$.
15. Prove that $\cos^4 \theta + \sin^4 \theta = 1 - 2 \sin^2 \theta \cdot \cos^2 \theta$.
16. The angle of elevation of the top of a tower from a point on the ground 50 m away from the foot of the tower is 60° . Find the height of the tower.
17. Show that the points $(-4, -2)$, $(1, 1)$ and $(6, 4)$ are collinear.
18. Find the slope, X-intercept and Y-intercept of the line $3x - 2y - 12 = 0$.
19. The slope of the line joining $(1, 4)$ and $(-5, a)$ is $-\frac{1}{2}$. Find the value of a .
20. Given $\begin{pmatrix} x+y & x-y \\ 7 & 6 \end{pmatrix} = \begin{pmatrix} 10 & 2 \\ 7 & z \end{pmatrix}$ find the values of x , y and z .
21. If $A = \begin{pmatrix} 2 & 4 & 6 \\ 1 & 3 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & 3 & 2 \\ -1 & -2 & -3 \end{pmatrix}$, find $3A + 2B$.
22. Find the S.D. of 2, 4, 6.
23. Three coins are tossed simultaneously. Find the probability of getting exactly two heads.
24. If two dice are thrown, what is the probability of getting a sum of 9?

25. Write the output for the following program :

10 READ E, F, G

20 LET $A = E \wedge F + (G * E)$

30 PRINT A

40 DATA 2, 3, 4

50 END.

SECTION - C

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

26. a) Prove that the straight line drawn parallel to one of the two sides of a triangle divides the other two sides proportionally.

OR

- b) State and prove S.A.S. similarity theorem.

27. a) If the sides of a quadrilateral ABCD touch a circle

28. a) Find the equation of the line through $(-1, 3)$ and parallel to the line joining $(5, -2)$ and $(-3, 1)$.

OR

- b) Find the equation of the median through A of triangle ABC whose vertices are respectively $(-3, 2)$, $(5, -4)$ and $(-1, 2)$.
29. a) Find the ratio in which the line joining the points $(-4, -4)$ and $(6, 6)$ is divided by the point $(3, 3)$.

OR

- b) Find the fourth vertex of a parallelogram, three of whose vertices taken in order are $(4, 12)$, $(6, -2)$ and $(5, -10)$.

SECTION - D

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

$$4 \times 5 = 20$$

30. a) Prove that $\frac{1}{1 + \cos \theta} + \frac{1}{1 - \cos \theta} = 2 \operatorname{cosec}^2 \theta$.

OR

- b) Two persons standing on opposite sides of a tower view the top of the tower at angles of elevation 45° and 30° . If the height of the tower is 50 m, find the distance between them.

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

OR

- b) Find X and Y if $3Y = \begin{pmatrix} -3 & 0 \\ 9 & 3 \\ 3 & -3 \end{pmatrix}$ and $3X - 2Y = \begin{pmatrix} 2 & -6 \\ 9 & -2 \\ -5 & 5 \end{pmatrix}$.

32. a) Find the Standard Deviation of the following data :

$x :$	4	6	8	10	12
$f :$	3	4	8	3	2

OR

- b) A two digit number is formed with the digits 2, 4, 5, 7. What is the probability that the number is divisible by 2 and by 5 (without repetition of number) ?
33. a) Draw a flowchart to find the volume of a sphere given the radius.
- OR
- b) Write a BASIC program to find the area of a circle.

SECTION - E

Note : Answer the question, choosing one of the alternatives (a) or (b). 10

34. a) Construct triangle ABC , given $BC = 6.4$ cm, vertical angle A is 46° and the altitude from A to BC is of length 6 cm.

OR

- b) Find the mean proportional to two given segments 7 cm and 5 cm.

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SECTION - F

Note : Answer the question, choosing one of the alternatives (a) or (b). 10

35. a) Calculate median, using 'greater than Ogive' for the following frequency distribution :

C.I:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
f:	7	12	15	20	12	10	4

OR

- b) Using 'less than Ogive', calculate median for the following data :

C.I:	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120	120 - 140
f:	4	6	8	15	10	7