5422

Register Number

MATHEMATICS — Paper II

Time Allowed : $2\frac{1}{2}$ Hours] [Maximum Marks : 100

PART – I

Note : i) This Part contains *two* Sections, **Section – A** and **Section – B**.

ii) **Section – A** contains Multiple Choice Questions.

iii) **Section – B** contains 15 questions.

SECTION – A

(i) Answer *all* the questions.

(ii) Choose the correct answer from the given alternatives : $20 \times 1 = 20$

1. If $P = \begin{pmatrix} 6 & 7 & 8 & 9 \\ -5 & -4 & 3 & 2 \end{pmatrix}$ and $Q = \begin{pmatrix} -2 & 5 & 3 & 0 \\ 5 & 4 & -3 & 2 \end{pmatrix}$, then the order of $P - Q$ is

1) 4×4 2) not defined

3) 2×4 4) 4×2.

2. If $X = (-1 \quad 3)$ and $Y = \begin{pmatrix} 1 \\ -3 \end{pmatrix}$, then $X + Y =$

1) $(0, 0)$ 2) $\begin{pmatrix} 0 \\ 0 \end{pmatrix}$

3) (-10) 4) not defined.

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3. If $\begin{pmatrix} 4 & 8 \\ x & 4 \end{pmatrix} = 4 \begin{pmatrix} 1 & 2 \\ 4 & 1 \end{pmatrix}$, then the value of x =

1) 16 2) 8

3) 4 4) 1.

4. The length of the tangent from a point at a distance of 13 cm from the centre of the circle of radius 5 cm is

1) 8 cm 2) 12 cm

3) $\sqrt{5^2 + 13^2}$ cm 4) 18 cm.

5. AB and CD are two chords of a circle intersecting at a point P inside the circle. If AB = 12 cm, AP = 2 cm, PD = 4 cm, then CP is equal to

1) 4 cm 2) 2 cm

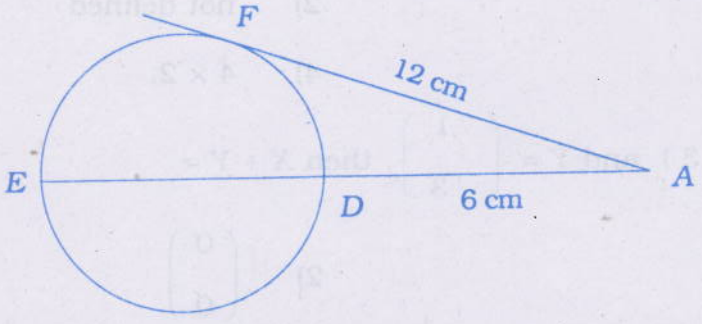
3) 3 cm 4) 5 cm.

6. In triangles ABC and DEF, $\angle A = \angle E$ and $\angle B = \angle F$. Then $AB : AC$ is

1) $DE : DF$ 2) $DE : EF$

3) $EF : ED$ 4) $DF : EF$.

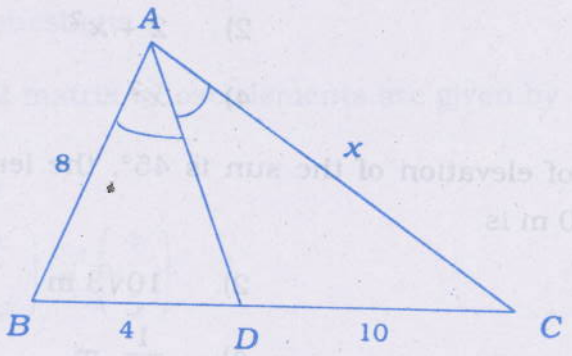
7. In the diagram, if AD = 6 cm, AF = 12 cm, then the length of DE is



1) 12 cm 2) 24 cm

3) 18 cm 4) 144 cm.

8. If AD is the bisector of $\angle A$, then AC is



1) 16 2) 20

3) 12 4) 18.

9. Centroid of the triangle with vertices $A(3, -7)$, $B(5, 1)$ and $C(-1, -5)$ is

1) $\left(\frac{7}{3}, -\frac{11}{3}\right)$ 2) $\left(-\frac{7}{3}, \frac{11}{3}\right)$

3) $\left(\frac{11}{3}, -\frac{7}{3}\right)$ 4) $\left(-\frac{11}{3}, \frac{7}{3}\right)$.

10. Area of a triangle ABC, whose vertices are $A(6, 7)$, $B(2, -9)$, $C(-4, 1)$ is

1) 48 sq.units 2) 68 sq.units

3) 28 sq.units 4) 38 sq.units.

11. The equation of a straight line which has the Y intercept -5 and slope 2 is

1) $2x + y + 5 = 0$ 2) $2x - y + 5 = 0$

3) $2x - y - 5 = 0$ 4) $2x + y - 5 = 0$

12. If the slope of the line joining $(-6, 13)$ and $(3, a)$ is $-\frac{1}{3}$, then the value of a is

1) 5 2) -10

3) -5 4) 10.

13. The lines $y = -3$ and $x = 8$ meet at the point

1) $(-8, -3)$ 2) $(3, 8)$

3) $(-3, 8)$ 4) $(8, -3)$.

14. If $\tan 40° = x$, then the value of $1 + \text{cosec}^2 50°$ is

1) $1 + x^2$ 2) $2 + x^2$

3) x 4) x^2.

15. When the angle of elevation of the sun is 45°, the length of the shadow of a tower of height 10 m is

1) 10 m 2) $10\sqrt{3}$ m

3) $\frac{10}{\sqrt{3}}$ m 4) $\frac{1}{\sqrt{3}}$ m.

16. The value of $\frac{\sqrt{1 - \sin^2 \theta}}{\sin \theta}$ is

1) $\cot \theta$ 2) $\frac{\sin \theta}{2}$

3) $\tan \theta$ 4) $\frac{1 + \sin \theta}{\sin^2 \theta}$.

17. The value of $\sin^2 18° + \sin^2 72°$ is

1) -1 2) 18

3) 72 4) 1.

18. $\sin^2 A \cdot \cos^2 B - \cos^2 A \cdot \sin^2 B$ is

1) $\sin^2 A$ 2) $\sin^2 B$

3) $\sin^2 A - \sin^2 B$ 4) $\sin^2 A - \cos^2 B$.

19. The standard deviation of 5 values is $5\sqrt{2}$. If each value is increased by 4, then the new standard deviation is

1) $20\sqrt{4}$ 2) $10\sqrt{2}$

3) $5\sqrt{2}$ 4) $\frac{5}{2}\sqrt{2}$.

20. What is the probability of drawing the number 6 from a well shuffled pack of 52 cards ?

1) $\frac{1}{13}$ 2) $\frac{1}{2}$

3) $\frac{1}{26}$ 4) $\frac{1}{4}$.

SECTION – B

Answer any *ten* questions : $10 \times 2 = 20$

21. Construct a 3×2 matrix whose elements are given by $a_{ij} = 3i - j$.

22. Solve for x and y

$$\begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}.$$

23. The perimeters of two similar triangles are 24 cm and 18 cm respectively. If one side of the first triangle is 8 cm, find the corresponding side of the other triangle.

24. Prove that the line drawn from the mid-point of one side of a triangle parallel to another side bisects the third side.

25. AB and CD are two chords of a circle, which intersect each other externally at P. If $AB = 5$ cm, $BP = 3$ cm, $PD = 2$ cm, then find CD.

26. Write down the equation of a line parallel to $3x - 4y - 5 = 0$ and passing through the point $(2, 3)$.

27. Where does the line $3y + 2y = 8$ meet the (i) x-axis and (ii) y-axis ?

28. The line joining $A(-1, -2)$ and $B(5, 6)$ is perpendicular to the line joining $C(4, 2)$ and $D(0, y)$. Find y.

29. Find the value of a so that $3x + y = 2$, $5x + 2y = 3$ and $ax - y = 3$ are concurrent.

30. The angle of elevation of a ladder leaning against a wall is 60° and the foot of the ladder is 10 m away from the wall. Find the length of the ladder.

31. Prove that $1 + \dfrac{\cot^2 \theta}{1 + \operatorname{cosec} \theta} = \operatorname{cosec} \theta$.

32. If ϕ is 30°, verify $\sin 3\phi = 3 \sin \phi - 4 \sin^3 \phi$.

33. Using the formula $\sin(A - B) = \sin A \cos B - \cos A \sin B$, find the value of $\sin 15°$.

34. The number of ice-cream cones bought by men, women, boys and girls, children on a day at the trade fair was 40, 42, 44, 46 and 48 respectively. Find the standard deviation.

35. A two digit number is formed with the digits 3, 5 and 7. Find the probability that the number so formed is greater than 57. Repetition of the digits is not allowed.

PART – II

Note : This part contains *four* Sections — **Section-C, Section-D, Section-E** and **Section-F**.

SECTION – C

Answer any *two* questions : $2 \times 5 = 10$

36. State and prove Angle bisector theorem.

37. Prove that the line segments joining the mid-points of the adjacent sides of a quadrilateral form a parallelogram.

38. One angle of a triangle is equal to one angle of another and bisectors of these equal angles divide the opposite sides in the same ratio. Prove that the triangles are similar.

SECTION – D

Answer any *three* questions : $3 \times 5 = 15$

39. If $A = \begin{pmatrix} 2 & 3 & -1 \\ 4 & 1 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & -2 \\ 3 & -3 \\ 2 & 6 \end{pmatrix}$, verify that $(AB)^T = B^T A^T$.

40. Find X and Y if $X + Y = \begin{pmatrix} 7 & 0 \\ 2 & 5 \end{pmatrix}$ and $X - Y = \begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$.

41. Find the standard deviation of the following data :

x :	10	15	18	20	25
f :	3	2	5	8	2

42. A card is drawn from a well shuffled pack of 52 cards. Find the probability that it is an ace or spade.

SECTION – E

Answer any *two* questions : $2 \times 5 = 10$

43. Prove that

$$\frac{\sin \theta}{1 + \cos \theta} + \frac{1 + \cos \theta}{\sin \theta} = 2 \operatorname{cosec} \theta.$$

44. Find the area of an isosceles triangle with base 10 cm and vertical angle 67°.

45. The angle of elevation of a tower at a point is 45°. After going 20 metres towards the foot of the tower the angle of elevation of the tower becomes 60°. Calculate the height of the tower.

SECTION – F

Answer any *three* questions : $3 \times 5 = 15$

46. The foot of perpendicular from (1, 2) on a line is the origin. Find the equation of the line.

47. Find the equation of the straight line joining the point of intersection of $3x - y + 9 = 0$ and $2y + x - 4 = 0$ to the point of intersection of $2x + y = 4$ and $2y = x + 3$.

48. Find the equation of the line which passes through the point (3, 4) and makes intercepts on the axes such that their sum is 14.

49. Find the orthocentre of the triangle *ABC* whose vertices are

$A (-2, -1)$, $B (-1, -4)$ and $C (0, -5)$

PART – III

SECTION – G

Answer any *one* question : $1 \times 10 = 10$

50. Draw a circle of radius 3·6 cm. Take a point *P* on it. Without using the centre of the circle, draw a tangent to the circle at the point *P*.

51. Construct a triangle *PQR* having base *PQ* = 5 cm, vertical angle 45° and altitude through *R* is 4 cm. How many such triangles can be constructed ?