8120

Register Number | | | | | | |

MATHEMATICS — Paper II

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

Instruction : Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

PART – I

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

ii) **Section – A** contains Multiple Choice Questions. Answer all the *twenty* Questions. Each question carries *one* mark.

iii) **Section – B** contains 15 questions. Answer any *ten* questions. Each question carries *two* marks.

SECTION – A

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

1. If $x + \begin{bmatrix} 7 & 8 & -1 \\ 4 & 3 & -2 \end{bmatrix} = \begin{bmatrix} 9 & 10 & 1 \\ -4 & -3 & 2 \end{bmatrix}$, then x =

1) $\begin{bmatrix} 16 & 18 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ 2) $\begin{bmatrix} 2 & 2 & 2 \\ 8 & 6 & 4 \end{bmatrix}$

3) $\begin{bmatrix} 2 & 2 & 2 \\ -8 & -6 & -4 \end{bmatrix}$ 4) $\begin{bmatrix} 2 & 2 & 2 \\ -8 & -6 & 4 \end{bmatrix}$.

2. The order of the matrix [0 4 8] is

1) 3×0 2) 3×1

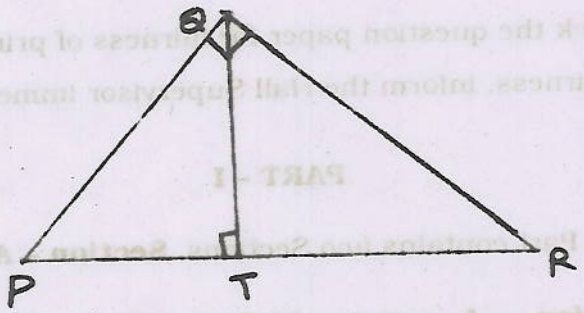
3) 1×3 4) 1×0.

3. If $\begin{bmatrix} 0 & 7 \\ a & 5 \end{bmatrix} + \begin{bmatrix} -3 & 4 \\ 5 & b \end{bmatrix} = \begin{bmatrix} -3 & 11 \\ 6 & 10 \end{bmatrix}$ then the values of a and b are

1) 1, 5 2) −1, 5

3) 5, 1 4) −1, −5.

4. In a right triangle PQR, the perpendicular QT on the hypotenuse PR is drawn. Then $PR.PT$ =



1) PR^2 2) PT^2

3) QT^2 4) PQ^2.

5. Chords AB and CD intersect at P inside a circle. If AP = 4 cm, PB = 6 cm, CP = 3 cm, then PD is ..... cm.

1) 5 2) 8

3) 7 4) 11.

6. If the ratio of altitudes of two similar triangles is 4 : 5, then ratio of their areas is

1) 1 : 2 2) 16 : 25

3) 4 : 5 4) 5 : 4.

7. In triangle ABC, AD is the bisector of angle A. If AB = 6 cm, AC = 8 cm, BD = 4·5 cm then DC = ... cm.

1) 5 2) 7·5

3) 6 4) 8.

8. AB is a line segment of length 6 cm and M is the midpoint. Semicircles are drawn with AM, MB and AB as diameter, all on the same side of AB. A circle is drawn to touch all the semicircles. The radius of the circle is

1) 6 2) 3

3) 2 4) 1.

9. The angle of inclination with X-axis of the line whose slope is $\sqrt{3}$ is

1) 30° 2) 45°

3) 60° 4) 90°.

10. The equation of the line passing through origin and parallel to the line $3x + 2y - 5 = 0$ is

1) $3x - 2y - 5 = 0$ 2) $2x - 3y = 0$

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

11. If $A(5, 5)$, $B(-5, 1)$, $C(10, 7)$ are collinear points, the area of triangle ABC is

1) $\frac{13}{2}$ 2) 9

3) 25 4) 0.

12. The midpoint of AB is the origin. If A is $(3, -2)$, then B is

1) $(3, 0)$ 2) $(0, -2)$

3) $(-3, 2)$ 4) $(-2, -3)$.

13. The point of intersection of $3x - y = 2$ and $x + y = 6$ is

1) $(4, 4)$ 2) $(4, 10)$

3) $(10, 4)$ 4) $(2, 4)$.

14. If $\cos 2A = \sin 48$, then the possible value of A is

1) 24° 2) 42°

3) 21° 4) 12°.

15. The value of $\frac{2\tan 30^\circ}{1+\tan^2 30^\circ}$ is

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

3) $\frac{\sqrt{3}}{2}$ 4) 1.

16. The angle of elevation of a ladder leaning against a wall is 60° and the foot of the ladder is 9·5 m from the wall. Then the length of the ladder is ..... m.

1) 10 2) 19

3) 29 4) 9·5.

17. If $\tan 2\theta = \cot(\theta + 6^\circ)$ where 2θ and θ are acute angles, then the value of θ is

1) 36° 2) 26°

3) 28° 4) 6°.

18. The simplified value of $\sec A \sqrt{1-\sin^2 A}$ is

1) – 1 2) 2

3) – 2 4) 1.

19. A and B are mutually exclusive events. If $P(A)=\frac{1}{2}$, $P(B)=\frac{1}{3}$ then $P(A \cap B)$ is

1) $\frac{1}{6}$ 2) $\frac{5}{6}$

3) 0 4) ∞.

20. The variance is 289 and its S.D. is

1) 17 2) 18

3) 13 4) 21.

SECTION – B

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

21. Find the unknowns a, b, c, d in the following matrix equation :

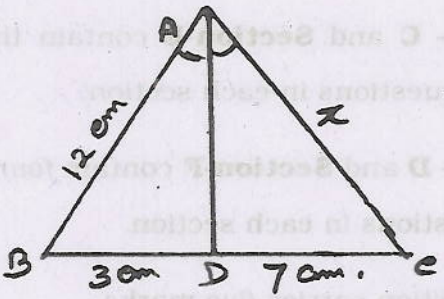
$$\begin{bmatrix} d+1 & 10+a \\ 3b-2 & c-4 \end{bmatrix} = \begin{bmatrix} 2 & 2a+1 \\ b-4 & 4c \end{bmatrix}.$$

22. Solve : $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$.

23. ABT is a secant of a circle which intersects the circle at A and B, and PT is a tangent to circle at P. If $PT = 5$ cm, $BT = 2{\cdot}5$ cm, find AB.

24. The incircle touches triangle ABC at D, E, F. If $BD = 4$ cm, $CE = 8$ cm, $AF = 3$ cm, find the perimeter of the triangle.

25. In the given figure, AD is the angle bisector of $\angle BAC$. Find x if $AB = 12$ cm, $BD = 3$ cm and $DC = 7$ cm where x is equal to AC.



26. Show that the points $(-2, -1)$ $(1, 0)$, $(4, 3)$ and $(1, 2)$ are the vertices of a parallelogram.

27. Show that the points $A\ (4, 1)$, $B\ (-2, -3)$ and $C\ (-5, -5)$ are collinear.

28. Find the equation of the line cutting of intercepts $\frac{-4}{3}$ and $\frac{3}{4}$ on the x and y-axes respectively.

29. A straight line passes through $(1, 2)$ and has the equation $y = 2x + k$. Find k.

30. Prove that $\frac{\tan^2 \theta}{\sec \theta + 1} = \sec \theta - 1$.

31. Prove that $\cos^4\theta - \cos^2\theta = \sin^4\theta - \sin^2\theta$.

32. The angle of depression of a stone on the ground from the top of building is 40°. If the stone is at a distance 40 m away from the building, find the height of the building.

33. Evaluate $\tan^2 30° + \tan^2 45° + \tan^2 60°$.

34. Find the S.D. of the first five natural numbers.

35. Three coins are tossed together. Find the probability that exactly two heads turn up.

PART – II

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

ii) **Section – C** and **Section-E** contain three questions each. Answer any *two* questions in each section.

iii) **Section – D** and **Section-F** contain *four* questions each. Answer any *three* questions in each section.

iv) Each question carries *five* marks.

SECTION – C

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

36. State and prove Thales Theorem.

37. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding angle bisectors.

38. PQR is a triangle in which $PQ = PR$ and Z is a point on the side PR such that $QR^2 = PR.RZ$. Prove that $QZ = QR$.

SECTION – D

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

39. If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ and $(A+B)^2 = A^2 + B^2$, find a and b.

40. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I_2 = 0$.

41. A two digit number is formed of the digits 2, 5 and 9. Find the probability that it is divisible by 2 or 5. (Repetition of digits is not allowed).

42. Find the variance of the following :

C.I.	20 – 30	30 – 40	40 – 50	50 – 60
f	8	6	5	4

SECTION – E

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

43. Prove that

$$\frac{\cos\theta}{1-\tan\theta} + \frac{\sin\theta}{1-\cot\theta} = \cos\theta + \sin\theta.$$

44. In a right triangle ABC, $\angle C = 90°$, $\angle A = 30°$ and $AB = 8$ cm. Find $\angle B$ and the sides BC and AC.

45. The angle of elevation of a tower at a point is 45°. After going 20 m 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 vertices of a triangle are A (1, 8), B (– 2, 4), C (8, – 5). M, N are the midpoints of AB and AC. Show that $MN \parallel BC$ and $MN = \frac{1}{2}BC$.

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. Show that the points (4, 8), (– 4, 0), (– 3, 1), (– 7, – 3) are collinear.

49. The line joining (– 4, 6) and (– 1, –3) is perpendicular to the line joining (0, – 4) and (3, a). Find a.

PART – III

Note : i) This part contains **Section-G**.

ii) Answer any *one* question.

iii) The question carries *ten* marks.

SECTION – G

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

50. Construct a triangle ABC in which BC = 7·5 cm, $\angle A = 55°$, and the median through A is of length 5·5 cm. Also find the length of the altitude drawn from the vertex A on BC.

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