3422

Register Number | | | | | | |

MATHEMATICS — Paper II

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

PART – I

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

ii) **Section – A** contains Multiple Choice Questions. Answer *all* the *twenty* questions.

iii) **Section – B** contains 15 questions. Answer any *ten* questions.

SECTION – A

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

1. If $\begin{pmatrix} x+y & x-y \\ 7 & 6 \end{pmatrix} = \begin{pmatrix} 10 & 2 \\ 7 & z \end{pmatrix}$ then x, y, z are

a) 4, 6, 6 b) 6, 4, 6

c) 6, 6, 4 d) 4, 4, 6.

2. If $(1\ 2\ 3\ 4)\ X = (6)$, then the order of X is

a) 1×4 b) 4×1

c) 4×4 d) $|X|$.

3. If a matrix $A = (a_{ij})_{3\times 3}$ and $a_{ij} = |-3i + j|$, then a_{23} is

a) -7 b) 3

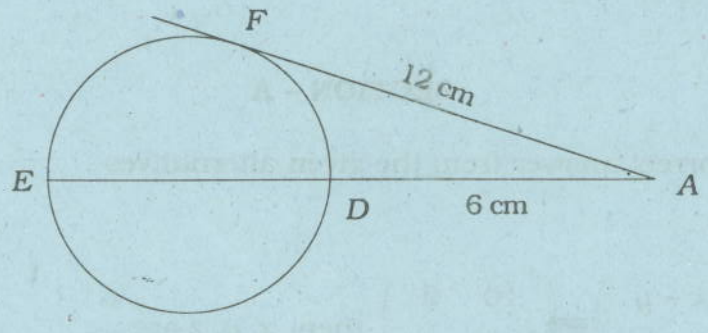
c) -3 d) 7.

4. Two circles of radii 8·2 cm and 3·6 cm touch each other externally, the distance between their centres is

a) 4·6 cm b) 11·8 cm

c) 4·1 cm d) 1·8 cm.

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



a) 12 cm b) 24 cm

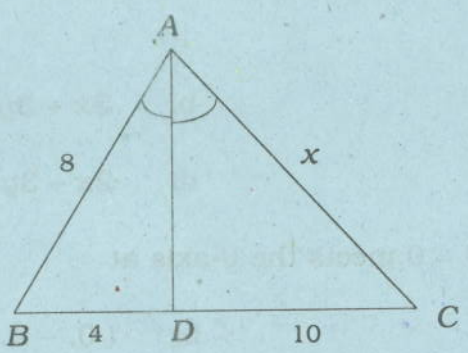
c) 18 cm d) 144 cm.

6. If D, E, F are the mid-points of sides BC, CA and AB respectively of ΔABC, then the ratio of the area of triangles DEF and ABC is

a) 1 : 4 b) 1 : 2

c) 2 : 3 d) 4 : 5.

7. If AD is the bisector of $\angle A$ in the diagram, then AC =



a) 16 b) 20

c) 12 d) 18.

8. In ΔABC, $\angle B = 90°$, $BD \perp AC$, $AB = 3$ cm, $AC = 5$ cm. AD =

a) 9 cm b) 3·2 cm

c) 1·8 cm d) 8·2 cm.

9. The slope of the line $x - 5 = 0$ is

a) 1 b) 5

c) ∞ d) 0.

10. If $(x, 2)$, $(-3, -4)$ and $(7, -5)$ are collinear, then x =

a) 60 b) 63

c) -63 d) -60.

11. The equation of a straight line whose slope is 4 and y-intercept is -3, is

a) $4x - 3y = 0$ b) $4x - 3y - 4 = 0$

c) $4x - y - 3 = 0$ d) $4x - y = 0$.

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

a) $3x - 2y + 5 = 0$ b) $2x + 3y = 0$

c) $3x + 2y = 0$ d) $2x - 3y = 0$.

13. The line $2x - 5y - 10 = 0$ meets the y-axis at

a) $(0, 2)$ b) $(0, -2)$

c) $(2, 0)$ d) $(-2, 0)$.

14. The value of $\tan 10° \tan 35° \tan 80° \tan 55°$ is

a) -1 b) 0

c) 1 d) ∞.

15. $\left(\tan^2\theta - \sin^2\theta\right)\left(\cot^2\theta - \cos^2\theta\right) =$

a) 1 b) $\sin^2\theta \cos^2\theta$

c) 0 d) $\tan^2\theta - \cot^2\theta$.

16. Each interior angle of a regular polygon of 8 sides is equal to

a) $225°$ b) $240°$

c) $135°$ d) $270°$.

17. The simplified value of $1 - \frac{\sin^2\theta}{1 + \cos\theta}$ is

a) $\cos\theta$ b) $\sin\theta$

c) $\tan\theta$ d) $\operatorname{cosec}\theta$.

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

a) 10 m b) $10\sqrt{3}$ m

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

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

a) $20\sqrt{4}$ b) $10\sqrt{2}$

c) $5\sqrt{2}$ d) $\frac{5\sqrt{2}}{2}$.

20. One card is selected at random from a pack of 52 cards. The probability that the card selected is a red card and a black card is

a) $\frac{1}{26}$ b) $\frac{1}{13}$

c) 1 d) 0.

SECTION – B

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

21. Define a scalar matrix with an example.

22. If $A = \begin{pmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{pmatrix}$ find the value of $5A - 2B$.

23. Two circles of radii 16 cm and 9 cm touch each other externally. Find the length of the direct common tangent.

24. In a triangle ABC, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $AD = 4$ cm, $AE = 8$ cm, $DB = (x - 4)$ cm and $EC = 3x - 19$ cm, find x.

25. The perimeter of two similar triangles ABC and PQR are respectively 36 cm and 24 cm. If $PQ = 10$ cm, find AB.

26. Find the X and Y intercepts of the line $2x - 3y - 12 = 0$.

27. Find the slope of a line which is perpendicular to a line passing through (0, 6) and (– 3, 1).

28. Find the equation of a line parallel to X-axis and passing through the point $(-4, 7)$.

29. If the vertices of the ΔABC are $A(-2, -1)$, $B(-1, -4)$ and $C(0, -5)$, find the equation of the median through B.

30. Prove that $\frac{\tan^3 \phi - 1}{\tan \phi - 1} = \sec^2 \phi + \tan \phi$.

31. When $\cos \theta > 0$, solve $2 \cos^2 \theta = \frac{1}{2}$.

32. Using the formula, $\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$, find $\sin 75°$.

33. From a point on the ground 20 m away from the foot of a vertical tower the angle of elevation of the top of the tower is 60°. Find the height of the tower.

34. The number of lollipops eaten by children of 5 families are 4, 6, 8, 12 and 15. Find their standard deviation.

35. Find the probability that a number selected from the first 25 natural numbers is a prime number.

PART – II

N. B. : 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 Angle bisector theorem and prove it.

37. In ΔABC, $\angle C$ is a right angle. P is a point on AB and $PN \perp CB$. If $AP = 3$, $PB = 4$, $CN = x$, $PN = y$, show that $y = \frac{4}{3}\sqrt{9 - x^2}$.

38. In ΔABC, PQ is a line segment intersecting AB at P and AC at Q such that $PQ \parallel BC$ and PQ divides ΔABC into two equal parts in area. Find $\frac{BP}{AB}$.

SECTION – D

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

39. Find X and Y, if $2X + Y = \begin{pmatrix} 4 & 4 & 7 \\ 7 & 3 & 4 \end{pmatrix}$, $X - 2Y = \begin{pmatrix} -3 & 2 & 1 \\ 1 & -1 & 2 \end{pmatrix}$.

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

41. Find the standard deviation of the following :

C.I :	0 – 10	10 – 20	20 – 30	30 – 40
f :	3	4	2	5

42. Two dice are rolled together. Find the probability that the two-digit number formed with the numbers turning up on their faces is a multiple of 7 or 5.

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. Find the area of an isosceles triangle with base 10 cm and vertical angle 47°.

45. From the top of a tree, the angle of depression of an object on the horizontal ground is found to be 60°. On descending 20 ft from the top of the tree the angle of depression of the object is found to be 30°. Find the height of the tree.

SECTION – F

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

46. Find the equation of the line passing through (– 3, 10) and making intercepts a, b on the X, Y axes whose sum is 8.

47. Find the equation of the line through the point of intersection of the lines $5x - 6y = 1$, $3x + 2y + 5 = 0$ and perpendicular to the line $3x - 5y + 11 = 0$.

48. The foot of the perpendicular from the poiint (1, 1) to a line is the point (– 3, 4). Find the equation of the line.

49. Find the orthocentre of the triangle ABC whose vertices are A (– 2, – 1), B (– 1, – 4) and C (0, – 5).

PART – III

N. B. : This part contains **Section – G** .

SECTION – G

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

50. Draw a circle of radius 3 cm. Take a point at a distance of 5·5 cm from the centre of the circle. From the external point draw two tangents to the circle (Using the centre of the circle). Calculate the length of the tangents and verify it.

51. Construct a ΔABC such that $AB = 6$ cm, $m \angle C = 40°$ and altitude from C to AB is of length 4 cm. Measure the length of median through C.