3922

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. 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. The order of matrix A is 5×3. The order of matrix B is 3×5. The order of $B \times A$ is

   a) 5×5 b) 3×3

   c) 1×1 d) 5×3.

2. If $X = [-1 \quad 3]$ and $Y = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$, then $X + Y$ is

   a) $[0, \ 0]$ b) $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$

   c) $[-10]$ d) not defined.

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3. If $A = \begin{bmatrix} 3 & 1 \\ 4 & 5 \\ 0 & 2 \end{bmatrix}$, then A^T is

a) $\begin{bmatrix} 1 & 3 \\ 5 & 4 \\ 2 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 0 & 2 \\ 4 & 5 \\ 3 & 1 \end{bmatrix}$.

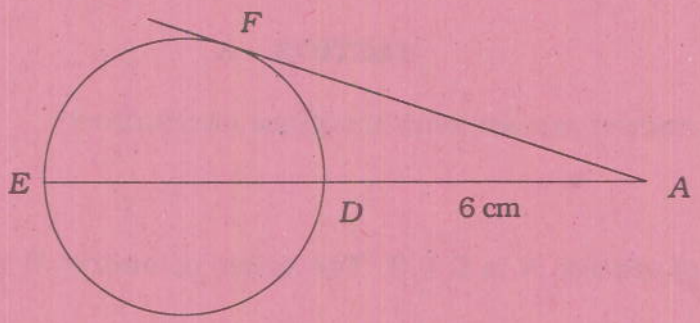
c) $\begin{bmatrix} 3 & 4 & 0 \\ 1 & 5 & 2 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 5 & 2 \\ 3 & 4 & 0 \end{bmatrix}$.

4. If the lengths of the corresponding sides BC and QR of two similar triangles ABC and PQR are respectively 6 cm and 10 cm then the ratio of the areas of ΔABC and ΔPQR is

a) 3 : 5 b) 9 : 25

c) 25 : 9 d) 5 : 3.

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



a) 12 cm b) 24 cm

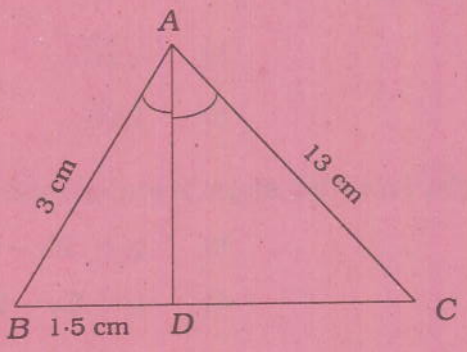
c) 18 cm d) 144 cm.

6. The distance between the centres of two circles is 13 cm and their radii are 8 cm and 3 cm respectively. The length of their direct common tangent is

a) 8 cm b) 5 cm

c) 13 cm d) 12 cm.

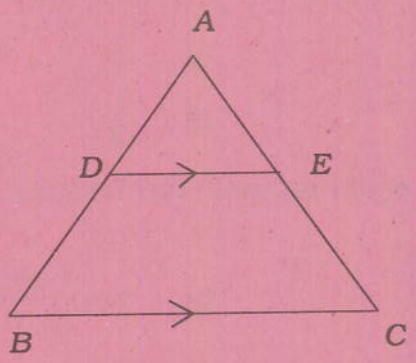
7. In the figure, AD is the bisector of $\angle A$, then DC =



a) 6·5 cm b) $\frac{13}{3}$ cm

c) 4·5 cm d) none of these.

8. In the figure, $AB = 7$, $AD = 3$ and $AE = 4{\cdot}5$, then EC is



a) 7 b) 6

c) 4·5 d) 8.

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

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

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

10. Slope of the line $2x + 3y + 6 = 0$ is

a) $\frac{2}{3}$ b) $-\frac{2}{3}$

c) -2 d) $\frac{1}{2}$.

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

a) $(-8, -3)$ b) $(3, 8)$

c) $(-3, 8)$ d) $(8, -3)$.

12. In ΔABC, $BC = 2\sqrt{10}$, then the length of the line segment joining the mid-points of sides AB and AC is

a) $\sqrt{5}$ b) $\sqrt{10}$

c) $\frac{1}{2}\sqrt{10}$ d) $2\sqrt{5}$.

13. The equation of a straight line with slope 2 and y-intercept 5 is

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

c) $y = 2x + 5$ d) $y = 5x - 2$.

14. $\frac{\sin^3\theta + \cos^3\theta}{\sin\theta + \cos\theta}$ is equal to

a) 1 b) $1 - \sin\theta\cos\theta$

c) $\sin\theta + \cos\theta$ d) $\tan\theta$.

15. If $\cos A = \frac{1}{2}$ then the value of $\sin^2 A + \cos^2 A$ is

a) 2 b) 1

c) -1 d) $\frac{1}{2}$.

16. A circle is divided into n equal sectors. The tangent of each angle at the centre is

a) $\tan(n)$ b) $\tan\left(\frac{360°}{n}\right)$

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

17. π radians = ... degrees.

a) 90 b) 180

c) 270 d) 360.

18. The value of $\tan 28° 26'$ =

a) 0·5407 b) 0·5415

c) 0·5438 d) 0·5430.

19. The range of the first 5 prime natural numbers in order is

a) 6 b) 9

c) 5 d) 82.

20. The probability of a sure event is

a) 1 b) 100

c) 0 d) 0·1.

SECTION – B

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

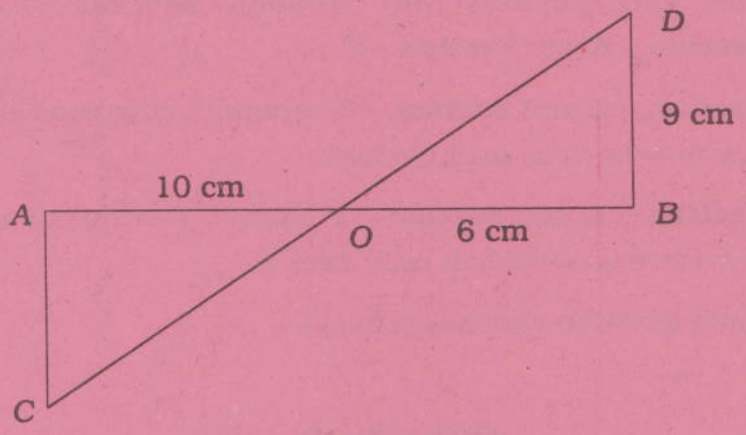
21. Construct a 3×3 matrix whose elements are given by $a_{ij} = 2i - j$.

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

23. State Basic proportionality theorem.

24. AB and CD are two chords of a circle which intersect each other externally at P. If $AB = 9$ cm, $BP = 3$ cm and $CP = 9$ cm, find DP.

25. In the given figure CA and DB are perpendicular to AB. If $AO = 10$ cm, $BO = 6$ cm and $DB = 9$ cm, find AC.



26. Find the equation of the straight line perpendicular to the line $4x - 3y + 2 = 0$ and which passes through $(-2, 3)$.

27. Show that the points $(-2, 3)$, $(3, 4)$ and $(8, 5)$ are collinear.

28. Where does the line $x - 3y + 7 = 0$ meets (i) the x-axis, (ii) y-axis.

29. A triangle has vertices at $(3, 4)$, $(1, 2)$ and $(-5, -6)$. Find the slope of its median from $(1, 2)$.

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

31. If $\phi = 30°$, verify that $\cos 3\phi = 4 \cos^3 \phi - 3 \cos \phi$.

32. A kite is flying with a thread 200 m long. If the thread makes an angle of 50° with the horizontal, find the height of the kite above the ground.

33. If $A = 30°$, prove that $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$.

34. The standard deviation of 7 values is 15. If each value is decreased by 8, find the standard deviation and variance of the new set of values.

35. Find the probability of drawing a red ball from a bag containing 4 white and 6 black balls.

PART – II

N. B. : i) This Part contains *four* Sections, **Section – C**, **Section – D**, **Section – E** and **Section – F**.

ii) **Section – C** and **Section – E** contain 3 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. Prove that if two triangles have one angle of the one equal to one angle of the other and the sides about the equal angles proportional, then the two triangles are similar.

37. With the vertices of a triangle PQR as centres, three circles are described, each touching the other two externally. If the sides of the triangle are 9 cm, 7 cm and 6 cm respectively, find the radii of the circles.

38. The diagonal BD of a quadrilateral $ABCD$ bisects $\angle B$ and $\angle D$.

Prove that $\frac{AB}{BC} = \frac{DA}{CD}$.

SECTION – D

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

39. If $A = \begin{bmatrix} 1 & -2 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 3A = 0$.

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

41. A number is selected at random from 40 to 80. Find the probability that it is divisible by 6 or 9.

42. Find the S.D. of the following :

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

SECTION – E

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

43. Prove that $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{2}{2\sin^2\theta - 1}$.

44. If $4 \tan\theta = 5$, evaluate $\frac{2\cos\theta - 3\sin\theta}{3\cos\theta + 2\sin\theta}$.

45. There are two temples, one on each bank of a river just opposite to each other. One temple is 40 m high. As observed from the top of this temple, the angles of depression of the top and the foot of the other temple are $12° 30'$ and $21° 48'$ respectively. Find the width of the river and the height of the other temple in metres approximately.

SECTION – F

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

46. Find the area of the quadrilateral $PQRS$, given $P(5, -2)$, $Q(3, 4)$, $R(4, -7)$ and $S(1, 1)$.

47. Find the equation of the perpendicular bisector of the line joining the points $(1, 3)$ and $(-2, 2)$.

48. Find the equation of the line through the intersection of lines

$3x + 2y = 8$, $5x - 11y + 1 = 0$ and parallel to the line $6x + 13y = 5$.

49. Obtain the equation of the line which is concurrent with the lines $x - y - 2 = 0$ and $3x + 4y + 15 = 0$ and is perpendicular to the line joining the points $(2, 3)$ and $(1, 1)$.

PART – III

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

ii) Answer any *one* question.

iii) Each question carries *ten* marks.

SECTION – G

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

50. Draw a circle of radius 4 cm. Take a point P outside the circle without using the centre of the circle, draw two tangents to the circle from the point P. Measure the lengths of the tangents and verify it.

51. Construct a ΔPQR in which $PQ = 6$ cm, $m \angle R = 50°$ and the median through R is 5·5 cm. Find the length of the altitude from R.