

COMMON HALF YEARLY EXAMINATION - 2023

B

Standard X

Reg.No.

--	--	--	--	--

MATHEMATICS

Time : 3.00 hrs

Part - I

Marks : 100

14 x 1 = 14

I. Choose the correct answer:

1. $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
 a) 8 b) 20 c) 12 d) 16
2. If $f: A \rightarrow B$ is a constant function, then the range of f will have _____ elements.
 a) 2 b) 0 c) 1 d) none of these
3. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
 a) 2025 b) 5220 c) 5025 d) 2520
4. The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$ is
 a) 14400 b) 14200 c) 14280 d) 14520
5. Graph of the linear equation is a _____.
 a) straight line b) circle c) parabola d) hyperbola
6. Find the matrix X if $2X + \begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix} = \begin{pmatrix} 5 & 7 \\ 9 & 5 \end{pmatrix}$
 a) $\begin{pmatrix} -2 & -2 \\ 2 & -1 \end{pmatrix}$ b) $\begin{pmatrix} 2 & 2 \\ 2 & -1 \end{pmatrix}$ c) $\begin{pmatrix} 1 & 2 \\ 2 & 2 \end{pmatrix}$ d) $\begin{pmatrix} 2 & 1 \\ 2 & 2 \end{pmatrix}$
7. In a $\triangle ABC$, AD is the bisector of $\angle BAC$. If $AB = 8$ cm, $BD = 6$ cm and $DC = 3$ cm. The length of the side AC is
 a) 6 cm b) 4 cm c) 3 cm d) 8 cm
8. The slope of the line joining $(12, 3)$, $(4, a)$ is $\frac{1}{8}$. The value of 'a' is
 a) 1 b) 4 c) -5 d) 2
9. $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta)$ is _____.
 a) -1 b) $\sec^2\theta$ c) $\tan^2\theta$ d) 1
10. The angle of elevation of a cloud from a point h metres above a lake is β . The angle of depression of its reflection in the lake is 45° . The height of location of the cloud from the lake is
 a) $\frac{h(1 + \tan\beta)}{1 - \tan\beta}$ b) $\frac{h(1 - \tan\beta)}{1 + \tan\beta}$ c) $h \tan(45^\circ - \beta)$ d) none of these

11. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be
 a) 12 cm b) 10 cm c) 13 cm d) 5 cm
12. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
 a) 1 : 2 : 3 b) 2 : 1 : 3 c) 1 : 3 : 2 d) 3 : 1 : 2
13. The mean of 100 activations is 40 and their standard deviation is 3. The sum of squares of all observations is
 a) 40000 b) 160900 c) 160000 d) 30000
14. Which of the following is incorrect?
 a) $P(A) > 1$ b) $0 \leq P(A) \leq 1$ c) $P(\phi) = 0$ d) $P(A) + P(\bar{A}) = 1$

Part - II

II. Answer any 10 questions. (Q.No.28 is compulsory)

10 x 2 = 20

15. A Relation R is given by the set $\{(x, y) / y = x + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$. Determine its domain and range.
16. If the ordered pairs $(x^2 - 3x, y^2 + 4y)$ and $(-2, 5)$ are equal, then find x and y.
17. What is the time 100 hours after 7 a.m?
18. Find the 19th term of an A.P. -11, -15, -19,
19. Simplify : $\frac{5t^3}{4t-8} \times \frac{6t-12}{10t}$
20. If $A = \begin{pmatrix} 7 & 8 & 6 \\ 1 & 3 & 9 \\ -4 & 3 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 11 & -3 \\ -1 & 2 & 4 \\ 7 & 5 & 0 \end{pmatrix}$, then find $2A + B$.
21. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and the radius of the circle is 3 cm.
22. Check whether the given lines are parallel or perpendicular, $5x + 23y + 14 = 0$ and $23x - 5y + 9 = 0$
23. Show that $\frac{1}{1 + \sin \theta} + \frac{1}{1 - \sin \theta} = 2 \sec^2 \theta$
24. From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the rock.
25. Find the diameter of a sphere whose surface area is 154 m^2 .

- ### Part - III

$$10 \times 5 = 50$$

Which is more varying than the other?

41. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.
42. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$, show that $A^2 - 5A + 7I_2 = 0$

Part - IV $2 \times 8 = 16$ **IV. Answer all the questions.**

43. a) Construct a triangle similar to a given triangle LMN with its side equal to $\frac{4}{5}$ of the corresponding sides of the triangle LMN (scale factor $\frac{4}{5} < 1$)

(OR)

- b) Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.
44. a) Nishanth is the winner in a Marathon race of 12 km distance. He ran at a uniform speed of 12 km / hr and reached the destination in 1 hour. He was followed by Aradhana, Jayanth, Sathya and Swetha with their respective speed of 6 km/hr, 4 km/hr, 3km/hr and 2 km/hr. And, they covered the distance in 2 hours, 3 hours, 4 hours and 6 hours respectively.

Draw the speed-time graph and use it to find the time taken of Kaushik with his speed of 2.4 km/hr.

(OR)

- b) Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$
