Cheating Replaces Learning

TERM -1

Time allowed: 3 hours **BVP/XI/Maths Core/2025-26**

Maximum marks: 80

General instructions:

1. The Question paper contains- five sections A,B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 very short (VSA)- type questions of 2 marks each.
4. Section C has 6 short (SA)- type questions of 3 marks each.
5. Section D has 4 long (LA)- type questions of 5 marks each.
6. Section E has 3 source based/case-based questions of 4 marks each.

SECTION A

Q1 Empty set is a /an _____.

(a). Infinite set (b) Finite set (c) Unknown set (d). Universal set

Q2. The value of $i^{49} + i^{50} + i^{51} + i^{52}$ where $i = \sqrt{-1}$

(a) 1 (b) 0 (c) i (d) -i

Q3. Number of terms in $(1 + 3x + 3x^2 + x^3)^6$ is

(a) 7 (b) 6 (c) 17 (d) 19

Q4. A recharger manufacturing company produces rechargers and its cost function for a week is $C(x) = 1/10((4270 + 23x)$ and its revenue function is $R(x) = 3x$, where x is the number of rechargers produced and sold per week. Number of rechargers must be sold for the company to realize a profit is

(a) $x \geq 618$ (b) $x > 610$ (c) $x > 480$ (d). None of These

Q5. The cardinality of the power set of $\{x: x \in N, x \leq 10\}$ is _____.

(a) 1024 (b)1023 (c)2048 (d) 2043

Q6. The value of $\sin(45° + \theta) - \cos(45° - \theta)$ is equal to

(a) $2\cos\theta$ (b)$2\sin\theta$ (c)1 (d)0

Q7.Solve: $4x + 7 < 6x + 3$ for real values of x.

(a) $x \in (2, \infty)$ (b) $x \in (-\infty, 2)$

(c) $x \in (-2, \infty)$ d) $x \in (-\infty, -2)$

Q8. ${}^{n}P_{r} \div {}^{n-1}P_{r-1}$ is

(a)n (b)n! (c)(n-1)! (d)${}^{n}C_{n}$

Q9.If the complex number $z = x + iy$ satisfies the condition $|z + 1| = 1$, then z lies on

(a) x-axis

(b) circle with centre (1, 0) and radius 1

(c) circle with centre (–1, 0) and radius 1

(d) y-axis

Q10. The number of ways in which 5 boys and 3 girls be seated in a row so that no two girls sit together ?

(a)8! (b)3! 5! (c)3! x^5P_4 (d) 5! x^6P_3

Q11. If A lies in second quadrant and $3 \tan A + 4 = 0$, then the value of $2 \cot A - 5 \cos A + \sin A$ is equal to

(a) $-\frac{53}{10}$ (b) $\frac{23}{10}$ (c) $-\frac{37}{10}$ (d) $\frac{37}{10}$

Q12. The coefficient of x^2 in the expansion of $(1 - 2x)^5$ is:

(a) -80 (b) -40 (c) 40 (d) 80

Q13. If A, B and C are any three sets, then $A \times (B \cup C)$ is equal to:

(a). $(A \times B) \cup (A \times C)$

(b). $(A \cup B) \times (A \cup C)$

(c) $(A \times B) \cap (A \times C)$

(d). None of the above

Q14. The first term of a G.P is 1. The sum of the 3rd and 5th terms is 90. Then the common ratio is:

(a)1 (b)2 (c)3 (d)4

Q15. Let n (A) = m, and n (B) = n. Then the total number of non-empty relations that can be defined from A to B is

(a) m^n (b) $n^m - 1$ (c) $mn - 1$ (d) $2^{mn} - 1$

Q16. The 3rd term of G.P is 4. Then the product of the first 5 terms is:

(a)4^3 (b)4^4 (c)4^5 (d)None of these

Q17. What will be the domain for which the functions $f(x) = 2x^2 - 1$ and $g(x) = 1 - 3x$ are equal?

(a) {-2, 1} (b) {1/2, -2} (c) [2, 12] (d) (-1, 2)

Q18. If $a + ib = c + id$, then

(a) $a^2 + c^2 = 0$ (b) $b^2 + c^2 = 0$ (c) $b^2 + d^2 = 0$ (d) $a^2 + b^2 = c^2 + d^2$

ASSERTION-REASON BASED QUESTIONS

In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

Q19.Assertion (A): The number of permutations of the letters of the word INDEPENDENCE is $\frac{12!}{2!4!3!}$

Reason (R): The number of permutations of n different objects taken r at a time, where $0 < r \leq n$ and the objects do not repeat is $^{n}P_{r}$.

Q20. Assertion (A): $A=\{x \in R : 3 < x < 4\}$ is an infinite set.

Reason(R): Between two Real numbers there are infinite Real numbers.

SECTION B

Q21. A horse is tied to a post by a ripe. If the horse moves along a circular path always keeping the rope tight and describes 88 m when it has traced out 72° at the centre, find the length of the rope.

OR

The angles of a triangle are in AP.If the number of degrees in the least is to the number of radians in the greatest are as 60: π ,find the angles in degrees.

Q22.If $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = x + iy$, then find (x, y).

Q23.Find all pairs of consecutive odd positive integers, both of which are larger than 10 such that their sum is less than 40.

Q24. Given that the app's growth follows the formula $(1.1)^{10000}$, determine which is larger: $(1.1)^{10000}$ or 1000? Justify your answer.

Q25 Define Greatest integer function. Draw its graph for $-2 < x < 2$. Hence, write the value of $[-1.9]$ and $[1.2]$. Is the Range of Greatest integer function all real numbers?

OR

Let the relation R be defined on N such that $R = \{(x, y): y = 2x; x, y \in N\}$. What is the Domain, Codomain and Range of R? Is this relation a function?

SECTION C

Q26. Two teams of students are given sets for a task. The number of subsets of the first set is 112 more than the number of subsets of the second set. The first team has a set with m elements, and the second team has a set with n elements. What values of m and n will satisfy the condition?

Q27. Solve the system of inequalities in R and hence, represent its solution on the real number line.

$$\frac{7x-1}{2} < -3, \quad \frac{3x+8}{5} + 11 < 0$$

OR

How many litres of water will have to be added to 600 litres of the 45% solution of acid so that the resulting mixture will contain more than 20% but less than 30% acid content?

Q28. Show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is a positive integer.

Q29 Find the domain and range of the function

(i) $f(x) = \sqrt{x-1}$

(ii) $f(x) = |x-1|$

Q30. An engineer is analyzing an AC circuit where the impedance is given by $Z=4+3i$ ohms, and current is $I=4+3i$ amps.

(a) Find the voltage $V=Z.I^*$ where I^* is the conjugate of I.

(b) Using this relation, find the complex number z' such that $(4 - 3i)\cdot z' = 1$. Also find the real part and imaginary part of z'.

OR

A drone is programmed to move in a straight line along the vector represented by a complex number $z = \frac{-16}{1+i\sqrt{3}}$. Find the modulus and argument of the drone's position vector?

Q31. Find $\sin\frac{x}{2}$, $\cos\frac{x}{2}$ *and* $\tan\frac{x}{2}$ when $\tan x = \frac{-4}{3}$, x is in quadrant II.

OR

If $\cos(\alpha + \beta) = 4/5$ and $\sin(\alpha - \beta) = 5/13$, where α lie between 0 and $\pi/4$, find the value of $\tan 2\alpha$

SECTION D

Q32 In the library, there are 2 language books, 4 subject specific books and 3 fictional books of his interest. Of these 9 books, a boy chooses exactly 2 subject specific books and 2 other books.

(i) In how many ways can he select the four books?

(ii) Once selected, in how many ways, can he now arrange the borrowed books in his bookshelf so that the subject specific books are always kept together?

Q33. For the function f, given by $f(x) = \sin x$, complete the following table:

X	-2π	$\frac{-3\pi}{2}$	$-\pi$	$\frac{-\pi}{2}$	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
f(x)			0		0	1			

Hence, draw the graph using appropriate scale. Also find the maximum and minimum value of y.

OR

Find the value of

$$\cos^2 x + \cos^2\left(x + \frac{\pi}{3}\right) + \cos^2\left(x - \frac{\pi}{3}\right)$$

Q34. If a and b are the roots of $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$, where a, b, c, d form a G.P. Prove that $(q + p) : (q - p) = 17:15$.

OR

The ratio of the A.M and G.M of two positive numbers a and b is m:n, show that $a:b = \frac{m+\sqrt{m^2-n^2}}{m-\sqrt{m^2-n^2}}$

Q35. Out of 100 students; 15 passed in English, 12 passed in Mathematics, 8 in Science, 6 in English and Mathematics, 7 in Mathematics and Science; 4 in English and Science; 4 in all the three. Find how many passed

(i) in English and Mathematics but not in Science
(ii) in Mathematics and Science but not in English
(iii) in Mathematics only
(iv) in more than one subject only.

SECTION E

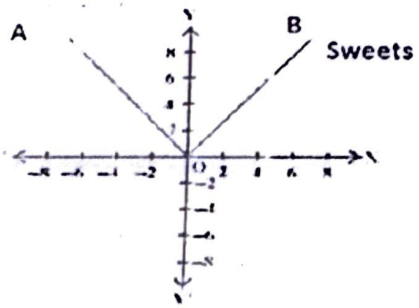
Q.36 A man saw his younger brother playing with building blocks. He observed that he is playing in a pattern by making a tower of 32 blocks and then dividing into half a tower of 16 blocks and so on till he got a tower of 1 block.

a)What kind of pattern is brother making? (1)

b)How many towers did the boy make? (2)

c) How many total blocks does the boy carry with him? (1)

Q37. A is the anthills of an ant, at B some sweets are there and ant wants to reach at B. The path traced by an ant is shown in the following graph:



On the basis of the above graph find the following:

(i) When ordinate is 6 then find abscissa. (1)

(ii) Which axis is line of symmetry for the graph? (1)

(ii) Write the function for the graph along with domain and range. (2)

Q38. Aditya's mother gave him Rs. 200 to buy some packets of rice and maggie from the market. The cost of one packet of rice is Rs. 30 and that of one packet of maggie is Rs. 20. Let x denotes the number of packet of rice and y denotes the number of packets of maggie.

(a) Find the inequality that represents the given situation. (1)

(b) If he buys 4 packets of rice and spends entire amount of Rs. 200, then find the maximum number of packets of maggie that he can buy. (1)

(c) Solve the following inequality for real x: $4x + 3 < 5x + 7$ (2)