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MID TERM EXAMINATION (2026-27)

BB

CLASS XI

SUBJECT: MATHEMATICS

Time: 3 Hours

M.M.: 80

General Instructions:

1. This 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 Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 source based/case based/passage based/integrated units of assessment of 4 marks each with sub-parts.

Section -A

(Multiple Choice Questions)

1. If $[x]^2 - 3[x] + 2 = 0$, where $[-]$ denotes the greatest integer function, then
- (a) $x \in [2, 3]$ (b) $x \in (1, 2]$
(c) $x \in [1, 2]$ (d) $x \in [1, 3]$

2. If $f(x) = x^{2026} - \frac{1}{x^{2026}}$, $x \neq 0$ then find $f(2) + f(0.5)$ is equal to:

- (a) 2^{2026} (b) 2×2^{2026} (c) 0 (d) 2^{2025}

3. If $A = \{1, 2, 3\}$ and $B = \{3, 4\}$, then $(A - B) \cup (B - A)$ is:

- (a) $\{1, 2, 4\}$ (b) $\{1, 2, 3, 4\}$
(c) $\{3\}$ (d) $\{1, 2\}$

4. Which of the following formula's is NOT correct?

- (a) $\sin 2x = 2 \sin x \cos x$ (b) $\cos 2x = 2 \cos^2 x - 1$
(c) $\cos 2x = 1 - 2 \sin^2 x$ (d) $\tan 2x = \frac{2 \tan x}{1 + \tan^2 x}$

5. Which of the following complex numbers is NOT purely imaginary

- (a) i^{2025} (b) i^{-2025} (c) $(1+i)^4$ (d) $(1+i)^2$

6. If a complex numbers lies in the third quadrant, then its conjugate lies in which quadrant?

- (a) first quadrant (b) second quadrant

(c) third quadrant

(d) fourth quadrant

7. If $\frac{1}{2}\left(\frac{3}{5}x + 4\right) \geq \frac{1}{3}(x - 6)$, $x \in \mathbb{R}$, then:

(a) $x \in (-\infty, 120]$

(b) $\{\dots, -5, -4, -3\}$

(c) $x \in (-\infty, 120)$

(d) $x \in (120, \infty)$

8. In a G.P. of even number of terms, the sum of all terms is 5 times the sum of odd terms. The common ratio of the G.P. is:

(a) $-\frac{4}{5}$

(b) $\frac{1}{5}$

(c) 4

(d) 3

9. Let $A = \{1, 2, 3\}$ and $B = \{1, 2, 3, 4\}$, then which of the following is true?

(a) B is a proper subset of A.

(b) A is a proper subset of B.

(c) $A = B$

(d) Number of subsets of set B are two more than number of subsets of set A.

10. $\sin\left(\frac{4\pi}{6}\right) + \cos\left(\frac{5\pi}{3}\right) =$

(a) -1

(b) 0.25

(c) 1

(d) 0

11. If $A = \{x: x \text{ is an even prime number}\}$ and $B = \{x: x \text{ is an odd natural number less than 10}\}$, then number of elements in $(A \times B)$ is:

(a) 20

(b) 15

(c) 10

(d) 5

12. If a, b, c are in G.P. with common ratio r , then the value of $\frac{a-b}{b-c}$ is equal to

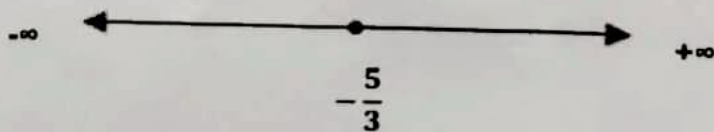
(a) 1

(b) r

(c) $\frac{1}{r}$

(d) $\frac{1}{c+b+a}$

13. The solution of the linear inequality (in x) represented on the number line is:



(a) $(-\infty, -\frac{5}{3}]$

(b) $(-\infty, -\frac{5}{3})$

(c) $(-\frac{5}{3}, \infty)$

(d) $[-\frac{5}{3}, \infty)$

14. The values of $\tan \frac{\pi}{3}$, $\tan \frac{\pi}{4}$, $\tan \frac{\pi}{5}$ are in:

(a) A.P.

(b) G.P.

(c) set of integers

(d) none of these

15. The smallest positive integer n , for which $(1+i)^{2n} = (1-i)^{2n}$ is:

(a) 1

(b) 3

(c) 2

(d) 4

✓ 16. The value of $\cos(\pi + x) \cdot \cos(\pi - x) \cdot \sec^2 x$ is:

- (a) 0 (b) 1 (c) -1 (d) 2

✓ 17. If $(2x + 7/3, 3y - 1) = (1/3, 11)$, then which of the following is true?

- (i) $x = -1$ (ii) $y = 2$ (iii) $x = 0$ (iv) $y = 4$

Choose the correct option from the following:

- (a) (ii) and (iii) (b) (i) and (ii)
(c) (iii) and (iv) (d) (i) and (iv)

18. The minimum value of $2\sin x \cdot \cos x$ is:

- (a) 1 (b) -1 (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 but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true.

19. Assertion (A): Two finite sets A and B have m and n elements respectively.

If the ratio of cardinal number of power set of B to power set of A is 128:1 and $m + n = 15$ then $m = 4$, $n = 11$.

Reason (R): Number of elements in the power set of A = (Number of elements in (set A))²

20. Assertion (A): The minimum value of $4^x + 4^{x-1}$, $x \in \mathbb{R}$ is 4.

Reason (R): A.M. $\geq$ G.M.

Section - B

✓ 21. Which term of the sequence $\sqrt{3}, 3, 3\sqrt{3}, \dots$ is 729? (2)

22. Write the relation $R = \{(x + 2, x^2) : x \text{ is a perfect square number less than } 11\}$ in the roster form. (2)

23. Find the value of $\tan 22^\circ 30'$ (2)

OR

✓ Evaluate: $\cos^2 45^\circ - \sin^2 15^\circ$

✓ 24. Express $(1 - 2i)^{-3}$ in the form of $a + ib$ (2)

✓ 25. Solve for x : $2 \leq 3x - 4 \leq 5$ (2)

Section - C

If $f(x) = \begin{cases} 1, & \text{if } x \in Q \\ -1, & \text{if } x \notin Q \end{cases}$, then find : (i) $f(1)$, (ii) $f(\sqrt{7})$, (iii) Range of f (1 + 1 + 1) (3)

Show that $\tan 3x \tan 2x \tan x + \tan x = \tan 3x - \tan 2x$

OR

In a circle of diameter 40 cm, the length of a chord is 20 cm. Find the minor arc of the chord. (3)

Reduce $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$ to the standard form. (3)

Solve the following inequality and represent the solution graphically on the line. (3)

$$5(2x - 7) - 3(2x + 3) \leq 0, 2x + 19 \leq 6x + 47$$

0. Prove that: $\cos 6x = 32 \cos^6 x - 48 \cos^4 x + 18 \cos^2 x - 1$ (3)

1. Find the sum of the sequence 7, 77, 777, 7777, ... to n terms. (3)

OR

The sum of two numbers is 6 times their geometric mean. Show that numbers are in the ratio $(3 + 2\sqrt{2}) : (3 - 2\sqrt{2})$

Section - D

32. The sum of three numbers in G.P. is 56. If we subtract 1, 7, 21 from these numbers in that order, we obtain an arithmetic progression. Find the three numbers. (5)

33. Find the value of : $(1 + \cos \frac{\pi}{9})(1 + \cos \frac{3\pi}{9})(1 + \cos \frac{5\pi}{9})(1 + \cos \frac{7\pi}{9})$ (5)

OR

$$\text{Prove that : } \cos 2x \cos \frac{x}{2} - \cos 3x \cos \frac{9x}{4} = \sin 5x \sin \frac{5x}{2}$$

34. Find the domain and the range of the function $g(x) = 2x^2 + 1$. Also, find $g(-3)$ and the numbers which are associated with the number 51 in its range. (5)

35. A milkman has 80% milk in his stock of 800 litres of adulterated milk. How much pure milk is to be added to it so that purity is between 90% and 95%? (5)

OR

Solve : $\frac{x-1}{x+1} > 2$ and represent the solution on number line.

SECTION -E

[This section comprises of 3 case- study/passage based questions of 4 marks each with sub parts. The first two case study questions have three sub parts (i), (ii), (iii) of marks 1,1,2 respectively. The third case study question has two sub parts of 2 marks each.]

36. Chahal divides a blank paper into four parts by drawing a vertical and horizontal lines from the middle. He name the four parts as the four quadrants of the coordinate system. Now, he chooses any number x in the third quadrant and assign a value to $\tan x$ such that $\tan x = \frac{3}{4}$. Based on the above information, answer the following questions.

- (i) Find the value of $\sin 2x$.
- (ii) Find the value of $\cos 2x$.
- (iii) Find the value of $\sin \frac{x}{2}$.

OR

- (iii) Find the value of $\cos \frac{x}{2}$.

37. While solving a typical equation a person finds that one of the root of the equation is a complex number $z = \frac{1+2i}{1-3i}$

Based on the above information, answer the following questions:

- (i) Represent z in the standard form $a + ib$.
- (ii) If $z = 2x + (4 - y)i$, then find the values of x and y .
- (iii) Find the conjugate of z

OR

- (iii) Find the modulus of z

38. There are 200 individuals with a skin disorder 120 had been exposed to chemical A, 50 to chemical B and 30 to both the chemicals A and B.

Based on the above information, answer the following questions:

- (i) Find the number of individuals exposed to Chemical A but not to chemical B.
- (ii) Find the number of individuals exposed to Chemical A or Chemical B.