

Bhavan's Tripura Vidyamandir
1st Terminal Examination : (2025-2026)

Class:- 11

Time:- 3 Hours

Name of the student:

Subject: Mathematics

Total :- 80 Marks

Roll: Sec:

General Instructions :

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| 1. This Question Paper has 5 Sections
3. Section B has 5 Questions Carrying 2 marks each.
5. Section D has 4 Questions Carrying 5 marks each.
7. All Questions are compulsory | 2. Section A has 20 Questions Carrying 1 mark each.
4. Section C has 6 Questions Carrying 3 marks each.
6. Section E has 3 case based questions Carrying 4 mark each. |
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SECTION: A (1X20=20)

- 1) If a set A having 3 elements how many non-empty subset it has
(a) 8 (b) 6 (c) 9 (d) none of these
- 2) The distance between the points A(-2, 4, 1) and the X axis
(a) 2 (b) 17 (c) $\sqrt{17}$ (d) none of these
- 3) The value of $\sec \frac{-25\pi}{3}$ is
(a) 1 (b) 2 (c) -3 (d) -2
- 4) $\lim_{x \rightarrow 0} \frac{\sin bx}{ax} = ?$
(a) $\frac{a}{b}$ (b) $\frac{b}{a}$ (c) ab (d) 0
- 5) If $f(x) = x \sin x$ then $f'(\frac{\pi}{2}) = ?$
(a) -1 (b) 1 (c) 0 (d) 2
- 6) For any two sets A and B, $A \cup B = A$ iff
(a) $B \subseteq A$ (b) $A \supseteq B$ (c) $A \neq B$ (d) $A = B$
- 7) If $(1 + i)(1 + 2i)(1 + 3i) \dots (1 + ni) = a + ib$ then $2 \times 5 \times 10 \times \dots (1 + n^2)$ is equal to
(a) $\sqrt{a^2 + b^2}$ (b) $\sqrt{a^2 - b^2}$ (c) $a^2 + b^2$ (d) $a^2 - b^2$
- 8) which term of the Gp $2, 1, \frac{1}{2}, \frac{1}{4}, \dots$ is $\frac{1}{128}$
(a) 10 (b) 8 (c) 7 (d) 9
- 9) For what values of x are the numbers $(x + 9), (x - 6)$ and 4 in Gp ?
(a) 0 (b) 16 (c) both a and b (d) none of these
- 10) Let $n(A) = m, n(B) = n$, then the total number of non empty relations that can be defined from A to B is
(a) $m^n - 1$ (b) $n^m - 1$ (c) $mn - 1$ (d) $2^{mn} - 1$
- 11) If $(x + 1, y - 2) = (3, 1)$ then the value of x and y is
(a) (2, 3) (b) (2, -3) (c) (4, -3) (d) (4, 1)
- 12) The domain of the function $f(x) = \frac{x^2 + 2x + 1}{x^2 - x - 6}$ is
(a) $R - \{3, -2\}$ (b) $R - \{-3, 2\}$ (c) $R - \{-3, -2\}$ (d) $R - [3, -2]$
- 13) $\frac{\cos x}{1 + \sin x}$ is equal to...
(a) $\tan x$ (b) $\tan(\frac{\pi}{4} + \frac{x}{2})$ (c) $\tan(\frac{\pi}{4} - \frac{x}{2})$ (d) none of these
- 14) If $-3x + 17 < -13$ then
(a) $x \in (10, \infty)$ (b) $x \in [10, \infty)$ (c) $x \in (-\infty, 10]$ (d) none of these
- 15) If the angle between two lines is $\frac{\pi}{4}$ and the slope of one of the line is $\frac{1}{2}$, then the slope of other line is ...
(a) 3 (b) $-\frac{1}{3}$ (c) both a and b (d) none of these
- 16) If $\tan \theta = x - \frac{1}{4x}$, then $\sec \theta - \tan \theta$ is
(a) $-2x, \frac{1}{2x}$ (b) $-\frac{1}{2x}, 2x$ (c) $2x,$ (d) $2x, \frac{1}{2x}$
- 17) The value of $\cos 180^\circ$ is
(a) 1 (b) 0 (c) -1 (d) 2
- 18) The radius of the circle whose centre is (2,3) and passes through the points (5,7) is
(a) 5 units (b) 4 units (c) 3 units (d) 1 unit

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 true and R is the correct explanation of A.
- b. Both A and R 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): Vertices of a triangle are A(1,2), B(3,2) and C(-4,0). Its side BC has length $3\sqrt{6}$ units.

Reason (R): Distance between the points P(x_1, y_1, z_1) and Q(x_2, y_2, z_2) is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

20) Assertion (A): Solution of $x^2 + x + 1 = 0$ are $\frac{-1+i\sqrt{3}}{2}, \frac{-1-i\sqrt{3}}{2}$

Reason (R): Solutions of $x^2 - 5ix - 6 = 0$ are $x = 3i, 2i$

SECTION: B (2X5=10)

21) Find the domain and range of the real function $f(x) = \sqrt{9 - x^2}$

22) If $\left| \frac{z-5i}{z+5i} \right| = 1$, show that Z is real

23) Insert three numbers between 1 and 256 so that the resulting sequence is a Gp.

24) evaluate $\lim_{x \rightarrow 2} \frac{x^5 - 32}{x^3 - 8}$

25) If $A + B + C = \pi$ prove that $\cot B \cot C + \cot C \cot A + \cot A \cot B = 1$

SECTION: C (3X6=18)

26) Find the sum of the series $0.7 + 0.77 + 0.777 + 0.7777 + \dots$ to n terms .

27) Solve the inequalities for real value of x; $\frac{2x-1}{3} \geq \frac{3x-2}{4} - \frac{2-x}{5}$

28) Find $\sqrt{7 + 24i}$

29) Find the equation of the line passing through the points (4, 1) and parallel to the line $4x + y = 16$

30) prove that $\cos x \cos 2x \cos 4x \cos 8x = \frac{\sin 16x}{16 \sin x}$

31) If $y = \sqrt{\frac{1-x}{1+x}}$, then prove that $(1 - x^2) \frac{dy}{dx} + y = 0$

SECTION: D (5X4=20)

32) Evaluate the limit $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\tan x (\tan x + 1)(\tan x - 1)}{\cos(x + \frac{\pi}{4})}$

33) Find the image of the point (-2, -4) with respect to the line $3x - y + 5 = 0$

34) If $x\sqrt{1+y} + y\sqrt{1+x} = 1$ then prove that $\frac{dy}{dx} = \frac{-1}{(1+x)^2}$

35) Prove that $\frac{\sec 8\theta - 1}{\sec 4\theta - 1} = \frac{\tan 8\theta}{\tan 2\theta}$

SECTION: E (4X3=12)

36) **Case study 1:** Read the following passage and answer the following questions given below.

In a survey of 25 students, it is found that 15 had taken Mathematics, 12 had taken Physics and 11 had taken Chemistry, 9 had taken Mathematics and Physics, 5 had taken Mathematics and Chemistry, 4 had taken Physics and Chemistry and 3 had taken all three subjects.

- (i) Find the number of students that had taken only Mathematics. 1
- (ii) Find the number of students that had taken Mathematics and Physics but not Chemistry. 1
- (iii) Find the number of students that had taken at least one of the subjects. 2

37) **Case study 2:** Read the following passage and answer the following questions given below.

Rahul is playing a game with different sets

Universal set $U = \{p, q, r, s, x, y, z, t, u\}$,

$A = \{p, q, t, u\}$ $B = \{p, q, x, y, z\}$, $C = \{s, u\}$ then find

i) $A \cup B$

ii) $A \cap C$

iii) $(A \cup C) \cap B$

38) **Case study 3:** Read the following passage and answer the following questions given below.

A person writes a letter to four of his friends. He asks each one of them to copy the letter and mail it to four different persons with the instruction that they move the chain similarly. Assuming that the chain is not broken and that it costs 50 paise to mail one letter.

- (i) Write the sequence of letters mailed in each set
- (ii) Find the common difference of the Gp?
- (iii) Find the total number of letters mailed in the first 5 sets.

OR

- (iii) Find the total amount spent on the postage when 8th set of letters is mailed.