Bhavan's Tripura Vidyamandir

2nd Terminal Examination (2024 –2025)

Class:-11   **Subject:** Mathematics

Time: - 3 hours   Total: - 80 Marks

Name of the student: Roll: Sec:

General Instructions :

- *This Question Paper has 5 Sections*
- **Section A** *has 20 Questions Carrying 1 mark each.*
- **Section B** *has 5 Questions Carrying 2 marks each.*
- **Section C** *has 6 Questions Carrying 3 marks each.*
- **Section D** *has 4 Questions Carrying 5 marks each.*
- **Section E** *has 3 case based questions Carrying 4 mark each.*
- *All Questions are compulsory*

Section: A   1 X 20=20

1) If a set A having 3 elements and B set having 2 elements then how many subset can be possible of $A \times B$
   (a) 64   (b) 6   (c) 32   (d) 16

2) The distance between the points A(-2, 4, 1) and B(1, 2, -5) is
   (a) 2   (b) 3   (c)6   (d) 7

3) The value of $Sec \frac{-25\pi}{3}$ is
   (a) 1   (b) 2   (c) -3   (d) -2

4) $\lim_{x\to 0} \frac{\sin ax}{bx}$ =?
   (a) $\frac{a}{b}$ (b) $\frac{a}{b}$ (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) The length of the latus rectum of the ellipse 9x² + 25x² = 225
   $(a)\frac{18}{5}$ (b)$\frac{16}{5}$ (c)$\frac{9}{5}$ (d)$\frac{8}{5}$

7) The co-ordinate of the focus of the parabola y² = 16x is
   (a) (-4, 0)   (b) (4, 0)   (c) (0,4)   (d) (0,-4)

8) 5th term of the expansion $(x - \frac{1}{x})^{10}$ is
   (a) 252   (b) 210   (c) 756   (d) 504

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) $\frac{cosx}{1-sinx}$ is equal to
    (a) $tanx$ (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 ∈(10, ∞)   (b) x ∈ [10,∞)   (c)x ∈ (−∞ , 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) $^nc_{12} = {^nc_8}$ then n equal to

   (a) 20   (b) 12   (c) 8   (d) 30

17) If $c_0 + c_1 + c_2 + - - - - + c_n = 64$ then $^nc_2$ equal to

   (a) 5   (b) 10   (c) 15   (d) 20

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 units

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,-1), B(3,2,1) and C(-4,0,2).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

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

20) Assertion (A): A die is rolled. Two events a Prime number appears and an even number appears are independent.

Reason (R): A coin is tossed twice, getting all heads and getting all tails are two mutually exclusive events.

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Section: B   **2 X5=10**

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

22) Find the equation of the parabola which is symmetry about y axis and passes through the point p (2,-3).

23) In how many different ways can 4 girls and 3 boys can be seated in a row so that no two boys are together ?

24) If E and F are two events such that $P(E) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and $P(E \text{ and } F) = \frac{1}{8}$

Find P (not E and not F).

25) If $A + B + C = \pi$ then prove that $cotBcotC + cotCcotA + cotAcotB = 1$

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Section: C   **3X6=18**

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

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

28) How many words with or without meaning, can be formed using all the letters of the word EQUATION at a time so that vowels and consonants occur together?

29) Find the equation of the circle passing through the points (4, 1) and (6, 5) and whose centre is on the line 4x + y = 16

30) $prove\ that\ \ cosxcos2xcos4xcos8x = \frac{sin16x}{16sinx}$

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

32) Evaluate the limit $\lim\limits_{x \to \frac{\pi}{4}} \dfrac{tanx \ (tanx+1)(tanx-1)}{cos(x+\frac{\pi}{4})}$

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

34) The co-efficient of the $(r-1)^{th}, r^{th}, (r+1)^{th}$ term in the expansion
   $(x+1)^n$ are in the ratio 1:3:5. Find n and r

35) Find the mean deviation about the mean for the following data:

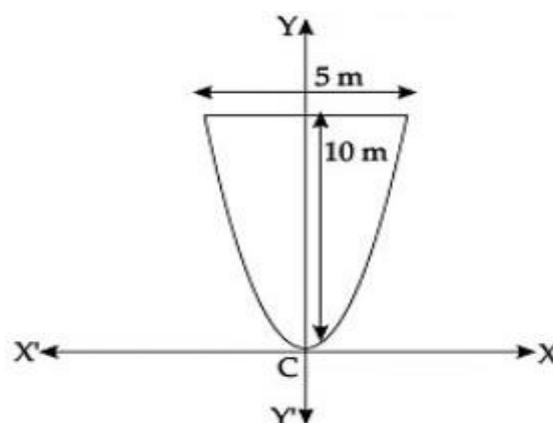| Mark obtained	10-20	20-30	30-40	40-50	50-60	60-70
Number of students	8	6	12	5	2	7

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 with a long string, he hangs the ends of the string at two points on the wall. Now, it is in the form of parabola with its vertical axis and is 10 m high and 5 m wide at its base as shown in the following figure:

(i) What is the particular equation of parabola in
   this case?   1
(ii) Find the value of 'a' in the standard equation.
                                                         1
(iii) How wide is it 2m from the vertex of the
     parabola?   2

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

One urn contains two black balls (labelled B_1 and B_2) and one white ball. A second urn contains one black ball and two white balls (labelled W_1 and W_2). Suppose the following experiment is performed. One of the two urn is chosen at random. Next a ball is randomly chosen from the urn. Then the second ball is chosen at random from the same urn without replacing the first ball.

(i) What is the probability that two black balls are chosen?   2
(ii) What is the probability that two balls of opposite colour are chosen?   2