Bhavan's Tripura Vidyamandir
1st Terminal Examination : (2024-2025)

Class:- 11   **Subject:- Mathematics**

Time:- 3 Hours   Total :- 70 Marks

Name of the student :   Roll: Stream:

General instruction :

- This question paper contains 5 section A, B, C , D & E
- Section A Contains 18 MCQ & 2 assertion and reasoning each carries 1 mark.
- Section B Contains 5 questions each carries 2 marks.
- Section C contains 6 questions each carries 3 marks.
- Section D contains 4 questions each carries 5 marks.
- Section E contains 3 case based questions each carries 4 marks.

SECTION : A   (1X10 = 10)

1. Which of the following statement is false
   a) $A - B = A \cap B^c$ b) $A - B = A - (A \cap B)$
   c) $A - B = A - B^c$ d) $A - B = (A \cup B) - B$

2. If A & B are two given sets then $A \cap (A \cap B)^c$ is equal to
   a) A b) B c) ϕ d) $A \cap B^c$

3. If A = { x : x is a multiple of 5} and B = { x : x is a multiple of 5} then A – B is
   a) $A \cap B$ b) $A \cap B^c$ c) $A^c \cap B^c$ d) $(A \cap B)^c$

4. What is the length of an arc of a circle of radius 5cm subtending a central angle measuring 15^0
   a) $\frac{\pi}{12}$ b) $\frac{5\pi}{12}$ c) π d) $\frac{\pi}{2}$

5. The value of $\sin(\frac{-11\pi}{3})$ is
   a) $\frac{\sqrt{3}}{2}$ b) $-\frac{\sqrt{3}}{2}$ c) $\frac{1}{2}$ d) 0

6. If $\tan A - \tan B = x$ and $\cot B - \cot A = y$, then the value of $\cot(A - B)$ is –
   a) $\frac{1}{x} - \frac{1}{y}$ b) $x + y$ c) $\frac{1}{x} + \frac{1}{y}$ d) $xy - x$

7. The value of $\sin 65^0 + \cos 65^0$ is
   a) $\cos 20^0$ b) $\sqrt{2}$ c) $\sqrt{2}\cos 20^0$ d) $\sin 20^0$

8. If $\left(\frac{1+i}{1-i}\right)^n = 1$ then the least positive value of n is
   a) 2 b) 3 c) -1 d) 4

9. If $Z = -1 - i$ then the amp Z is –
   a) $\frac{3\pi}{4}$ b) $\frac{-3\pi}{4}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{2}$

10. Z is a complex number and $\left|\frac{z-2}{z-3}\right| = 2$ represent a circle then find the radius of the circle is –
    a) $3/2$ b) $2/3$ c) -3 d) 3

11. If $\frac{3x-4}{2} \geq \frac{x+1}{4} - 1$ then the range of x is.
    a) $x \leq 2$ b) $x \geq 2$ c) $x \geq 1$ d) $x \leq 0$

12. $1 = a_1 = a_2$ and $a_n = a_{n-1} + a_{n-2}$, $n > 2$ then the value of a_7 is.
    a) 7 b) 8 c) 5 d) none of these

13. the 10th term of the GP 5, 25, 125, ... is
    a) 5^5 b) 5^{10} c) 5^7 d) 5^8

14. the value of $\lim_{x \to 1}\frac{x^{15}-1}{x^{10}-1}$ is
    a) 5 b) $\frac{3}{2}$ c) 5 d) 0

15. $\lim\limits_{x\to 0}\dfrac{sinax}{sinbx}$ is

    a) $\dfrac{a}{b}$ b) $\dfrac{b}{a}$ c)ab   d) b

16. The derivative of $\log(secx + tanx)$ is

    a) secx   b) tanx   c) cosecx   d) none of these

17. The slope of the straight line passing through the points (3,5) and (6,10) is

    a) 5/3   b) 3/5   c) 2   d) ½

18. The mean deviation about the mean for the following observations 6, 7, 10, 12,13, 4, 8, 12 is.

    a) 3.75   b)2.75   c)2   d) none of these

    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.

19. Assertion (A): If $x = t^2$, $y = t^3$, then $\dfrac{dy}{dx} = \dfrac{3}{2}t$.

    Reasoning (R): $\dfrac{d}{dx}x^n = nx^{n-1}$.

20 Assertion (A): The equation of the straight line passing through the points (3,2) and (6,8)

          is $2x - y = 4$.

    Reasoning (R): $y = mx + c$ is the equation of straight line where m is the slope.

<center>**SECTION : B**   (2X5= 10)</center>

21. U = {1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {2, 4, 6, 8} & B = {2, 3, 5, 7} then find $(A \cup B)^c$.

22. Prove that $cos24^0 + cos55^0 + cos\ 125^0 + cos204^0 + cos300^0 = ½$

23. If $CosecA + secA = CosecB + SecB\ then\ prove\ that\ \tan(A + B) = cotAcotB$

24. Express $\dfrac{5+4i}{4+5i}$ in a + ib form.

25. Evaluate $\lim\limits_{x\to 0}\dfrac{sinax+bx}{ax+sinbx}$

<center>**SECTION : C**   (3X6= 18)</center>

26. If $\dfrac{3+2isin\theta}{1-2isin\theta}$ is purely real then find the value of θ.

27. Prove that $cos40^0\ cos80^0\ cos20^0 = \dfrac{1}{8}$

28. If $siny = xsin(a + y)$ then Prove that $\dfrac{dy}{dx} = \dfrac{sin^2(a+y)}{sina}$.

29. Evaluate $\lim\limits_{x\to 2}\dfrac{(1+x)^n-3^n}{x-2}$

30. Find the equation of the line passing through the point (-3,5), and perpendicular to the lines through the points (2,5) and (-3,6).

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

SECTION : D (5X4= 10)

32. Find the co-ordinates of the foot of the perpendicular from the point (-1,3) to the line 3x-4y-16=0.

33. If 2tan α = 3tanβ then prove that $\tan(\alpha-\beta) = \frac{sin2\beta}{5-cos2\beta}$

34. Find the sum of the nth terms of the sequence 8, 88, 888, 8888, ...

35. Find the mean deviation about the mean for the following data.

Marks obtained	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Numberof students	2	3	8	14	8	3	2

<u>SECTION : E (case based question)</u> (4X3=12)

36. case:1 In a survey of 100 students the number of student standing the various language were found to be English only 18, English but not Hindi 23, English and German 8, English 26, German 48, German and Hindi 8, no language 24.

Based on the above information, find the number of students who were studying

   (i) Hindi only   (ii) English and Hindi,   (iii) English, Hindi and German

37. Case 2: Let U={1,2,3,4,5,6,7,8,9,10}, and   A={2,4,5,6,9}, B={4,5,8,10),

   then find
   (i)   AUB
   (ii) A-B   (1+1+2)
   (iii) A′

38. Case 3: On Monday Ramu's father gives him 5 chocolates and on Tuesday his father gives him 10 chocolates, on Wednesday his father gives him 20 chocolates and this way his father giving him chocolates in this particular week. Based on this situations answer the following.

   i) on Friday how many chocolates he will get?

   ii) based on this situation form the geometric progression?

   iii) find the total number of chocolates that he will get from Monday to Saturday?   (1+1+2)