VICTORY TUITION CENTRE, CBE – 25

CLASS: XI MATHEMATICS(VOL–I) MARKS: 70

I. Answer the following(Any 7 Q.No. 10 is Compulsory): 7x2=14

1. Let f and g be the two functions from R to R defined by $f(x) = 3x - 4$ $g(x) = x^2 + 3$ find $g \circ f$ and $f \circ g$.
2. Solve $|x - 9| < 2$ for x.
3. Find the value of tan 120 °.
4. If $\frac{1}{7!} + \frac{1}{8!} = \frac{A}{9!}$ then find the value of A.
5. Find $\sqrt[3]{1001}$ approximately (two decimal point).
6. Show that the lines are $3x + 2y + 9 = 0$ and $12x + 8y - 15 = 0$ are parallel lines.
7. Find the domain of $\frac{1}{1-2\sin x}$.
8. Show that $\tan(45° - A) = \frac{1-\tan A}{1+\tan A}$.
9. Find the total number of outcomes when 5 coins are tossed once.
10. Simplify $(343)^{\frac{2}{3}}$.

II. Answer the following(Any 7 Q.No. 20 is Compulsory): 7x3=21

11. From the curve $y = \sin x$, draw $y = \sin|x|$. (Hint: $\sin(-x) = -\sin x$)
12. If $\left(x^{\frac{1}{2}} - x^{-\frac{1}{2}}\right)^2 = \frac{9}{2}$, then find the value of $\left(x^{\frac{1}{2}} - x^{-\frac{1}{2}}\right)$ for $x > 1$.
13. Find the value of cos 150°.
14. If $nP_r = 720$, and $nC_r = 120$ find n,r .
15. If a, b, c are in geometric progression, and $a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}}$ then prove that x, y, z are in arithmetic progression.
16. Separate the equation $ax^2 + 6xy + y^2 = 0$.
17. Compute the sum of first n terms of $6 + 66 + 666 + \cdots$
18. If one root of $k(x-1)^2 = 5x - 7$ is double the other root, show that $k = 2\ or -25$.
19. If $n(A) = 10$and $n(AnB) = 3$, find $n((AnB)'\ n\ A)$.
20. If $nC_{r-1} = 36, nC_r = 84$ and $nC_{r+1} = 126$ find the value of r.

III. Answer the following 7x5=35

21a) If AXA has 16 elements s{(a,b)}∈AXA; a<b}; (-1,2) and (0,1) are two elements of S then find the remaining elements of S (OR)

b)If f,g:R → R are defined by f(x)=|x|+x , g(x)=|x|-x find g∘ f and f∘ g

22 a)Resolve the partial fraction $\frac{2x}{(x^2+1)(x-1)}$ (OR)

b) If $\frac{logx}{y-z} = \frac{logy}{z-x} = \frac{logz}{x-y}$ then prove that xyz=1

23a)State and prove Napier's theorem (OR)

b) Prove that $\frac{\cot(180^0+\theta)\sin(90^0-\theta)\cos(-\theta)}{\sin(270^0+\theta)\tan(-\theta)cosec(360^0+\theta)} = cos^2\theta cot\theta$

24a) Prove that for any natural number n, a^n-b^n is divisible by a-b where a>b (OR)

b)Evaluate (i) 5_{p_3} (ii) 8_{p_4}

25a) Prove that $\sqrt[3]{x^3+6} - \sqrt[3]{x^3+3}$ is approximately equal to $\frac{1}{x^2}$ where x is sufficiently large. (OR)

b) The number of bacteria in a certain culture doubles every hour. If there were 30 bacteria present in the culture originally, how many bacteria will be present at the end of 2nd hour, 4th hour and nth hour?

26a) If P1 and P2 are the length of the perpendiculars from the origin to the straight lines xsecθ+ycosec$\theta = 2a$ and x cos$\theta - y\ sin\theta$ = a cos 2θ, then prove that $P_1^2+P_2^2=a^2$

(OR)

b) If the equation λx^2-10xy+12y^2+5x-16y-3=0 represent a pair of straight lines find (i) the value of λ and the separatee equation of the lines (ii) point of intersection of the lines (iii) angle between the lines.

27a)Solve $\log_{10} x + \log_4 x + \log_2 x$ =7 (OR)

b) if $\frac{n!}{3!(n-4)!}$ and $\frac{n!}{5!(n-5)!}$ are in the ratio 5:3 find the value of n.

ALL THE BEST