Class : 11

Register Number

FIRST MID TERM TEST - 2024

Time Allowed : 1.30 Hours]

MATHEMATICS

[Max. Marks : 50]

Part-I

Answer all the Questions: YouTube/ Akwa Academy   **10X1=10**

1. If the function $f : [-3, 3] \to S$ defined by $f(x) = x^2$ is onto, then S is

   1) $[-9, 9]$ 2) $\mathbb{R}$ 3) $[-3, 3]$ 4) $[0, 9]$

2. The number of relations on a set containing 3 elements is

   1) 9   2) 81   3) 512   4) 1024

3. If $A = \{(x, y) : y = e^x, x \in \mathbb{R}\}$ and $B = \{(x, y) : y = e^{-x}, x \in \mathbb{R}\}$ then $n(A \cap B)$ is

   1) Infinity   2) 0   3) 1   4) 2

4. The value of $\log_3 \frac{1}{81}$ is

   1) -2 2) -8 3) -4 4) -9

5. The number of roots of $(x + 3)^4 + (x + 5)^4 = 16$ is

   1) 4   2) 2   3) 3   4) 0

6. The number of solutions of $x^2 - 5|x| + 6 = 0$ is

   1) 4   2) 1   3) 2   4) 3

7. $\frac{1}{\cos 80^\circ} - \frac{\sqrt{3}}{\sin 80^\circ} =$

   1) $\sqrt{2}$ 2) $\sqrt{3}$ 3) 2   4) 4

8. $\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots \cos 179^\circ =$

   1) 2   2) 1   3) -1 4) 0

9. If $n(A) = 2$ and $n(B \cup C) = 3$, then $n[(A \times B) \cup (A \times C)]$ is

   1) 2^3 2) 3^2 3) 6   4) 5

10. $\left(1 + \cos \frac{\pi}{8}\right)\left(1 + \cos \frac{3\pi}{8}\right)\left(1 + \cos \frac{5\pi}{8}\right)\left(1 + \cos \frac{7\pi}{8}\right) =$

    1) $\frac{1}{8}$ 2) $\frac{1}{2}$ 3) $\frac{1}{\sqrt{3}}$ 4) $\frac{1}{\sqrt{2}}$

Part-II

Answer any four Questions, Q.no:16 is compulsory.   **4X2=8**

11. Find the number of subsets of A if $A = \{ x : x = 4n + 1, 2 \leq n \leq 5, n \in \mathbb{N}\}$.

12. Find the domain of $\frac{1}{1 - 2\cos x}$.

V/11/ Mat / 1

13. From the curve $y = \sin x$, draw $y = \sin|x|$

14. Solve : $|x - 9| < 2$ for x.

15. Find the values of $\sin 34° + \cos 64° - \cos 4°$

16. Find the values of (i) $\cos(- 45°)$ and (ii) $\cot(- 60°)$

Part-III

Answer any four Questions, Q.no:22 is compulsory.   **4X3=12**

17. If $n(P(A)) = 1024$, $n(A \cup B) = 15$ and $n(P(B)) = 32$, then find $n(A \cap B)$.

18. Find the range of the function $f(x) = \dfrac{1}{1 - 3\cos x}$

19. Find the values of (i) $\cos 105°$ and (ii) $\tan \dfrac{7\pi}{12}$

20. Find the values of $\sin 18°$

21. In the set Z of integers, define mRn if $m - n$ is a multiple of 12. Prove that R is an equivalence relation.

22. If $\log\left(\dfrac{a+b}{5}\right) = \dfrac{1}{2}(\log a + \log b)$ show that $\dfrac{a}{b} + \dfrac{b}{a} = 23$

Part-IV

                                                                         4X5=20

Answer all the Questions:

23. (a) If $f, g : R \to R$ are defined by $f(x) = |x| + x$ and $g(x) = |x| - x$, find gof and fog.   (OR)

    (b) Prove that $\dfrac{\cot(180°+\theta)\,\sin(90°-\theta)\,\cos(-\theta)}{\sin(270°+\theta)\,\tan(-\theta)\,\cos ec(360°+\theta)} = \cos^2\theta\,\cot\theta$

24. (a) Solve : $\dfrac{x+1}{x+3} < 3$ (OR)

    (b) Simplify: $\dfrac{1}{3-\sqrt{8}} - \dfrac{1}{\sqrt{8}-\sqrt{7}} + \dfrac{1}{\sqrt{7}-\sqrt{6}} - \dfrac{1}{\sqrt{6}-\sqrt{5}} + \dfrac{1}{\sqrt{5}-2}$

25. (a) Resolve into partial fractions: $\dfrac{2x}{(x^2+1)(x-1)}$ (OR)

    (b) If $A + B = 45°$, show that $(1 + \tan A)(1 + \tan B) = 2$.

26. (a) State and prove Napier's Formula.   (OR)
    (b) If $f : R \to R$ is defined by $f(x) = 3x - 5$ prove that f is a bijection and find its inverse.

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