

V11M

Virudhunagar District
Common First Mid Term Test - 2024

Standard 11
MATHEMATICS

Time: 1.30 Hrs.

Marks: 50

Part - I**Choose the best answer:****10×1=10**

- 1) Let A and B be subsets of the universal set N, the set of natural numbers then $A' \cup [(A \cap B) \cup B']$ is
 a) A b) A' c) B d) N
- 2) Let R be the universal relation on a set X with more than one element. Then R is
 a) not reflexive b) not symmetric
 c) transitive d) none of the above
- 3) The number of constant functions from a set containing m elements to a set containing n-elements is
 a) mn b) m c) n d) m+n
- 4) The function $f: R \rightarrow R$ is defined by $f(x) = \sin x + \cos x$ is
 a) an odd function b) neither an odd function nor an even function
 c) an even function d) both odd function and even function
- 5) If $\frac{|x-2|}{x-2} \geq 0$, then x belongs to
 a) $[2, \infty)$ b) $(2, \infty)$ c) $(-\infty, 2)$ d) $(-2, \infty)$
- 6) The value of $\log_{\sqrt{2}} 512$ is
 a) 16 b) 18 c) 9 d) 12
- 7) If 8 and 2 are the roots of $x^2+ax+c=0$ and 3, 3 are the roots of $x^2+dx+b=0$ then the roots of the equation $x^2+ax+b=0$ are
 a) 1, 2 b) -1, 1 c) 9, 1 d) -1, 2
- 8) The number of roots of $(x+3)^4+(x+5)^4=16$ is
 a) 4 b) 2 c) 3 d) 0
- 9) If $\cos 28^\circ + \sin 28^\circ = K^3$, then $\cos 17^\circ$ is equal to
 a) $\frac{K^3}{\sqrt{2}}$ b) $\frac{-K^3}{\sqrt{2}}$ c) $\pm \frac{K^3}{\sqrt{2}}$ d) $\frac{-K^3}{\sqrt{3}}$
- 10) If $\pi < 2\theta < \frac{3\pi}{2}$, then $\sqrt{2 + \sqrt{2 + 2 \cos 4\theta}}$
 a) $-2 \cos \theta$ b) $-2 \sin \theta$ c) $2 \cos \theta$ d) $2 \sin \theta$

Part - II**Answer ANY FOUR questions:****4×2=8**

- 11) Let A and B be two sets such that $n(A) = 3$ and $n(B) = 2$. If $(x, 1), (y, 2), (z, 1)$ are in $A \times B$, find A and B, where x, y, z are distinct elements.
- 12) If $f: R \rightarrow R$ is defined as $f(x) = 2x^2 - 1$ find the preimages of 17, 4.



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- 13) Solve: $2|x+1|-6 \leq 7$
- 14) Find the roots of the polynomial equation $(x-1)^2(x+1)^2(x+5) = 0$ and state their multiplicity.
- 15) Find the value of $\tan 120^\circ$.
- 16) Convert 150° into radian measure.

Part - III

Answer ANY FOUR questions:

4x3=12

- 17) If A and B are two sets so that $n(B-A) = 2n(A-B) = 4n(A \cap B)$ and if $n(A \cup B) = 14$, then find $n(P(A))$.
- 18) Graph the functions (i) $y = \sin x$ (ii) $y = \cos x$.
- 19) Resolve into partial fractions: $\frac{x}{(x+3)(x-4)}$
- 20) Simplify by rationalising the denominator: $\frac{7+\sqrt{6}}{3-\sqrt{2}}$
- 21) Prove that $\tan 315^\circ \cot(-405^\circ) + \cot 495^\circ \tan(-585^\circ) = 2$.
- 22) If $\sin A = \frac{3}{5}$ and $\cos B = \frac{9}{41}$, $0 < A < \frac{\pi}{2}$, $0 < B < \frac{\pi}{2}$. Find the value of $\sin(A+B)$.

Part - IV

Answer ANY FOUR questions:

4x5=20

- 23) In a survey of 5000 persons in a town. It was found that 45% of the persons know language A, 25% know language B, 10% know language C, 5% know languages A and B, 4% know languages B and C, and 4% know languages A and C. If 3% of the persons know all the three languages. Find the number of persons who knows only language A.
- 24) If $f, g : \mathbb{R} \rightarrow \mathbb{R}$ are defined by $f(x) = |x|+x$ and $g(x) = |x|-x$, find $g \circ f$ and $f \circ g$.
- 25) If one root of $K(x-1)^2 = 5x-7$ is double the other root, show that $K = 2$ or -25 .
- 26) Prove that $\log 2 + 16 \log \frac{16}{15} + 12 \log \frac{25}{24} + 7 \log \frac{81}{80} = 1$.
- 27) Show that $\tan 75^\circ + \cot 75^\circ = 4$.
- 28) If $\tan \frac{\theta}{2} = \frac{\sqrt{1-a}}{\sqrt{1+a}} \tan \frac{\phi}{2}$, then prove that $\cos \phi = \frac{\cos \theta - a}{1 - a \cos \theta}$.
