**CRM01**

# KEAM CRASH 2019

## DAILY TEST - MATHS

**Time : 30 min**
**Marks : 120**

*(Sets, Relations and Functions, Trigonometric functions, Principle of Mathematical Induction)*

**1.** If A and B are disjoint, the $n(A \cup B)$ is equal to

(1) n(A)

(2) n(B)

(3) n(A) + n(B)

(4) n(A) . n(B)

2. The inverse of f(x) = $\frac{2}{3}\frac{10^x - 10^{-x}}{10^x + 10^{-x}}$ is

(1) $\frac{1}{3}\log_{10}\frac{1+x}{1-x}$

(2) $\frac{1}{2}\log_{10}\frac{2+3x}{2-3x}$

(3) $\frac{1}{3}\log_{10}\frac{2+3x}{2-3x}$

(4) $\frac{1}{6}\log_{10}\frac{2-3x}{2+3x}$

3. The function $f : R \to R$, defined by f(x) = [x], $\forall x \in R$, is

(1) one-one

(2) onto

(3) Both one-one and onto

(4) neither one-one nor onto

4. The domain of the function $f(x) = \frac{1}{\sqrt{x^2 - 3x + 2}}$ is

(1) $(-\infty, 1)$

(2) $(-\infty, 1) \cup (2, \infty)$

(3) $(-\infty, 1] \cup [2, \infty)$

(4) $(2, \infty)$

5. If f(x) = ln $\left(\frac{x^2 + e}{x^2 + 1}\right)$, then range of f(x) is

(1) (0, 1)

(2) (0, 1]

(3) [0, 1)

(4) {0, 1}

6. The function y(x) given implicitly by

3sin y + a sin x = 1, a > 0, exists provided then

(1) $a \geq 4$ (2) $2 \leq a \leq 4$

(3) $1 \leq a \leq 2$ (4) $0 < a < 2$

7. The domain of f(x) = $\sqrt{\cos(\sin x)} + \sqrt{\log_x \{x\}}$; { . } denote the fractional part, is

(1) $[1, \pi)$

(2) $(0, 2\pi) - [1, \pi)$

(3) $\left(0, \frac{\pi}{2}\right) - \{1\}$

(4) (0, 1)

8. The function y(x) given implicitly by the equation 3siny + 5sinx = 1 is real in-

(1) $\left[-\frac{\pi}{2}, \tan^{-1}\frac{2}{\sqrt{23}}\right]$

(2) $\left[-tan^{-1}\frac{2}{\sqrt{21}}, tan^{-1}\frac{4}{3}\right]$

(3) $\left[\tan^{-1}\frac{5}{3}, \frac{\pi}{2}\right]$

(4) None of these

9. The set of all values of x in $[0, \pi]$ for which the function $\sqrt{1 - 2\sin 3x}$ takes real values is

(1) $\left[0, \frac{\pi}{6}\right] \cup \left[\frac{5\pi}{6}, \pi\right]$

(2) $\left[0, \frac{\pi}{9}\right] \cup \left[\frac{2\pi}{9}, \frac{7\pi}{9}\right] \cup \left[\frac{8\pi}{9}, \pi\right]$

(3) $\left[0, \frac{\pi}{6}\right] \cup \left[\frac{5\pi}{18}, \frac{13\pi}{18}\right] \cup \left[\frac{17\pi}{18}, \pi\right]$

(4) None of these

10. If cosecA + cotA = $\frac{11}{2}$ , then tanA is equal to

(1) $\frac{21}{12}$ (2) $\frac{15}{16}$

(3) $\frac{44}{117}$ (4) $\frac{117}{43}$

11. In a triangle ABC, if cos $\frac{A}{2} = \sqrt{\frac{b+c}{2c}}$ , then

(1) $a^2 + b^2 = c^2$

(2) $b^2 + c^2 = a^2$

(3) $c^2 + a^2 = b^2$

(4) $b - c = c - a$

12. The general solution of cos $\left(\frac{3}{2}\theta\right) = 0$ is

(1) $\frac{n\pi}{3}; n \in I$

(2) $n\pi + \frac{\pi}{3}; n \in I$

(3) $(2n+1)\frac{\pi}{3}; n \in I$

(4) None of these

13. $\frac{\cos\theta}{1-\tan\theta} + \frac{\sin\theta}{1-\cot\theta}$ is equal to

(1) $\sin\theta - \cos\theta$

(2) $\sin\theta + \cos\theta$

(3) $\tan\theta + \cot\theta$

(4) $\tan\theta - \cot\theta$

14. In a $\Delta ABC$ a = 2 cm, b = 3 cm, c = 4 cm then cosA equals to

(1) $\frac{8}{7}$

(2) $\frac{7}{8}$

(3) $\frac{1}{8}$

(4) $\frac{1}{7}$

15. The value of $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ$ is

(1) $\frac{3}{8}$ (2) $\frac{1}{8}$

(3) $\frac{3}{16}$ (4) None of these

16. If $\alpha$ and $\beta$ be between 0 and $\frac{\pi}{2}$ and if $\cos(\alpha+\beta)) = \frac{12}{13}$ and $\sin(\alpha-\beta) = \frac{3}{5}$, then $\sin 2\alpha$ is equal

(1) $\frac{16}{15}$ (2) 0

(3) $\frac{56}{65}$ (4) $\frac{64}{65}$

17. The general solution of the equation

$\tan\theta = -\frac{1}{\sqrt{3}}$, is

(1) $\theta = 2n\pi \pm \frac{\pi}{6}$

(2) $\theta = n\pi + (-1)^n \frac{\pi}{6}$

(3) $\theta = n\pi + \frac{\pi}{6}$

(4) $\theta = n\pi - \frac{\pi}{6}$

18. $\frac{\cos(90^\circ+\theta)\sec(-\theta)\tan(180^\circ-\theta)}{\sin(360^\circ+\theta)\sec(180^\circ+\theta)\cot(90^\circ-\theta)}$ equals

(1) 2

(2) 1

(3) $-1$

(4) 0

19. In a triangle ABC, if a = 2, B = $60^\circ$ and C = $75^\circ$, then b equals

(1) $\sqrt{3}$ (2) $\sqrt{6}$

(3) $\sqrt{9}$ (4) $1+\sqrt{2}$

20. If $P(n) = 2 + 4 + 6 + \ldots\ldots + 2n$, $n \in N$, then $P(k) = k(k + 1) + 2 \Rightarrow P(k + 1) = (k + 1)(k + 2) + 2$ for all $k \in N$. So we can conclude that $P(n) = n(n + 1)+2$ for

(1) all $n \in N$

(2) $n > 1$

(3) $n > 2$

(4) nothing can be said

21. The greatest positive integer, which divides $n(n + 1)(n + 2)(n + 3)$ for all $n \in N$ is

(1) 2

(2) 6

(3) 24

(4) 120

22. Let T(k) be the statement $1 + 3 + 5 + \ldots\ldots + (2k - 1) = k^2 + 10$. Which of the following is correct?

(1) T(1) is true

(2) T(k) is true $\Rightarrow$ T(k + 1) is true

(3) T(n) is true for all $n \in N$

(4) All above are correct

23. If $m = (3n)!$ then

(1) $3^n$ divides m

(2) $6^n$ divides m

(3) $(n!)^3$ divides m

(4) All are correct

24. Let $S(K) = 1 + 3 + 5\ldots\ldots + (2K - 1) = 3 + k^2$, Then which of the following is true?

(1) Principle of mathematical induction can be used to prove the formula

(2) $S(K) \Rightarrow S(K + 1)$

(3) $S(K) \not\Rightarrow S(K + 1)$

(4) S(1) is correct

25. $10^n + 3(4^{n+2}) + 5$ is divisible by $(n \in N)$

(1) 7

(2) 5

(3) 9

(4) 17

26. When $2^{301}$ is divided by 5, the least positive remainder is

(1) 4

(2) 8

(3) 2

(4) 6

27. For every natural number n, n(n + 1) is always

(1) Even

(2) Odd

(3) Multiple of 3

(4) Multiple of 4

28. Let P(n) be statement $2^n < n!$, Where n is a natural number, then P(n) is true for

(1) all n

(2) all $n > 2$

(3) all $n > 3$

(4) none of these

29. The smallest +ve integer n for which $n! < \left(\frac{n+1}{2}\right)^n$ holds is

(1) 1

(2) 2

(3) 3

(4) 4

30. if the set A has p elements, B has q elements, then the number of elements in $A \times B$ is __

(1) p+ q+ 1 (2) pq

(3) $p^2$ (4) p + q