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MATHEMATICS SAMPLE QUESTIONS – VOL.03

1. For any set A, $A \cup A$ is
   a. A
   b. U
   c. $\emptyset$
   d. None

2. For any set A, $A \cap A$ is
   a. A
   b. U
   c. $\emptyset$
   d. None

3. For any set A, $A \cup \emptyset$ is
   a. A
   b. U
   c. $\emptyset$
   d. None

4. Evaluate : $(1 + i)^6 + (1 - i)^3$
   a. -2- 10i
   b. 2- 10i
   c. -2+ 10i
   d. 2+10i

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5. If $(x+iy)^{\frac{1}{3}} = a + ib$, where x, y, a, b $\in$ R, then

   a. $\frac{x}{a}+\frac{y}{b}=4(a^2+b^2)$

   b. $\frac{x}{a}-\frac{y}{b}=-2(a^2+b^2)$

   c. $\frac{x}{a}-\frac{y}{b}=2(a^2+b^2)$

   d. $-\frac{x}{a}-\frac{y}{b}=-2(a^2+b^2)$

6. The standard form of $\frac{(33-2i)(2+3i)}{(1+2i)(2-i)}$

   a. 573+154i/5

   b. 573+154i/125

   c. 573+154i/25

   d. 573-154i/25

7. A matrix $A = [a_{ij}]$ is an upper triangular matrix, if

   (a) it is a square matrix and $a_{ij} = 0$, i < j

   (b) it is a square matrix and $a_{ij} = 0$, i > j

   (c) it is not a square matrix and $a_{ij} = 0$,i > j

   (d)it is not a square matrix and $a_{ij} = 0$,i < j

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8. If A is any m × n matrix such that AB and BA are both defined, then B is an

(a) m × n matrix

(b) n × m matrix

(c) n × n matrix

(d) m × m matrix

9. If $E(\theta)=\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$, then E(α) E(β) is equal to

(a) E(0°)

(b) E(αβ)

(c) E(α + β)

(d) E(α - β)

10. The value of $\begin{vmatrix}2 & 4\\ -5 & -1\end{vmatrix}$

a. 18
b. 22
c. -18
d. 16

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11. The value of $\begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix}$

a. -1
b. 1
c. 2
d. 0

12. The value of $\begin{vmatrix} x^2 - x + 1 & x - 1 \\ x + 1 & x + 1 \end{vmatrix}$

a. $x^3 - x^2 + 1$
b. $x^3 - x^2 - 2$
c. $x^3 - x^2 + 2$
d. $x^3 - x^2 + 12$

13. if $x^y = e^{x-y}$ then $\frac{dy}{dx}$ is

a. $\frac{1+x}{1+\log x}$
b. $\frac{1-\log x}{1+\log x}$
c. not defined
d. $\frac{\log x}{(1+\log x)^2}$

14. let $y = t^{10}+1$ & $x = t^8+1$ then $\frac{d^2y}{dx^2}$ is equal to

a. 5t/2
b. $20t^8$
c. $5/16t^6$
d. none

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15. if $2^x+2^y=2^{x+y}$ then $\frac{dy}{dx}$ is equal to

a. $\frac{2^x+2^y}{2^x-2^y}$

b. $\frac{2^x+2^y}{1+2^{y+x}}$

c. $2^{x-y}(\frac{2^y-1}{1-2^x})$

d. $\frac{2^{x+y}-2^x}{2^y}$

16. The function given by $f(x) = 7x - 3$ is strictly
a. Strictly increasing
b. Strictly decreasing
c. increasing
d. Decreasing

17. the function f given by $f(x) = x^3 - 3x^2 + 4x$, $x \in R$ is
a. Strictly increasing
b. Strictly decreasing
c. increasing
d. Decreasing

18. The function given by f(x) = cosx is
a. Strictly decreasing in $(0, \pi)$
b. Strictly decreasing in $(0, \pi)$
c. Strictly decreasing in $(0, \pi)$
d. Strictly decreasing in $(0, \pi)$

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19. The function $f(x) = 5x - 3$ is continuous
    a. Everywhere
    b. Only Natural number
    c. No where
    d. none

20. $f(x) = x - 5$
    a. is continuous at each $x \in R$.
    b. is continuous at each $x \in Z$.
    c. is continuous at each $x \in N$.
    d. is discontinuous at each $x \in R$.

21. The function $f(x) = x^n$ is continuous
    a. is continuous at each $x \in R$.
    b. is continuous at each $x \in Z$.
    c. is continuous at each $x \in N$.
    d. is discontinuous at each $x \in R$.

22. $\sin 2x$

    a. $-\frac{1}{2}\cos 2x + C$

    b. $-\frac{1}{2}\cos x + C$

    c. $\frac{1}{2}\cos 2x + C$

    d. $-\frac{1}{2}\cos 2x + C$

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23. $\cos 3x$

a. $\frac{1}{3}\sin 3x + C$

b. $\frac{1}{3}\sin 2x + C$

c. $\frac{1}{3}\sin x + C$

d. $-\frac{1}{3}\sin 3x + C$

24. e^{2x}

a. $\frac{1}{2}e^{2x} + C$

b. $\frac{1}{2}e^{3x} + C$

c. $\frac{1}{2}e^{2x} + C$

d. $\frac{1}{2}e^{2x} + C$

25. If the angles of a triangle are in the ratio 1 : 2 : 3, then the sides are in the ratio

(a) $1 : \sqrt{3} : 2$
(b) $\sqrt{3} : 1 : 2$
(c) $\sqrt{3} : \sqrt{2} : 1$
(d) $1 : \sqrt{3} : \sqrt{2}$

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26. If the angles A, B and C of a triangle are in an arithmetic progression and if

a, b and c denote the lengths of the sides opposite to A, B and C respectively,

then the value of the expression $\frac{a}{c}\sin 2C + \frac{c}{a}\sin 2A$ *is*

(a) $\frac{1}{2}$

(b) $\frac{\sqrt{3}}{2}$

(c) 1

(d) $\sqrt{3}$

27. If b = 3, c = 4, B = 60^0, then the number of triangles that can be constructed

is:

(a) Nil

(b) 1

(c) 2

(d) Infinitely many

28. Find $\sin\theta$ if $\cot\theta = \frac{12}{5}$, θ in quadrant III

a. -5/12

b.-4/12

c.-5/-13

d. -5/13

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29. Find $\cot\theta$, if $\cos\theta = \frac{1}{2}$, θ in quadrant II

a. $\frac{-1}{\sqrt{3}}$

b. $\frac{-2}{\sqrt{3}}$

c. $\frac{-3}{\sqrt{3}}$

d. $\frac{1}{\sqrt{3}}$

30. Find the value of $\sin 315^{o}$

a. $\frac{1}{\sqrt{2}}$

b. $-\frac{1}{\sqrt{2}}$

c. $\frac{2}{\sqrt{2}}$

d. $-\frac{2}{\sqrt{3}}$

31. How many terms are there in the sequence 3, 6, 9, 12, …, 111

(a) 37
(b) 38
(c) 39
(d) 40

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32. Which term of the sequence 20, $19\frac{1}{4}, 18\ \frac{1}{2}, 17\frac{3}{4}$, … is the first negative term

(a) 27
(b) 28
(c) 20
(d) 30

33. If m times the m^{th} term of an A.P. is equal to n times its n^{th} term of A.P then its $(m + n)^{th}$ is

(a) 10
(b) 9
(c) 0
(d) None

34. The sum of three numbers in A.P. is -3, and their product is 8. The numbers are

(a) 4, 6, 8
(b) 14, 16, 18
(c) 16, 18, 20
(d) -4, -1, 2

35. Discuss the existence of limit $\lim_{x\to 0}\frac{1}{x}$

a. 0
b. 3
c. 6
d. Does not exist

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36. Let $f(x) = \begin{cases} \cos x, \text{if } x > 0 \\ x + k, \text{if } x < 0 \end{cases}$. Find the value of constant k, given that $\lim_{x \to 0} f(x)$ exists.

a. K= 1
b. K= 2
c. K= -2
d. K= 3

37. Let $f(x)$ be a function defined by $f(x) = \begin{cases} 4x - 5, & \text{if } x \leq 2 \\ x - \lambda, & \text{if } x > 2 \end{cases}$ Find λ, if $cf(x)$ exists.

a.-1
b.-2
c.2
d.1

38. In a class there are 27 boys and 14 girls. The teacher wants to select 1 boy and 1 girl to represent the class in a function. In how many ways can the teacher make this selection?
a.378
b.377
c.356
d.345

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39. A person wants to buy one fountain pen, one ball pen and one pencil from a stationary shop. If there are 10 fountain pen verities, 12 ball pen varieties and 5 pencil varieties, in how many ways can he select these articles?

a.600
b.700
c.602
d.702

40. From Goa to Bombay there are two roots; air, and sea. From Bombay to Delhi there are three routes; air, rail and road From Goa to Delhi via Bombay, how many kinds of routes are here?

a.5
b.6
c.8
d.9

41. If three coins are tossed simultaneously, then the probability of getting at least two heads, is

a. $\frac{1}{4}$

b. $\frac{3}{8}$

c. $\frac{1}{2}$

d. $\frac{1}{4}$

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42. In a single throw of a die, the probability of getting a multiple of 3 is

a. $\frac{1}{2}$

b. $\frac{1}{3}$

c. $\frac{1}{6}$

d. $\frac{2}{3}$

43. A number x is chosen at random from the numbers $-3,-2,-1,0,1,2,3$ the probability that $|x|<2$ is

a. $\frac{5}{7}$

b. $\frac{2}{7}$

c. $\frac{3}{7}$

d. $\frac{1}{7}$

44. The probability of guessing the correct answer to a certain test question is $\frac{x}{12}$. If the probability of not guessing the correct answer to this question is $\frac{2}{3}$, then $x=$ a.

a.2

b. 3

c. 4

d.6

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45. The term containing x^3 in the expansion $\left(\sqrt{x^5}+\frac{3}{\sqrt{x^3}}\right)^6$ appears in

a. 3^{rd} term b. 5^{th} term c. 6^{th} term d. 4^{th} term

46. The coefficient of x^{-4} in $\left(\frac{x}{2}-\frac{3}{x^2}\right)^{10}$ is

a. $\frac{405}{256}$ b. $\frac{405}{225}$ c. $\frac{405}{201}$ d. $\frac{226}{405}$

47. If the coefficient of x in $\left(x^2+\frac{k}{x}\right)^5$ is 270 then k = 1

a.3 b.4 c.5 d.2

48. If the equation $x^2 + 4x + k = 0$ has real and distinct roots, then

(a) $k < 4$ (b) $k > 4$ (c) $k \geq 4$ (d) $k \leq 4$

49. If the equation $x^2 - ax + 1 = 0$ has two distinct roots, then

(a) $|a| = 2$ (b) $|a| < 2$ (c) $|a| > 2$ (d) None of these

50. If the equation $9x^2 + 6kx + 4 = 0$ has equal roots, then the roots are both equal to

(a) $\pm\frac{2}{3}$ (b) $\pm\frac{3}{2}$ (c) 0 (d) ± 3

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ANSWER KEYS:

1	A	11	B	21	A	31	A	41	C
2	A	12	C	22	A	32	B	42	B
3	A	13	D	23	A	33	C	43	C
4	A	14	C	24	A	34	D	44	C
5	A	15	C	25	A	35	D	45	D
6	C	16	A	26	D	36	A	46	A
7	B	17	C	27	A	37	A	47	A
8	B	18	C	28	D	38	A	48	A
9	C	19	A	29	A	39	A	49	C
10	A	20	A	30	B	40	B	50	A