# IMU-CET
# MATHEMATICS SAMPLE QUESTIONS – VOL.03

1. Given L = {1, 2, 3, 4}, M = {3, 4, 5, 6} and N = {1, 3, 5} then L – (M ∪ N) equals
   a. (L – M) ∩ (M – N)
   b. (L – N) ∩ (M – N)
   c. (L – M) ∪ (L – N)
   d. (L – M) ∩ (L – N)
2. If A and B are two sets, then A ∩ (A ∪ B) equals
   a. B
   b. Empty set
   c. None
   d. A
3. If A and B are any two sets, then A – B is equal to
   a. A ∪ B′
   b. A
   c. A ∩ B
   d. A ∩ B′
4. If a + ib = $\frac{c+i}{c-i}$, where c is real then value of $a^2 + b^2$
   a. 1
   b. 2
   c. 3
   d. 4

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

   a. $4(a^2 - b^2)$

   b. $4(a^2+b^2)$

   c. $4(-a^2 - b^2)$

   d. $4(a^2 / b^2)$

6. The conjugate of $\frac{1}{3+4i}$.

   a. 3+15i/5

   b. 3+4i/5

   c. -3+4i/5

   d. none



7. If $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, $J = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then B equals

   (a) $I\cos\theta + J\sin\theta$

   (b) $I\sin\theta + J\cos\theta$

   (c) $I\cos\theta - j\sin\theta$

   (d) $-I\cos\theta + J\sin\theta$

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8. If A is a square matrix such that $AA^T = \ell = A^TA$, then A is

(a) a symmetric matrix

(b) a skew – symmetric matrix

(c) a diagonal matrix

(d) an orthogonal matrix

9. If A is an orthogonal matrix, then $A^{-1}$ equals

(a) A (b) $A^T$

(c) $A^2$ (d) none of these



10. $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$

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

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11. Value of $\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix}$

a. 1
b. 2
c. 3
d. 0

12. Value of $\begin{vmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{vmatrix}$

a. 1
b. 0
c. 3
d. -1



13. $\frac{\sqrt{a}+\sqrt{x}}{\sqrt{a}-\sqrt{x}}$ Differentiate

a. $\frac{\sqrt{a}2x}{\sqrt{x}(\sqrt{a}-\sqrt{x})^2}$

b. $\frac{\sqrt{x}}{\sqrt{x}(\sqrt{a}-\sqrt{x})^2}$

c. $\frac{\sqrt{ax}}{\sqrt{x}(\sqrt{a}-\sqrt{x})^2}$

d. $\frac{\sqrt{a}}{\sqrt{x}(\sqrt{a}-\sqrt{x})^2}$

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14. $x^2 e^x \log x$ Differentiate

a. $xe^x (1 + x \log x + 2 \log 5x)$

b. $xe^x (1 + x \log x + 2 \log x)$

c. $xe^x (1 + x \log x + 2 \log 3x)$

d. $xe^x (1 + x \log x + 2 \log 2x)$

15. If $y = \left(\sin\frac{x}{2} + \cos\frac{x}{2}\right)^2$, find $\frac{dy}{dx}$ at $x = \frac{\pi}{6}$.

a. $7\frac{\sqrt{3}}{2}$

b. $5\frac{\sqrt{3}}{2}$



c. $\frac{\sqrt{3}}{2}$

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

16. The function given by $f(x) = \sin x$ is

a. increasing in $(0, \pi)$

b. neither increasing nor decreasing in $(0, \pi)$

c. neither increasing nor decreasing in $(0, 2\pi)$

d. decreasing in $(0, \pi)$

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17. The intervals in which the function f is given by $f(x) = 2x^2 - 3x$ is strictly decreasing

    a. $(-\infty, 3/4)$

    b. $(-\infty, -3/4)$

    c. $(3/4, \infty)$

    d. None

18. The intervals in which the functions strictly increasing $x^2 + 2x - 5$

    a. $x>2$

    b. $x<-1$

    c. $x>-1$

    d. None



19. The intervals in which the functions strictly increasing $6 - 9x - x^2$

    a. $x<9/2$

    b. $x<-9/2$

    c. $x>9/2$

    d. $x>-9/2$

20. $\int\left(\sqrt{x}-\frac{1}{\sqrt{x}}\right)^2 dx$

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

b. $\frac{x^2}{2}-3x+\log x+C$

c. $\frac{x^2}{2}-2x+\log x+C$

d. $\frac{x^2}{3}-2x+\log x+C$



21. $\int\frac{x^3+5x^2-4}{x^2}dx$

a. $\frac{x^2}{2}+6x+\frac{4}{x}+C$

b. $\frac{x^2}{2}+5x+\frac{4}{x}+C$

c. $\frac{x^2}{2}+4x+\frac{4}{x}+C$

d. $\frac{x^2}{2}+2x+\frac{4}{x}+C$

22. $\int \frac{x^2+3x+4}{\sqrt{x}} dx$

a. $\frac{2}{7}x^{\frac{7}{2}} + 2x^{\frac{2}{2}} + 8x^{\frac{1}{2}} + C$

b. $\frac{2}{7}x^{\frac{7}{2}} + 2x^{\frac{3}{1}} + 8x^{\frac{1}{2}} + C$

c. $\frac{2}{7}x^{\frac{7}{2}} + 2x^{\frac{3}{2}} + 8x^{\frac{2}{2}} + C$

d. $\frac{2}{7}x^{\frac{7}{2}} + 2x^{\frac{3}{2}} + 8x^{\frac{1}{2}} + C$



23. If $\Delta = a^2 - (b - c)^2$, where $\Delta$ is area of $\Delta$ ABC, then tan A is
(a) 15/16
(b) 8/17
(c) 8/15
(d) ½

24. The sides BC, CA and AB of a triangle ABC are of lengths a, b and c respectively. If D is the mid point of BC and AD is perpendicular to AC, then the value of cos A cos C is
(a) $\frac{3(a^2-c^2)}{2ac}$
(b) $\frac{2(a^2-c^2)}{3bc}$
(c) $\frac{(a^2-c^2)}{3ac}$
(d) $\frac{2(c^2-a^2)}{3ac}$

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25. In a triangle ABC, angle B = $60^0$, then
    (a) $(a - b)^2 + ab = c^2$
    (b) $(b - c)^2 + bc = a^2$
    (c) $(c - a)^2 + ca = b^2$
    (d) $a^2 + b^2 + c^2 = 2b^2 + ac$

26. Find the value of $\operatorname{cosec} 390^\circ$

    a.4
    b.3
    c.2
    d.6

27. Find the value of $\cot 570^\circ$

    a. $\sqrt{3}$
    b. $\sqrt{2}$
    c. $\sqrt{5}$
    d. $\sqrt{2}$

28. Find the value of $\tan 480^\circ$

    a. $\sqrt{3}$
    b. $-\sqrt{3}$
    c. $-\sqrt{2}$
    d. $-\sqrt{1}$

29. Find the value of $\cos 270^\circ$

    a.1
    b.3
    c.0
    d.2

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30. The interior angles of a polygon are in A.P. The smallest angle is $120^0$ and the common difference is $5^0$. The number of sides of the polygon
    (a) 9
    (b) 16
    (c) 15
    (d) Both 9 and 16

31. If the sum of n terms of an A.P. is $nP + \frac{1}{2} n (n - 1) Q$, where P and Q are constants, then the common difference.
    (a) P
    (b) Q
    (c) 1
    (d) None

32. The number of terms of an A.P. is even, the sum of odd terms is 24, and of the even terms is 30, and the last term exceeds the first by 10 ½, find the number of terms
    (a) 22
    (b) 21
    (c) 20
    (d) 15



33. Evaluate $\lim_{x \to 0^+} \frac{1}{3x}$

    a. $\beta$
    b. $\infty$
    c. $\alpha$
    d. $-\beta$

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34. Evaluate $\lim_{x\to 1} \frac{x^2+1}{x+1}$

a.-1

b.1

c.-4

d.-5

35. Evaluate $\lim_{x\to 0} \frac{2x^2+3x+4}{x^2+3x+2}$

a.5

b.2

c.6

d.-2



36. A letter lock consists of three rings each marked with 10 different letters. In how many ways it is possible to make an unsuccessful attempt to open the lock?
    a.999
    b.978
    c.968
    d.949

37. There are 6 multiple choice questions in an examination. How many sequences of answers are possible, if the first three questions have 4 choices each and the next three have 2 ach?
    a.512
    b.514
    c.515
    d.516

38. There are 5 book on Mathematics and 6 books on Physics in a book shop. In How many ways can a student buy : (i) a Mathematics book and a Physics book (ii) either a Mathematic book or a Physics book.
    a. (i) 30 (ii) 1
    b. (i) 40 (ii) 0
    c. (i) 30 (ii) 15
    d.none

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39. The probability of throwing a number greater than 2 with a fair dice is

a. $\frac{3}{5}$

b. $\frac{2}{5}$

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

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

40. A card is accidently dropped from a pack of 52 playing cards. The probability that it is an ace is

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

b. $\frac{1}{13}$

c. $\frac{1}{52}$

d. $\frac{12}{13}$

41. The probability that a nonleap year has 53 Sundays is

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

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

c. $\frac{6}{7}$

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

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42. If the coefficients of $x^8$ and $x^7$ is $\left(3+\frac{x}{2}\right)^n$ are equal then $n=$

a.50 b.60 c.55 d.65

43. In the expansion of $(1+x)^{11}$, the 5th term is 24 times the 3rd term, then $x=$

a.2 b.$-2$ c.$\pm 2$ d.none

44. If $\frac{T_2}{T_3}$ is the expansion of $(a+b)^n$ and $\frac{T_3}{T_4}$ in the expansion of $(a+b)^{n+3}$ equal, then $n=$

a.3 b.4 c.5 d.6

45. The value of $\sqrt{6+\sqrt{6+\sqrt{6+}}}$..... is

(a) 4 (b) 3 (c) -2 (d) 3.5

46. If 2 is a root of the equation $x^2+bx+12=0$ and the equation $x^2+bx+q=0$ has equal roots, then q =

(a) 8 (b) -8 (c) 16 (d) -16

47. If the equation $(a^2+b^2)x^2-2(ac+bd)x+c^2+d^2=0$ has equal roots, then

(a) ab = cd (b) ad = bc (c) ad = $\sqrt{bc}$ (d) ab = $\sqrt{cd}$

48. All points of discontinuity of f $\begin{cases}\frac{|x|}{x}, & \text{if } x\neq 0\\ 0 & \text{if } x=0\end{cases}$

a. x=3
b. x=2
c. x=4
d. x=0

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49. If f(x) = $\begin{cases} \frac{1}{1+e^{1/x}} & x \neq 0 \\ 0 & x = 0 \end{cases}$ then f(x) is

(a) Continuous as well differentiable at x = 0
(b) Continuous but not differentiable at x = 0
(c) Differentiable but not continuous at x = 0
(d) None of these

50. If f(x) = $\begin{cases} \frac{e^{1/x}-1}{e^{1/x}+1} & x \neq 0 \\ 0 & x = 0 \end{cases}$ then f(x) is

(a) Continuous as well as differentiable at x = 0
(b) Continuous but not differentiable but x = 0
(c) Differentiable but not continuous at x = 0
(d) None of these



**ANSWER KEYS:**

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