

Sample Questions for Entrance Examination

Q. 1 The value of $(1 - i)^{15}/(1 + i)^{15}$ is

- (a) $-i$
- (b) i
- (c) 1
- (d) -1

Q. 2 Which of the following set of vectors is linearly independent? (\hat{i} , \hat{j} , \hat{k} denote the unit vectors along x , y and z axes respectively.)

- (a) $\hat{i} + \hat{j}$, $\hat{i} - \hat{j}$, $3\hat{i} + 2\hat{j}$
- (b) $\hat{i} + \hat{j} - \hat{k}$, $-3\hat{i} - 3\hat{j}$, $2\hat{k}$
- (c) $\hat{i} + \hat{j}$, $\hat{i} + 2\hat{j}$, $\hat{i} + \hat{k}$
- (d) $\hat{i} + 7\hat{j}$, $-2\hat{i} + 3\hat{j}$, $4\hat{i} - \hat{j}$

Q. 3 The function $f(x) = |x|$ is

- (a) continuous but not differentiable at $x = 1$.
- (b) continuous and differentiable at $x = 1$.
- (c) differentiable but not continuous at $x = 1$.
- (d) neither continuous nor differentiable at $x = 1$.

Q. 4 The sum of first 100 even numbers starting from 2 is

- (a) 10000
- (b) 10100
- (c) 11000
- (d) 11100

Q. 5 The integral

$$\int_{-\pi/3}^{\pi/3} x^3 \cos(x) + x^2 \sin(x) dx$$

is

- (a) 3
- (b) $7/\sqrt{2}$
- (c) 0
- (d) $1 + 1/\sqrt{2}$

Q. 6 If we have a sample of 2000 couples, each with three kids, the probable number of couples with two sons and one daughter is.

- (a) 200
- (b) 400
- (c) 750
- (d) none of the above

Q. 7 The function $f : \mathbb{R} \rightarrow \mathbb{R}^+$, defined as $f(x) = a^x$ has an inverse

- (a) only for $a > 1$
- (b) only for $-1 < a < 1$
- (c) only for $a = 1$
- (d) only for all $a > 0$ except $a = 1$
- (e) none of these

Q. 8 From a pack of 52 cards, a card is drawn at random. The event that it is a spade and the event that it is an ace are

- (a) exclusive and independent events
- (b) exclusive and but not independent
- (c) not exclusive but independent events
- (d) neither exclusive nor independent events
- (e) none of these

Q. 9 In a class of 100 students there are 70 boys whose average marks in a subject are 75. If the average marks of complete class is 72, the the average of girls is

- (a) 73
- (b) 65
- (c) 68
- (d) 74
- (e) none of these

Q. 10 If the positive numbers x , y and z are in geometric progression, then $\log(x^n)$, $\log(y^n)$ and $\log(z^n)$ are

- (a) also in geometric progression
- (b) are in arithmetic progression
- (c) are in harmonic progression
- (d) are in geometric progression if x , y and z are greater than 1.

Q. 11 You play a game in which you flip a coin until you get tails. Each time your coin comes up heads, you win Rs.200. If you play the game only once, what is the probability that you make exactly Rs.1000?

- (a) $1/2$
- (b) $1/8$
- (c) $1/32$
- (d) $1/64$

Q. 12 The probability of picking a red marble from a bag of red, blue, and yellow marbles is $7/15$. The probability of picking a yellow marble is 0.2. There are 15 blue marbles in the bag. How many total marbles are there in the bag?

- (a) 30
- (b) 45
- (c) 60

(d) 100

Q. 13 The triangle whose vertices are (2,0), (2,3) and (8,0) is

- (a) acute angled
- (b) isosceles
- (c) right angled
- (d) equilateral

Q. 14 The number $-i$ is

- (a) square root of unity.
- (b) fourth root of unity.
- (c) sixth root of unity.
- (d) all of the above.

Q. 15 The new coordinates of point (4,5) when origin is shifted to (1,-2) are

- (a) (5,3)
- (b) (3,5)
- (c) (3,7)
- (d) (3,3)

Q. 16 If $1, \omega, \omega^2$ are cube roots of unity, $(1 + \omega^2)^6 - (1 + \omega)^3$ is

- (a) 2
- (b) 1
- (c) i
- (d) 0

Q. 17

$$\int x^{-1} \log(x)^4 dx =$$

- (a) $x \log(x) + C$
- (b) $(\log(x))^5/5 + C$
- (c) $\log(x) + x \log(x) + C$
- (d) $x^4 \log(x) + C$

Q. 18 The function $\sin(x) + \sin^2(x)$ is

- (a) increasing function
- (b) decreasing function
- (c) periodic function
- (d) continuous but not differentiable

Q. 19 A polynomial $ax^4 + bx^2 + c$ where a, b, c are positive while x is a real variable, has

- (a) 4 real roots
- (b) 2 real roots
- (c) no real roots
- (d) zero everywhere

Q. 20 Rajesh, Umesh, Sarvesh and Anvesh give seminars in class. The teacher can sequence the seminars in

- (a) 12 ways
- (b) 4 ways
- (c) 256 ways
- (d) none of these

Q. 21 A patient with multiple organ failure is treated by lung, heart and brain surgeons. The success rate of these surgeons is 50%. The patient dies if any of the surgery fails. The probability that the patient survives is

- (a) $1/2$
- (b) $1/4$

- (c) $3/4$
- (d) $1/8$