

Sample Questions
Part-I: Mathematical Aptitude

1. The number of real roots of the function $f(x) = x^4 + 11x - 4$ is
 - (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) None of the above

2. The value of $\lim_{n \rightarrow \infty} \frac{1^3 + 2^3 + \dots + n^3}{n^4}$
 - (a) $\frac{1}{2}$
 - (b) $\frac{1}{4}$
 - (c) 0
 - (d) 1
 - (e) None of the above

3. If $a_n = 11\dots 1$ with 3^n digits, then which of the following is true
 - (a) a_n is a prime number.
 - (b) a_n is divisible by $2a_{n-1}$
 - (c) a_n is divisible by $3a_{n-1}$
 - (d) a_n is divisible by 3^n
 - (e) None of the above

4. If $f_1(x) = e^x$ and $f_n(x) = e^{f_{n-1}(x)}$ for $n > 1$, then $\frac{d}{dx} f_n(x)$ is
 - (a) $f_{n-1}(x)f_n(x)$
 - (b) $f_1(x)f_2(x) \cdots f_{n-1}(x)$
 - (c) $f_1(x)f_2(x) \cdots f_n(x)$
 - (d) $f_2(x)f_3(x) \cdots f_n(x)$
 - (e) None of the above

5. Let p denote the statement $e^\pi > \pi^e$ and q denote the statement $a^b > b^a$ when $b > a > e$, then which of the following holds
 - (a) both p and q are true
 - (b) both p and q are false
 - (c) p is true and q is false
 - (d) q is true and p is false
 - (e) None of the above

6. Let $A = \{1, 2, 3, \dots, 30\}$. The number of subsets of A with exactly one multiple of 3 is
 - (a) 2^{10}
 - (b) $2^{10} \times 20$
 - (c) $2^{20} \times 10$
 - (d) 2^{20}

- (e) None of the above
7. A function is said to be injective (one-to-one) if
- the image set/range is a superset of the codomain
 - the image set/range is a subset of the codomain
 - the image set/range is empty
 - the image set/range is equal to the codomain
 - None of the above
8. Let A and B be two sets. Which of the following is not necessarily true?
- $\overline{A \cup B} \subseteq \bar{A} \cup \bar{B}$
 - $A \cap \bar{B} \subseteq \bar{A} \cup \bar{B}$
 - $\overline{A \cap B} \subseteq A \cup \bar{B}$
 - $\bar{A} \cap \bar{B} \subseteq A \cup \bar{B}$
 - None of the above
9. How many four digit numbers greater than 3000 can be formed using the digits 2, 2, 3, 3, 3, 4, 4, 4, 4?
- 25
 - 26
 - 51
 - 102
 - None of the above
10. A shipment agency wishes to audit its accounts statement. This can be done only when all the shipment orders are cleared. Currently, there are some backlog/pending shipment orders. Assume that the number of shipment orders received is the same on all days. Further, assume that all ships have equal capacity. Under these assumptions, it takes 4 days for 7 ships to clear the shipment orders while it takes 10 days for 3 ships to clear the shipment orders. If the shipment orders are to be cleared in 5 days then what is the minimum number of ships required?
- 3
 - 5
 - 7
 - 9
 - None of the above
11. A green and a blue dice are cast. The number three occurs on the green die. What is the probability that the sum (of both dice) is an even number?
- $\frac{1}{2}$
 - $\frac{1}{12}$
 - $\frac{1}{6}$
 - $\frac{1}{4}$
 - None of the above
12. Three numbers have a mean of 3 and a standard deviation of $\sqrt{2}$. If one of them is 1 the other two numbers are
- {4, 4}
 - {3, 5}

- (c) {3.5, 4.5}
(d) {4.2, 3.8}
(e) None of the above
13. If \vec{k} is a unit vector and scalar product $(\vec{x} - \vec{k}) \cdot (\vec{x} + \vec{k}) = 8$ then the magnitude $|\vec{x}| =$
(a) 9
(b) 6
(c) 4
(d) 3
(e) None of the above
14. If $A = \begin{pmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{pmatrix}$ and $A + A^T = I$ then $\theta =$
(a) $\frac{\pi}{6}$
(b) $\frac{\pi}{3}$
(c) π
(d) $\frac{3\pi}{2}$
(e) None of the above
15. If $A = \begin{pmatrix} x+y & y+z & z+x \\ z & x & y \\ 1 & 1 & 1 \end{pmatrix}$ then $\det(A) =$
(a) 1
(b) $x+y+z$
(c) 0
(d) xyz
(e) None of the above