

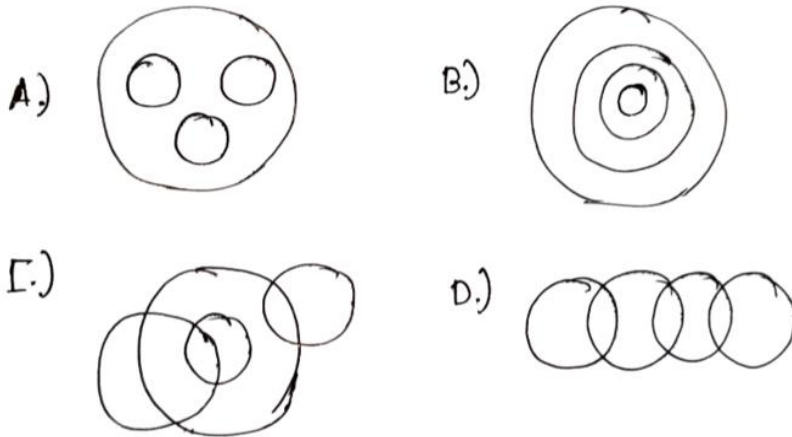
CSIR NET 2022 Mathematical Science Memory Based Questions



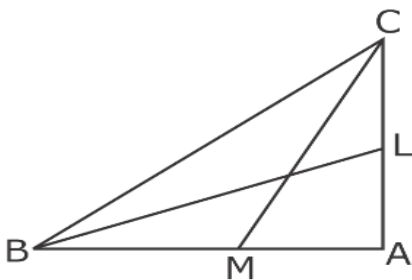
CSIR NET Mathematical Science Memory Based Questions

Part A

1. Which of the following indicates the best diagram between Vegetables, Food, Roots, and Ice Cream?



2. In a right-angled triangle ABC, the median BL, and CM are one of the same lengths. The ratio of BC to ML is.



- A. 2
B. $\frac{4}{3}$
C. $\frac{3}{4}$
D. 1

3. Statement 1 : Statement 3 is true

Statement 2 : Statement 1 is true

Statement 3 : Statement 1 is true and statement 2 is false.

Statement 4 : Statement 1, 2 and 3 false.

Which of the following statement is mutually consistent?

- A. Statement 1
- B. Statement 2
- C. Statement 3
- D. Statement 4

4. In a mixture of 360 ml, 40% is alcohol. If 3600 ml water is added to the mixture then what is the Percentage of alcohol after adding water ?

5. A watermelon of 5 kg weight contains 99% water. Some water is absorbed and water remains 98% then what is the current weight of watermelon ?

Part B & C

- 1. The hazard function of a lifetime of X is $r(x) = \frac{2x}{1-x^2}$
- 2. Consider the testing of hypothesis based on single observation x_1 to test of size $\alpha = 0.2$

$$H_0 = f(x) = 4x^3 ; 0 < x < 1$$

$$H_1 = f(x) = 8x^7 ; 0 < x < 1$$

has the power

- 1. 0.9

3. G is a simple group of order 168 then the number of elements of order 7

- A. 6
- B. 7
- C. 48
- D. 56

4. Let x, x_1, \dots, x_n be independent random variable having follows $N(\theta, \theta)$, $0 < \theta < \infty$. Then which of the following is the maximum likelihood estimator of θ ?

5. Let X be a random variable with $P[X \in \{0, 1, 2\}] = 1$

If C is any constant such that

$$P[X = i] = CP[X = i - 1] ; i = 1, 2$$

find $E(X)$

6.

1. Consider the function $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ defined by
 $f(x, y) = x^{1/3}y^{1/3}$ ($x, y \in \mathbb{R}$)

Which of following statements are true

- A. The directional derivative of f exists at $(0, 0)$ in some direction
- B. The partial derivative f_x does not exist at $(0, 0)$
- C. f is continuous at $(0, 0)$
- D. f is not differentiable at $(0, 0)$

7.

Q. Which of the given sequence (a_n) satisfy following

identity $\limsup_{n \rightarrow \infty} a_n = -\liminf_{n \rightarrow \infty} a_n$

A. $a_n = \frac{1}{n}$ for all n.

B. $a_n = (-1)^n \left(n + \frac{1}{n} \right)$ for all n

C. $a_n = 1 + \frac{(-1)^n}{n}$ for all n.

D. (a_n) is an enumeration of all rational numbers.

8.

Q. Let V be a vector space of polynomials $f(x, y) \in \mathbb{R}(x, y)$ with (total) degree less than 3. Let $T : V \rightarrow V$ be a linear transformation given by $\frac{\partial}{\partial x}$ then which of the following are true?

Ans.

(a) The nullity of T is at least 3

(b) The rank of T is at least 4

(c) The rank of T is at least 3

9. What is the largest possible real number δ such that $|x - y| < \delta$, we have

$$|\cos x - \cos y| < \sqrt{2}$$

10.

Q. Let $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ st

$f(x, y) = x^{1/3} \cdot y^{1/3}$; $x, y \in \mathbb{R}$ of the following are true?

Ans.

(a) The direction derivative $(0, 0)$ in some direction

(b) f is Cts at $(0, 0)$

(c) f is not differential at $(0, 0)$

11.

Q. Which of the given sequence (a_n) satisfy following

identity $\limsup_{n \rightarrow \infty} a_n = -\liminf_{n \rightarrow \infty} a_n$

A. $a_n = \frac{1}{n}$ for all n .

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C. $a_n = 1 + \frac{(-1)^n}{n}$ for all n .

D. (a_n) is an enumeration of all rational numbers.

12.

Q. Let V be a vector space of polynomials $f(x, y) \in \mathbb{R}(x_1, y_1)$ with (total) degree less than 3. Let $T : V \rightarrow V$ be a linear transformation given by $\frac{\partial}{\partial x}$ then which of the following are true?

Ans.

- (a) The nullity of T is at least 3
- (b) The rank of T is at least 4
- (c) The rank of T is at least 3

13.

1. Consider the function $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ defined by $f(x, y) = x^{1/3}y^{1/3}$ ($x, y \in \mathbb{R}$)

Which of following statements are true

- A. The directional derivative of f exists at $(0, 0)$ in some direction
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