

* Choose the correct option of the following

2 x 10 = 20

1. Let $A = \{ \frac{1}{m} + \frac{1}{n} : m, n \in \mathbb{N} \}$, the SupA and infA are respectively

- (i) 1 & 0 (ii) $\frac{1}{2}$ & 2 (iii) 2 & 0 (iv) 2 & 1

2. Which of the following is both open set and closed set:

- (i) \mathbb{R} (ii) $\{x \in \mathbb{R} : 0 \leq x \leq 1\}$ (iii) \emptyset (iv) $\mathbb{R} - \emptyset$

3. Every finite set has _____ limit point:

- (i) one (ii) two (iii) infinitely many (iv) No

4. Let $S = \{ (-1)^m + \frac{1}{n} : m \in \mathbb{N}, n \in \mathbb{N} \}$. Then the derived set of S (S') is equal to

- (i) $S' = \{1\}$ (ii) $S' = \{1, -1\}$ (iii) $S' = \{-1\}$ (iv) $S' = \{0, 1, -1\}$

5. Let $f: \mathbb{N} \rightarrow \mathbb{R}$ be defined by $f(n) = \sin \frac{n\pi}{2}$, $n \in \mathbb{N}$. Then the range of the sequence is

- (i) $\{0\}$ (ii) $\{-1, 1\}$ (iii) $\{0, \frac{1}{2}, 1, -\frac{1}{2}, -1\}$ (iv) $\{-1, 0, 1\}$

6. Let $u_n = (-1)^n (1 + \frac{1}{n})$, $n > 1$. Then $\overline{\lim} u_n$, $\underline{\lim} u_n$ are respectively

- (i) -1 & 1 (ii) 1 & -1 (iii) 0 & 1 (iv) -1 & 0

7. The geometric series $1 + a + a^2 + \dots$ is convergent if

- (i) $a < 1$ (ii) $|a| < 1$ (iii) $|a| \leq 1$ (iv) $|a| > 1$

8) $\lim_{n \rightarrow \infty} (\sqrt{n+1} - \sqrt{n}) = ?$

- (i) 1 (ii) -1 (iii) 0 (iv) 2

9) Let $S = \{1, \frac{1}{2}, \frac{1}{3}, \dots\}$. Then interior of S ($\text{int} S$) is equal to

- (i) $\text{int} S = \mathbb{R}$ (ii) $\text{int} S = \emptyset$ (iii) $\text{int} S = \{0\}$ (iv) $\text{int} S = \{1\}$

10) The sequence $\{(1)^n\}$ is an

- (i) Convergent sequence
(ii) Divergent sequence
(iii) Oscillatory sequence
(iv) None of the above