SEAT No.		No. of Printed Pages :	
[70]	Sardar Patel University , Vallabh Vidyanagar		
B.Sc Sem: V Subject : Mathematics			
Date: 24/12/2020	US05CMTH21 [Real Analysis]	Time:2.00 to 4.00	Max.Marks: 70
Q.1 Choose the correct option	for each of the following.	•	[10]
(1)Which of the following	g is an ordered field ?		
(a) Q (b) R	(c) N (d) none of these		
(2) The Smallest number	of a set ,if exists is		
(a) the supremum of t	the set (b) the infimum of the set (c)	not unique (d) none	
(3) The supremum of $\left\{\frac{1}{m}\right\}$	$\left\{ +\frac{1}{n}/m,n\in N\right\}$ is		
(a) 0 (b) 1	(c) 2 (d) none		* .
(4) Every open interval in	n R isset	And the second	
(a) an open (b) a clos	ed (c) open and closed (d) none		•,
(5) The derived set of A	={1,2,3,4} is		\$ * ·
(a) A (b) R (c) Ø (d) Z		1 38
(6) The closure of Qi.e	$ ilde{Q}$ is		. *
(a) N (b) Q	(c) Ø (d) R		
(7) The Range of seque	nce is always		
(a) empty (b) infinit	te (c) non- empty (d) none		
(8) Every convergent se	equence is		
(a) oscillating (b) b	ounded (c) unbounded (d) none	. :	
(9) A positive term serie	es $\sum \frac{1}{n^p}$ is convergent iff		No.
(a) $p = 1$ (b) 0	(c) $p > 1$ (d) $p < 0$		
110) A sorios Valuis co	nvergent then lim u		

(a) $\neq 0$ (b) = 0 (c) = 1 (d) does not exists

Q.2 Do as directed.

[8]

- (1) The infimum of $\left\{\frac{(-1)^n}{n}/n \in N\right\}$ is
- (2) If S =(0,5) U {5,6,7} then the greatest element of S is
- (3) If $S_n = \left(\frac{-1}{n}, \frac{1}{n}\right)$, $\forall n \in \mathbb{N}$ then $\bigcap_{n=1}^{\infty} S_n = \dots$
- (4) is a limit point of a set $S = \left\{ \frac{1}{n} / n \in \mathbb{N} \right\}$
- (5) The range of sequence $\{(-1)^n/n \in N\}$ is
- (6) True Or False: A sequence without limit point is bouded.
- (7) True Or False :If a positive term series $\sum_{n=1}^{\infty} u_n$ is convergent then its partial sums is bounded above.
- (8) True Or False :The series $\sum_{n=1}^{\infty} \frac{n}{n+1}$ is convergent.
- Q.3 Attempt anyTEN:

[20]

- (1) Define : An Ordered Field.
- (2) Prove that the greatest lower bound of a set S is unique, if it exist.
- (3) Find the g.l.b and l.u.b of $\left\{1+\frac{(-1)^n}{n}/n\in N\right\}$ if they exist.
- (4) Prove that every open set is a union of open intervals.
- (5) Define: An open set.
- (6)Define: A limit point of a set .
- (7)Define: A convergent sequence.
- (8) Prove that every convergent sequence is bounded.
- (9) Prove that $\lim_{n\to\infty} \frac{3+\sqrt{2}n}{n} = \sqrt{2}$
- (10) Define: Infinite series
- (11) Prove that the series $\sum_{n!}^{\infty}$ is convergent. n=1
- (12) Investigate the behaviour of the series whose n^{th} term is $n^{\frac{1}{n}}$.

Q.4 Attempt any FOUR:

- (1) State and Prove the Archimedean property of R.
- (2) Prove that the set of all rationals Q is not an order complete field.
- (3) Prove that a set is closed iff its complement is open .
- (4) Prove that the union of arbitrary family of open sets is open.
- (5) State and Prove Bozano-Weierstrass theorem for sequence.
- (6) State and Prove Cauchy's first theorem on limits.
- (7) State and Prove comparision test of first type.
- (8) Prove that the positive term geometric series $1+r+r^2+\cdots$ converges for r<1 and diverges to ∞ for $r\geq 1$.