ADITYA DEGREE COLLEGES :: ANDHRA PRADESH

INTRODUCTION TO REAL ANALYSIS

MID-I MATHS- MINOR

Time:2 hrs. Marks:60

SECTION-A **5 x 4 = 20 M**

Answer any five from the following questions:

1. Every convergent sequence is bounded.
2. Using sandwich theorem prove that $\lim_{n \to \infty} \left(\sqrt{n^2+n} - n\right) = \frac{1}{2}$
3. If Sn= $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + ... + \frac{1}{n(n+1)}$ prove that $\{S_n\}$ is convergent.
4. Show directly from definition that the sequence Sn= $1 + \frac{1}{2!} + \frac{1}{3!} + ... + \frac{1}{n!}$ is came by sequence.
5. Test for convergence $\sum_{n=1}^{\infty} \frac{2n-1}{n(n+1)(n+2)}$
6. Test for convergence $\sum \frac{2^n}{n^3}$
7. Test for convergence $\sum \frac{2^n - 2}{2^n + 1} x^n$
8. Prove that 1- $\frac{1}{2} + \frac{1}{3} - \frac{1}{4} + ...$ converges.

SECTION - B

Answer all the following questions: **4 X10 = 40 M**

9. (a)Prove that the sequence $\{S_n\}$ defined by $S_n= (1+\frac{1}{n})^n$ is convergent.

(or)

(b) A monotonic sequence is convergent iff it is bounded.

10. (a) Prove that lim $\left[\frac{1}{(n+1)^2} + \frac{1}{(n+2)^2} + ... + \frac{1}{(n+n)^2}\right] = 0$

(or)

(b)State and prove Cauchy general principle.

11. (a)State and prove limit comparison test.

(or)

(b)State and prove D′ alembert's Ratio test.

12. (a) State and prove Leibnitz test.

(or)

(b) Test for a convergence $\sum_{n=1}^{\infty} \left(3\sqrt{n^3+1} - n\right)$