ADITYA DEGREE COLLEGE

ANDHRA PRADESH

II YEAR B.Sc IV-SEMESTER – MID 1 EXAMINATIONS

Introduction to Real Analysis & Problem Solving Sessions

Date: ***Max Marks:60M***

SECTION - A

I Answer the FIVE of the following Questions 5 x 4 = 20M

1. If $S_n = \sqrt{n+1} - \sqrt{n}$ prove that lim $s_n = 0$.

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

3. If $S_n = \frac{1}{1.2} + \frac{1}{2.3} + \ldots. + \frac{1}{n(n+1)}$, prove that {Sn} is convergent.

4. Prove that the sequence $S_n = 1 + \frac{1}{2} + \frac{1}{3} + \ldots.. + \frac{1}{n}$ is not convergent.

5. Test for convergence $\sum_{n=1}^{\infty} \frac{1}{2^n + 3^n}$

6. Test for convergence $\Sigma \frac{2.4.6....(2n)}{5.7.....(2n+3)}$

7. Test for convergence $\Sigma \frac{n^{n^2}}{(n+1)^{n^2}}$

8. Examine the convergence of $\frac{1}{1.2} - \frac{1}{3.4} + \frac{1}{5.6} -$ ……

SECTION – B

II Answer the following Questions 4 x 10 = 40M

9. (a) State and prove sandwich theorem.

(or)

(b) Discuss the nature of the sequence $\{r^n\}$ for all $-1 < r \leq 1$.

10. (a) A monotonic sequence is convergent iff it is bounded.

(or)

(b)Prove that the sequence $\{S_n\}$ defined by Sn= $1 + \frac{1}{1!} + \frac{1}{2!} + \ldots. + \frac{1}{n!}$ is convergen

11. (a) State and prove D′ Alembert′s Ratio test.

(or)

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

12. (a) State and prove Leibnitz test.

(or)

(b) State and prove n^{th} root test.

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