SELF ASSESSMENT TEST -5
CLASS B.A,B.SC-2
INFINITE SERIES

1.If $\sum_{1}^{\infty} a_n$ is cgt then prove that $\lim_{n\to\infty} a_n = 0$,converse is not true

2.Is $\sum_{1}^{\infty} \frac{n^2-1}{n^2+1}$ cgt ? justify your answer.

3.Apply Cauchy Criterion to prove the cgt of $\sum_{1}^{\infty} \frac{1}{n^2}$.

4.Discuss the cgs $\sum r^{\log n}$ r > 0

5.Prove that $\sum_{2}^{\infty} (-1)^n \frac{\log n}{n^2}$ cgt.

6. If the $\sum a_n$ is absolutely cgt, then prove that is cgt. Is its converse true

7.Discuss the cgs of $\sum (-1)^n \left(n^{\frac{1}{n}} - 1\right)$.

8.Show that $\sum (-1)^{n-1} \frac{n+1}{n}$ oscillates finitely

9.Discuss the cgs $\sum_{1}^{\infty} \frac{1}{x^n + x^{-n}}$, x > 0

10. If $\sum a_n$ is a positive terms cgt series then show that $\sum a_n^2$ is cgt. Is the converse true ?

11.Discuss the cgt of $\sum u_n$ where a >1 and $u_n = a^{\frac{1}{n}} - 1 - \frac{1}{n}\log a$.

12.Discuss the cgs of $\sum \frac{1}{n^{1+\frac{1}{n}}}$

13.Discuss the cgs $\sum\left(\frac{1}{n}-\log\frac{n+1}{n}\right)$.

14.Discuss the cgs $\sum \frac{a^n}{a^n+x^n}$.

15.If $\sum a_n$ is cgt then so is $\sum \frac{a_n}{1+a_n}$.

16. Discuss the cgt $\sum \frac{1}{n}\sin\frac{1}{n^2}$.

17.state Cauchy's condensation test & using this test prove that $\sum \frac{1}{n^p}$, p>0 cgt if p>1 and divergent if p $\leq$ 1.

18.State Cauchy's integral test & using this test prove that $\sum \frac{1}{n^p}$, p>0 cgt if p>1 and div if p $\leq$ 1

19. Prove that $\sum \frac{1}{n^p}$ p>1 cgt and its sum lies between $\frac{1}{p-1}$ & $\frac{p}{p-1}$.

20. Prove that $\sum_{n=2}^{\infty} a_n$, where $a_n \frac{1}{n^p(\log n)^q}$ cgt if either p > 1 or p=1 and q>1.

21.Discuss the cgs or div $\sum_{3}^{\infty} \frac{1}{n\log n(\log\log n)^p}$ p>0.

22.Discuss the cgs or div of (a) $\sum q^{n^2} r^n$ q,r >0 . (b) $\sum e^{-\sqrt{n}} r^n$ r >0 .

23.Discuss the cgs or div $\frac{2}{1^2}x+\frac{3^2}{2^3}x^2+\frac{4^3}{3^4}x^3+................,x>0$