AMOGH GARG - 2020UCO1688 - CONVERGENCE TEST

(1) P-Series Test: The series $\sum_{n=1}^{\infty} \frac{1}{n^p} = 1 + \frac{1}{2^p} + \frac{1}{3^p} + \cdots$

(a) is convergent if $p > 1$; (b) Divergent if $p \leq 1$

(2) Comparison Test: If $\sum u_n$ and $\sum v_n$ be 2 positive term ∞ series st from and after some particular term $\lim_{n\to\infty} \frac{u_n}{v_n} = K$ (Finite, non zero) then $\sum u_n$ and $\sum v_n$ are either both convergent or divergent.

(3) D'Alembert's Ratio Test: If $\sum u_n$ be a +ve term series st from and after some particular term $\lim_{n\to\infty} \frac{u_n}{u_{n+1}} = K$

then $\sum u_n$: (i) converges if $K > 1$
(ii) Diverges if $K < 1$
(iii) Test fails for $K = 1$

(4) Raabe's Test: If $\sum u_n$ be a +ve term series, st from and after some particular term $\lim_{n\to\infty} n\left(\frac{u_n}{u_{n+1}} - 1\right) = K$,

then $\sum u_n$: (i) converges if $K > 1$
(ii) Diverges if $K < 1$
(iii) Test fails for $K = 1$

(5) Logarithmic Test: If $\sum u_n$ be a +ve term series st from and after some particular term $\lim_{n\to\infty} n \log \frac{u_n}{u_{n+1}} = K$

then $\sum u_n$: (i) converges if $K > 1$
(ii) Diverges if $K < 1$
(iii) Test fails for $K = 1$

(6) Cauchy's Root Test: If $\sum u_n$ be a series (+ve term), st from and after some particular term $\lim_{n\to\infty} (u_n)^{1/n} = K$

then $\sum u_n$: (i) converges if $K < 1$
(ii) Diverges if $K > 1$
(iii) Test fails for $K = 1$

(7) Integral Test: If $f(x)$ is +ve, continuous and monotonically decreasing and st $f(x) = u_n$ then $\sum u_n$ is convergent or divergent, according as the value of integral $\int_1^{\infty} f(x) \cdot dx$ is finite and unique or infinite.