Sheet-3

Q.1 Check whether the following series is absolutely convergent, conditionally convergent or divergent.

1) $\sum_{n=1}^{\infty} (-1)^n 3^{-n}$, 2) $\sum_{n=1}^{\infty} (-1)^n n \sin\left(\frac{1}{n}\right)$, 3) $\sum_{n=1}^{\infty} (-1)^n \frac{2^{-n}}{n}$, 4) $\sum_{n=2}^{\infty} \frac{(-1)^n}{\ln n}$,

5) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{(\ln n)^3}{n}$, 6) $\sum_{n=1}^{\infty} (-1)^n \frac{\tan^{-1} n}{n^2+4}$, 7) $\sum_{n=1}^{\infty} (-1)^n \frac{\sec^{-1} n}{2^{n-1}}$,

8) $\sum_{n=1}^{\infty} (-1)^n \frac{1}{n^{\frac{1}{3}}}$, 9) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{2^n}{n!}$, 10) $\sum_{n=1}^{\infty} (-1)^n \frac{\ln n}{n^4}$,

11) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{n^n}{4^n}$, 12) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!}$, 13) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{\sqrt{n}}{2n-1}$,

14) $\sum_{n=1}^{\infty} (-1)^n \frac{2^n}{n}$, 15) $\sum_{n=1}^{\infty} (-1)^n \frac{n!}{n^n}$, 16) $\sum_{n=2}^{\infty} (-1)^n \frac{1}{\sqrt{\ln n}}$,

17) $\sum_{n=1}^{\infty} \frac{\sin n}{n^2}$, 18) $\sum_{n=2}^{\infty} \frac{\sin n\pi}{n}$, 19) $\sum_{n=2}^{\infty} \frac{\cos n}{2n^2-1}$

Answers: 1) Absolutely convergent, 2) Divergent, 3) Absolutely convergent, 4) Conditionally convergent, 5) Conditionally convergent, 6) Absolutely convergent, 7) Absolutely convergent, 8) Conditionally convergent, 9) Absolutely convergent, 10) Absolutely convergent, 11) Divergent, 12) Absolutely convergent, 13) Conditionally convergent, 14) Divergent, 15) Absolutely convergent, 16) Conditionally convergent, 17) Absolutely convergent, 18) Conditionally convergent, 19) Absolutely convergent.