

(Lecture
19)

Root Test

$$\lim_{x \rightarrow \infty} (qn)^{1/n} = l \quad \left| \quad \lim_{x \rightarrow \infty} (1+x)^{1/x} = e$$

Ques 1:-

$$\sum_1^{\infty} n^n$$

$$a_n = n^n$$

$$= \lim_{n \rightarrow \infty} (n^n)^{1/n}$$

$$= \lim_{n \rightarrow \infty} n = \infty \text{ (Diverge)}$$

Ques 2:-

$$\sum_1^{\infty} \left(\frac{2^n}{n^3} \right)$$

$$a_n = \frac{2^n}{n^3}$$

$$= \lim_{n \rightarrow \infty} \left(\frac{2^n}{n^3} \right)^{1/n}$$

$$= \lim_{n \rightarrow \infty} \left(\frac{2}{n^{3/n}} \right) = \frac{2}{1} = 2 \text{ (Diverge)}$$

Ques no 3:- (Important Question)

$$\sum_1^{\infty} \left(\frac{3n+2}{2n-1} \right)^n$$

$$a_n = \left(\left(\frac{3n+2}{2n-1} \right)^n \right)^{1/n}$$

$$= \lim_{n \rightarrow \infty} \left(\left(\frac{3n+2}{2n-1} \right)^n \right)^{1/n}$$

$$= \lim_{n \rightarrow \infty} \frac{n(3+2/n)}{n(2-1/n)} = \frac{3}{2} \text{ (Diverge)}$$

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Que no 4:- (Important Question)

$$\sum_1^{\infty} \frac{1}{n^n}$$

$$a_n = \frac{1}{n^n}$$

$$= \lim_{n \rightarrow \infty} \left(\frac{1}{n^n} \right)^{1/n} = \lim_{n \rightarrow \infty} \left(\frac{1}{n} \right)$$

$$= \frac{1}{\infty} = 0 \quad (\text{Convergent})$$

Que no 5:- $\sum_1^{\infty} \left(\frac{n}{10} \right)^n$

$$a_n = \left(\frac{n}{10} \right)^n$$

$$= \lim_{n \rightarrow \infty} \left(\left(\frac{n}{10} \right)^n \right)^{1/n}$$

$$= \lim_{n \rightarrow \infty} \left(\frac{n}{10} \right) = \frac{\infty}{10} = \infty \quad (\text{Divergent})$$