Tutorial Sheet No. 07

Course: B.Tech. (CSE, IT, ECE, EEE, ME, CE, FT)

Year & Semester: I / II

Subject & Code: Mathematics – II (BAS – 203)

Unit & Topic: III / Sequence and Series

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1. Test the convergence of the sequence $< u_n >$ if

(i) $u_n = \frac{n}{n^2+1}$ [Ans.: convergent] (ii) $u_n = [n + (-1)^n]^{-1}$ [Ans.: convergent]

(iii) $u_n = \sin n$ [Ans.: oscillatory] (iv) $u_n = 2n + 1$ [Ans.: divergent]

2. 1. Test the convergence of the series:

(i) $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \cdots$ [Ans.: convergent]

(ii) $-1 - 2 - 3 - 4 - \cdots$ [Ans.: divergent]

(iii) $1 - 2 + 3 - 4 + 5 - \cdots$ [Ans.: oscillatory]

(iv) $1 + 4 + 9 + 16 + 25 + \cdots$ [Ans.: divergent]

(v) $1 + 8 + 27 + 64 + \cdots$ [Ans.: divergent]

(vi) $\frac{1}{3} + \frac{4}{3^2} + \frac{9}{3^3} + \cdots$ [Ans.: convergent]

3. Test the convergence of the series $\sum u_n$ where

(i) $u_n = \frac{2^n}{n^3}$ [Ans.: divergent]

(ii) $u_n = \frac{\sqrt{n}}{\sqrt{n^2+1}} x^n; x > 0$ [Ans.: convergent for $x < 1$ and divergent for $x \geq 1$]

4. Test the convergence of the series $\frac{x}{1.2} + \frac{x^2}{3.4} + \frac{x^3}{5.6} + \cdots$

[Ans.: convergent for $x \leq 1$ and divergent for $x > 1$]

5. Test the convergence of the series $\sum \frac{1}{\sqrt{n+1}-1}$ [Ans.: divergent]