Department of Mathematics

15B11MA211 **Mathematics-II**
B.Tech. Core

Tutorial Sheet 4 (Alternating Series and Power Series)

1. Test the series $\sum(-1)^{n-1}\frac{1}{n^p}$ for (a) convergence (b) absolute convergence.
2. Show that the series $\frac{2}{1^2}-\frac{3}{2^2}+\frac{4}{3^2}-\frac{5}{4^2}+\ldots$ converges conditionally.
3. Discuss the convergence of the series
$$1-2x+3x^2-4x^3+\ldots$$
4. Show that the series $x-\frac{x^3}{3}+\frac{x^5}{5}-\ldots$ converges if and only if $-1\le x\le 1$.
5. Test for the uniform convergence for the series
$$1+a\cos x+a^2\cos 2x+a^3\cos 3x+\cdots a^n\cos nx+\cdots\ldots$$
6. Find the radius of convergence and region of convergence for the following series:
$$\sum n(x+2)^n/3^{n+1}$$

Ans:

1. (a) convergent for all p≥0
   (b) absolute convergent for p>1
3 convergent for |x|<1, divergent for |x|≥1
5 uniform convergent for |a|<1.
6 3, -5<x<1