

Assignment-2

KKSJ MANINAGAR SCIENCE COLLEGE

B. Sc. (Sem-VI)
MAT-308 (Analysis-II)

- Find radius of convergence and interval of convergence of
(i) $\sum_{n=1}^{\infty} \frac{n(x-3)^n}{(n+1)3^n}$ (ii) $\sum_{n=1}^{\infty} \frac{2^n x^n}{n!}$.
- If the series $\sum_{n=0}^{\infty} a_n$ and $\sum_{n=0}^{\infty} b_n$ converge absolutely to A and B respectively then prove that their Cauchy Product series $\sum_{n=0}^{\infty} c_n$ is convergent and if C is the sum of Cauchy product then $C = AB$.
- Test the convergence of (i) $\int_0^1 \frac{1}{\sqrt{1-x}} dx$ and (ii) $\int_0^{\frac{\pi}{2}} \tan x dx$.
- State Taylor's theorem. Using Lagrangian form for the remainder, for any real x show that
$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^n}{n!} + \cdots$$
- Expand $\sin x$ in powers of $x - \frac{\pi}{4}$.
- Show that $(1+x)^\alpha \approx 1 + \sum_{n=1}^{\infty} \frac{\alpha(\alpha-1)(\alpha-2)\cdots(\alpha-n+1)}{n!} x^n$, and find its radius of convergence.
- Obtain the power series solution of the differential equation $(1-x)y' - 2y = 0$ with initial condition $y(0) = 4$.
- Find Taylor's series of $\log x$ in powers of $x - 2$.
