Parul University

Faculty of Engineering & Technology

Department of Applied Sciences and Humanities

1st Year B.Tech Programme (All Branches)

Mathematics – 1 (303191101)

Assignment -4

Q.1 **Short questions.**

1. If $f(x)$ is continuous on $[a, \infty)$, then $\int_a^{\infty} f(x)dx =$ _____.
2. $\int_1^{\infty} \frac{1}{x^2} dx =$ _____.
3. If the improper integrals of the second type and if $f(x)$ is unbounded at $x = a$ then $\int_a^b f(x) =$ _____.
4. $\Gamma(\frac{1}{2}) =$ _____.
5. Show the relation between $Beta$ and $Gamma$ function in equation form.
6. A function $f(x)$ is said to be even, if $f(-x) =$ _____.
7. Find the function $|x|$ is even or not?
8. If $f(x)$ is periodic then $f(x + p) =$ _____.

Q.2 **Solve examples.**

1. Evaluate $\int_{-\infty}^{0} x \, sin \, sin \, x \; dx$ & $(ii) \int_0^5 \frac{1}{(x-2)^2} dx$.
2. Test the convergence of

$$(i) \int_{-\infty}^{0} \frac{2x}{x^5} dx, (ii) \int_1^{\infty} e^{-x^2} dx, (iii) \int_0^1 \frac{1}{x^2 + \sqrt{x}} dx \; \& \; (iv) \int_0^1 \frac{1 - e^{-x}}{x^3} dx$$

3. Evaluate $(i) \int_0^{\infty} \sqrt{x} e^{-\sqrt[3]{x}} dx$ & $(ii) \int_3^7 \sqrt[4]{(x-3)(7-x)} \, dx$.
4. Obtain the Fourier series to represent $f(x) = e^{ax}$ $(a \neq 0)$ in the interval $0 < x < 2\pi$.
5. Expand $f(x) = |cos \, cos \, x|, -\pi \leq x \leq \pi$ *as Fourier series*.
6. Find the Fourier sin series of $f(x) = x - \pi, for \; 0 < x < 3$.
7. Find a Fourier series of $f(x) = x^2, \; 0 < x < c$.
8. Express $f(x) = x,$ as a half range *sin series and cosine series* in $0 < x < 2$.