SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc.Mathematics - END SEMESTER EXAMINATIONS - NOV'2024
SEMESTER - II

20UMACT2004 - Integral Calculus and Fourier Series

Total Duration : 2 Hrs.30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Integrate $x^2\ e^{-x}$.
2. Integrate $e^x\ (x-1)^2$.
3. Evaluate $\int e^{2x} \cos 3x dx$.
4. Evaluate $\int a^2 sinx$.
5. Evaluate $\int_0^1 x^6(1-x)^9 dx$
6. Find the Fourier representation of $f(x) = x 0 \leq x \leq 2\pi$.
7. Find the Fourier series for $f(x) = e^x$ in $[\pi, -\pi]$.
8. Find the Fourier series of $f(x) = x^2$ in the interval (0, 2π).

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Evaluate $\int_0^a \sqrt{a^2 - x^2} dx$.
10. Integrate $\int x^3 sin3x$.
11. Evaluate $\int_0^1 x^m \left(log\frac{1}{x}\right)^n dx$.
12. Obtain the Fourier series expansion for the function
    $f(x) = \begin{cases} x, & \text{for} 0 \leq x \leq \pi \\ 2\pi - x, & \text{for} \pi \leq x \leq 2\pi \end{cases}$ and deduce that
    $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5} + ... = \frac{\pi^2}{8}$.
13. Expand the function $f(x)$ in Fourier series $f(x) = \begin{cases} \pi + x, -\pi < x < 0 \\ \pi - x, 0 < x < \pi \end{cases}$.

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