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. END SEMESTER EXAMINATIONS APRIL-2022
SEMESTER - II
20UMACT2004 - Integral Calculus and Fourier Series

Total Duration : 3 Hrs. **Total Marks : 60**

Section A

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

1. If $I_n = \int_0^{\pi/4} \tan^n$ x dx prove that $I_n + I_{n-2} = 1/n - 1$ and hence evaluate I_5.
2. Evaluate $\iint xy$ dx dy over the region in the positive quadrant for which x + y=1.
3. Evaluate $\int_0^{\pi} \int_0^{a} (1 + \cos\theta)$ r dr dθ.
4. Find the third form of beta function $\beta(m, n) = \int_0^1 x^{m-1}(1 - x)^{n-1}$dx.
5. Find the fourier series of f(x) = x in the interval (0, 2π) .
6. Find the fourier series of f(x) = x^2 in interval (-π,π) .
7. Obtain a cosine series for f(x) = e^x , 0 < x < π.
8. Expand f(x) = $\cos x, 0 < x < \pi$ in half – range sine series.

Section B

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

9. Find the reduction formula for $\int \sin^n$ x dx.
10. Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z}$ dzdydx.
11. Derive the relation between beta – gamma function.
12. Develop a fourier series for the function f(x) = x(π - x) in the interval (0, 2π).
13. Expand f(x)= 2X – x^2 in the interval (0,2).

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