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.Statistics - END SEMESTER EXAMINATIONS - NOV'2024
SEMESTER - II
20USTAT2002 - Allied Mathematics - II

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

Section B

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

1. Prove that the inverse image of the union of two sets is the union of the inverse images.
2. Define composition of functions. And find g ∘ f, where f(x) = 1+ sin x, - ∞ < x < ∞ and g(x) = x^2, 0 ≤ x < ∞ .
3. Show that $\sum_{n=1}^{\infty} (1/n)$ is divergent.
4. Define (i) Limit of the sequence (ii) Convergent sequence
   (iii) Divergent sequences.
5. Find the Taylor series about $x = 0$ for the function $f(x) = sinx$, $x \in R$.
6. Show that $L(cosat) = \frac{s}{s^2 + a^2}$.
7. Compute Laplace transform of $\left[\frac{1 - e^t}{t}\right]$.
8. Determine the inverse Laplace transform of $\left(\frac{1}{(s+a)^2}\right)$.

Section C

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

9. Show that the countable union of countable sets is countable and concluded that the set of all rational number is countable.
10. If $\sum_{n=1}^{\infty} a_n$ is a divergent series of positive numbers, then show that there is a sequence $\{\varepsilon_n\}_{n=1}^{\infty}$ of positive numbers which converges to zero but for which $\sum_{n=1}^{\infty} \varepsilon_n \, a_n$ still diverges.
11. State and prove Rolle's theorem and examine the derivatives property through an example.
12. Predict the value of $L(sin^3 \, 2t)$.
13. Determine the inverse Laplace transform of $\frac{1 + 2s}{(s+2)^2(s-1)^2}$.

*****