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 NOVEMBER – 2022
SEMESTER – II

20USTAT2002– Allied Mathematics – II

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

Section A

Answer any ***SIX*** questions (6 × 5 =30 Marks)

1. Which of the following statement is correct:

   A: The inverse image of the intersection of two sets is the union of the inverse of images.

   B. The inverse image of the union of two sets is the union of the inverse of images.
   Justify your answer.

2. If f is a continuous function on the closed bounded interval [a, b], f ′(x) exists for all x in (a, b) and if there exists c in (a, b), then compute the value of f ′(c).

3. Show that

   (i) $L(\cos at) = \frac{s}{s^2 + a^2}$

   (ii) $L(\sin\ at) = \frac{a}{s^2 + a^2}$

4. Determine the inverse Laplace transform of $\left(\frac{1}{(s+a)^2}\right)$.

5. Show that the sequence $\{10^7 / n\}_{n=1}^{\infty}$ has a limit 0.

6. Show that the Taylor series about x = 0 for f(x) = sin x converges to sin x for every real x.

7. Compute Laplace transform of $\left[\frac{1-e^t}{t}\right]$.

8. Compute $L^{-1}\left(\frac{s}{(s+2)^2}\right)$.

Contd...

Section B

Part A

Answer any ***THREE*** questions (3 × 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($t e^{-t} \sin t$).

13. Determine the inverse Laplace transform of

$$\frac{1}{(s+1)(s^2+2s+2)}$$

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