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 - V

20UMACT5010 - Real Analysis

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

Section B

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

1. Prove that a non-decreasing sequence which is bounded above is convergent.
2. Show that the sequence $\left\{ \left(1 + \frac{1}{n}\right)^n \right\}_{n=1}^{\infty}$ is convergent.
3. Define Cauchy sequence and prove that if $\{s_n\}_{n=1}^{\infty}$ is a Cauchy sequence of real numbers, then $\{s_n\}_{n=1}^{\infty}$ is convergent.
4. Discuss conditional convergence and absolute convergence.
5. Prove that every subset of R_d is open.
6. If $\langle M, \rho \rangle$ be a complete metric space and A is a closed subset of M, then prove that $\langle A, \rho \rangle$ is also complete.
7. State and prove Rolle's theorem.
8. State and prove the second fundamental theorem of calculus.

Section C

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

9. Prove that countable union of countable sets is countable.
10. State and prove nested-interval theorem.
11. If G_1 and G_2 are open subsets of the metric space M, then prove that $G_1 \cap G_2$ is also open.
12. State and prove Picard fixed-point theorem.
13. If f is continuous on the closed bounded interval [a, b], and if F(x)= $\int_a^x f(t)dt$, $(a \leq x \leq b)$, $then\ F'(x) = f(x)$ $(a \leq x \leq b)$.

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