STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(Effective from the academic year 2019-2020)

CODE: 19MT/PC/RA14

REAL ANALYSIS

END SEMESTER EXAMINATION – NOVEMBER 2021

Time: 3 Hours **Max marks: 100**

SECTION – A

ANSWER ALL THE QUESTIONS: **($2 \times 4 = 8$)**

1. What are adherent points of a set in R^n? Distinguish it from an accumulation point giving an example for each.
2. What are the Additive Property of Total Variation of a function of bounded variation.

SECTION – B

ANSWER ANY TWO QUESTIONS: **($2 \times 12 = 24$)**

3. Establish : The Integral as a Function of the Interval in R-S integrals.
4. Derive : Taylor's formula for functions from $\Re^n$ to $\Re^1$
5. If A be an open subset of $\Re^n$ and $\bar{f} : A \to \Re^n$ has continuous partial derivatives $D_i f_i$ on A. If $J_{\bar{f}}(\bar{x}) \neq 0$ for all $\bar{x}$ in A, prove that $\bar{f}$ is an open mapping.

SECTION – C

ANSWER ANY TWO QUESTIONS: **($2 \times 34 = 68$)**

6. a) State and prove Bolzano-Weierstrass Theorem.
   b) If f is function of bounded variation on $[a, b]$ and if $c \in (a, b)$ then prove that f is function of bounded variation on $[a, c]$ and f is function of bounded variation on $[c, b]$ and check its total variations.
   c) Derive Integration by Parts for R-S integrals. (15+9+10)

7. a) Necessary and Sufficient Condition for Existence of Riemann-Stieltjes Integrals
   b) Derive a sufficient condition for differentiability.
   c) State and prove the matrix form of chain rule for derivatives. (15+9+10)

8. State and prove implicit function theorem proving inverse function theorem.

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