

## PREFACE

The works of the thesis, arranged in five Chapters, concern generalised limit, continuity, derivatives and integrals of real valued functions of a real variable relative to a non-decreasing function  $\omega$ .

In Chapter I, we introduce the definition of  $(\omega)$ sparse sets which is a generalisation of the notion of sparse sets recently introduced by Sarkhel and De [48]. Then we define  $(\omega)$ proximal extreme limits and  $(\omega)$ proximal continuity. We prove, among other things, that if  $\omega$  is continuous on an interval  $I$ , then a  $(\omega)$ proximal continuous function on  $I$  is Darboux. The contents of this Chapter form the subject matter of my paper entitled "On  $(\omega)$ proximal extreme limits and  $(\omega)$ proximal semi-continuity" which is accepted for publication in the "Bulletin of the Calcutta Mathematical Society".

In Chapter II, we introduce the notion of  $(\omega)$ proximal derivatives. Among other things, we show that the  $(\omega)$ proximal derivatives are  $(\omega)$ measurable.

In Chapter III, we introduce the notions of  $PBV-\omega$  and  $PAC-\omega$  functions as generalisations of the notions of  $(PVB)$  and  $(PAC)$  functions respectively recently introduced by Sarkhel

and Kar [49]. These notions are further generalised to  $PBVG-\omega$  and  $PACG-\omega$  functions. We establish different properties of functions which are  $PBV-\omega$ ,  $PAC-\omega$ ,  $PBVG-\omega$  and  $PACG-\omega$ . In particular, we show that a  $PACG-\omega$  function satisfies Lusin's condition  $(N_\omega)$  (Definition 3.2.4).

In Chapter IV, we introduce a  $(\omega)$ proximally continuous Perron type integral (the (PPS)-integral). We study different properties of the (PPS)-integral. In particular, we prove the Cauchy property of this integral. The contents of this Chapter form the subject matter of my paper entitled "Proximal Perron-Stieltjes integral" which is accepted for publication in the "Commentationes Mathematicae".

In Chapter V, we introduce a  $(\omega)$ proximally continuous Denjoy type integral (the (PDS)-integral) whose indefinite integral is  $ACG-\omega$ . The (PDS)-integral is defined descriptively by the method of Saks ([44], p.241). We study different properties of this integral. We give a characterisation of the (PDS)-integral in terms of the Cauchy and Harnack properties. We also give a constructive definition of the (PDS)-integral. Finally in §6 of this Chapter, we introduce an integral (the (GPDS)-integral) whose indefinite integral is  $(\omega)$ proximally continuous and  $PAC-\omega$ . The (GPDS)-integral is more general than the (PDS)-integral. The contents of §1 - §4 of this

Chapter form the subject matter of my paper entitled "On the proximal Denjoy-Stieltjes integral" which has appeared in "Indian Journal of Pure and Applied Mathematics, Volume 16, September 1985, p.975 - 993".

In fine, I wish to express my warmest thanks to the authors of the books and papers referred to in pages 204 - 209 whose expositions have helped me to complete the work. Also I am grateful to the University of North Bengal for giving me the permission to submit the thesis for the degree of Doctor of Philosophy (Science).

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