Conclusion, limitations and future plan

**Conclusion.** An almost contact manifold is a smooth manifold with a maximally non-integrable hyperplane distribution. Again if it carries a compatible Riemannian metric, then it becomes almost contact metric manifold. This maximally non-integrable distribution restricts one to directly apply the Ricci flow theory over this structure. For this reason, we have chosen the non-dynamical aspect of the Ricci flow. We have treated the compatible Riemannian metric as a fixed background metric and considered its evolution by means of pure homothety and scaling, i.e. we have considered our compatible Riemannian metric as a $RS$.

Since the general study of $RS$s in contact geometric framework is well studied on the literature but few are available when one changes the affine connection. In this thesis we concentrated on this issue.

The main results we have obtained in our framework that the background manifolds, evolving $RS$ equation, reduces to the Einstein class and some other weaker classes. Thus one can not find non-trivial $RS$ structure in this setup. Also we have obtained many information about the potential vector field of the $RS$ and studied various weaker notion of symmetry. Among others we have observed that how the $RS$ structure
changes when we deform the underlying almost contact structure (Kenmotsu structure in our case) by $D$-homothetic deformation. We also constructed some interesting examples to verify our theorems in some cases.

**Limitations and future plan.** The prime concern of the thesis is to investigate $RS$ and some of its generalizations (namely, $RAS$ and $\eta$-$RS$s) on some types of almost contact metric manifolds. Largely based on some theoretical works, we have made a thorough study of Kenmotsu manifolds, $GSSF$, generalized $(k,\mu)$-space-forms, para-Sasakian manifolds whose metric tensor is $RS$ and some of its generalizations. Beside this we may also study another so many almost contact metric manifolds whose metric tensor is $RS$ and their generalizations. We may also investigate many remaining generalizations of $RS$, like $h$-$RS$, conformal $RS$ etc. in almost contact metric structure setting, para contact structure setting, Lorentizian setting. Though we have tried to little study $RS$ structure in para Sasakian manifolds in last chapter of the thesis. We used some connections, namely Levi-Civita connection, semisymmetric metric connection, quarter symmetric non-metric $\phi$-connection, Schouten-van Kampen connection etc. Beside these there are so many connections in literature, say Tanaka Webster connection, semisymmetric non-metric connection, quarter symmetric metric and semi-metric connection, Ricci quarter symmetric metric connection, Tripathi connection etc. We have plan to study also these results and more with respect to those above connections. Recently some researchers attempted to investigate submanifolds of almost contact metric manifolds whose metric tensor is $RS$ and its generalization. So, one can study in this context also. Not withstanding our sincere effort to use the unique notations e.g., different connections, associated scalars, vector fields, 1-forms etc., there may be some mismatches in this respect. Such discrepancies
are purely unintentional. The books and research papers which we have consulted during the course of my research work are cited in the bibliography, but if some are missing here it would be humble request to kindly consider it as unintentional one. Throughout the thesis, we used coordinate free method and modern tools and techniques of the tensor calculus. These are all about our limitations and future plan of the work.