

# Preface

The thesis contains a study of cosmological models obtained in different theories of gravity and determination of the observational parameters in terms of recent cosmological and astronomical observations. This thesis is the outcome of my research work carried out at the Department of Physics, University of North Bengal, West Bengal, India. There are total nine Chapters. The first Chapter contains an introduction, aim of the work and brief summary of the work. The other Chapters are based on the following papers:

Chapter 2 is based on:

*“Constraints on exotic matter needed for an Emergent Universe”*, B. C. Paul, P. Thakur and S. Ghose, *Mon. Not. Roy. Astron. Soc. (MNRAS)* **407**, 415 (2010).

Chapter 3 is based on:

(i) *“Emergent Universe from a composition of matter, exotic matter and dark energy”*, B. C. Paul, S. Ghose and P. Thakur, *MNRAS* **413**, 686 (2011);

(ii) *“Observational constraints on the model parameters of a class of Emergent Universe”*. S. Ghose, B. C. Paul and P. Thakur, *MNRAS* **421**, 20 (2012).

Chapter 4 is based on:

*“Modified Chaplygin gas and constraints on its  $B$  parameter from CDM and UDME cosmological models”*, P. Thakur, S. Ghose and B. C. Paul, *MNRAS* **397**, 1935 (2009).

Chapter 5 is based on:

*“Observational constraints on modified Chaplygin gas from cosmic growth”*, B. C. Paul and P. Thakur, *JCAP* **11**, 052 (2013).

Chapter 6 is based on:

*“Holographic dark energy model with generalized Chaplygin gas”*, B. C. Paul, P. Thakur and A. Saha, *ICTP IC/IR/2007/006*.

Chapter 7 is based on:

*“Modified Chaplygin gas in Horava-Lifshitz gravity and constraints on its  $B$  parameter”*, B. C. Paul, P. Thakur and A. Saha, *Phys. Rev. D* **85**, 024039 (2012).

Chapter 8 is based on:

*“Observational constraints on modified Chaplygin gas in Horava-Lifshitz gravity with dark radiation”*, B. C. Paul, P. Thakur and M. M. Verma, *Pramana, A Journal of physics*, **81**, 691 (2013).

Concluding remark of the research work and future plan are discussed in Chapter 9.