M.Sc. (Mathematics) (NEW CBCS Pattern) Sem-IV

PSCMTH19 (B) : Optional Paper-Core Elective Course : Cosmology

P. Pages : 2 **GUG/W/22/13771**

Time : Three Hours * 3 4 7 5 * Max. Marks : 100

Notes : 1. Solve all **five** questions.
2. All questions carry equal marks.

UNIT – I

1. a) Discuss the geometry of Einstein's Universe. **10**

b) Discuss the Doppler shift of the Einstein's universe. **10**

OR

c) Explain pressure & density in de sitter universe. **10**

d) Explain motion of test particles in de sitter universe. **10**

UNIT – II

2. a) Derive Robertson-Walker line element. **10**

b) Discuss the motion of particles and light rays in the Robertson-Walker model. **10**

OR

c) Discuss the Red-shift in Robertson-Walker model. **10**

d) Discuss the general motion of a particle. **10**

UNIT – III

3. a) Explain density & pressure of the present universe. **10**

b) Show that the matter dominated ear of the universe is governed by the equation **10**
$\left(\frac{\dot{R}}{R_0}\right)^2 = H_0^2\left\{1-2q_0+2q_0\cdot\frac{R_0}{R}\right\}$, where the symbols have their conventional meaning.

OR

c) Discuss an open isotropic model of the universe given by the Robertson-Walker metric **10**
$ds^2 = R^2(t)\left[-d\alpha^2-\sin h^2\alpha\left(d\theta^2+\sin^2\theta d\phi^2\right)\right]+dt^2$ reference to dust & radiation distribution.

d) Explain steady state cosmology. **10**

UNIT – IV

4. a) Discuss a distance measured in cosmology. **10**

b) Discuss an angular diameter distance. **10**

OR

c) Define : Comoving & proper distance. **10**

d) Explain Parallax & Parallax distance. **10**

5. a) Discuss on de-sitter universe. **5**

b) Explain Hubble constant. **5**

c) Explain the Fridman model. **5**

d) Find the relation between angular diameter distance & luminosity distance. **5**

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