Part – II

Answer *any two* questions.   8×2=16

1. Outline the basic principles of the Steady State model. Suppose, in 1950s, a cosmologist supports steady state model. Provide 3 pieces of evidence, emerging during the 1960s, that would have caused the cosmologist to abandon his support of the Steady State model.

2. What are the parameters of potential slow roll? What are the slow roll conditions of inflation? Derive slow roll approximation from inflation.

3. What is meant by inflation? Briefly explain what problems with the classical Big Bang model, inflation was intended to solve, and how it solves them.

M. Sc. Mathematics Examination, 2023

(2nd Year, 2nd Semester)

MATHEMATICS

PAPER – DSE-07 (B28)

[RELATIVISTIC COSMOLOGY]

Time : 2 hours   Full Marks : 40

(Use separate answer script for each part)

Part – I

Answer *any three* questions.   8×3=24

1. Show that the Newtonian cosmology rules out the static Universe.

2. Derive the formula for measuring the angular size of a galaxy. Write a short note on Hubbles law.

3. Discuss closed model of the Universe for dust case.

4. From the R-W metric,

$$ds^2 = dt^2 - a^2(t)\left[\frac{dr^2}{1-kr^2} + r^2d\theta^2 + r^2\sin^2\theta d\phi^2\right]$$

show that for perfect fluid,

$$\dot{\rho} + 3(p+\rho)\frac{\dot{a}}{a} = 0.$$

5. i) Write a short note on de Sitter Universe.

   ii) Discuss Einstein static Universe.