Name:

Enrolment No:

UPES

End Semester Examination, May 2023

Course: Relativity & Cosmology **Semester : II**

Program: M.Sc (Physics) **Time : 03 hrs.**

Course Code: PHYS 7019 **Max. Marks : 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	What is a non-inertial reference frame?	**4**	**CO1**
Q 2	Match the closest in the following: i. Galilean transformation — a. Non-inertial too ii. Special theory of relativity — b. Light velocity constant iii. Lorentzian transformation — c. high velocities iv. General theory of relativity — d. time absolute	**4**	**CO1**
Q 3	A certain process takes a picosecond to occur in an atom at rest. How much time would an experimenter in a lab record for this process for the atom moving with velocity 3×10^7 m/s?	**4**	**CO1**
Q 4	What is a white dwarf?	**4**	**CO3**
Q 5	What is a Euclidean space?	**4**	**CO2**

SECTION B
(4Qx10M= 40 Marks)

Q 6	What are tensors? Explain covariant and contravariant tensors.	**10**	**CO2**
Q 7	Describe the principles of equivalence in your own words.	**10**	**CO2**
Q 8	What does the acronym CMB mean in cosmology? Assess the significance of CMB in cosmological studies. OR What does the term Event Horizon mean in Astrophysics? Appraise it in your own words.	**10**	**CO4**
Q 9	Which is the most accepted theory for the creation of our universe? Assess it by analyzing the salient features of the theory.	**10**	**CO4**

SECTION-C (2Qx20M=40 Marks)			
Q 10	Analyze the Special Theory of Relativity. Apprise in your words the novel results the theory yields for various physical phenomena.	**20**	**CO1**
Q 11	Recreate the life cycle of massive stars that end up as black holes. OR Recreate the life cycle of Sun like stars. Analyze the physical conditions that exist at each stage of the life cycle, for whichever of the above two cases that is being considered.	**20**	**CO3**