

Name:			
Enrolment No:			
UPES End Semester Examination, December 2023			
Course: COSMOLOGY Semester: III Program: M.Sc (Physics) Course Code: PHYS 8091P		Time : 03 hrs. Max. Marks: 100	
Instructions: All questions in Section A are mandatory, while questions # 9 and 11 of Sections B and C, respectively, have internal options.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	The Special Theory of Relativity (STR) is based on 2 postulates. One is that the velocity of light is constant and does not depend on the relative motion of the source and the observer. What is the other?	4	CO2
Q 2	In relativity proper measurements are the key. What is 'proper time'?	4	CO2
Q 3	Why is the Special Theory of Relativity called so?	4	CO2
Q 4	A segment of a linear accelerator is 3 km long. An electron with energy 24 GeV travels this segment. Determine the measure of time dilation involved.	4	CO2
Q 5	Are length contraction and time dilation real, or are they perceived? Support your response strongly.	4	CO2
SECTION B (4Qx10M= 40 Marks)			
Q 6	Discuss the formation of galaxies. List a classification of them.	7+3	CO1
Q 7	What are the different types of 'nucleosynthesis' in cosmology? Discuss them in detail.	10	CO4
Q 8	The Cosmic Microwave Background (CMB) plays an important role in cosmology. Discuss the anisotropy in CMB.	10	CO4
Q 9	Describe the construct of space-time. How are the space-time intervals different from those in conventional space and time? OR Appraise the concept of gravitational waves. How are they 'measured'?	4+6 5+5	CO2
SECTION-C (2Qx20M=40 Marks)			
Q 10	The scale of distances travelled on earth and in cosmos are more than orders of magnitude different. Appraise the concept of 'distance ladder'	20	CO1

	used to measure distances in cosmos. Also consider those 'ladder steps' which are typically called classical.		
Q 11	<p>The Big Bang model is the most celebrated model of our universe. However, it too has weaknesses. Analyze the shortcomings of this model in detail.</p> <p style="text-align: center;">OR</p> <p>Like for 'beings' and 'things', our universe too has a future! Evaluate rigorously the options of 'open', 'closed' and 'flat' universes.</p>	20	CO3