Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UPES
End Semester Examination, December 2024

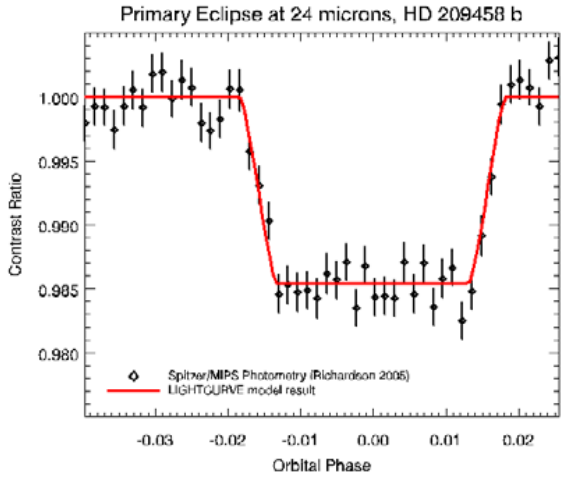
Course: Planetary Sciences **Semester : VII**
Program: Bachelor of Science In Physics by Research **Time : 03 hrs.**
Course Code: PHYS4036P **Max. Marks: 100**

Instructions:
1. **All questions are compulsory.**
2. **Question 8 in section B has an internal choice.**
3. **Question 10 in section C has an internal choice.**
4. **Use of scientific calculator is allowed.**
5. **Number of Pages: 3.**

SECTION A
(5 Q x 4 Marks = 20 Marks)

S. No.		Marks	CO
1	Outline the main differences between the inner and outer planets in our Solar System.	**4**	**CO1**
2	Describe the concept of tidal forces and their effect on planetary bodies.	**4**	**CO1**
3	Explain the significance of the solar nebula hypothesis in planetary formation.	**4**	**CO2**
4	Summarize the main factors influencing the structure and composition of planetary atmospheres.	**4**	**CO3**
5	List the methods used to detect exoplanets and briefly describe one of them.	**4**	**CO4**

SECTION B
(4 Q x 10 Marks = 40 Marks)

6	Explain the dynamics involved in the formation of the Solar System and the role of angular momentum in this process.	**10**	**CO1**
7	Calculate the energy required to move a satellite from low Earth orbit to escape velocity. Assume Earth's gravitational constant $G = 6.674 \times 10^{-11}$ Nm^2/kg^2 and Earth's radius R = 6.371×10^6 m.	**10**	**CO2**
8	Describe how the study of crater formation on planetary surfaces helps scientists understand the history of the Solar System. Provide examples from two celestial bodies. ***OR*** Explain the structure of the Kuiper Belt and its importance in understanding the formation and evolution of the Solar System.	**10**	**CO3**
9	Describe the transit method of exoplanet detection and discuss its effectiveness in determining planetary characteristics like size and orbital period. Analyze the provided transit light curve of an exoplanet (HD 209458 b). Using the light curve's shape and depth:  1. Determine the **impact parameter** b (the distance of the planet's closest approach to the star's center, in units of stellar radius). 2. Calculate the **planet-to-semi-major axis ratio**, assuming an approximate circular orbit.	**10**	**CO4**

	SECTION C **(2 Q x 20 Marks = 40 Marks)**		
10	Explain the structure and composition of planetary atmospheres in our Solar System. Discuss how factors like solar radiation, gravity, and temperature influence atmospheric properties. ***OR*** Examine the energy balance of Earth's atmosphere. Include an explanation of the greenhouse effect and its impact on Earth's climate.	**20**	**CO1**
11	Critically analyze the concept of habitable zones around stars with different spectral types. How does stellar luminosity affect the position and width of habitable zones?	**20**	**CO3**