Name: **Enrolment No:**	

UPES

End Semester Examination, May 2025

Course: Space Communication **Semester: VI**

Program: B.Tech Aerospace Engg. **Time : 03 hrs.**

Course Code: ASEG3036P **Max. Marks: 100**

Instructions: All questions are compulsory. Neat diagrams and real-world examples are encouraged.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	What is the significance of satellite constellation configuration? Explain with suitable examples.	**4**	**CO1**
Q 2	Define transient temperature variation in orbit. How does it affect satellite operations?	**4**	**CO3**
Q 3	Differentiate between telemetry and telecommand systems.	**4**	**CO1**
Q 4	Explain the impact of microgravity and thermal cycling on spacecraft structure.	**4**	**CO3**
Q 5	What role do sun sensors and magnetometers play in satellite attitude control?	**4**	**CO3**
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	Analyze the design trade-offs between electric and chemical propulsion systems for Earth-orbiting satellites.	**10**	**CO4**
Q 7	Evaluate the subsystem integration strategy adopted in the James Webb Space Telescope. Focus on structural, thermal, and TT&C systems.	**10**	**CO2**
Q 8	Discuss the key features and advancements of modern ground control systems. How do they support autonomous spacecraft operations? **OR** Compare passive and active thermal control techniques with examples from planetary and deep-space missions.	**10**	**CO3** **Or** **CO4**
Q 9	Describe the typical RF link budget considerations in TT&C systems for LEO satellites.	**10**	**CO3**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	a) Derive and formulate the transfer function of a basic RC low-pass filter and describe how component values influence its cutoff frequency.	**10+10= 20**	**CO2**

	b) An RC low-pass filter is built using a resistor R = 1 kΩ and a capacitor C = 0.1 μF . (i) Calculate the cutoff frequency (fc) of the filter. (ii) If a sinusoidal signal of frequency 1 kHz is applied, will it be attenuated significantly? **OR** Develop a thermal protection strategy for a satellite designed for operations in geostationary orbit. Highlight control techniques and integration constraints.		
Q 11	Evaluate the telemetry and command strategy used in the Perseverance Mars Rover. Discuss its robustness, redundancy, and communication architecture.	**20**	**CO4**