

**Visvesvaraya Technological University**  
**Subject: BAS405C - Introduction to Aerospace Engineering**  
**MODEL QUESTION PAPER**

*Note: 1) Answer all Full Questions, selecting at least one questions from each MODULE/PART*

Q.N O	QUESTION	MARK S	CO'S	RB TL
<b>Module 1</b>				
1.	a) Derive the Tsiokovsky rocket equation. Also Elucidate its significance. b) A rocket using Hydrogen-Oxygen as the fuel-Oxidizer combination has a specific impulse of 360 s. Calculate the ratio of propellant mass to initial mass required to achieve a burn out velocity equal to the escape velocity from the earth.	10+10	CO1	L3
<b>(OR)</b>				
2.	a) Explain the working of Solid Propellant rocket motor with neat sketch. b) With neat sketch, explain the working principle of LPR engine.	10+10	CO1	L2
<b>Module 2</b>				
3.	Consider a solid iron sphere entering the Earth's atmosphere at 13 km/s and at an angle of 15 degree below the horizontal. The sphere diameter is 1 m. The drag coefficient of sphere at hypersonic velocity is approximately 1. The density of iron is 6963 kg /m <sup>3</sup> . Calculate a) the altitude at which maximum deceleration occurs, b) the value of the maximum deceleration and c) the velocity at which the sphere would impact the earth's surface. d) Analyze the results with respect to aerodynamic heating.	20	CO2	L4
<b>(OR)</b>				
4.	Explain in detail about Glide reentry, Skip reentry and reentry corridor.	20	CO2	L2
<b>Module 3</b>				
5.	a) Discuss about the various orbital elements. b) Briefly explain the Kepler's laws of planetary motion.	10+10	CO1	L3
<b>(OR)</b>				
6.	a) Explain Hohmann transfer with neat sketch. b) Explain Bielliptical transfer with neat sketch.	10+10	CO1	L2
<b>Module 4</b>				
7	Explain the attitude control techniques of Spinning spacecraft.	20	CO3	L2
<b>OR</b>				
8	Explain the attitude control techniques of non-spinning spacecraft.	20	CO3	L2
<b>Module 5</b>				
9	Explain high level space mission operations architecture with neat sketch.	20	CO3	L2
<b>OR</b>				
10	Explain mission spaces and core operations for the team responsibilities.	20	CO3	L2