Model Question Paper-2 with effect from 2019-20 (CBCS Scheme)

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Fourth Semester B.E. Degree Examination

18AS45 - INTRODUCTION TO SPACE TECHNOLOGY

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02.
03.

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	Explain in detail about Solid rocket propulsion with neat sketch and its Advantages & Disadvantages.	L1	12
	b	Write short notes: i. Space mission and Space Environment	L1	8
	c			
		OR		
Q.02	a	A rocket engine has the following data: Effective jet velocity = 1200 m/s, Flight to jet speed ratio=0.82,oxidizer flow rate=3.4kg/s, Fuel flow rate =1.2kg/s, Heat of reaction per kg of the exhaust gases =2520kJ/kg Calculate the following: i) Thrust ii)Specific Impulse iii)Propulsive efficiency iv)Thermal efficiency v)overall efficiency	L3	12
	b	Write Short notes on: i) Gravity TurnTrajectories,	L1	8
	c			
		Module-2		
Q. 03	a	Derive Double Dip Reentry.	L2	10
	b	Design a transfer ellipse from Earth at a heliocentric position of r = 1.00 AU and a longitude of 41.26° to Pluto at r = 39.5574 AU and a longitude of 194.66°., Place the line of apsides at a longitude of 25°. The radii of date of the planets are r1 (Earth) = 1.49598 x 108 km, r2(Pluto) = 5.9177 x 109 km	L3	10
	c			
		OR		
Q.04	a	Consider two bodies in a circular orbit around the earth an altitude of 800 km above the surface of the earth. Each body has a mass of 1800 kg. one body is a cone shaped with the total vertex angle of 10degree. The other body is sphere, for the cone the pressure drag coefficient at hypersonic mach number is 0.017 and the skin friction drag coefficient is 0.01, for the sphere the pressure drag co-efficient is 1 and friction drag coefficient is 0.001. Calculate and compare the total aerodynamic heating input to each body during atmospheric entry.	L3	10
	b	Explain briefly Aerobraking &Lifting body Reentry	L1	10
	c			
		Module-3		
Q. 05	a	Explain briefly about Bielliptical Transfer & Plane change	L2	10
	b	.A 2000-kg spacecraft is in a 480 x 800 km earth orbit (orbit 1). Find (a) The Δv required at perigee A to place the spacecraft in a 480 x16,000 km transfer ellipse (orbit 2). (b) The Δv (apogee kick) required at B of the transfer orbit to establish a circular orbit of 16,000 km altitude (orbit 3). (c) The total required propellant if the specific impulse is 300 s.	L3	10
	c			
		OR		

Q. 06	a	Design a Hohmann transfer from a circular Mars orbit of radius 8000 km to a circular Mars orbit of radius 15,000 km. From Appendix C for Mars,μ= 42,828.3 km_3/s_2	L1	10
	b	An Earth satellite is in an orbit with a perigee altitude of 400 km and an eccentricity of 0.6. Find (a) the perigee velocity (b) the apogee radius (c) the apogee velocity (d) the orbit period (e) the satellite velocity when its altitude is 3622 km (f) the true anomaly at altitude 3622 km (g) the flight path angle at altitude 3622 k	L1	10
	c			
Module-4				
Q. 07	a	Derive The Yo-Yo Mechanism.	L2	10
	b	Write short notes on : i. Attitude Control for Non - Spinning Spacecraft	L1	10
			L1	
OR				
Q. 08	a	Write short notes on Attitude Determination.	L1	10
	b	Write short notes on i. Dual Spin Spacecraft	L1	10
Module-5				
Q. 09	a	Explain mission phases and core operations for team responsibilities.	L1	10
	b	Explain high level space mission operations architecture with neat sketch.	L1	10
	c			
OR				
Q. 10	a	Explain Standard operations practices.	L1	10
	b	Explain Mission Diversity	L1	10
	c			

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.