Sanjay Ghodawat University, Kolhapur

2020-21

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

EXM/P/09/00

Year and Program: BTech	School of Technology	Department: Aeronautical Engineering
Course Code:AET405	Course Title: Space Flight Dynamics	Semester : VII
Day : Wednesday Date: 03.03.2021	End Semester Examination	Time:2 Hrs. Max Marks:50

Instructions: 1) All questions are compulsory.
2) Assume appropriate values wherever necessary

		Marks	Bloom's Level	CO
Q.1	**Answer the following (any two)**–			
a)	With a neat sketch, explain the concept of celestial sphere.	8	L_2	CO1
b)	Explain the effect of low orbital altitude on satellite lifetimes.	8	L_2	CO2
c)	An earth satellite is in an elliptical orbit with perigee altitude z_p =400 km and an eccentricity e=0.6. Find (a) the perigee velocity, v_p (b) the apogee radius, r_a (c) the semimajor axis, a (d) theapogee velocity, (e) the period of the orbit.Consider μ=398600 km^3/s^2 and R_E =6378 km.	8	L_4	CO2
Q.2	**Answer the following (any two)** –			
a)	Aspacecraft starts from a circular parking orbit of 6578 km at an inclination of 28.5 degrees. Compute thetransfer to reach geosynchronous, equatorial orbit. Assume the inclination change is performed aspart of the apoapsis maneuver.	8	L_4	CO3
b)	Explain the concept of tidal friction effects and mutual gravitational attraction in detail with a neat diagram.	8	L_3	CO3
c)	Analyze the perigee and apogee for an earth satellite whose orbit satisfies all the following conditions: it is sun-synchronous, its argument of perigee is constant, and its period is 3 hours. Consider J_2 = 0.0010826.	8	L_5	CO4
Q.3	**Answer the following (any two)** –			

a)	Explain the concept of minimum energy trajectory in earth-moon system.	9	L_3	CO5
b)	Describe how patch cone approximation is used for interplanetary missions with neat diagram.	9	L_3	CO5
c)	It is desired to send an interplanetary probe to Mars on a Hohmann ellipse around the Sun. The launch vehicle burns out at an altitude of 0.05 DU. Determine the burnout velocity required to accomplish this mission.Calculate the burn velocity when altitude is changed to 0.1 DU, 0.2 DU and 0.25 DU.	9	L_5	CO5

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