Department of Electrical Engineering
Assignment
Date: 13/04/2020

Course Details

Course Title: Radar and Satellite Communications **Module:** 8th
Instructor: _____ **Total Marks:** 30

Student Details

Name: _____ **Student ID:** _____

Student Signature: _____

Q1.		**Answer the following questions**	Marks 15 CLO 01
	(a)	Explain why some satellites employ cylindrical solar arrays, whereas others employ solar-sail arrays for the production of primary power. State the typical power output to be expected from each type. Why is it necessary for satellites to carry batteries in addition to solar-cell arrays?	Marks 05
	(b)	Explain why an omnidirectional antenna must be used aboard a satellite for telemetry and command during the launch phase. How is the satellite powered during this phase?	Marks 05
	(c)	Explain what is meant by frequency reuse, and describe briefly two methods by which this can be achieved in a satellite communication system.	Marks 05
Q2.		**A LEO satellite is in a circular orbit 550 km above the earth. Assume the average radius of the earth is 6378 km. Assume the earth eccentricity is 0.** a) Determine the orbital velocity of the satellite in m/sec b) What is the orbital period, in minutes, for the LEO satellite? c) From the above, determine the orbital angular velocity for the satellite, in radians/sec.	Marks 05 CLO 02
Q3.		**The orbit for an earth-orbiting satellite orbit has an eccentricity of 0.15 and a semimajor axis of 9000 km. Determine** a) its periodic time b) the apogee height c) the perigee height. **Assume a mean value of 6371 km for the earth's radius.**	Marks 05 CLO 02
Q4.		**A communications satellite is located in geostationary orbit at 90°W longitude. Calculate the range, azimuth, and elevation angle to the satellite as seen from ground stations located in altitude 35°N and longitude 100°W.**	Marks 05 CLO 02