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10EC662

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Satellite Communication

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. List the services provided by the satellite with frequency band designation. (08 Marks)
- b. Define the terms : i) Inclination ii) Sub satellite path iii) Perigee iv) Apogee. (04 Marks)
- c. Determine the limits of visibility for an earth station situated at mean sea level at latitude 54.42°N and longitude 102.20°W . Assume minimum angle of elevation of 5° . (08 Marks)
- 2 a. State and explain with necessary diagram and equations Kepler's three laws of motion. (10 Marks)
- b. Determine the angle of tilt required for a polar mount used with an earth station at latitude 54°N . Assume spherical earth of mean radius 6371 km and ignore earth station altitude. (06 Marks)
- c. List Kepler's elemental set. (04 Marks)
- 3 a. Explain Atmospheric and Ionospheric losses in satellite communication. (06 Marks)
- b. An unlink operates at 14GHz and flux density required to saturate the transponder is $-120\text{B}(\text{W}/\text{m}^2)$. The free space loss is 207dB and other propagation losses amount to 2dB. Calculate the earth station [EIRP] required for saturation, assuming clear sky conditions. Assume [RFL] is negligible. (06 Marks)
- c. Calculate for a frequency of 12GHz and for horizontal and vertical polarization, the rain attenuation which is exceeded for 0.01 percent of the time in any year, for a point rain rate at 10mm/h, the earth station attitude is 600m and the antenna, elevation angle is 50° , the rain height is 3km and $a_h > 0.0188$, $a_v = 0.0168$, $b_h = 1.217$, $b_v = 1.2$.
Note : All heights and lengths are in KM and rain rate is mm/h. (08 Marks)
- 4 a. Explain momentum wheel stabilization of satellite. (07 Marks)
- b. Briefly explain TT and C subsystems. (06 Marks)
- c. Explain satellite transponder. (07 Marks)

PART – B

- 5 a. Explain the DBSTV/FM reception. (06 Marks)
- b. Describe the community antenna TV system. (06 Marks)
- c. Explain with figure preassigned FDMA. (08 Marks)
- 6 a. Explain onboard signal processing for FDMA/TDM operation. (07 Marks)
- b. Briefly explain spade system with chanelising scheme. (06 Marks)
- c. Explain satellite switched TDMA. (07 Marks)
- 7 Explain the following :
 - a. Transponder capacity (07 Marks)
 - b. Bit rate digital TV (07 Marks)
 - c. Frequency and polarization. (06 Marks)
- 8 a. Explain global positioning system in detail. (08 Marks)
- b. Describe the operation of VSAT system and application. (06 Marks)
- c. Explain Radarsat. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. $42+8=50$, will be treated as malpractice.