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Total Number of Pages: 2

B.Tech.
PEEC5418

8th Semester Regular / Back Examination 2016-17
SATELLITE COMMUNICATION SYSTEMS
BRANCH(S): CSE, ECE, EEE, ELECTRICAL, ETC, IT, ITE, MINING
Time: 3 Hours
Max Marks: 70
Q.CODE: Z280

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

- Q1 Answer the following questions: (2 x 10)**
- a) What is the significance of EIRP in satellite communication?
 - b) A satellite orbits the earth with mean height of 1500 km. What is the minimum and maximum visible range of the satellite under these circumstances? The mean radius of the earth is 6378 km.
 - c) Define look angle. Why it is necessary?
 - d) What is energy dispersal? Discuss its application for satellite communication.
 - e) What are the roles of transponders in satellite communication system? How many types of transponders are used in satellite?
 - f) What is the need of attitude and orbit control systems in satellite communication systems?
 - g) How (G/T) ratio can be expressed in terms of (C/N) ratio?
 - h) What is Doppler shift?
 - i) What is the role of a LNA in a satellite receiver? Is the receiver a superheterodyne one?
 - j) What is beam steering? How is it carried out?
- Q2 a) A GEO satellite carries a transponder with 20 W transmitter at 4 GHz. The transmitter is operated at an O/P power of 10 W and drives an antenna with a gain of 30 dB. An earth station is the center of the coverage zone of the satellite, at range of 38500 km. Find (i) the flux density at the earth station, (ii) the power received by an antenna with a gain of 39 dB, (ii) the EIRP of the transponder. (5)**
- b) Explain different satellite launching procedure. (5)**
- Q3 a) Describe in detail typical features of DBS systems. (5)**
- b) Explain how satellite communication system implements TDMA? (5)**

- Q4 a)** Write down the design procedure for a one-way satellite communication link. **(5)**
- b)** For a Ku-band downlink design, **(5)**
 Given that $(C/N)_o = 17$ dB when $(C/N)_{up} = 30$ dB.
 Then calculate the value of $(C/N)_{dn}$.
- Q5 a)** A TDMA network of fine earth station shares a single transponder equally. The frame duration is 20 ms, the preamble time per station is $20\mu s$, and guard bands of $5\mu s$ are used between bursts. Transmission bursts are QPSK at 30 Mbaud. Calculate the no. of 64 kbps voice channels that each TDMA earth station can transmit and what is the efficiency of the TDMA system. **(5)**
- b)** Explain the direct broadcasting of satellite television. **(5)**
- Q6 a)** Discuss the propagation effects that are not associated with the hydrometeors. **(5)**
- b)** Explain the prediction of rain attenuation in satellite communication. **(5)**
- Q7** (i) Derive the expression for the link equation and power received in any radio link. **(10)**
 (ii) Explain the principle of operation spread spectrum transmission in the satellite communication.
- Q8 Write short answer on any TWO:** **(5 x 2)**
- a)** Satellite Transponders
- b)** Uplink and Downlink Design
- c)** SPADE
- d)** Cassegrain Antennas