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B.TECH
(SEM VIII) THEORY EXAMINATION 2018-19
SATELLITE COMMUNICATION

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. Define Apogee and Perigee.
b. List the disadvantages of Satellite Communication.
c. What is noise temperature?
d. Give the uplink frequency and downlink frequency in "C" band.
e. Explain pre-emphasis and de-emphasis.
f. Compare FDMA and TDMA.
g. Define Channel Capacity.
h. What are Rain and Cloud effects in Satellite Communication?
i. Differentiate GEO and LEO satellites.
j. Briefly explain GPS.

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. Write the advantages and disadvantages of geostationary orbit. A satellite moving in a highly eccentric Molniya orbit having the farthest and the closest points as 35000km and 500km respectively from the surface of the earth. Determine the orbital time period and the velocity at the apogee and perigee points.
b. Discuss in detail the factors that affect the uplink design and the downlink design in geostationary satellites? How the uplink design different than the downlink design?
c. Explain the working of a basic CDMA system. How does it employ spread spectrum technique during the multiple accesses of the signals? Also determine the throughput efficiency for this system.
d. Explain in detail the various measures that are taken against propagation impairment.
e. Explain DBS home receiver with the help of neat block diagram.

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

(a) What are the Kepler's laws of Planetary Motion? Explain ascending node and descending node of a satellite.
(b) Explain various types of satellite launcher? Describe the satellite launch sequence in detail.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Describe the various antennas used in satellite communication. Also discuss the antenna requirements for large and small earth stations.

(b) Derive the expression for C/N ratio. A satellite TV signal occupies the full 36 MHz transponder bandwidth and is desired to provide a C/N ratio of 22dB at the earth station. If the downlink frequency is 4GHz and the other losses amount to 3.4dB, what must be the G/T of the earth station if GRP is 37dBW. The path length is 40000km. (Boltzman's constant $K=1.38\times10^{-23}$ J/K).

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain DAMA and demand assignment control methods.

(b) What do you understand by 'threshold' in FM detector? Explain FM improvement and derive the S/N ratio. A 1KHz test tone is used to produce a peak deviation of 5KHz in an FM system. Calculate the FM improvement and Post-detector S/N ratio, if the received C/N ratio is 30dB.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain Convolutional Coding. Explain why do convolutional codes provide better error correction performance?

(b) A message 101101 is to be transmitted in cyclic code with a generator polynomial $G(p) = 1 + p^3 + p^4$. Obtain the systematic cyclic code transmitted. List the advantages of Cyclic codes.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Discuss Low earth orbit and non-geostationary systems in detail.

(b) Write sort notes on (i) direct broadcast satellite television and (ii) Satellite navigation.