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B TECH
(SEM-VIII) THEORY EXAMINATION 2017-18
SATELLITE COMMUNICATION

Time: 3 Hours   *Max. Marks: 100*

Note: Be precise in your answer.

SECTION-A

1. **Attempt all of the following questions:**   **(2×10=20)**

(a) List different types of antennas used in Satellite Communication?
(b) Draw the block diagram of satellite communication system.
(c) What do you understand by argument of perigee?
(d) Explain the Ice effect in Satellite Communication?
(e) List different types of satellite launcher.
(f) What are Look angles?
(g) What is sun transit outage?
(h) List the advantages of satellite communication.
(i) What are TT and C systems?
(j) Differentiate LEO and GEO satellites.

SECTION-B

2. **Attempt any three of the following questions:**   **(3×10=30)**

(a) An earth station situated in the dockland of London England needs to calculate the look angle to a geostationary satellite in Indian Ocean operated by Intelsat. The details of earth station site and satellite are as follows:-Earth station latitude and longitude are 52.0º and 0º and satellite longitude (sub satellite point) is 66.0ºE.

(b) Explain the basic principle of a GPS system. Explain why a minimum of four satellites must be visible at an earth location utilizing the GPS system for position determination.

(c) With the help of suitable diagram describe the working of home receiver units in DBS television.

(d) A code word is received as (1010110). Find whether is a correct code-word. If not, find the correct code word. The generator matrix is given by:-

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

(e) Explain the various interferences that may affect the satellite link performance.

Describe how can they be minimized?

SECTION – C

3. **Attempt any one of following questions:**   **(1×10=10)**

(a) Write short notes on any two:-
    (i) VSAT Systems
    (ii) LEO Satellites for internet Transmission.
(b) (i) What are the factors that affect the uplink design and the downlink design in geostationary satellites?
    (ii) The EIRP of a 240 W transponder is 57 dBW. Calculate the approximate gain of the antenna if the transponder is switched to 120 W. Also calculate the new EIRP assuming that the same antenna is used.

4. **Attempt any one of following questions:**   **(1×10=10)**

(a) Briefly describe the overall working of Direct Broadcast Satellite (DBS) television network. Explain the working of DBS-TV receiver with the help of a neat block diagram.
(b) Explain Kepler's law of planetary motion. How are these applied to the case of geostationary satellite?

5. **Attempt any one of following questions:**   **(1×10=10)**

(a) Derive general link equation. Find out expression for C/N the G/T ratio.
(b) What is function of Demand Assignment control in DAMA system? Explain various such control systems.

6. **Attempt any one of following questions:**   **(1×10=10)**

(a) Determine the average angular velocity of a satellite moving in an elliptical orbit. If the semi-major axis is 42164.8 km and orbital eccentricity is 0.0011. Given that- $G=6.67*10^{-11}$ and $M=5.98*10^{28}$.
(b) Write a short note on Non Geo-stationary satellites.

7. **Attempt any one of following questions:**   **(1×10=10)**

(a) With the help of simple block diagram, explain the function of a satellite transponder.
(b) What are the propagation impairments that affect the design of the satellite communication system? Why C-band satellite transmission is most suitable?