B.E DEGREE EXAMINATIONS: APRIL/MAY 2014

(Regulation 2009)

Sixth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

ECE136: Satellite Communication

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. UHF band is specified in the following frequency range -
   a) 3 – 300 MHz
   b) 300 – 3 GHz
   c) 3 – 30 GHz
   d) 300 – 3 MHz

2. The line joining perigee and apogee through the centre of Earth is the
   a) Line of nodes
   b) Longitudes
   c) Equator
   d) Line of apsides

3. The geostationary orbit height is approximately
   a) 42, 000 Km
   b) 36, 000 Km
   c) 6,300 Km
   d) 3, 600 Km

4. When a satellite enters eclipse, the sub-system that is most critically affected is
   a) Transponder
   b) Antenna
   c) Battery
   d) Communication

5. The operating point of a TWT amplifier is shifted closer to the linear portion of transfer curve, leading to reduction in input power. This is called
   a) Attenuation
   b) Input back-off
   c) Input overload
   d) Power outage

6. An FM system produces a peak deviation of 5 kHz with 1 kHz test tone. Given a received C/N of 30, the receiver power gain is
   a) 30
   b) 150
   c) 450
   d) 45

7. In one of the following bands, the effect of rain is significant leading to signal fading -
   a) Ka
   b) Ku
   c) S
   d) L

8. The carrier to Noise ratio, C/N, of a satellite link is given by
   a) EIRP + G/T – Losses - k
   b) G/T – Losses - k
   c) EIRP + G/T - k
   d) EIRP – Losses - k

9. SPADE is an example of
   a) SCPC pulse modulation
   b) SCPC Pulse coded modulation
   c) SCPC pulse modulation with DAMA
   d) CDMA

10. In GPS, the number of satellites required to locate latitude and longitude of an object is
    a) 1
    b) 2
    c) 3
    d) 4

PART B (10 x 2 = 20 Marks)

11. What are the important services offered by INTELSAT?

12. State Keplar's third law and its significance.

13. What are look angles of antenna?

14. Compute limits of visibility of geostationary satellites. Assume necessary parameters.

15. What are methods that are used for attitude control of satellites?

16. List the features of TVRO system.

17. Define saturation flux density of TWTA. Express the same in Decibel notation.

18. What is intermodulation noise?

19. Compare pre-assigned TDMA and DAMA.

20. What is VSAT' Give an application.

PART C (5 x 14 = 70 Marks)

21. a) i) What are the characteristic features and services offered by US DOMSATs? (7) Explain.
    ii) What are the orbital elements? Illustrate how these could be derived from Keplar's laws? (7)

    (OR)

    b) i) Illustrate how topocentric – horizon coordinate system could be used to locate a satellite and its orbital parameters. (10)
    ii) Calculate the apogee and perigee heights. Assume a mean Earth radius of 6371 Km. (Use e = 0.0011501, μ = 3.986 x 10^{14} m^3/s^2) (4)

22. a) i) What are the conditions required for a geostationary satellite? Use Keplar's third law and calculate geostationary distance. (7)
    ii) Describe the various launching methods and launch used for satellites. (7)

    (OR)

b) i) What are the parameters that are required to determine the look angles for geostationary orbit? Also, illustrate locating Sub-satellite point with respect to Earth station for various relative positions. (10)

ii) Describe the effects due to Earth eclipse and sun outage on satellites. (4)

23. a) i) What is payload? Also, describe frequency allocation scheme for a typical transponder system. (7)

ii) Explain the working of a satellite wide-band receiver with a block diagram. (7)

(OR)

b) i) Describe the working of TWTA with neat diagram. (7)

ii) Describe the home terminal used for DBS TV/FM reception with a block diagram. (7)

24. a) i) Derive an expression for C/No ratio for satellite link. (10)

ii) Calculate free-space loss for a geostationary satellite operating at 6 GHz. (4)

(OR)

b) i) Obtain an expression for C/No ratio for combined uplink and downlink for a satellite circuit. (10)

ii) The C/N values for a satellite circuit are uplink – 25 dB, downlink 15 dB. Calculate overall C/N ratio. Justify choice of other parameters required. (4)

25. a) i) Describe the channel allocation scheme used for SPADE system. (7)

ii) What are the basic equipment used in TDMA? Explain with a block diagram. (7)

(OR)

b) i) What are the formats of preamble and post amble in a traffic burst? Explain. (7)

ii) Describe satellite-switched TDMA scheme. (7)

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