



B.E DEGREE EXAMINATIONS: APRIL/MAY 2016

(Regulation 2009)

Eighth 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. The Ku band, used by INTELSAT satellites occupy the frequency band -
 - a) 14 – 16 GHz
 - b) 4 – 6 GHz
 - c) 12 – 14 GHz
 - d) 2 - 4 GHz
2. The point closest to Earth for a satellite is called as
 - a) aphelion
 - b) apogee
 - c) perihelion
 - d) perigee
3. Look angle determines
 - a) Visible angle of satellite from ES
 - b) Tilt of satellite antenna
 - c) Orientation of ES antenna
 - d) Orientation of satellite antenna towards ES
4. Sun transit outage causes
 - a) Power drain
 - b) Excess noise
 - c) Eclipse
 - d) Attitude shift
5. The equipment that provides link between transmit and receive antenna is
 - a) Control section
 - b) Transponder
 - c) Telemetry section
 - d) Tracking section
6. The direct broadcast satellite operates in
 - a) C Band
 - b) Ka band
 - c) Ku band
 - d) S band
7. A satellite downlink at 12 GHz operates with a transmit power of 10 W and an antenna gain of 48.4 dB. The EIRP in dBW is
 - a) 48.5
 - b) 58.4
 - c) 4.85
 - d) 5.84

8. The ratio of carrier power to noise power at receiver input depend upon
 - a) Noise power
 - b) Bandwidth
 - c) Antenna gain
 - d) Atmospheric losses
9. The transponder frequency bandwidth is subdivided into smaller channels in
 - a) DA-FDMA
 - b) Pre-assigned FDMA
 - c) SPADE
 - d) SCPC
10. CDMA is superior to VSAT
 - a) High throughput efficiency
 - b) Adjacent satellite interference
 - c) Synchronization between stations is required
 - d) Large beamwidth of antenna

PART B (10 x 2 = 20 Marks)

11. Compare prograde and retrograde orbits.
12. What are near geostationary orbits? Why are they used?
13. Obtain geostationary height using Kepler's third law. Assume an Earth radius of 6371 Km.
14. What are the factors that are required to determine look angles?
15. List the three axes of motion of satellite.
16. What is meant by station keeping?
17. What are the losses that occur between transmit and receive antenna?
18. Define noise temperature. State its significance.
19. List the constituents of reference burst in TDMA.
20. How many satellites are required at minimum, to locate an object using GPS? State the principle used.

PART C (5 x 14 = 70 Marks)

21. a) i) What are orbital elements? On a geocentric-equatorial coordinate system, (10) identify the orbital elements.
- ii) State the use of different calendars in satellite systems. (4)
- (OR)**
- b) i) Illustrate how each of Kepler's three laws applies to satellite orbits. (10)
- ii) Given $e = .0011501$ and $a = 7192.34$ km calculate apogee and perigee heights. (4)
Assume Earth radius of 6371 km
22. a) i) Outline the approaches and four different configurations used for determining (10) the look angles for a geostationary satellite.

- ii) Discuss limits of visibility of geostationary satellites. (4)
- (OR)**
- b) i) Discuss the salient features of polar mount antenna. (7)
- ii) What are the different orbits used for satellite launch? Discuss (7)
23. a) i) Illustrate different techniques that are used for satellite attitude control. (10)
- ii) Discuss a typical uplink frequency and polarization plan for transponder. (4)
Assume a bandwidth of 500 MHz.
- (OR)**
- b) i) Describe the functions of Tracking, telemetry and control system. (10)
- ii) Compare DBS TV with MATV systems. (4)
24. a) i) Derive an expression for C/N ratio for downlink. (10)
- ii) Describe the need input back off. State how is it accounted for in link budget calculation. (4)
- (OR)**
- b) i) Obtain an expression for link power budget equation. Assume suitable parameters. (10)
- ii) What is output back off? Explain. (4)
25. a) Illustrate the working of TDMA system.
- (OR)**
- b) It is desired to install a Direct broadcast satellite(DBS) for TV service for home. Illustrate a suitable receiver architecture for the same. Compare DBS TV with MA TV
