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**Question Paper Code : 91421**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019  
Seventh Semester  
Electronics and Communication Engineering  
EC 6004 – SATELLITE COMMUNICATION  
(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Which is called as direct orbit ?
2. Define the terms apogee and perigee.
3. What does the term 'bus' refer in TT&C ?
4. Write down the formula for reliability of hardware.
5. A receiving system has antenna noise temperature 60K and receiver noise figure 9dB. Find the system noise temperature if room temperature is 290K.
6. State the basic requirements of an earth station antenna.
7. What are the techniques used in demand assignment access ?
8. What is burst position synchronization ?
9. Write any two features of GPS.
10. Define DBS and name any two services.

PART – B

(5×18=65 Marks)

11. a) i) Explain the orbital perturbations. (7)  
ii) What is meant by the geostationary orbit and also explain the conditions to be required for an orbit to be geostationary. (6)

(OR)



- b) i) State and explain the Kepler's three laws of motion with suitable diagram. (9)
- ii) Explain about satellite launch vehicles. (4)
12. a) i) Explain what is meant by satellite attitude, and briefly describe two forms of attitude control. (9)
- ii) Discuss about the need of thermal control in a satellite. (4)
- (OR)
- b) i) Explain the working of telemetry tracking and control with a suitable diagram. (9)
- ii) Determine the angle of tilt required for a polar mount used with an earth station at latitude  $49^\circ$  north. Assume a spherical earth of mean radius 6371 km and ignore earth-station altitude. (4)
13. a) i) In a link-budget calculation at 12 GHz, the free-space loss is 206 dB, the antenna pointing loss is 1 dB, and the atmospheric absorption is 2 dB. The receiver [G/T] is 19.5 dB/K, and receiver feeder losses are 1 dB. The EIRP is 48 dBW. Calculate the carrier-to-noise spectral density ratio. (6)
- ii) Explain in detail the feeder losses and misalignment losses in space link. (7)
- (OR)
- b) i) What is TVRO and explain briefly the home terminal for DBS TV/FM reception. (9)
- ii) Derive the power output of earth station HPA. (4)
14. a) i) Draw the encoder diagram for the following digital signals – Unipolar NRZ, Polar NRZ, Manchester, Polar RZ for the digital data 1010111. (8)
- ii) Write down the advantages of CDMA for satellite networking. (5)
- (OR)
- b) i) Explain how carrier recovery is done in TDMA with an example. (9)
- ii) Describe the concept of multiplexing. (4)
15. a) i) Describe the architecture of GSM in detail. (9)
- ii) Write a detailed note on MPEG compression standards. (4)
- (OR)
- b) i) Explain in detail the working of a typical VSAT system. (9)
- ii) Give a detailed note on E-mail. (4)



PART - C

(1×15=15 Marks)

16. a) i) An uplink operates at 14 GHz, and the flux density required to saturate the transponder is  $-120 \text{ dB (W/m}^2\text{)}$ . The free space loss is 207 dB, and the other propagation losses amount to 2 dB. Calculate the EIRP required for saturation, assuming clear sky conditions. Assume RFL is negligible. (7)
- ii) Draw the basic arrangement for the detection of the unique word. (4)
- iii) Define EIRP and derive the formula for it in decibels. (4)

(OR)

- b) i) Describe about the cascading of amplifiers. (7)
- ii) A video signal of bandwidth 4.2 MHz is used to frequency modulate a carrier, the deviation ratio being 2.56. Calculate the peak deviation and the signal bandwidth. (4)
- iii) Explain the term 'redundant' in redundant earth station and show this diagrammatically. (4)
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