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Reg. No. : ....

Name : ....

Eighth Semester B.Tech. Degree Examination, April 2015
(2008 Scheme)
08.804 : SATELLITE AND MOBILE COMMUNICATION (T)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **4** marks.

1. Why uplink and downlink frequencies made different in satellite communication ? Why uplink is made higher than downlink ? Give the typical frequencies.

2. Differentiate geostationary and geosynchronous orbits. State atleast three advantages of geostationary orbit.

3. For a satellite circuit the individual carrier to noise spectral density ratios are $(C/N)_{uplink} = 23dBHz$ $(C/N)_{downlink} = 20dBHz$, intermodulation 24dBHz. Calculate the overall carrier to noise ratio in decibels.

4. Briefly describe the mobile satellite networks.

5. If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses

   a) 4 cell reuse

   b) 7 cell reuse.

6. State and briefly explain the four factors that influence small-scale fading.

7. State and explain the multiple access technique used in GSM. Also differentiate FDD and TDD.

8. Briefly describe the Ultra Wide band communication system giving emphasis to its application and multiple access technique.

9. State atleast four advantage of CDMA system.

10. Define relative other - cell interference factor in a CDMA cell. What is its range and what are the factors that affect the value of it ?   **(10×4=40 Marks)**

PART – B

Answer **any two** questions from **each** Module.

Module – 1

11. a) Describe a transmit receive type earth station with a block diagram.

    b) Compare the performance of high power amplifiers used in earth station.

12. a) Define

    a) Antenna look angles

    b) Coverage angle and slant range.

    b) A geostationary satellite is located at 90°W. Calculate the

    a) Azimuth angle

    b) Elevation angle and

    c) Range for an earth station antenna at latitude 35°N and longitude 100° W.

13. a) Explain how a satellite is placed into geostationary orbit from earth.

    b) What is meant by the earth eclipse of an earth-orbiting satellite ? Why is it preferable to operate with a satellite positioned west, rather than east of earth station longitude.

Module – 2

14. A transmitter produces 50W of power, express the transmit power in :

    a) dBm

    b) dBW

    If 50W is applied to a unity gain antenna with a 900 MHz carrier frequency find the power received in dBm at free space distance of 100 m from the antenna. What is P_r (10 km) ?

    Hint : Gain of Receiving antenna is unity.

15. Explain any one of the outdoor propagation models ? State the advantage and disadvantage of Lorzely– Rice and Okamura models.

16. a) With a block diagram explain GSM architecture.

   b) Briefly describe the GSM channel types.

Module – 3

17. State the four diversity combining techniques. Explain atleast two of them.

18. A CDMA system has an information rate $R_b = 4800$ bps and spreading rate is 32. The system in error protected by a $-\frac{1}{2}$ convolutional code. Compare the degradation with and without FEC coding at BER of 10^{-5} and when there are seven interfering uses. With FEC what is the spreading factor ? Given E_b/N_o for BER $10^{-5} = 9.6$dB.

19. a) What is meant by space division multiple access ? State atleast four advantages. How SDMA improve the system capacity.

   b) Briefly explain smart antennas used for mobile application.   **(6×10=60 Marks)**