BOSTON INTERNATIONAL COLLEGE

MID TERM EXAM

Level: Bachelor	**Year : 2022**
Program: BCIS Semester: VIII	**Full Marks : 100**
Course: Wireless & Mobile Communications	**Time : 3:00 hrs**

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Model Questions

Group A

Very Short Answer Questions

Attempt all the questions. Give your answer in few lines: 10*2=20

1. What is the difference between GSM and GPRS?
2. How 5G SA is different than 5G NSA?
3. What is frequency reuse? Why is it needed?
4. What is trunking?
5. How sectoring improves the capacity in cellular systems?
6. What is satellite communications? List out its applications.
7. What is GPS? What are its applications?
8. What is modulation and what are its benefits?
9. What is diversity technique in wireless communication?
10. What are the propagation mechanisms in wireless communication?
11. What is Noise? How does it affect user data signal?
12. What is antenna? List our difference between directional and omnidirectional antenna.
13. What is digital audio compression? What are its advantages?
14. Define broadcasting.
15. Define traffic intensity.

Group B

Descriptive Answer Questions

Attempt any five questions. 6*10=60

16. List out the key feature of 1G, 2G, 3G, 4G and 5G mobile phone technology.
17. Describe all elements of GSM architecture with necessary figure.
18. a. What are the difference between Fixed and dynamic channel assignment strategies?
    b. What is interference? Explain the co-channel interference and adjacent channel interference.
19. What is satellite communication systems? How it works? Explain with necessary block diagram of transmitting and receiving side.
20. How does the Dish TV or Satellite TV works? Explain with necessary figure.
21. Suppose we have satellite system operates at 12.5GHz, with transmit carrier power of 120W, and transmit antenna gain 34dB, IF Bandwidth 20MHz. The receiving dish have gain of 33.5dB, with receiver noise figure 1.1dB, locates 39000km from the satellite. Calculate the received carrier power at receiver terminal and Signal to Noise Ratio (SNR).
22. What is QAM (Quadrature Amplitude Modulation)? How message signal is modulated with QAM? Draw the constellation diagram of 16QAM.
23. What is remote sensing? What are its advantages? What are the elements involved in the remote sensing? Explain with necessary figures.
24. Explain analog and digital modulation types along with waveform diagram.

Group C
Case Analysis

25. The Second largest telecom service provider of Nepal NCELL company bought a 2G GSM spectrum 900 MHz, the region for which they allocated this 10 MHz bandwidth has total area 100 km^2 (assume a squared area of 10 km width and 10 km length). We have to find out the ways with which maximum number of customers can be supported to communicate simultaneously. Full duplex voice communication (in GSM) requires 200 kHz uplink and 200 kHz downlink for a single customer. Assume that the company uses 890 to 895 MHz for uplink and 895 to 900 MHz for downlink, i.e. 5MHz uplink and 5MHz downlink.

    So the number of channels available = $(5 \times 10^6)/200 \times 10^3) = 25$ i.e. uplink and 25 downlink.

    Now assume the 2G GSM technology is TDMA. When TDMA is used a 200 kHz channel can be shared between 8 devices (that means it can be subdivided in 8 channels).

    So the total number of downlink/uplink channels available = 25x8 = 200.

    Now assume if only one high power antenna is installed by the operator in the middle of square to transmit and receive signals. Only 200 customers can communicate at a time. The question is how can we increase the system capacity (number of channels)?

    The answer is frequency reuse. Using the concept of frequency reuse, how many BTS needs to be installed with reused frequency to provide the service for 5000 customers? Support your deployment with necessary figures. Implement your design considering the total area 100 km^2 (assume a squared area of 10 km width and 10 km length). 100 km^2 (assume a squared area of 10 km width and 10 km length). Explain the impact of using the larger cell radius vs small cell radius. Also explain the impact of using larger vs smaller co-channel distance.