

CODE NO: A109211201

R09

SET - 1

II B.TECH - I SEMESTER EXAMINATIONS – MAY, 2011
DATA COMMUNICATION SYSTEMS
(INFORMATION TECHNOLOGY)

Time: 3hours**Max. Marks: 75**

Answer any FIVE questions
All Questions Carry Equal Marks

- - -

1. Draw the block diagram of OSI model and explain the functionality of each layer in detail. [15]
- 2.a) Describe different modes of propagation that are possible in optical Fiber Cable.
b) Explain in detail about the losses in optical fiber cables. [8+7]
- 3.a) With the aid of block diagram, explain the single channel simplex PCM transmission system.
b) A PCM system has the following parameters: Maximum analog signal frequency $f = 4$ kHz, maximum decoded voltage at the receiver $V_r = \pm 2.55$ V, minimum dynamic range = 46 dB. Determine
 - i) minimum sampling rate
 - ii) minimum number of bits used in the PCM code
 - iii) resolution
 - iv) quantization error. [7+8]
- 4.a) Describe the terms related to wave propagation: reflection, refraction, diffraction and interference with suitable diagrams.
b) Explain about spherical wave front of electromagnetic wave. What is Poynting vector? Explain its importance. [8+7]
- 5.a) What are the basic Telephone call procedures? Explain them.
b) Explain in detail about the Paging systems and their functions. [7+8]
- 6.a) What is meant by First-Generation Cellular telephone system? Describe the technical specifications of AMPS.
b) With the aid of suitable block diagram, explain architecture of the GSM system in detail. [8+7]
7. Explain different types of error detection methods used in data communications with suitable examples. [15]
8. Write the following:
 - a) Binary Synchronous Communications
 - b) Data link Protocol functions [8+7]

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- 1.a) List out and describe the functions of different components of a data communications circuit.
- b) What are the transmission modes of a data communication system? Explain them. [8+7]
- 2.a) Explain about optical sources and detectors in brief.
- b) Define velocity factor and dielectric constant and explain how they affect the performance of a given transmission line.
- c) For a given length of a coaxial cable with distributed Capacitance $C = 48.3 \text{ pF/m}$, and inductance $L = 241.56 \text{ nH/m}$, determine the velocity factor and velocity of propagation of the wave. [5+5+5]
- 3.a) Derive the expression for signal to quantization noise ratio in case of standard PCM system.
- b) What are the different quantization techniques that are used in a PCM system? Explain them. [7+8]
- 4.a) What is free space path loss? Calculate free space path loss if a 6 GHz radio wave is propagating in free space a distance of 50 km.
- b) With suitable frame formats, discuss about the microwave communication. Mention the application of each microwave frequency band. [7+8]
- 5.a) Discuss about the following signaling messages: alerting, supervising, controlling, and addressing. What is the purpose of dial tone, when it is applied to a telephone circuit?
- b) Describe the differences between the operation of a cordless telephone and a standard telephone. [8+7]
- 6.a) List out the advantages of digital TDMA over analog AMPS FDMA.
- b) Discuss about the Iridium Satellite System. [8+7]
- 7.a) Explain about the error correction methods used in data communications.
- b) For a 12 bit data string of 101100010010, determine the number of Hamming bits required, arbitrarily place the Hamming bits into the data string. Also determine the logic condition of each Hamming bit. Assume an arbitrary single bit transmission error, and prove that the Hamming code will successfully detect the error. [7+8]
8. Write the following:
 - a) HDLC
 - b) Asynchronous Data link Protocols. [7+8]

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- 1.a) Discuss about different classifications of Data Network.
- b) With the help of neat sketches, explain different Network topologies of data communications. [7+8]
- 2.a) Discuss about the wave propagation in metallic transmission lines.
- b) Enumerate different losses that occur in metallic transmission lines and explain them with suitable sketches. [7+8]
- 3.a) With suitable sketches, explain about AT&T's FDM digital hierarchy system.
- b) What is Frame synchronization? How is it achieved in a PC-TDM system? [8+7]
- 4.a) Describe the importance of Skip distance in radio wave propagation.
- b) Explain the terrestrial propagation of electromagnetic waves with suitable sketches. [7+8]
- 5.a) What are the main component parts that make up a traditional local loop? Explain them.
- b) List out different types of units that are used in power measurements?
- c) For a signal measurement of -42dBm, a noise measurement of 16 dBnc, and a -40 dBm TLP, determine

i) signal level in dBnc	ii) Noise level in dBm	
iii) Signal level in dBmO	iv) and signal to noise ratio in dB.	[4+3+8]
- 6.a) What are the different types of handoff mechanisms possible with N-AMPS? Explain them.
- b) Explain the North American Digital Cellular TDAMA format. [8+7]
- 7.a) Describe how vertical redundancy checking accomplishes error detection. Explain it with suitable example.
- b) Discuss about the Voice-Band Modem and its classifications. [8+7]
8. Write the following:
 - a) Bit oriented protocols
 - b) Character oriented protocols. [7+8]

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- 1.a) Describe the relationship between bit rate, bandwidth, and baud rate in case of QPSK and 16-QAM. Also draw the constellation diagrams for the modulation schemes mentioned above and comment on the performance of each scheme based on the diagrams.
- b) For a circuit with a signal power of 100 and a thermal noise power of 0.002 mW, determine the SNR in absolute and dB values. [8+7]
- 2.a) List out different types of metallic transmission lines and explain them in detail.
- b) If a coaxial cable of one meter length has inner conductor diameter of 0.025 inch; and inner diameter of the outer conductor of 0.15 inch. Calculate its characteristic impedance. [7+8]
- 3.a) Discuss about wavelength division multiplexing in detail and mention its advantages and disadvantages.
- b) What is statistical TDM? Explain in what way it is advantageous as compared to standard TDM system. [8+7]
- 4.a) Discuss about the attenuation and absorption of Electromagnetic wave when it propagates in a medium.
- b) What are the optical properties of radio waves? Explain them in detail. [8+7]
- 5.a) With aid of suitable diagrams, explain two-wire and four-wire Voice-Frequency circuits.
- b) What is cross talk? How is it initiated in telephone circuits? Explain.
- c) The magnitude of the cross talk on a circuit is 66 dB lower than the power of the signal on the same circuit. Determine the cross talk in dBm. [5+5+5]
6. Explain the following standards:

a) IS-54	b) IS-95	c) IS-136.	[5+5+5]
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- 7.a) Determine the BCC for the following data, and CRC generating polynomials:
 $G(x) = x^7 + x^4 + x^2 + 1$; $P(x) = x^5 + x^4 + x + 1$;
- b) Explain the different types of Bar codes that are commonly used.
- c) Explain the difference between probability of error and Bit error rate. [5+5+5]
8. Write the following:

a) SDLC	b) Asynchronous Data link Protocols.	[7+8]
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