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Daffodil International University

Faculty of Science & Information Technology
Department of Information Technology & Management (ITM)
Final Examination, Spring 2024
Course Code: ITM 315, Course Title: Data Communication and Networking
Section: A (4th &7th Batch) Teacher: BCD

Time: 2:00 Hrs **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1	*a)*	(i) What do you mean by Signal to Noise Ratio (SNR) and Decibel (dB)? (ii) The power of a signal is 10 mW and the power of the noise is 1 μW; what are the values of SNR and SNRdB?	3+3=6	
	b)	(i) Define Propagation time and transmission time. (ii) What are the propagation time and the transmission time for a 2.5kbyte message (an email) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×108 m/s.	2+3=5	CO3 (5)
2	*a)*	Explain the Uni-polar and Polar coding in digital-to-digital communication.	6	
	b)	In a digital transmission, the receiver clock is 0.1 percent faster than the sender clock. How many extra bits per second does the receiver receive if the data rate is 1 kbps? How many if the data rate is 1 Mbps?	3	CO3 (5)
3	*a)*	(i) Write down the shift keying in digital-to-analog conversion? Describe briefly the frequency shift keying with figure. (ii) An analog signal has a bit rate of 8000 bps and a baud rate of 1000 baud. How many data elements are carried by each signal element? How many signal elements do we need?	1+2+2=5	CO4 (2)
	b)	What are the functionalities of Amplitude Modulation (AM) and Frequency Modulation, describe with figures?	5	
4	*a)*	(i) Describe the concept and techniques of Multiplexing in communication networks. (ii) Assume that a voice channel occupies a bandwidth of 4 kHz. We need to combine three voice channels into a link with a bandwidth of 12 kHz, from 20 to 32 kHz. Show the configuration, using the frequency domain. Assume there are no guard bands.	3+4=7	
		The Advanced Mobile Phone System (AMPS) uses two bands. The first band of 824 to 849 MHz is used for sending, and 869 to 894 MHz is used for receiving. Each user has a bandwidth of 30 kHz in each direction. How many users can use their cellular phones simultaneously?	3	CO4 (3)