VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (IT: CBCS) IV-Semester Main & Backlog Examinations, May-2019
Data Communications

Time: 3 hours

Max. Marks: 60

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Q.No.	Stem of the question	M	L	CO	PO
	Part-A (10 × 2 = 20 Marks)				
1.	Categorize the four basic topologies in terms of Line Configuration.	2	2	1	2
2.	If a periodic signal is decomposed into five sine waves with frequencies of 200, 400, 600, 800, and 900 Hz, what is its bandwidth? Draw the spectrum, assuming all components have a maximum amplitude of 5 V.	2	3	1	3
3.	What does the amplitude of a signal measure? What does the frequency of a signal measure? What does the phase of a signal measure?	2	1	1	3
4.	List two techniques of digital-to-digital conversion?	2	2	2	2
5.	A bit-stuffing based framing protocol uses an 8-bit delimiter pattern of 01111110. If the output bit-string after stuffing is 0111110010. Write the input bit-string.	2	3	3	3
6.	Draw the frame format of HDLC and mention various fields of it.	2	2	3	1
7.	Which of the three multiplexing techniques is common for fiber optic links?				
8.	What is DSL technology? What are the services provided by the telephone companies using DSL?	2	1	4	1
9.	What is piggybacking? What is its advantage?	2	2	4	3
10.	What is the functionality of a Bridge?	2	1	5	1
	Part-B (5 × 8 = 40 Marks)				
11.a)	What is a protocol? Give the key elements of a protocol.	3	1	1	1
b)	Define channel capacity. What key factors affect highest data rate for noiseless channel and noisy channel? Signal to Noise ratio is often given in decibels. Assume $SNR_{db} = 20$ and the channel bandwidth is 3 MHz. Calculate theoretical channel capacity.	5	3	1	2
12.a)	State sampling theorem. With the help diagrams, explain the process of transforming analog signal to digital data using pulse code modulation technique.	4	2	2	1
b)	A device is sending out data at the rate of 1000 bps. i) How long does it take to send out 10 bits? ii) How long does it take to send out a single character (8 bits)? iii) How long does it take to send a file of 100,000 characters?	4	2	4	2
13.a)	For a 12bit data string of 101100010010, determine the number of Hamming bits required, assume an arbitrary single bit transmission error and prove that the hamming code will successfully detect the error.	5	4	3	3
b)	Why do you need error detection? Explain different types of Errors?	3	2	2	2

		M	L	CO	PO
14.a)	List four Major components of packet Switching and write their Function. With suitable example illustrate working of virtual circuit for Packet Swithing.	3	3	4	1
b)	Two channels, one with a bit rate of 200 kbps and another with a bit rate of 190 kbps, are to be multiplexed using pulse-stuffing TDM with no synchronization bits. Answer the following questions: i) What is the size of a frame in bits? ii) What is the frame rate? iii) What is the duration of a frame? iv) What is the data rate?	5	4	4	3
15.a)	Write steps to implement CSMA/CD. How CSMA/CD works. Why is there no need for CSMA/CD on a full-duplex Ethernet LAN?	4	3	5	3
b)	List two sub layers of Data link layer. What are the standard Ethernet common implementations? Discuss briefly.	4	3	5	2
16.a)	Discuss TCP/IP Protocol Suite.	4	2	1	1
b)	Show the equivalent analog sine-wave pattern of the bit string 10100111 using amplitude shift keying, frequency shift keying and phase shift keying.	4	3	2	2
17.	Answer any *two* of the following:				
a)	Explain with a neat diagram: i) The Go Back 'n' ii) Selective-reject sliding window protocols	4	2	4	2
b)	Explain different planes in ATM references model. Discuss various ATM adaption layers.	4	2	4	1
c)	Explain the significance of each field in an Ethernet Frame.	4	2	5	1

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	60
2	Knowledge on application and analysis (Level-3 & 4)	40
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	

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