Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2019

IT3CO18 Data Communication

Programme: B.Tech. Branch/Specialisation: IT

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Internet Surfing is an example of **1**

(a) Simplex (b) Full duplex

(c) Half Duplex (d) LAN

ii. In Coaxial Cable, whole cable is protected by a **1**

(a) Plastic cover (b) Insulator

(c) Shield (d) Conductor

iii. Nyquist theorem specifies the minimum sampling rate to be- **1**

(a) Equal to the lowest frequency of a signal.

(b) Equal to the highest frequency of a signal.

(c) Twice the bandwidth of a signal.

(d) Twice the highest frequency of a signal.

iv. Which line encoding shows the transition at the middle of the bit, but the bit values are determined at the beginning of the bit. If the next bit is 0, there is a transition; if the next bit is 1, there is none. **1**

(a) Manchester (b) Differential Manchester

(c) Both (a) and (b) (d) Neither (a) nor (b)

v. In a multiplexed system, __ lines share the bandwidth of ____ link. **1**

(a) n; n (b) n; 1 (c) 1; 1 (d) 1; n

vi. Determine the Bandwidth of a FM wave when the maximum deviation allowed is 75KHz and the modulating signal has a frequency of 10KHz. **1**

(a) 85KHz (b) 170KHz (c) 340KHz (d) 100KHz

vii. Internet has been using a checksum of **1**

(a) 2 bit (b) 4 bit (c) 8 bit (d) 16 bit

P.T.O.

viii. In modulo-2 arithmetic, which operation is used for both addition and subtraction? **1**
(a) OR (b) XOR (c) AND (d) NOR

ix. A local telephone network is an example of **1**
(a) Virtual-circuit Network (b) Datagram Network
(c) Circuit-switched Network (d) Message switched Network

x. As assigned by the Federal Communications Commission, cellular radio systems operate in the **1**
(a) LF and HF band (b) HF and VHF band
(c) VHF and UHF band (d) UHF and microwave band

Q.2 i. Explain the components of data communication. **2**

ii. Define the terms frequency and period of a signal. A periodic signal is decomposed into five sine waves with frequencies 100, 200, 300, 400, 800 Hz what is the bandwidth? **3**

iii. Define Shannon capacity formula. Assume that the TV picture is to be transmitted over a channel with 4.5MHz bandwidth and a 35dB signal-to-noise ratio. Find the capacity of the channel (bps). **5**

OR iv. Explain how optical fiber is constructed with a diagram. List out the benefits of optical fiber compared to twisted pair and coaxial cable. **5**

Q.3 i. Write down the difference between asynchronous and synchronous transmission. **4**

ii. Given the bit pattern 01100, encode this data using ASK, FSK, and PSK Where frequency is 2Hz. **6**

OR iii. Encode the bit pattern “0101100000000100100001” using B8ZS and HDB3 (number of non-zero Pulses are even after last substitution). **6**

Q.4 i. What are the goals of multiplexing technique? **3**

ii. Distinguish between a link and a channel in multiplexing. Explain FDM hierarchy used in telephone communication. **7**

OR iii. What is spread spectrum? Explain FHSS and bandwidth sharing. **7**

Q.5 i. Define single-bit error and burst error and show its effect on data unit. **3**

ii. How VRC generator and receiver can implement by using series of XOR gate. Explain with an example. A system uses LRC on a block of 24 byte, how many redundant bits are sent per block, what is the ratio of useful bits to the total bits? **7**

OR iii. Explain how error detection is done using CRC. Implement the above scheme for the message 1010001101 and generator polynomial x5+x4+x2+1. **7**

Q.6 i. Explain the significance of packet size in a packet switching network. **4**

ii. Draw and explain GSM system architecture. **6**

OR iii. What is circuit switched Network? How communication is established in these networks? **6**

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Marking Scheme
IT3CO18 Data Communication

Q.1	i.	Internet Surfing is an example of (c) Half Duplex		**1**
	ii.	In Coaxial Cable, whole cable is protected by a (a) Plastic cover		**1**
	iii.	Nyquist theorem specifies the minimum sampling rate to be- (d) Twice the highest frequency of a signal.		**1**
	iv.	Which line encoding shows the transition at the middle of the bit, but the bit values are determined at the beginning of the bit. If the next bit is 0, there is a transition; if the next bit is 1, there is none. (b) Differential Manchester		**1**
	v.	In a multiplexed system, __ lines share the bandwidth of ____ link. (b) n; 1		**1**
	vi.	Determine the Bandwidth of a FM wave when the maximum deviation allowed is 75KHz and the modulating signal has a frequency of 10KHz. (b) 170KHz		**1**
	vii.	Internet has been using a checksum of (d) 16 bit		**1**
	viii.	In modulo-2 arithmetic, which operation is used for both addition and subtraction? (b) XOR		**1**
	ix.	A local telephone network is an example of (c) Circuit-switched Network		**1**
	x.	As assigned by the Federal Communications Commission, cellular radio systems operate in the (c) VHF and UHF band		**1**
Q.2	i.	Components of data communication.		**2**
		0.5 mark for each	(0.5 mark * 4)	
	ii.	Frequency	1 mark	**3**
		Period of a signal	1 mark	
		Bandwidth	1 mark	
	iii.	Define Shannon capacity formula	2 marks	**5**
		Find the capacity of the channel (bps).	3 marks	
OR	iv.	Optical fiber is constructed with a diagram	3 marks	**5**
		Comparison	2 marks	
Q.3	i.	Difference between asynchronous and synchronous transmission.		**4**
		1 mark for each difference	(1 mark * 4)	
	ii.	Given the bit pattern 01100, encode this data using ASK, FSK, and PSK Where frequency is 2Hz.		**6**
		Each waveform 2 mark for each	(2 marks * 3)	
OR	iii.	Encode the bit pattern “0101100000000100100001” using B8ZS and HDB3		**6**
		Each waveform 3 marks for each	(3 marks * 2)	
Q.4	i.	At least three goals of multiplexing technique		**3**
		1 mark for each	(1 mark * 3)	
	ii.	FDM hierarchy	5 marks	**7**
		Difference	2 marks	
OR	iii.	Spread spectrum	2 marks	**7**
		FHSS with diagram	3 marks	
		Bandwidth sharing.	2 marks	
Q.5	i.	Single-bit error	1 mark	**3**
		Burst error	1 mark	
		Its effect on data unit.	1 mark	
	ii.	VRC generator and receiver	5 marks	**7**
		Number of redundant bits	1 mark	
		Ratio	1 mark	
OR	iii.	Error detection is done using CRC	2 marks	**7**
		Numerical solution	5 marks	
Q.6	i.	Explanation of packet size in a packet switching network.		**4**
	ii.	GSM system architecture.	2 marks	**6**
		Explanation	4 marks	
OR	iii.	Definition of circuit switched Network	2 marks	**6**
		Communication is established in these networks	4 marks	

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