Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018
Course Code: IT203
**Course Name: DATA COMMUNICATION (IT)**

Max. Marks: 100   Duration: 3 Hours

PART A
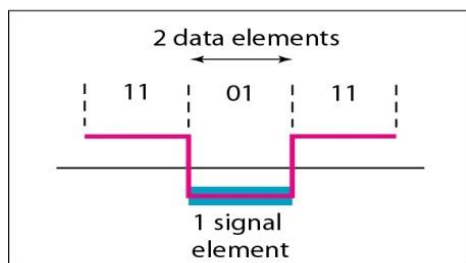*Answer any two full questions, each carries 15 marks*   Marks

1	a)	What are the advantages of frequency-domain plots of a sine wave over time domain plot?	(4)
	b)	What is attenuation and how to compensate it? The attenuation of a signal is -10 dB. What is the final signal power if it was originally 5 W?	(6)
	c)	Compare between step-index fibre and graded-index fibre.	(5)
2	a)	What is the significance of Shannon capacity indata communications?	(3)
	b)	Consider a noiseless channel with a bandwidth of 3000 Hz transmitting a signal with two signal levels. Calculate the maximum bit rate?	(4)
	c)	Calculate the bit rate for the given baud rate and type of modulation.	(8)

i) 1000 baud, FSK   ii) 1000 baud, ASK
iii) 1000 baud, BPSK   iv) 1000 baud, QPSK

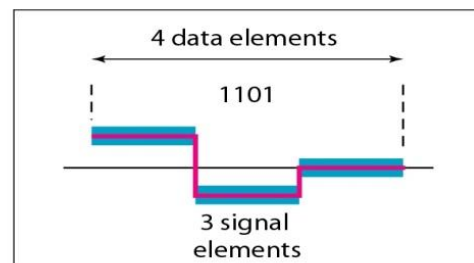|			
3	a)	Differentiate between asynchronous and synchronous transmission.	(4)
	b)	Calculate the value of the signal rate for each case in the following figure if the data rate is1 Mbps and c = 1/2.	(5)
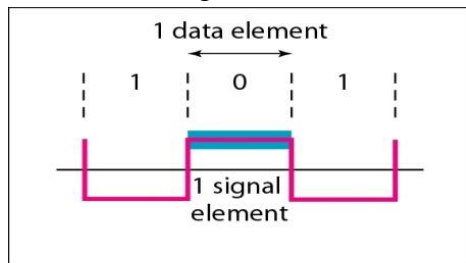
a. One data element per one signal element
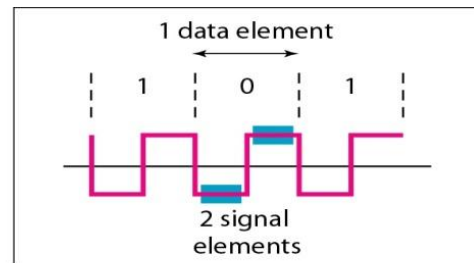
b. One data element per two signal elements

c. Two data elements per one signal element

d. Four data elements per three signal elements

	c)	Differentiate between Polar NRZ-L and NRZ-I schemes.	(6)

PART B
Answer any two full questions, each carries 15 marks

4   a)   Assume that a voice channel occupies a bandwidth of 4 kHz. We need to multiplex 10 voice channels with guard bands of 500 Hz using FDM. Calculate the required bandwidth?   (2)

     b)   A Synchronous TDM which combines 20 digital sources, each of 100 Kbps. Each output slot carries 1 bit from each digital source, but one extra bit is added to each frame for synchronization.   (8)

           i) What is the size of an output frame in bits?

           ii) What is the output frame rate?

           iii) What is the duration of an output frame?

           iv) What is the output data rate?

     c)   What is CDMA? How it differs from TDMA and FDMA?   (5)

5   a)   What is block coding?   (6)

     b)   Find the bandwidth for the following situations if we need to modulate a 5-KHz voice: (3)

        i) AM   ii) FM (set $\beta = 5$)   iii) PM (set $\beta = 1$)

     c)   What are the components of PCM?   (6)

6   a)   What are the steps inHuffman coding algorithm?   (3)

     b)   Consider a discrete memoryless service with seven possible symbols x_i, i=1,2,...,7 and the corresponding probabilities $P(x_1)$=0.46, $P(x_2)$=0.30, $P(x_3)$=0.12, $P(x_4)$=0.06, $P(x_5)$=0.03, $P(x_6)$=0.02, $P(x_7)$=0.01. Generate Huffman code and Huffman tree. Find out its entropy and efficiency?   (5)

     c)   Describe encoder and decoder for simple parity check code with diagram.   (7)

PART C
Answer any two full questions, each carries20 marks

7   a)   Is it possible to check a valid codeword?   (4)

     b)   What is CRC? Calculate the frame for the transmission for a data word 1001 using the generator $G(x) = x^3 + x + 1$ by calculating the CRC.   (8)

     c)   What are BCH codes and RS codes?   (8)

8   a)   What are cyclic codes? What is its extra property from other linear block codes?   (8)

     b)   Explain the GPRS Network Architecture.   (6)

     c)   Compare between Wi-Fi and Wi-Max.   (6)

9   a)   How do we calculate Hamming Code?   (6)

     b)   Calculate the Hamming code for the data 10011010.   (6)

     c)   Compare and contrast a circuit-switched network and a packet-switched network.   (8)

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