Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

III SEMESTER B.TECH. (COMPUTER AND COMMUNICATION ENGINEERING)

MAKEUP EXAMINATIONS, DECEMBER 2017

DIGITAL COMMUNICATION [ICT 2152]

REVISED CREDIT SYSTEM

(30/12/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions.
- Missing data, if any, may be suitably assumed.

1A. In a system using CDMA technique consider a scenario where the user A [1 1 -1 -1 1 1], user B [1 1 -1 1 1 -1] and user C [1 -1 -1 1 -1 1] are to modulate the data pattern 010 simultaneously using their chip patterns. Compute the combined signal. Show the decoding corresponding to individual user. 5

1B. Explain OQPSK with a neat diagram and also write the difference between QPSK and OQPSK. 3

1C. For a 12 – bit binary string 010011000110, calculate the number of transitions for bipolar AMI and Manchester encoding schemes. 2

2A. With a neat block diagram explain delta modulation technique. Provide example to substantiate this. 5

2B. Suppose a transmitter produces 50 W of power.

i. Express the transmit power in units of dBm.

ii. If the transmitter's power is applied to a unity gain antenna with a 900-MHz carrier frequency, what is the received power in dBm at a free space distance of 100 m?

iii. If gain of receiver antenna is 2 and carrier frequency is 600-MHz, what is the received power in dBm at a free space distance of 200 m? 3

2C. Explain carrier sense multiple access with collision detection protocol. 2

3A. With a neat block diagram of transmitter and receiver, explain synchronous time division multiplexing. Explain the DS-1 transmission frame format with respect to digital carrier system for transmission of voice traffic. 5

3B. Explain the frame structure for high level data link control protocol. 3

3C. Suppose the spectrum of a channel is between 3MHz and 4MHz and $SNR_{dB} = 24$, what is the capacity of the channel? Calculate the signaling levels required to achieve this capacity. 2

4A. With a neat vertical time sequence diagram explain Go- back N and selective reject ARQ techniques. 5

4B. Explain the following transmission impairments:

i. White Noise

ii. Intermodulation noise

iii. Delay Distortion 3

4C. What is the minimum hamming distance among the following codewords: 000000, 111101, 001010, 110111 and 110001. 2

5A. Draw the shift register implementation for the generator polynomial $X^8 + X^2 + X+1$. Encode the data bit sequence 11110011100111 using the same. 5

5B. With no intervening obstacles, the optical line of sight can be expressed as $d=3.54\sqrt{h}$, where d is the distance between an antenna and the horizon in kilometers and h is the antenna height in meters. Using a value for the earth's radius of 6370km, derive this equation. Assume that the antenna is perpendicular to the earth's surface, and note that the line from the top of the antenna to the horizon forms a tangent to the earth's surface at the horizon. 3

5C. Compare circuit and packet switching networks. 2