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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

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

MAKEUP EXAMINATIONS, JANUARY 2017

SUBJECT: DIGITAL COMMUNICATION [ICT 2152]

REVISED CREDIT SYSTEM
(04/01/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. Explain the various transmission impairments. SNR, Eb/No ratio and spectral efficiency. **(05)**

1B. Encode the digital input 01001100011 with respect to NRZI, Manchester and differential encoding technique. **(03)**

1C. Given a channel with an intended capacity of 20 Mbps, the bandwidth of the channel is 3 MHz. Assuming white thermal noise, what signal-to-noise ratio is required to achieve this capacity? **(02)**

2A. With a neat block diagram and relevant equation of the signal, explain the working of QPSK and OQPSK modulator. For an input of 1011000111 show the inphase and quadrature phase output for the QPSK and OQPSK. **(05)**

2B. Provide the physical description, application and transmission characteristic of twisted pair cable. **(03)**

2C. A microwave transmitter has an output of 0.1 W at 2 GHz. Assume that this transmitter is used in a microwave communication system where the transmitting and receiving antennas are parabolas, each 1.2 m in diameter. **(02)**

i. What is the gain of each antenna in decibels?
ii. Taking into account antenna gain, what is the effective radiated power of the transmitted signal?
iii. If the receiving antenna is located 24 km from the transmitting antenna over a free space path, find the available signal power out of the receiving antenna in dBm units.

3A. Using the shift register implementation method, compute the CRC code for the message M= 1010001101 and the divisor pattern P= 110101. Using the polynomial division process, check if the transmitted code from the above process has reached the receiver with any error. **(05)**

3B. Generate the code word for the ASCII character "K"= 1001011. Assume even parity for the Hamming code. **(03)**

3C. Show how framing error can occur when the receiver clock is faster by 6% as compared to the sender with a suitable example in the case of asynchronous transmission with one start, one stop and eight bit data. **(02)**

4A. With suitable examples explain the various operations that are carried out during exchange of frames in the case of HDLC. **(05)**

4B. Consider an MFSK scheme with f_c = 250 kHz, f_d = 25 kHz, M = 8 and L = 3 bits **(03)**

i. Make a frequency assignment for each of the eight possible 3-bit data combinations.

ii. Apply FHSS to this MFSK scheme with k = 2; that is, the system will hop among four different carrier frequencies. Expand the results of part (i) to show the 4 * 8 = 32 frequency assignments.

4C. What are advantages and disadvantages of Selective Reject ARQ with respect to go-back-N ARQ? **(02)**

5A. With neat block diagram explain the working of synchronous TDM at the transmitter end. How are the problems associated with empty slots and bit slip handled? **(05)**

5B. Explain the various methods that are adopted in CSMA when there are packets to be transmitted in a busy channel. **(03)**

5C. Explain the working principle of FDDI along with its characteristics. **(02)**