Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104

(Constituent College of Manipal University)

THIRD SEMESTER B.TECH. (CCE) DEGREE END SEMESTER EXAMINATION NOV/DEC – 2015
SUBJECT: DIGITAL COMMUNICATION – ICT 2152
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS **05/12/2015** **MAX. MARKS: 50**

Instructions to candidates

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

1A. What is frequency hop spread spectrum (FHSS)? Assuming data encoding uses 4-FSK, explain the concept of slow FHSS. Take $T_c = 3T_s$.

1B. A 64 kilobyte message is to be transmitted over two hops in a network. The network limits packets to a maximum size of 2 kilobytes and each packet has a 32 byte header. The transmission lines in the network are error free and have a speed of 50 Mbps. Each hop is 1000 km long. How long does it take to get the message from the source to the destination? Assume that the signal travels at the speed of light.

1C. What is CSMA? Mention different CSMA protocols [5+3+2]

2A. With neat block diagram, explain the concept of PCM and Delta modulation methods of encoding analog data to digital signal .

2B. The power of an optical signal in dBm is defined as $10\log_{10} P$ where P is in mW (milli watts).

i.) What is the power in mW of a –30 dBm signal and 6dBm signal?
ii.) What is the power in dBm of 1 microwatt signal?
iii.) What is the power of an optical signal if initially it is 2 mW and then undergoes attenuation by 10 dB?

2C. What is analog carrier system (ACS)? Explain. [5+3+2]

3A. With the help of vertical time sequence diagram, show the frame exchanges between the transmitter and receiver using HDLC protocol using selective reject ARQ. Assume a window size of 7.

i.) A initializes the link and B acknowledges
ii.) A sends frames 0, 1, 2 and 3 to B
iii.) B acknowledges frames 0, 1 and 2
iv.) A sends frame 4, 5 and 6
v.) B rejects frame 3
vi.) A transmit frame 3 and 7
vii.) A transmit frames 0 and 1
viii.) B acknowledges frames 0 and 1
ix.) B initiates for disconnect, A acknowledges.

3B. Consider an audio signal with spectral components in the range 300 to 3000 Hz. Assume that a sampling rate of 7000 samples per second will be used to generate a PCM signal. For SNR=30 dB, what is the number of uniform quantization levels needed? Calculate the data rate.

3C. Consider the use of 2000-bit frames on a 2-Mbps satellite channel with a 470-ms delay. What is the maximum link utilization for

i.) Stop-and-wait flow control?
ii.) Continuous flow control with a window size of 7?
iii.) Continuous flow control with a window size of 255? [5+3+2]

4A. With an appropriate example, explain the concept of CDMA encoding and decoding methods.

4B. With graphical illustration, explain concepts of circuit switching and packet switching.

4C. Derive the effect of doubling the transmission frequency on free space loss for following scenarios.

i.) Transmitter and receiver uses identical isotropic antenna

ii.) When identical parabolic antennae are used.

[5+3+2]

5A. Consider the divider polynomial $P(X)=X^3+X+1$ and the information sequence 1 0 0 1. Use polynomial method to find the code word corresponding to the information sequence. Assume the first bit of code word is affected by channel impairments and toggles, write the code word sequence received by the receiver. Show the receivers error checking method and write receiver's conclusion.

5B. Write physical description, transmission characteristics of terrestrial microwave and satellite microwave communication methods.

5C. Show the contents of output frames for a synchronous TDM multiplexer that combines four sources sending the following characters. Note that the characters are sent in the same order that they are typed. The third source is silent.

Source 1 message: HELLO

Source 2 message: HI

Source 3 message:

Source 4 message: BYE

[5+3+2]