Reg. No.										

प्रज्ञानं ब्रह्म

Manipal
INSPIRED BY LIFE

MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104

(Constituent College of Manipal University)

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MANIPAL INSTITUTE OF TECHNOLOGY

THIRD SEMESTER B.TECH. (CCE) DEGREE MAKE UP EXAMINATION DEC 2015 – JAN 2016
SUBJECT: DIGITAL COMMUNICATION – ICT 2152
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS **07/01/2016** **MAX. MARKS: 50**

Instructions to candidates
- Answer any **FIVE FULL** questions.
- Missing data, if any, may be suitably assumed.

1A. A Forward Error Correction scheme uses a polynomial $P(X) = X^4 + X^3 + 1$ to construct the CRC from a 11-bit message.
   i) Use modulo – 2 division method to encode the data bit sequence 1 0 0 1 1 0 1 1 1 0 0.
   ii) What is the length of code and the length of CRC pattern?
   iii) If $E(X) = X^8 + X^6 + 1$ is error polynomial, write the received bit pattern.
   iv) Check for CRC at the receiver and write the comments.

1B. Explain the terms Ground wave Propagation, Sky wave Propagation and Line of sight Propagations with respect to the wireless signal propagation.

1C. An FHSS system employs a total bandwidth of 400MHz and an individual channel bandwidth of 100Hz. What is the minimum number of PN bits required for each frequency hop, if BPSK signalling scheme is used for encoding the data stream?

(5+3+2)

2A. A character interleaved TDM is used to combine the data streams of a number of 110 bps asynchronous terminals for data transmission over a 2400 bps digital line. Each terminal sends asynchronous characters consisting of 7 data bits, 1 parity bit, 1 start bit and 2 stop bits. Assume the one synchronization character is sent every 19 data characters and, in addition, at least 3% of the line capacity is reserved for pulse stuffing to accommodate speed variations from various terminals.
   i) Determine the number of bits per character.
   ii) Determine the number of terminals that can be accomodated by the multiplexer.
   iii) Sketch the possible framing pattern for the multiplexer.

2B. Explain, with an example, any two multilevel binary signal encoding methods.

2C. Define inter-modulation noise and impulse noise?

(5+3+2)

3A. Explain the concept of Direct Sequence Spread Spectrum (DSSS). Give the neat block diagram of Transmitter and Receiver of DSSS using BPSK.

3B. Two neighbouring nodes A and B use a sliding-window protocol with a 3-bit sequence number. As the ARQ mechanism, Go-Back-N is used with a window size of 4. Assuming A is transmitting and B is receiving, show the window positions for the following succession of events:
   i) Before A sends any frames
   ii) After A sends frames 0,1,2 and receives acknowledgement from B for 0 and 1
   iii) After A sends frames 3,4 and 5 and B acknowledges 4 and the ACK is received by A.

3C. Explain the terms hamming distance and hamming weight with respect to linear block codes. Derive the relation between them.

(5+3+2)

4A. Write the HDLC frame format indicating the individual field size in bits.
   i) Explain the features of control field.
   ii) Why bit stuffing is used?

4B. With neat block diagrams and analytical expressions give the concept of QAM modulation and demodulation.

4C. What is antenna gain? For a parabolic reflector antenna, obtain an expression for antenna gain.

(5+3+2)

5A. With necessary vertical time sequence diagrams, explain Go-Back-N and Slective Reject ARQ methods used in data link flow control. Show reject and reject recovery methods.

5B. What is an isotropic antenna? Define the terms optical line of sight and radio line of sight. Given that the transmitter and receiver antenna height is 50 meters and 20 meters respectively, what should be the height of transmitter antenna alone required, if the receiving antenna is at ground level?

5C. Explain the concept of Statistical Time Division Multiplexing

(5+3+2)