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Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



V SEMESTER B.TECH (COMPUTER SCIENCE AND ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: COMPUTER COMMUNICATION AND NETWORKS [CSE 311]

REVISED CREDIT SYSTEM 7/12/2015

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- * Answer ANY FIVE FULL questions.
- ✤ Missing data, if any, may be suitably assumed.

1A. Differentiate between

- i) Connection-oriented and connectionless service.
- ii) Services and Protocols.

Give one protocol example that uses

- i) Connection-oriented communication
- ii) Connectionless communication

3M

1B. Write how a digital signal is encoded using NRZI and bipolar AMI encoding schemes. Sketch NRZI and bipolar AMI waveforms for the bit stream 10110010. Assume that the signal level for the preceding bit for NRZI was high; the most recent preceding 1 bit (AMI) has a negative voltage. What are the limitations of NRZ encoding? 4M

1C. Explain the following with relevant mathematical expressions:

i) Relation between modulation rate and data rate.

ii) BFSK. Also draw the waveform for the bit pattern 01100 using BFSK. 3M

2A. What do you mean by analog and digital transmission. Which is the preferred method of transmission? Give reasons. 4M

2B. Define channel capacity. A digital signaling system is required to operate at 8Mbps.

i) If a signal element encodes a 8-bit word, what is the minimum required bandwidth of the channel?

ii) If the bandwidth of the channel is 1MHz, what is the SNR in dB of the channel? 4M2C. Define the following:

- i) Digital signal ii) Periodic signal
- iii) Spectrum of a signal iv) Effective bandwidth 2M

3A. Explain the different transmission modes in optical fibers with necessary diagrams. What is the basic principle of satellite communication? Explain. Why must a satellite have distinct uplink and downlink frequencies? 5M

3B. What is asynchronous transmission? Explain. Show the effect of timing error with an example 3M

3C. For P = 110101 and D = 1010001101, find the FCS using binary long division. 2M

4A. Draw the HDLC frame format and explain the flag field.

Consider a 200-m optical fiber link operating at 1 Gbps. The velocity of propagation of optical fiber is 2 X 10^8 m/s. A frame of 1000 bytes is transmitted. Find the Stop and Wait link utilization. 4M

4B. Derive the expression for link utilization in error free sliding window flow control with necessary diagrams 4M

4C. Four channels are multiplexed using TDM. If each channel sends 100 bytes/s and we multiplex 1 byte per channel find the frame size, the duration of a frame, the frame rate, and the bit rate for the link. 2M

5A. Explain CSMA/CD binary exponential backoff algorithm 3M

5B. A 1-km-long, 10-Mbps CSMA/CD LAN (not 802.3) has a propagation speed of 200 m/ μ sec. Repeaters are not allowed in this system. Data frames are 256 bits long, including 32 bits of header, checksum, and other overhead. The first bit slot after a successful transmission is reserved for the receiver to capture the channel in order to send a 32-bit acknowledgement frame. What is the effective data rate, excluding overhead, assuming that there are no collisions?

5C. Explain hidden terminal and exposed terminal problem in wireless LANs with necessary figures. 2M

6A. Explain the implementation of connectionless service in the network layer with an example. 5M

6B. Consider the network of Fig. Q6B. Distance vector routing is used, and the following vectors have just come in to router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and from E: (7, 6, 3, 9, 0, 4). The cost of the links from C to B, D, and E, are 6, 3, and 5, respectively. What is C's new routing table? Give both the outgoing line to use and the cost.



Fig. Q6B.

2M 3M

6C.Explain the following congestion control techniques:

- i) Explicit Congestion Notification
- ii) Random Early Detection