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V SEMESTER B.TECH.(COMPUTER SCIENCE AND ENGINEERING) DEGREE
END-SEMESTER EXAMINATION-DECEMBER 2013
SUBJECT: COMPUTER COMMUNICATION AND NETWORKS (CSE 311)
DATE: 14-12-2013

TIME: 3 HOURS MAX.MARKS: 50

Instructions to Candidates

- **Note:** Answer any **FIVE** full questions.

1.A. Draw and explain the OSI Reference Model.

1.B. Using the polynomial $X^{16}+X^{12}+X^5+1$ generate the 16 bit CRC Code for a message consisting of a 1 followed by 15 0s using:
a. Long Division Method b. Shift Register Mechanism.

1.C. Would you expect that the inclusion of a parity bit with each character would change the probability of receiving a correct message? Justify your answer.

(4+(2+2)+2)

2.A. Explain the different types of transmission impairment which can occur at any communications system.

2.B. Suppose a digitalized TV picture is to be transmitted from a source that uses a matrix of 480 x 500 pixels, where each pixel can take on one of 32 intensity values. Assume that 30 pictures are sent per second. Find the source rate R(bps). Assume that TV picture is to be transmitted over a channel with 5MHZ bandwidth and 40dB SNR. Find the capacity of the channel.

2.C. If the received signal level for a particular digital system is -151 dbW and the receiver system effective noise temperature is 1500 K, what is E_b/N_o for a link transmitting 2400 bps?

(5+3+2)

3.A. Draw the Conceptual Model used by CSMA/CD. Explain the worst case scenario of round trip propagation time on the ethernet? Explain the algorithm which does randomization when a collision occurs.

3.B. A large population of ALOHA users manages to generate 50 requests/sec, including both originals and retransmissions. Time is slotted in units of 40 msec.

a) What is the chance of success on the first attempt?

b) What is the probability of exactly k collisions and then a success?

c) What is the expected number of transmission attempts needed?

3.C. Explain the 3 forms of Carrier Sense Multiple Access Protocols.

((1+1+2)+3+3)

4.A. For the bit stream 01001110, sketch the waveforms for all the 6 encoding schemes. Also sketch the waveform for the scrambling techniques. Assume the signal level for the preceding bit for NRZI was high; the most recent preceding 1 bit (AMI) has a negative voltage; and the most recent preceding 0 bit (pseudoternary) has a negative voltage.

4.B. a. Explain Antenna Gain. Give the expression to show the relationship between Antenna Gain and effective area. What are the parameters used in this expression.

b. Mention any 4 characteristics which distinguish optical fibre from twisted pair or coaxial cable.

4.C. Draw the QPSK and OQPSK modulator.

(4+(2+2)+2)

5.A. a. Derive the expression denoting the maximum possible utilization of the link using Stop-and-Wait Flow Control. From this deduce the expression for the parameter 'a' and the performance expression for Stop-and-Wait ARQ.

b. Two neighboring 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 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 3, 4 and 5 and B acknowledges 4 and the ACK is received by A.

5.B. What are the three different approaches used in Statistical TDM Frame Formats to minimize the bit overhead. Draw the SONET/SDH frame formats.

5.C. Consider the use of 1000 bit frames on a 1 Mbps satellite channel with a 270 ms delay. What is the maximum link utilization for:

a) Stop and Wait flow control?

b) Continuous flow control with a window size of 127?

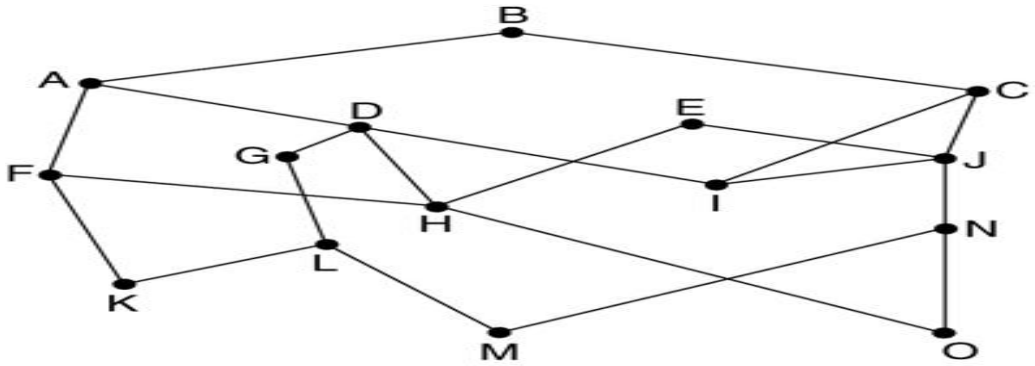
((4+1)+(2+1)+2)

6.A. Explain brief Routing for Mobile Hosts. How is Congestion Control handled in Virtual Circuit Subnets?

6.B. Looking at the subnet of the following figure, how many packets are generated by a broadcast from B, using

a) Reverse Path Forwarding

b) Sink Tree.



6.C. Ten 9600 bps lines are to be multiplexed using TDM. Ignoring overhead bits in the TDM frame, what is the total capacity required for synchronous TDM? Assuming that we wish to limit average link utilization of 0.8 and assuming that each link is busy 50% of the time, what is the capacity required for statistical TDM.

((2+3)+3+2)

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