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MANIPAL INSTITUTE OF TECHNOLOGY Manipal University



FIFTH SEMESTER B.TECH (E & C) DEGREE END SEMESTER EXAMINATION NOV/DEC 2015 SUBJECT: COMMUNICATION NETWORKS (ECE - 309)

MAX. MARKS: 50

- Instructions to candidatesAnswer ANY FIVE full questions.
 - Missing data may be suitably assumed.
- 1A. Draw and explain the ATM Reference model.
- 1B. Mention any five differences between OSI and TCP/IP reference models.
- 1C. What signal-to-noise ratio is needed to put a T1 carrier on a 50-kHz line?

(5+3+2)

- 2A. What is the total delay for a frame of size 5 million bits that is being sent on a link with 10 routers each having queueing time of 2 μ sec and processing time of 1 μ sec. The length of the link is 2000 Km and speed of light inside the link is $2x10^8$ m/sec. The link has bandwidth of 5 Mbps. Which component of the total delay is dominant? Which one is negligible? Also find delay-bandwidth product and line utilization.
- 2B. Draw the timing of events for Circuit switching, Virtual circuit packet switching and Datagram packet switching.
- 2C. Represent the bit stream "01001110" using the following line encoding schemes.

i) RZ ii) Bipolar iii) Differential Manchester iv) NRZ-I

(5+3+2)

- 3A. Draw and explain the frame formats of IEEE 802.5 and FDDI. Mention the Token formats of each
- 3B. Fig 3A shows the frame transition diagram of standard Ethernet frame exchange between computers A and B connected via a 10BT Hub. Each frame sent by A contains 1500 Bytes of Ethernet payload data, while each frame sent by B contains 40 Bytes of Ethernet payload data. Calculate the average utilization of the media during this exchange. Assume that the Inter Frame Gap (IFG) ignored.



Fig.3A

3C. The users in a LAN that uses an ALOHA protocol generates 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?

4A. Form a routing table for node's' using Dijkstra's Algorithm with the Subnet shown in Fig 4A.



- 4B. Manipal University wants to allocate the CIDR addresses starting from 198.16.0.0. The University is decided to allocate 4000, 2000, 4000 and 8000 addresses to its Institutes KMC, TAPMI, SOC and MIT in that order. Design an IP address blocks (i.e. the beginning and ending addresses and the Mask) for each Institute.
- 4C. Explain the ways to address Counting to Infinity Problem in the subnet. Show the routing table of node 4 which addresses this problem after link failure between nodes 3 and 4 as shown in Fig 4C.



(5+3+2)

- 5A. Show the flow of mail transfer when the sender and receiver are i) connected to same server
 - ii) connected on different servers iii) connected in different LANs. Also explain the steps involved in mail delivery with the relevant diagram.
- 5B. Draw and explain the TCP header.
- 5C. An ATM network uses a token bucket scheme for traffic shaping. A new token is put into the bucket every 5 μsec. If each token is used to send a cell, what is the maximum sustainable data rate? (5+3+2)
- 6A. Write about the subsystems that each wireless sensor node contains. Draw and explain the clustered architecture of wireless sensor network? Mention the differences between MANETs and Wireless Sensor Networks.
- 6B. Describe various ISDN channels and mention the data rates of each.
- 6C. If the Sidereal Day is 23 hrs 56 min 4.1 sec, Calculate radius and height of GEO orbit.

(5+3+2)