

**Fifth Semester B.E. Degree Examination, Dec.09/Jan.10**  
**Computer Networks - I**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
at least TWO questions from each part.**

**PART - A**

1.
  - a. What is data communication? What are its four important fundamental characteristics? (06 Marks)
  - b. What is a protocol? What are its key elements? (02 Marks)
  - c. Explain OSI reference model, with a neat figure. (08 Marks)
  - d. Differentiate between:
    - i) ARP and RARP
    - ii) ICMP and IGMP
    - iii) UDP and TCP (04 Marks)
  
2.
  - a. Suppose an application layer wants to send L-bytes message to its peer process using the existing TCP connection. The TCP consists of message plus 20 bytes of header. The segment is encapsulated into IP packet that has an additional 20 bytes of header. The IP packet in turn goes inside the ethernet frame that has 18 bytes of header and trailer. What percentage of the transmitted byte in the physical layer correspond to the message information? L = 100 byte. (06 Marks)
  - b. Define bandwidth. A periodic signal has bandwidth of 20 Hz. The highest frequency is 60Hz. What is the lowest frequency? Draw the spectrum, if the signal contains all frequencies of the same amplitude. (04 Marks)
  - c. Explain briefly, with neat figures, the two approaches for digital transmission. (08 Marks)
  - d. A signal travels through an amplifier and the power is increased 10 times. Calculate the power gained. (02 Marks)
  
3.
  - a. A voice grade channel of a telephone network has a bandwidth of 3.4kHz.
    - i) Calculate channel capacity for S/N = 30 dB.
    - ii) Calculate S/N required to support information transfer at 4800 bps. (06 Marks)
  - b. What is FDM? Briefly explain its multiplexing and demultiplexing process. (06 Marks)
  - c. Explain briefly the two spread spectrum techniques. (08 Marks)
  
4.
  - a. Explain briefly the fiber optic cable, with a neat figure. (08 Marks)
  - b. Find the codeword C(x) for the information d(x) = x<sup>3</sup> + 1 with the generator polynomial t(x) = x<sup>3</sup> + x + 1. (06 Marks)
  - c. What is internet checksum? With an example list the steps undertaken by the sender and receiver for error detection. (06 Marks)

**PART – B**

- 5 a. Explain briefly, with neat figures, stop-and-wait ARQ and Go-Back N ARQ. (12 Marks)  
b. Explain the frame format and transitional phases of point-to-point protocol. (08 Marks)
- 6 a. A network transmits 200 bit frame on a shared channel of 200 kbps. For aloha and slotted aloha, what is the  
i) requirement to make the frame collision free?  
ii) throughput if the system produces 1000 frames/sec? (08 Marks)  
b. Define channelization and list its three protocols. (10 Marks)  
c. How does p-persistent method improve efficiency? (02 Marks)
- 7 a. Explain with a neat figure, 802.3 MAC frame format. (08 Marks)  
b. Explain the hidden and exposed station problems in IEEE 802.11. (12 Marks)
- 8 a. Explain briefly the three categories of satellites. (10 Marks)  
b. Explain briefly STS-1 frame format. (10 Marks)

\*\*\*\*\*  
VTU Club