



UNIVERSITY OF RUHUNA

Faculty of Engineering

Mid-Semester 5 Examination in Engineering: June 2014

Module Number: EE5315

Module Name: Digital Communication and Computer
Networking

[Two Hours]

[Answer all questions, each question carries five marks]

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- Q1. a) What does "negotiation" mean when discussing network protocols? Explain your answer using an example. [1.0 Mark]
- b) Which of the OSI layer handles each of the following function?
i) Dividing the transmitted bit stream into frames.
ii) Determining which route through the packet is forwarded. [1.0 Mark]
- c) State two ways in which OSI and TCP/IP reference models are similar and two ways in which they are different. [1.0 Mark]
- d) State two advantages and two disadvantages of having international standards for network protocols. [1.0 Mark]
- e) A system has an n -layer protocol hierarchy. Applications generate messages of length M -bytes. At each of the layers, an h -byte header is added. What fraction of the network bandwidth is used for the message transmission? [1.0 Mark]
- Q2. a) A host on a LAN sends the bit stream; 0001110101. Sketch the relevant encoding scheme using
i) Manchester encoding.
ii) Differential Manchester encoding. [1.0 Mark]
- b) Determine the maximum bit rate and appropriate signal levels for a channel having a bandwidth of 1600 Hz under the following signal to noise ratios.
i) 0 dB.
ii) 20 dB. [1.5 Marks]
- c) Explain briefly, how ARP (Address Resolution Protocol) works? [1.0 Mark]
- d) Assume that the host A transmits data to the host B using a bit-oriented data link protocol with frame tags. The starting and ending frame tags consist of the bit sequence 10000001. The host A performs bit stuffing by inserting a bit "1" whenever six 0 bits are appeared in a sequence.

- i) If the host A wants to send the binary data message 0110100000110000000001010000001 to host B, what is the transmitted message?
- ii) If host B receives the binary message 100000001010011000000100100000001 then, what is the transmitted message?

[1.5 Marks]

- Q3. a) Consider the delay of pure ALOHA versus slotted ALOHA at low load (i.e. when there are very few stations are involved in transmission). Which method does have the lowest delay? Explain your answer.

[1.0 Mark]

- b) The Ethernet chooses CSMA/CD as its protocol instead of slotted ALOHA, pure ALOHA and CSMA. Explain briefly.

[1.5 Marks]

- c) What is the advantage of using sliding-window flow control compared to stop-and-wait flow control?

[1.0 Mark]

- d) A channel which uses stop-and-wait flow control has a bandwidth of 4 kbit/s and propagation delay of 20 ms. Find the frame size for an efficiency of 50%.

[0.5 Marks]

- e) i) Explain briefly, the selective repeat mechanism in sliding window protocol. Use relevant diagrams to show how an NAK (Negative Acknowledgement) speeds up this mechanism.

- ii) Explain how this mechanism works when an NAK is lost during the transmission.

[1.0 Mark]

- Q4. a) What are the responsibilities of a routing protocol?

[0.5 Marks]

- b) Describe the differences between,

- i) static versus dynamic routing.
- ii) interior versus exterior gateway protocols.
- iii) distance vector versus link state protocols.

[1.5 marks]

- c) What is mean by

- i) administrative distance?
- ii) split horizon?
- iii) route Poisoning?

[1.5 Marks]

- d) Explain the following RIP (Routing Information Protocol) timers.

- i) Routing-update timer.
- ii) Invalid timer.
- iii) Hold-down timer.
- iv) Route-flush timer.

[1.0 Mark]

- e) Discuss the following OSPF (Open Shortest Path First) terms.

- i) OSPF area.
- ii) Link-state database or topological database.

[0.5 Marks]