

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION

SUMMER SEMESTER, 2016-2017

DURATION: 3 Hours

FULL MARKS: 150

CSE 4605: Computer Networks

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **8 (eight)** questions. Answer any **6 (six)** of them.

Figures in the right margin indicate marks.

1. a) Suppose that you would like to increase the link speed of your Ethernet cable, how would this upgrade affect the minimum required packet sizes? If you upgrade your cable to a higher speed and realize that you cannot change packet size, what else can you do in maintaining correct operation? 4+3
 b) What do you mean by vulnerable time? With the aid of diagrams, explain the vulnerable time of slotted ALOHA protocol. 10
 c) Compare the 'Selective Repeat ARQ' protocol with the 'Go-Back-N ARQ' protocol. 8
2. a) Explain different persistence methods used in CSMA protocol. 9
 b) Why wireless LAN (IEEE 802.11) cannot implement CSMA/CD as a MAC protocol? What is the significance of inter frame space (IFS) and contention window(CW) in CSMA/CA? 5+6
 c) What is the role of network allocation vector (NAV) in the *collision avoidance* aspect of CSMA/CA protocol? 5
3. a) Briefly explain the major responsibilities of ICMP. What is the purpose of including the IP header and the first 8 bytes of datagram data in the error reporting ICMPv4 messages? 5+3
 b) Briefly explain how Address Resolution Protocol (ARP) is used to create subnetting effect. Why is an ARP query sent within a broadcast frame and an ARP response sent within a frame with specific MAC address? 5+3
 c) An organization is granted the address block 195.15.40.0/24, which contains 256 addresses. The organization has six departments and needs to divide the addresses into six sub blocks of 128, 64, 32, 16, 8, and 8 addresses. Design the sub blocks and give the slash notation for each sub block that are assigned to different departments. Now answer the following questions: 9
 - i. What are the valid subnets?
 - ii. What are the broadcast addresses for each subnet?
 - iii. What are the valid hosts in each subnet?
4. a) Neatly sketch the structure of IPv4 datagram. Name the fields in IPv4 header those are necessary to handle the fragmentation of packets. How does the IPv6 datagram differ from the IPv4 datagram? 5+3+5
 b) An IPv4 datagram has arrived with the following information in the header (in hexadecimal): 6

43 00 00 54 00 03 40 00 20 06 00 00 7C 4E 03 02 B4 0E 0F 02

 - i. Is the packet corrupted?
 - ii. Is the packet fragmented?
 - iii. How many more routers can the packet travel to?
 c) Both IPv4 and IPv6 assume that packet may have different priorities or precedence. Explain how each protocol handles this issue. 6

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| 5. | a) | With the aid of necessary diagrams briefly explain the working principal of Link State Routing Protocols. How does link state routing differ from distance-vector routing? | 7+3 |
| | b) | Briefly explain the 'counting to infinity' problem of distance vector routing with possible solutions. | 10 |
| | c) | Briefly explain the source routing option of <i>IPv4</i> . | 5 |
| 6. | a) | Neatly sketch the state transition diagram of TCP connection establishment and connection termination. | 6 |
| | b) | TCP opens a connection using an initial sequence number (ISN) of 14,534. The other party opens the connection with an ISN of 21,732. | 4+5 |
| | i. | Show the three TCP segments during the three-way handshaking connection establishment. | |
| | ii. | Show the contents of the segments during the connection termination using four-way handshaking with half-close . | |
| | | (Use two timelines for each side to show the states and the relative duration of the client and the server.) | |
| | c) | What is the significance Persistence timer in TCP? With necessary equations briefly explain how the retransmission timeout (RTO) value is calculated for a Retransmission timer. | 3+7 |
| 7. | a) | What are the significances of PSH and URG flag in a TCP segment? | 6 |
| | b) | How does flow control differ from congestion control in TCP? Briefly explain the concept of fast retransmission in TCP. | 4+5 |
| | c) | Suppose you have a TCP source, which starts transmission from segment number 15 with initial value of slow start threshold 65000. Draw the timing diagram (time axes toward the bottom of the page for both the source and destination) for the transmission of segments at least up to 25. The diagram should include slow start, congestion avoidance, and one packet loss identified by triple duplicate acknowledgment and one by time out. | 10 |
| 8. | a) | How do the classical ciphers differ from the modern ciphers? Encrypt the message "successful committee" using the Playfair cipher using the key "Crypto". | 3+7 |
| | b) | Explain the reflection attack with a diagram and show how we can design a protocol that solves the problem? | 8 |
| | c) | Explain the ticket invalidation problem in Needham-Schroeder protocol. | 7 |