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

SEMESTER FINAL EXAMINATION SUMMER SEMESTER, 2018-2019
DURATION: 3.0 Hours FULL MARKS: 150

CSE 4411: Data Communication and Networking

Programmable calculators are not allowed. Do not write anything on the question paper.
There are **8 (eight)** questions. Answer any **6 (six)** from the rest of them.
Figures in the right margin indicate marks.

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1. a) Write down the names of protocols working in each layers of TCP/IP protocol suite. 10
   b) Why Slotted AlOHA protocol performs better than the Pure ALOHA protocol? Use necessary diagram to explain. 8
   c) What do you understand by Shannon Capacity? Consider you have a channel with bandwidth 1.0 MHz. The SNR for this channel is 63. What are the appropriate bit rate and signal levels. 7

2. a) Draw the flow diagram of Go-Back-N ARQ. Diagram should contain window state of Sender and Receiver site and timer info. Assume that A is sender and B is receiver. In the following order the events are occurred. Sending window size is four. 10

Table 1: Events for Question 2(a)

1	Initial State
2	Frame 0 is sent, received successfully
3	ACK 1 is received successfully
4	Frame 1 is sent, received successfully
5	ACK 2 is lost
6	Frame 2 is sent, received successfully but ACK is lost
7	Frame 3 is sent but lost
8	Timer for Frame 1 expires, Frame 1 resent, received successfully
9	Timer for Frame 2 expires, Frame 2 resent, received successfully
10	Timer for Frame 3 expires, Frame 3 resent, received successfully

   b) What is the window size of Sender and Receiver site in Selective Repeat ARQ? Explain necessary arguments to support your answer. 8
   c) What is bit stuffing and why it is necessary? Assume that the data from upper layer is 7

0011 1110 1111 1111 1100

Show the bit stuffing and un-stuffing process marking the changes.

3. a) Explain the four performance measure of a network: Bandwidth, Throughput, Delay, Bandwidth Delay Product 10

   b) Write short notes on the following in terms of **OSI** model. 9
      i) Process to process delivery
      ii) Host to host delivery
      iii) Source to destination delivery
   c) 'IPv4 is a best effort delivery service'- Explain this statement with appropriate reasoning. 6

4. a) Encode the bit pattern **1011 0011** into following encoding techniques 15
      i. NRZ-I
      ii. Polar RZ
      iii. Manchester
      iv. Differential Manchester
      v. AMI

b) Using $W_1 = [-1]$, Find the chips for a network with **ten** stations. Evaluate with two examples whether the created code follow the characteristics of CDMA. 10

5. a) Discuss three phases of virtual circuit network with appropriate diagrams. 12
   b) What is linear block code? The minimum Hamming distance of a linear block code is the number of 1s in the nonzero valid codeword with the smallest number of 1s. – explain why? 5
   c) In case of Hamming code, we need a dataword of at least 12 bits. Calculate values of k and n that satisfy this requirement. 4
   d) How to handle a burst error? Explain with example. 4

6. a) Explain the procedure of CSMA/CD protocol. Your answer must contain the Flow diagram. 15
   b) In the Figure 1, the data rate is 10Mbps, the distance between station A and C is 2000m and the propagation speed is 2×10^8 m/s. Station A starts sending along frame at time $\mathbf{t_1=0}$, station C starts sending a long frame at time $t_2 = 3\mu s$. The size of the frame is long enough to guarantee the detection of collision by both stations. Find: 6
      i. The time when station C detects the collision (t_3)
      ii. The time when station A detects the collision (t_4)
      iii. The number of bits station A has sent before detecting the collision.
      iv. The number of bits station C has sent before detecting the collision.

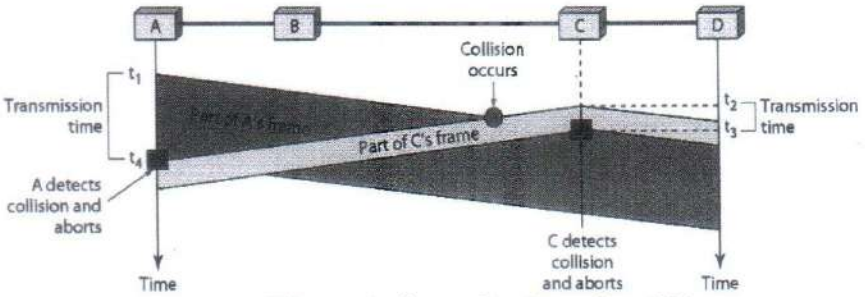

Figure 1: figure for Question 6(b)

   c) Is CSMA/CD is suitable for wireless communication? Why or why not? 4

7. a) Discuss three strategies to maintain compatibility while transitioning from IPv4 system to IPv6 System. 9
   b) What is NAT? In which scenario NAT is necessary? Explain the translation process where both IP address and port address is used. 8
   c) For a class C network address **192.168.10.0** and subnet mask **255.255.255.192** find out the following 8
      i. The Subnet Addresses
      ii. The first valid host for each subnet
      iii. The last valid host for each subnet
      iv. The broadcast address

8. a) Discuss **both** of the TCP connection termination process with appropriate diagrams. 12
   b) 8

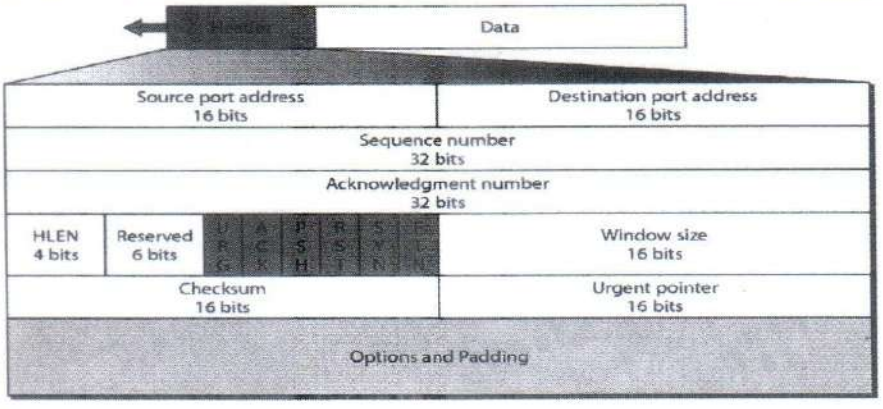

Figure 2: TCP Header Format

The following is a dump of a TCP header in hexadecimal format.

05320017 00000001 00000000 500207FF 00000000

a. What is the source port number?
b. What is the destination port number?
c. What is the sequence number?
d. What is the acknowledgment number?
e. What is the length of the header?
f. What is the type of the segment?
g. What is the window size

c) What is SYN Flooding Attack? How different implementations handle this attack? 5