UNIVERSITY OF GHANA, LEGON

BACHELOR OF SCIENCE IN ENGINEERING
FIRST SEMESTER EXAMINATIONS: 2015/2016

DEPARTMENT OF COMPUTER ENGINEERING
CPEN 305: COMPUTER NETWORKS (3 CREDITS)

INSTRUCTION: ***ANSWER ALL QUESTIONS (i.e. total of 4 questions)***

TIME ALLOWED: ***TWO AND A HALF (2½) HOURS***

1.

a. With the help of a diagram, explain the different stages involved in the exchange of data and control frames in time, between a source and destination using CSMA/CA. **(7 Marks)**

b. Match the following to one or more layers of the OSI model

i. Route determination **(1 Mark)**

ii. Flow control **(1 Mark)**

iii. Interface to transmission media **(1 Mark)**

iv. Provision of access to the end user **(1 Mark)**

c. State the main functions of each layer of the TCP/IP model **(5 Marks)**

d. A 280-byte message is sent through a private internet using the TCP/IP protocol suite. If the protocol adds a 20-byte header at each layer, what is the efficiency of the system (ratio of the number of useful bytes to the number of total bytes). **(4 Marks)**

2.

a. Find the subnet mask in each of the following cases: (6 Marks)

i. 1024 subnets in class A

ii. 256 subnets in class B

iii. 32 subnets in class C

iv. 4 subnets in class C

b. In a class A subnet, we know the IP address of one of the hosts and the subnet mask as given below: **(4 Marks)**

IP Address: 25.34.12.56 **Subnet mask: 255.255.192.0**

i. What is the first address (subnet address)?

ii. What is the last address?

c. In a class C subnet, we know the IP address of one of the hosts and the subnet mask as given below: **(4 Marks)**

IP Address: 202.44.82.116 **Subnet mask: 255.255.255.240**

i. What is the first address (subnet address)?

ii. What is the last address?

d. In a block of addresses, we know that the IP address of one host is 25.34.12.56/16.

i. What is the first address (network address) in this block?

ii. What is the last address (limited broadcast address) in this block?

(6 Marks)

3.

a. An organization is granted the block 130.56.0.0/16. The administrator wants to create 1024 subnets. Find the following: **(10 Marks)**

i. the subnet mask

ii. the number of addresses in each subnet

iii. the first and the last address in the first subnet

iv. the first and the last address in the last subnet (subnet 1023)

b. Knowing the backbone network in Internet can be switched WANs, briefly describe the following switched WAN technologies: **(6 Marks)**

i. X25

ii. ATM

iii. Frame Relay

c. Discuss the differences between a router and a switch. **(4 Marks)**

4.

a. Discuss two (2) main reasons for the adoption of the new protocol IPv6.

(4 Marks)

b. Discuss two (2) differences between the IPv4 and IPv6 headers.

(2 Marks)

c. Show the original (unabbreviated) form of the following IPv6 addresses:

i. ::

ii. 0::2

iii. 0:23::0

iv. 0:A::3

v. 123::12:23

vi. B:A:CC::1234:A **(6 Marks)**

d. As a network administrator, you are requested to configure access to some services located on a remote server by using either TELNET or SSH. Briefly compare the two protocols and justify your choice **(4Marks)**

e. Compare SCTP protocol to **(4 Marks)**

i. UDP protocol

ii. TCP protocol