TUNKU ABDUL RAHMAN UNIVERSITY OF MANAGEMENT AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

ACADEMIC YEAR 2023/2024

JANUARY EXAMINATION

AACS2034 FUNDAMENTALS OF COMPUTER NETWORKS

THURSDAY, 18 JANUARY 2024 TIME: 2.00 PM – 4.00 PM (2 HOURS)

DIPLOMA IN COMPUTER SCIENCE

DIPLOMA IN INFORMATION TECHNOLOGY

DIPLOMA IN SOFTWARE ENGINEERING

Instructions to Candidates:

Answer **ALL** questions. All questions carry equal marks.

Question 1

a) Answer the following questions by referring to Figure 1.

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R1# X
Gateway of last resort is not set

     172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.16.18.0/24 is directly connected, GigabitEthernet0/1
L       172.16.18.1/32 is directly connected, GigabitEthernet0/1
     192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.10.0/26 is directly connected, GigabitEthernet0/0
L       192.168.10.1/32 is directly connected, GigabitEthernet0/0
     209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.165.200.0/30 is directly connected, Serial0/0/0
L       209.165.200.2/32 is directly connected, Serial0/0/0
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Figure 1: Partial output of X command on Router R1.

(i) What is the Internetwork Operating System (IOS) command that is labelled as X based on Figure 1? (1 mark)

(ii) What is being displayed from Figure 1? (1 mark)

(iii) How many routes that are attached to R1? (2 marks)

(iv) Provide any **TWO (2)** directly connected routes from Figure 1. (2 marks)

(v) Identify any **TWO (2)** Internet Protocol version 4 (IPv4) addresses that had been configured on the interfaces of R1 as shown in Figure 1. (2 marks)

(vi) Provide **TWO (2)** usages of GigabitEthernet0/1 as stated in Figure 1. (4 marks)

(vii) R1 received a packet with the destination IPv4 address of 210.200.100.8. How will R1 process the received packet? Explain your answer. (3 marks)

b) Explain **THREE (3)** characteristics of Internet Protocol (IP). (6 marks)

c) Provide **TWO (2)** comparisons to distinguish IPv4 packet header from IPv6 packet header. (4 marks)

[Total: 25 marks]

Question 2

a) Identify the address class and the default subnet mask for the following IPv4 addresses:

(i) 10.6.70.1 (2 marks)

(ii) 192.168.38.9 (2 marks)

(iii) 172.16.15.19 (2 marks)

b) What is the purpose of using class D IPv4 addresses? Provide an example of a class D IPv4 address. (4 marks)

c) List and explain **THREE (3)** migration techniques that enable IPv4 and IPv6 to coexist. (9 marks)

d) Apply Rule 1 and Rule 2 for each of the following IPv6 addresses:

(i) 2001:0DB8:CAFE:FDFF:000A:0100:0000:0001 (2 marks)

(ii) FE80:0000:0000:0000:020A:F3FF:FEBB:A594 (2 marks)

(iii) FDFF:0000:A100:9800:0000:AAAA:BBBB:CCCC (2 marks)

[Total: 25 marks]

Question 3

a) Analyse the following based on IPv4 address of 192.168.8.9/27.

(i) How many bits had been borrowed? (1 mark)

(ii) What is the network address for 192.168.8.9/27? Support your answer by using ANDing operation. (4 marks)

(iii) How many total usable hosts for 192.168.8.9/27? (2 marks)

(iv) "*192.168.8.9/27 is a broadcast address*". Do you agree with the statement? Provide a justification to support your answer. (3 marks)

Question 3 (Continued)

b) Ace Tech company consists of five departments. Each department has a number of usable addresses. Table 1 shows the five departments with their respective requirements in terms of usable host addresses.

Department	Number of usable hosts
IT	25
Accounting	58
Purchasing	18
Sales	8
Warehouse	10

Table 1: Number of usable hosts for departments.

Each department is grouped as one subnet. The company is using the IPv4 address of 192.168.10.0/24. Perform subnetting based on Variable Length Subnet Mask (VLSM) and document the IPv4 addressing scheme for the subnets in the answer booklet by using the format given in Table 2.

Department name	Subnet address	Prefix length	First usable host address	Last usable host address	Broadcast address

Table 2: VLSM subnet table for Ace Tech company.

(15 marks)

[Total: 25 marks]

Question 4

a) Explain socket pairs at the transport layer of the Open System Interconnection (OSI) model. Provide an example of a socket. (4 marks)

b) Distinguish between *well-known port* and *registered port* based on **TWO (2)** comparisons. (8 marks)

c) List the **THREE (3)** protocols that support e-mail and operate at the application layer of the OSI. (3 marks)

Question 4 (Continued)

d) List and briefly describe **THREE (3)** common message types of Hypertext Transfer Protocol (HTTP) used between clients and servers over networks. (10 marks)

[Total: 25 marks]