STRATHMORE UNIVERSITY
SCHOOL OF COMPUTING AND ENGINEERING SCIENCES
MASTER OF SCIENCE IN INFORMATION SYSTEMS SECURITY
END OF SEMESTER EXAMINATION
MST 8101
NETWORKING AND COMMUNICATIONS

DATE: 12th January, 2023 **Time: 2.5 Hours**

Instructions: Answer Question One and any Two other Questions

QUESTION 1

a. To enhance security and subscriber identification, the Global System for Mobile (GSM) uses several digital identifiers, list three identifiers that are used in GSM networks and explain their use. **[6 Marks]**

b. Referring to Fig. Q1b

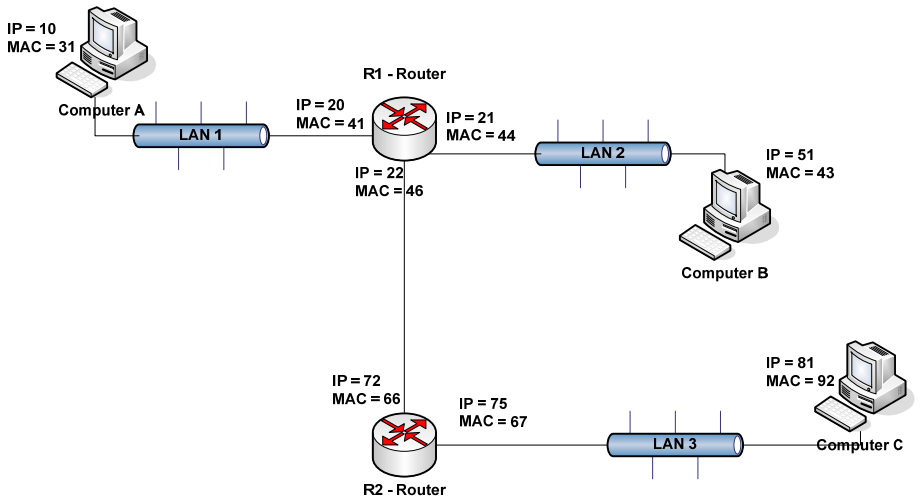


Fig. Q1b

i. Explain how a TCP segment at layer 4 of TCP/IP reference model in computer A is processed and sent to computer B. Your answer should give a detailed end-to-end description including encapsulation and de-capsulation until data get to layer 1 of computer B. **[4 Marks]**

ii. Label source and destination IP addresses and Mac addresses on each link when a packet is sent from computer A to computer C **[3 Marks]**

iii. Label IP addresses and MAC addresses on each link when a packet is sent from computer B to computer C **[3 Marks]**

iv. Explain how computer A would discover the MAC address of the **left** network card of router R1 in order to use it as the default gateway. [**4 Marks**]

(**Total 20 Marks**)

QUESTION 2

a. Using a DNS tree diagram, discuss how a computer in Kenya can resolve the domain name www.strathmore.ac.ke [**5 Marks**]

b. Simple Mail Transport Protocol (SMTP) is used to relay email between servers. Consider a scenario where a user called Mary sends an email to James. Assume Mary's email address is **mary@strathmore.edu** (server hosted by gmail.com) and James' email address is **jm@yahoo.com**. Use a diagram to illustrate the forwarding of email from Mary's computer (internet browser) to James' computer (outlook client). *Note: Show user agents, mail servers and where respective protocols are used*. [**5 Marks**]

c. State and explain the meaning of two HTTP response codes. [**2 Marks**]

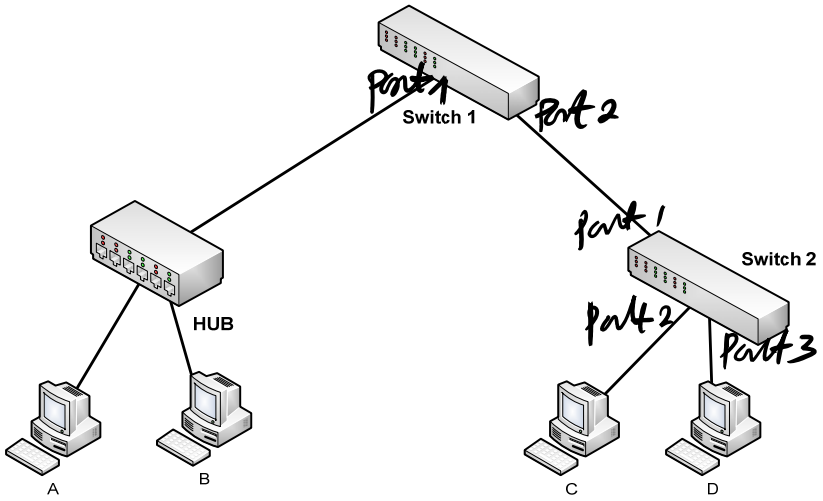
d. With the help of an architectural diagram, illustrate how you would use HTTP response code 3xx to offer the URL summarisation service e.g. when a user enters **http://bt.ly/abc** in their browser, they are redirected to **http://www.thefullurl.com/the-requested-service/top-items-for-today** [**3 Marks**].

(**Total 15 Marks**)

QUESTION 3

a. Use a diagram to illustrate the structure of a TCP header. [**5 Marks**]

b. Use a switch learning table to explain the processing of Ethernet frames for the network given below [**5 Marks**].



c. Describe how Gratuitous ARP (GARP) could be used to launch Denial of Service (DOS) attacks and Man-in-the-Middle (MITM) attacks in a Local Area Network (LAN) [**5 Marks**]

(**Total 15 Marks**)

QUESTION 4

a. Use an illustrative diagram to discuss the routing of an incoming GSM call that originated from a PSTN network. [**7 Marks**]

b. Discuss security exploits that can arise when using GSM services such as SMS and voice call for authenticating financial transactions [**3 Marks**]

c. Use a diagram to illustrate how WLAN networks use Carrier Sense Multiple Access with collision avoidance. [**5 Marks**]

(**Total 15 Marks**)