



FINAL SEMESTER II 2013/2014

COURSE CODE : **SCSR 1213**
COURSE NAME : **NETWORK COMMUNICATIONS**
YEAR/PROGRAM : **1 SCSB/SCSJ/SCSR/SCSV**
TIME : **X:XX – X:XXAM**
DATE : **2014 ()**
VENUE :

INSTRUCTION TO CANDIDATE:

- a) The questions are divided into Part A and part B. Part A is 25 marks and Part B is 75 marks.
- b) Answer Part A in Objective answer sheet and Part B in answer question booklet.

SECTION A**MULTIPLE CHOICE QUESTIONS (25 MARKS)**

1. Virtual-Circuit (VC) consists of the following statements, **EXCEPT** **
- A) a path (that is, a series of links and routers) between the source and destination hosts
 - B) VC numbers, one number for each link along the path
 - C) entries in the forwarding table in each router along the path
 - D) a connectionless service at the network layer
2. The _____ connects the router's input ports to its output ports.
- A) input ports
 - B) switching fabrics
 - C) output ports
 - D) routing processor
3. Choose **TRUE** statement(s) about **CIDR**:
- i) more flexible than classful addressing
 - ii) have fix number of subnet portion
 - iii) can choose among class A, B or C type of addressing scheme
 - iv) arbitrary length in subnet portion
- A) i & ii
 - B) iii & iv
 - C) ii & iii
 - D) i & iv

4. Which of the following shows the correct sequence of the DHCP protocol
- i) DHCP discover message
 - ii) DHCP ACK message
 - iii) DHCP request message
 - iv) DHCP offer message
- A) i – iv – iii – ii
- B) i – iii – iv – ii
- C) iv – iii – i – ii
- D) iv – i – iii – ii
5. Choose the FALSE statement regarding NAT.
- A) User can change addresses of devices in local network without notifying outside world
- B) Just one public IP address for all devices
- C) Providing the details of the home network to the outside world
- D) ISP can be changed without changing addresses of devices in local network
6. Choose the TRUE statement about ICMP.
- A) It is used for error reporting
- B) It is used for checksum detection
- C) It is used for recovering error
- D) It is used for connection setup
7. Choose the CORRECT routing algorithm classification.
- A) Managed or sponsored routing algorithms
- B) Global or centralized routing algorithms global & decentralized
- C) Static or dynamic routing algorithms
- D) Sensitive or insensitive routing algorithms

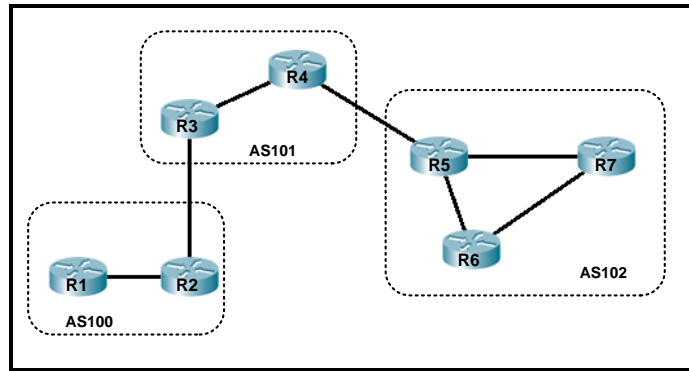


Figure 1: Interconnected ASes

8. Which of the routers in Figure 1 are gateway routers?

A) R1, R3, R5, R7

B) R2, R3, R4, R5

C) R2, R4, R6, R1

D) All the routers

9. BGP is an example of

A) Distance Vector routing protocol

B) An inter-AS routing algorithm

C) An intra-AS routing algorithm

D) A link-state routing algorithm

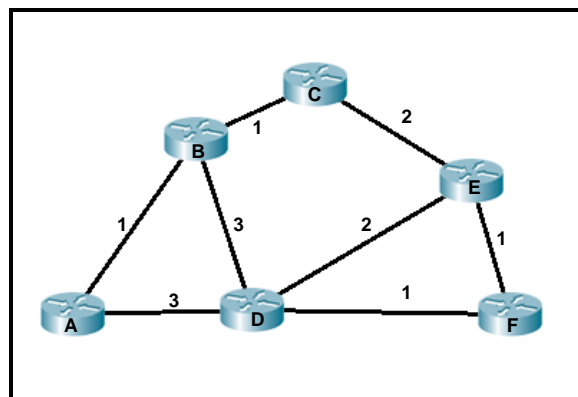


Figure 2: A network topology

10. Refer the network topology shown in Figure 2. Using the Bellman-Ford algorithm, which link will be chosen by Node E to reach Node A?
- A) Link E-C
 - B) Link E-F
 - C) Link E-D
 - D) Link E-B
11. Which of the following statement is FALSE about link layer implementation?
- A) implemented in wired Ethernet network interface card
 - B) implemented in 802.11 wireless network interface card
 - C) implemented by hardware components only (hardware, software & firmware)
 - D) implemented on both link and physical layers
12. Which of the following is NOT a MAC protocol class?
- A) channel partitioning
 - B) random access
 - C) taking turns
 - D) 3-way handshake
13. Which of the following does not implement random access MAC protocols?
- A) Token Ring
 - B) ALOHA
 - C) CSMA/CD
 - D) CSMA/CA
14. Channel partitioning can be implemented by the following methods EXCEPT?
- A) Time Division
 - B) Frequency Division
 - C) Code Division
 - D) Panel Division

15. Which of the following statement about “taking turns” MAC protocols is FALSE?
- A) Polling applies the concept of master-slave invitation
 - B) The drawback of polling is single point of failure occurring in slave **** master**
 - C) Token passing applies the concept of token passing
 - D) The drawback of polling is single point of failure occurring in token
16. If calculated CRC does not match the CRC in frame received, what action will the node take?
- A) Drop the frame ******
 - B) Reconstruct the frame from the CRC
 - C) Forward the frame as it is to the next host
 - D) Disable the interface on which the frame arrives
17. What are the contents of the data field in a link layer frame?
- A) 64 bytes checksum
 - B) The network layer datagram
 - C) The Layer 2 source address
 - D) Parity checking bit
18. The following are other names for MAC address EXCEPT?
- A) LAN address
 - B) Physical address
 - C) Ethernet address
 - D) Network address
19. Choose the FALSE statement about VLAN.
- A) Switch ports are grouped so that single physical switch can operate as multiple virtual switches
 - B) It has static membership
 - C) It uses 802.1Q frame format
 - D) Trunk port carries frames between VLANs

20. How forwarding between different VLANs is done?
- A) Via routing
 - B) Via switching
 - C) Via encapsulation
 - D) Via fragmentation
21. In 802.11, each wireless station needs to associate with an _____ before it can send or receive network-layer data.
- A) Internet
 - B) ad Hoc network
 - C) access Point
 - D) infrastructure network
22. The fundamental building block of the 802.11 architecture is the _____.
- A) Extended Service Set (ESS)
 - B) Basic Service Set (BSS)✓
 - C) Ad Hoc Network (AHN)
 - D) Personal Area Network (PAN)
23. _____ occurs when portions of the electromagnetic wave reflect off object and the ground, taking paths of different lengths between a sender and receiver.
- A) Path lost
 - B) Interference
 - C) Multipath Propagation
 - D) Weak signal strength
24. The following wireless network technologies enable the formation of ad hoc networks, EXCEPT:
- A) Bluetooth
 - B) Mobile Ad hoc Networks (MANETs)
 - C) A Vehicular Ad hoc Network (VANET)
 - D) WiFi

25. 4G network provides faster mobile network service compared to 3G network. Which of the following Telco DOES NOT offer 4G network?

- A) Maxis
- B) Celcom
- C) Yes
- D) Time

SECTION B: STRUCTURED QUESTIONS (75 MARKS)**QUESTION 1(15 Marks)**

- (a) Refer to Figure 3 and answer the following questions. [1 marks]
- How many subnets are in the network topology shown? [3 marks]
 - The organization needs about 5000 hosts and applied for a Class B network address. Calculate the total number of hosts allocated with a Class B network address. [1 marks]
 - Calculate how many host addresses are wasted.

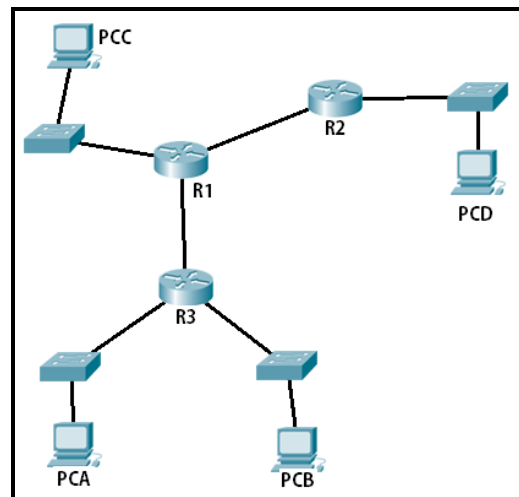


Figure 3: Network with sub-networks

- (b) Consider sending a 1600-byte datagram into a link that has an MTU of 500 bytes. Suppose the original datagram is stamped with the identification number 291. Answer the following questions. [2 marks]
- How many fragments are generated? Justify your answer. [8 marks]
 - Draw the fragmented frames as shown in Figure 4.

	length =1600	ID =291	fragflag =0	offset =0
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Figure 4: Fragmented frame

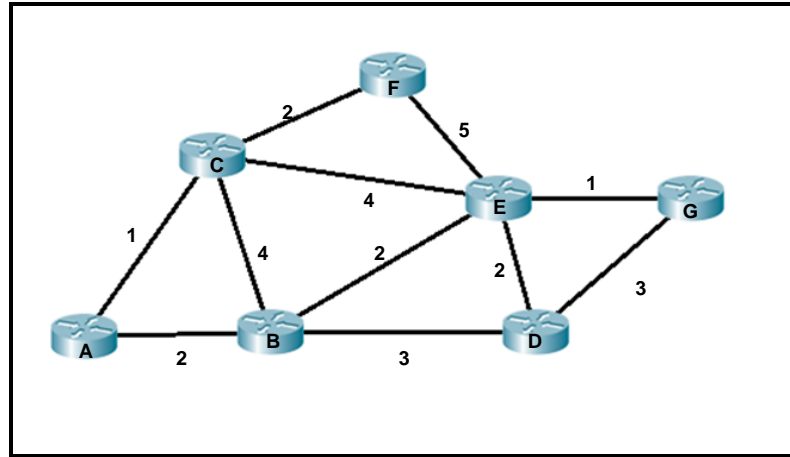
QUESTION 2 (15 Marks)

Figure 5: Topology of a network

- (a) Study the topology given in Figure 5. With Node A as the source, and using Dijkstra Algorithm, calculate the least cost paths from Node A to Node G. Use the following header to create your table. [8 marks]

Step	N'	D(B),p(B)	D(C),p(C)	D(D),p(D)	D(E),p(E)	D(F),p(F)	D(G),p(G)

- (b) Produce the forwarding table for Node A [3 marks]
- (c) With Node A as the source, and using Bellman-Ford Algorithm, calculate least cost path from Node A to Node G. Show your workings. [4 marks]

QUESTION 3 (15 Marks)

- (a) Complete a 2-D error checking scheme with even parity (P) bits value is shown in Figure 6. In each packet data that you analyzed, determine whether error is detected or not. If error is detected, identify the error and correct value. [5 marks]

Error detection (Yes/No)					
Error detection (Yes/No)	E				<u>1</u>
	4				<u>1</u>
	3				<u>1</u>
	D				<u>1</u>
	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>

Figure 6: 2-D error checking scheme

- (b) Calculate CRC bit value for the binary data 1010 1001 0 using generator bit G=1001 [5 marks]
- (c) Figure 7 shows computer A and computer B are sending their packets to the network cable using CSMA/CD protocol. Briefly explain actions taken by the computers in each time slot from t_0 to t_5 showing in Table 1. [5 marks]

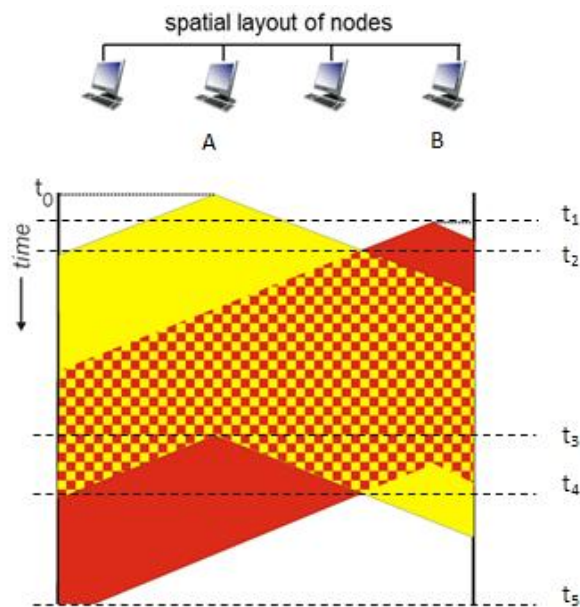


Figure 7: CSMA/CD protocol transmission

Table 1: CSMA/CD protocol Event

Time slot	Action
t_0 to t_1	
t_1 to t_2	
t_2 to t_3	
t_3 to t_4	
t_4 to t_5	

QUESTION 4 (6 Marks)

Refer to the network topology given in Figure 8. Reproduce Table 2 below with the correct answer by indicating the source/destination MAC and IP addresses at chosen points during the transmission.

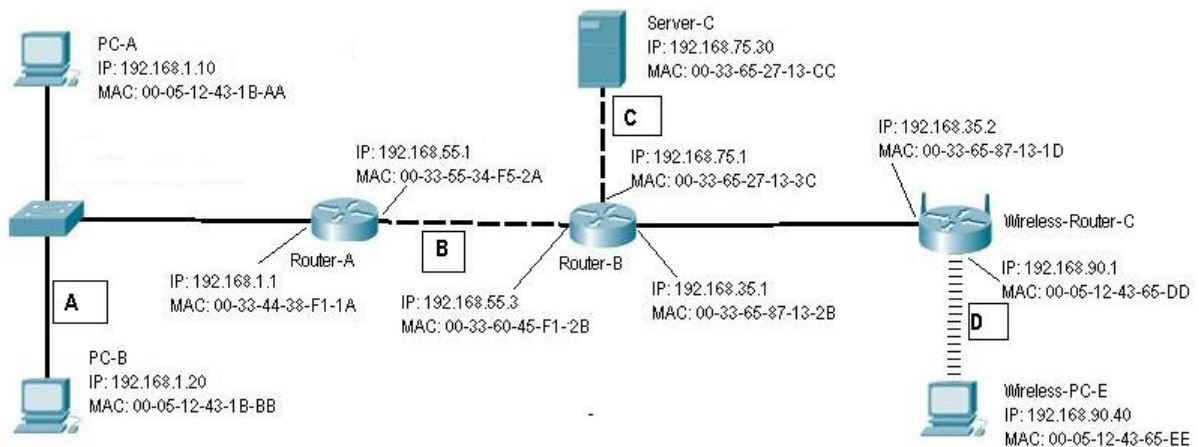


Figure 8: Network topology with assigned MAC and IP addresses

Table 2: Sender's and receiver's MAC and IP addresses

Point	A	B	C	D
Sender	PC-A	PC-A	PC-A	Wireless-PC-E
Receiver	PC-B	Server-C	Server-C	PC-B
Source IP Address				
Destination IP Address				
Source MAC Address				
Destination MAC Address				

QUESTION 5 (9 Marks)

Answer the following questions using the information provided in Figure 9.

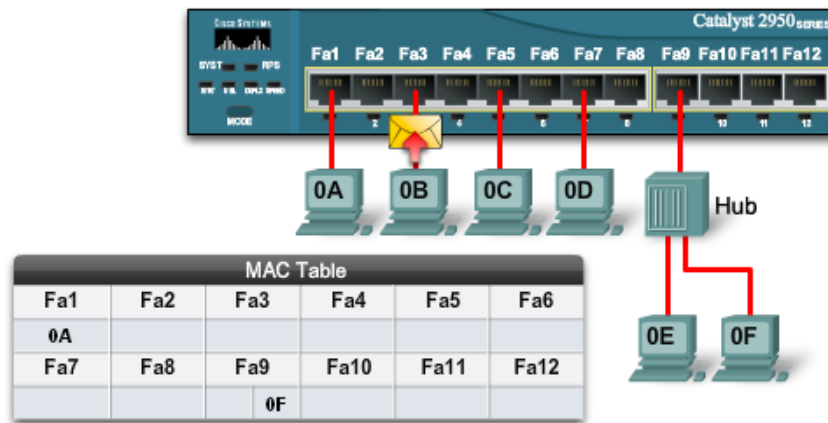


Figure 9: Switch ports and MAC addresses

- (a) Host 0E has an empty ARP table. It wants to send frame to host 0D. What is the correct address for the destination MAC field in the ARP query packet shown in Figure 10. [1 marks]

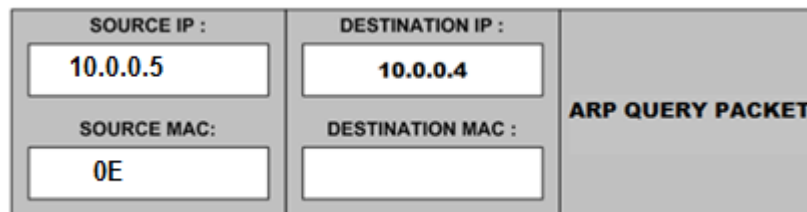


Figure 10: ARP query packet

- (b) Explain briefly what happens after the frame in (a) has been sent into the network until 0E receives the reply. [3 marks]

- (c) Switch receives the following frame as shown in Figure 11. What does it do? [2 marks]

Preamble	Destination MAC	Source MAC	Length Type	Encapsulated Data	End of frame
	0C	0B			

Figure 11: Frame format

- (d) Reproduce Table 3 by updating the MAC table after the transmissions in questions (a-c) had happened [3 marks]

Table 3: MAC table

MAC Table					
Fa1	Fa2	Fa3	Fa4	Fa5	Fa6
0A					
Fa7	Fa8	Fa9	Fa11	Fa11	Fa12
			0F		

QUESTION 6 (15 Marks)

- (a) Given three nodes labeled as A, B, and C describe the interference that may occur when nodes A and C transmit data by considering the conditions illustrated in Figures 12 and 13.

[5 marks]

- i) Assume that A and C are within each other radio transmission

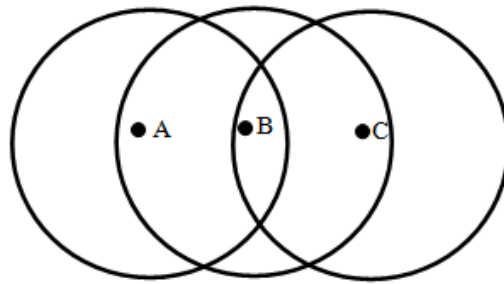


Figure 12: Radio coverage between nodes A, B, and C

- ii) Assume that A are too far apart C

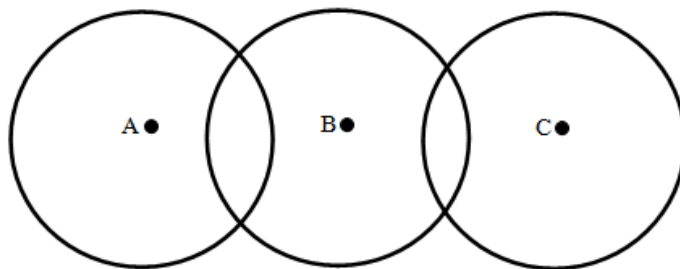


Figure 13: Radio coverage between nodes A, B, and C

- b) Given a simple 3G system architecture as shown in Figure 14, explain how 3G users access data and voice network using the architecture.

[10 marks]

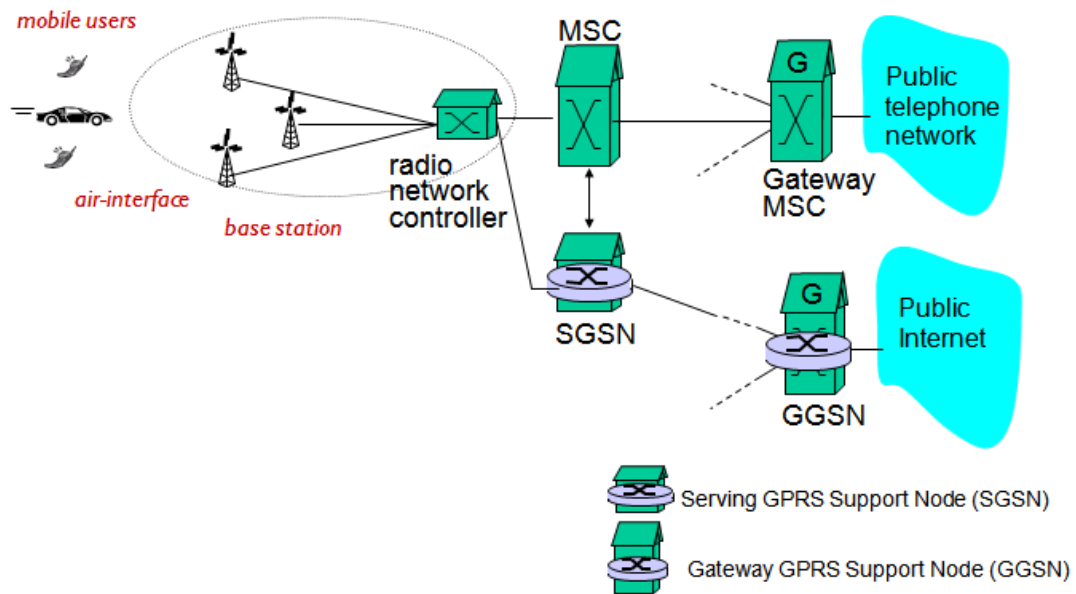


Figure 14: 3G system architecture

----- End of Questions -----