UTM | Faculty of Computing

UNIVERSITI TEKNOLOGI MALAYSIA

R E S E A R C H   U N I V E R S I T Y

TEST 2

SEMESTER I 2014/2015

SUBJECT CODE	:	SCSR 1213
SUBJECT TITLE	:	NETWORK COMMUNICATION
DURATION	:	1 HOUR 45 MINUTES
DATE	:	24 April 2015
TIME	:	9.30am - 11.15am
VENUE	:	DK 7 (N24)

INSTRUCTIONS TO CANDIDATES:

1. Answer **ALL** questions in **SECTION A** in the answer sheet provided on page 6.

2. Answer **ALL** questions in **SECTION B** in this question booklet.

Name	
Matric No.	
Year/Course	* 1 2 3 4 / SCR / SCV / SCI / SCJ
Section	
Lecturer's Name	JOHAN / MARINA / FO'AD / MAZNAH / RAJA ZAHILAH / HAZINAH / MURTADHA / MUHALIM

This questions paper consists of (15) printed pages, EXCLUDING this page.

SECTION A: MULTIPLE CHOICE QUESTIONS [15 MARKS]

1. What is the BEST protocol to accomplish the task in the given phrase below?

   " In order for the user to access the remote account, the user must provide the identification and password. After providing this authorization information, the user can transfer files from the local file system to the remote file system and vice versa (Kurose and James, 2011). …"

   A) SMTP
   B) UDP
   C) FTP
   D) DNS

2. What is the port number used for DNS?

   A) 80
   B) 20
   C) 21
   D) 53

3. HTTP and FTP are both file transfer protocols and have many common characteristics. Which statement is **CORRECT** to the both protocols

   A) Both run below of TCP
   B) Both run on the application layer
   C) Both use control and data connection
   D) Both are stateless because do not have to keep of any user state

4. SMTP and HTTP have many common characteristics. Which statement is **FALSE** regarding the similarities and characteristics on both protocols?

A) Both protocols are used to transfer files from one host to another

B) HTTP transfer a file called objects via a browser, SMTP transfer a file called email message via mail server

C) Both use non-persistent connections

D) HTTP uses a pull protocol, SMTP uses a push protocol

5. The following statements are **TRUE** regarding Domain Name System (DNS), **EXCEPT**

A) The DNS is a distributed database implemented in a hierarchy of DNS servers

B) The DNS is a transport-layer protocol that allows hosts to query the distributed database

C) The DNS servers are often UNIX machines running the Berkeley Internet Name Domain (BIND) software

D) The DNS protocol runs over UDP and uses port 53

6. Choose the **INCORRECT** statement on Transport layer service and protocol:

A) Transport layer break application message into segments.

B) FTP is a transport protocol.

C) Transport protocols run in end systems.

D) UDP is a transport protocol.

7. In a UDP segment, the system have made a summation of source port number, destination port number and length field to come out with a value of **0A4B**. Find the correct checksum value.

A) E5B5.

B) E5A4.

C) F5B4.

D) F4A5.

8. Which of these is NOT a service provided by TCP?

A) Reliable transfer.

B) Congestion control.

C) In-order delivery.

D) Guarantees of delay.

9. What the size of sliding window (*N*) for the protocol in the following diagram?
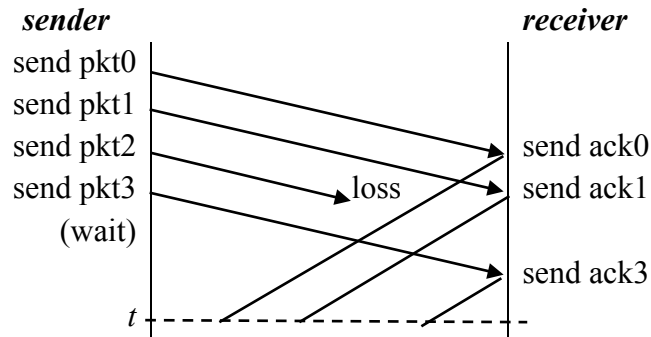
A) N is 3

B) N is 4

C) N is 5

D) N is 6

10. Which of the following value is required in estimating RTT?

A) Measured time from segment transmission until ACK not receipt.

B) Average of several recent measurements, not just current SampleRTT.

C) Timeout should be greater than RTT.

D) Sequence number of sent packet.

11. To handle the presence of errors, rdt2.0 includes all the following mechanisms EXCEPT:

A) Expiration of Timeout.

B) Acknowledgements (ACKs): receiver explicitly tells sender that packet received OK.

C) Negative acknowledgements (NAKs): receiver explicitly tells sender that packet had errors.

D) Sender retransmits packet on receipt of NAK.

12. Which of the following flag bit is set for closing TCP connection?

A) SYN

B) SEQ

C) FIN

D) RST

13. The following statements describe end-end congestion control approach, EXCEPT:
A) The network layer does not provide explicit feedback.
B) TCP segment loss is an indication of network congestion.
C) Approach taken by TCP.
D) Approach taken by UDP.

14. Suppose TCP uses Additive Increase Multiplicative Decrease (AIMD) for its congestion control without slow start. If *cwnd* increases linearly by 2 MSS, how long does it take for *cwnd* to increase from 4 MSS to 12 MSS? Assuming constant round-trip times (RTT) and no loss events.
A) It takes 4 RTTs to increase to 12 MSS.
B) It takes 6 RTTs to increase to 12 MSS.
C) It takes 8 RTTs to increase to 12 MSS.
D) It takes 10 RTTs to increase to 12 MSS.

15. In TCP, what is the variable that is used for flow control services?
A) Congestion window
B) Reflow window
C) Receive window
D) Buffer window

Name: _____

Section: _____

1. =A=   =B=   =C=   =D=

2. =A=   =B=   =C=   =D=

3. =A=   =B=   =C=   =D=

4. =A=   =B=   =C=   =D=

5. =A=   =B=   =C=   =D=

6. =A=   =B=   =C=   =D=

7. =A=   =B=   =C=   =D=

8. =A=   =B=   =C=   =D=

9. =A=   =B=   =C=   =D=

10. =A=   =B=   =C=   =D=

11. =A=   =B=   =C=   =D=

12. =A=   =B=   =C=   =D=

13. =A=   =B=   =C=   =D=

14. =A=   =B=   =C=   =D=

15. =A=   =B=   =C=   =D=

SECTION B: STRUCTURED QUESTIONS [60 MARKS]

QUESTION 1 [6 Marks]

These steps show the basic scenario of SMTP protocol in application layer. Let's say Alice wants to send Bob a simple message.

Step 1 : Alice invokes her _____ for e-mail.

Step 2 : Alice's user agent sends the message to her _____.

Step 3 : The client side of SMTP protocol opens _____ connection to SMTP server on Bob's mail server.

Step 4 : After some initial SMTP handshaking, the _____ sends Alice's message into the TCP connection.

Step 5 : At Bob's mail server, the _____ of SMTP receives the message.

Step 6 : Bob's mail server places the message in Bob's _____.

Step 7 : Bob invokes his user agent to read the message.

i) Using the terms given, fill in the blank in steps 1 to 7 taken by Alice to send a message to Bob. [3M]

user agent, TCP, mail server, mailbox, POP3, UDP, SMTP client , server side

ii) Explain briefly the differences between IMAP and POP3 in retrieving user emails. [3M]

QUESTION 2 [11 Marks]

(a) A simple design for DNS would have one DNS server that contains all the mappings. In the centralized design, clients simply direct all queries to the single DNS server and the DNS server responds directly to the querying clients. Briefly describe two problems with this design. [3M]

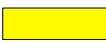(b) There are three classes of DNS servers. Briefly explain the three classes. [4M]

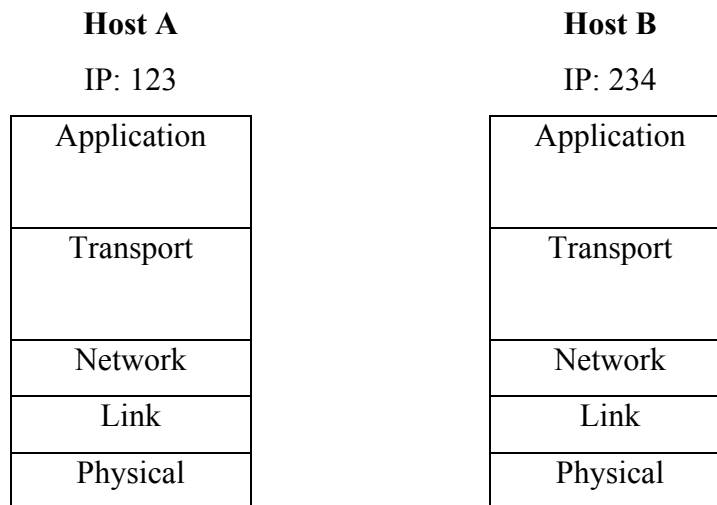(c) Describe Iterative query process used in DNS. [4M]

QUESTION 3 [10 Marks]

There are 2 segments from Host A destined to Host B. The IP address of Host A and B is 123 and 234 respectively. The 2 segments information are as below:

1ˢᵗ segment: Source IP, Port #: 123, 5000; Destination IP, Port #: 234, 80
2ⁿᵈ segment: Source IP, Port #: 123, 5050; Destination IP, Port #: 234, 80

(a) Draw the **demultiplexing** process at the receiver showing Process and Socket clearly when the application uses TCP. Use the symbols ⬭ and ▭ for Process(s) and Socket(s) respectively. Use ➡ for flow direction from source to destination. Label your drawing clearly with the given information above. [4M]

Host A	Host B
IP: 123	IP: 234
Application	Application
Transport	Transport
Network	Network
Link	Link
Physical	Physical

(b) The following questions are based on the UDP segment diagram shown below.

83F H	A1 H
20 H	F6EF H
Application Data (Payload)	

    i).   What is size of the message (payload)? [2M]

    ii).   Does the UDP segment contain error? Prove your answer. [4M]

QUESTION 4 [18 Marks]

a)   What is the difference between the stop-and-wait and pipeline operations? [2M]

b)   The following questions refer to the Go-Back-N (GBN) sliding window protocol in Figure 3.
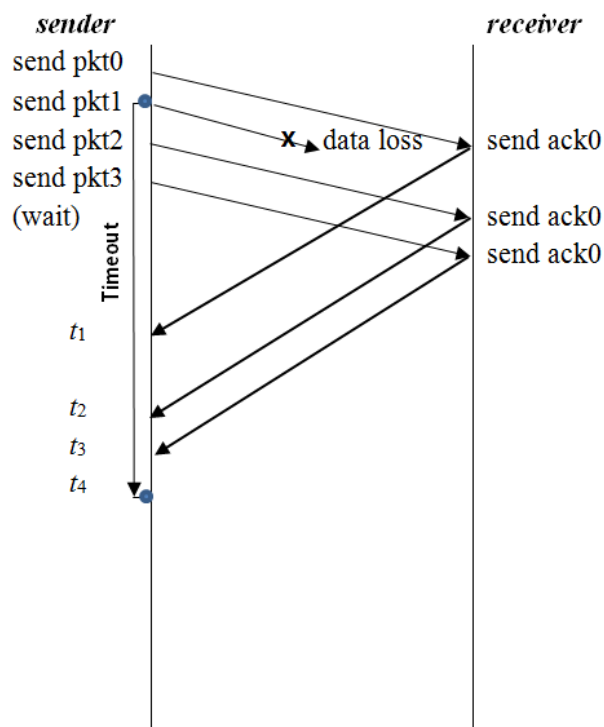

Figure 3: GBN sliding window protocol

i). What is the action of sender at time t_1, t_2, t_3? Complete Figure 3 with appropriate arrows for illustration. [5M]

ii). Briefly explain the action taken at t_4 when the sender detects a timeout for packet 1 (i.e. pkt1). [3M]

c) Assume a host performs **fast retransmit** by transmitting five (5) TCP segments with respective sequence numbers 1200, 2400, 3600, 4800, 6000. The sender receives five acknowledgements with the following sequence numbers, 2400, 2400, 2400, 2400, 7200.

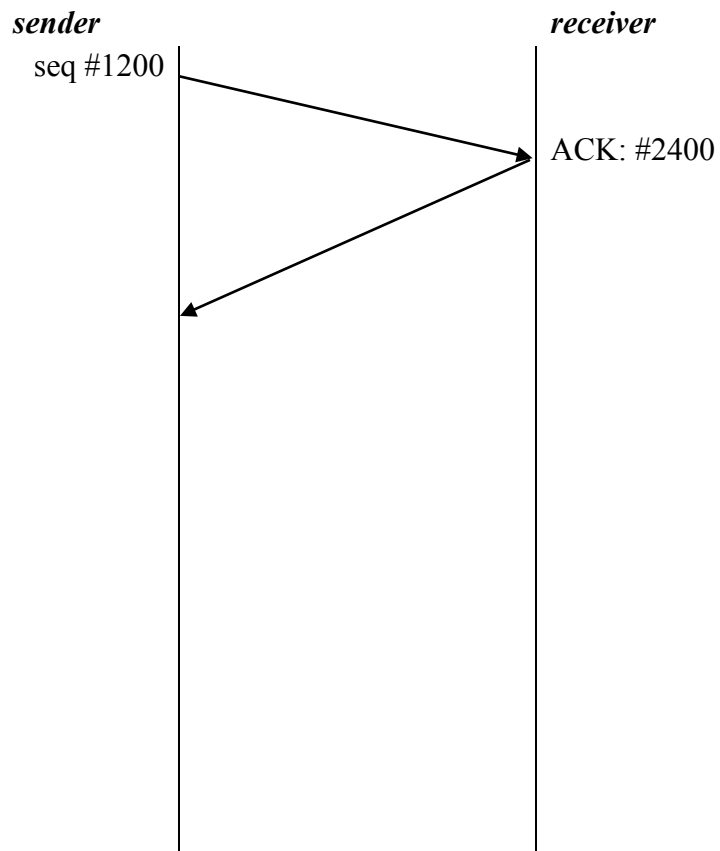   a) Complete Figure 4 to show exchanging of TCP segments between sender and receiver. [5M]

Figure 4: Exchange of segments

b) Based on the completed Figure 4, briefly explain how TCP fast retransmit operates? [3M]

QUESTION 5 [15 Marks]

(a) Consider the following graph of TCP throughput in Figure 5, where the y-axis describes the TCP window size of the sender. The window size of the TCP sender decreases at several points in the graph.
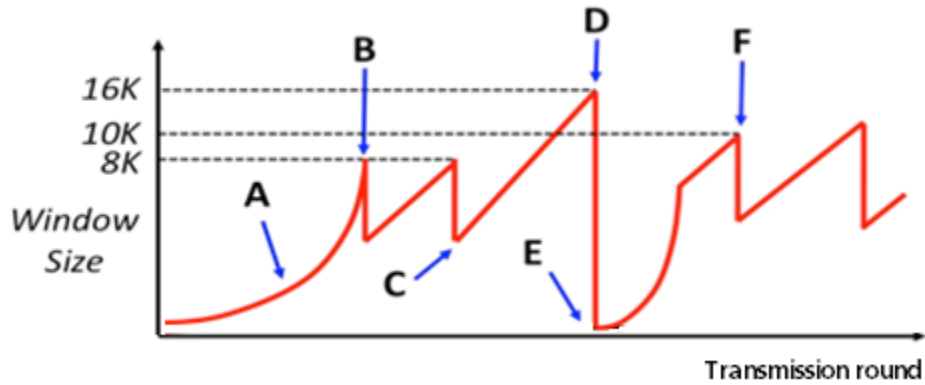

Figure 5: TCP throughput

Assumed TCP Reno is used for congestion control, answer the following questions:

   i)   Name the event at B and the cause for the event to occur. [2M]

   ii)   Name the event at D and the cause for the event to occur. [2M]

   iii) Explain the behavior of the TCP between events E to F. [3 M]

iv)   Consider the curved slope labeled by point A. Why does the TCP window behave in such a manner, rather than have a linear slope? [3M]

v)   Label in the graph any two occurrences of congestion avoidance. [1 M]

(b) Explain how TCP Tahoe handles timeout and fast retransmission events for congestion control. [4 M]

ooooooooooooooooooooooooooooooo **End of The Question** oooooooooooooooooooooooooooooooooooo