UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2001/2002

September 2001

CSI504 – Computer Networks

Duration : 3 hours

INSTRUCTION TO CANDIDATE:

- Please ensure that this examination paper contains **TEN** questions in **FIVE** printed pages before you start the examination.
- Answer **ALL** questions.
- You can choose to answer either in Bahasa Malaysia or English.

ENGLISH VERSION OF THE QUESTION PAPER

1. Consider an e-commerce site that wants to keep a purchase record for each of its customers.

   (a) Describe how this can be done with HTTP authentication.

   (b) Describe how this can be done with cookies.

   [8 marks]

2. Each Internet host will have at least one local name server and one authoritative name server. What role does each of these servers have in DNS?

   [8 marks]

3. The TCP segment consists of header fields and a data field.

   (a) Sketch the TCP segment structure, and

   (b) Describe briefly, the header fields.

   [10 marks]

4. In order to provide a reliable transport service, Transport Layer of the Internet uses a reliable data transfer protocol.

   (a) Explain how the Stop and Wait protocol works.

   (b) What is the weakness of the Stop and Wait protocol?

   (c) How does the Sliding Window Protocol overcome the weakness?

   [10 marks]

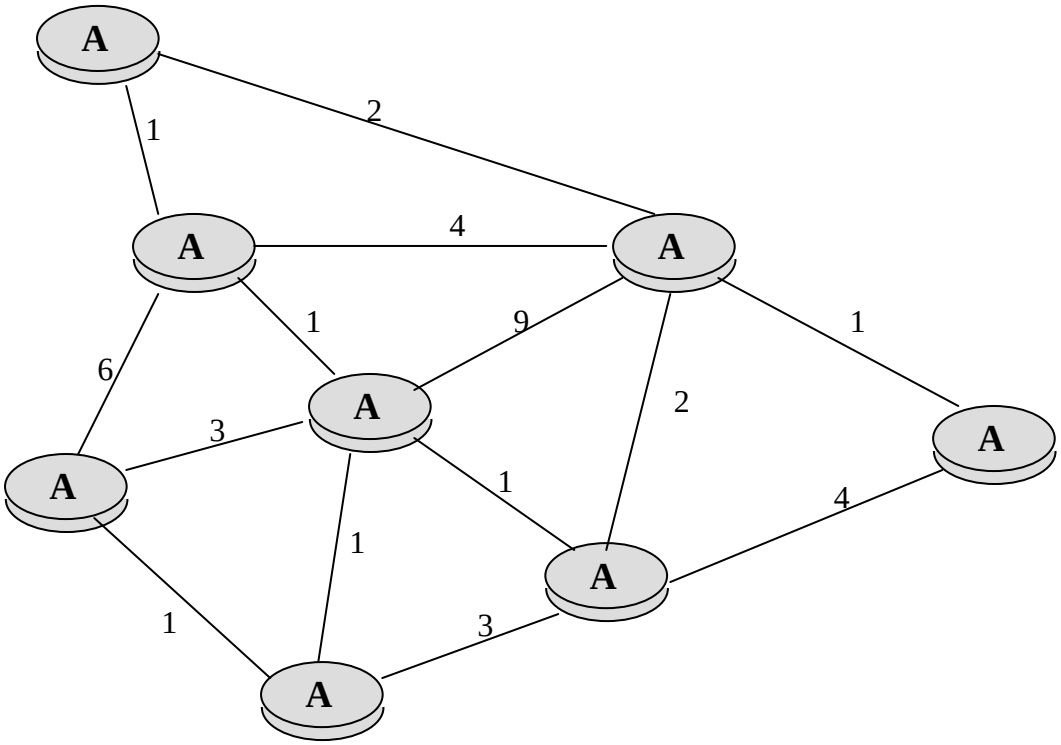
5. The network protocol in the Internet is called the Internet Protocol, or more commonly, the *IP Protocol*. There are two versions of the IP protocol in use today, i.e.: IPv4 and IPv6.

   (a) Compare and contrast the IPv4 and the IPv6.

   (b) How will the public Internet, which is based on IPv4, be transitioned to IPv6?

   [10 marks]

6. Consider the following network. With the indicated link costs, use Dijkstra's shortest path algorithm to compute the shortest path from F to all network nodes. Show how the algorithm works by computing a table.



[10 marks]

7. Using RSA, choose p = 3 and q = 11, and encode the phrase "hello." Apply the decryption algorithm, to the encrypted version to recover the original plaintext message.

[10 marks]

8. Suppose that an intruder could both insert and remove DNS messages into the network. Give three scenarios showing the problems that such an intruder could cause.

[10 marks]

9. Consider Local Area Networks (LANs), network that are geographically concentrated in a single building (or on a corporate or university campus). Broadcast channels are often used in LANs.

   (a) Describe how the two protocols of Multiple Access Channel Sub Layer, CSMA/(CD) and CSMA/(CA) work.

   (b) Discuss technologies standardized by the IEEE 802.3 LAN.

   (c) Describe briefly, the following LANs devices

      (i) HUB

      (ii) REPEATER

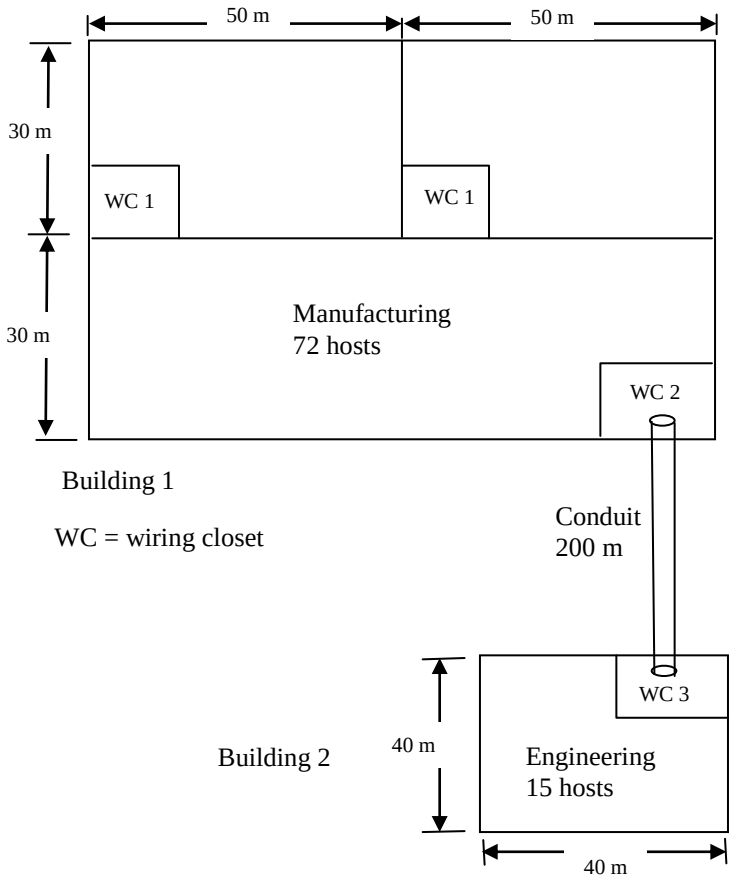
      (iii) BRIDGE

      (iv) SWITCH

      (v) ROUTER

[12 marks]

10. You are to design a LAN for the campus layout shown below:



The following equipment may be used:

Equipment	Cost
UTP	RM 4 per meter
Fiber-optic cable pair	RM 8 per meter
NIC UTP port	RM 280
2-Port Repeater	RM 3,200
Multiport fiber Repeater (6 fiber ports)	RM 8,000
2-Port Bridge (any combo of thin coax, UTP, fiber)	RM 8,800
Hub—6 fiber ports, 24 UTP ports	RM 24,000
Pentium File Server – w/NOS (max. 30 users)	RM 36,000
Bridges always include interface cards	

The design must respect the following requirements:

- Each department must have access to the resources of all other departments.
- The traffic generated by users of one department cannot affect another department's LAN unless accessing a resource on that other department's LAN.
- A file server can support only 30 users.
- File servers may not be shared by multiple departments.
- All repeaters, bridges, and hubs must reside in the wiring closets (WCs).

You are required to use UTP (no thin coax) and, if deemed necessary, fiber optic:

(a) Provide a diagram for your design.

(b) List all the equipment you use (with quantities).

(c) Calculate the total cost of the LAN.

[12 marks]