



SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide In Act No. 29 of 1995)

Higher National Diploma in Information Technology

First Year, 2nd Semester Examination - 2012

IT 2004 - Introduction to Data Communication and Computer Networks (New)

Instructions for Candidates:

Answer five questions.

All questions carry equal marks.

No of pages : 03

No of questions : 08

Time : Three (03) hours

(1) Briefly explain how data is transmitted through digital communication.

(03 marks)

(i) What is a communication channel? Give four examples of communication channels.

(05 marks)

(ii) Compare channels you mentioned on the above question on the following criteria.

(08 marks)

- Speed
- Cost
- Flexibility/Easy to use
- Possible maximum transmission distance

(iii) Explain simplex and duplex transmission

(04 marks)

(Total 20 marks)

(2) Suppose you have been asked to design a new local area network for your institute. Also your institute may have more than one lab. In answering the following parts of this question you must provide a full justification of all decision and recommendations that you make.

i) A small room at the computer lab will house one server and will be the location of their Internet connection. What type of local area network technology should be installed and what equipment and cabling will be required?

(8 marks)

ii) The fixed desks will be equipped with desktop computers for the student. What type of local area network technology should be installed and what equipment and cabling will be required?

(6 marks)

iii) There are students who may use laptop computers on any place on your premise of your institute. Explain how you would give Internet facilities to those students.

(6 marks)

(Total 20 marks)

- (3) i) What is meant by the term virtual circuit? (4 marks)
- ii) Explain how a network connection is established between a user and a server over the Internet using the TCP protocol. (6 marks)
- iv) If a server is unable to receive data at the rate that the user is sending it over a TCP connection, explain how TCP is able to reduce the flow of data. (5 marks)
- v) Explain how you could secure the transmission of data over the Internet. (5 marks)

(Total 20 marks)

- (4) i) The OSI Reference Model defines seven protocol layers, each of which is responsible for a specific range of functions. By considering this model, explain the main functions performed by a protocol operating at: (12 marks)
- a) The Physical layer
 - b) The Network layer
 - c) The Application layer
 - d) Data link layer
- ii) In a small scale LAN, a computer is connected to a LAN switch, the LAN switch is then connected to a router and the router is connected to a second LAN switch. A server is then connected to this second switch. Determine which layers of the OSI Reference Model are used within:
- a) The computer / server (2 marks)
 - b) The LAN switches (3 marks)
 - c) The router (3 marks)

(Total 20 marks)

- (5) Describe the term "latency" in networking. Give two examples of two different mediums. (4 marks)
- i) Describe the basic difference between wireless and ad-hoc networking. (4 marks)
 - ii) What three basic elements does a fibre optic system consist of? Why are there three different bands available ideal for data transmission? (4 marks)
 - iii) What can you do with the software tool "Ping"? How does it work? (4 marks)
 - iv) What is a VSAT-Device? What is it used for? (4 marks)

(Total 20 marks)

- (6) i) Many people now access the Internet using broadband connections. The most common form of broadband connection is that based upon the Asymmetrical Digital Subscriber Line (ADSL) technology. Explain how ADSL allow that both data and telephone call services at the same time? (6 marks)
- ii) Suppose you have a laptop computer, two desk top computers, a printer and an ADSL router. Draw a diagram for network system considering the followings: (8 marks)
- Internet can be accessed from any computers
 - You may use laptop computer anywhere on your premise.
 - Printer can be used from any computer.
 - Allowing telephone
- iii) Identify other devices required to the above network. Also write specification of those devices. (6 marks)
- (Total 20 marks)
- (7) i) What is a protocol in networking? (Marks 5)
- ii) What are the differences between a connection orientated and a connectionless protocol? Give examples of such protocols. (Marks 5)
- iii) What are the basic functions of Transmission Control Protocol (TCP)? (Marks 5)
- iv) What is TCP segment? What information does it hold? (Marks 5)
- (Total 20 marks)
- (8) Explain the followings:
- i. Peer to Peer network and Client/Server network
 - ii. Virtual Private Network(VPN)
 - iii. Bus topology and Star topology
 - iv. Class C of IP address
 - v. Subnet mask

(Total 20 marks)