



# 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, Second Semester Examination – 2016

HNDIT1213- Data Communications and Networks I

IT2004- Introduction to Data Communications & Computer Networks

Instructions:

Answer any five questions.

All questions carry equal marks

No. of questions : 06

No. of pages : 04

Time : Three hours

### Q1.

- i. What is data communication? **(01 mark)**
- ii. In order to establish communication what are the conditions which should be satisfied? **(05 marks)**
- iii. Briefly describe communication channel? **(02 marks)**
- iv. List the Key Elements of a Communication System. **(06 marks)**
- v. The direction of data flow between two devices can take place in three modes. Briefly describe them by giving suitable example for each of them. **(06 marks)**

### Q2.

- i. Compare and contrast the analog signals and digital signals? **(04 marks)**
- ii. Periodic analog signals can be classified as simple signal and composite signal. What are the differences between simple signal and composite signal? (Hint : You may use diagrams to illustrate this.) **(04 marks)**
- iii. Shifting a sine wave to left can be given as an equation. By observing the following equation identify the symbols associated with it. **(03 marks)**

$$s(t)=A \sin(\omega t - \theta)$$

- iv. The power supply voltage signal to household is a good example of a simple sine wave. The maximum amplitude is approximately 155 volts and frequency is 60Hz. Write the mathematical expansion and find the instantaneous value of the signal at time  $t$ .  
**(03 marks)**
- v. A nonperiodic composite signal has a bandwidth of 300 kHz, with a middle frequency of 367 kHz and peak amplitude of 20 V. The two extreme frequencies have an amplitude of 0. Draw the frequency domain of the signal.  
**(03 marks)**
- vi. Assume we need to download text documents at the rate of 100 pages per minute. What is the required bit rate of the channel? A page is an average of 24 lines with 80 characters in each line. You may assume that one character requires 8 bits.  
**(03 marks)**

### Q3.

- i. Communication media can be classified into two categories. Name them by supplying suitable examples.  
**(03 marks)**
- ii. What are the category types in UTP cable?  
**(03 marks)**
- iii. Using Suitable diagram show the color codes of two ends in cross over cable.  
**(04 marks)**
- iv. Which pair of devices can be connected using crossover cable for communication purposes? List 03 pair of them.  
**(03 marks)**
- v. Name 03 wireless transmission waves.  
**(03 marks)**
- vi. Considering a network with 8 devices, evaluate the number of cable links required for a mesh topology.  
**(04 marks)**

**Q4.**

- i. What do you mean by “Protocol”? List 04 protocols used in TCP (Transmission Control Protocol) **(03 marks)**
- ii. Name four levels of addresses are used in internet employing the TCP/IP protocols? **(02marks)**
- iii. The TCP/IP model has the four layers. Represent it diagrammatically by mentioning the protocols available in internet layer. **(03 marks)**
- iv. List the 07 layers available in OSI Model. State the functions of each layers in OSI Model. **(07 marks)**
- v. What are the advantages of layered architecture? **(05 marks)**

**Q5.**

- i. There are two formats for referencing an IP address. Name those. **(02 Marks)**
- ii. What are the functionalities of DNS? Write the required command to view the IP address of the given url. Given url : www.sliate.ac.lk **(03 marks)**
- iii. Identify the difference(s) between “Classful IP addresses” and “Classless IP addresses”. **(04 marks)**
- iv. Answer the following question by using the given IP address 168.173.70.134/29
  - a. Class of the host IP address **(02 marks)**
  - b. Subnet mask **(01 marks)**
  - c. Network IP **(02 marks)**
  - d. First host IP **(01 marks)**
  - e. Last host IP **(01 marks)**
  - f. Available hosts **(02 marks)**
  - g. Broadcast address of the subnet **(02 marks)**

**Q6.**

- i. Identify the difference between network security and internet security. **(04 marks)**
- ii. Network security is mostly achieved through the use of cryptography. What do you mean by cryptography? **(02 marks)**
- iii. Cryptography can provide several aspects of security related to the interchange of messages through networks. List those aspects. **(02 marks)**
- iv. Give pictorial representation of cryptography components. **(03 marks)**
- v. Compare and contrast Symmetric Key Cryptography and Asymmetric Key Cryptography. **(06 marks)**
- vi. Use the shift cipher with key = 14 to encrypt the message "HELLO WORLD". **(03 marks)**