

Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
300 level 2nd Semester Examination – Jan. / Feb. 2016
CST 105 -2 Fundamentals of Computer Networks



Instructions to candidates

Duration: Two (02) hours

Number of questions: (04) Four

Mark allocation: 100



1.

- a. What is a computer network?
- b. What is meant by a signal and discuss about the analog and digital signals.
- c. Pulse Code Modulation (PCM) method used to convert an analog signal to a digital signal. Briefly explain sampling, quantizing and encoding in PCM.
- d. Describe the use of computer networks in the following applications
 - i. Business applications
 - ii. Home applications
 - iii. Mobile users
- e. Explain '**synchronous transmission**' and '**asynchronous transmission**' techniques using diagrams.
- f. Explain the following in terms of copper cables
 - i. Thermal noise
 - ii. Interference
 - iii. Attenuation

(25 mark)

2.

- a. Name the ISO-OSI layers
- b. Differentiate the TCP/IP stack and the ISO-OSI layers using a diagram
- c. Explain how your home internet connection (ADSL) is connected using a diagram.
- d. Discuss the differences of **Segment, Frame and packet**.
- e. Describe circuit and packet switching.

(25 mark)

3.

- a. Briefly explain the following by providing examples,
 - i. Simplex transmission
 - ii. Half-duplex transmission
 - iii. Full-duplex transmission
- b. Explain the functionality of the following networking devices given below
 - i. Bridge
 - ii. Switch
 - iii. Router
- c. Consider the following scenario in TCP / IP model and ethernet frame in Local Area Network (LAN) model.
2950 bytes of data from application layer are going through the transport layer, network layer and data link layer. Maximum Transfer Unit (MTU) of ethernet frame is 1500 bytes.

- i. Draw the TCP segment, IP packet/s and Ethernet frame/s with the number of bytes in each header and data sections.
(Note: Assume LLC Frame is not used when TCP / IP combine with Data Link Layer - Ethernet frame)
 - d. Describe any three (03) basic and two (02) hybrid network topologies.
 - e. Explain Data Circuit-terminating Equipment (DCE)and Data Terminal Equipment (DTE)
 - f. Describe the following
 - i. Local Area Network (LAN)
 - ii. Wide Area Network (WAN)
 - iii. Metropolitan Area Network (MAN)
- (25 mark)

4.

- a. Describe any two (02) WAN technologies and any three (03) devices.
- b. You are required to connect a ring topology (Media access control is token ring) and bus topology (media access control is CSMA/CD) together. What is the device that can be used to connect both topologies?
- c. Discuss the differences of logical , physical and port address
- d. UVA is a bank with the following components,
 - Three (03) floors in the building (Ground, First and Second)
 - The server room is located on the first floor
 - The internet connection is terminated directly to the server room
 - The Human Resources (HR) division with 3 users and the accounts division with 5 users is located on the ground floor
 - Pawning center is located in the First floor with 20 users
 - There are 10 computers in the Administration Division and the branch manager office is located in the Second floor

The supplied resources are given below

- Cable boxes (CAT5 cables)
- Crimping tools (tool used to make cables)
- Jacks for the cables
- Three (03) number of 48port switches
- Four (04) number of 12 port switches
- Two (02) number of 8 port switches
- Two (02) routers

You are required to draw a **network diagram** using the information given above.

(25 mark)