UVA WELLASSA UNIVERSITY OF SRI LANKA

DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY

END SEMESTER EXAMINATION – 1st SEMESTER – 2008/2009

CST 301-2 DATA COMMUNICATION & NETWORKING
ENG 333-2 DATA COMMUNICATION & NETWORKING

Time Allowed: TWO HOURS **Answer All Questions** **All questions carry equal marks**

(1)

(a) Write down three (3) key elements that are needed to have a proper communication session in general (3 Marks)

(b) Why must a modem to be used to transmit binary data through a public switch telephone network ? (3 Marks)

(c) What is the principal difference between connectionless communication and connection oriented communication? (4 Marks)

(d) State two (2) advantages of ADSL over PSTN as approaches for local access. (4 Marks)

(e) In GSM 900 signal band, it uses 890 MHz to 915 MHz for mobile-to-base (uplink) and 935 MHz to 960 MHz for base-to-mobile (downlink).

(i) If carrier signals are spaced 200 kHz, calculate the maximum number of available channels for each direction. (4 Marks)

(ii) If eight users sharing a single channel, calculate the maximum number of users that can support simultaneously within a single cell. (3 Marks)

(f)

(i) What is the routing and what is the role of a router ? (2 Marks)

(ii) Give an example for routing protocols (1 Marks)

(iii) Give an example for routed protocols (1 Marks)

(2)

(a) Assume that a full block of IP addresses (from 200.100.50.0 to 200.100.50.255) is given to a computer network administrator. The network administrator needs to subnet the above IP block into three (3) subnets with Subnet-A having 50 hosts, Subnet-B having 40 hosts and Subnet-C having 20 hosts.

(i) What is the subnet mask that can be used by the network administrator ? (Assume that all zero and all one subnets can be used as well) (6 Marks)

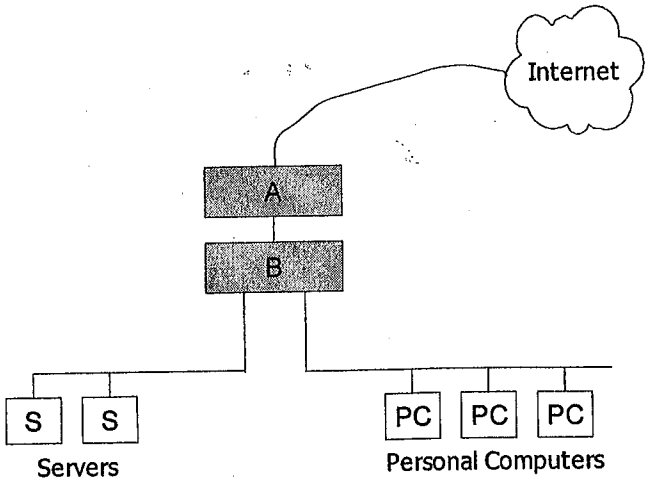
(ii) What is the maximum number of hosts supported by each such subnet? (4 Marks)

(b) Assume that the subnet-A is expanded to occupy 100 hosts. In this scenario, How should the system administrator allocate IP addresses to the subnets ? Show your workings clearly. (10 Marks)

(c) What is a "Virtual Private Network" (VPN)? Explain how a VPN can be implemented over the Internet. (5 Marks)

(3)

(a) Consider the following network diagram.



(i) Identify and write down the correct devices for A and B in the diagram. (6 Marks)

(ii) List two (2) main functions carried out by each of these devices. (4 Marks)

(b) Write down two (2) functions of a firewall (4 Marks)

(c) CSMA/CD is the media access control mechanism used in Ethernet. What are the steps taken if a collision is detected ? (5 Marks)

(d) In a public key cryptographic system, each user is given a private key and a public key. Assume that users Saman and Rani have the following keys respectively.

User	Public Key	Private Key
Saman	P_S	Q_S
Rani	P_R	Q_R

(i) Saman needs to sends an encrypted message to Rani. What are the necessary steps he should follow to do it ? (3 Marks)

(ii) After receiving the Saman's encrypted message, What are the necessary steps that follow Rani to read it ? (3 Marks)

(4)

(a) The table shown below attempts to map a network functionality with the corresponding layers of the OSI model. Copy the table to your answer sheet and tick the corresponding cells which show the functionalities provided by each layer.

Functionality	Layer						
	Physical Layer	Data Link Layer	Network Layer	Transport Layer	Session Layer	Presentation Layer	Application Layer
I. Path selection and routing							
II. Synchronize the dialog between the hosts							
III. Defining electrical and mechanical characteristics							
IV. Defining maximum transmission distance and connectors							
V. Check for in-order delivery of frames							
VI. Provide an API for client-server programming							
VII. Translate between multiple data formats by using a common format							
VIII. Concerned with device level addressing							
IX. Define host level addressing							
X. Encryption and compression							

(12 Marks)

(b) List four (4) protocols that function at the TCP/IP Internet layer (8 Marks)

(c) What happens if a packet with time to live (TTL) field containing the value of one arrives at a router ? (2 Marks)

(d) Connection oriented protocols track the transfer of data packets, and ensure they arrive successfully at the destination. In the TCP header, what field(s) allows this to happen ? (3 Marks)

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