Final Assessment Test – November 2018

VIT
Vellore Institute of Technology

Course: CSE1004 - Network and Communication
Class NBR(s): 6188 / 7031   Slot: G2+TG2
Time: **Three Hours**   Max. Marks: **100**

Answer ALL Questions
(10 X 10 = 100 Marks)

1. a) Discuss the protocols involved in each layers of TCP/IP model.   [5]

   b) For each device in the list below, briefly describe what the device does and in which OSI layer(s)   [5]
   the device operates. State whether the device has a physical (MAC) address or an IP addresses
   Devices: repeater, hub, bridge and router.

2. A path in a digital circuit-switched network has a data rate of I Mbps. The exchange of 1,000 bits is
   required for the setup and teardown phases. The distance between two parties is 3,000 km. Answer
   the following questions if the propagation speed is 2×10^8 m/s.
   (i) What is the total delay if 1,000 bits of data are exchanged during the data transfer phase?
   (ii) What is the total delay if 100,000 bits of data are exchanged during the data transfer phase?
   (iii) What is the total delay if 1,000,000 bits of data are exchanged during the data transfer phase?
   (iv) Find the delay per 1,000 bits of data for each of the above cases and compare them. What can
   you infer?

3. a) Generate the hamming code for the ASCII character "U" = 1010101. Assume even parity for the   [5]
   hamming code.

   b) Message frame consists of 1101011011 for which the divisor is 10011. Calculate CRC and   [5]
   transmitted frame. Also determine the remainder obtained at the receiver if the transmission is
   error free.

4. a) The distance from earth to a distant planet is approximately 9×10^{10} m. What is the channel   [5]
   utilization if a stop-and-wait protocol is used for frame transmission on a 64 Mbps point-to-
   point link? Assume that the frame size is 32 KB and the speed of light is 3×10^8 m/s.

   b) Draw the timeline diagram for the Go-Back-N-ARQ with sequence number and sliding window in   [5]
   the following situations. Frames 0, 1, 2 and 3 are sent. However, frame 1 is lost. The receiver
   receives frames 2 and 3, but they are discarded because they are received out of order. The
   sender receives no acknowledgment about frames 1, 2 or 3. Its timer finally expires. The sender
   sends all outstanding frames (1, 2 and 3) because it does not know what is wrong. Note that the
   resending of frames 1, 2 and 3 is the response to one single event. When the sender is
   responding to this event, it cannot accept the triggering of other events. This means that when
   ACK 2 arrives, the sender is still busy with sending frame 3. When ACK 3 arrives, the sender is
   busy responding to ACK 2. It happens again when ACK 4 arrives. Note that before the second
   timer expires, all outstanding frames have been sent and the timer is stopped.

5. Company ABC has 100 workstations in their head office and the IT manager would like to assign a
   subnetwork address for each department. He wants to create 5 subnets using the 192.168.1.0/24
   block and assign the first subnetwork to their servers and the rest for their 100 workstations. How
   will we compute the subnetwork requirement?

6. a) An organization has been assigned the network address: 140.25.0.0 and it needs to create a set of subnets that support up to 25 hosts on each subnet. [4]
   (i) What is the maximum possible number of such subnets in the given network?
   (ii) Given that there are 25 hosts on each subnet, how much of the address space is being wasted (in percentage)?

   b) An IP datagram carrying 10000 bytes of data must be sent over a link (i.e. network) that has an MTU of 4468 bytes. Assume the datagram has no Options, and the Identification number is 218. [6]
   1. How many fragments will be generated?
   2. State the values (in decimal numbers) of the following fields for each of the fragments:
   X. Identification, Total Length, D-bit, M-bit, Fragmentation Offset.

7. Find shortest path from a to z using Dijkstra's shortest path algorithm. [Show step by step procedure]
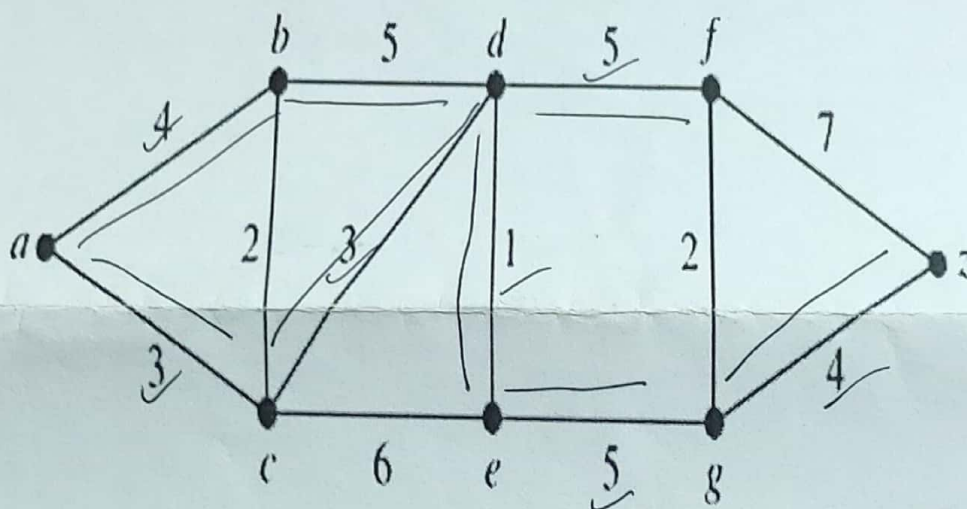
$$30 \times 5 + 5 \times 5 + 25$$
$$= 150 = 125$$

8. Justify the need of traffic shaping algorithms over congestion control techniques. Explain how leaky bucket algorithm shapes the incoming traffic.

9. Explicate the functionalities of network management system with an appropriate example. Also list out various SNMP PDUs are exchanged between SNMP Agent and the SNMP manager.

10. How RSA algorithm can be used to generate key pairs? Take a case with p as 3 and q as 11 and generate a public and private key from that using RSA. Show how encryption and decryption can be done after that.

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$$7, 3$$
$$3$$
$$5 = 125^{26}$$
$$26$$

$$125^{26^{33}}$$