Bonus Assignment – IT110
Deadline: Sunday 28th December, 2014 at 11:59 pm. 5 marks

1. List the Four Network Topologies and their Functionalities?

1- Mesh topology: networks that provide multiple paths between end nodes. One node failure won't stop network traffic. Large networks that use switches and routers are mesh networks.
2- Star topology: all nodes are connected point-to-point to a central device and they communicate through it. Switching in the central device connects pairs of nodes together allowing direct communication and leading data from one node to another.
3- Ring topology: consists of a point-to-point connection from each node on the network to the next. Last node on this king of network is connected back to the first forming a closed ring. Each node retransmits the signal that it receives from the previous node to the next node in the ring. Packets travel from node to node in form of loop until the desired node is reached.
4- Bus topology: each node is tapped into the bus along the bus. To communicate, a sending node "broadcasts" a message which travels along the bus. Every node on the bus receives the message but it is ignored by all nodes except the one whose node matches the delivery address in the message. Transmission from any stations travels entire medium (both directions). Termination required at ends of bus to prevent the signal from echoing. Branches can be added to a bus, expanding it into a tree but messages are still broadcast throughout the entire tree

2. Define the following terms with respect to Hard Disk

- **Average Seek time**

Time required moving from one track to another.

- **Average Latency time**

Time required for disk to rotate to beginning of correct sector.

- **Transfer time**

Time required transferring a block of data to the disk controller buffer.

- **Total Time to access a disk block**

Summation of Average Seek time, Average Latency time and Transfer time.

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3. Describe the IPv4 addresses Data Format.

An IPv4 address is 32-bits long and every node on the Internet has a unique address. The 32-bits are divided into four octets (four one-byte integers, separated by dots). IP addresses are still assigned in blocks and they are contiguous, so the number of addresses in a block must be a power of 2. A block is assigned by specifying a given number of bits, from left to right; the remaining bits represent addresses in the block.

4. Given the equation below, find out its instruction set using the 2-Address Machine architecture using the Memory and Registers. Write your answer in the boxes provided.

$$a = (a + b) - (c * a)$$

Note: use T1 and T2 as source and destinations.

a) Using Memory:

Code	Memory Reference
MOVE T1, A	2
ADD T1, B	3
MOVE T2, C	2
MUL T2, A	3
SUB T1, T2	3
MOVE A, T1	2
Total Memory References	15

b) Using registers:

Code	Memory Reference
MOVE R1, A	1
ADD R1, B	1
MOVE R2, C	1
MUL R2, A	1
SUB R1, R2	0
MOVE A, R1	1
Total Memory References	5