

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF ELECTONIC ENGINEERING

BACHELOR OF ENGINEERING (HONS) DEGREE

Final Examination January 2013

TEE 5133

**COMPUTER ARCHITECTURE AND OPERATING
SYSTEMS**

Duration of Examination – 3 Hours

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of 3 printed papers and 7 questions.
 2. Answer any FIVE questions only.
 3. Each question carries 20 marks.
 4. Show your steps clearly in any calculation.
 5. Start the answers for each question on a fresh page.
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Question 1

A Computer has 4MB of RAM. Show the logical memory mapping indicating the address range for logical memory in the diagram. Explain the functions of each logical memory. [20]

Question 2

- a) Define CPU Utilisation and show how the number of processes affects CPU utilization. [5]
- b) Calculate CPU utilization of six processes run concurrently and are known to be blocked for 75% of their execution. [7]
- c) Describe various ways of storing files on a disk paying particular attention to their relative advantages and disadvantages. [8]

Question 3

A memory cache uses a six-bit TAG in a direct mapping system. If the blocks are eight words in size and the Block part of the address is seven bits, calculate the sizes of the main memory and cache memory in words. [20]

Question 4

- (a) Assume we make an enhancement to a computer that improves some mode of execution by a factor of 10. This new fast mode is used 30% of the time, measured as a percentage of the execution time when the fast mode is in use. What is the overall speedup we can achieve? [10]
- (b) Explain the difference network classes as specified by IP addressing identifying the IP address range and the default subnets for each class. [4]
- (c) Explain the reason for performing subnetting? [4]
- (d) What is a subnet mask? [2]

Question 5

Given 192.220.100.0 as the Network address in Class C Addresses design the network with its sub networks.

- i. What is the Subnet Mask address for the sub networks?
- ii. How many subnets can the network have?
- iii. How many hosts can each subnet have?
- iv. What are the valid subnets Addresses?
- v. What are the valid hosts addresses in each subnet?
- vi. What is the broadcast of each subnet?

NB Show all calculation and the table of the subnet Ranges [20]

Question 6

- a) Explain why internet could not have arrived in the 1970s? [8]
- b) What is interleaving? [4]
- c) Using diagram as well, explain the various types of interleaving. [8]

Question 7

Two disk systems are similar, each having nine sectors of 512 bytes, and a rotation rate of 300 r.p.m. Disk A has no interleaving (reads data from adjacent sectors), while Disk B has single interleaving (reads from alternate sectors). What is the data rate (in bytes per sec) for each of these disks to read all the data on a track? Assume that the arm is already positioned correctly radially, and the average half a revolution of the disk is required to put the first sector under the head.

[20]

END OF PAPER