Code: AC59/AT59   Subject: OPERATING SYSTEMS & SYSTEMS SOFTWARE

AMIETE – CS/IT

Time: 3 Hours   **DECEMBER 2012**   Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.
- **Question 1 is compulsory and carries 20 marks. Answer to Q. 1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions, answer any FIVE Questions, selecting at least TWO questions from each part. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1   Choose the correct or the best alternative in the following: (2×10)

a. The memory management system that supports user's view of memory is

   (A) Segmentation   **(B)** Paging
   (C) Virtual memory   **(D)** Contiguous memory

b. If a process spends more time in paging than execution, CPU utilization decreases. This is known as

   (A) Hashing   **(B)** Caching
   (C) Thrashing   **(D)** Fetching

c. Page sizes in paging system are expressed in

   (A) Powers of 10   **(B)** Powers of 8
   (C) Powers of 16   **(D)** Powers of 2

d. 'Fork' is a

   (A) user process   **(B)** CPU bound process
   (C) System call   **(D)** I/O operation

e. Memory utilization factor shall be computed as follows

   (A) memory in use/allocated memory
   (B) memory in use/total memory connected
   (C) memory allocated/free existing memory
   (D) memory committed/total memory available

f. For a segment with base = 400 and Length = 350, the physical address for a logical address 575 is

   (A) 975, valid   **(B)** 750, invalid
   (C) 750, valid   **(D)** 975, invalid

g. The rule which govern the formation of valid statements in the source langua
   is called

   (A) Semantic rule   **(B)** Lexical rule
   (C) Syntax rule   **(D)** None of these

h. A compiler bridges the semantic gap between a

   (A) Programming language domain and execution domain
   (B) Scope analysis and dynamic analysis
   (C) automatic allocation and program controlled allocation
   (D) none of these

i. Each process that wants to communicate must explicitly name the recipient or
   sender for communication. This type of mode is used in

   (A) Asymmetric communication   **(B)** Direct communication
   (C) Buffering communication   **(D)** Indirect communication

j. Once a file is declared as shared by its creator, it cannot be modified by others.
   This property is known as

   (A) Access control file   **(B)** Immutable shared file semantics
   (C) Mutable shared file semantics   **(D)** Andrew shared file semantics

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PART A
Answer at least TWO questions. Each question carries 16 marks.

Q.2   a. What are the various actions an operating system performs when a new process
          is created? Explain four fundamental states for a process using a state transition
          diagram.   **(8)**

          b. List typical functionalities of an OS Kernel. What are disadvantages of the
          layered OS model based on Kernels that became primary motivation for a
          microkernel?   **(8)**

Q.3   a. Not every unsafe state leads to a deadlock. Give an example to show that the
          processes in an unsafe state complete their execution without entering a
          deadlock state.   **(5)**

          b. Explain the functionality of each of the following and give their differences:
          (i) Short-term scheduler
          (ii) Medium-term scheduler
          (iii) Long-term scheduler components.   **(6)**

          c. What is dispatch latency? How does it affect Real time scheduling? Suggest
          some solutions to keep dispatch latency low.   **(5)**

Q.4 a. State Producers-Consumers system with bounded buffer. Write a solution outline for this problem. **(8)**

b. Discuss in detail two approaches to non contiguous disk space allocation. **(4)**

c. What is access path? Define relative and absolute access path. **(4)**

Q.5 a. Consider a system which has 170 K bytes available for user programs. Let the following programs await memory allocation:

Program name	Size
C	40K
D	90K
E	55K
F	70K

How much total fragmentation would be there when using
(i) first-fit
(ii) best-fit criterion for memory allocation. **(6)**

b. Differentiate between Paging and Segmentation. What is need of paged segmentation? **(5)**

c. Explain LRU page replacement algorithm. How many page faults are there if LRU is used with reference string as 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5 and with 4 physical pages? **(5)**

PART B
Answer at least TWO questions. Each question carries 16 marks.

Q.6 a. List the properties which a hashing function should possess to ensure a good search performance. What approaches are adopted to handle collision? **(5)**

b. Give the Schematic of Interpretation of HLL program and execution of a machine language program by the CPU. **(5)**

c. Briefly discuss two language processor development tools. **(6)**

Q.7 a. What is parsing? Write down the drawback of top down parsing of backtracking. **(4)**

b. Differentiate between non-relocatable, relocatable and self relocatable programs. **(4)**

c. What is macro-expansion? List the key notions concerning macro expansion. Write an algorithm to outline the macro-expansion using macro-expansion counter. **(8)**

Q.8   a.   Explain the following with respect to assembly language:
(i)   Mnemonic operation codes
(ii) Symbolic operands
(iii) Data declarations
(iv) Statement format.   **(10)**

b.   List the tasks performed by the analysis and synthesis phases of an assembler.
(6)

Q.9   a.   Differentiate between:

(i)   Pure and impure interpreters
(ii) Static and Dynamic binding
(iii) Local and global optimization   **(9)**

b.   Explain the following optimizing transformations used in compilers by giving
suitable example for each:
(i) Frequency reduction
(ii) Strength reduction.   **(7)**