

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

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|--------------------|-----------------------|
| (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

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|---------------|--------------|
| (A) Hashing   | (B) Caching  |
| (C) Thrashing | (D) Fetching |

c. Page sizes in paging system are expressed in

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

d. 'Fork' is a

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|------------------|-----------------------|
| (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

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|----------------|------------------|
| (A) 975, valid | (B) 750, invalid |
| (C) 750, valid | (D) 975, invalid |

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- g. The rule which govern the formation of valid statements in the source language 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.**

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- 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)

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- 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:

<u>Program name</u>	<u>Size</u>
C	40K
D	90K
E	55K
F	70K

How much total fragmentation would be there when using

- (i) first-fit (6)
- (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)**