Subject: OPERATING SYSTEMS & SYSTEMS SOFTWARE

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

JUNE 2010

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.**
- **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. Which of the following is a solution to the critical section problem?

(A) Round Robin algorithm **(B)** Bakery algorithm
(C) Banker's algorithm **(D)** Best-fit policy

b. Which of the following statement is not true for YACC?

(A) It is a language processor development tool
(B) It generates a parser
(C) Its full form is Yet Another Compiled Compiler
(D) It takes input that resembles a grammar production

c. An assembly language is a _____

(A) machine dependent, low level programming language.
(B) machine independent, low level programming language.
(C) machine dependent, high level programming language.
(D) machine independent, high level programming language.

d. Interval between the time of submission to the time its result become available to user is called

(A) Waiting time **(B)** Turnaround time
(C) Throughput **(D)** Response time

e. A recursive descent parse is a

(A) Top-Down parser
(B) Bottom-up parser
(C) Top-Down parser without backtracking
(D) LALR parser

f. A program in execution is called

(A) Process **(B)** Instruction
(C) Procedure **(D)** Function

g. Which of the following is not a valid page replacement policy?

(A) LRU **(B)** FIFO
(C) RLU policy **(D)** Optimal page replacement

h. The syntax of the assembler directive ORIGIN is

(A) ORIGIN <address space> **(B)** <symbol>ORIGIN<address space>
(C) <symbol>ORIGIN **(D)** None of the above

i. A low cost alternative to processes for certain kinds of concurrent applications are

(A) Program **(B)** Threads
(C) Jobs **(D)** Events

j. A macro definition consists of

(A) macro prototype statement **(B)** one or more model statements
(C) macro pre-processor statements **(D)** All of the above

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

Q.2 a. What is PCB? Briefly explain its various components. **(8)**

b. Distinguish time sharing and multiprogramming. **(4)**

c. What are the desirable features of a real-time operating system? **(4)**

Q.3 a. Which is the most commonly used scheduling algorithm, and why? **(4)**

b. What is the difference between Least Completed Next (LCN) and Shortest Time to Go (STG) policies in pre-emptive scheduling? **(4)**

c. Describe an approach to detect deadlock in a system. What are the possible recovery strategies once deadlock is detected? **(8)**

Q.4 a. Explain the difference between

(i) Logical and Physical addresses
(ii) Internal and external fragmentation **(8)**

b. Given memory partitions of 100 K, 500 K, 200 K, 300 K and 600 K(in order), how would each of the First-fit, Best-fit and Worst-fit algorithms place processes of 212 K, 417 K, 112 K, and 426 K(in order)? Which algorithm makes the most efficient use of memory? **(8)**

Q.5 a. What is a critical-section problem? What are the three requirements that a solution to the critical-section problem must satisfy? **(8)**

b. Discuss linked and indexed schemes for allocating disk space. **(8)**

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

Q.6 a. Perform "Top-Down parsing without backtracking" of expression <id>+<id>*<id> after rewriting the following grammar

E::=T+E | T
T::=V*T | V
V::= <id> **(10)**

b. Explain the similarities and differences between the use of macros and the use of subroutines. **(6)**

Q.7 a. Give one example each of linear and non-linear search data structures. Describe implementation of the three basic operations for each of them. **(8)**

b. Define a language processor. Describe various types of language processors. **(8)**

Q.8 a. Discuss various categories of assembly language statement. **(5)**

b. How literal references are handled in Pass I and Pass II assembler? **(5)**

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

Q.9 a. What are various parameter-passing mechanisms? Write short note on side effect characteristics and execution efficiency of each. **(5)**

b. Explain static and dynamic memory allocation models of memory allocation. What is automatic allocation and program controlled allocation? **(6)**

c. Differentiate between pure and impure interpreters. **(5)**