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Subject: OPERATING SYSTEMS & SYSTEMS SOFTWARE

Time: 3 Hours **JUNE 2011** **Max. Marks: 100**

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. Time quantum is used in

(A) Priority scheduling **(B)** Round-Robin scheduling
(C) Multi-level scheduling **(D)** Real time scheduling

b. Load address for the first word of the program is called

(A) Linker address origin **(B)** Load address origin
(C) Virtual address **(D)** Absolute address

c. A program in execution is called

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

d. A static binding is a binding

(A) Performed after the execution of a program begins
(B) Performed before the execution of a program begins
(C) Performed during the execution of a program
(D) None of these

e. The _____ loader is executed when the computer is turned on or restarted.

(A) Cross-Compiler loader **(B)** Relating loader
(C) Boot Strap loader **(D)** Compile and go loader

f. The _____ of a program contains all information necessary to relocate and link the program with other programs

(A) Source program **(B)** Loader
(C) Object modules **(D)** Grammar

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g. SSTF stands for

(A) Shortest-Seek-Time-First Scheduling
(B) Shortest-Simple-Time-First
(C) Seek-Simple-Time-First
(D) Small-Seek-Time-First

h. A scheduler which selects processes from secondary storage device is called

(A) Short term scheduler **(B)** Long term scheduler
(C) Medium term scheduler **(D)** Process scheduler

i. The "blocking factor" of a file is

(A) the number of blocks accessible to a file
(B) the number of blocks allocated to a file
(C) the number of logical records in one physical record
(D) none of the above

j. A process that is spending most time in paging than execution is called

(A) Scanning **(B)** Thrashing
(C) Spooling **(D)** Swapping

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

Q.2 a. What is an operating system? Discuss the various functions of operating system. **(8)**

b. What is a Process? Discuss briefly, the various process states. **(4)**

c. Discuss the differences between user level threads and kernel level threads. **(4)**

Q.3 a. Explain Event Control Block (ECB). With the help of a suitable diagram, discuss the organization of the different modules of event handler. **(8)**

b. Define Deadlock. Write an algorithm for deadlock detection. **(8)**

Q.4 a. Define Semaphore. Give a solution for reader-writers problem using conditional critical regions. **(8)**

b. Discuss the various attributes of a file. What are the methods that help in accessing the information stored in a file? Discuss them. **(8)**

Q.5 a. Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms, assuming four frames? All frames are initially empty.
(i) LRU replacement (ii) FIFO replacement **(4+4)**

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b. Write shorts note on:
(i) Use of reference counts (ii) Garbage collection **(4+4)**

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

Q.6 a. Discuss various fundamental language processing activities. **(5)**

b. What are the different criteria used to classify the data structures for Language Processors? **(5)**

c. What is Binding and Binding Time? Specify the binding times for the various entities of the given program segment. **(6)**

```
program bindings (input, output);
        var
                i : integer;
                a,b : real;
        procedure proc (x : real; j : integer);

                var
                        info : array [1..10, 1..5] of integer;
                        p : ↑integer;
                begin
                        new(p);
        end;
        begin
        proc(a,i);
end.
```

Q.7 a. What are the problems that may arise during top-down parsing with backtracking? **(4)**

b. Compare and contrast Non-relocatable program, Relocatable program and Self-relocatable program. **(6)**

c. Explain the term Marco Definition and Macro Call. Explain the differences between macros and subroutines. **(6)**

Q.8 a. What are different kind of statements used in Assembly Language Programs? Give suitable examples. **(8)**

b. Discuss the different data structures used during Pass I of the Assembler. **(8)**

Q.9 a. Discuss the issues involved that contribute to the semantics gap between a programming language domain and an execution domain. **(8)**

b. What are the points that compiler must ensure while implementing a function call? **(4)**

c. What is an interpreter? What are the different components of an interpreter? **(4)**

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