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Your Roll No.

1948

B.Sc. (Hons.) Computer Science/IV Sem.

C

Paper 401--OPERATING SYSTEMS

(Admissions of 2001 and onwards)

Time : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Section A

(All questions are compulsory)

1. (a) Differentiate between the following :

(i) Soft real-time system Vs. Hard real-time system.

(ii) Message passing model Vs. Shared memory model

(iii) Trap Vs. Interrupt. 6

(b) What are the benefits of Virtual machine ? 3

P.T.O.

2. (a) Why it is easy to add a new service in microkernel approach ? 3
- (b) What is the utility of system programs ? Give an example of a system program. 2
- (c) What resources are inherited by a thread ? What are its private resources ? 2
- (d) What are the three models used for multithreading model ? 3
3. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds :

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	5
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0 :

- (a) Draw Gantt charts for illustrating the execution of these processes using a non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 2) scheduling.
- (b) What is the turnaround time of P1 and P4 for each of the scheduling algorithms in part (a) ?
- (c) What is waiting time of P2 and P3 for each of the scheduling algorithms in part (a) ?
- (d) Which of the schedules in part (a) results in the minimal average waiting time ? 8
4. (a) What do you mean by priority inversion ? 3
- (b) Explain why spin locks are not appropriate for uni-processor systems yet may be suitable for multiprocessor systems ? 3

- (c) What is meant by mutual exclusion? How semaphores can be used for mutual exclusion? 2

Section B

(Attempt any *four* questions) :

5. (a) Explain briefly the methods for handling deadlocks. 7
- (b) Give the solution of busy waiting using wait and signal operations? 3
6. (a) Consider a logical address space of 16 pages of 1024 words each, mapped onto a physical memory of 32 frames. 4
- (i) How many bits are there in the logical address? .
- (ii) How many bits are there in the physical address?

(b) Consider the following segment table :

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses ?

(i) 0428

(ii) 115

(iii) 2500

(iv) 4012

6

7. (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 ?

(i) LRU replacement

(ii) FIFO replacement

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(b) What is a page fault ? How is it handled ? 4

8. (a) Suppose that a disk drive has 2000 cylinders, numbered 0 to 1999. The drive is currently serving request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests is :

86, 1270, 943, 1509, 748, 130.

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling algorithms :

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- (i) FCFS
- (ii) LOOK
- (iii) C-LOOK.

- (b) What is the function of device drivers ? Generally why they are installed explicitly ?

4

9. (a) Explain the following :
- (i) mounting of a file system
 - (ii) indexed file allocation
 - (iii) one time passwords
 - (iv) difference between protection and security. 8
- (b) Enumerate the steps required to accomplish an input operation using polling. 2