Your Roll No

6192 **J**

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

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)*

Attempt **all** *questions All parts of a question
must be answered together*

1 (a) Describe a Clustered System Give differences between Symmetric and Asymmetric clustering 3

(b) Which of the following instructions are privileged?

2

(i) Set value of time

(ii) Read the clock

(iii) Clear memory

(iv) Turn off interrupts.

2 (a) Differentiate between hard and soft real time systems, giving suitable examples 3

(b) What is a command interpreter? What are the advantages and disadvantages of integrating the command interpreter with the kernel of an operating system? 5

(c) What hardware protection machanisms are available for protecting CPU and memory ? 2

3. (a) What are CPU bound and I/O bound processes? How does the type of a process affect CPU scheduling? 5

(b) Explain with the help of a diagram one method of mapping user level threads to kernel level threads 3

4. (a) Consider the following set of processes, with the length of CPU burst time given in millisecond

Process	Arrival Time	Burst Time	Priority
P₁	0	8	4
P₂	2	5	3
P₃	5	6	2
P₄	9	2	1 (Highest)

(i) Draw Gantt charts illustrating the execution of these processes using

(1) Shortest remaining time first,

(2) Priority based (non-preemptive)

(ii) What is the average waiting time of each of the scheduling algorithms given in part (i)? 6

(b) What is the role of dispatcher in CPU scheduling? 2

5   (a)   Consider the following definition of wait() operation

of a semaphore S, with initial value of S as 0

wait(S) {

while (S < 0)

'

S--,

}

Why does this definition suffer from the problem
of busy waiting? Suggest an implementation which
does not have this problem   4

(b)   Given the conditions of mutual exclusion, no-
preemption and circular wait hold, explain how hold-
and-wait condition may lead to a dead lock.   3

6   (a)   Consider the following page-reference string :

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6

How many page faults would occur for the following
replacement algorithms, assuming 3 frames? All
frames are initially empty.   4

(ı) LRU

(ıı) Optimal replacement

(b)   Consider a system with 256 KB of free memory
Given the following sequence of requests by the

[P T O

process, show the memory lay out at every stage for worst-fit allocation algorithm

Pid	Request	Mem requested (KB)	
P_1	Alloc	50	
P_0	Alloc	50	
P_2	Alloc	40	
P_0	Dealloc	50	
P_4	Alloc	20	
P_1	Dealloc	50	
P_5	Alloc	40	6

(c) Differentiate between Paging and Segmentation 3

7 (a) What is contiguous allocation method for disk space? What are its advantages and disadvantages compared to indexed allocation? 5

(b) What are the different ways in which a directory can be structured? Draw suitable diagrams 5

8 (a) Suppose the read/write head is at track 97, moving towards track 199 (the highest numbered track on the disk) and the disk request queue contains read/write requests for the sectors on tracks 84, 155, 103, 96 and 197, respectively What is the total number of head movements needed to satisfy the requests in the queue using .

(ı) FCFS

(ıı) SCAN

(ııı) C-LOOK   6

(b) Explain with the help of an example, how denial of service is a security concern   3

9   (a) How are files protected in Unix file system?   3

(b) What are the components of access time of a hard disk?   2