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**MANIPAL INSTITUTE OF TECHNOLOGY**  
**(A Constituent Institute of Manipal University)**  
**MANIPAL-576104**



**V SEMESTER B.E. (CSE)**  
**END SEMESTER EXAMINATION -November 2009**  
**SUBJECT: OPERATING SYSTEMS AND UNIX (CSE 307)**

**TIME: 3 HOUR**

**21-11-2009**

**MAX.MARKS: 50**

**Instruction to Candidates**

- **Answer any 5 full questions.**

1 a) Explain working of inverted page table with a neat diagram.

Systems using inverted page table have difficulty in implementing shared memory.

Explain (2+1)

b) Write Peterson's solution to critical section problem. Does this solution satisfy the requirements of critical section problem. (3)

c) Explain the different variants of COPY rights in an access matrix. (2)

d) Write a note on second- chance page replacement algorithm with appropriate diagram. (2)

2 a) Given the memory partitions of 100k, 500k, 200k, 300k and 600k (in order). How would the worst fit and best fit algorithms place processes of 212k, 417k, 112k and 426k (in order)? (1+1)

b) Give the general idea behind a thread pool. Also mention the benefits of the thread pool. (3)

c) What is TLB Reach. Mention the two approaches used in increasing the TLB Reach. (3)

d) Explain sector sparing with an example. (2)

3 a) Explain the various scheduling queues used in process scheduling with a neat Queueing diagram. (2)

b) Explain the following terms. (3)

i) Medium Term Scheduler.

ii) Job Scheduling

iii) CPU Scheduling

c) With the help of a Gantt Chart for the following data calculate Average Waiting Time and Turnaround time for a preemptive SJF and preemptive priority scheduling. Assume that a smaller priority number implies a higher priority. (4)

<b>Process</b>	<b>Arrival Time (msecs)</b>	<b>Burst Time(msecs)</b>	<b>Priority</b>
P1	0	6	4
P2	2	4	1
P3	4	3	2
P4	5	1	3

d) Why do application programmer prefer programming according to an API rather than invoking the actual system call (1)

4 a) Write the general structure of a critical section solution.

Write a solution to Readers-writers problem using semaphores. Explain. (1+3)

b) What is the problem with priority scheduling. How is it overcome. (1+1)

c) Consider a logical address space of eight pages of 1024 words each mapped into physical memory of 32 frames. Give proper steps (2)

i) How many bits are there in logical address

ii) How many bits are there in physical address

d) Write a short note on single level directory. (2)

5 a) What is a file. Describe the different file attributes. (1+2)

b) Explain the working of a boot sector virus with a neat diagram. (2+1)

c) Consider the following Reference String.

1,2,3,4,1,2,5,1,2,3,4,5

How many page faults would occur for the following page replacement algorithms when given frame size is three?

i) Optimal Page Replacement

ii) FIFO Page Replacement (2)

d) What is the fundamental idea behind the concept of virtual machine. (2)

6 a) Resource type A has 12 instances, resource type B has 4 instances, and resource type C has 6 instances. Consider the following snapshot of the system. If process P3 makes a request of (2,1,0) will the system be safe .

Show all the steps involved in finding the safety of the system. (5)

	Allocation			Max		
	A	B	C	A	B	C
P <sub>0</sub>	2	1	0	9	4	2
P <sub>1</sub>	2	0	0	3	2	2
P <sub>2</sub>	3	0	1	9	0	2
P <sub>3</sub>	2	1	1	4	2	2
P <sub>4</sub>	0	0	2	4	3	3

b) List the necessary conditions for deadlock to arise in a system. Explain. (2)

c) Mention the three components of a LINUX System. Explain. (3)