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Total number of printed pages – 3

B. Tech  
PCCS 4304

**Sixth Semester Regular Examination – 2014**

**OPERATING SYSTEM**

**BRANCH(S) : IT, ES-12**

**QUESTION CODE : F 251**

**Full Marks – 70**

**Time : 3 Hours**



*Answer Question No. 1 which is compulsory and any five from the rest.*

*The figures in the right-hand margin indicate marks.*

1. Answer the following questions :

2 × 10

- What is a time sharing operating system ?
- What is the difference between a trap and interrupt ?
- What do you mean by caching ?
- What is DMA ? For what type of purpose is DMA useful ?
- What is the purpose of system calls ?
- What two advantages do threads have over multiple processes ?
- Define and difference between preemptive and non-preemptive scheduling.
- Is it possible to have a deadlock involving only one single process ? Explain your answer.
- Why are segmentation and paging sometimes combined into one scheme ?
- What is thrashing in the context of virtual memory ? What is the cause of thrashing ?

2. (a) Define an operating system. Discuss the different operating system services. 5

(b) Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. Use non-preemptive scheduling to answer the following questions. 5

<u>Process</u>	<u>Arrival Time</u>	<u>Burst Time</u>
P1	0.0	8
P2	0.4	4
P3	1.0	1

P.T.O.

- (i) Draw the Gantt charts illustrating the execution of these processes using FCFS and SJF scheduling.
- (ii) What is the turnaround time of each process for each of the scheduling algorithms in part i ?

3. (a) What is critical section problem ? Explain the bakery algorithm for solving the critical section problem for n number of processes. 5
- (b) Explain the concept of transaction atomicity. Discuss the different locking protocols with suitable example. 5

4. Define deadlock. Consider the following snapshot of a system :

	<u>Allocation</u>				<u>Max</u>				<u>Available</u>			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				



Answer the following question using Banker's algorithm : 10

- (a) What is the content of the matrix Need ?
- (b) Is the system in a safe state ? If so, what is the safe sequence ?
- (c) If a request from a process P4 arrives for (0,4,2,0), can the request be granted immediately ?

5. (a) What is paging ? Explain the difference between internal and external fragmentation with suitable diagram. 5

(b) Consider the following page-reference string :  
 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1  
 How many page faults would occur for the following replacement algorithms, assuming three and four frames ? (all frames are initially empty) 5

- (i) LRU replacement
- (ii) FIFO replacement
- (iii) Optimal replacement.

6. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is  
 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 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 ? 10

- (a) FCFS

- (b) SSTF
  - (c) SCAN
  - (d) LOOK
  - (e) C-SCAN.
7. (a) Describe, in brief, about contiguous allocation, linked allocation and indexed allocation of file system implementation. 5
- (b) How were the design goals of UNIX different from those of other operating systems during early stages of UNIX development ? Why are there many versions of UNIX currently available ? 5
8. Explain the following terms in brief. 2.5×4
- (a) Semaphores
  - (b) Demand Segmentation
  - (c) Overlay
  - (d) Monitors.

