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**Third Semester M.C.A Degree Examination, January/February 2005**  
**Master of Computer Applications**  
**Operating Systems**

Time: 3 hrs.]

[Max.Marks : 100

**Note:** Answer any FIVE full questions.

1. (a) What is an operating system? What are the functions of operating system? (8 Marks)
- (b) Distinguish between virtual machine and nonvirtual machine. (4 Marks)
- (c) Describe the differences between symmetric and asymmetric multiprocessing. Mention the advantages and disadvantages of multiprocessor systems. (8 Marks)
2. (a) What is a process? With a neat diagram explain the different states of process. (8 Marks)
- (b) What is a scheduler? Distinguish between long-term scheduler. Short-term scheduler and medium-term scheduler. (8 Marks)
- (c) What is a thread? How it works? (4 Marks)
3. (a) What is a monitor? With a neat diagram explain the working of a monitor (10 Marks)
- (b) Consider the following snapshot of a system

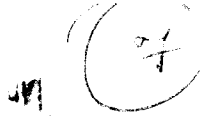
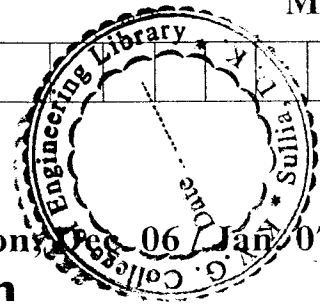
	Allocation				MAX				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
$P_0$	0	0	1	2	0	0	1	2	1	5	2	0
$P_1$	1	0	0	0	1	7	5	0				
$P_2$	1	3	5	4	2	3	5	6				
$P_3$	0	6	3	2	0	6	5	2				
$P_4$	0	0	1	4	0	6	5	6				

Using banker's algorithm, find

- i) What is the content of the matrix need?
  - ii) Is the system in a safe state?
  - iii) If a request from process  $P_1$  arrives for (0, 4, 2, 0) can the request be granted immediately? (10 Marks)
4. (a) Describe the following allocation methods.
    - i) First fit
    - ii) Best fit

- iii) Worst fit
- iv) Given memory partitions of 100 KB, 500KB, 200KB, 3000KB and 600KB (in order), how would each of the first - fit, best-fit and worst - fit algorithms place processes of 212KB, 417KB, 112KB and 426KB (in order)? Which algorithm makes the most efficient use of memory? (10 Marks)
- (b) What is paging? With a neat diagram explain paging hardware with TLB. (10 Marks)
5. (a) Consider the page reference string 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,3,6 How many page faults would occur considering three and four frames using
- (i) LRU replacement
- (ii) FIFO replacement
- (iii) Optimal page replacement (12 Marks)
- (b) What is thrashing? How it affects performance of the system? (8 Marks)
6. (a) What is a file? List and explain different file attributes. (8 Marks)
- (b) What are the different operation performed on a directory? (6 Marks)
- (c) Distinguish between Linked allocation and Indexed allocation. (6 Marks)
7. (a) With an example, explain FCFS and SSTF disk scheduling. (10 Marks)
- (b) What are the important components of Linux system? Briefly explain with a diagram. (10 Marks)
8. (a) Explain how access matrix is implemented? (8 Marks)
- (b) What is meant by denial of service? (4 Marks)
- (c) What is authentication? Explain any two approaches for authentication. (8 Marks)

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**NEW SCHEME****Third Semester MCA Degree Examination**  
**Operating System**

Time: 3 hrs.]

[Max. Marks:100

**Note :** Answer any FIVE full questions.

- 1 a. What is an operating system? (03 Marks)  
b. What are the various functions of an operating system? Explain briefly. (07 Marks)  
c. Explain the features of multiprocessing and multiprogramming systems. (10 Marks)
- 2 a. What are system calls? (03 Marks)  
b. List different types of system calls associated with process, file, device, information and communication. Explain briefly. (07 Marks)  
c. What is PCB? Explain its components with a block diagram. (10 Marks)
- 3 a. Draw a process state diagram and label its states. (03 Marks)  
b. Explain the quenching diagram representation of a process scheduling. (07 Marks)  
c. What are threads? Explain the benefits of multithreaded programming. (10 Marks)
- 4 a. How do you distinguish between user threads and kernel threads? (03 Marks)  
b. Explain multithreading models with a neat diagram. (07 Marks)  
c. Explain various threading issues. (10 Marks)
- 5 a. What are the various criterias are consider for the CPU scheduling algorithm? Explain briefly. (10 Marks)  
b. Consider the job mix as below

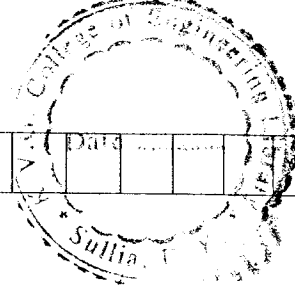
Process	CPU burst time	Priority	Arrival time
P <sub>1</sub>	8	2	0
P <sub>2</sub>	2	1	1
P <sub>3</sub>	3	3	2
P <sub>4</sub>	5	4	3

Write Gantt chart and compute average waiting time using i) FCFS ii) SJF  
iii) Priority iv) RR (time quantum = 2ms) (10 Marks)

- 6 a. What is deadlock? What are its necessary conditions? (03 Marks)  
b. Explain Bankers safety algorithm. (07 Marks)  
c. What are the methods for handling deadlocks? Explain how do you prevent it. (10 Marks)
- 7 a. What is the meaning of overlays and swapping techniques used in memory management? (03 Marks)  
b. Explain memory allocation issues using first fit, best fit and worst fit methods. (07 Marks)  
c. Explain the segmentation hardware with a neat diagram and give one example. (10 Marks)
- 8 Write short notes on any four :  
a. Demand paging  
b. Goals of protection  
c. Semaphores  
d. Beladys anomaly (20 Marks)

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**NEW SCHEME**

**Third Semester MCA Degree Examination, July 2007**  
**Operating Systems**

Time: 3 hrs.]

[Max. Marks:100

**Note :** 1. Answer any FIVE full questions.  
2. Draw figures wherever necessary.

- 1 a. Explain the following types of operating systems:  
i) Multiprocessor system ii) Client server system  
iii) Clustered systems iv) Desktop system. (12 Marks)  
b. Explain operating system services. (08 Marks)
- 2 a. Explain process control block. (06 Marks)  
b. With the help of a state diagram explain various states of a process. (06 Marks)  
c. Explain multithreading models. (08 Marks)
- 3 a. What is a deadlock? What are the four conditions that cause deadlock? (10 Marks)  
b. Explain the steps involved in recovering from a deadlock. (10 Marks)
- 4 a. With an example explain overlay technique. (10 Marks)  
b. Explain the following:  
i) First fit ii) Best fit iii) Worst fit. (10 Marks)
- 5 a. Explain the following:  
i) Belady's anomaly ii) Thrashing. (08 Marks)  
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.  
Assuming three frames, find the number of page faults when the following algorithms are used:  
i) LRU ii) FIFO iii) OPTIMAL.  
Note that initially all the frames are empty. (12 Marks)
- 6 a. Briefly explain the following with respect to a file system:  
i) File attributes ii) File operations. (08 Marks)  
b. Consider a disk queue with requests for blocks on cylinders (0 – 199)  
98, 183, 37, 122, 14, 124, 65, 67  
in that order. Initially disk head is at cylinder 53 and moving in the backward direction. Calculate the number of head movements using the following scheduling algorithms:  
i) FCFS ii) SSTF iii) SCAN. (12 Marks)
- 7 a. What are the components of LINUX system? Explain. (10 Marks)  
b. What is access matrix? Discuss the implementation of access matrix. (10 Marks)
- 8 Write short notes on any four:  
a. Paging b. Semaphores  
c. Dynamic loading d. Indexed allocation. (20 Marks)



## Third Semester MCA Degree Examination, Dec. 07 / Jan. 08

### Operating Systems

Time: 3 hrs.

Max. Marks: 100

**Note : Answer any FIVE full questions.**

- 1 a. What is an operating system? What are the basic functions of an operating system? Explain. (10 Marks)
- b. Discuss the different operating systems given below,
  - i) Multiprogrammed systems.
  - ii) Time-Sharing systems.
  - iii) Clustered systems
  - iv) Real time systems. (10 Marks)
- 2 a. With the help of a diagram explain the different states of a process. (06 Marks)
- b. Discuss the different types of CPU schedulers. (06 Marks)
- c. Discuss the different multithreading models. (08 Marks)
- 3 a. Consider the following processes, which have arrived at the ready queue with the burst time and arrival time as shown. (10 Marks)

Process	Arrival time	Burst time
P <sub>1</sub>	0	8
P <sub>2</sub>	1	4
P <sub>3</sub>	2	9
P <sub>4</sub>	3	5

Construct the Gantt chart and calculate the average waiting time using the following algorithms i) FCFS ii) SJF (preemptive).

- b. Explain multilevel queue scheduling and multilevel feedback queue scheduling. (10 Marks)
- 4 a. What is a critical section? What are the three requirements to solve critical section problem? (06 Marks)
- b. What are the four conditions that causes deadlock situation in a system? (04 Marks)
- c. Consider the following snapshot of a system,

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P <sub>0</sub>	0	0	1	2	0	0	1	2	1	5	2	0
P <sub>1</sub>	1	0	0	0	1	7	5	0				
P <sub>2</sub>	1	3	5	4	2	3	5	6				
P <sub>3</sub>	0	6	3	2	0	6	5	2				
P <sub>4</sub>	0	0	1	4	0	6	5	6				

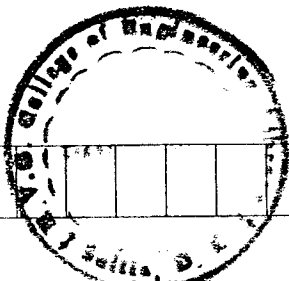
Answer the following questions using banker's algorithm:

- i) Construct the need matrix.
- ii) Is the system in a safe state? If yes what is the safe sequence of execution? (10 Marks)
- 5 a. With respect to memory management explain the algorithms,
  - i) First fit
  - ii) Best fit
  - iii) Worst fit. (06 Marks)
- b. With the help of a block diagram explain the steps involved in handling of page fault. (06 Marks)

- 5 c. Consider the reference string  
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1  
with three frames available find the number of page faults using the following algorithms:  
i) FIFO  
ii) Optimal (08 Marks)
- 6 a. What are the different attributes of a file? (04 Marks)  
b. Define the following:  
i) Rotational latency.  
ii) Seek time. (04 Marks)  
c. Explain the following with respect to file system:  
i) Contiguous allocation.  
ii) Indexed allocation.  
iii) Linked allocation. (12 Marks)
- 7 a. Consider a disk queue with requests for I/O to blocks on cylinders  
98, 183, 37, 122, 14, 124, 65, 67  
in that order. If the disk head is initially at cylinder 53, find the number of head movements  
using the following algorithms  
i) FCFS ii) SSTF. (10 Marks)  
b. Discuss the components of a Linux operating system. (10 Marks)
- 8 Write short notes on:  
a. Microkernel  
b. Thrashing  
c. Access matrix  
d. External fragmentation (20 Marks)

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**Third Semester MCA Degree Examination, June / July 08**  
**Operating System**

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions.

- 1 a. What are the differences between loosely coupled systems and tightly coupled systems? (06 Marks)
- b. What is an operating system? What are the goals of an operating system? (06 Marks)
- c. Explain the various services provided by an operating system. (08 Marks)

- 2 a. What is a process? With the help of a state transition diagram, explain the various states of a process. (06 Marks)
- b. Explain briefly the following : (06 Marks)
  - i) Dispatches
  - ii) Thread
  - iii) Medium – Term schedules.
- c. Consider the following set of processes, with the length of the CPU – burst time given in milliseconds.

Process	Arrival Time	Burst Time
P <sub>1</sub>	0	8
P <sub>2</sub>	0	4
P <sub>3</sub>	1	3
P <sub>4</sub>	2	2
P <sub>5</sub>	3	6

The processes are assumed to have arrived in the same order.

Draw Gantt chart using FCFS, SJF (non – preemptive) and RR(quantum = 2) scheduling.

Also, find the average waiting time for each process for each scheduling algorithm.

(08 Marks)

- 3 a. What is a deadlock? What are the necessary conditions for a deadlock to occur? (06 Marks)
- b. Explain the semaphore solution of readers writes problem.
- c. Using the following snap shot of a system, answer the questions using Banker's algorithm. (06 Marks)

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P <sub>0</sub>	0	0	1	2	0	0	1	2	1	5	2	0
P <sub>1</sub>	1	0	0	0	1	7	5	0				
P <sub>2</sub>	1	3	5	4	2	3	5	6				
P <sub>3</sub>	0	6	3	2	0	6	5	2				
P <sub>4</sub>	0	0	1	4	0	6	5	6				

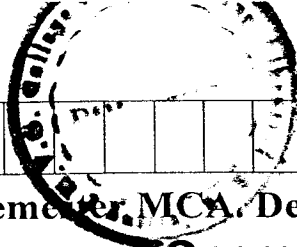
What is the content of need matrix? If a request from P<sub>2</sub> arrive for (1, 0, 0, 2) can the request be granted immediately? (08 Marks)

- 4 a. Explain the difference between internal and external fragmentation. (06 Marks)  
 b. What are the differences between paging and segmentation? (06 Marks)  
 c. Given memory partitions of 100 kB, 500 kB, 200 kB, 300 kB, and 600 kB(in order) how would each of the first – fit, best – fit, and worst – fit algorithms place processes of 212 kB, 417 kB, 112 kB, and 426 kB(in order)? Which algorithm makes the most efficient use of memory? (08 Marks)
- 5 a. Explain the following :  
 i) Thrashing ii) Belady's Anomaly. (06 Marks)  
 b. 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 three frames?  
 i) LRU ii) FIFO iii) Optimal. (08 Marks)  
 c. Under what circumstances do page faults occur? Describe the actions taken by the operating system when a page fault occurs. (06 Marks)
- 6 a. Explain 2 – level directory system. (08 Marks)  
 b. 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 starting from the current head position, what is the total distance (in cylinders) that the disc arm moves to satisfy all the pending request for each of the following discuss – scheduling algorithms?  
 i) FCFS ii) SSTF iii) SCAN iv) LOOK. (12 Marks)
- 7 a. What is access matrix? Discuss the implementation of access matrix? (08 Marks)  
 b. Explain various file allocation methods in detail. (08 Marks)  
 c. Explain CPU scheduling in Linux system. (04 Marks)
- 8 Write short notes on any four of the following : (10 Marks)  
 a. Compaction  
 b. Real – time systems  
 c. Wait – for – graph  
 d. Critical section  
 e. Components of a linux system. (10 Marks)

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Third Semester MCA Degree Examination, June-July 2009

## Operating Systems

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Max. Marks: 100

Time: 3 hrs.

**Note : Answer any FIVE full questions.**

- 1 a. Explain in detail about : i) Multiprocessor system ii) Clustered systems. (10 Marks)  
b. List and explain operating system services. (06 Marks)  
c. Explain the layered architecture of operating system. (04 Marks)
- 2 a. What is a Process Control Block? Describe the contents of process control block. (06 Marks)  
b. What is a thread? Explain the concept of multithreading and their various models. (06 Marks)  
c. Consider the 5 processes P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub>, P<sub>4</sub>, P<sub>5</sub> all arrived at time zero. They have estimated burst time of 10, 6, 2, 4, 8 units, their priorities are 3, 5, 2, 1 and 4 respectively. With a smallest priority number implies a higher priority. For each of the following algorithms draw the Gantt chart and determine the average turnaround time : i) SJF ii) Non pre-emptive priority iii) RR with priority basis (Quantum = 5). (08 Marks)
- 3 a. What is a Semaphore? Define wait and signal operations. (06 Marks)  
b. What is a dead lock? List the four necessary conditions for a deadlock to occur. (07 Marks)  
c. Explain Banker's Safety Algorithm. (07 Marks)
- 4 a. What is page fault? What action does the operating system take when a page fault occurs? (10 Marks)  
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 in the case i) LRU ii) FIFO iii) Optimal algorithms assuming three frames.  
Note that initially all frames are empty. (10 Marks)
- 5 a. What is a file? List and explain different file attributes and various operations on a file that could be performed. (08 Marks)  
b. What is a mount point? Explain how a file system is mounted and unmounted. (08 Marks)  
c. What are the different operations performed on a directory? (04 Marks)
- 6 a. What is a boot block? How are bad blocks formed? (08 Marks)  
b. Explain swap space management. (08 Marks)  
c. Explain tertiary storage structure. (04 Marks)
- 7 a. What is Access matrix? How is access matrix implemented? (10 Marks)  
b. Explain process management and process scheduling in Linux operating system. (10 Marks)
- 8 Write short notes on:  
a. Fragmentation.  
b. Swapping.  
c. Virtual memory.  
d. Multilevel feedback queue. (20 Marks)

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## Third Semester MCA Degree Examination, Dec.09-Jan.10

### Operating Systems

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1 a. Explain in detail multiprocessor system and Hand – held systems. (10 Marks)
- b. Explain operating system services. (10 Marks)
- 2 a. What is process control block? Describe the contents of process control block. (06 Marks)
- b. With the help of a diagram, explain the different states of a process. (06 Marks)
- c. Explain multithreading models. (08 Marks)

- 3 a. Consider the following processes, which have arrived at the ready queue with the burst time and the arrival time given in milliseconds as shown.

Process	Burst time in milliseconds	Arrival time in milliseconds
P <sub>1</sub>	8	0
P <sub>2</sub>	4	1
P <sub>3</sub>	9	2
P <sub>4</sub>	5	3

Construct the Gantt chart and calculate the average waiting time using the following algorithms : i) FCFS ii) SJF (pre emptive) (10 Marks)

- b. Explain multilevel queue scheduling and multilevel feed back queue scheduling. (10 Marks)
- 4 a. What is a deadlock? What are the four conditions that cause deadlock? (10 Marks)
- b. Consider the following snapshot of a system.

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P <sub>0</sub>	0	1	0	7	5	3	3	3	2
P <sub>1</sub>	2	0	0	3	2	2			
P <sub>2</sub>	3	0	2	9	0	2			
P <sub>3</sub>	2	1	1	2	2	2			
P <sub>4</sub>	0	0	2	4	3	3			

Answer the following questions using Banker's algorithm :

- i) construct the need matrix. ii) Is the system in a safe state? If yes, what is the safe sequence of execution? (10 Marks)
- 5 a. Explain the following algorithms, with respect to memory management :
  - i) First fit ii) Best fit iii) Worst fit. (06 Marks)
- b. Explain the need and implementation of semaphore in detail. (06 Marks)
- c. Consider the reference string : 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. With three frames available, find the number of page faults using the following algorithms :
  - i) FIFO ii) Optimal. (08 Marks)

- 6 a. Suppose that a disk drive has 200 cylinders numbered 0 to 199. The drive is currently serving a request at cylinder 53, and the previous request was at cylinder 65. The queue of pending requests in FIFO order is 98, 183, 37, 122, 14, 124, 65, 67. What is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the below disk scheduling algorithms? Explain each with a neat diagram.  
i) FCFS    ii) SSTF    iii) SCAN. (10 Marks)
- b. Give brief account of the following :  
i) File attributes    ii) File operations    iii) Access methods. (10 Marks)
- 7 a. What is access matrix? Discuss the implementation of access matrix. (10 Marks)  
b. What are the components of LINUX operating system? Why it is so popular? (10 Marks)
- 8 Write short notes on the following :  
a. Thrashing.  
b. Fragmentation.  
c. Paging.  
d. The Dining – philosopher’s problem. (20 Marks)

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