FIFTH SEMESTER B.E. (COMPUTER SCIENCE AND ENGINEERING) DEGREE EXAMINATION, MARCH 2001

OPERATING SYSTEMS

Time : Three Hours

Maximum : 100 Marks

Answer any **five** *questions.*

1. (a) What is an Operating system ? Explain considering different possible views.

(6 marks)

(b) Define Spooling and the need for it. Explain its working with the necessary diagrams.

(6 marks)

(c) Explain the different sub-components of an Operating system. (8 marks)

2. (a) Bring out the requirements of :

(i) Real-time Operating systems.

(ii) Distributed Operating systems.

(8 marks)

(b) Explain process states with a diagram. What is the need for a context switch ?

(7 marks)

(c) What is "Co-operating process" ? Explain. (5 marks)

3. (a) Differentiate Pre-emptive and Non-preemptive scheduling giving the application of each of them.

(6 marks)

(b) Explain multi-level feedback queue scheduling with an example. (6 marks)

(c) Write an algorithm to implement critical section problem for multiple processes.

(8 marks)

4. (a) What is deadlock ? Explain the necessary conditions for its occurrence. (10 marks)

(b) Give a scheme for detecting and recovering deadlock. (10 marks)

5. (a) What is fragmentation ? Explain its types and disadvantages. (6 marks)

(b) Explain any *two* page replacement algorithms. (6 marks)

(c) Explain segmented memory management. (8 marks)

6. (a) Explain the different types of files. (4 marks)

(b) Differentiate between Protection and Security in file system. How are they implemented ?

(10 marks)

(c) Define File and Directory. Give one implementation of file directory. (6 marks)

7. (a) Explain different disk scheduling techniques with examples. How are their performance measured ?

(10 marks)

(b) Explain block, fragments, inode and mapping of a file descriptor to an inode in UNIX-OS.

(10 marks)

8. Write short notes on the following :—

(a) System calls.

(b) Working set theory.

(c) Swap space management.

(d) Windows-NT architecture.

(4 × 5 = 20 marks)

Reg. No. ☐☐☐☐☐☐☐☐☐☐

Fifth Semester B.E. Degree Examination, January/February 2003
Information Science and Engineering
Operating Systems

Time: 3 hrs.]   [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Define the term "Operating system" and explain its various functions.
   (8 Marks)

   (b) Discuss the essential properties of the following operating system

   i) Batch   ii) Time shared   iii) Real time.   (6 Marks)

   (c) Explain how multi-programming improves the performance.   (6 Marks)

2. (a) With the help of state transition diagram, explain the various state of a "process".   (8 Marks)

   (b) Compute the average waiting time and average turn around time for the following scheduling policies.
   i) FCFS   ii) SJF   iii) RR (time quontm = 1)

   Consider the work load for the system as given below

Job	Arrival time	Burst time
X	0	10
Y	0	3
Z	2	3
A	3	4

   (12 Marks)

3. (a) Define "safety" and using Banker's algorithm test whether the following situation is safe or not. Write the correct safety sequence.

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	2	4	3	3			

   (8 Marks)

   (b) Write and explain deadlock detection algorithm and explain how it differs from Banker's algorithm.   (12 Marks)

4. (a) Define critical section problem, and explain the necessary characteristics of a correct solution.
(6 Marks)

(b) What is semaphore and name types of semaphores and compare them.
(4 Marks)

(c) What is "dining philosopher's" problem? Explain monitor solution to the dining philosopher's problem.
(10 Marks)

5. (a) Differentiate between :

   i)　Static and dynamic memory allocation schemes.

   ii)　Contiguous and non-contiguous memory allocation schemes.　(10 Marks)

(b) What is page fault? What actions does the operating system takes when a page fault occurs?
(10 Marks)

6. (a) What is Belady's anomaly? Explain with example.
(6 Marks)

(b) What is CSCAN disk scheduling? Explain with example.
(6 Marks)

(c) With respect to disk management, explain the following :

   i)　Boot block

   ii)　Bad block concepts.
(8 Marks)

7. (a) Explain the following w.r.t file systems :

   i)　Different operations that can be performed on file

   ii)　File types.
(10 Marks)

(b) Discuss the features of LINUX operating system.
(10 Marks)

8.　Write short notes on the following :

   a)　Threats

   b)　Systems calls

   c)　File - system mounting

   d)　Protection of files.
(5×4=20 Marks)

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Fifth Semester B.E. Degree Examination, January/February 2003

Computer Science & Engineering

Operating Systems

Time: 3 hrs.]   [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Define the essential properties of the following types of operating systems:

    i) Batch   ii) Time sharing   iii) Real time   iv) Distributed.   (12 Marks)

    (b) Explain the different services provided by the operating system.   (8 Marks)

2. (a) Describe the process states with the help of a process transition diagram.   (6 Marks)

    (b) Explain multilevel feedback queue scheduling with an example.   (4 Marks)

    (c) Suppose the following jobs arrive for processing at the times indicated. Each job will run the listed amount of time.

Job	Arrival Time	Burst Time
1	0.0	6
2	0.4	3
3	1.0	1

    i)   Give the Gantt chart illustrating the execution of these jobs using the non-pre emptive FCFS and SJF scheduling algorithms.

    ii) What is the turn around time and wait time of each job for the above algorithms.

    iii) Compute average turn around time if the CPU is left idle for the first one unit and then SJF scheduling is used. (Job 1 and Job 2 will wait during this time)   (10 Marks)

3. (a) What is critical section problem? Write a solution to critical section problem in multiple processes.   (10 Marks)

    (b) What is semaphore? Explain.   (5 Marks)

    (c) What are monitors? Explain.   (5 Marks)

4. (a) What is a deadlock? Explain the necessary conditions for its occurance.   (8 Marks)

(b) Consider the following snapshot of a system:

Process	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				

Answer the following questions using Banker's Algorithm:

i) What is the content of array 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 immediately granted?   **(12 Marks)**

5. (a) Explain with a neat diagram internal and external fragmentation.   **(6 Marks)**

(b) When do page faults occur? Describe the actions taken by the O.S. when a page fault occurs.   **(6 Marks)**

(c) 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 in the case of

i) LRU   ii) FIFO   iii) Optimal algorithms assuming three frames. Note that initially all frames are empty.   **(8 Marks)**

6. (a) Explain the different file access methods.   **(6 Marks)**

(b) Explain the linked allocation of file implementation with merits and demerits.   **(6 Marks)**

(c) What is disk scheduling? Explain any three disk scheduling methods.   **(8 Marks)**

7. (a) Discuss the different methods used to solve the problem of security at the operating system level.   **(10 Marks)**

(b) With a diagram explain the three main component sof a LINUX system.   **(10 Marks)**

8. Write short notes on

(a) Working set model   **(6 Marks)**

(b) Paging   **(6 Marks)**

(c) Windows NT architecture.   **(8 Marks)**

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Fifth Semester B.E. Degree Examination, July/August 2003

Computer Science and Engineering

Operating Systems

Time: 3 hrs.]

[Max.Marks : 100

Note: 1. Answer any FIVE full questions.
2. All questions carry equal marks.
3. Missing data if any may be assumed with proper justification.

1. (a) Distinguish among the following terminologies associated with the operating system and explain each of them in detail.

i) Multiprogramming systems.

ii) Multitasking systems.

iii) Multiprocessor systems.

(12 Marks)

(b) Explain the layered approach to the structuring of an operating system along with the relevant diagram.

(8 Marks)

2. (a) Explain the functions of the following :

i) System calls ii) System programs iii) Command interpreter. (6 Marks)

(b) Name the different file allocation and file access methods and clearly differentiate between them. Bring out the relative problems of contiguous allocation methods and explain how these problems are solved in linked allocation method. Bring out its relative demerits, if any.

(14 Marks)

3. (a) What is the criterion used to select the time quantum in case of round-robin scheduling algorithm? Explain it with a suitable example. (6 Marks)

(b) Consider the following set of processes with their arrival and burst times as shown

Process	A.T.	B.T.
P0	0	10 hr
P1	0	05 hr.
P2	1	02 hr
P3	2	01 hr

Compute the turn around time and waiting time of each job using the following scheduling algorithms.

i) F.C.F.S ii) S.J.F iii) Round-Robin (choose time quantum = 1)(9 Marks)

(c) What is dynamic storage allocation problem? Mention the names of different methods used to solve the above problem.

(5 Marks)

4. (a) Explain with the help of supporting diagram how TLB improves the performance of a demand paging system.   (8 Marks)

(b) The available space list of a computer memory is specified as follows:

START ADDRESS (S.A)	BLOCK ADDRESS IN WORDS (B.A)
100	50
200	150
450	600
1200	400

Determine the available space list after allocating the space for the stream of requests consisting of the following block sizes :

25, 100, 250, 200, 100, 150

Use i) FIRST FIT ii) BEST FIT and iii) WORST FIT algorithms.

Your answer should be in terms of the given available space list format only.
                    (12 Marks)

5. (a) Differentiate among the following terminologies

   i)   global vs. Local allocation

   ii) Equal vs. Proportional allocation.   (4 Marks)

(b) Explain the term locality of reference and elaborate on its usefulness in presenting thrashing.
                    (6 Marks)

(c) A virtual memory system has the following specification :

   Size of the virtual address space = 64 k

   Size of the physical address space = 4k

Page size = 512

VIRTUAL PAGE #	PHYSICAL FRAME #
0	0
3	1
7	2
4	3
10	4
12	5
24	6
30	7

   i)   Find all the virtual addresses that will generate a page fault.

   ii) Compute the main memory addresses for the following virtual addresses.

   24, 3784, 10250, 30780   (10 Marks)

6. (a) Mention any hardware machine instruction you know of which can be used to implement the 'wait-s' function for binary semaphore -S. Demonstrate how the specific instruction could be used to implement the desired function. State the disadvantages of the above method and suggest a more efficient method of implementing semaphore operations.

(12 Marks)

(b) Explain the synchronising protocol of a classical readers/writers problem. Write a symbolic program code to implement any one of the above protocol.

(8 Marks)

7. (a) What is the difference between a deadlock prevention and deadlock avoidance methods of dealing with a dead lock problem? Explain the different approaches towards a dead lock detection problem when

i)   there is a single instance of a resource type.

ii) Multiple instances of a resource type.

(12 Marks)

(b) Explain the terms 'WORMS' and 'VIRUSES' with reference to system threats.

(8 Marks)

8. (a) Explain the salient features of 4.3BSD Kernel I/O structure with the help of a block diagram.

(6 Marks)

(b) Explain the different types of services provided by the different sockets in UNIX system.

(6 Marks)

(c) Explain file management in windows NT

(8 Marks)

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Fifth Semester B.E. Degree Examination, July/August 2004

Computer Science & Engineering

Operating Systems

Time: 3 hrs.]

[Max.Marks : 100

Note: *1. Answer any FIVE full questions.*
2. All questions carry equal marks.

1. (a) What is an operating system ? Explain its services. (8 Marks)

   (b) Explain i) Time shared system   ii) Distributed system (6 Marks)

   (c) Why spooling is necessary for batch multiprogramming ? Is it needed for time-shared systems ? Explain. (6 Marks)

2. (a) What is a process ? How a process is represented in an operating system ? Explain. (6 Marks)

   (b) Describe co-operating processes. (6 Marks)

   (c) For the following set of processes find the average waiting time and average turn arround time using GANTT chart for.

   i)   FCFS

   ii) SJF - pre emptive

   iii) SJF - Non - pre emptive

Process	Arrival Time (in sec)	Burst Time (in sec)
P_1	0	4
P_2	1	2
P_3	2	5
P_4	3	4

   (8 Marks)

3. (a) Explain the operation of multilevel queue scheduling. (6 Marks)

   (b) What is a critical section problem ? Write an algorithm to implement critical section problem for multiple processes. (10 Marks)

   (c) What are monitors ? Explain. (4 Marks)

4. (a) What is a "DEAD LOCK" ? Explain necessary conditions for its occurance . Differentiate deadlock and "STARVATION". (8 Marks)

   (b) Consider the following snapshot of a system

	Allocation	Max	Availably
	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	

Answer the following questions using Banker's Algorithm.

i) What is the content of matrix "need" ?

ii) Is the system in a safe state ?

iii) If a request from process P, arrives for (0, 4, 2, 0) can the request be granted immediately? (12 Marks)

5. (a) Explain

    i) Worst fit

    ii) First fit

    iii) Best fit storage allocation (6 Marks)

(b) A process references 5 pages A, B, C, D, E in the following order :

A, B, C, D, A, E, B, C, E, D

Assuming that the replacement algorithm is "LRU" and "FIFO", find out the number of page faults during the sequence of references, starting with an empty main memory with 3 frames. (8 Marks)

(c) Describe the action taken by the operating system when a page fault occurs. (6 Marks)

6. (a) Name the different file allocation methods. Explain linked and indexed allocation methods and give its merits and demerits. (12 Marks)

(b) Suppose that the head of moving head disk with 200 tracks numbered 0 to 199 is currently serving the request at track 143 and has just finished a request at track 125.
If the queue request is kept in FIFO order.

86, 147, 91, 177, 94, 150, 102, 175, 130

what is the total head movement to satisfy these requests for i) FCFS and ii) SSTF disk scheduling algorithm (8 Marks)

7. (a) Explain block fragments, inode and mapping of a file descriptor to an inode in UNIX operating system. (10 Marks)

(b) Discuss the different methods used to solve problems of security at operating systems level. (10 Marks)

8. Write short notes on the following :

    a) Thrashing   c) System calls

    b) Windows NT architecture   d) Virtual machines

(4×5=20 Marks)

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Fifth Semester B.E. Degree Examination, July/August 2004
Information Science and Engineering
Operating Systems

Time: 3 hrs.]   [Max.Marks : 100

Note: *1. Answer any FIVE full questions.*
2. Non Programmable calculators are allowed.

1. (a) Define the essential properties of the following types of operating systems:

    i) Batch ii) Time sharing iii) Distributed.   (10 Marks)

   (b) List out and explain briefly the various services that the operating system provides to programs and users.   (10 Marks)

2. (a) What is the use of system call? List out the different types of system calls.
                                                                        (5 Marks)

   (b) Explain the concept of virtual machines.   (5 Marks)

   (c) What do you mean by process & process state? Give the state diagram corresponding to process states and explain.   (10 Marks)

3. (a) What are threads? How do they differ from a process? Explain the difference in process level switching and thread level switching.   (10 Marks)

   (b) Distinguish between symmetric & asymmetric communication between processes.

                                                                        (10 Marks)

4. (a) Consider the following table, where the CPU burst times of a set of processes are given in milli seconds.

Process	Burst Time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

    Assume that process arrival sequence is P_1 P_2 P_3 P_4 P_5 all at time 0.

    i)   Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a non-preemtive priority and RR (quantum = 1) scheduling (smaller priority number implies a higher prority)

    ii) What is turn around time of each process for each of the scheduling algorithm?

    iii) What is the waiting time of each process for each of the scheduling algorithm?

    iv) Which of the schedule gives the minimal average waiting time?

                                                                        (16 Marks)

   (b) Give the information that is kept in process control block.

                                                                        (4 Marks)

5. (a) What is critical section problem and what are the requirements that need to be satisfied by any solution to critical section problem? Give a solution to a 2 process critical section problem. (10 Marks)

(b) What are semaphores? Explain how it can be used to implement mutual exclusion. (5 Marks)

(c) Define resource allocation graph with an example and show how it can be used for dead link detection. (5 Marks)

6. (a) Consider a logical address space of eight pages of 1024 words each, mapped on to a physical memory of 32 flames.

   i) How many bits are there in the logical address?

   ii) How many bits are there in the physical address? (5 Marks)

(b) Suppose we have a demand paged memory. The page table is held in registers. It takes 8ms to service a page fault if an empty page is available or the replaced page is not modified, and 20ms if the replaced page is modified. Memory access time is 100 nano seconds.

Assume that the page to be replaced is modified 70% of the time. What is the maximum acceptable page fault rate for an effective access time of no more than 200 nano seconds? (5 Marks)

(c) 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

Find out the number of page faults if there are 4 page frames, using the following page replacement algorithm

   i) LRW ii) FIFO & iii) Optimal. (10 Marks)

7. (a) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive currently services a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending request in FIFO order is

   86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130

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

   I) FCFS ii) SSTF iii) SCAN iv) LOOK v) C-SCAN. (10 Marks)

(b) Give the windows NT block diagram and explain it briefly. (10 Marks)

8. (a) What are three main bodies of code in LINUX implementation? Explain. (5 Marks)

(b) What are three classes of devices in LINUX? Explain the overall structure of the device-driver system in LINUX. (10 Marks)

(c) Explain password mechanism in LINUX. (5 Marks)

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NEW SCHEME

CS/IS52

USN ☐☐☐☐☐☐☐☐☐☐

Fifth Semester B.E. Degree Examination, January/February 2005

Computer Science / Information Science and Engineering

Operating Systems

Time: 3 hrs.]

[Max.Marks : 100

Note: 1. *Answer any FIVE full questions.*
2. *All questions carry equal marks.*

1. (a) Distinguish between multi-tasking and multi programming operating systems.
   (4 Marks)

   (b) Explain features of multi-processor systems.
   (6 Marks)

   (c) List the various operating system services.
   (4 Marks)

   (d) Explain the virtual machine system model along with its benefits. (6 Marks)

2. (a) Explain the three multi - threading models.
   (6 Marks)

   (b) Define any four scheduling criteria.
   (4 Marks)

   (c) Consider the following set of processes with a length of the CPU burst time given in milliseconds.

Process	Arrival time	Burst time	Priority
P1	0	7	3
P2	3	2	2
P3	4	3	1
P4	4	1	1
P5	5	3	3

   i) Draw Gantt charts illustrating the execution of these processes using SRTF, Preemptive priority and round robin (time slice = 1ms).

   ii) Compute the waiting times in each of the three schedules in i) and find which of them provides results in the minimal average waiting time and turn around time.

   iii) Find out the time of which there are maximum number of processes in ready queue in the above scenario.
   (10 Marks)

3. (a) Give an algorithm for critical section problem involving at least 2 processes satisfying all necessary and sufficient conditions. Modify the same algorithm using semaphores.
   (10 Marks)

   (b) Define the dining philosopher's problem and give a solution for the same using a monitor.
   (10 Marks)

4. (a) Give the dead lock detection algorithms for both single and multiple instances of resources.
   (10 Marks)

(b) Consider the following snap-shot of a system.

Process	Allocation A B C D	Max A B C D
P0	0 0 1 2	0 0 1 2
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

The available resources are A = 1, B = 5, C = 2 and D = 0

   i)   What is the content of matrix NEED

  ii)   Is the system in SAFE state? If so give the SAFE sequence

 iii)   If a request from a process P1 arrives for (0 4 2 0), can the request be granted immediately?   (10 Marks)

5. (a) Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, 600 KB (in order), how would each of the first fit, best fit and worst fit algorithms place processes of 212 KB, 417KB, 112KB and 426KB (in order). Which algorithm makes the most efficient use of memory ?   (6 Marks)

  (b) Consider a logical address space of 8 pages of 1024 words each mapped onto a physical memory 32 frame. How many bits are there in logical and physical address ?.   (4 Marks)

  (c) Consider the following page reference stream

      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 LRU, FIFO and Optimal replacement algorithms, assuming 3 and 5 frames? Which one of the above is most efficient?   (10 Marks)

6. (a) What is thrashing? Explain how working set model can be used to solve the same.   (6 Marks)

  (b) What are the different file types? Give their functions with an example for each.   (10 Marks)

  (c) Explain indexed file allocation method.   (4 Marks)

7. (a) What is access matrix? Explain how the access matrix is implemented effectively.   (10 Marks)

  (b) What are the different user authentication methods? Explain any two of them.   (10 Marks)

8.   Write short notes on :

    i)   Process control block

   ii)   SCAN and CSCAN disk scheduling

  iii)   UNIX file system

  iv)   Inter process communication in UNIX   (20 Marks)

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CS5T3

USN ☐☐☐☐☐☐☐☐☐☐

Fifth Semester B.E. Degree Examination, July/August 2005

Computer Science & Engineering
(Old Scheme)

Operating Systems

Time: 3 hrs.]   [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) What is an operating system ? Explain the various functions of an operating system.   (6 Marks)

   (b) Describe the essential properties of time shared operating systems and real time operating systems.   (8 Marks)

   (c) WIth the help of an example, explain the concept of virtual machines.
   (6 Marks)

2. (a) What are threads ? Distinguish between user level and Kernel level threads.
   (5 Marks)

   (b) Mention and define the various scheduling criteria.   (5 Marks)

   (c) Distinguish between short term scheduling and long term scheduling.
   (4 Marks)

   (d) Consider 5 jobs with (arrival time, burst time) as $(0,3), (1,5), (3,2), (9,5)$ and $(12,5)$. Find the average turn around time for a jobs using $FCFS$, SJF and $RR(q = 1)$ scheduling algorithms.   (6 Marks)

3. (a) What is critical section ? Define the requirements that should be satisfied for a solution to the critical section problem.   (8 Marks)

   (b) What are semaphores ? Explain the solution to the producer - consumers problem using semaphores.   (12 Marks)

4. (a) How are deadlocks characterized ? Mention various techniques of handling deadlocks.   (6 Marks)

   (b) Briefly explain the various strategies employed to recover from deadlocks.
   (5 Marks)

   (c) With examples, differentiate between internal and external fragmentation.
   (4 Marks)

(d) 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 ?
(0, 430), (1, 10), (2, 500), (3, 400) and (4, 112) (5 Marks)

5. (a) With the help of examples, explain any two page replacement algorithms.
  (8 Marks)

(b) What is virtual memory ? Show how demand paging is used to implement virtual memory. (6 Marks)

(c) Explain the different kinds of consistency semantics employed in file systems. (6 Marks)

6. (a) Describe the various file allocation methods bringing out the advantages and disadvantages of each. (12 Marks)

(b) Suppose a disk drive has 5000 cylinders numbered 0 to 4999. Drive is currently serving request at cylinder 143, and previous request was at cylinder 125. Queue of pending requests in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending request for FCFS, SSTF, LOOK and SCAN disk scheduling algorithms. (8 Marks)

7. (a) Explain the access matrix model of implementing protection effectively in operating systems. (10 Marks)

(b) What are the various system components of the WINDOWS - NT operating system ? Explain the file system of windows - NT in detail. (10 Marks)

8. Write short notes on :

a) System calls

b) Monitors

c) Thrashing

d) Encryption (5×4=20 Marks)

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NEW SCHEME

CS52

Reg. No. ☐☐☐☐☐☐☐☐☐☐

Fifth Semester B.E. Degree Examination, January/February 2006
Computer Science/Information Science and Engineering
Operating Systems

Time: 3 hrs.)

(Max.Marks : 100

Note: *1. Answer any FIVE full questions.*
2. Write relevant figures/diagrams wherever necessary.

1. (a) What is an operating system (OS)? Differentiate between the two views of OS.
   (5 Marks)

   (b) List the essential properties of the following types of operating systems :
   i)   Batch
   ii) Time sharing
   iii) Distributed.
   (9 Marks)

   (c) Mention the activities connected with process management, memory management and file management.
   (6 Marks)

2. (a) Compare virtual machine and nonvirtual machine.
   (3 Marks)

   (b) Write the structure of PCB and the state transition diagram. Mention the function of each state.
   (6 Marks)

   (c) Describe the function of long term, medium term and short term schedulers with a block diagram.
   (6 Marks)

   (d) Write a program in C language to create a child process and synchronize with the main program.
   (5 Marks)

3. (a) Differentiate between one-to-one and many-to-many model used for multithreading implementation.
   (4 Marks)

   (b) Define throughput and response time in a multiprogramming system.
   (2 Marks)

   (c) Explain round robin scheduling policy.
   (6 Marks)

   (d) Consider the following set of processes. The processes have arrived in the order P_1, P_2, P_3, P_4, P_5 all at time 0.

Process	CPU burst time in msec	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

   i) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a nonpreemptive priority (a smaller priority number implies a higher priority), and RR (quantum=1) scheduling
   ii) What is the turnaround time of each process for each of the scheduling algorithms in part (i)?
   (8 Marks)

4. **(a)** Explain critical section problem. Discuss on efficient algorithm which can meet all the requirements to solve this problem. **(7 Marks)**

(b) Write a monitor solution to the dining philosophers problem. **(5 Marks)**

(c) What is deadlock? What are the necessary conditions for a deadlock situation? **(3 Marks)**

(d) Describe banker's algorithm for deadlock avoidance. **(5 Marks)**

5. **(a)** Determine the total swap time for a user process of size 4 MB with a disk transfer rate of 10 MB per second and latency time is 12 msec. **(3 Marks)**

(b) Describe both internal and external fragmentation problems encountered in a contiguous memory allocation scheme. **(6 Marks)**

(c) Explain paged memory allocation scheme. **(8 Marks)**

(d) What is virtual memory concept ? Explain the address translation mechanism. **(3 Marks)**

6. **(a)** Define :
    i) Thrashing
    ii) Belady's anomaly and
    iii) Effective access time in demand paging. **(3 Marks)**

(b) 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 three page frames in the main memory? All page frames are initially empty, so that first unique pages will all cost one fault each.
    i) FIFO
    ii) LRU
    iii) Optimal. **(9 Marks)**

(c) Differentiate between two level directory structure and tree structured directory. **(4 Marks)**

(d) Explain the structure of disk. **(4 Marks)**

7. **(a)** Explain the 6 file operations. **(6 Marks)**

(b) Describe indexed allocation of disk space. **(6 Marks)**

(c) Discuss on SCAN disk scheduling method. Also compare with C-SCAN scheduling. **(8 Marks)**

8. **(a)** Describe aeass matrix model of protection. **(7 Marks)**

(b) Explain the different program threats. **(6 Marks)**

(c) Discuss on the process management function in Linux OS. **(7 Marks)**

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Fifth Semester B.E. Degree Examination, July/August 2005

Computer Science & Engineering
(Old Scheme)

Operating Systems

Time: 3 hrs.]

[Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) What is an operating system ? Explain the various functions of an operating system.

    (6 Marks)

    (b) Describe the essential properties of time shared operating systems and real time operating systems.

    (8 Marks)

    (c) WIth the help of an example, explain the concept of virtual machines.

    (6 Marks)

2. (a) What are threads ? Distinguish between user level and Kernel level threads.

    (5 Marks)

    (b) Mention and define the various scheduling criteria.

    (5 Marks)

    (c) Distinguish between short term scheduling and long term scheduling.

    (4 Marks)

    (d) Consider 5 jobs with (arrival time, burst time) as $(0,3),(1,5),(3,2),(9,5)$ and $(12,5)$. Find the average turn around time for a jobs using $FCFS$, SJF and $RR(q=1)$ scheduling algorithms.

    (6 Marks)

3. (a) What is critical section ? Define the requirements that should be satisfied for a solution to the critical section problem.

    (8 Marks)

    (b) What are semaphores ? Explain the solution to the producer - consumers problem using semaphores.

    (12 Marks)

4. (a) How are deadlocks characterized ? Mention various techniques of handling deadlocks.

    (6 Marks)

    (b) Briefly explain the various strategies employed to recover from deadlocks.

    (5 Marks)

    (c) With examples, differentiate between internal and external fragmentation.

    (4 Marks)

(d) 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 ?
$(0,430)$, $(1,10)$, $(2,500)$, $(3,400)$ and $(4,112)$ (5 Marks)

5. (a) With the help of examples, explain any two page replacement algorithms.
                                                                       (8 Marks)

(b) What is virtual memory ? Show how demand paging is used to implement virtual memory.   (6 Marks)

(c) Explain the different kinds of consistency semantics employed in file systems.
                                                                       (6 Marks)

6. (a) Describe the various file allocation methods bringing out the advantages and disadvantages of each.   (12 Marks)

(b) Suppose a disk drive has 5000 cylinders numbered 0 to 4999. Drive is currently serving request at cylinder 143, and previous request was at cylinder 125. Queue of pending requests in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending request for FCFS, SSTF, LOOK and SCAN disk scheduling algorithms.   (8 Marks)

7. (a) Explain the access matrix model of implementing protection effectively in operating systems.   (10 Marks)

(b) What are the various system components of the WINDOWS - NT operating system ? Explain the file system of windows - NT in detail.   (10 Marks)

8.   Write short notes on :
a) System calls
b) Monitors
c) Thrashing
d) Encryption   ($5 \times 4 = 20$ Marks)

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