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

OPERATING SYSTEMS

Maximum 100 Marks

Time : Three Hours

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)

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MODEL QUESTION PAPER

OPERATING SYSTEMS

Sub Code : CS52
Total Marks : 100
DURATION : 3 Hrs.

Answer any five full questions. All questions carry equal marks.

1 a. Explain the salient features of distributed, real-time and clustered systems. (10)
 b. Explain the concept of virtual machine taking JVM as the example (05)
 c. Explain the layered approach to implement operating system in a modular way. (05)

2 a. Give the reasons for providing an environment to support process co-operation, give an example. (05)
 b. Distinguish between user and kernel threads (05)
 c. List the different scheduling criteria (02)
 d. The arrival times and the CPU burst times of the processes are as shown below:

Process	Arrival time	CPU-burst time
P_1	0	1
P_2	14	3
P_3	10	12
P_4	3	4
P_5	2	5

Which is the better scheduling policy among *round robin* and *shortest remaining job first* (time slot = 1) with respect to average waiting time and average turnaround time (08)

3 a. Explain multiple process solution for critical section problem (10)
 b. What are semaphores? State and explain Readers-writers problem and its solution using semaphores. (10)

4 a. How can you make sure that deadlocks will never happen. (10)
 b. Given 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	

Answer the following question using the banker's algorithm
i. What is the content of the matrix Need?
ii. Is the system in a safe state.
iii. If a request from P_1 arrives for (0,4,2,0), can the request be granted immediately? (10)

5 a. Consider the following segment table:

Segment	Base	Length
0	219	600
0	2300	14
0	90	100
0	1327	580
0	1952	96

What are the physical addresses for the following logical addresses?
0430, 110, 2500, 3400 and 4112. (05)

b. In a system the total virtual address space is 2^{32}, total physical address space is 2^{28}, the page size is 8 Kilo bytes, each page table entry takes 64 bits. Find the size of Page table. (05)

c. Explain the concept and implementation of paging scheme. (10)

6 a. Explain the Look and C-Scan disk scheduling schemes (08)
   b. Explain the three file allocation methods (12)

7 a. Explain the different events in accessing memory using demand paging scheme. (10)
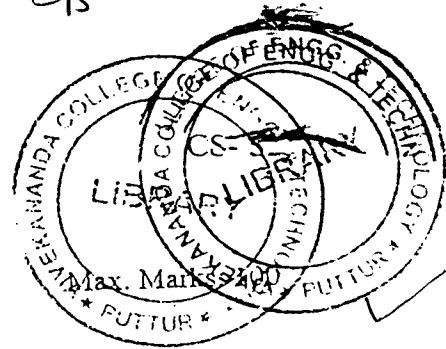   b. Explain the different components of a linux system (05)
   c. Explain the proc file system in linux (05)

8 a. Explain how protection is implemented using Access matrix model (10)
   b. Write a note on authentication (05)
   c. Explain the role of encryption in providing network security (05)

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Model Question Paper for V Semester B.E.
COMPUTER SCIENCE & ENGINEERING
OPERATING SYSTEMS

Time: 3 hrs.

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

1. a) What is an operating system? Explain various functions of an operating system. (06 Marks)
   b) Define the essential properties of the following operating systems: (08 Marks)
      i. Time sharing operating system.
      ii. Batch operating system.
      iii. Real time operating system.
      iv. Distributed operating system.
   c) What are the system calls? Explain the categories of system calls. (06 Marks)

2. a) With the help of transition diagram, explain various states of process. (08 Marks)
   b) Explain different types of schedulers, giving the advantages and limitations of each. (08 Marks)
   c) Explain virtual machine approach in brief. (04 Marks)

3. a) What is CPU scheduling? List out all CPU scheduling algorithms. (04 Marks)
   b) For the following set process find the average waiting time and average turn around time for the following algorithms. Give a Gantt chart also. (08 Marks)
      (i) SJF   (ii) Priority scheduling

Process	Burst time	Arrival time	Priority
P_1	6	2.0	5
P_2	4	0.0	4
P_3	7	1.6	3
P_4	2	1.0	1
P_5	1	0.4	2

   c) What is critical section? What requirements should be satisfied for a solution to the critical section problem? (04 Marks)
   d) What are the classical problems of synchronization? (04 Marks)

4. a) What is deadlock? Explain the necessary conditions for its occurrence. How deadlock can be prevented? (12 Marks)
   b) Explain briefly semaphores and monitors. (04 Marks)
   c) Explain the mutual exclusion. (04 Marks)

5. a) Explain any two page replacement algorithms with examples. (10 Marks)
   b) Explain internal and external fragmentation with neat diagrams. (06 Marks)
   c) Differentiate between paging and segmentation. (04 Marks)

6. a) Explain the different file allocation methods with advantages and disadvantages of each. (10 Marks)
   b) Explain the different disk scheduling techniques with examples. How are their performance measured? (10 Marks)

7. a) What is access matrix? Explain how the access matrix can be implemented effectively. (10 Marks)
   b) Discuss the features of Linux operating system. (10 Marks)

8. Write short notes on the following:

   a) Virtual memory.
   b) Threads.
   c) File system mounting.
   d) Interprocess communication.

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Fifth Semester B.E. Degree Examination, February 2002

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 Operating system? What are the functions of operating system?
(10 Marks)

   (b) Write a brief note on different Operating system structures.
(8 Marks)

   (c) Explain the distinguishing features of

   i)   Real time system.

   ii) Multiprocessor system.
(6 Marks)

2. (a) What are system calls? What are the categories of the system calls? (6 Marks)

   (b) Describe the process states with the help of process transistion diagram.
(6 Marks)

   (c) For the following set of process find the average waiting time using Gantt chart for

   i) SJF   ii) Priority scheduling

Process	Burst time	Priority
P_1	5	5
P_2	3	4
P_3	8	3
P_4	2	1
P_5	1	2

   The process have arrived in the order P_2, P_1, P_4, P_3 and P_5 (8 Marks)

3. (a) What is critical section problem? Write a solution to n process critical section problem.
(10 Marks)

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

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

4. (a) Define deadlock. List and elaborate the necessary condition for deadlock to occur.
(10 Marks)

   (b) What is Bankers algorithm? Explain.
(10 Marks)

5. (a) Discuss the following page replacement algorithm with an example
(10 Marks)

   i)   Optimal   ii) LRU

(b) Explain with neat diagram the internal and external fragmentation. (5 Marks)

(c) Describe the action taken by the operating system when a page fault occurs. (5 Marks)

6. (a) Define file system. Explain the different directory structure. (8 Marks)

(b) Discuss the different file protection schemes. (6 Marks)

(c) What are the different file access method? Explain. (6 Marks)

7. (a) What is desk scheduling? Explain any 3 desk scheduling method with example. (12 Marks)

(b) Explain interface and memory management in UNIX. (8 Marks)

8. Write short notes on the following:

   i) Operating system components

   ii) CPU scheduling criteria

   iii) Paging

   iv) Design principle of linux system. (5 Marks each)

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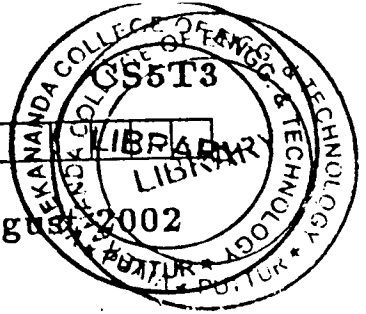
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Fifth Semester B.E. Degree Examination, July/August 2002

Computer Science & Engineering

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?
(6 Marks)

   (b) Define spooling. Why is it needed? Explain its working with the necessary diagram.
(6 Marks)

   (c) What are system calls? Briefly describe different categories of these. (8 Marks)

2. (a) Explain the concept of 'Process'. Also describe the contents of a Process Control Block (PCB)
(6 Marks)

   (b) 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	8
2	0.4	4
3	1.0	1

   i) Give a Gnatt chart illustrating the execution of these jobs using the non-preemptive FCFS and SJF scheduling algorithms.

   ii) What is 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 1 unit and then SJF scheduling is used. (Job 1 and Job 2 will wait during this time)
(10 Marks)

   (c) Explain 'Co-operating Process'.
(4 Marks)

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

   (b) Write a note on monitors.
(5 Marks)

   (c) What is a semaphore? Explain.
(5 Marks)

4. (a) What is a deadlock? List the four conditions for deadlock to occur. (6 Marks)

   (b) Write a note on 'Safe State'.
(4 Marks)

   (c) Write and explain Banker's algorithm for deadlock avoidance.
(10 Marks)

5. (a) Explain segmented memory management.
(10 Marks)

(b) Discuss the following page replacement algorithm with an example. (10 Marks)
   i) Optimal   ii) LRU

6. (a) Name the different file allocation methods. Explain the linked allocation of file implementation with merits and demerits. (10 Marks)

   (b) What is disk scheduling? Explain FCFS and SCAN disk scheduling algorithms. (10 Marks)

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

   (b) Explain the three main components of a Linux system with a neat figure. (10 Marks)

8. Write short notes on:
   (a) Overlays
   (b) Thrashing
   (c) Windows-NT architecture
   (d) Fragmentation.

   (4×5=20 Marks)

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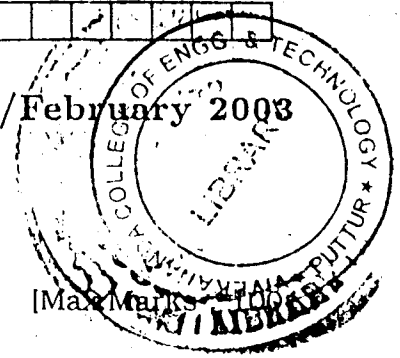
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Fifth Semester B.E. Degree Examination, January/February 2008

Computer Science & Engineering

Operating Systems

Time: 3 hrs.]   [Max Marks:

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

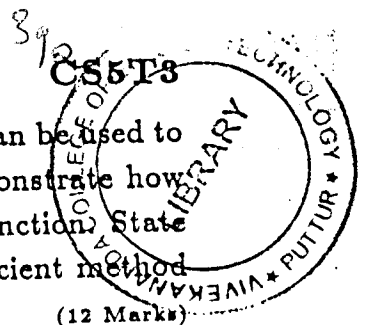 | VIRTUAL PAGE # | PHYSICAL FRAME # |
   |---|---|
   | 0 | 0 |
   | 3 | 1 |
   | 7 | 2 |
   | 4 | 3 |
   | 10 | 4 |
   | 12 | 5 |
   | 24 | 6 |
   | 30 | 7 |

   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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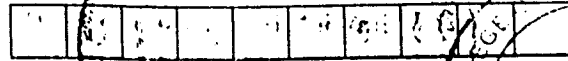
Fifth Semester B.E. Degree Examination, January/February 2004
Computer Science & Engineering
Operating Systems

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

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

1. (a) Explain the three main purposes of an operating system.   (6 Marks)

   (b) What are the essential properties of operating systems for time shared computers and personal computers? Explain.   (6 Marks)

   (c) Mention the different system structures employed in modern operating systems. Explain the virtual machine approach in detail.   (8 Marks)

2. (a) Discuss the various services provided by an operating system from the perspective of program execution.   (7 Marks)

   (b) With the help of a detailed process state diagram, explain the different states in which a process can be in the system highlighting the different transitions.   (7 Marks)

   (c) Differentiate between short term, medium term and long term schedulers.   (6 Marks)

3. (a) Explain the different file allocation methods bringing out the advantages and disadvantages of each.   (10 Marks)

   (b) What are the various disk management aspects that an operating system is responsible for? Explain them in brief.   (6 Marks)

   (b) Briefly explain how disk reliability is carried out.   (4 Marks)

4. (a) Define Bernstein's conditions for concurrency.   (4 Marks)

   (b) Describe the monitor solution to the classical dining philosophers problem.   (8 Marks)

   (c) With a suitable example, explain the banker's algorithm for deadlock detection.   (8 Marks)

5. (a) What are the common strategies used for memory allocation? Explain, with relevance to problems encountered in the above algorithms and how they are overcome.   (10 Marks)

   (b) Explain in detail the paging mechanism with translation lookaside buffer. Illustrate the advantage in such a mechanism obtained in memory access times with suitable example.   (10 Marks)

6. (a) What is virtual memory? Explain. (4 Marks)

(b) Explain the demand paging system of implementing virtual memory. (10 Marks)

(c) Consider the following page reference string :

10710212303240302107

How many page faults would occur for the FIFO, LRU and optimal page replacement algorithms, assuming 3 and 4 page frames, respectively.(6 Marks)

7. (a) Explain the access matrix model of protection and its implementation. (10 Marks)

(b) Briefly explain the various kinds of program threats and system threats. (10 Marks)

8. (a) Discuss the file system model employed in LINUX operating system. (10 Marks)

(b) Explain the various services provided by the windows NT executive that the environmental systems make use of. (10 Marks)

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NEW SCHEME

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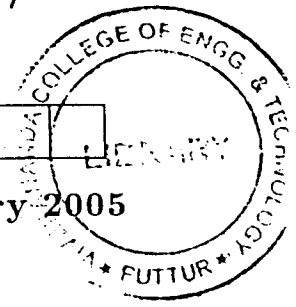
Fifth Semester B.E. Degree Examination, January/February 2005

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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Reg. No. [4][V][P][0][3][I][S][0][1][6]

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

(Max.Marks : 100

Time: 3 hrs.)

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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CS52

USN

NEW SCHEME

Fifth Semester B.E. Degree Examination, July 2006
CS / IS
Operating Systems

[Max. Marks:100

Time: 3 hrs.]

Note : *1. Answer any Five full questions.*
2. Write relevant figures wherever necessary.

1 a) Explain the salient features of:
   (i) Multiprogramming system and   (08 Marks)
   (ii) Real time system.
  b) Define the following :
   (i) Operating system,
   (ii) Micro Kernel and   (03 Marks)
   (iii) Virtual machine.
  c) What are the activities connected with (i) Main memory management and (ii) I/O system (04 Marks)
     management.   (05 Marks)
  d) Explain the layered approach of designing an operating system.

2 a) Describe the functions of the various process states and the process control block structure
     used in the process management function of an operating system.   (08 Marks)
  b) Define the following :
   (i) Process
   (ii) Thread
   (iii) Context switch and   (04 Marks)
   (iv) Degree of multiprogramming.
  c) Write a C program to create a child process and synchronize with the parent process.
                                                                       (08 Marks)

3 a) Differentiate between:
   (i) Blocking and non-blocking communication   (04 Marks)
   (ii) User and Kernel threads.   (04 Marks)
  b) What are the benefits of multithreaded programming?
  c) Compare:
   (i) One to one and many to many thread models   (08 Marks)
   (ii) Preemptive and Non-preemptive scheduling.   (04 Marks)
  d) Define a dispatcher. What are the function of a dispatcher?
                                                                       (05 Marks)

4 a) Define the five scheduling criteria considered in process management. (08 Marks)
  b) Describe the shortest-job-first scheduling policy with an example.
  c) If 14 processes arrive every second, and if there are normally 28 processes in the queue,
     compute the average waiting time per process. Define the standard formula used for this
                                                                       (04 Marks)
     calculation.
  d) What are the three requirements to be met by a solution to the critical section problem?
                                                                       (03 Marks)

5 a) Write an algorithm for producer consumer problem with a bounded buffer and explain the race condition problem. **(08 Marks)**

   b) Explain signal and wait primitive structures for a binary semaphore variable. **(04 Marks)**

   c) What are the four necessary conditions for deadlock? **(04 Marks)**

   d) Consider the following snapshot of a system.

	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	

   What is the content of the matrix-Need? Is the system in a safe state? Is request from $P_1=(1,0,2)$ and then the request from $P_4=(3,3,0)$ can be granted or not? **(04 Marks)**

6 a) Let the user process size be 1 MB and the data transfer rate from memory to disk be 5 MB per second. Determine the time required for the program data transfer to disk from memory. If the average latency is 8 m sec, determine the total swapping time. **(04 Marks**

   b) Explain fragmentation problem and the paging scheme to avoid this problem. **(08 Marks)**

   c) Let the page reference string be : 70120304230321201701. Three frames are allocated for the program in main memory. Determine the number of page faults in LRU policy. **(08 Marks)**

7 a) Describe direct access file organization. **(06 Marks)**

   b) Explain acyclic graph directory structure. **(06 Marks)**

   c) Discuss the indexed allocation of disk space. **(08 Marks)**

8 a) Describe the access matrix model used for protection purpose. **(08 Marks)**

   b) Explain the two types of system threats. **(06 Marks)**

   c) Discuss the memory management function in a Linux operating system. **(06 Marks)**

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CS52

USN

Fifth Semester B.E. Degree Examination, Dec. 06 / Jan. 07
CS / IS
Operating Systems

Time: 3 hrs.]

[Max. Marks:100

Note : *Answer any FIVE full questions.*

1 a. What is an operating system? What are its functions both from user and system perspective? **(06 Marks)**
   b. Explain any two computing environments. **(04 Marks)**
   c. List out and briefly explain the services provided by the operating system that are helpful to the user. **(05 Marks)**
   d. Explain the layered approach to structuring of an operating system along with a relevant diagram. **(05 Marks)**

2 a. What is a process? Draw a state diagram and explain the various states that a process passes through in its lifetime. **(07 Marks)**
   b. Explain two fundamental methods of inter process communication. **(06 Marks)**
   c. Why is a thread called a LWP? Explain the different threading models. Bring out the concept of a thread pool. **(07 Marks)**

3 a. List out the circumstances under which CPU scheduling decisions take place. **(04 Marks)**
   b. Given the following example of load, compute the average turnaround and average waiting times if FCFS and RR scheduling algorithms with a time quantum of 50 are used.

Process	Burst time
P_0 —	350
P_1 —	125
P_2 —	475
P_3 —	250
P_4 —	075

   (10 Marks)
   c. What is critical section problem? What are the requirements to be satisfied by any solution to critical section problem? **(06 Marks)**

4 a. How can deadlocks be prevented? Describe them. **(10 Marks)**
   b. A safe state is not a deadlock state but a deadlock state is an unsafe state. Explain. **(02 Marks)**

c. Consider a system with four resource types $C = \langle 6,4,4,2 \rangle$ that is supporting five processes. The maximum claims and allocation state are shown below. Is the system in a safe state? Justify your answer.

Process	Maximum Claims				Current Allocation			
	R_0	R_1	R_2	R_3	R_0	R_1	R_2	R_3
P_0	3	2	1	1	2	0	1	0
P_1	1	2	0	2	1	1	0	0
P_2	1	1	2	0	1	1	0	0
P_3	3	2	1	0	1	0	1	0
P_4	2	1	0	1	0	1	0	1

(08 Marks)

5 a. Explain the concept of paging using TLB. (10 Marks)
   b. What is the need for page replacement? (02 Marks)
   c. Consider the following page reference stream :
      $R = 0, 1, 2, 3, 0, 1, ,4, 0, 1, 2, 3, 4.$
      Calculate the number of page faults when number of frames is equal to 3 and 4 using FIFO algorithm. Do you notice Belady's anamoly. (08Marks)

6 a. Explain the different access methods for files. (10 Marks)
   b. Describe the different approaches to managing free space on a disk. (10 Marks)

7 a. Explain the following aspects of disk management :
      i) Disk formatting
      ii) Bad block handling. (10 Marks)
   b. Distinguish between system protection and system security. Explain protection using access matrix. (10 Marks)

8 Write a note on each of the following :
   a. Components of Linux system
   b. Concept of demand paging
   c. Disk space allocation for files in Unix
   d. Semaphores to implement mutual exclusion. (20 Marks)

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3 2

CS52

NEW SCHEME

O

Fifth Semester B.E. Degree Examination, July 2007
CS / IS
Operating System

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

Note : *Answer any FIVE full questions.*

1   a. Distinguish between 'multiprocessor systems' and 'multitasking systems'. **(06 Marks)**
    b. Describe the 'layered approach' to the design of an operating system and state its advantages. **(06 Marks)**
    c. Draw and describe a state transition diagram for processes. **(08 Marks)**

2   a. What are the information stored in a process control block? How it is used? **(06 Marks)**
    b. Describe the use of 'fonk' and 'exec' system calls. **(04 Marks)**
    c. The following processes arrive for execution at times indicated

Process	Arrival Time	Burst time
P_1	0	1.5
P_2	1.5	3
P_3	3	1
P_4	3	7.5

Draw a Gantt chart and calculate average waiting time for
   i) FCFS scheduling
   ii) Preemptive SJF (Shortest remaining time first) scheduling. **(10 Marks)**

3   a. Describe the critical-section problem. **(06 Marks)**
    b. Describe 'Test-and –set' and 'Swap' instructions and their use in synchronization of processes. **(06 Marks)**
    c. Describe how the 'dining philosophers problem' brings out the need for synchronization and avoids deadlocks. **(08 Marks)**

4   a. Describe the necessary conditions for a deadlock situation to arise in a system. **(04 Marks)**
    b. Draw a resource-allocation graph for the following situation and check if the system is in deadlock and explain.
       Process P_1 is (holding) using resource R_2 and waiting for resource R_1
               P_2 is using R_1 and waiting for R_3, R_4 and R_5
               P_3 is using R_4 and waiting for R_5
               P_4 is using R_5 and waiting for R_2
               P_5 is using R_3 **(08 Marks)**

c. Given a system with total resources of A(3); B(14) and C(12), and the following snapshot : calculate the need matrix and check the system for deadlock using Banker's algorithm.

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	0	1	0	0	1	1	5	2
P_1	1	0	0	1	7	5			
P_2	1	3	5	2	3	5			
P_3	0	6	3	0	6	5			
P_4	0	0	1	0	6	5			

(08 Marks)

5 a. Given memory partitions of 270, 150, 600 (KB) (in order) how would each of first-fit, best-fit and worst fit algorithms place the processes of 100, 212 and 270 (KB) (in order).
(06 Marks)
   b. Describe TLB. How it improves memory access time with an example?   (05 Marks)
   c. For a memory access system with a TLB we have TLB hit ratio of 0.9; memory access time 110 nano secs; TLB search time 20 nano secs. Calculate the effective memory access time.
(05 Marks)
   d. Describe execution time binding.
(04 Marks)

6 a. Describe demand paging system.
(04 Marks)
   b. Given page-fault service time 8 m sec; memory access time 100 nano secs; page fault rate 0.0002; Calculate effective access time.
(06 Marks)
   c. Describe LRU page replacement algorithm.
(05 Marks)
   d. Describe thrashing.
(05 Marks)

7 a. Describe a tree directory structure.
(04 Marks)
   b. Explain three major methods of disk space allocation.
(06 Marks)
   c. Compare FCFS and SSTF scheduling for disks.
(06 Marks)
   d. Sketch how SSTF disk scheduling occurs for a request queue of (cyl. Numbers) 95, 180, 36, 120, 14, 65 when the head starts at 53.
(04 Marks)

8 Write short notes on the following :
   a. Multithreading models
   b. Recovery from deadlocks (processes)
   c. Access matrix
   d. Worms and viruses.

(20 Marks)

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USN ☐☐☐☐☐☐☐☐☐☐

CS52

Fifth Semester B.E Degree Examination, Dec. 07 / Jan. 08
Operating Systems

Time: 3 hrs.

Max. Marks:100

Note : 1. Answer any FIVE full questions.
2. Draw neat diagrams wherever required.

1 a. Explain the fundamental difference between
    i) N/W Operating Systems and Distributed OS   ii)   Web – Based computing and Embedded computing.   (08 Marks)
  b. What do you mean by cooperating processes? Describe four advantages of cooperating processes.   (06 Marks)
  c. What are the different categories of system programs? Explain.   (06 Marks)

2 a. What do you understand by PCB? Where is PCB used? What are its contents? Explain.   (08 Marks)
  b. Explain direct and indirect communications with respect to message passing system.   (06 Marks)
  c. Explain the difference between short term, medium term and long term schedulers.   (06 Marks)

3 a. Consider the following set of processes, with CPU burst time (in ms) :

Process	Arrival time (in ms)	Burst time
P0	0	6
P1	1	3
P2	2	1
P3	3	4

    i) Draw the Gantt chart illustrating the execution of above processes using Shortest – Remaining – Time First (SRTF) and non-preemptive Shortest-Job-First (SJF).
    ii) Find the turn around time for each process for SRTF and SJF, hence show that, SRTF is faster than SJF.   (10 Marks)
  b. What are Semaphores? Explain two primitive semaphore operations. What are the advantages of semaphores?   (06 Marks)
  c. Explain any one synchronization problem for testing newly proposed synchronization scheme.   (04 Marks)

4 a. Why is deadlock state more critical than starvation in a multiprogramming environment? Describe a resource allocation graph, i) with a dead lock   ii) with a cycle but no dead lock.   (08 Marks)
  b. What are the two options for breaking a deadlock? Explain each clearly.   (07 Marks)
  c. What is wait – for graph? Explain how it is useful for detection of deadlock.   (05 Marks)

5 a. What do you mean by fragmentation? Explain difference between internal and external fragmentation.   (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 page replacement algorithms assuming 2 and 6 frames. Also note that all frames are initially empty, so your first unique page will cost one fault each. i) LRU   ii) Optimal.   (10 Marks)
  c. What is the cause of thrashing? How does the system detect thrashing?   (04 Marks)

6 a. Define the following terns with respect to disk scheduling.
   i) Constant Linear Velocity (CLV)   iii) Seek time
   ii) Constant Angular Velocity (CAV).   iv) Rotational latency.   (04 Marks)
   b. Suppose that a disk has 50 cylinders named 0 to 49. The read/write head is currently serving at cylinder 15. The queue of pending requests are in order : 4, 40, 11, 35, 7, 14. For each scheduling algorithms : FCFS, SSTF, and LOOK.
   i) Show the graphical representation for above scheduling algorithms.
   ii) Find the average head movement for above scheduling algorithms.   (10 Marks)
   c. What is the need – to – know principle? Why is it important for a protection system to adhere to this principle?   (06 Marks)

7 a. What is boot block and bad block? Explain the techniques used for handling bad blocks.
                                                                                  (06 Marks)
   b. Name 3 system threads. Explain any one.   (06 Marks)
   c. Discuss the various components of a LINUX OS.   (08 Marks)

8 Write a note on :
   a. User threads V/s Kernel threads.
   b. Symmetric multiprocessing V/s Asymmetric multiprocessing.
   c. Monitors with respect to process synchronization.
   d. Operating – System Services.   (20 Marks)

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USN ⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜

06CS53

Fifth Semester B.E. Degree Examination, Dec.08/Jan.09
Operating System

Time: 3 hrs.

Max. Marks:100

Note : *Answer any FIVE full questions, answering at least Two from each part.*

PART - A

1 a. Define an Operating System. Discuss its role from different perspectives. **(07 Marks)**
   b. List out the different services that an operating system provides. Explain. **(06 Marks)**
   c. Explain the concept of virtual machines. Bring out its advantages. **(05 Marks)**
   d. Differentiate between a trap and an interrupt. **(02 Marks)**

2 a. What is a process? Draw and explain the process state diagram. **(05 Marks)**
   b. Discuss the operations of process creation and process termination in UNIX. **(07 Marks)**
   c. Describe the implementation of IPC using shared memory and message passing. **(08 Marks)**

3 a. Why is a thread called a LWP? Describe any one threading, model and cite an operating system which implements it. Also explain any one of the many threading issues. **(06 Marks)**
   b. Consider the following data about processes

Process	Arrival Time	Burst Time	Priority
P_1	0	7	3
P_2	3	2	2
P_3	4	3	1
P_4	4	1	1
P_5	5	3	3

   i)   Draw charts to illustrate execution using SRTF, preemptive priority and RR (TS = 1msec).
   ii) Compute waiting time in each of the cases.
   iii) Which of them provide minimal average waiting time and turnaround time?
   iv) Find out the time at which there are maximum numbers of processes in the ready queue in the above scenario? **(10 Marks)**
   c. Consider a system running 10 I/0 bound tasks and one CPU bound task. Assume I/0 bound tasks issue an I/0 once for every msecs of CPU computing and that each I/0 operation takes 10msecs to complete. Also assume that the context switching overhead is 0.1msec. and that all processes are long running tasks. Comment on the CPU utilization for a RR scheduler when TS = 1msec and TS = 10msec. **(04 Marks)**

4 a. Define race condition. List the requirements that a solution to critical section problem must satisfy. **(04 Marks)**
   b. Define the algorithms Test and Set ( ) and Swap ( ). Show that they satisfy mutual exclusion. **(06 Marks)**

c. Consider the following snap shot of resource – allocation at time t_1:

	Allocation A B C	Request A B C	Available A B C
P_0	0 1 0	0 0 0	0 0 0
P_1	2 0 0	2 0 2	
P_2	3 0 3	0 0 0	
P_3	2 1 1	1 0 0	
P_4	0 0 2	0 0 2	

i) Show that the system is not deadlocked by generating one safe sequence.

ii) At instance t2, P_2 makes one additional request for instance of type C. Show that the system is deadlocked if the request is granted. Write down the deadlocked processes.

(10 Marks)

PART - B

5   a. Memory partitions of 100KB, 500KB, 200KB, 300KB, 600KB (in order) are available How would 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?

(06 Marks)

b. Differentiate between internal and external fragmentations? How are they overcome?

(04 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 a file? Describe the different access methods on files.   (07 Marks)

b. What is file mounting? Explain.   (04 Marks)

c. Draw a neat diagram and explain finked file allocation. Is FAT linked allocation? Discuss.

(09 Marks)

7   a. A 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 travelled (in cylinders) by the disk arm to satisfy the requests using algorithms FCFS, SSTF, SCAN, LOOK. Illustrate with figures in each case.   (12 Marks)

b. Explain the access matrix model of implementing protection in operating systems.

(08 Marks)

8   Write notes on :
   a. Buddy system of memory management in UNIX.
   b. Thrashing.
   c. Solution to bounded buffer problem using Semaphore.
   d. Bad blocks on disks.

(20 Marks)

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Fifth Semester B.E. Degree Examination, June-July 2009
Operating Systems

Time: 3 hrs.   Max. Marks:100

Note : *1. Answer any FIVE full questions, selecting atleast*
TWO questions from each part.
2. Assume missing data if any.

PART - A

1   a. Explain the role of operating system with user and system viewpoints.   **(07 Marks)**
    b. Give the features of symmetric and asymmetric multiprocessing systems.   **(04 Marks)**
    c. Discuss the operating system functions
       i)   that are helpful to user.
       ii)   that are meant for ensuring the efficient operation of system.   **(09 Marks)**

2   a. Describe the process states with the help of state diagram.   **(06 Marks)**
    b. Discuss various multithreading models with diagram.   **(06 Marks)**
    c. Consider the following set of processes.

Process	Burst time	Arrival time	Priority
P1	10	0	2
P2	5	2	1
P3	2	3	0
P4	20	5	3

Table Q2(c)

Draw Gantt charts and calculate average waiting time, average turnaround time
using following CPU scheduling algorithms.
   i)   Preemptive shortest Job First.
   ii)   Non preemptive priority (0 = HIGH Priority).   **(08 Marks)**

3   a. What are the three requirements to be met by a solution to the critical section
       problem? Explain.   **(06 Marks)**
    b. Describe the Bounded – buffer problem and give a solution for the same using
       semaphores. Write the structure of producer and consumer processes.   **(08 Marks)**
    c. Describe the following :   i) Semaphore   ii)   Wait ( ) operation
       iii)   Signal ( ) operation.   **(06 Marks)**

4   a. Consider the following snapshot of a system.

	Allocation			Maximum			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Table Q4(a)

Answer following questions using Bankers algorithm.
   i)   Is the system in a safe state?
   ii) If a request from P1 arrives for (1, 0, 2), can the request be granted
        immediately?   **(09 Marks)**

b. Discuss the various approaches, used for deadlock recovery. **(06 Marks)**
c. Consider the Resource allocation graphs given in fig.Q4(c) (i) and (ii), check whether deadlock exists in the system, if yes, identify the processes involved in deadlock.
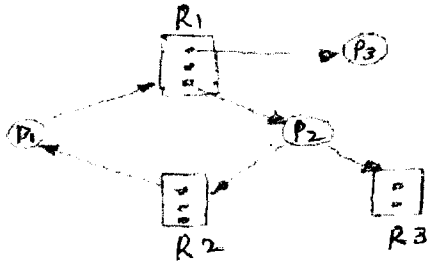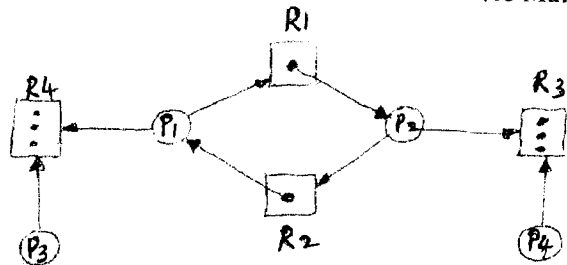
(05 Marks)

Fig.Q4(c) (i)

Fig. Q4(c) (ii)

PART - B

5 a. Assume we have a paged memory system with associative registers (TLBs) to hold the most active page table entries. If the page table is normally held in memory and memory access time is 1micro second, what would be the effective access time if 85% of all memory references find their entries in the associative registers. Assume that associative registers access time is zero.
(04 Marks)
b. Give the differences between : i) Internal and external fragmentation ii) Paging and segmentation.
(06 Marks)
c. Discuss the steps involved in handling page fault, with diagram. **(06 Marks)**
d. 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 FIFO page replacement algorithm, assuming three frames?
(04 Marks)

6 a. Discuss the following in brief : i) File Attributes ii) File types
iii) Sequential File Access iv) Tree Structured Directories. **(12 Marks)**
b. Explain contiguous, linked and indexed methods of allocating disk space. **(08 Marks)**

7 a. Explain the following disk scheduling algorithms in brief with examples.
i) F C F S Scheduling ii) S S T F Scheduling iii) S C A N Scheduling
iv) L O O K Scheduling.
(12 Marks)
b. Describe the access matrix model used for protection in a computer system.
(08 Marks)

8 Write short notes on any FOUR of the following:
a. Components of LINUX system.
b. Process management in LINUX.
c. Inter process communication.
d. Dynamic loading.
e. Process Control Block (PCB).

(20 Marks)

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Srinivas Institute of Technology
Library, Mangalore

06CS53

Fifth Semester B.E. Degree Examination, Dec.09/Jan.10
Operating Systems

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1　a. Define an operating system. Discuss its role with user and system viewpoints. **(06 Marks)**
　b. Give the features of symmetric and asymmetric multiprocessing systems. **(04 Marks)**
　c. Briefly explain the common classes of services provided by the various operating systems for helping the user and for ensuring the efficient operation of the system. **(10 Marks)**

2　a. With a diagram, explain the different states of a process. **(06 Marks)**
　b. Differentiate between long-term and short-term schedulers. **(04 Marks)**
　c. Suppose the following jobs arrive for processing at the times indicated. Each job will run the listed amount of time.

Job	1	2	3
Arrival time	0.0	0.4	1.0
Burst time	8	4	1

　　i)　Give a Gantt chart illustrating the execution of these jobs, using the non pre-emptive FCFS and SJF scheduling algorithms.
　　ii)　What is turn around time and waiting time of each job for the above algorithms?
　　iii)　Compute average turn around time if CPU is left idle for the first 1 unit and then SJF is used. (Job1 and Job2 will wait during this time) **(10 Marks)**

3　a. Discuss various multithreading models, with a diagram. **(06 Marks)**
　b. Explain the three requirements that a solution to the critical-section problem, must satisfy. **(04 Marks)**
　c. State the dining philosophers problem and give a solution for the same, using semaphores. Write the structure of philosopher i. **(10 Marks)**

4　a. Define the hardware instructions test and set() and swap(). And also give the algorithms for implementing mutual exclusion with these instructions. **(06 Marks)**
　b. Describe the necessary conditions for a deadlock situation to arise, in a system. **(04 Marks)**
　c. Consider the following snapshot of a system:

	Allocation				Maximum				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 the Banker's algorithm:
　　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 e granted immediately? **(10 Marks)**

PART – B

5 a. What is paging and swapping? (04 Marks)
   b. With a diagram, discuss the steps involved in handling a page fault. (06 Marks)
   c. 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
      for a memory with three frames. How many page faults would occur for LRU, FIFO and optimal page replacement algorithms? Which is the most efficient among them?
      (10 Marks)

6 a. Explain the following :
      i)   File types
      ii) File operations
      iii) File attributes (12 Marks)
   b. Explain the methods used for implementing directories. (08 Marks)

7 a. A disk drive has 200 cylinders numbered from 0 to 199. The disk head is initially at cylinder 53. The queue of pending requests in FIFO order is : 98, 183, 37, 122, 14, 124, 65, 67. Starting from the current head position, what is the total distance traveled (in cylinders) by the disk arm to satisfy the requests using algorithms FCFS, SSTF, SCAN and LOOK. Illustrate with figures in each case. (12 Marks)
   b. Describe the access matrix model used for protection purpose. (08 Marks)

8 Write short notes on :
   a. Components of LINUX system
   b. Interprocess communication facility in LINUX
   c. SCAN and C-SCAN disk scheduling
   d. Tree directory structure. (20 Marks)

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Fifth Semester B.E. Degree Examination, May/June 2010
Operating Systems

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   Explain the following terms :
    i) Bootstrap program   ii) Caching   iii) Trap
    iv) Job pool   v) Symmetric multiprocessing.   **(10 Marks)**

    b.   Explain two sets of operating system services that are helpful to user as well as efficient operation of system.   **(05 Marks)**

    c.   Write and explain the sequence of system calls for copying a file to another (new) file.   **(05 Marks)**

2   a.   What is PCB? Enumerate and explain various fields in PCB.   **(04 Marks)**

    b.   What is multithreading? Explain the benefits of multithreaded programming.   **(05 Marks)**

    c.   Consider the following set of processes :

Process	Arrival time	Burst time
P_1	0	1
P_2	1	9
P_3	2	1
P_4	3	9

      i)   Draw Gantt charts showing the execution of these processes using FCFS, preemptive SJF, non-preemptive SJF and RR (Quantum – 1) scheduling schemes.

      ii)   Compute the turn around time and waiting time for each process for each of the schemes above.

      iii)   Compute the average turn around time and average waiting time in each scheme and thus find the best scheme in this particular case.   **(11 Marks)**

3   a.   Define race condition. List the requirements that a solution to critical section problem must satisfy.   **(05 Marks)**

    b.   What are semaphores? Explain two primitive semaphore operations. What are the advantages of semaphore?   **(07 Marks)**

    c.   Define the algorithms TestAndSet( ) and swap( ). Show that they satisfy mutual exclusion.   **(08 Marks)**

4   a.   Explain how resource-allocation graph is used to describe deadlocks.   **(05 Marks)**

    b.   What are the different methods for handling deadlocks? Explain Banker's algorithm.   **(11 Marks)**

    c.   "A safe state is not a deadlock state but a deadlock state is an unsafe state". Explain.   **(04 Marks)**

PART – B

5   a.   What do you mean by dynamic storage allocation problem? Explain possible solutions to this problem.   **(04 Marks)**

    b.   Explain the concept of forward-mapped page table.   **(04 Marks)**

    c.   Consider the following 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, all initially empty, how many page faults would occur for :
    i) LRU   ii) FIFO   iii) Optimal page replacement algorithms? Which of the algorithms is most efficient in this case?   **(12 Marks)**

6 a. What is meant by 'consistency semantics'? Explain the consistency semantics as implemented in a modern O. S.

(07 Marks)

  b. With the help of a neat diagram, describe :
    i) Tree –structured directory
    ii) Acyclic – graph directory.

(08 Marks)

  c. Explain virtual file system(VFS).

(05 Marks)

7 a. Suppose the position of cylinder is at 53. Sketch the graphical representation for the queue of pending requests in the order – 98, 183, 37, 122, 14, 124, 65, 67 for FCFS, SSTF and LOOK scheduling schemes. Give your comment on this scenario for the above schemes.

(12 Marks)

  b. Describe the access matrix model used for protection in a computer system.

(08 Marks)

8   Write short notes on :
  a. Components of Linux system
  b. Processes and threads
  c. Conflict resolution mechanism of Linux
  d. Linux file system.

(20 Marks)

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