

Guru Nanak Dev Engineering College, Ludhiana

Department of Information Technology

Program	B.Tech. (IT)	Semester/Section	A
Subject Code	PCTT-106	Subject Title	Operating System
Mid Semester Examination (MSE) No.	24	Course Coordinator(s)	Dr. A.S. Maru
Max. Marks	24	Time Duration	09am - 10.30am
Date of MSE	25 th May 2023 (Thursday)	University Roll Number	

Note: Attempt all questions.

Q. No.	Question	COs, RBT level	M:
Q1	What is the difference between deadlock and starvation.	CO2, L1	
Q2	Illustrate any four major differences between UNIX, LINUX and Windows.	CO6, L5	
Q3	Explain with diagram Single-Partition allocation and Multiple-partition allocation?	CO3, L3	
Q4	Explain Local and Global Page Replacement, Bad Blocks, File Layered Architecture and Protection Mechanisms.	CO3, L2	
Q5	Discuss the Belady's Anomaly and Segmentation. Consider the page reference sequence 7, 6, 4, 2, 5, 3, 0, 4, 2, 3, 0, 3, 2 with four page frames. Find number of page faults using Optimal and Least recently used page replacement algorithms.	CO4, L5	
Q6	Distinguish between Internal and External Fragmentation. How Virtual Memory is used? Suppose the total numbers of tracks on a single disk are 300 and the order of R/W request is 82, 169, 44, 144, 224, 16, and 190, respectively. Current position of R/W head is at track number 45. Enlist the benefits, limitations along-with the total seek time using FCFS, SSTF, CSCAN and LOOK Disk Scheduling algorithms (Direction of Movement is towards the smaller value).	CO5, L5	

Course Outcomes (CO)

Students will be able

1	Exemplify various types of Operating Systems, deadlocks, Process, File and Memory management.
2	Implement various deadlock scheduling algorithms.
3	Analyze and apply various memory and file management mechanisms.
4	Classify various page replacement algorithms for demand paging.

Higher Order Thinking Levels (HOTL)					
1.1	1.2	1.3	1.4	1.5	C
Remembering	Understanding	Applying	Analyzing	Evaluating	C

Guru Nanak Dev Engineering College, Ludhiana

Department of Information Technology

Program	B.Tech (IT)	Semester/ Section	4 th / A
Subject Code	PCIT-106	Subject Title	Operating System
Mid Semester Test (MST) No.	1 st	Course Coordinator	Pankaj Bhambri
Max. Marks	24	Time Duration	01 pm – 02.30 pm
Date of MST	22 nd March 2022	University Roll Number	

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks															
Q1	Classify at-least four major differences between shell and kernel.	CO6, L2	2															
Q2	Consider the following set of four processes. Their arrival time and time required to complete the execution (CPU burst time) are given in the following table: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Process</th> <th>Arrival Time</th> <th>CPU Burst Time</th> </tr> <tr> <td>P₀</td> <td>0</td> <td>10</td> </tr> <tr> <td>P₁</td> <td>1</td> <td>6</td> </tr> <tr> <td>P₂</td> <td>3</td> <td>2</td> </tr> <tr> <td>P₃</td> <td>5</td> <td>4</td> </tr> </table> Consider all time values in milliseconds. Evaluate the Average Waiting Time using First Come First Serve Scheduling algorithm.	Process	Arrival Time	CPU Burst Time	P ₀	0	10	P ₁	1	6	P ₂	3	2	P ₃	5	4	CO1, L5	2
Process	Arrival Time	CPU Burst Time																
P ₀	0	10																
P ₁	1	6																
P ₂	3	2																
P ₃	5	4																
Q3	What is a Process? Describe the different states of a process with their detailed elaboration.	CO1, L2	4															
Q4	Demonstrate the usage of stack, heap, data and code as a part of various sections in a process, through appropriate example.	CO3, L1	4															
Q5	Interpret the roles of process synchronization, critical section and mutual exclusion. How semaphores resolve the issue of process synchronization?	CO1, L4	4															
Q6	Compare and contrast the various features, pros/cons and applications of different types of operating systems.	CO1, L4	8															

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3	Analyze and apply various memory and file management mechanisms.
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5	Use different disk scheduling algorithm for better utilization of external memory.
6	Examine the case studies of different Operating Systems to recapitulate the concepts of Operating System.

RBT Classification	Lower Order Thinking Levels (LOTS)			Higher Order Thinking Levels (HOTS)		
RBT Level Number	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Guru Nanak Dev Engineering College, Ludhiana

Department of Information Technology

Program	B.Tech (IT)	Semester/ Section	4 th / A
Subject Code	PCIT-106	Subject Title	Operating System
Mid Semester Exam (MSE) No.	1 st	Course Coordinator	Dr. KS Mann
Max. Marks	24	Time Duration	09.00AM – 10.30AM
Date of MSE	31 st March 2023 (Friday)	University Roll Number	2104514

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks																								
Q1	Write the Syntax for a)tee b)cut	CO1, L2	2																								
Q2	What is Interprocess communication? Choose the Correct Answer. a) allows processes to communicate and synchronize their actions when using the same address space b) allows processes to communicate and synchronize their actions c) allows the processes to only synchronize their actions without communication d) none of the mentioned	CO1, L5	2																								
Q3	Show the mapping and difference between Logical and Physical Address in Operating System by using relevant Examples and diagrams?	CO1, L3	4																								
Q4	Demonstrate the four criterias required for the process synchronization. How two types of semaphores resolve the issue of process synchronization? Demonstrate through appropriate examples.	CO1, L3	4																								
Q5	Explain with relevant examples that how An Operating System provides services to both the users and to the programs.	CO1, L5	4																								
Q6	1. FCFS 2.RR (1ms quantum) 3.Non Preemptive Priority 4. Preemptive Priority. Calculate AWT. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Process</th> <th>Arrival Time</th> <th>Priority</th> <th>Burst Time</th> </tr> <tr> <td>P₁</td> <td>0</td> <td>4</td> <td>8</td> </tr> <tr> <td>P₂</td> <td>2</td> <td>1</td> <td>6</td> </tr> <tr> <td>P₃</td> <td>2</td> <td>2</td> <td>1</td> </tr> <tr> <td>P₄</td> <td>1</td> <td>2</td> <td>9</td> </tr> <tr> <td>P₅</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table>	Process	Arrival Time	Priority	Burst Time	P ₁	0	4	8	P ₂	2	1	6	P ₃	2	2	1	P ₄	1	2	9	P ₅	3	3	3	CO1, L4 CO2, L4	8
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Course Outcomes (CO)

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RBT Classification	Lower Order Thinking Levels (LOTS)			Higher Order Thinking Levels (HOTS)		
RBT Level Number	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

0 P₁ → 8 7 6 5 4 3 2 1
 2 P₂ → 8 7 6 5 4 3 2 1
 2 P₃ → 8 7 6 5 4 3 2 1
 1 P₄ → 8 7 6 5 4 3 2 1
 1 P₅ → 8 7 6 5 4 3 2 1

Guru Nanak Dev Engineering College, Ludhiana

Department of Information Technology

Program	B.Tech (IT)	Semester/ Section	4 th / A
Subject Code	PCIT-106	Subject Title	Operating System
Mid Semester Examination (MSE) No.	2 nd	Course Coordinator	Pankaj Bhambri
Max. Marks	24	Time Duration	10.30am – 12pm
Date of MSE	31 st May 2022 (Tuesday)	University Roll Number	

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks
Q1	Describe the four necessary conditions for Deadlock.	CO2, L1	2
Q2	Illustrate UNIX and LINUX.	CO6, L5	2
Q3	Elaborate the File Management with detailed requirement and implementation issues of Contiguous, Linked and Indexed allocation methods.	CO3, L3	4
Q4	Explain Overlays, Internal and External Fragmentation, Virtual Memory and Thrashing, in details.	CO3, L2	4
Q5	Discuss the Belady's Anomaly. Consider the page references 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, with 4 page frame. Find number of page fault using Optimal page replacement and Least recently used algorithms.	CO4, L5	4
Q6	Suppose the order of request is 82, 170, 43, 140, 24, 16, 190 and current position of Read/Write head is 50. Enlist the Advantages, Disadvantages along-with the total seek time using FCFS, SSTF, CSCAN and LOOK Disk Scheduling algorithms.	CO5, L5	8

Course Outcomes (CO)

Students will be able

1	Exemplify various types of Operating Systems, deadlocks, Process, File and Memory management.
2	Implement various deadlock scheduling algorithms.
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RBT Classification	Lower Order Thinking Levels (LOTS)			Higher Order Thinking Levels (HOTS)		
RBT Level Number	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

F=6

842

208

373

314

$$\begin{array}{r}
 120 \\
 124 \\
 174 \\
 127 \\
 97 \\
 \hline
 642
 \end{array}$$

Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

MORNING

[Total No. of Questions: 09]

Uni. Roll No.

20 JUN 2023

[Total No. of Pages: 02]

Program: B.Tech. (Batch 2018 onward)

Semester: 4th

Name of Subject: Operating System

Subject Code: PCIT-106

Paper ID: 16235

Detail of allowed codes/charts/tables etc. Nil

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) Define Inter-process communication.
- b) List the services provided by an operating system?
- c) Point out the significant differences between UNIX, LINUX and Windows
- d) Compare single-partition allocation and multiple-partition allocation.
- e) List three major activities of an OS with regard to memory management.
- f) What is thrashing? How is it controlled by OS?

Part – B

[Marks: 04 each]

Q2. Explain process scheduling? Describe the different types of schedulers?

Q3. Some computer systems do not provide a privileged mode of operation in hardware. Is it possible to construct a secure operating system for these computer systems? Justify your reply.

Q4. Elaborate the mapping and difference between logical and physical address.

MORNING

20 JUN 2023

- Q5.** Consider the following page reference string. 1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2. How many page faults would occur for the following replacement algorithm, assuming four and six frames respectively **a)** page replacement. **b)** FIFO page replacement.
- Q6.** Define C-SCAN scheduling. Why rotational latency is not considered in disk scheduling?
- Q7.** What are points to be consider in file system design? Explain linked list allocation & index allocation in detail.

Part – C

[Marks: 12 each]

- Q8.** Differentiate among the following types of OS by defining their essential properties.
a) Time sharing system b) Parallel system c) Distributed system d) Real time system

OR

Differentiate between the following a) Paging and Segmentation b) Page table and segment table c) tightly coupled systems and loosely coupled systems

- Q9.** What are critical sections? Why mutual exclusion required? Explain any 2 methods of achieving mutual exclusion in detail.

OR

Distinguish between Internal and External Fragmentation. How Virtual Memory is used? Suppose the total numbers of tracks on a single disk are 300 and the order of R/W request is 82, 169, 44, 144, 224, 16, and 190, respectively. Current position of R/W head is at track number 45. Enlist the benefits, limitations along-with the total seek time using FCFS, SSTF and LOOK Disk Scheduling algorithms (Direction of Movement is towards the smaller value).

Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

[Total No. of Questions: 09]
Uni. Roll No.

MORNING *Evening*

16 JAN 2023

[Total No. of Pages: 02]

Program: B.Tech. (Batch 2018 onward)
Semester: 4th
Name of Subject: Operating System
Subject Code: PCIT-106
Paper ID: 16235

Detail of allowed codes/charts/tables etc. Nil

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part - A

[Marks: 02 each]

Q1.

- a) List three objectives of an operating system.
- b) Distinguish between hard real time systems and soft real time systems.
- c) Why page size is always power of 2?
- d) Why API's need to be used rather than system call?
- e) Is deadlock state more critical than starvation? Justify.
- f) What are the three methods for allocating disk space?

Part - B

[Marks: 04 each]

- Q2. Discuss the general structure of an operating system.
- Q3. State dining philosopher's problem and give a solution using semaphores. Write structure of philosopher.
- Q4. Describe necessary conditions for a deadlock situation to arise. Brief about different methods to handle deadlocks.

16 JAN 2023

- Q5. The queue of requests in FIFO is 86,147,91,177,94,150,102,175,130 What is the total head movement needed to satisfy the requests for the following Scheduling algorithms FCFS, SJF, SCAN, LOOK, C-SCAN
- Q6. Discuss the LINUX operating system as a case study.
- Q7. Explain the following i) file types ii) file operation iii) file attributes.

Part - C

[Marks: 12 each]

- Q8. What is disk scheduling? Explain FCFS and SCAN disk scheduling algorithms.

OR

Distinguish between i) Process and Program ii) Multiprogramming and multiprocessing iii) Job scheduling and CPU scheduling

- Q9. Differentiate between the following a) Paging and Segmentation b) Page table and segment table c) internal and external fragmentation.

OR

What is virtual memory? Assume 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 100ns. 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 200ns?

[Total No. of Questions: 09]
Uni. Roll No.

EVENING

30 JUN 2022

[Total No. of Pages: 2]

Program: B.Tech. (Batch 2018 onward)
Semester: 04

Name of Subject: Operating System
Subject Code: PCIT-106
Paper ID: 16235

Time Allowed: 03 Hours

NOTE:

Max. Marks: 60

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part - A

Q1.

[Marks: 02 each]

- a) What is an Operating System?
- b) What is the difference between deadlock and starvation?
- c) Define Virtual Memory and what are its advantages?
- d) What is thrashing?
- e) Explain Inter Process Communication.
- f) What do you mean by PCB? What are its contents?

Part - B

[Marks: 04 each]

- Q2. What is a process? Explain and draw Process State Diagram.
- Q3. Write a brief note on Layered Architecture in reference to device management.
- Q4. What is a deadlock and what are the conditions to prevent it?
- Q5. What are the different access methods of files? How are they implemented?
- Q6. What are semaphores and its advantages? Explain two primitive semaphore operations.
- Q7. What is fragmentation? Explain its types and disadvantages.

- Q8. Consider the following set of processes, with the length of the CPU burst given in ms:

Process	Burst Time	Priority
P1	2	2
P2	1	1
P3	8	4
P4	4	2
P5	5	3

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 at time 0.

- Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non pre-emptive priority (a larger priority number implies a higher priority), and RR (quantum= 2).
- What is the turnaround time of each process for each of the scheduling algorithms in part a?
- What is the waiting time of each process for each of these scheduling algorithms?
- Which of the algorithms results in the minimum average waiting time?

OR

Explain different types of operating systems in detail.

- Q9. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130

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

- FCFS
- SSTF
- SCAN
- LOOK
- C-SCAN
- C-LOOK

OR

Given page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. Compare the number of page faults for LRU, FIFO and Optimal page replacement algorithm with frame size 4.
