

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL  
UNIVERSITY, LONERE – RAIGAD -402 103  
Semester Examination – Summer - 2019**

**Branch: Computer Science & Engineering**

**Sem.: -IV**

**Subject with Subject Code:- Operating System (BTCOC403)**

**Marks:60**

**Date:-20/05/19**

**Time:- 3 Hr.**

**Instructions to the Students**

1. Each Question carries 12 marks.
2. Attempt **any Five** Questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q (1) Attempt any four of the following. 12

- (a) What is an Operating System? Give its purpose. How it works similar to government?
- (b) How are network computers different from traditional personal computers? Why do some systems store the O.S. in firmware and other on disk?
- (c) In what ways, is the modular, kernel approach similar to the layered approach? In what ways, does it differ from layered approach?
- (d) How does the distinguish between kernel mode function as a rudimentary form of protection or system security? Enlist all Operating System services.
- (e) Explain the architecture of UNIX Operating System. What is System Administration? Describe the roles of all the members of System Administration.

Q (2) Attempt any four of the following. 12

- (a) Discuss the structure of a Regular file. Enlist different file attributes and directories.
- (b) Discuss the role of Buffer in Operating System. How does we differentiate buffering with spooling?
- (c) How buffer pools are used? Discuss advantages and disadvantages of Buffer Cache.
- (d) What is an Inode? How to perform conversion of a Path Name to an Inode?
- (e) What is page? How we replace it?

Q (3) Attempt any two of the following 12

- (a) What is system call? What system calls have to be executed by a command interpreter or shell in order to start a new process? Why there is need of process creation and termination? Enlist different system calls for above two operations?
- (b) What are the advantages and disadvantages of using the same system call interface for manipulating both files and devices? Discuss the roles of system calls for file system.
- (c) Discuss how the user view of designing the operating system differs with abstract view. Enlist different tasks performed by Operating System.

Q (4) Attempt any four of the following 12

- What is process? Discuss process states and its transition.
- Explain Layout of System. How do we save the context of a process?
- What is System program? Discuss its categories with examples.
- What is shell? Discuss its applications and types. What is system boot?
- Why there is need of synchronization? What is critical section problem?

Q (5) Attempt any four of the following 12

- How do you prove the following solutions of critical section problem are correct? i) Mutual Exclusion is preserved.  
ii) Progress requirement is satisfied.  
Iii) Bounded waiting requirement is met.
- How do we differentiate Storage management with Device or I/O management?
- What is deadlock? Suggest necessary conditions for deadlock?
- If short term scheduler takes 10 ms to decide to execute a process for 100 ms, then how much percentage of CPU is being used simply for scheduling the work? Mention the role of scheduler with their types.
- What is dynamic storage allocation problem? Give its solution?

Q (6) Attempt any two of the following 12

- How do we differentiate memory management with task or process management?
- What is Interprocess Communication? Discuss its application.
- How do you differentiate paging with segmentation by giving explanation on page and segment table?
- Consider the following set of processes, with the length of the CPU burst given in ms:

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

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

- Draw Gantt charts that illustrates the execution of these processes using the following scheduling algorithms: FCFS, SJF, nonpreemptive priority.
- What is the turnaround time of each process for each of the scheduling algorithms?
- What is the waiting time of each process for each of these scheduling algorithms?

END

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**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103**

**B. Tech Winter Semester Supplementary Examination: Nov.-2019**

**Branch: B.Tech. ( Computer Engineering )**

**Sem: IV**

**Subject with Subject Code: Operating System[ BTCOC403]**

**Marks:60**

**Date:- 30/11/2019**

**Time: 3 Hrs**

**Instructions to the Students:**

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

**Marks**

**Q.1 Attempt the following questions.**

**06**

(A) Define operating system. Enlist and explain different types of os.

**06**

(B) List five services provided by an operating system, and explain how each creates convenience for users. In which cases would it be impossible for user-level programs to provide these services? Explain your answer.

**Q. 2 Attempt the following questions.**

**06**

(A) Describe the actions taken by a kernel to context-switch between processes.

**06**

(B) Using the given information about the processes, calculate Average Waiting Time and Average Turnaround Time of each process under following scheduling algorithms:

- a) First Come First Served
- b) Shortest Job First
- c) Round Robin (With time slice of 5 ms)

Process	Burst time(ms)
P1	5
P2	24
P3	16
P4	10
P5	3

**Q.3 Solve any Two.**

**06**

(A) What is Inter-process communication? Are function callback and inter-process communication same?

- (B) Explain why interrupts are not appropriate for implementing synchronization primitives in multiprocessor systems. 06
- (C) What are the requirements for the solution to critical section problem? 06

**Q.4 Attempt the following questions.**

- (A) Consider the deadlock situation that could occur in the dining-philosophers problem when the philosophers obtain the chopsticks one at a time. Discuss how the four necessary conditions for deadlock indeed hold in this setting. Discuss how deadlocks could be avoided by eliminating any one of the four conditions. 06
- (B) What are the Conditions for Deadlock to occur? Briefly explain. In a system, the following state of processes and resources are given:  $R_1 \rightarrow P_1$ ,  $P_1 \rightarrow R_2$ ,  $P_2 \rightarrow R_3$ ,  $R_2 \rightarrow P_2$ ,  $R_3 \rightarrow P_3$ ,  $P_3 \rightarrow R_4$ ,  $P_4 \rightarrow R_3$ ,  $R_4 \rightarrow P_4$ ,  $P_4 \rightarrow R_1$ ,  $R_1 \rightarrow P_5$ . Draw Resource Allocation Graph for the system and check for deadlock condition. Explain your answer. 06

**Q.5 Attempt the following questions.**

- (A) Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)? Which algorithm makes the most efficient use of memory? 06
- (B) Compare the memory organization schemes of contiguous memory allocation, pure segmentation, and pure paging with respect to the following issues: 06
- External fragmentation
  - Internal fragmentation
  - Ability to share code across processes

**Q.6 Attempt the following questions.**

- (A) Consider a reference string: 4, 7, 6, 1, 7, 6, 1, 2, 7, 2. the number of frames in the memory is 3. Find out the number of page faults respective to: 06
- Optimal Page Replacement Algorithm
  - FIFO Page Replacement Algorithm
  - LRU Page Replacement Algorithm
- (B) In what situations would using memory as a RAM disk be more useful than using it as a disk cache? 06

\*\*\*\*\*End of Paper\*\*\*\*\*

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**

**Regular End Semester Examination – Summer 2022**

**Course: B. Tech. Branch: Computer Engineering**

**Semester: IV**

**Subject Code & Name: BTCOC402 & Operating Systems**

**Max Marks: 60**

**Date: 18/08/2022**

**Duration: 3.45 Hr.**

**Instructions to the Students:**

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

**(Level) Marks**

**Q.1 Solve Any Two of the following. (This is just a sample instruction)**

- A) Define a virtual machine with neat diagram. Describe the concept and working of JVM. Explain what are the benefits of a VM? **(2) 6**
- B) What is the purpose of command interpreter? Why is it usually separate from the Kernel? **(2) 6**
- C) Describe major activities of an operating system in regard to: **(2) 6**
- 1) Process management
  - 2) File management
  - 3) Main Memory management
  - 4) Secondary storage management

**Q.2 Solve Any Two of the following. (This is just a sample instruction)**

- A) Consider the following data with burst time given in milliseconds: **(3) 6**
- | Process | Burst Time | Priority |
|---------|------------|----------|
| P1      | 10         | 3        |
| P2      | 1          | 1        |
| P3      | 2          | 3        |
| P4      | 1          | 4        |
| P5      | 5          | 2        |
- The process has arrived in the order P1, P2, P3, P4, P5.
- i) Draw Gantt charts for the execution of these processes using FCFS, SJF, non-preemptive Priority and RR (quantum=2) scheduling.
  - ii) What is turnaround time and waiting time of each process for each of the scheduling algorithm.
- B) What are co-operating processes? Describe the mechanism of inter process communication using shared memory and message passing **(2) 6**
- C) Suppose the following jobs arrive for processing at the times indicated, each job will run the listed amount of time. **(3) 6**



Job	arrival time	burst time
1	0.0	8
2	0.4	4
3	1.0	1

- Give a Gantt chart illustrating the execution of these jobs using the non-preemptive FCFS and SJF scheduling algorithms.
- What is turnaround time and waiting time of each job for the above algorithms?

**Q. 3 Solve Any Two of the following.** *(This is just a sample instruction)*

- A) Examine banker's algorithm after applying to the example given below. A system has 5 processes, P1, P2, P3, P4 and P5. There are 3 types of resources R1, R2 and R3. there are 10 instances of R1, 5 instances of R2 and 7 instances of R3. At time T0, the situation is as follows; (3) 6

Process	Allocation			Maximum		
	R1	R2	R3	R1	R2	R3
P1	0	1	0	7	5	3
P2	2	0	0	3	2	2
P3	3	0	2	9	0	2
P4	2	1	1	2	2	2
P5	0	0	2	4	3	3

Is the system in a safe state at time T0?

Suppose now at time T1, process P2 requests one additional instance of resource type R1, is the system in a safe state?

- B) Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock, also explain resource allocation graph with a cycle but no deadlock. (2) 6
- C) Describe the bounded-buffer Producer-Consumer problem and give a solution for the same using semaphores. Write the structure of Producer and Consumer processes. (2) 6

**Q.4 Solve Any Two of the following.** *(This is just a sample instruction)*

- A) Given memory partitions of 150 K, 250 K, 500 K, 300 K and 600 K (in order) how would each of the first-fit, best-fit and worst-fit algorithms allocate processes of 212K, 417K, 112K and 426 K (in order)? Which algorithm makes the most efficient use of memory? (3) 6

- B) Consider the following page reference string (3) 6  
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 3 page frames, using the following page replacement algorithm i) LRU ii) FIFO iii) Optimal
- C) Describe the action taken by the operating system when a page fault occurs (2) 6  
with neat diagram.

**Q. 5 Solve Any Two of the following. (This is just a sample instruction)**

- A) Describe the different file allocation methods. Also explain the methods of file implementation with merits and demerits. (2) 6
- B) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. the drive (3) 6  
currently services a request at cylinder 1043, and the previous request was at cylinder 1225. the queue of pending request in FIFO order is 486, 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) SSFT iii) SCAN iv) LOOK v) C-SCAN.
- C) Describe how free-space management is implemented in file system. Also (2) 6  
explain bit map with the help of an example

\*\*\* End \*\*\*

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**

**Summer Examination – 2023**

**Course: B. Tech.      Branch: Computer Engineering      Semester: IV**

**Subject Code & Name: BTCOC402   Operating System**

**Max Marks: 60      Date: 15.07.2023      Duration: 3 Hr.**

**Instructions to the Students:**

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

**(Level)      Marks**

**Q. 1 Solve Any Two of the following.**

**12**

- |   |            |   |
|---|------------|---|
| A) Describe memory layout of multiprogramming operating system. State its advantages. | Understand | 6 |
| B) Discuss design goals, policies and implementation of a typical operating system.   | Understand | 6 |
| C) Explain Virtual Machine (VM) based structure of operating system.                  | Remember   | 6 |

**Q.2 Solve Any Two of the following.**

**12**

- |   |          |   |
|---|----------|---|
| A) Describe the contents of Process Control Block (PCB).                                      | Remember | 6 |
| B) Explain the role of long term, short term and middle term scheduler in process scheduling. | Analyze  | 6 |
| C) Consider the following set of processes to be executing on uniprocessor system.            | Apply    | 6 |

Processes	AT	BT
A	0	3
B	2	6
C	4	4
D	7	2

Draw the Gantt Chart and calculate average turnaround time and average waiting time for

- i) SJF Non-preemptive
- ii) SJF Preemptive

**Q. 3 Solve Any One of the following.**

**12**

- |  |            |   |
|--|------------|---|
| A) Explain the use of Resource Allocation Graph (RAG) in deadlock detection.   | Analyze    | 6 |
| B) Write a pseudocode of Swap instruction used for process synchronization.  | Understand | 6 |
| C) Examine banker's algorithm for following snapshot of the system, there are 3 processes, P1, P2 and P3. And 3 resource types, R1, R2 and R3. | Apply      | 6 |

There are 12 instances of resource type R1, 11 instances of resource type R2 and 20 instances of resource type R3.



At time T0, the situation is as follows-

Processes	Allocated Resources			Maximum resources		
	R1	R2	R3	R1	R2	R3
P1	2	2	3	3	6	8
P2	2	0	3	4	3	3
P3	1	2	4	3	4	4

State-

- Contents of matrix Need.
- Is the system in a safe state at T0?

**Q.4 Solve Any Two of the following.**

**12**

- A) Consider the page reference string-  
4, 7, 6, 1, 7, 6, 1, 2, 7, 2.

Apply

**6**

If there is there is three-page frames, calculate page faults for following algorithms-

- FIFO page replacement
- LRU page replacement
- Optimal page replacement

- B) Explain paging mechanism with neat diagram. State the importance of offset in it.

Understand

**6**

- C) Discuss the need of page replacement. Differentiate between local and global page replacement.

Analyze

**6**

**Q. 5 Solve Any One of the following.**

**12**

- A) Explain the concept of file. State various file operations.

Remember

**6**

- B) Discuss linked and index disk space allocation methods with neat sketch.

Understand

**6**

- C) Write a note on free space management.

Understand

**6**

**\*\*\* End \*\*\***

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**

**Supplementary Semester Examination – January 2023**

**Course: B. Tech.**

**Branch : CE / CSE / CS**

**Semester : IV**

**Subject Code & Name: Operating Systems [BTCOC403]**

**Max Marks: 60**

**Date:**

**Duration: 3 Hrs.**

**Instructions to the Students:**

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/  
CO) Marks

**Q.1 Solve the following questions.**

**[12]**

- A)** Explain the storage system hierarchy of operating system with neat diagram. 2
- B)** Write a Short Note on the following: 2
- a) Real-time Embedded System
  - b) Advantages of Multiprocessor System

**Q.2 Attempt the following questions.**

**[12]**

- A)** Describe the actions taken by a kernel to context-switch between processes. 2
- B)** Describe Process Control Block with suitable Example. 1
- C)** Determine the average waiting time and draw a Gantt Chart for following process with burst time using Shortest-Job-First scheduling algorithm. 3

Process	Burst Time
P1	6
P2	8
P3	7
P4	3

**Q.3 Solve Any Two of the following.**

**[12]**

- A)** Discuss the Peterson's solution for the critical-section problem. 2
- B)** Explain the Dining Philosopher's problem with the structure of philosophers. 2
- C)** Describe the three requirements to satisfy as a solution to critical-section problem. 1

**Q.4 Solve any TWO questions of the following.**

**[12]**

- A)** Consider a logical address space of 64 pages of 1,024 words each, mapped onto a physical memory of 32 frames. 3
- a) How many bits are there in the logical address?

b) How many bits are there in the physical address?

**B)** Given five memory partitions of 100KB, 500KB, 200KB, 300KB, and 600KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 212KB, 417KB, 112KB, and 426KB (in order)? Which algorithm makes the most efficient use of memory? **3**

**C)** Consider the following page reference string: **3**

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

How many page faults would occur for the following replacement algorithms, assuming five frames? Remember that all frames are initially empty.

- a) LRU replacement
- b) FIFO replacement
- c) Optimal replacement

**Q.5 Solve Any Two of the following.** **[12]**

**A)** Enlist and Explain in details the various operations performed on the file. **2**

**B)** Describe the following file types with respect to extension used for the file and functioning of the respective file type. **1**

- a) Executable
- b) object
- c) batch
- d) library
- e) archive
- f) source code

**C)** Write the name of the terminology used for the boot-control block and volume-control block in Unix and NT File System. **3**

Consider a file system that uses inodes to represent files. Disk blocks are 8 KB in size, and a pointer to a disk block requires 4 bytes. This file system has 12 direct disk blocks, as well as single, double, and triple indirect disk blocks. What is the maximum size of a file that can be stored in this file system?

**\*\*\* End \*\*\***

Course: B. Tech.      Branch: Computer Engineering      Semester: IV

Subject Code & Name: BTCOC402 & Operating System

Max Marks: 60

Date:

Duration: 3 Hr.

**Instructions to the Students:**

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level)      Marks

**Q.1 Solve Any Two of the following.**

12

- A) List out different services of Operating Systems and Describe each service. (2) 6
- B) What are system calls? Explain different categories of system calls with example? (2) 6
- C) Describe different sub-components of an operating system. (2) 6

**Q.2 Solve Any Two of the following.**

12

- A) Consider the following data with burst time given in milliseconds: (3) 6

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

- i) Draw Gantt charts for the execution of these processes using FCFS, non-preemptive and preemptive SJF, and non-preemptive Priority scheduling.
- ii) What is the Average waiting time of each process for each of the scheduling algorithm.
- B) Describe the actions taken by a kernel to context switch between kernel level threads (2) 6
- C) Suppose the following jobs arrive for processing at the times indicated, each job will run the listed amount of time. (3) 6

Job	arrival time	burst time
1	0.0	9
2	0.2	5
3	1.2	2

- i) Give a Gantt chart illustrating the execution of these jobs using the non-preemptive FCFS and SJF scheduling algorithms.
- ii) what is turnaround time and wait time of each job for the above algorithms?

**Q. 3 Solve Any Two of the following.****12**

- A) Examine banker's algorithm after applying to the example given below A system has 5 processes, P1, P2, P3, P4 and P5. There are 2 types of resources A, and B. there are 10 instances of A, and 5 instances of B. At time T0, the situation is as follows; (3) **6**

Process- Allocation- Maximum

	A	B	A	B
P1	0	1	7	5
P2	2	0	3	2
P3	3	0	9	0
P4	2	1	2	2
P5	0	0	4	3

Is the system in a safe state at time T0?

Suppose now a time T1, process P2 requests one additional instance of resource type A.

- B) Describe necessary conditions for a deadlock situation to arise. (2) **6**
- C) 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. (2) **6**

**Q.4 Solve Any Two of the following.****12**

- A) Consider a logical address space of 8 pages of 1024 words each, mapped on to a physical memory of 32 frames. (3) **6**

How many bits are there in the logical address?

How many bits are there in the physical address?

- B) A process references 6 pages 1, 2, 3, 4, 5, 6 in the following order (3) **6**
- 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6

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

- C) Explain with the help of supporting diagram how TLB improves the performance of a demand paging system. (2) **6**

**Q. 5 Solve Any Two of the following.****12**

- A) Consider two files systems A and B, that use contiguous allocation and linked allocation, respectively. A file of size 100 blocks is already stored in A and also in B. Now, consider inserting a new block in the middle of the file (between 50th and 51st block), whose data is already available in the memory. Assume that there are enough free blocks at the end of the file and that the file control blocks are already in memory. Let the number of disk accesses required to insert a block in the middle of the file in A (3) **6**



and B are  $n_A$  and  $n_B$  respectively, then the calculate value of  $n_A + n_B$ .

- B)** Suppose that a disk drive has 200 cylinders, numbered 0 to 199. the drive currently services a request at cylinder 50, and the previous request was at cylinder 25. the queue of pending request in FIFO order is 82,170,43,140,24,16,190 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) SSFT iii) SCAN iv)LOOK v) C-SCAN vi) C-LOOK. (3) 6
- C)** What are the three methods for allocating disk space? Explain with help each method suitable diagram, merits and demerits. (2) 6

\*\*\* End \*\*\*

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**

**Regular & Supplementary Summer 2024**

**Course: B. Tech.**

**Branch : Computer and Allied**

**Semester: IV**

**Subject Code & Name: BTCOC402**

**Operating Systems**

**Max Marks: 60**

**Date: 14/06/2023**

**Duration: 3 Hr.**

**Instructions to the Students:**

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Write proper Syntax, example and program wherever necessary.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

**Q.1 Solve Any Two of the following.**

**12**

- A) Explain operating services with respect to programs and users. **Remember** 6
- B) Explain Real time operating system with its types, advantages and examples. **Synthesis** 6
- C) Explain microkernel type operating system structure. **Understanding** 6

**Q.2 Solve Any Two of the following.**

**12**

- A) What is thread? Differentiates between user level thread and kernel level thread. **Synthesis** 6
- B) What is inter- process communication in operating System? Explain its types. **Understanding** 6
- C) Consider the set of 5 processes whose arrival time and burst time are given below **Apply** 6

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

If the CPU scheduling policy is priority preemptive, calculate the average waiting time and average turnaround time. (Higher priority number represents higher priority).

**Q.3 Solve Any Two of the following.**

**12**

- A) Illustrate Peterson's Solution for critical section problem. **Analysis** 6
- B) How the readers and writers problem can be solved using semaphore? **Evaluate** 6

- C) Considering a system with five processes P0 through P4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t following snapshot of the system has been taken: Find...

**Apply**

6

Process	Allocation			Max			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			

- What will be the content of the Need matrix?
- Is the system in a safe state? If Yes, then what is the safe sequence?

**Q.4 Solve Any Two of the following.**

12

- What is demand paging? Explain the steps in handling page fault using appropriate diagram.
- Write short on:
  - Working set model.
  - Fragmentation
- Assume three frames and consider the reference page string below.  
Reference page string: 5, 7, 6, 0, 7, 1, 7, 2, 0, 1, 7, 1, 0  
Determine the number of page faults using optimal and least recently used page replacement algorithm. State which algorithm is most efficient?

**Remember**

6

**Knowledge**

6

**Application**

6

**Q.5 Solve Any Two of the following.**

12

- Explain the linked allocation type disk free space management.
- Explain the contiguous and indexed file allocation methods.
- Explain following disk scheduling techniques with its advantages ...
  - Shortest Seek Time First
  - SCAN

**Remember**

6

**Analysis**

6

**Understanding**

6

\*\*\* End \*\*\*

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**

**Supplementary Winter Examination – 2024**

**Course: B.Tech**

**Branch : Computer Science & Engineering and Allied**

**Semester :IV**

**Subject Code & Name: BTCOC402 Operating system**

**Max Marks: 60**

**Date: 21/12/2024**

**Duration: 3 Hr.**

**Instructions to the Students:**

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks		
<b>Q. 1</b>	<b>Objective type questions. (Compulsory Question)</b>		<b>12</b>		
1	_____ refers to the allocation of computer resources in time slots to several programs simultaneously.	CO1	1		
	<table border="1"> <tr> <td>a. Time sharing</td> <td>b. Batch processing</td> <td>c. Spooling</td> <td>d. Multiprogramming</td> </tr> </table>			a. Time sharing	b. Batch processing
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2	In process Management OS Perform _____.	CO2	1		
	<table border="1"> <tr> <td>a. process creation</td> <td>b. Process execution</td> <td>c. Process termination</td> <td>d. all of these</td> </tr> </table>			a. process creation	b. Process execution
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3	System call provides the services of the operating system to the user programs via _____.	CO1	1		
	<table border="1"> <tr> <td>a. API</td> <td>b. jump</td> <td>c. procedure</td> <td>d. interface</td> </tr> </table>			a. API	b. jump
a. API	b. jump	c. procedure	d. interface		
4	Which state of process defined "instructions are being executed".	CO2	1		
	<table border="1"> <tr> <td>a. Ready</td> <td>b. Waiting</td> <td>c. Running</td> <td>d. Terminate</td> </tr> </table>			a. Ready	b. Waiting
a. Ready	b. Waiting	c. Running	d. Terminate		
5	_____ scheduler is also called a job scheduler.	CO2	1		
	<table border="1"> <tr> <td>a. Long term</td> <td>b. medium term</td> <td>c. short tem</td> <td>d. Multilevel</td> </tr> </table>			a. Long term	b. medium term
a. Long term	b. medium term	c. short tem	d. Multilevel		
6	Which section in Peterson's Solution is responsible for ensuring that only one process can enter the critical section at a time?	CO3	1		
	<table border="1"> <tr> <td>a. Entry section</td> <td>b. Exit section</td> <td>c. Reminder section</td> <td>d. Critical section</td> </tr> </table>			a. Entry section	b. Exit section
a. Entry section	b. Exit section	c. Reminder section	d. Critical section		
7	A deadlock avoidance algorithm dynamically examines the _____ to ensure that a circular wait condition can never exist.	CO3	1		
	<table border="1"> <tr> <td>a. operating system</td> <td>b. resources</td> <td>c. system storage state</td> <td>d. resource allocation state</td> </tr> </table>			a. operating system	b. resources
a. operating system	b. resources	c. system storage state	d. resource allocation state		
8	The Wait for graph describes _____ precisely.	CO3	1		
	<table border="1"> <tr> <td>a. Wound wait</td> <td>b. deadlocks</td> <td>c. map</td> <td>d. Spin</td> </tr> </table>			a. Wound wait	b. deadlocks
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9	The base register is also known as the _____.				CO4	1																																																												
	a.regular register	b. relocation register	c. basic register	d. movement register																																																														
10	Working set model for page replacement is based on the assumption of _____.				CO4	1																																																												
	a.modularity	b. locality	c. reference	d. none of these																																																														
11	When two users keep a subdirectory in their own directories, the structure being referred to is _____ directory.				CO5	1																																																												
	a.tree structure	b. cyclic graph	c. acyclic graph	d. linear graph																																																														
12	File type can be represented by _____.				CO5	1																																																												
	a.file extension	b. file name	c. file identifier	d.file line																																																														
<b>Q. 2 Solve the following.</b>						<b>12</b>																																																												
A)	Explain microkernel structure of operating system with its advantages.				CO1	6																																																												
B)	What is distributed operating system? What are the advantages of distributed operating system?				CO1	6																																																												
<b>Q.3 Solve the following.</b>						<b>12</b>																																																												
A)	What do you mean by PCB? Where is it used? What are its contents?				CO2	6																																																												
B)	Explain Non preemptive priority scheduling round robin scheduling.				CO2	6																																																												
<b>Q. 4 Solve Any Two of the following.</b>						<b>12</b>																																																												
A)	What is semaphore? Explain binary semaphore and counting semaphore?				CO3	6																																																												
B)	Explain Peterson's solution to the critical section problem?				CO3	6																																																												
C)	In this example, we have a process table with a number of processes that has an allocation column (to show how many resources of type A, B, and C are allocated to each process in the table), a max field (to show how many resources of type A, B, and C can be allotted to each process), and an available field (for showing the currently available resources of each type in the table).				CO3	6																																																												
<table><tr><th>Process</th><th colspan="3">Allocation</th><th colspan="3">Max</th><th colspan="3">Available</th></tr><tr><th></th><th>A</th><th>B</th><th>C</th><th>A</th><th>B</th><th>C</th><th>A</th><th>B</th><th>C</th></tr><tr><td>P0</td><td>2</td><td>1</td><td>0</td><td>8</td><td>6</td><td>3</td><td>4</td><td>3</td><td>2</td></tr><tr><td>P1</td><td>1</td><td>2</td><td>2</td><td>9</td><td>4</td><td>3</td><td></td><td></td><td></td></tr><tr><td>P2</td><td>0</td><td>2</td><td>0</td><td>5</td><td>3</td><td>3</td><td></td><td></td><td></td></tr><tr><td>P3</td><td>3</td><td>0</td><td>1</td><td>4</td><td>2</td><td>3</td><td></td><td></td><td></td></tr></table>							Process	Allocation			Max			Available				A	B	C	A	B	C	A	B	C	P0	2	1	0	8	6	3	4	3	2	P1	1	2	2	9	4	3				P2	0	2	0	5	3	3				P3	3	0	1	4	2	3			
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We need to compute the following two things using the above processing table																																																																		



	Q.1 Construct the need matrix? Q.2 Is the system in safe state?		
<b>Q.5</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	With a diagram discuss the steps involved in handling a page fault.	CO4	6
B)	What is the purpose of the working set model? What happens when the sum of the working set sizes of all processes exceeds the total no. of frames in main memory?	CO4	6
C)	Consider a reference string: 4, 7, 6, 1, 7, 6, 1, 2, 7, 2. the number of frames in the memory is 3. Find out the number of page faults respective to: 1. Optimal Page Replacement Algorithm 2. LRU Page Replacement Algorithm	CO4	6
<b>Q. 6</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	Explain the contiguous allocation of file Implementation with merits and demerits.	CO5	6
B)	How does a linked list help in free space management?	CO5	6
C)	What is swap space management? State its advantages and disadvantages.	CO5	6
	<b>*** End ***</b>		