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**Code No: 135SC**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
**B. Tech III Year I Semester Examinations, January/February - 2023**
**OPERATING SYSTEMS**
**(Computer Science and Engineering)**

**Time: 3 hours** **Max. Marks: 75**

**Note:** i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.



## PART – A

**(25 Marks)**

| | | |
|---|---|---|
| 1.a) | How do clustered systems differ from multiprocessor systems? | [2] |
| b) | Show the purpose of system calls? | [3] |
| c) | What is the meaning of the term busy waiting? | [2] |
| d) | Show the process state diagram with two suspend states. | [3] |
| e) | List out the differences between logical and physical address space. | [2] |
| f) | Illustrate about Swapping. | [3] |
| g) | Write about the Acyclic graph directory. | [2] |
| h) | Define the terms seek time and rotational latency. | [3] |
| i) | What is Deadlock? How Deadlock can be avoided? | [2] |
| j) | Demonstrate the principles of protection. | [3] |

## PART – B

**(50 Marks)**

2.a) Explain the three main purposes of an operating system.
b) Discover the three major activities of an operating system with regard to memory management. [5+5]

**OR**

3.a) Distinguish between the client–server and peer-to-peer models of distributed systems.
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. [4+6]

4. Following is the snapshot of a CPU

| Process | CPU Burst | Arrival Time |
|---|---|---|
| P1 | 10 | 0 |
| P2 | 29 | 1 |
| P3 | 03 | 2 |
| P4 | 07 | 3 |

Construct the Gantt chart and calculate the turnaround time and waiting time of the processes using the following scheduling algorithms: a) FCFS b) SJF c) RR (with time quantum=5). [3+3+4]

**OR**

5.a) Evaluate that, if the wait() and signal() semaphore operations are not executed atomically, then mutual exclusion may be violated.

b) List out the differences between pre-emptive and non-pre-emptive scheduling. [6+4]

6.a) Consider the page reference string 1, 0, 2, 5, 3, 0, 1, 0, 2, 4, 0, 3, 0, 4, 2, 4, 3, 4, 1, 4, 0. How many page faults occur for the Optimal and LRU Page replacement algorithms with 4 frames each?

b) Explain first, best fit memory allocation techniques. [7+3]

**OR**

7.a) What is Thrashing? Explain the Causes of Thrashing.

b) Discuss in detail about various page table structures. [5+5]

8. Explain the following disk scheduling algorithm with proper diagram

a) FCFS c) SCAN e) C-SCAN.

b) SSTF d) LOOK [10]

**OR**

9. Discuss the following:

a) Contiguous

b) Linked file allocation methods. [5+5]

10. Consider a system with three processes and four resources. Resource R1 and R3 with one instance, R2 with two instance, process P1 holding an instance of R2 and waiting for R1, process P2 is holding an instance of R1 and R2 and waiting for R3,process P3 is holding an instance of R3.

a) Examine resource allocation graph to the given system.

b) Is it possible to apply the Resource allocation graph algorithm to avoid deadlock? Explain. [5+5]

**OR**

11.a) What is access matrix? Explain the various methods to implement it.

b) Analyze the importance of Capability-Based Protection system. [5+5]

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