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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## June 2025 Semester End Main Examinations

**Programme: B.E.** **Semester: IV**
**Branch: Information Science and Engineering** **Duration: 3 hrs.**
**Course Code: 22IS4PCOPS** **Max Marks: 100**
**Course: Operating System**

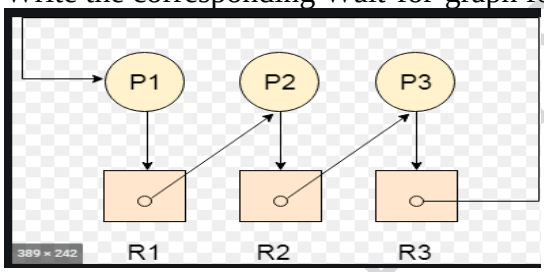
**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | UNIT - I | CO | PO | Marks |
|---|---|---|---|---|---|
| 1 | a) | Summarize the operating system services that ensures efficient operation with respect to user and system with a neat diagram. | CO1 | | 10 |
| | b) | Differentiate between Long term and Short term schedulers. | CO1 | | 5 |
| | c) | Explain Distributed system with suitable examples. | CO1 | | 5 |
| | | **OR** | | | |
| 2 | a) | Demonstrate the mode of operation where the Operating system can protect itself and other system components with a neat diagram. | CO2 | CO1 | 10 |
| | b) | Explain client server computing with a neat diagram. | CO1 | | 5 |
| | c) | Explain the role of an OS with respect to user view and system view? | CO1 | | 5 |
| | | **UNIT - II** | | | |
| 3 | a) | State the Reader's Writer's Problem and give a solution for the same using Semaphores. Write the structure for Reader and Writer process | CO2 | CO1 | 10 |
| | b) | Summarize the requirements that a critical section problem must satisfy. Illustrate the general structure of a typical process Pi. | CO2 | CO1 | 5 |
| | c) | Explain the benefits of Multithreading. | CO1 | | 5 |
| | | **OR** | | | |
| 4 | a) | State the Dining philosopher's problem and give a solution for the same using semaphores. What are the constraints to be met for a philosopher? Also, write the structure of philosopher i. | CO2 | CO1 | 10 |
| | b) | Differentiate Direct and Indirect communication in IPC. | CO1 | | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | c) | Explain the various Process states with a neat diagram. | *CO1* | | **5** |
| | | | **UNIT - III** | | | |
| | 5 | a) | Assume we have the following process to execute with one processor.<br>Suppose the scheduling is RR (with time quantum 10 ms) and SJF scheduling (both pre-emptive and non-pre-emptive).<br>i) Draw the Gantt chart illustrating the execution of the processes.<br>ii) Compute the average waiting time and average turnaround time of the processes for the above scheduling? | *CO3* | *CO2* | **10** |
| | | b) | Check whether the given resource allocation graph is safe or not? Write the corresponding Wait-for-graph for the same. | *CO3* | *CO2* | **5** |
| | | c) | CPU scheduling algorithms must satisfy few **scheduling criteria**. Elucidate the same. | *CO1* | | **5** |
| | | | **OR** | | | |
| | 6 | a) | **Consider the following snapshot of a system:**<br>i. Calculate the content of the need matrix?<br>ii. Is the system in a safe state?<br>iii. Determine the total amount of resources of each type? | *CO3* | *CO2* | **10** |

| Process | Burst time (ms) | Arrival time (ms) |
|---|---|---|
| P0 | 75 | 0 |
| P1 | 40 | 10 |
| P2 | 25 | 10 |
| P3 | 30 | 55 |
| P4 | 45 | 95 |




| **Processes** | **Allocation** A B C | **Max** A B C | **Available** A B C |
|---|---|---|---|
| **$P_0$** | **1 1 2** | **4 3 3** | **2 1 0** |
| **$P_1$** | **2 1 2** | **3 2 2** | |
| **$P_2$** | **4 0 1** | **9 0 2** | |
| **$P_3$** | **0 2 0** | **7 5 3** | |
| **$P_4$** | **1 1 2** | **1 1 2** | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | b) | State the advantages and disadvantages of FCFS and SJF Scheduling algorithm. | *CO1* | | **6** |
| | | c) | Describe the necessary conditions for a deadlock situation to arise in a system. | *CO1* | | **4** |
| | | | **UNIT - IV** | | | |
| | 7 | a) | Given page reference string:<br>1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6<br>Compare the number of page faults for LRU and Optimal page replacement algorithm. | *CO4* | *CO2* | **10** |
| | | b) | Elucidate Hashed Page table and Inverted Page table. | *CO1* | | **10** |
| | | | **OR** | | | |
| | 8 | a) | Consider the Pages referenced by the CPU in the order are **6, 7, 8, 9, 6, 7, 1, 6, 7, 8, 9, 1, 7, 9, 6.** Given the frame size 3. Find the number of Page Faults for the following Page replacement algorithms. Also Compare their performance.<br>**(i) Least Recently Used (LRU) (ii) Optimal** | *CO4* | *CO2* | **10** |
| | | b) | Explain Thrashing in Operating System. | *CO1* | | **5** |
| | | c) | Illustrate how Segmentation is handled in Main memory with a neat diagram. | *CO1* | | **5** |
| | | | **UNIT - V** | | | |
| | 9 | a) | If the Disk requests are arrived in the order 82,170,43,140,24,16,190 then what will the total head movement if the OS use SCAN and C-SCAN disk scheduling algorithm if current head position is 50. | *CO4* | *CO2* | **10** |
| | | b) | Explain the different levels of directory structures in Operating System. | *CO1* | | **10** |
| | | | **OR** | | | |
| | 10 | a) | Illustrate LOOK and C-LOOK scheduling algorithms with a request queue 98, 183, 37, 122, 14, 124, 65, 67. Disk drive is numbered from 0-199 with a total of 200 cylinders. Currently, Head pointer is at 53. | *CO4* | *CO2* | **10** |
| | | b) | Explain Linked Free space management scheme. | *CO1* | | **5** |
| | | c) | List and explain any five file attributes. | *CO1* | | **5** |

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