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PRESIDENCY UNIVERSITY BENGALURU

 SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

 MAKEUP EXAMINATION - JULY 2024

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| **Semester : 4th Semester** | **Date : 03/07/2024** |
| **Course Code : CSE2010/CSE210** | **Time : 1:30 PM to 4:30 PM** |
| **Course Name : Operating Systems** | **Max Marks : 100** |
| **Program : B.Tech** | **Weightage : 50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** |
|  **ANSWER ANY 4 QUESTIONS 4Q X 5M=20M** |
| 1 | Define Operating System. With a diagram explain the use of operating system in working of application software and system software | (CO 1) | [Knowledge] |
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| 2 | Explain the advantages and disadvantages of Layered and Micro-kernel structure of Operating System implementation. | (CO 1) | [Knowledge] |
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| 3 | Explain different states of a process, with the help of a diagram. When does the transition take place from each state to next state? | (CO 2) | [Knowledge] |
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| 4 | What is a Critical section? Explain the conditions that must be satisfied by a solution for Critical section problem. | (CO 3) | [Knowledge] |
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| 5 | Define Swapping? Why swapping is required? | (CO 4) | [Knowledge] |
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| 6 | Define i) Loader ii) Linker iii) Non-Contiguous Memory allocation iv)Demand Paging v) Page Replacement | (CO 4) | [Knowledge] |
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| **PART B** |
|  **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** |
| 7 | Explain various services offered by operating system with the help of suitable diagram. | (CO 1) | [Comprehensive] |
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| 8 | What is interprocess communication? Explain the types of IPC and analyze their benefits. | (CO 2) | [Comprehensive] |
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| 9 | Analyze the different threading issues. | (CO 2) | [Comprehensive] |
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| 10 | Explain Peterson’s solution for critical section problem. How does it satisfy the requirements of critical section problem’s solution? | (CO 3) | [Comprehensive] |
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| 11 | Explain Safety algorithm and Resource-Request algorithm. | (CO 3) | [Comprehensive] |
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| 12 | Analyze the procedure followed in Demand paging with diagram. Why is it necessary? | (CO 4) | [Comprehensive] |
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| 13 | Explain the types of fragmentation? What is compaction, how is it related to fragmentation. | (CO 4) | [Comprehensive] |
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| **PART C** |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** |
| 14 | Illustrate and explain context switching. Suppose a system has the following processes with given burst time and arrival time –

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| --- | --- | --- |
| Process | Arrival Time(m sec) | Burst Time(m sec) |
| P1 | 0 | 6 |
| P2 | 1 | 3 |
| P3 | 2 | 1 |
| P4 | 3 | 4 |
| P5 | 4 | 5 |

1. Calculate the average turn around time and average waiting time of the system, if the system uses First Come First Serve(FCFS), Shortest Remaining Time First (SRTF).
2. Calculate the number of context switches in each of the above cases.
 | (CO 2) | [Application] |
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| 15 | Determine whether the following system is in safe state by using Banker’s algorithm.

|  |  |  |  |
| --- | --- | --- | --- |
| Process | Allocated Resources | Max. requirements | Available resources |
| R1 | R2 | R3 | R1 | R2 | R3 | R1 | R2 | R3 |
| P1 | 0 | 1 | 0 | 7 | 5 | 3 | 3 | 3 | 2 |
| 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 |  |  |  |

If a request for P1 arrives for (1,0,2), can the request be granted immediately? | (CO 3) | [Application] |
|  |
| 16 | Suppose the processor request for the following sequence of pages in a system : 2, 4, 3, 2, 1, 3, 4, 0, 2, 3, 4, 5, 1, 2, 4, 5. Calculate the number of page faults (page miss) and page fault rate, if the system uses replacement algorithms such as Least Recently Used, Optimal, First In First Out.**Note** that there are three frames and all frames are initially empty. | (CO 4) | [Application] |
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