**SRM Institute of Science and Technology**

Mode of Exam

**OFFLINE**

**College of Engineering and Technology**

**School of Computing**

**DEPARTMENT OF COMPUTING TECHNOLOGIES**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

**Academic Year: 2021-2022 (EVEN)**

**Test:** CLAT-2 **Date: 26-5-2022**

**Course Code & Title:** 18CSC205J: Operating systems **Duration:** 2 Period

**Year & Sem:** II & IV **Max. Marks:** 50 Marks

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course Outcomes (CO): | | | | | | | *At the end of this course, learners will be able to:* | | | | | | | | | |  |
| CO-2 : | | *Implement synchronization and scheduling in Operating System* | | | | | | | | | | | | | | |
| CO-3 : | | *Apply fragmentation, paging and segmentation in memory management* | | | | | | | | | | | | | | |  |
| Program Outcomes (PO) | | | | | | | | | | | | | |  | | |
| 1 | 2 | | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | 10 | 11 | 12 | PSO | | |
| Engineering Knowledge | Problem Analysis | | Design & Development | Analysis, Design, Research | Modern Tool Usage | Society & Culture | | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO - 1 | PSO - 2 | PSO – 3 |
| *2* | *1* | | *3* |  |  |  | |  |  |  |  |  |  |  | *2* |  |
| *3* | *2* | | *2* |  |  |  | |  |  |  |  |  |  | *2* |  |  |

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| **Part - A**  **(10 x 1 = 10 Marks)**  **Instructions: Answer all** | | | | | | |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** | **PI Code** |
| **1** | Which of the following are true   * 1. all unsafe states are deadlocks   2. An unsafe state may lead to a deadlock   3. All safe states are not deadlocks   4. A safe state may lead to a deadlock | 1 | L2 | 2 | 3 | 3.6.1 |
| **2** | The notation Pj--🡪Ri indicates that   * 1. Process j is requesting for resource i   2. Process i is requesting for resource j   3. Process j may request for resource i   4. Resource I is allocated to process j | 1 | L2 | 2 | 3 | 3.6.1 |
| **3** | There are 3 printers , 2 scanners, 7 disk drives and 3 card readers are available in a system. At time t0, following is the snapshot of the system   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | Allocation | | | | Maximum | | | | | printer | Scanner | Disk file | Card Reader | printer | Scanner | Disk file | Card Reader | | P0 | 1 | 0 | 3 | 0 | 1 | 1 | 3 | 1 | | P1 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 1 | | P2 | 1 | 0 | 2 | 0 | 1 | 0 | 3 | 0 | | P3 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | | P4 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 |   Find the available resources at time to   1. 1 printer 1 scanner and 2 disk files 2. 1 scanner 3 disk files and 1 card reader 3. 1 printer 1 scanner 2 disk files and 3 card readers 4. 2 printers 1 scanner 5 disk files and 3 card readers | 1 | L4 | 2 | 3 | 3.7.1 |
| **4** | The process requires less CPU-time for its execution is called as\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   1. I/O bounded process 2. CPU bounded process 3. Tight bounded process 4. Loose bounded process | 1 | L3 | 2 | 3 | 3.6.1 |
| **5** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Scheduler selects a process to the CPU for its execution.   1. Long-term scheduler 2. Short-term scheduler 3. Medium-term scheduler 4. Full-term scheduler | 1 | L2 | 2 | 3 | 3.5.1 |
| **6** | The process exists as a single block of sequential addresses are called \_\_\_\_\_\_\_   1. Non-Contiguous Allocation 2. Contiguous Allocation   c. Multiple Partition Allocation  d. Both a and c | 1 | L1 | 3 | 1 | 1.6.1 |
| **7** | External fragmentation can be reduced by \_\_\_\_\_\_  a. Segmentation  b. Fixed partition  c. Dynamic Partition  d.Compaction | 1 | LL1 | 3 | 1 | 1.6.1 |
| **8** | What is the condition to check whether the segment number is legal or not?  a. S > STLR  b.S < STLR  c. S >= STLR  d. S < STBR | 1 | L2 | 3 | 1 | 1.6.1 |
| **9** | Page table is kept in \_\_\_\_\_\_  a. Main Memory  b. Secondary Memory  c. Flash Memory  d. Cache Memory | 1 | L1 | 3 | 1 | 1.6.1 |
| **10** | Two memory access problem can be solved using \_\_\_\_\_\_\_\_\_\_.  a. Cache  b. Flash  c. TLB  d. HDD | 1 | L1 | 3 | 1 | 1.6.1 |
| **Part – B**  **(4 x 5 = 20 Marks)**  **Instructions: Answer any 4** | | | | | | |
| **11** | Consider a system consisting of processes P1, P2, ..., Pn, each of which has a unique priority number. Write a monitor that allocates three identical printers to these processes, using the priority numbers for deciding the order of allocation. | 5 | L2 | 2 | 3 | 3.7.1 |
| **12** | Five processes , a printer, a scanner , a card reader, a disk file and a disk drive is available in a system. The requests and the allocations are given in the following table    Draw the resource allocation graph for this system. Draw the wait-for graph and check whether a deadlock is detected. | 5 | L5 | 2 | 3 | 3.7.1 |
| **13** | When do page faults occur? Describe the actions taken by the operating system when a page fault occurs. | 5 | L3 | 3 | 2 | 2.7.1 |
| **14** | Calculate the number of bits required in the address for memory having size of 16 GB. Assume the memory is 4-byte addressable. | 5 | L3 | 3 | 3 | 3.7.1 |
| **15** | Draw the Gantt chart for the following scenario (using Round robin algorithm) with time slot “3”.    Also find the average waiting time. | 5 | L5 | 2 | 3 | 3.7.1 |
| **Part – C**  **(2 x 10 = 20 Marks)**  **Instructions: Answer All** | | | | | | |
| **16(a)** | Consider the following snapshot of a system:   |  |  |  |  | | --- | --- | --- | --- | | Process | Allocation | Max | Available | | A B C D | A B C D | A B C D | | P0 | 2 0 0 1 | 4 2 1 2 | 3 3 2 1 | | P1 | 3 1 2 1 | 5 2 5 2 |  | | P2 | 2 1 0 3 | 2 3 1 6 |  | | P3 | 1 3 1 2 | 1 4 2 4 |  | | P4 | 1 4 3 2 | 3 6 6 5 |  |   Answer the following questions using the banker’s algorithm:  a. Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete.  b. If a request from process *P*1 arrives for (1*,* 1*,* 0*,* 0), can the request be granted immediately?  c. If a request from process *P*4 arrives for (0*,* 0*,* 2*,* 0), can the request be granted immediately? | 10 | L5 | 2 | 3 | 3.7.1 |
| **(OR)** | | | | | | |
| **16(b)** | Consider a scenario where the following processes are arriving in the given time and their CPU burst is given in the milliseconds    Which of the following algorithm would be more suitable for this given scenario to yield best average waiting and average turnaround time?   1. Shortest remaining time first 2. Shortest job first   Justify your answer whether the preemptive scheduling or non-preemptive scheduling work well for this case. And also specify the difference in the average waiting time by those two algorithm. | 10 | L5 | 2 | 3 | 3.7.1 |
| 17(a) | Associate the technique used for Structuring the page table,  Case 1: There might be a case where the page table is too big to fit in a contiguous space may have a hierarchy with several levels.  Case 2: Identify the approach is used to handle address spaces that are larger than 32 bits. | 10 | L2 | 3 | 3 | 3.7.1 |
| **(OR)** | | | | | | |
| 17(b) | In an Operating system, the OS doesn't care about the User's view of the process. It may divide the same function into different pages and those pages may or may not be loaded at the same time into the memory. It decreases the efficiency of the system. So identify which technique is suitable to overcome the drawback and also helps out in better efficiency and performances. | 10 | L4 | 3 | 3 | 3.7.1 |

**Course Outcome (CO) and Bloom’s level (BL) Coverage in Questions**

**Approved by the Audit Professor/Course Coordinator**