**SRM Institute of Science and Technology**

Mode of Exam

**OFFLINE**

**SET A**

**College of Engineering and Technology**

**School of Computing**

**DEPARTMENT OF COMPUTING TECHNOLOGIES**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

**Academic Year: 2021-2022 (EVEN) Reg. No.:**

**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** | | Four jobs to be executed on a single processor system arrive at time 0 in the order A, B, C, D. Their burst CPU time requirements are 4, 1, 8, 1 time units respectively. The completion time of A under round robin scheduling with time slice of one time unit is-   1. 10 2. 4 3. 8 4. 9 | **1** | **5** | **2** | **3** | **3.6.1** |
| **2** | | Which of the following characteristics wrong in round robin scheduling algorithm?   1. Round Robin Scheduling algorithm resides under the category of Non-Preemptive Algorithms. 2. This algorithm is one of the oldest, easiest, and fairest algorithm. 3. This Algorithm is a real-time algorithm because it responds to the event within a specific time limit. 4. In this algorithm, the time slice should be the maximum that is assigned to a specific task that needs to be processed. Though it may vary for different operating systems. 5. This is a hybrid model and is clock-driven in nature. 6. This is a widely used scheduling method in the traditional operating system. 7. a. A and C 8. b. B and D 9. c. A and D 10. d. E and F | **1** | **4** | **2** | **3** | **3.6.1** |
| **3** | | The performance of the round robin heavily depends upon   1. Size of the process 2. The I/O burst of the process 3. The CPU burst of the process 4. The size of the time quantum | **1** | **1** | **2** | **3** | **3.6.1** |
| **4** | | Which of the following statement is correct related to Multilevel queue scheduling algorithm?   1. The processes are permanently assigned to the queue, so it has advantage of low scheduling overhead. 2. Some processes may starve for CPU if some higher priority queues are never becoming empty. 3. **Ready Queue** is divided into three queues for each class of processes 4. **Each queue follow same scheduling algorithm.** 5. a and b 6. c and d 7. d and b 8. b and c | **1** | **3** | **2** | **3** | **3.6.1** |
| **5** | | In round robin scheduling as time quantum is increased the average turnaround time.   1. Increases 2. Decreases 3. Remains constant 4. Varies irregularly | **1** | **2** | **2** | **3** | **3.6.1** |
| **6** | | ---------------is the advantage and drawback of the “first fit”.   1. First fit is the fastest but results in internal fragmentation. 2. First fit is the fastest but results in external fragmentation. 3. First fit is the memory-efficient but slowest. 4. First fit is the fastest but more computation is required. | **1** | **1** | **3** | **1** | **1.6.1** |
| **7** | | -----------------generates the logical address.   1. MMU 2. CPU 3. OS 4. User | **1** | **1** | **3** | **1** | **1.6.1** |
| **8** | | -------------are the functions of the Memory Management Unit.  1. Mapping of the logical address to physical address during run time.  2. Allocates the free memory space to the process and deallocates after the execution of the process.   1. 1 is true 2. 2 is true 3. Both 1 and 2 are true 4. Both the statements are false. | **1** | **1** | **3** | **1** | **1.6.1** |
| **9** | | What are the effects of increasing the size of RAM?  1. More efficient in multiprocessing.  2. Size of the virtual memory decreases  3. The number of page faults decreases   1. Statements 1 and 2 are true 2. Statements 1 and 3 are true 3. Statements 2 and 3 are true 4. Statements 1 and 2 are false | **1** | **1** | **3** | **1** | **1.6.1** |
| **10** | | Compaction is used to overcome  a. Internal fragmentation  b. External fragmentation  c. Page fault  d. Fatal error | **1** | **1** | **3** | **1** | **1.6.1** |
| **Part – B**  **(4 x 5 = 20 Marks)**  **Instructions: Answer any 4** | | | | | | | |
| **11** | Compare Multilevel queue scheduling and Multilevel feedback scheduling algorithm with neat diagram and justify which one is best. | | **5** | **2** | **2** | **3** | **3.6.2** |
| **12** | Suppose the following two processes, foo and bar are executed concurrently and share the semaphore variables S and R (each initialized to 1) and the integer variable x (initialized to 0).    a. Can the concurrent execution of these two processes result in one or both being blocked forever? If yes, give an execution sequence in which one or both are blocked forever.  b. Can the concurrent execution of these two processes result in the indefinite postponement of one of them? If yes, give an execution sequence in which one is indefinitely postponed. | | **5** | **4** | **2** | **3** | **3.6.2** |
| **13** | What is the effect of allowing two entries in a page table to point to the same page frame in memory? Explain how this effect could be used to decrease the amount of time needed to copy a large amount of memory from one place to another. What effect would be updating some byte on the one page have on the other page? | | **5** | **3** | **3** | **1** | **1.7.1** |
| **14** | Consider a system in which a program can be separated into two parts: code and data. The CPU knows whether it wants an instruction (instruction fetch) or data (data fetch or store). Therefore, two base– limit register pairs are provided: one for instructions and one for data. The instruction base–limit register pair is automatically read-only, so programs can be shared among different users. Discuss the advantages and disadvantages of this scheme. | | **5** | **3** | **3** | **2** | **2.6.2** |
| **15** | A certain computer system has the segmented paging architecture for virtual memory. The memory is byte addressable. Both virtual and physical address spaces contain 216 bytes each. The virtual address space is divided into 8 non-overlapping equal size segments. The memory management unit (MMU) has a hardware segment table, each entry of which contains the physical address of the page table for the segment. Page tables are stored in the main memory and consist of 2 byte page table entries. What is the minimum page size in bytes so that the page table for a segment requires at most one page to store it? | | **5** | **5** | **3** | **3** | **3.7.1** |
| **Part – C**  **(2 x 10 = 20 Marks)**  **Instructions: Answer All** | | | | | | | |
| **16 [a]** | Consider the set of 5 processes whose arrival time and burst time are given below-    If the CPU scheduling policy is Round Robin with time quantum = 2 unit, calculate the average waiting time and average turnaround time.  If time Quantum is increase in round robin what happens? Justify.  **[OR]** | | **10** | **3** | **2** | **3** | **3.6.4** |
| **16 [b]** | Two processes, P1 and P2, need to access a critical section of code. Consider the following synchronization construct used by the processes:    Here, wants1 and wants2 are shared variables, which are initialized to false. Which one of the following statements is TRUE about the above construct by considering all the following statements by giving proper justification for each statement?  (A) It does not ensure mutual exclusion.  (B) It does not ensure bounded waiting.  (C) It requires that processes enter the critical  section in strict alternation.  (D) It does not prevent deadlocks, but ensures mutual exclusion. | | **10** | **3** | **2** | **3** | **3.7.1** |
| **17 [a]** | Suppose a 16 bit address is used with 4 bits for the segment number and 12 bits for the segment offset so the maximum segment size is 4096 and the maximum number of segments that can be refereed is 16.  **[OR]** | | **10** | **4** | **3** | **3** | **3.6.2** |
| **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** | **4** | **3** | **3** | **3.6.2** |

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

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