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**Sample Question Format**

**KIIT Deemed to be University**

**Online Mid Semester Examination(Spring Semester-2021)**

**Subject Name & Code:** CS2002 & Operating Systems **Applicable to Courses:** B. Tech

**Full Marks=20** **Time:1 Hour**

**SECTION-A(Answer All Questions. All questions carry 2 Marks)**

**Time:20 Minutes (5×2=10 Marks)**

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| **Question No** | **Question Type(MCQ/SAT)** | **Question** | **Answer Key (if MCQ)** | **CO Mapping** |
| **Q.No:1(a)** | **MCQ** | Consider system that uses multilevel feedback queue scheduling algorithm. It uses several queues with initial queue time quantum 5ms and the time quantum of each level of the queue is incremented by 5ms gradually. Each queue uses SJF scheduling algorithm for scheduling the processes. Consider three CPU bound processes with following arrival time and burst time as given below. Compute the order of completion of these processes and on which queue P1 process complete its execution.   |  |  |  | | --- | --- | --- | | Process | Arrival Time | Burst Time | | P1 | 5 | 12 | | P2 | 0 | 5 | | P3 | 10 | 10 |  1. P1, P2, P3 & 1st queue 2. P2, P1, P3 & 2nd queue 3. P3, P2, P1 & 3rd queue 4. None of these | B |  |
|  | **MCQ** | Consider system that uses multilevel feedback queue scheduling algorithm. It uses several queues with initial queue time quantum 5ms and the time quantum of each level of the queue is incremented by 5ms gradually. Each queue uses SJF scheduling algorithm for scheduling the processes. Consider three CPU bound processes with following arrival time and burst time as given below. Compute the order of completion of these processes and on which queue P3 process complete its execution.   |  |  |  | | --- | --- | --- | | Process | Arrival Time | Burst Time | | P1 | 5 | 10 | | P2 | 5 | 5 | | P3 | 0 | 7 |  1. P1, P2, P3 & 2nd Queue 2. P2, P1, P3 & 1st Queue 3. P3, P2, P1 & 2nd Queue 4. None of these | C |  |
|  | **MCQ** | Consider system that uses multilevel feedback queue scheduling algorithm. It uses several queues with initial queue time quantum 5ms and the time quantum of each level of the queue is incremented by 5ms gradually. Each queue uses SJF scheduling algorithm for scheduling the processes. Consider three CPU bound processes with following arrival time and burst time as given below. Compute the order of completion of these processes and on which queue P3 process complete its execution.   |  |  |  | | --- | --- | --- | | Process | Arrival Time | Burst Time | | P1 | 5 | 12 | | P2 | 0 | 5 | | P3 | 5 | 10 |  1. P2, P3, P1 & 2nd Queue 2. P2, P1, P3 & 3rd Queue 3. P3, P2, P1 & 1st Queue 4. None of these | A |  |
|  | **MCQ** | Consider system that uses multilevel feedback queue scheduling algorithm. It uses several queues with initial queue time quantum 5ms and the time quantum of each level of the queue is incremented by 5ms gradually. Each queue uses SJF scheduling algorithm for scheduling the processes. Consider three CPU bound processes with following arrival time and burst time as given below. Compute the order of completion of these processes and on which queue P3 process complete its execution.   |  |  |  | | --- | --- | --- | | Process | Arrival Time | Burst Time | | P1 | 5 | 12 | | P2 | 5 | 5 | | P3 | 10 | 10 |  1. P1, P2, P3 & 1st Queue 2. P2, P3, P1 & 2nd Queue 3. P3, P2, P1 & 3rd Queue 4. None of these | B |  |
| **Q.No:1(b)** | **MCQ** | Which of the following options are TRUE about interrupt?   1. Interrupt can be understood as a signal from a device causing context switch. 2. To handle the interrupts, interrupt handlers or service routines are required. 3. The address of each Interrupt service routine is provided in a list which is maintained in interrupt vector. 4. Interrupts details are maintained in a register | A, C |  |
|  | **MCQ** | Which of the following options are TRUE about a thread?   1. A thread is a basic unit of CPU utilization. 2. It consists of a thread ID 3. It consists of a program counter 4. It consists of a register set 5. It consists of a stack 6. It consists of I/O operations clock cycle details | A, B, C, D, E |  |
|  | **MCQ** | Choose the below correct options if the semaphore value is negative.   1. no operation can be further performed on it until the signal operation is performed on it 2. its magnitude is the number of processes waiting on that semaphore 3. it is invalid 4. None of the above | B |  |
|  | **MCQ** | Which of the following options are FALSE about interrupt?   1. Interrupt can be understood as a signal from a device causing context switch. 2. To handle the interrupts, interrupt handlers or service routines are required. 3. The address of each Interrupt service routine is provided in a list which is maintained in interrupt vector. 4. Interrupts details are maintained in a register | B, D |  |
| **Q.No:1(c)** | **MCQ** | Consider the below resource allocation graph with four number of processes and three resources with two instances each. Determine the below graph is deadlock or no deadlock. If deadlock, which processes are deadlocked?  7   1. P1, P3 are deadlocked 2. P1, P3, P4 are deadlocked 3. All of these are deadlocked 4. No Deadlock | D |  |
|  | **MCQ** | Consider the below resource allocation graph with two number of processes and two number of resources. Determine which processes are deadlocked?  3.jpg   1. P1, P2 are deadlocked 2. No Deadlock 3. P2 is deadlocked 4. P1 is deadlocked | B |  |
|  | **MCQ** | Consider the below resource allocation graph with four number of processes and three resources. Determine the below graph is deadlock or no deadlock. If deadlock, which processes are deadlocked?  8   1. P0, P2 are deadlocked 2. P1, P0, P2 are deadlocked 3. No Deadlock 4. All of these are deadlocked | C |  |
|  | **MCQ** | Consider the below resource allocation graph with three number of processes and four number of resources. Determine the below graph is deadlock or no deadlock. If deadlock, which processes are deadlocked?     1. P1, P2 are deadlocked 2. P2, P3 are deadlocked 3. All of these are deadlocked 4. No Deadlock | C |  |
| **Q.No:1(d)** | **MCQ** | A system shares 10 resources of same type among three processes. The current allocation and maximum requirement of resources for these three processes are given below:   |  |  |  | | --- | --- | --- | | Processes | Resources Allocated | Maximum Required | | P1 | 4 | 7 | | P2 | 2 | 5 | | P3 | 3 | 4 |   What will be the sequence of execution of the processes within these available resources?  A) P1, P2, P3  B) P2, P1, P3  C) P2, P3, P1  D) P1, P3, P2  E) None of these | E |  |
|  | **MCQ** | Consider a system with 4 processes share 9 instances of same resource type. Each process can request a maximum of k resources. Resources can be requested and released only one at a time. What will be the maximum value of k that will always avoid deadlock?  A) 2  B) 3  C) 4  D) 5  E) None of these | B |  |
|  | **MCQ** | Consider a system with n processes share 8 instances of same resource type. Each process can request a maximum of 3 resources. Which of the following value of n will lead to a deadlock?  A) 1  B) 2  C) 3  D) 4  E) None of these | D |  |
|  | **MCQ** | What is the minimum number of resources required to ensure that deadlock will never occur, if there are four processes P1, P2, P3 and P4 are running currently in the system whose maximum demand for resources of same type are 3, 5, 7, 8 respectively?  A) 18  B) 20  C) 21  D) 22  E) None of the above | B |  |
| **Q.No:1(e)** | **MCQ** | Consider a parent process P that has forked a child process C. Now, P terminates while C is still running. Which of the following options is TRUE?  A.   Will C immediately become a zombie?  B.   Will P immediately become a zombie, until reaped by its parent?  C.   Will C be terminated immediately after termination of P?  D.   P can’t be terminated before C terminates. | B |  |
|  | **MCQ** | Which of the following options is FALSE?  A.   A process in user mode cannot execute certain privileged hardware instructions.  B.   Can two processes be concurrently executing the same program executable?  C.   A context switch can occur only after processing a timer interrupt, but not after any other system call or interrupt.  D.   A C program can invoke the OS system calls by calling the C library routines. | C |  |
|  | **MCQ** | Which of the following steps do NOT occur always when a process makes a system call to transmit a TCP packet over the network?  A.   The process moves to kernel mode.  B.   The program counter of the CPU shifts to the kernel part of the address space.  C.   The process is context-switched out and a separate kernel process starts execution.  D.   The OS code that deals with handling TCP/IP packets is invoked. | C |  |
|  | **MCQ** | Which of the following options are TRUE?  A.   A process in user mode cannot execute certain privileged hardware instructions.  B.   Can two processes be concurrently executing the same program executable?  C.   A context switch can occur only after processing a timer interrupt, but not after any other system call or interrupt.  D. A C program can invoke the OS system calls by calling the C library routines. | A,B,D |  |

**SECTION-B(Answer Any One Question. Each Question carries 10 Marks)**

**Time: 30 Minutes** **(1×10=10 Marks)**

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| **Question No** | **Question** | **CO Mapping** |
| **Q.No:2** | Consider a system having 3 processors named CPU1, CPU2 and CPU3, where each processor is associated with one ready queue named RQ1, RQ2 and RQ3 respectively. The processes belongs to RQ1 are executed in Round robin fashion with quantum time 3. The processes belongs to RQ2 are executed in SRTF fashion. After 15 units of time, all the processes belongs to RQ1 and RQ2, along with the new incoming processes will join RQ3. In RQ3, the processes are executed in Round robin fashion with quantum time 2. First the processes belongs to RQ1 will enter into RQ3 followed by the processes in RQ2 and then the new incoming processes.  A set of 8 processes whose arrival time, burst time and initially assigned queues are as given below:   |  |  |  |  | | --- | --- | --- | --- | | **Process No.** | **Arrival Time** | **CPU Burst** | **Initially Assigned Queue** | | | P1 | 0 | 7 | RQ1 | | p2 | 5 | 6 | RQ1 | | P3 | 4 | 10 | RQ1 | | P4 | 0 | 8 | RQ2 | | P5 | AA | 6 | RQ2 | | P6 | 3 | 4 | RQ2 | | P7 | 15 | 7 | RQ3 | | P8 | 17 | 3 | RQ3 |   Calculate the waiting time and and completion time of each process.  Here, AA= (Your roll no) % 10 |  |
| **Q.No:3** | Consider a system having 3 processors named CPU1, CPU2 and CPU3, where each processor is associated with one ready queue named RQ1, RQ2 and RQ3 respectively. The processes belongs to RQ1 are executed in Round robin fashion with quantum time 3. The processes belongs to RQ2 are executed in SRTF fashion. After 15 units of time, all the processes belongs to RQ1 and RQ2, along with the new incoming processes will join RQ3. In RQ3, the processes are executed in Round robin fashion with quantum time 2. First the processes belongs to RQ1 will enter into RQ3 followed by the processes in RQ2 and then the new incoming processes.  A set of 8 processes whose arrival time, burst time and initially assigned queues are as given below:   |  |  |  |  | | --- | --- | --- | --- | | **Process No.** | **Arrival Time** | **CPU Burst** | **Initially Assigned Queue** | | | P1 | 0 | 7 | RQ1 | | p2 | 5 | 6 | RQ1 | | P3 | 4 | 10 | RQ1 | | P4 | 0 | 8 | RQ2 | | P5 | AA | 6 | RQ2 | | P6 | 3 | 4 | RQ2 | | P7 | 15 | 7 | RQ3 | | P8 | 17 | 3 | RQ3 |   Calculate the waiting time and and completion time of each process.  Here, AA= (Your roll no) % 5 |  |
| **Q.No:4** | Consider a system having 3 processors named CPU1, CPU2 and CPU3, where each processor is associated with one ready queue named RQ1, RQ2 and RQ3 respectively. The processes belongs to RQ1 are executed in Round robin fashion with quantum time 3. The processes belongs to RQ2 are executed in SRTF fashion. After 15 units of time, all the processes belongs to RQ1 and RQ2, along with the new incoming processes will join RQ3. In RQ3, the processes are executed in Round robin fashion with quantum time 2. First the processes belongs to RQ1 will enter into RQ3 followed by the processes in RQ2 and then the new incoming processes.  A set of 8 processes whose arrival time, burst time and initially assigned queues are as given below:   |  |  |  |  | | --- | --- | --- | --- | | **Process No.** | **Arrival Time** | **CPU Burst** | **Initially Assigned Queue** | | | P1 | 0 | 7 | RQ1 | | p2 | 6 | 5 | RQ1 | | P3 | AA | 10 | RQ1 | | P4 | 0 | 8 | RQ2 | | P5 | 6 | 6 | RQ2 | | P6 | 3 | 4 | RQ2 | | P7 | 15 | 7 | RQ3 | | P8 | 17 | 3 | RQ3 |   Calculate the waiting time and and completion time of each process.  Here, AA= (Your roll no) % 10 |  |
| **Q.No:5** | Consider the set of 4 processes whose priority(lower value becomes more priority), arrival time, and burst time are given below:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Process No.** | **Arrival Time** | **Priority** | **Burst Time** | | | | **CPU Burst** | **I/O Burst** | **CPU Burst** | | P1 | 0 | 2 | 3 | 1 | 2 | | p2 | 2 | x | 1 | 2 | 3 | | P3 | 3 | 3 | 2 | 4 | 1 | | P4 | 1 | y | 2 | 1 | 2 |     Here  x= (Your roll no) % 5  y= ((Your roll no) / 100) %5  For example, if roll no is **2106653**, then x=3 and y=1.  If the OS uses priority based Scheduling, then draw the gantt chart along with calculate the Response time, waiting time, and completion time of each process. (**Lower number means higher priority**) |  |
| **Q.No:6** | Consider the set of 4 processes whose priority(lower value becomes more priority), arrival time, and burst time are given below:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Process No.** | **Arrival Time** | **Priority** | **Burst Time** | | | | **CPU Burst** | **I/O Burst** | **CPU Burst** | | P1 | 0 | 2 | 3 | 1 | 2 | | p2 | 2 | x | 1 | 2 | 3 | | P3 | 3 | 3 | 2 | 4 | 1 | | P4 | 1 | y | 2 | 1 | 2 |     Here  x= (Your roll no) % 4  y= ((Your roll no) / 100) %4  For example, if roll no is **2106653**, then x=1 and y=2.  If the OS uses priority based Scheduling, then draw the gantt chart along with calculate the Response time, waiting time, and completion time of each process. (**Lower number means higher priority**) |  |
| **Q. No:7** | 1. Consider the set of 4 processes whose priority(lower value becomes more priority), arrival time, and burst time are given below:  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Process No.** | **Arrival Time** | **Priority** | **Burst Time** | | | | **CPU Burst** | **I/O Burst** | **CPU Burst** | | P1 | 0 | 2 | 3 | 1 | 2 | | p2 | 2 | y | 1 | 2 | 3 | | P3 | 3 | 3 | 2 | 4 | 1 | | P4 | 1 | x | 2 | 1 | 2 |   Here  x= (Your roll no) % 4  y= ((Your roll no) / 100) %4  For example, if roll no is **2106653**, then x=1 and y=2.  If the OS uses priority based Scheduling, then draw the gantt chart along with calculate the Response time, waiting time, and completion time of each process. (**Lower number means higher priority**) |  |

**Controller of Examinations**