**SET A**

**SRM University, Kattankulathur**

**Faculty of Engineering and Technology, Department of Information Technology**

**IT1017 – OPERATING SYSTEMS AND LINUX ADMINISTRATION**

**Cycle Test - II**

**Year/Sem : III/V Date : 2.9.2016**

**Time : 8:50 – 10:35 a.m Max. Marks : 50**

**Instructional Objectives:**

IO1. Understand the basic concepts and functions of operating systems

IO2. Understand how the resources are scheduled and managed

**Student Outcomes:**

i: An ability to use current techniques, skills, and tools necessary for computing practice.

**Sub outcome** i2: An ability to understand the design issues involved in the development of modern-day OS and incorporating the knowledge of process, memory and storage management.

**Outcome Analysis :**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Question 1 | Instructional Objective | Outcome | Sub Outcome | Maximum marks | Marks obtained |
| 1 | IO2 | i | i2 | 4 |  |
| 2 | IO2 | i | i2 | 4 |  |
| 3 | IO2 | i | i2 | 4 |  |
| 4 | IO2 | i | i2 | 4 |  |
| 5 | IO2 | i | i2 | 4 |  |
| 6 | IO2 | i | i2 | 4 |  |
| 7 | IO2 | i | i2 | 15 |  |
| 8 | IO2 | i | i2 | 15 |  |
| 9 | IO2 | i | i2 | 15 |  |
| 10 | IO2 | I | i2 | 15 |  |
|  | | | | Total |  |

**Part B (5\*4 :20 marks) SET A**

**Answer any 5 questions:**

1. List out and explain the various CPU scheduling criteria.
2. How a process status is maintained by an Operating systems? Explain the possible states a process can take up during its lifetime.
3. Define the term deadlock. Explain the various recovery methods for handling a Deadlock.
4. What is a spin lock ? How it is used to solve the critical section problem.
5. Write short notes on Threads.
6. Explain the two process solution for the critical section problem proposed by Peterson? List out the advantages and its disadvantages.

**Part C (2 \*15 : 30 marks)**

**Answer the following Questions:**

1. a. Define a race condition. With a suitable scenario explain the race condition. (5)

b. What is the problem encountered in priority scheduling. Explain the solution proposed for it. (5)

c. Solve the following using priority non-preemptive scheduling and compute the average waiting time and average turnaround time and idle time of the CPU. (5)

|  |  |  |  |
| --- | --- | --- | --- |
| Process No | Arraival time | Priority Number | Burst time |
| P0 | 2 | 5 | 5 |
| P1 | 2 | 4 | 3 |
| P2 | 3 | 1 | 2 |
| P3 | 4 | 1 | 6 |
| P4 | 5 | 2 | 5 |
| P5 | 6 | 3 | 6 |

OR

1. Write short notes on the following :
2. Producer – consumer problem using semaphores (7)
3. Starvation problem with respect to deadlocks (4)
4. Wait for graph (4)
5. a. Write the safe state algorithm and resource request algorithm for deadlock avoidance. (5)

b. Compute the safe state sequence for the given scenario. (5)

Available [A B C D]=[10 5 4 4] , Max and Allocation vectors are given below:

c. Check the request from P2 : < 1 3 1 0 > with respect to the resource types <A B C D > could be granted or not. If the request is granted, give the safe sequence (5)

**Allocation Max**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| process no | a | b | c | d |  | a | b | c | d |
| 1 | 3 | 2 | 1 | 0 |  | 5 | 5 | 1 | 0 |
| 2 | 2 | 1 | 0 | 0 |  | 4 | 2 | 0 | 1 |
| 3 | 2 | 0 | 1 | 1 |  | 4 | 3 | 2 | 2 |
| 4 | 1 | 0 | 0 | 1 |  | 2 | 0 | 1 | 1 |
| 5 | 0 | 1 | 0 | 1 |  | 0 | 1 | 1 | 2 |

OR

1. a. Explain the methods to recover from the deadlock ? (5)

b.What is a monitor? Explain the monitor solution for the dining philosophers problem. (10)

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**SET B**

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**Outcome Analysis :**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Question 1 | Instructional Objective | Outcome | Sub Outcome | Maximum marks | Marks obtained |
| 1 | IO2 | i | i2 | 4 |  |
| 2 | IO2 | i | i2 | 4 |  |
| 3 | IO2 | i | i2 | 4 |  |
| 4 | IO2 | i | i2 | 4 |  |
| 5 | IO2 | i | i2 | 4 |  |
| 6 | IO2 | i | i2 | 4 |  |
| 7 | IO2 | i | i2 | 15 |  |
| 8 | IO2 | i | i2 | 15 |  |
| 9 | IO2 | i | i2 | 15 |  |
| 10 | IO2 | I | i2 | 15 |  |
|  | | | | Total | 50 |

**Part B (5\*4 :20 marks) SET B**

**Answer any 5 questions:**

1. Define the term scheduler. List out and explain the different types of schedulers.

2.Explain the context-switch operation with a suitable diagram.

3.What is the critical section of a problem? What are the requirements that a solution to the Critical Section Problem must satisfy?

4.Explain the wait(s) and signal(s) with respect to semaphores.

5.Explain how a Kernel level thread varies from user level threads.

6.What is a Resource allocation graph? How it is used for deadlock avoidance.

**Part C (2 \*15 : 30 marks)**

**Answer the following Questions:**

1a.(i)Why Test and set (TSL) is called indivisible instruction? How it is used to solving the critical section problem. (4)

(ii)What is the notion of a medium term scheduler ? (4) (iii) Solve the following Round Robin scheduling and (7)

Compute average waiting time and the average turnaround time. Time Quantum = 4 milliseconds.

|  |  |
| --- | --- |
| Process No | Burst time |
| P0 | 16 |
| P1 | 6 |
| P2 | 9 |
| P3 | 7 |

OR

1b.Write short notes on the following :

(i) Bounded buffer problem (7)

(ii)Busy waiting with respect to Process synchronization (4)

(iii) Multilevel queue Scheduling (4)

2.a. (i) Write the deadlock detection Algorithm. (5)

(ii) How to prevent the deadlock. (5)

(iii) Apply the Bankers algorithm and compute the safe sate sequence. (5)

Available : [ A: 12 B: 7 C: 3 D: 5]

**Allocation Max**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| process no | a | b | c | d |  | a | b | c | d |
| 1 | 4 | 0 | 0 | 1 |  | 5 | 1 | 0 | 3 |
| 2 | 2 | 1 | 0 | 1 |  | 4 | 2 | 0 | 1 |
| 3 | 2 | 2 | 0 | 0 |  | 3 | 3 | 1 | 2 |
| 4 | 1 | 0 | 0 | 1 |  | 4 | 1 | 0 | 1 |
| 5 | 1 | 1 | 1 | 0 |  | 2 | 2 | 2 | 0 |

OR

2.b. (i) Illustrate how a binary semaphore can be used to implement mutual exclusion among N processes. (7)

(ii) Explain in detail the readers and writers problem using semaphores and write the pseudocode for the same. (8)