Mid-Semester Examination

School of Computer Engineering
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Q1)Answer all questions. [1×5]

(a)Why the FCFS scheduling is always non preemptive type?

Evaluation Scheme
Since a later coming process cannot better satisfy the scheduler criteria._____1 mark

(b) Two processes P_0 and P_1, share the following variables:

```
boolean key;
boolean lock ; /* initially false */
```

Structure of the processes is given below:

```
do {
key = True;
while(key == True)
{
Swap(&lock, &key);
}
// critical section
lock = True;
// remainder section
} while(True);
```

The Swap() is as follows:

```
void Swap(boolean *a, boolean *b)
{
boolean x = *a;
*a = *b;
 *b = x;
}
```

Whether the above mentioned algorithm ensure mutual exclusion requirement? Justify.

Evaluation Scheme
No:only one process will be able to enter the critical section only once:_____1 mark

(c)What are the benefits of threads over processes?

Evaluation Scheme
Benefits--context switching, creation_____1 mark

(d) If Round Robin is used with a time quantum of 2 seconds, what will be the turnaround time for the process P2 ?

Process	Next CPU Burst Time
P1	9 min

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P2	1 sec

Evaluation Scheme
Assuming execution sequence P1-->P2: turn around time of P2=3sec_____1 mark

(e)What is aging priority? Why is it used?

Evaluation Scheme
To avoid starvation: _____0.5 mark
Explanation_____0.5 mark

Q2) (a)Compare among different schedulers that can exist in an operating system? [2.5]

Evaluation Scheme
Marks to be awarded based on explanation on short term, long term and middle term schedulers.

(b)Consider the following snapshot of the system: [2.5]

Process	Next CPU Burst Time(ms)	Arrival Time
P1	10	0
P2	5	1
P3	2	2
P4	1	3

Using shortest remaining time first scheduling, find the waiting time of each process.

Evaluation Scheme
Order of Execution:

P1->P2->P3->P4->P2->P1

Waiting time
P1=0+8=8
P2=0+3=3
P3=0
P4=1

Marks to be awarded by looking into the correctness in order of execution_____1.5 mark
calculation of waiting time_____1 mark

Evaluation Scheme
Q3) What are the various states of a process? Explain about the state transitions of a process during its life. [5]

Explanation of different states like new, ready, running, waiting, terminate_____ 2.5 marks

State transition diagram and explanation_____2.5marks

Q4)What are the conditions for a solution to critical section problem? Design a solution to critical section problem involving 2-processes. Justify that the solution is satisfying the conditions. [5]

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Evaluation Scheme

Explanation of conditions like mutual exclusion, progress & bounded waiting: 2 marks
2-process solution 1 mark
Justification for the solution 2 marks

Q5) Consider the following processes arrived in a system. [5]

Process	Next CPU Burst Time(ms)	Arrival Time
A	4	0
B	5	1
C	6	2
D	3	3
E	1	4
F	4	5

Calculate the average waiting time of the processes if the scheduling algorithm is Round Robin with time slice length as 2 ms.

Evaluation Scheme

Execution sequence: A->B->C->A->D->E->B->F->C->D->B->F->C

Waiting Time in ms:

A=0+4=4
B=1+7+5=13
C=2+9+4=15
D=5+7=12
E=6
F=8+4=12

Average waiting time=62/6=10.33 ms

Execution sequence and ready queue sequence 2.5 marks
Waiting Time calculation 2.5 marks

Q6) What is busy waiting? How a semaphore can be implemented to have no busy waiting? [5]

Evaluation Scheme

Explanation of busy waiting 2 marks
Structure implementation 2 marks
Explanation 1 mark

Q7)Explain Dinning philosopher problem. Develop a deadlock free semaphore based solution to solve the dinning philosopher problem. Whether the solution is free from starvation? [5]

Evaluation Scheme

Dinning philosopher problem:Definition 1 mark
Semaphore based solution 2 marks
Deadlock free solution 2 marks

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