



Date: 24/01/2015

Time: 4.00pm – 5.30pm

Answer All Questions

QUESTION 1

- 1.1) List **five** (5) major activities with regard to file management in an operating system?
- 1.2) What is the difference between macro kernel and micro kernel? List **two** (2) operating systems with Macro kernel.
- 1.3) Briefly explain *wakeup* and *dispatch* operations that are applied to a process in an operating system.
- 1.4) Write an algorithm for the *producer and consumer problem* which operates on a bounded buffer in an operating system.

QUESTION 2

- 2.1) List **two** (2) applications of a thread in an operating system.
- 2.2) Consider the following set of processes, arrival times and CPU bursts in answering section 2.2. State your assumptions and show all the calculations.

Process	Arrival Time (ms)	Burst Time (ms)
P1	0	10
P2	3	4
P3	5	2
P4	6	5
P5	8	1

- (i) Assuming that the SJF scheduling algorithm with preemption is used, draw the Gantt chart of process execution. Calculate the average turnaround time, average waiting time and average response time.
 - (ii) Assuming that the round robin scheduling algorithm with time quanta of 4 ms is used, draw the necessary Gantt charts and calculate the average turnaround time and average waiting time.
- 2.3) Explain the purpose of having three types of schedulers (short, medium, long) in an operating system

QUESTION 3

- 3.1) Give necessary and sufficient conditions that are required to have a deadlock in an operating system.
- 3.2) Explain the following Inter process communication related message passing primitives

(i) Blocking vs Non-Blocking

(ii) Direct vs In-direct

- 3.3) Draw a clear resource allocation graph based on the information below.

(The sets P - processes, R - resources, E- edges as follows)

$P = \{P1, P2, P3, P4\}$

$R = \{R1, R2, R3, R4, R5\}$

$E = \{(P1, R5), (P1, R2), (R3, P1), (R5, P1), (P2, R3), (R2, P2), (P3, R3), (P3, R1), (R2, P3), (R4, P3), (P4, R3), (P4, R1), (R4, P4), (P4, R5)\}$

The number of resource instances are

R1 has 1 instance

R2 has 2 instances

R3 has 1 instance

R4 has 3 instances

R5 has 2 instances

- 3.4) Using the resource graph that you have drawn in section 3.3, identify deadlock sequences (if any). Justify your answer.

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