Printed Pages : 4 MCA311

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 7308 Roll No.

# M.C.A

## (SEM III) ODD SEMESTER THEORY EXAMINATION 2009-10

## OPERATING SYSTEMS

*Time : 3 Hours]* *[Total Marks : 100*

**Note :** *Attempt* ***all*** *questions.*

1 Attempt any **four** parts : 5×4=20

(a) What is an operating system? Describe the role of an operating system as a resource manager.

(b) What is the motivation for multiprogramming?

(c) What is an interrupt? How does an operating system handle an interrupt? - Discuss.

(d) Distinguish between multithreading and multiprocessing.

(e) What is a virtual machine? Briefly explain the main components of virtual machine.

(f) Explain the following :

(i) System calls

(ii) Real-time systems.

2 Attempt any **two** parts : **10×2=20**

(a) (i) Define the difference between preemptive and non-preemptive scheduling.

(ii) Show how multilevel feedback queues accomplish each of the following scheduling goals :

(1) favour short jobs

(2) favour I/O bound jobs to get good I/O device utilization.

(b) What are the performance criteria of a CPU scheduling algorithm? - Discuss.

(c) (i) Consider the following shape shot of processes and compute average turn around time and waiting time of processes for FCFS, SJF algorithms.

| Process | Arrival time (ms) | Next Burst time (ms) |
|---|---|---|
| $P_1$ | 0.0 | 6 |
| $P_2$ | 0.5 | 4 |
| $P_3$ | 1.0 | 2 |

(ii) Compare the following scheduling algorithm, highlighting the strengths and limitations of each algorithm :

(a) FCFS

(b) SJF

(c) Preemptive Priority.

3 Attempt any **two** parts : **10×2=20**

(a) Explain the producer consumer problem. Give a solution to the problem using semaphores.

(b) (i) What is a deadlock? Discuss the necessary conditions for deadlock with examples.

(ii) Consider the following snapshot of a system :

| | Allocation | | | | Max | | | | Available | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | A | B | C | D | A | B | C | D |
| $P_0$ | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 1 | 5 | 2 | 0 |
| $P_1$ | 1 | 0 | 0 | 0 | 1 | 7 | 5 | 0 | | | | |
| $P_2$ | 1 | 3 | 5 | 4 | 2 | 3 | 5 | 6 | | | | |
| $P_3$ | 0 | 6 | 3 | 2 | 0 | 6 | 5 | 2 | | | | |
| $P_4$ | 0 | 0 | 1 | 4 | 0 | 6 | 5 | 6 | | | | |

Answer the following questions using Banker's algorithm :

(i) What is the content of the matrix need?

(ii) Is the system in a safe state?

(c) Discuss the following :

(i) Deadlock prevention

(ii) Semaphores and monitors.

4 Attempt any **two** parts : **10×2=20**

(a) Consider the following page reference string

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3

How many page faults would occur for the following replacement algorithm, assuming three frames? (remember that all frames are initially empty)

(i) FIFO replacement

(ii) LRU replacement

(iii) Optimal replacement.

(b) (i) Describe why SSTF (Shortest-Seek-Time-First) scheduling tends to favour mid range tracks at the expense of innermost and outermost tracks.

(ii) Discuss the page placement strategies with examples.

(c) Explain the following :

(i) Demand Paging

(ii) Thrashing.

5 Write short notes on any **four** parts : **5×4=20**

(a) Encryption

(b) Windows-NT

(c) Access Matrix

(d) File System in LINUX system

(e) Interprocess communication

(f) System Threats.