Printed Pages : 7 MCA-311

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

PAPER ID : 7308 Roll No. | | | | | | | | | | |

M.C.A.

(Semester-III) Theory Examination, 2011-12

OPERATING SYSTEMS

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

Note : This paper is in three Sections. Section-A carries 20 marks. Section-B carries 30 marks and Section-C carries 50 marks.

Section-A

Answer *all* parts of this question. 2×10=20

1. (a) What is the difference between hard real time system and soft real time system ?

   (b) What is multitasking, multiprogramming and multithreading ?

   (c) Is Windows NT a full blown object oriented operating system ? Give reasons.

(d) What is a Safe State and what is its use in deadlock avoidance?

(e) What are demand paging and pre-paging?

(f) What is the protection mechanism used in Windows NT?

(g) In loading programs into memory, what is the difference between load-time dynamic linking and run-time dynamic linking?

(h) How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?

(i) Differentiate between local and global page replacement.

(j) How does the wait/signal operation for monitors differ from those of semaphores?

Section-B

Answer any *three* parts of this question. 10×3=30

2. (a) What are the basic functions of an operating system? Compare and contrast system calls and system programs.

(b) Consider the following processes with their CPU burst time and arrival time :

Process	Arrival Time	Burst Time
P1	0.0 ms	6 ms
P2	0.5 ms	4 ms
P3	1.0 ms	2 ms

Find the average waiting time and turnaround time w.r.t. FCFS, SJF and Priority scheduling algorithms.

(c) Can a system detect that some of its processes are starving ? If yes, explain how it can. If no, explain how the system can deal with the starvation problem.

(d) Discuss the various file allocation strategies for disk space management.

(e) What are the different forms of security attacks in non-distributed systems ? What level of security does Windows NT operating system meet ?

Section-C

Attempt *all* of this Section. $10 \times 5 = 50$

3. Answer any *two* parts of the following :

(a) Explain the structure of an operating system. What are its different components ?

(b) Explain the concept of re-reentrancy. What is spooling ?

(c) Differentiate between monolithic and micro lithic kernels.

4. Answer any *two* parts of the following :

(a) What are short, long- and medium-term scheduling ? Explain the functions of a dispatcher.

(b) What advantage is there in having different time quantum sizes on different levels of a multilevel queuing system ?

(c) What are the different methods of Inter Process Communication ? Explain the concept of transaction atomicity.

5. Answer any *two* parts of the following :

(a) Explain how a counting-semaphore can be implemented using binary semaphores.

(b) Give a solution to the reader writer problem, using semaphores and monitors.

(c) Consider the following snapshot of a system :

	Available				Allocation				Max			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following using Banker's algorithm :

(i) What is the content of matrix need ?

(ii) Is the system in a safe state ?

(iii) If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately ?

6. Answer any *two* parts of the following :

(a) Consider the logical addresses requested by a process having a page size of 100 bytes : 0745, 0012, 0130, 0237, 0090, 0398, 0060, 0444, 0239, 0377, 0001, 0367, 0259, 0179, 0200, 0010, 0199, 0700, 0078, 0180.
With an available physical memory of 3 page frames :

(i) Determine memory reference string.

(ii) Determine the number of Page Faults in FIFO, LRU & OPTIMAL page replacement algorithms.

(b) Consider a swapping system in which memory consists of the following holes in memory in that order :
10K, 4K, 20K, 18K, 7K, 9K, 12K, 15K.
Which hole is taken for successive segment requests of 12K, 10K, 9K for first, best and worst hit ? Also, determine memory loss due to internal fragmentation and external fragmentation in each case.

(c) Explain shortest seek time first (SSTF) disk scheduling. Why SSTF scheduling tends to favour middle cylinders over the inner most and outer-most cylinders ?

7. Answer any *two* parts of the following :

(a) Discuss the following with respect to file system :

(i) Consistency checking

(ii) Common file attributes and file operations.

(b) Compare the file systems of Linux and Windows NT. Also explain memory management in both.

(c) Write short notes on the following :

(i) System threats

(ii) Access matrix.