2016

MCA

MCA 4.1

OPERATING SYSTEMS

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following questions: 1X10=10
   i. Define Operating Systems?
   ii. What are Time sharing systems?
   iii. Why it is important for the scheduler to distinguish I/O bound programs and CPU bound programs.
   iv. What is Multitasking?
   v. What is a Kernel?
   vi. What is Semaphore?
   vii. What does Contiguous Memory Allocation mean?
   viii. What is a Process?
   ix. What is Dispatch Latency?
   x. What is a Ready Queue?
2. Answer the following questions : 2X5=10
   i. Describe process control block?
   ii. Describe context switch?
   iii. What is Virtual Address and Virtual Address space?
   iv. Define Critical Section Problem.
   v. Differentiate between internal and external Fragmentation.

3. Answer any three questions : 5X3=15

i. Define Turnaround Time and Response Time in CPU scheduling. 2.5X2=5

ii. Describe Resource Allocation Graph algorithm in deadlock avoidance.

iii. Explain Paging.

iv. Describe Magnetic Disk.

v. Define Least Recently Used Page Replacement algorithm. Find the number of page faults for the following reference string using 3 number of page frames: 2+3=5

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

4. Answer any four questions from the following : 10X4=40

i. Describe Deadlock Prevention in details.

ii. Explain the Basic method of Paging.

iii. Explain First Come First Serve and Round Robin CPU Scheduling. Find out the average waiting time for the following processes for both FCFS and RR CPU scheduling: 2.5X4=10

Process	Arrival Time	Burst Time
P1	0	24
P2	1	3
P3	1	3

Time quantum=4ms.

iv. Explain various Scheduling Queues and draw the queuing diagram representation of process scheduling. Consider the following four Processes given with their respective Arrival Time and their CPU Burst (in milliseconds).3+2+3+2=10

Process	Arrival Time	Burst Time
A	0	8
B	1	4
C	2	10
D	3	6

If the Processes are scheduled using Preemptive Shortest Job First Scheduling, then,

a) Calculate the average waiting time and

b) Calculate the turnaround time of each of the Processes

ii. Describe the methods for Recovery from Deadlock. Consider the following snapshot of a system:

5+2+1+2=10

	ALLOCATION					MAX					AVAILABLE			
	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					

Where P0 to P4 are processes and A, B, C, D are different resource types.

Answer the following questions using Banker's algorithm

a) What is the content of the matrix Need?

b) Is the system in a safe state?

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

vi. Suppose that a Disk drive has 5000 cylinders, numbered 0 to 4999, the drive is currently serving a request at 143.

The queue of pending requests in FIFO order is:
86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130
Starting from the current head position , draw the graph and find out the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms? 2.5X4=10

a) FCFS.
b) SSTF.
c) SCAN.
d) C-SCAN.

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