53 (CS 303) OPSY

2013

(December)

OPERATING SYSTEM

Paper : CS 303

Full Marks : 100

Pass Marks : 30

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions **out of seven.***

1. *(a)* Discuss the various services of an operating system. 10

   (b) Define the following : 5×2=10

   (i) Distributed operating system

   (ii) Network operating system

   (iii) System call

   (iv) Virtual machine

   (v) Command interpreter.

Contd.

2. *(a)* Consider the following set of processes : 10

Process	Arrival time *(ms)*	Burst time *(ms)*
P_1	0	9
P_2	2	4
P_3	3	2
P_4	3	7
P_5	1	10

Using STF scheduling (preemptive and non-preemptive) and Round Robin scheduling (assume time quantum = 3*ms)* techniques, draw the Gantt chart and find out the following :

(i) average waiting time

(ii) average response time and

(iii) average turnaround time

According to you, performance of which scheduling algorithm is the best in this case and why ?

(b) What do you mean by starvation and aging ? 2+2=4

(c) What do you mean by critical section ? How binary semaphores are used to solve the critical section problem ? 1+5=6

3. (a) What are the necessary conditions for a process to be deadlocked ? 6

(b) What is resource allocation graph ? How it can be used for describing deadlocks ? 6

(c) Consider a system with five processes P_0, P_1, P_2 P_3, P_4 and three resource types A, B, and C. Resource type A has 10 instances, B has 5 instances and C has 7 instances. Let's consider that the following snapshot of the system has been taken at time T_0. 8

Processes	Allocation	Max	Available
	A B C	A B C	A B C
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

Using Banker's algorithm for deadlock avoidances answer the following :

(i) What is the content of matrix Need ?

(ii) Is the system in a safe state ?

(iii) If a request for resources (1, 0, 2) arrives from process P_1, can the request be granted to the process ?

4. (a) What do you mean by logical and physical address space ? 2

(b) Given memory partitions of 100*k*, 500*k*, 200*k*, 300*k* and 600*k* (in order), how would each of the first fit, best fit and worst fit algorithms place processes of 212*k*, 417*k*, 112*k* and 426*k* (in order) ? Which algorithm makes the most efficient use of memory ? 10

(c) Consider a page size of 4 *bytes* and a physical memory of 32 *bytes*. Using paging scheme, show how the logical memory can be mapped into physical memory. 8

5. (a) What do you mean by page fault ? 3

(b) Consider the following page reference string : 3×3=9

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

How many page faults would occur for the following replacement algorithms ? (Assume that we have 3 frames and all the frames are initially empty.)

(i) FIFO

(ii) Optimal

(iii) LRU

(c) Define the following : 4×2=8

(i) Demand paging

(ii) Belady's anomaly

(iii) Thrashing

(iv) Virtual memory.

6. (a) What do you mean by a file ? Discuss *any three* basic operations that can be performed on a file. 2+6=8

(b) Discuss the sequential and direct access methods for accessing a file. 3+3=6

(c) Define a directory. What are the various information that are included in a directory ? 1+5=6

7. Write short notes on : 4×5=20

(i) External fragmentation and internal fragmentation

(ii) Paging

(iii) Segmentation

(iv) Direct memory access (DMA).
