53 (CS 303) OPSY

2014

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)* What do you mean by an operating system ? Explain the various services of an operating system. 2+8=10

   (b) Discuss *any two* types of operating system with examples. 4

   (c) Define the following : 3×2=6

   (i) System call

   (ii) Virtual machine

   (iii) Command interpreter.

Contd.

2. *(a)* What do you mean by a process ? Describe the different states of a process. 2+6=8

(b) What are the major components of a PCB ? Discuss in brief. 6

(c) Define context switch. Explain how context switching is done with the help of a diagram. 2+4=6

3. *(a)* Consider the following set of processes — 6

Process	Arrival time *(ms)*	Burst time *(ms)*	Priority
P_1	0	10	3
P_2	1	1	1
P_3	2	2	4
P_4	3	1	5
P_5	4	5	2

Using priority scheduling (preemptive and non-preemptive) technique, draw the Gantt chart and find out the following :

(i) average waiting time

(ii) average response time

(iii) average turn around time.

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

(c) What do you mean by process synchronization ? Discuss the producer-consumer problem for synchronizing cooperating processes. 2+8=10

4. (a) What do you mean by critical section ? How binary semaphores are used to solve the critical section problem ? 2+6=8

(b) Define a deadlock. 2

(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. Lets consider that the following snapshot of the system has been taken at time T_0.

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 avoidance, 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 ? 10

5. *(a)* 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. Assume that the logical memory is 16 bytes. 5

(b) Consider the following page reference string : 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 algorithm ? (Assume that we have 3 frames and all the frames are initially empty)

(i) FIFO

(ii) Optimal

(iii) LRU

(c) Define the following : 3+3=6

(i) Demand paging

(ii) Virtual memory.

6. (a) Define a file. Discuss *any three* 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) What do you mean by spooling ? How is it different from buffering ? 3+3=6

7. Write short notes on : 4×5=20

(i) Paging

(ii) Segmentation

(iii) Interrupt

(iv) Direct memory access (DMA).
