53 (IT 502) OPSY

2014

OPERATING SYSTEM

Paper : IT 502

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. *(a)* What is Belady's Anomaly ? Consider the following page reference string :

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6

How many page faults would occur for the Optimal and FIFO page replacement algorithms, assuming two and five frames ? Remember that all frames are initially empty.

2+8=10

(b) Explain the difference between internal and external fragmentation. 5

(c) Consider a simple segmentation system that has the following segment table : 5

Starting address	Length *(bytes)*
660	248
1752	422
222	198
996	604

For each of the following logical addresses, determine the physical address or indicate if a segment fault occurs :

(i) 0,198 *(ii)* 2,156 *(iii)* 1,530 *(iv)* 3,444 *(v)* 0,222

2. Write short notes on : 10×2=20

(a) TLB

(b) Dining Philosopher Problem.

3. *(a)* Assume that a program has just referenced an address in virtual memory. Describe a scenario in which each of the following can occur. (If no such scenario can occur, explain why.) 10

(i) TLB miss with no page fault

(ii) TLB miss and page fault

(iii) TLB hit and no page fault

(iv) TLB hit and page fault.

(b) With a diagram explain the address translation in Paging System. 10

4. What is Gang Scheduling ? Consider a set of three periodic tasks with execution profiles of given table. Develope scheduling diagram for this set of tasks by using Rate Monotonic Scheduling algorithm. Also find average turnaround time, waiting time and response time. 5+15=20

Task	Period	Execution Time
A	6	2
B	8	7
C	12	4

5. *(a)* Calculate how much disk space (in sectors, tracks and surfaces) will be required to store 90000 200-*byte* logical records if the disk is fixed sector with 512 *bytes/sector*, 128 *sectors/track*, 140 *tracks/surface* and 12 usable surfaces. Ignore any file header records and track indices and assume that a record can't span two sectors. 5

(b) List and briefly define *five* file organisations. 15

6. *(a)* Define Producer Consumer Problem. Solve Infinite Buffer Producer Consumer Problem by using Semaphore. 3+7=10

(b) Consider the following snapshot of a system : 10

Allocation	Max	Available
A B C D	A B C D	A B C D
0 0 1 2	0 0 1 2	1 5 2 0
1 0 0 0	1 7 5 0	
1 3 5 4	2 3 5 6	
0 6 2 2	0 6 5 2	
0 2 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 ?

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

7. (a) What are the types of Inter Process Communication ? Explain *any one* technique of Inter Process Communication. 2+8=10

(b) What is the difference between Passive and Active security threats ? Describe some worm counter measures. 3+7=10
