

Total No. of printed pages = 5

Co-505/OS/5th Sem/M/2013

OPERATING SYSTEM

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

Answer question No. 1 and any *five* from the rest.

1. (i) State true or false : 5×1=5
- (a) The number of processes completed per unit time is known as efficiency.
 - (b) Most operating systems use the tree directory structure.
 - (c) Banker's algorithm is used to rectify a deadlocked state.
 - (d) PCB stands for Process Communication Block.
 - (e) A critical region is a piece of code which only one process executes at a time.

[Turn over

(ii) Fill in the blanks :

5×1=5

- (a) Interval between the time of submission and completion of the job is called _____.
- (b) The scheduling in which CPU is allocated to the process with least CPU burst time is called _____.
- (c) 'LRU' page replacement policy is _____.
- (d) The memory allocation scheme subject to "external" fragmentation is _____.
- (e) To avoid race condition, the maximum number of processes that may be simultaneously inside the critical section is _____.

(iii) Define the following terms :

5×2=10

- (a) Pre-emptive scheduling
- (b) Semaphore
- (c) Page fault
- (d) Multiprogramming
- (e) Shell.

2. (a) What is a system call? Give examples of a few of them. 2

(b) The following are the set of processes with their respective CPU burst time (in ms):

Process	Burst time
P1	10
P2	5
P3	5

Calculate the average waiting time, if the process arrived in the following order:

(i) P1, P2, P3

(ii) P2, P3 and P1 4

(c) Explain busy waiting semaphores. 4

3. (a) Consider the page reference string:

1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5

Explain the FIFO and LRU Page Replacement Algorithms with the concept of page fault in each case. Consider 4 frames and all frames are initially empty. $3 \times 2 = 6$

(b) Illustrate the major differences in the paging and segmentation concepts of memory management. 4

4. (a) Differentiate between protection and security. Explain the techniques used for protection of user files. $2+4=6$
- (b) What are threads? Differentiate between kernel level and user level threads. 4
5. (a) Define deadlock. 2

- (b) Consider the following system snapshot using data structures in the Banker's algorithm, with resources A, B, C and D and process P0 to P4.

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

Using Banker's algorithm, answer the following: $2+2+4=8$

- (i) How many resources of type A, B, C and D are there?
- (ii) What are the contents of the Need Matrix?
- (iii) Is the systems in a safe state? Why?