Total No. of printed pages = 5

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. 3×2=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 ?

6. (a) Explain the necessary conditions for deadlock to occur. 4

(b) Identify and highlight the differences between the work station server model and processor pool model in connection to distributed O.S.

6

7. (a) What are the major functions performed by the operating system ? 4

(b) Identify the differences in the UNIX and WINDOW-NT operating systems with respect to the following points : 6

(i) OS structure

(ii) File structure

(iii) Memory management.