B. E. Fifth Semester (Computer Technology) Examination

Course Code : CT 1302 / CT 302 **Course Name : Operating Systems**

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions carry marks as indicated.
(2) Due credit will be given to neatness and adequate dimensions.
(3) Assume suitable data wherever necessary.
(4) Diagrams should be given wherever necessary.
(5) Illustrate your answers wherever necessary with the help of neat sketches.

1. (a) What is the pupose of system calls ? List the types of system calls normally provided by OS. Also state methods used to pass parameters to the operating system. 7

OR

(b) Write advantages and disadvantages of Batch system. Also explain different approaches used for improving system performance in Batch system. 7

2. (a) Explain various fields of Process Control Block Why it is needed ? Where is a PCB normally kept by an Operating Systems ? 8

OR

(b) Consider the following set of process with the length of CPU burst time in milliseconds :—

Process	Burst Time	priority
P1	7	3
P2	9	2
P3	2	1
P4	2	4
P5	3	5

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 and all at time 0.

(a) Draw Gantt chart, illustrating the execution of these processes using FCFS, SJF, preemptive priority and RR (quantum = 2) scheduling.

(b) What is turn around time of each process for each of the following scheduling algorithm in Part A ?

(c) What is the waiting time for each process for each of the scheduling algorithms in Part A ?

(d) Which of the schedule in Part A, results in the minimal average waiting time (overall process) ? 8

3. (a) Explain bakery algorithm to synchronize n processes to solve critical section problem. 7

OR

(b) What is semaphore ? What are the different uses of semaphore ? Show how wait ( ) and signal ( ) operation can be used to synchronize 3 process if there is data dependency in the following order P2 –> P1 –> P3 7

4. (a) State and explain necessary condition for deadlock to occur. Given process resource usage and availability shown in table below, draw the resource allocation graph :

Process	Current Allocation			Additional Request			Resource Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	2	0	0	1	1	0	0	0	0
P2	3	1	0	0	0	0			
P3	1	3	0	0	0	1			
P4	0	1	1	0	1	0			

8

OR

(b) How does deadlock avoidance differ from deadlock prevention ? Write about deadlock avoidance algorithm in detail. 8

5. Solve any **Three** :—

(a) Consider the following segment table :

Segment No.	Base	Bound
0	350	600
1	1200	14
2	80	120
3	1425	620
4	1850	75

What are the physical addresses for the following logical Address :—

(i) 0, 400

(ii) 1, 10

(iii) 2, 2500

(iv) 3, 100

(v) 4, 80 5

(b) Give memory partition 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 algorithm place process of 212 k, 417 k, 112 k and 426 k (in order) ? Which algorithm makes the most efficient use of memory. 5

(c) On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space and a page size of 2^{10} bytes :

(i) How many bytes are in logical address ?

(ii) How many bytes are in page frame ? 5

(d) Consider a main memory with five page frames and the following sequence of page references :—

3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3. Which one of the following is true with respect to page replacement policies First In First Out (FIFO) and Least Recently (LRU) ?

(a) Both incur the same number of page faults.

(b) FIFO incurs 2 more page faults than LRU.

(c) LRU incurs 2 more page faults than FIFO.

(d) FIFO incurs 1 more page faults than LRU.

Also show the number of page faults for the same. 5

6. Solve any **Three** :—

(a) A disk drive has 50 cylinders, numbered 0 to 49. The drive is currently serving a request at cylinder 15, and the previous request was at cylinder 9. The queue of pending requests, in FIFO order is
4, 40, 11, 35, 7, 14

(i) FCFS

(ii) SSTF

(iii) LOOK

(iv) C-LOOK

(v) SCAN. 5

(b) A program has just read the first record in a sequential access file. It next wants to read the tenth record. How many records must the program read to input the tenth ? why ? 5

(c) Compare disk space allocation methods - Contiguous allocation, Linked allocation and Indexed allocation. 5

(d) Discuss hierarchical directory structure in detail. What are the different ways to specify the filenames uniquely ? 5