Course Code : CAT 203 **GVHW/RW – 23 / 1402**

Third Semester B. Tech. (Computer Science and Engineering / Artificial Intelligence and Machine Learning) Examination

OPERATING SYSTEM

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) Assume suitable data wherever necessary.
(2) All questions carry marks as indicated.

1. (a) Describe the differences between symmetric and asymmetric multiprocessing. What are the advantages and one disadvantages of multiprocessor system ? 4(CO1)

   (b) Explain how memory and CPU protection is provided by operating system. Explain with the help of neat diagram. 3(CO1)

   (c) What is system calls ? Evaluate why system call are needed. 3(CO1)

2. (a) Utilize the following set of processes with the length of the CPU burst time given in milliseconds by inferring the following table :

Job	Arrival Time	Burst Time
P1	0	4
P2	1	5
P3	3	2
P4	3	1
P5	4	6
P6	6	3

   (a) SJF (Preemptive).

   (b) SJF (Non-Preemptive). 4(CO2)

(b) Explain user and kernel threads. What are the benefits of using threads ? 3(CO2)

(c) Which scheduling algorithms could result in starvation ? What is the solution to this problem ? 3(CO2)

3. (a) With the help of an example list the advantages and disadvantages of semaphores. Support your explanation with an example pseudo-code. 4(CO4)

(b) Consider the methods used by processes i for accessing their critical sections whenever needed, as given below.

Explain two processes I and j satisfies mutual exclusion or not :

```
Flag[i] = true ;
Turn = j ;
While (flag[j]) and turn = = j) ; do skip

Critical section

flag[i] = false ;
```

3(CO4)

(c) Why synchronization is required between two co-operating process. Give two process software solutions. 3(CO4)

4. (a) An Operating system uses deadlock detection algorithm. At time t0 system state is :

	Allocation				Request				Available			
Process	A	B	C	D	A	B	C	D	A	B	C	D
P1	4	0	3	1	6	0	4	6	1	9	5	3
P2	1	0	1	2	3	0	0	7				
P3	2	5	8	0	4	7	9	1				
P4	2	0	2	4	2	0	1	3				
P5	1	0	0	1	1	0	0	1				

(a) Determine weather system is in deadlock state or not

(b) If it in deadlock mention the deadlock processes 6(CO2)

(b) How would you estimate and elaborate the ways in which deadlocks can be prevented ? 4(CO3)

5. (a) Elaborate the following Concepts :

(a) Thrashing.

(b) Belady Anomaly. 4(CO3)

(b) Consider the page references :

1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 3, 6, 12, 3, 4, 2 with 3 and 4 frames. Find the total number of page faults for following page replacement policies —

(a) FCFS,

(b) Optimal,

(c) LRU. 6(CO3)

6. (a) Suppose that a disk drive has 3000 cylinders, numbered 0 to 2999. The drive is currently serving a request at cylinder 225, and the previous request was at cylinder 321.

The queue of pending requests (in FIFO order) is :

34, 12, 78, 457, 1703, 367, 1120, 2670.

Find the total number of seek operations made to access all the requested cylinders using the following disk scheduling algorithms :

(a) FCFS,

(b) SCAN,

(c) LOOK. 6(CO3)

(b) Explain advantages and disadvantages of following file allocation methods :

(i) Contiguous Allocation.

(ii) Linked Allocation. 4(CO2,3)