Course Code : CST 219 / CST 207   **ITSJ/RW – 17 / 1307**

Fourth Semester B. E. (Computer Science and Engineering) Examination

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 and neat sketches should be given wherever necessary.

   (5)   Solve Q. **Three** or Q. **Four**.

   (6)   Solve Q. **Seven** or Q. **Eight**.

1. Solve any **Two** :—

   (a)   Evaluate why system calls are needed. Classify and explain any four categories of system call.   5 (CO 1)

   (b)   What facts would you select to show the understanding of multiprocessor operating system and time sharing operating system ?   5 (CO 1)

   (c)   Explain how memory and CPU protection is provided by operating system. Explain with the help of neat diagram.   5 (CO 1)

2.   (a)   Solve any **One** :—

      (i)   Distinguish between :

         (1)   Kernel level threads and user level threads.   4 (CO 2)

         (2)   Short term scheduler and long term scheduler.   4 (CO 2)

      (ii)   How would you describe process state diagram ?   4 (CO 2)

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

Process	Burst Time	Priority	Arrival Time
P1	10	3	0
P2	1	1	2
P3	2	3	3
P4	1	4	6
P5	5	2	7

Draw three Gantt charts illustrating the execution of these processes and calculate average waiting time using :—

(i) FCFS scheduling.

(ii) Preemptive SJF scheduling.

(iii) Preemptive priority scheduling. 6 (CO 2)

3. (a) Discuss any **Two** of the following classical problems of synchronization :—

(i) The bounded buffer problem.

(ii) The readers – writers problem.

(iii) The Dining philosophers problem. 6 (CO 3)

(b) Demonstrate with example how deadlock and starvation can be formed by improper semaphore implementation. 2 (CO 3)

(c) Elaborate how TestAndSet instruction can be sued to solve the mutual exclusion problem. 2 (CO 3)

OR

4. (a) How would you describe any two approaches in two process solutions to a critical section problem ? 5 (CO 3)

(b) Based on what you know, how would you explain Bakery algorithm for multiple process synchronization? 5 (CO 3)

5. Solve any **Two** :—

    (a)   How would you estimate and elaborate the ways in which deadlocks can be prevented ?   5 (CO 3)

    (b)   Explain Banker's algorithm with an example.   5 (CO 3)

    (c)   How would you analyze a detail view of the methods of recovery from deadlock ?   5 (CO 3)

6.   (a)   Solve any **One** :—

        (i)   What ideas can you inspect for handling a page fault ? Explain with all the steps.   4 (CO 4)

        (ii)   How would you build your understanding to draw and discuss hierarchical page table and inverted page table structures ?   4 (CO 4)

    (b)   Estimate how many page faults occur for LRU, FIFO and Optimal page replacement for the following reference string with initial three, four free frames :

        1, 4, 3, 6, 2, 3, 7, 3, 1, 2, 5, 4   6 (CO 4)

7.   (a)   Illustrate any two file allocation methods.   4 (CO 4)

    (b)   Suppose that a disk drive has 5000 cylinders. The drive is currently serving a request at 98 and the previous request was at cylinder 499. The queue of pending requests is
452, 789, 235, 4123, 1250, 45, 85, 678, 1509, 1470, 45 Starting from the current head position. Examining the given facts evaluate what is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms?

        (i)   FCFS.

        (ii)   SSTF.

        (iii)   C-LOOK.   6 (CO 4)

OR

8.   (a)   What information would you conclude to explain free space management ?   5 (CO 4)

    (b)   How can you model and identify explanation for different directory structures ?   5 (CO 4)