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**FOURTH SEMESTER
MID SEMESTER EXAMINATION**

**B. Tech [CO]
MAR-2020**

CO 204: Operating System Design

Time: 1.5 Hours

Max. Marks: 30

Note: 1) All questions are compulsory.
2) Assume suitable missing data, if any.

- Q.1. a) What is the Critical Section problem? Mention the requirements to be satisfied by a solution to the critical section problem. [2]
b) What are system programs? Give example. [2]
c) What is preemption in process scheduling? What are its drawbacks? [2]
d) What is graceful degradation? How is it different from fault tolerance? [2]
e) Explain Convoy effect with an example. [2]

Q.2. a) What is a Process Control Block? Describe the information stored within it and its role in context-switching. [4]

b) Consider the following set of processes and their corresponding information: [6]

Process ID	Arrival Time	Burst Time	Priority
1	0	3	5
2	1	1	2
3	3	4	1
4	5	2	3
5	5	1	4

Draw Gantt charts to illustrate the execution of these processes and find average waiting time and average turnaround time, for each of the following algorithms:

- (a) Round-Robin (time quantum $q = 1$)
(b) Preemptive Priority scheduling

Q.3. a) Discuss in detail the two models of Inter-Process Communication. [5]

OR

b) (i) Consider Peterson's algorithm for mutual exclusion between two concurrent processes i and j. The program executed by process is shown below: [2]

```
repeat
    flag [i] = true;
    turn = j;
    while ( P ) do no-op;
    Enter critical section, perform actions, then exit critical
    section
    flag [ i ] = false;
    Perform other non-critical section actions.
until false;
```

What should be the predicate P, in while (P) to guarantee mutual exclusion?

b) (ii) Discuss the role of operating system in process management, memory management and storage management. (3)

Q.4. a) Explain the bounded buffer problem and its solution using semaphores. (5)

OR

(b) Differentiate between the following

(i) Long term and short term scheduler (2)

(ii) Multitasking, multiprogramming and multiprocessing (3)