MANAV RACHNA
Vidyanatariksha

MANAV RACHNA UNIVERSITY
FORMERLY MANAV RACHNA COLLEGE OF ENGINEERING
NAAC ACCREDITED 'A' GRADE INSTITUTION
Declared as State Private University under section 2f of the UGC act, 1956

# DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY

*"T2 Examination, March-2019"*

**Semester:** IV
**Subject:** OPERATING SYSTEMS
**Branch:** CSE
**Course Type:** Core
**Time:** 90 Minutes
**Program:** B.Tech

**Date of Exam:** 14/03/19
**Subject Code:** CSH 211-T
**Session:** I
**Course Nature:** Hard
**Max.Marks:** 30
**Signature: HOD/Associate HOD:**

*Note: Part A: All questions are compulsory. Each Question carries 2 marks.*
*Part B: Attempt any two questions. Each Question carries 10 marks.*

## *PART-A*

Q1. **Short Answer Questions :-**

(a) Which scheduling algorithms could result in Starvation? Discuss the Solution for Starvation.
(b) List the four necessary conditions that lead to a deadlock.
(c) Given the below situations suggest an appropriate CPU scheduling algorithm
  (i) The incoming processes are short and there is no need for the processes to execute in a specific order.
  (ii) The processes are a mix of user based and kernel based processes.
(d) What are the rules for selecting a time quantum in RR scheduling?
(e) Define race condition? Mention the solution to prohibit race condition.

## *PART-B*

Q2. Consider the following scenario of processes with Time Quantum = 2:

| Process | Arrival Time | Execution Time |
|---|---|---|
| P1 | 0 | 5 |
| P2 | 2 | 3 |
| P3 | 3 | 2 |
| P4 | 5 | 7 |

Draw the Gantt chart for the execution of the processes, showing their start time and end time, using **Round Robin Scheduling** and **SJF-Non Preemptive.** Calculate Turnaround Time, Waiting Time for each process and Average Turnaround Time and Average Waiting Time for the system. [10]

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Q3 -

(a) In a system. The following state of processes and resources are given :
R1->P1, P1->R2, P2->R3, R2->P2, R3->P3, P3->R4, P4->R3, R4->P4, P4->R1,R1->P5
Draw the RAG for the system and check for deadlock condition. [5]

(b) Consider a system with 5 processes P0 through P4 and three resource types A, B, C. A has 10 instances, B has 5 instances and C has seven instances. Suppose that at time t0, the following snapshot of a system has been taken:

| | Allocation | Max | Available |
|---|---|---|---|
| | A B C | A B C | A B C |
| Po | 0 1 0 | 7 5 3 | ? ? ? |
| Pl | 2 0 0 | 3 2 2 | |
| P2 | 3 0 2 | 9 0 2 | |
| P3 | 2 1 1 | 2 2 2 | |
| P4 | 0 0 2 | 4 3 3 | |

Using Banker's algorithm answer whether the system in a safe state? If yes, what will be the safe sequence? [5]

Q4. (a) Briefly mention the conditions that the solution to critical section problem should satisfy. [3]

(b) Consider the methods used by processes P1 and P2 for accessing their critical sections whenever needed, as given below. The initial values of shared boolean variables S1 and S2 are randomly assigned.

| *Method Used by P1* | *Method Used by P2* |
|---|---|
| `while (S1 == S2) ;` | `while (S1 != S2) ;` |
| `Critical Section` | `Critical Section` |
| `S1 = S2;` | `S2 = not (S1);` |

Which of the following statements given below describes the properties achieved and **explain how each of the property is being achieved/not achieved?** [1+3+3]

(i) Mutual exclusion but not progress
(ii) Progress but not mutual exclusion
(iii) Neither mutual exclusion nor progress
(iv) Both mutual exclusion & progress

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