MANAV RACHNA
vidyaparikshaa

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-2020"

Semester: 4th
Subject: Operating System
Programme: CSE
Course Type: Core
Time: 90 Minutes
Max.Marks: 30

Date of Exam: 24/03/2020
Subject Code: CSH206B-T
Session: (II)1:00AM-3:30PM
Course Nature: Hard
Branch: CSE
Signature: HOD/Associate HOD:

PART A (All questions are compulsory)

Q1. Answer the following:

(a) Mention which scheduling algorithm would be used in following situations: [5]

(i) The process needs to be scheduled in order of its arrival in a non-preemptive manner.

(ii) Front end processes need to be scheduled first followed by back end processes.

(iii) The processes need to be scheduled in ascending order of burst time in a non-preemptive manner.

(iv) The processes need to be scheduled in ascending order of burst time in a preemptive manner

(v) This scheduling algorithm allocates time quantum to each process for fair CPU utilization.

(b) Answer the following as to how would you achieve the following with justification:[5]

(i) To solve the problem of starvation through scheduling algorithm for processes that have aged in the system.

(ii) The synchronization tool used for successful critical section execution of n number of cooperating processes.

(iii) Deadlock management conditions to ensure that the system will never enter a deadlock state.

(iv) Deadlock algorithm to ensure deadlock avoidance when there are multiple instances of resource types.

(v) To solve the issue of race condition.

PART B (Attempt all questions. Each question carries 10 marks)

Q2. (a) Following is a scenario where P represents process and R represents a resource type. There are 2 instances of R1 and two instances of R2 available in the system. Determine if the system is in 'safe' state. Justify your answer with a resource allocation graph. **[5]**

Allocation:

- P1 is allocated one instance of R2.
- P2 is allocated one instance of R1.
- P3 is allocated one instance of R1.
- P4 is allocated one instance of R2.

Request: P3 is requesting one instance of R2.

(b) Consider the following snapshot of a system:

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	2	0	0	1	4	2	1	2	3	3	2	1
P1	3	1	2	1	5	2	5	2				
P2	2	1	0	3	2	3	1	6				
P3	1	3	1	2	1	4	2	4				
P4	1	4	3	2	3	6	6	5				

Answer the following questions using banker's algorithm:

(a) What will be the contents of the need matrix> **[2]**
(b) Whether the system is in safe state? if yes, then what is the safe sequence. **[1]**
(c) If a request for process P1 arrives for (1,1,0,0), can the request be granted immediately? **[1]**
(d) If a request for process P4 arrives for (0,0,2,0), can the request be granted immediately **[1]**

Q3. (a) Consider the set of 5 processes whose arrival time and burst time are given below- If the CPU scheduling policy is Round Robin with time quantum = 2 units, Draw a Gantt chart and calculate the average waiting time and average turnaround time. **[5]**

Process	Arrival Time	Execution Time
P1	0	5
P2	1	3
P3	2	1
P4	3	2
P5	4	3

(b) Apply SRTF on 3 processes with their arrival times zero, and having burst time ten, twenty & thirty units respectively. Each process undergoes input/output for first twenty percent of time, & next seventy percent of time is spent on execution and last ten percent time is again consumed on input/output. New process gets scheduled either when the running process gets blocked on input/output or when the running process finishes its burst. Assuming all input/output can be overlapped as much as possible, draw the Gantt chart & calculate for what percentage of time does the CPU remain idle? **[2.5]**

(c) A Counting Semaphore was initialized to 12. then 10 P (wait) and then 4 V (Signal) operations were computed on this semaphore. What is the result? **[2.5]**