NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI
CYCLE TEST – 1: JAN. 2023 SESSION

DEPARTMENT : CSE

DATE & TIME OF EXAM : 9th March 2023/ 3:30 -4:30 PM

SUB CODE : CSPC43 DURATION:1 hour

The course outcome-1 (Comprehend the techniques used to implement the process manager) of the course is tested in this assessment.

Answer all the questions

1. What is dual-mode operation? (1)
2. Briefly discuss the different types of parallelism. (1)
3. For the following set of processes, find the average waiting time, and turnaround time while applying the RR algorithm. Assume that the quantum time is 10 ms. Draw charts and show the calculations. (4)

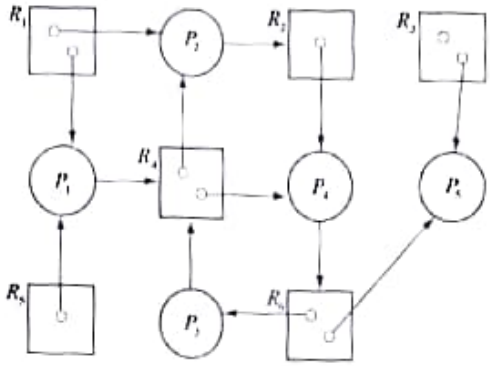
Process Number	Burst (ms)	Arrival (ms)
P1	25	0
P2	12	10
P3	20	15
P4	10	25
P5	60	20

4. Write a Pthread program which takes a number *n* as command line argument and calls a function called 'calculator' that counts and prints the count of even numbers from 0 to the given *n*. (3)
5. Consider the following snapshot of a system in which four resources A, B, C and D are available. The system contains a total of 6 instances of A, 4 of resource B, 4 of resource C and 2 of resource D (4)

	Allocation				*Max*				*Need*				*Available*			
	A	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	*D*
P_0	2	0	1	1	3	2	1	1					6	4	4	2
P_1	1	1	0	0	1	2	0	2								
P_2	1	0	1	0	3	2	1	0								
P_3	0	1	0	1	2	1	0	1								

6. Consider the following resource allocation graph. Is there a deadlock? If so, what are the processes involved. (2)

(5) suppose at a time t_1, P_0 requests 1,2,0,0 check if it can be allocated immediately



7. Consider the Dekker's algorithm below. The two processes, *P*0 and *P*1, share the following variables: (3)

```
boolean flag[2]; /* initially false */
int turn;
```

The structure of process *Pi* (i == 0 or 1) is shown below. The other process is *Pj* (j == 1 or 0). Prove that the algorithm satisfies all three requirements for the critical-section problem.

```
do {
   flag[i] = true;

   while (flag[j]) {
      if (turn == j) {
         flag[i] = false;
         while (turn == j)
            ; /* do nothing */
         flag[i] = true;
      }
   }

      /* critical section */

   turn = j;
   flag[i] = false;

      /* remainder section */
} while (true);
```

8. For the monitor program that we discussed in class, illustrate a situation in which a philosopher might be starved to death. (2)