

Time: 50 min

MM: 15

Instructions: Attempt all questions.

1. How does a zombie process differ from an orphan process? (2)
2. What is the purpose of medium term scheduler? (1)
3. Which of the following statements are true?
 - I. Shortest remaining time first scheduling may cause starvation. (2)
 - II. Round robin is better than FCFS in terms of response time. (1)
4. Consider a multilevel feedback queue scheduling (MLFQBQ) with three queues q1, q2 and q3. q1 and q2 use round-robin algorithm with time quantum (TQ) = 5, and 4 respectively. q3 use first-come first-service algorithm. Find the average waiting time and average turnaround time for executing the following process?

Processes	Burst time
P1	8
P2	22
P3	4
P4	12

(3)

OR

Under what circumstances is the rate monotonic scheduling is inferior to earliest deadline first scheduling in meeting the deadlines associated with each process. Consider two processes P1 and P2, where $p1 = 50$, $t1 = 25$, $p2 = 75$, and $t2 = 30$. Illustrate the scheduling of these two processes using earliest deadline-first (EDF) scheduling. (3)

5. An operating system uses the banker's algorithm for deadlock avoidance when managing the allocation of three resource types X, Y and Z to three processes P0, P1 and P2. The table given below presents the current system state.

	Allocated	Maximum	Available
Process P0	0 0 1	8 4 3	3 2 2
Process P1	3 2 0	6 2 0	
Process P2	2 1 1	3 3 3	

The system is currently in safe state. Consider the independent requests for additional resources in the current state- REQ1: P0 requests 0 units of X, 0 units of Y and 2 units of Z, REQ2: P1 requests 2 units of X, 0 units of Y and 0 units of Z. Check whether Only REQ1 can be permitted Only or REQ2 can be permitted only or Both or Neither. (3)

6. Consider the methods used by processes P1 & P2 for accessing their critical sections as

P1
while (S1 == S2);
Critical Section
S1 = S2

P2
while (S1 != S2);
Critical Section
S2 = !S1

$T_{true} = false$

!=

Check whether mutual exclusion or progress are ensured or not with the initial values of shared boolean variables S1 and S2 are assigned as follows:

- a) S1 = 0 and S2 = 0 b) S1 = 0 and S2 = 1

(4)