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.
   II. Round robin is better than FCFS in terms of response time.   (2)
4. Consider a multilevel feedback queue scheduling (MLFBQ) 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	P2
while (S1 == S2);	while (S1 != S2);
Critical Section	Critical Section
S1 = S2	S2 = !S1

   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)