Question 2.
Consider the following set of jobs to be scheduled for execution on a single CPU system.
Arrival time burst time

Job	Arrival	Burst
J1	0	10
J2	2	8
J3	3	3
J4	10	4
J5	12	1
J6	15	4

Compute the turnaround time and total waiting time for each job using each of the following CPU schedulers:

TAT = T(Completion) – T(Arrival)

Waiting time = TAT – Burst

a. FCFS scheduling

J1 runs for 10 seconds t=10, TAT = 10 – 0 = 10s, 10-10=0

J2 runs for 8 seconds t=18, TAT = 18-2 = 16s, 16-8=8

J3 runs for 3 seconds t=21, TAT = 21-3 = 18s, 18-3=15

J4 runs for 4 seconds t=25 TAT = 25 – 10 = 15s, 15-4=11

J5 runs for 1 second t=26, TAT = 26 – 12 = 14s, 14-1=13

J6 runs for 4 seconds t=30, TAT = 30 – 15 = 15s, 15-4=11

b. SJF scheduling

J1 runs for 10 seconds, t=10, 10-0 = 10, WT=10-10=0

J3 runs for 3 seconds t=13 13-3 = 10, WT=10-3=7

J5 runs for 1 second t=14, 14 – 12= WT=2, 2-1=1

J4 runs for 4 seconds t=18, 18-10 = 8, WT=8-4=4

J6 runs for 4 seconds t=22, 22-15=7, WT=7-4=3

J2 runs for 8 seconds t=30, 30-2=28, WT=28-8=20

b. Preemptive SJF scheduling

J1 runs for 2 seconds, 8s remains, T=2
J1 runs for 1 second, 7s remains, T=3
J3 runs for 3 seconds, Completes at T=6
J1 runs for 7 seconds, Completes at T=13
J5 runs for 1 second, Completes at T=14
J4 runs for 4 seconds, Completes at T=18
J6 runs for 4 seconds, Complets at T=22
J2 runs for 8 seconds, Complets at T=30

J1 TAT=13-0=13, WT=13-10=3
J2 TAT=30-2=28, 28-8=20
J3 TAT=6-3=3, WT=3-3=0
J4 TAT=18-10=8, WT=8-4=4
J5 TAT=14-12=2, WT=2-1=1
J6 TAT=22-15=7, WT=7-4=3

c. MLFQ scheduling with three queues as follows:
• Queue 1: 3 time slices
• Queue 2: 6 time slices
• Queue 3: FCFS (First-Come, First-Served)

J1 runs for 3 units, 7 units remain, but it is demoted to Q2, t=3
J2 runs for 3 units, 5 units remain, but it is demoted to Q2, t=6
J3 runs for 3 units, it completes at t=9
J1 runs for 1 unit, 6 units remain, it is pre-empted by J4. T=10
J4 runs for 3 units, 1 unit remains, it is demoted to Q2, t=13
J5 runs 1 unit, completes at t=14
J1 runs for 1 unit, 5 units remain, it is pre-empted by J6 t=15
J6 runs for 3 units, 1 unit remains, it is demoted to Q2 t=18
J1 runs for 5 units, completes at t=23
J2 runs for 5 units, completes at t=28
J4 runs for 1 unit, completes at t=29
J6 runs for 1 unit, completes at t=30

J1 TAT = 23-0=23, WT=23-10
J2 TAT= 28-2=26, WT=26-8=18
J3 TAT=9-3=6, WT=6-3=3
J4 TAT=29-10=19, WT=19-4=15
J5 TAT=14-12=2, WT=2-1=1
J6 TAT=30-15=15, WT=15-4=11