1. Answer:

a) Average turnaround time and maximum waiting time: Average turnaround time is minimized by executing the shortest tasks first. Such a scheduling policy could however starve long-running tasks and thereby increase their waiting time.

b) I/O device utilization and CPU utilization: CPU utilization is maximized by running long-running CPU-bound tasks without performing context switches. I/O device utilization is maximized by scheduling I/O-bound jobs as soon as they become ready to run, thereby incurring the overheads of context switches.

2. Answer:

- Preemptive scheduling allows a process to be interrupted in the midst of its execution. The dispatcher takes the CPU away from the process and allocates it to another process.
- Non-preemptive scheduling ensures that a process relinquishes control of the CPU only when it finishes with its current burst.
- Non-preemptive would not be a good choice in a computer center, because it cannot guarantee that each user gets a fair share of the CPU at regular intervals. Non-preemptiveness allows programs to run infinitely long thus making response time and turnaround time for other submitted jobs even longer.

3. Answer:

a)

- SRT is a preemptive version of SPN.
- The scheduler always chooses the process that has the shortest expected remaining processing time. When a new process joins the ready queue, it may in fact have a shorter remaining time than the currently running process. Accordingly, the scheduler may preempt whenever a new process becomes ready. In contrast, SPN does not preempt the currently running process.

b) Both SPN and SRT require to estimate the expected service time.

4. Answer:

a)

FCFS	A	A	A	B	B	B	B	B	C	C	D	D	D	D	D	E	E
RR, q = 1	A	B	A	B	C	A	B	C	B	D	B	D	E	D	E	D	D
SPN	A	A	A	C	C	B	B	B	B	B	D	D	D	D	D	E	E
SRT	A	A	A	C	C	B	B	B	B	B	D	D	E	E	D	D	D
HRRN	A	A	A	B	B	B	B	B	C	C	D	D	D	D	D	E	E

b)

		A	B	C	D	E
	T_a	0	1	3	9	12
	T_s	3	5	2	5	2
FCFS	T_f	3	8	10	15	17
	T_r	3	7	7	6	5
	T_r/T_s	1.00	1.40	3.50	1.20	2.50
RR $q = 1$	T_f	6	11	8	17	15
	T_r	6	10	5	8	3
	T_r/T_s	2.00	2.00	2.50	1.60	1.50
SPN	T_f	3	10	5	15	17
	T_r	3	9	2	6	5
	T_r/T_s	1.00	1.80	1.00	1.20	2.50
SRT	T_f	3	10	5	17	14
	T_r	3	9	2	8	2
	T_r/T_s	1.00	1.80	1.00	1.60	1.00
HRRN	T_f	3	8	10	15	17
	T_r	3	7	7	6	5
	T_r/T_s	1.00	1.40	3.50	1.20	2.50

Self-test

1. D
2. D
3. B
4. C
5. B
6. B