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:

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) All of SPN, SRT and HRRN require to estimate the expected service time.

3. Answer:

From favoring the short process the least to the most:

(i) FCFS discriminates against short jobs since any short jobs arriving after long jobs will have a long waiting time.

(ii) RR treats all jobs equally (giving them equal bursts of CPU time) so short jobs will be able to leave the system faster since they will finish first.

(iii) Feedback scheduling discriminates very favorably toward short jobs since short processes can exit in high priority queue.

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