A closed two tasks embedded systems

An embedded system has four possible operational states, characterized by the following energy consumptions:

1. Idle [0.1 W]
2. CPU computation [2 W]
3. GPU computation [10 W]
4. I/O [0.5 W]

The system starts in Idle state. A New job is executed on the average every 10 sec. When the job starts, it initially runs on the CPU. Then:

- It can finish after an average time of 50 sec. and return Idle.
- It can do I/O after an average time of 10 sec. I/O has an average duration of 5 sec, then control returns to the CPU.
- It can do GPU computation an average time of 20 sec. GPU computation has an average duration of 2 sec, then control returns to the CPU.

Considering that all timings are exponentially distributed, determine:

- The probability of being in each state, both steady state and as function of time, from t =0 to t = 500;
- The following performance metrics, both steady state and as function of time, from t =0 to t = 500:
  - Utilization [time the system is not idle] {state reward}
  - Average power consumption [measure in W] {state reward}
  - System throughput [when the system returns to the idle state] {transition reward}
  - GPU throughput [when a GPU task finishes and the control returns to the CPU] {transition reward}
  - I/O frequency [[when a I/O task finishes and the control returns to the CPU] {transition reward}