**Scenario**

You are technician working in Electronics Company developing digital systems. Your team leader asked you to work on some new designs will be used as a part of larger systems like LCD TV and remote control devices and others. This task requires you to understand sequential circuits also to design and build some of sequential circuits.

**Task 1:**

Describe the operation of two from the following sequential logic devices:

**Devices:**

* J-K flip flop.
* D flip flop.
* Counter.
* Shift register.
* Parallel latch.

**P2.1**

**Note:**

**You assessor will choose 2 requests to work on.**

**Task 2:**

Use formal design techniques to design two from the following sequential circuits:

Sequential circuits:

* BCD Counter.
* Parallel to serial converter.
* 2 bits synchronous binary counter
* Pseudo random number generator (3 bits).

**P2.2**

**Note:**

1. You assessor will choose 2 requests to work on.
2. Your design should include:
   1. Circuit diagram.
   2. Circuit description.
   3. Minimization if needed.
   4. Clock speed used.
   5. Clock speed /power trade off for CMOS if used.
   6. Race hazards.
   7. Power supply decoupling.

**Task (3)**

**Construct and test the sequential circuits previously designed in task 2.**

**P2.3**

**Task (4)**

**Use computer software package to simulate the sequential circuits previously designed in task 2.**

**P2.4**

**Task (5)**

It is required to find appropriate solution to count the sequence (12, 5, 8, 7, and 3) and repeat the same sequence. It is also required to use a clock of 1 Hz speed for this counter.

Study this case then prepare a formal report including the strategy and the solution for these problems.

**M1.3**

**Task (6)**

Use two methods to design 3 bit binary counter.

**M2.7**

**Task (7)**

Validate the results obtained from your previous designs of (**Task 6**) using your simulator software.

**D1.2**