**Department of Computer Science & Engineering**

**University of Asia Pacific (UAP)**

**Program: B.Sc. in Computer Science and Engineering**

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| **Final Examination** | **Spring 2021** | **4TH Year 2ND Semester** | | |
| **Course Code: CSE 457** | **Course Title: Design and Testing of VLSI Circuit** | | | **Credits: 3** |
| **Full Marks: 120\* (Written)** |  | | **Duration: 2 Hours** | |
| \* Total Marks of Final Examination: 150 (Written: 120 + Viva: 30) | | | | |
| **Instructions:**   1. There are **Four (4)** Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins. 2. Non-programmable calculators are allowed. | | | | |

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| **1.** | **a)** | Draw the circuit diagram of a thyristor. Briefly explain the thyristor’s equivalent circuit that causes latch up in a circuit. | **15** |
|  | **b)** | Prove that n input NAND GATE has (n+2)/3 logical effort. | **15** |
| **2.** | **a)** | How is reliability shown in bathtub curve? Explain with a diagram. | **15** |
|  | **b)** | Explain why non-ideal Current vs Voltage (IV) is seen in our graph in Shockley’s equation. | **15** |
| **3.** | **a)** | With a diagram, show the classification of SMT. | **15** |
|  | **b)** | Why is the FPGA popular from an engineering design point of view? | **15** |
| **4.** | **a)** | Let us consider a product with the following components:  Microprocessor — 10 FIT  10 RAM chips — 10 FIT each  100 TTL parts — 10 FIT each  What is the total failure rate of the product? | **15** |
|  | **b)** | Design the CMOS equivalent circuit of a D-LATCH. | **15** |
|  |  | **OR** |  |
|  | **a)** | A novel inverter has the transfer characteristics shown in the Figure below. Determine the values of *VIL*, *VIH*, *VOL*, and *VOH* that give best noise margins? | **15­­­** |
|  | **b)** | The following circuit is partitioned into six major blocks. Each block is represented by a rectangle which has a fixed amount of area requirement.  Design floor planning and partitioning. Briefly explain how you designed. | **15** |