Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **17EI3025** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PROGRAMMABLE DEVICES FOR INDUSTRIAL AUTOMATION** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Design a Programmable Logic Array device to realize combinational logic using truth table.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Input | | |  | | Output | | | A | B | C | | D | x | y | | 0 | 0 | 0 | | 1 | 1 | 0 | | 1 | 0 | 0 | | 0 | 1 | 1 | | 0 | 1 | 1 | | 0 | 0 | 1 | | 1 | 1 | 1 | | 1 | 1 | 1 | | 0 | 1 | 1 | | 1 | 0 | 0 | | 1 | 1 | 0 | | 1 | 1 | 0 | | CO2 | 10 |
| b. | Design gray to binary code convertor using Programmable Read Only Memory. | CO3 | 10 |
| (OR) | | | | |
| 2. | a. | Differentiate Programmable Logic Array and Programmable Array Logic. | CO1 | 6 |
| b. | Design a PID controller that maintains room temperature near 22 °C with fluctuations of the outside temperature, modeled as a disturbance using VHDL coding. | CO5 | 14 |
|  |  |  |  |  |
| 3. | a. | Implement the following function using Xilinx 3000. Suggest the mode with which the above function can be implemented. Identify the number of CLBs and LUTs required.  Y1 = x’+y1; Y2= xy2’+x’y1’  Z= x.y1 | CO6 | 10 |
|  | b. | Design a sequence detector that produces an output ‘1’ whenever non-overlapping sequence 1011 is detected. | CO3 | 10 |
| (OR) | | | | |
| 4. | a. | With wide range of automotive and industrial applications, Electric motors are controlled by drivers that vary the electrical input power to control speed, torque and position. Justify how FPGA based system increase motor control performance. | CO6 | 10 |
|  | b. | Design a combinational circuit which has four inputs, two select lines and one input. Write a hardware descriptive language code for the above combinational circuit. | CO5 | 10 |
|  |  |  |  |  |
| 5. | a. | Illustrate the different configurations available in Xilinx XC 3000. | CO2 | 10 |
|  | b. | With block diagram, explain how home automation is done using FPGA controller. | CO4 | 10 |
| (OR) | | | | |
| 6. | a. | Design a 2 bit comparator used in analog to digital convertor of process system to compare A1 A2 with B1 B2 using Xilinx 3000 FPGA. Suggest the mode with which the structure can be implemented. Identify the number of CLBs and LUTs required. | CO4 | 14 |
|  | b. | Discuss the importance of case statement with examples used in hardware descriptive language. | CO2 | 6 |
|  |  |  |  |  |
| 7. | a. | Design a Controller for Flow Process station with Xilinx FPGA. | CO4 | 14 |
|  | b. | Distinguish between: sequential and concurrent statement in VHDL. | CO2 | 6 |
| (OR) | | | | |
| 8. | a. | Design clocked sequential circuit whose state table is given as   |  |  |  | | --- | --- | --- | | Present state | Next state | | |  | X=0 | X=1 | | 00 | 00 | 01 | | 01 | 10 | 01 | | 10 | 10 | 11 | | 11 | 11 | 00 | | CO1 | 14 |
|  | b. | Differentiate between: Moore and Melay model. | CO1 | 6 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss different technologies used to program FPGA. | CO2 | 10 |
|  | b. | Outline the trends and challenges seen by designers of industrial applications and how FPGAs enable solutions to meet their stringent design goals. Also explain the architecture of ALTERA MAX 7000 FPGA architecture. | CO6 | 10 |

ALL THE BEST