B.E. ELECTRICAL ENGINEERING THIRD YEAR FIRST SEMESTER SUPPLEMENTARY EXAMINATION- 2024

PROGRAMMABLE LOGIC & MICROCONTROLLER

Time: Three hours   (50 marks for each part)   Full Marks 100

Use a separate Answer-Script for each part

	PART I	
	Answer any FIVE:	
1.	Illustrate with relevant circuits the principle of operation of an AND-matrix within a PLA device. State the differences between PLA and PAL	10
2.	Using a diode-based AND matrix and transistorized OR matrix, draw a complete circuit to implement a full-adder block. Explain your solution.	10
3.	Name different switching technologies used in PLD. What are the factors on which speed of an IC chip depends? What are the programming techniques available for CPLDs? Discuss briefly.	2+4+4
4.	Describe with neat circuit diagram, the functionality of Altera MAX7000 chip	10
5.	What are the merits and demerits of SRAM cell used in a programmable switch? Discuss the antifuse switching technology employed in FPGA with proper example.	4+6
6.	Develop a Tri-stated gate with proper test bench program in VHDL. Draw the timing diagrams for input and output signals.	10
7.	What is an LUT? How is it used to implement the logic function $f = ab + \bar{c}$ in FPGA Structure?	3+7
8.	Write short notes on: a) Macrocell b) different logic states available in VHDL	5+5

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SUBJECT: - PROGRAMMABLE LOGIC AND MICROCONTROLLER

Full Marks 100

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No. of Questions	PART II	Marks
	Answer any **THREE**. *Two marks reserved for neat and well organized answer.*	
1.	**Compare (any FOUR):**	4x4=16
	(i) Harvard Architecture and Princeton Architecture	
	(ii) RISC processor and CISC processor	
	(iii) RAM vs ROM	
	(iv) Microprocessor and Microcontroller	
	(v) Timer and Counter	
2.	**(a)** Explain the functions of DDR and PIN registers.	4
	(b) Draw a circuit using a switch to generate logic 1 and 0 for different states of the switch. Explain your solution.	4
	(c) What is a bootloader? Mention the purpose of its use.	4
	(d) How do you connect high current LED with a pin of microcontroller? Explain with appropriate circuit diagram.	4
3.	**(a)** Write a program segment to:	5x2=10
	(i) read bit-5 of PORTC	
	(ii) set bit-3 of PORTA without modifying other bits	
	(iii) Reset bit-6 of PORTD without modifying other bits	

	(iv) shift the content of PORTB by an amount mentioned in program	
	(v) calculate the execution time of a block of commands	
4.	**(b)** Write a program to toggle LED connected to bit-4 of PORTB at a frequency of 10Hz.	6
	(a) Write a program using Timer-3 to generate a pulse of 100Hz at a duty cycle of 50%. Explain your solution stating necessary assumptions, if any.	10
	(b) Read two switches connected to pin-0 and pin-1 of PORTC. If they are same, send the ASCII character S through PORTE, else send ASCII character D. Write the program.	6
5.	Write Short notes on (any TWO):	8+8
	(a) Settings to configure and control timer operation on microcontroller	
	(b) Bit manipulation using microcontroller	
	(c) Conversion between serial and parallel data	