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PES University, Bangalore

(Established under Karnataka Act No. 16 of 2013)

UE15CS201

END SEMESTER ASSESSMENT (ESA) B.TECH. 3rd SEMESTER- Nov. 2016

UE15CS201-Digital Design and Computer Organization

Time: 3 Hrs | Answer All Questions | Max Marks: 100

1.	a)	Simplify the given Boolean function using K-Map. Find all the prime implicants and essential prime implicants. $F(A,B,C,D) = \sum(0, 2, 3, 5, 7, 8, 9, 10, 11, 13, 15)$	6
	b)	Simplify the following expression to (1) sum-of-products and (2) products-of-sums: F=ACD' + C'D + AB' + ABCD	6
	c)	Design a four-input priority encoder with inputs D0, D1, D2, D3 with input D3 having the highest priority and input D0 the lowest priority.	8
2.	a)	Using a decoder and external gates, design the combinational circuit defined by the following three Boolean functions: i) F1 = x'yz' + xz , F2 = xy'z'+ x'y, F3 = x'y'z' + xy ii) F1 = (y' + x)z F2 = y'z' + x'y + yz' F3 = (x + y)z	6
	b)	Implement the following Boolean function using 4-to -1 line multiplexer. F (A, B, C, D) = $\sum$(1, 3, 4, 11, 12, 13, 14, 15)	6
	c)	A sequential circuit has two JK flip-flops A and B and one input x. The circuit is described by the following flip-flop input equations: JA = x KA = B and JB = x KB = A' (i) Derive the state equations A(t + 1) and B(t + 1) by substituting the input equations for the J and K variables. (ii) Draw the state diagram of the circuit.	8
3.	a)	A PN flip-flop has four operations: clear to 0, no change, complement, and set to 1, when inputs P and N are 00, 01, 10, and 11, respectively (i) Tabulate the characteristic table. (ii) Derive the characteristic equation. (iii) Tabulate the excitation table. (iv) Show how the PN flip-flop can be converted to a D flip-flop.	8
	b)	Design a counter with count sequence 0,1,2,4,5,6 using JK Flip-Flops.	8
	c)	Write an assembly code to add 'N' numbers using loops.	4
4.	a)	Write a Sequence of actions needed to fetch and execute the instruction: I) Add R3, R4, R5. II) Load R5, X(R7).	8
	b)	Explain with neat block diagram, the basic organization of a microprogrammed control unit.	6
	c)	Differentiate between hardwired control unit and microprogrammed control unit	6
5.	a)	Perform the multiplication of A:+13 and B :-6 using Booth algorithm	6
	b)	Perform the operation 8/3 using restoring division method	6
	c)	What are the steps involved in handling the interrupts assuming the device has raised an interrupt	4
	d)	What is program controlled I/O. List out the registers used in keyboard and display interfaces	4