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Mid-Term Examinations - Sept. 2023

Programme	:	**B.Tech – BEC, BAC, BSA**	Semester	:	**Fall 2023-24**
Course/Code	:	**Digital Logic Design/ ECE2002**	Slot	:	**B11+B12+B13+B14**
Time	:	**1½ hours**	Max. Marks	:	**50**

Answer all the Questions

Q. No.		Question Description	Marks
1	a.	Determine the results for the following number conversions. i. Convert decimal 27.315 to binary. ii. Calculate the binary equivalent of $2/3$ out to eight places. Then convert from binary to decimal. How close is the result to $2/3$?	6+4
	b.	Determine the base of the numbers in each case for the following operations to be correct: **(i)** $23 + 25 = 51$ **(ii)** $\frac{52}{2} = 12$	
2		Determine the solution of following using complement form: a. Add -31.5_{10} to -93.125_{10} using 12-bit 2's complement form. b. Subtract 27.50_{10} from 68.75_{10} using the 12-bit 1's complement form. c. Subtract -25_{10} to $+14_{10}$ using 5-bit 2's complement form and also verify your answer. Justify the reason, if the answer is incorrect.	3+3+4
3		Given the Boolean function $F(W,X,Y,Z) = \sum m(0,1,4,6,7,8,10,14,15)$ a. Determine and write down the number of implecants, prime implicants (PI) and essential prime implicants (EPI). b. Using K-Map find the reduced Boolean expression of the $F(W,X,Y,Z)$ with minimum literals. c. Realize the final output using NAND or NOR logic, separately.	3+3+4
4		Design a combinational circuit with input variables, A, B and C, and three output variables, x, y, and z. When the binary input is 0, 1, 2, or 3, the binary output is one greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is one less than the input.	10
5		Implement the following Boolean function with a 8:1 multiplexer: (a) $F(A,B,C,D) = \sum m(0,2,5,8,10,14)$ (b) $F(A,B,C,D) = \sum m(2,6,11)$	10

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