Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (NEW) EXAMINATION – SUMMER 2022

Subject Code:3132003 Date:15-07-2022

Subject Name:Design Concepts in Basic Electronics

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Write short note on intrinsic and extrinsic semiconductor materials.	**03**
	(b)	Give detail comparison of analog and digital systems.	**04**
	(c)	Explain digital system with block diagram and its functional elements. Also explain different functions of digital system.	**07**
Q.2	**(a)**	Design and explain half adder combinational logic circuit.	**03**
	(b)	Briefly explain min-terms and max-terms with suitable example.	**04**
	(c)	Reduce the given Boolean Expression to its simplest possible form, compare the truth tables and implement them using minimum number of logic gates. **A[B + A'B(B + A'C')']**	**07**
		OR	
	(c)	Simplify the following function using K-Map method. Also implement the circuit for minimized function using logic gates. $F(A, B, C, D) = \Pi\{0,1,2,4,5,6,8,10,12,13,15\}$	**07**
Q.3	**(a)**	What is the effect of temperature on barrier potential? Explain in detail.	**03**
	(b)	Explain forward bias V-I characteristics of PN junction diode.	**04**
	(c)	Explain significance of voltage Doubler, Tripler and Quadrupler circuits.	**07**
		OR	
Q.3	**(a)**	Prove $(A + B)(A + C) = A + BC$ using Boolean Algebra.	**03**
	(b)	Explain reverse bias V-I characteristics of PN junction diode.	**04**
	(c)	Explain different types of gates with their symbols and truth tables used in digital system.	**07**
Q.4	**(a)**	Design 1-Bit magnitude comparator.	**03**
	(b)	Explain Capacitor Filter for bridge rectifier with circuit diagram and waveforms.	**04**
	(c)	Explain input and output characteristics of CB configuration of transistor.	**07**
		OR	
Q.4	**(a)**	What are the applications of Transistor-Transistor Logic (TTL) circuits?	**03**
	(b)	Write a short note on D Flip-Flop.	**04**
	(c)	Attempt the following questions: 1. Perform binary multiplication of $(101)_2$ and $(111)_2$. 2. Convert $(11011)_2$ to Grey code. 3. Express $(-39)_{10}$ as 8-bit binary number using sign bit method. 4. Convert $(F37A)_{16}$ to binary number. 5. Convert $(2469)_{10}$ to BCD using 8421 code. 6. Convert $(1011)_2$ to decimal number. 7. Convert $(237)_8$ to decimal number.	**07**

Q.5	**(a)**	Explain 3-bit decoder.	**03**
	(b)	Explain series clipper circuit with circuit diagrams and waveforms.	**04**
	(c)	Explain positive, negative and biased clamper circuits with circuit diagrams and waveforms.	**07**

OR

Q.5	**(a)**	Explain SERIAL IN/PARALLEL OUT shift register.	**03**
	(b)	Explain parallel clipper circuit with circuit diagram and waveforms.	**04**
	(c)	Explain 3-bit Asynchronous Counter in detail.	**07**

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