

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2023****Subject Code:3132003****Date:18-01-2024****Subject Name:Design Concepts in Basic Electronics****Time:10:30 AM TO 01:00 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)** Attempt the following: **03**
1. Perform binary multiplication of (1001) and (110).
  2. Convert octal number (65) to binary number.
  3. Represent decimal number (-23) as signed number using sign bit method.
- (b)** Briefly explain sum of minterms and product of maxterms. **04**
- (c)** What is transistor approximation? Explain ideal, second and third approximation for transistor. **07**
- Q.2 (a)** Briefly explain forward biasing of PN junction diode. **03**
- (b)** Attempt the following: **04**
1. What is bulk resistance in diode?
  2. Convert decimal number (649) to BCD.
  3. What is the value of forward biased voltage of silicon diode with second approximation?
  4. What is DC resistance in diode?
- (c)** Explain emitter bias configuration with application. **07**
- OR**
- (c)** Explain AND, OR and NOT Gates with their truth tables and one application of each. **07**
- Q.3 (a)** Simplify the following using Boolean Laws: **03**
- $$[(A+BC)'+D(E+F)']'$$
- (b)** What are the De Morgan's theorems? **04**
- (c)** Explain NAND Gate as universal Gate. **07**
- OR**
- Q.3 (a)** What are the pros and cons of capacitor input filter? **03**
- (b)** Explain working of bridge rectifier in detail. **04**
- (c)** What are the applications of clipper circuits? Briefly explain positive and negative clipper circuits. **07**
- Q.4 (a)** Compare intrinsic semiconductors with extrinsic semiconductors. **03**
- (b)** What is the use of voltage doubler? Explain half wave voltage doubler with diagram. **04**
- (c)** Design and explain working of full subtractor with logic diagram. **07**
- OR**
- Q.4 (a)** What are the characteristics of RTL logic family? **03**
- (b)** Explain working of serial in/parallel out shift register. **04**

- (c) Design and explain working of three-bit magnitude comparator with logic diagram. **07**
- Q.5** (a) Write a short note on Q-point for transistor. **03**  
(b) Derive the equations of IDC, VDC, IRMS, VRMS for full wave rectifier. **04**  
(c) Explain working of Asynchronous up-down counter in detail. **07**
- OR**
- Q.5** (a) Differentiate between combinational circuit and sequential circuit? **03**  
(b) Explain V-I characteristics PN junction diode with forward bias condition. **04**  
(c) What is the use of flip-flop? Give detail explanation of D flip-flop with logic diagram and wave forms. **07**

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