

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

SET - A

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - FEB 2023**

Semester : Semester I - 2022

Course Code : ECE1001

Course Name : Sem I - ECE1001 - Elements of Electronics Engineering

Program : B.Tech - (All Programs)

Date : 20-FEB-2023

Time : 1.00PM - 4.00PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

(10 X 2 = 20M)

1. There are six laws of boolean algebra which helps in simplifications of circuits. Explain the identity and compliment law of boolean algebra ?
(CO1) [Knowledge]
2. The Decimal, Binary, Octal and Hexadecimal Number Systems are Positional Value Number systems. Accordingly, the resultant of Converting the following binary number of decimal - 10101010
(CO1) [Knowledge]
3. Implement a AND gate using a NOR gate. How many gates are required?
(CO1) [Knowledge]
4. Microprocessor buses come in a variety of bit sizes and can be either unidirectional or bidirectional. The data is sent out via data buses. What is the data bus's size and nature ?
(CO1) [Knowledge]
5. A Microprocessor is an important part of a computer architecture. In 8085 microprocessor the Registers which are used for Temporary storage of DATA and cannot be accessed by the programmer are _____
(CO1) [Knowledge]
6. A microprocessor typically contains registers, ALU and timing and control circuits. Explain the utility of timing and control circuits.
(CO1) [Knowledge]
7. Find the equivalent resistance of 3 resistors (100Ω, 50 Ω and 25 Ω)
a) in series
b) in parallel.
(CO1) [Knowledge]

8. The Transistors are operated in three Different Mode / Configuration: CB, CE and CC. Accordingly, α and β are the parameters for a transistor which defines the current gain in a transistor. Write the relation between α and β .

(CO1) [Knowledge]

9. In Transistor is a semiconductor device used for switching, amplifying, controlling, and generating electrical signals. Which terminal's current will help to switch ON and OFF the LED.

(CO1) [Knowledge]

10. Diode Approximation is a mathematical method used to approximate the non-linear behavior of real diodes to enable calculations and circuit analysis. Explain the ideal diode model

(CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

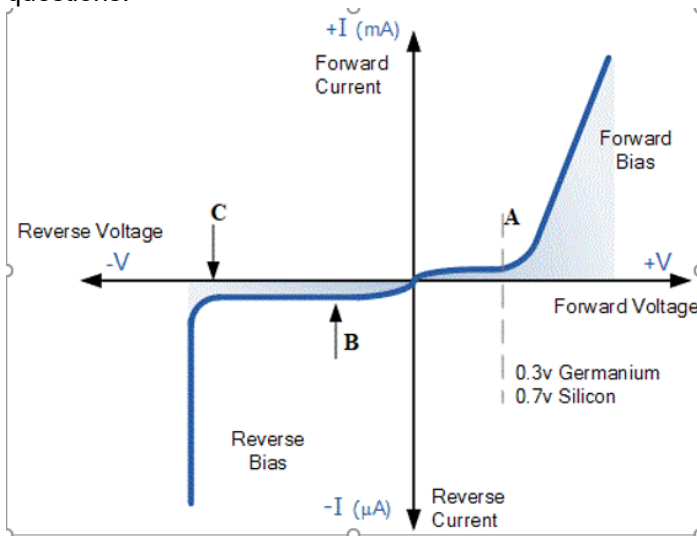
(4 X 10 = 40M)

11. i) A Transistor DC load line is a line on the output characteristics of a transistor and determines the ideal operating point. There are three different configurations of operations. Derive the expression of transistor load line for Common Emitter Configuration and and comment on the Q point.

ii) What are the two main applications of transistor ? Explain the conditions when transistors acts as a open or close swtich ?

(CO2) [Comprehension]

12. A diode is a two terminal semiconductor device, P-N junction diode is formed by combining the N-Type and P-Type material together and providing the leads to connect external biasing. The figure below represents PN junction diode characteristics. Refer the figure and answer the following questions:



1. In forward bias condition, at point A, value of silicon diode and Germanium diode is 0.7V and 0.3V respectively. Identify and define Point A? (2 M)

2. In reverse bias condition, point B represents very low value of current, how the current is measured in reverse bias condition? (1 M)

- (a) μ Amperes (b) n Amperes (c) Amperes (d) Both (a) & (b)

1. For above PN Junction diode if forward current is given as 3 mA and forward voltage is given as 6 V calculate the static resistance of Diode? (3 M)

2. Identify and define Point B and C and also Define and when they occur in PN junction Diode? (4 M)

(CO2) [Comprehension]

13. Explain the significance of universal gates. Briefly discuss SOP and POS expression using examples. Using the concept of conversion of basic gates, Implement the following gates using both NAND-NAND and NOR-NOR implementation
i) NOT ii) AND iii) OR iv) EX-OR v) EX-NOR

(CO2) [Comprehension]

14. a) The communication system is a system which describes the information exchange between two points. The process of transmission and reception of information is called communication. Describe the major elements involved through a Block diagram of Communication System.

b) Modulation is used by singers and other vocalists to modify characteristics of their voices, such as loudness or pitch. Technically it expresses the multiplication of the original signal by another periodic signal. Henceforth, briefly illustrate the process of Modulation, need of modulation and the different types of modulation techniques.

(CO2) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 20 = 40M)

- 15.a) There are four number systems used in digital system based on the base i.e. Decimal, Binary, Hexadecimal and Octal. Convert the following number into another number systems as mentioned.

(CO3) [Application]

- i) 65 in decimal to binary and octal
ii) 2F9A in hexadecimal to binary
iii) 10100110101111 in binary to hexadecimal

- 15.b) Both 1's and 2's complements are used to perform subtraction in digital logic. Using 2's complement, perform the following operations. Clearly mention the steps.

(CO3) [Application]

- i) 12-6
ii) 6-12

- 15.c) $f(ABC) = \sum m(5, 7, 2, 6, 0, 1)$

(CO3) [Application]

For the above function, find

- i) SOP equation
ii) Simplification
iii) Implementation a) AND-OR b) NAND-NAND

- 16.a) a) Addition, Subtraction, Multiplication, Division, Compliment, Logical-AND, Logical-OR are the most basic mathematical and logical operations performed ALU of any Microprocessor. These operations are implemented in a computational machines using Digital logic Circuits. According perform the following operations: Implement the following gates using NAND Universal Gate: NOT, AND, OR, XOR and XNOR gates.

(CO3) [Application]

b) In Boolean Algebra, the De-Morgan's Law are a pair of transformation rules that are both valid rules of inference. The rules allow the expression of conjunction and disjunctions purely in terms of each other via negation. Accordingly: State and prove with the help of Truth table, the 3-Variable De-Morgan's Theorems.

- 16.b) Accumulator register is used to store the output of addition. Briefly explain the Accumulator register. How does the value of accumulator register changes for the following lines of codes:

(CO3) [Application]

1. A= 10H
2. B= 11H
3. ADD A,B

What changes needs to be done to add three numbers using accumulator ?

- 16.c) Buses in microcontrollers are sets of pins, wires or signals having common function. Explain the three types of busses and mention the differences between any two of them.

(CO3) [Application]