Course: Digital Systems and Computer Architecture		Course Code: CS1101	Semester: I
Time: 2:30 PM to 4:00 PM	Duration: 90 minutes	Date : 04/12/2024	Max Marks: 25
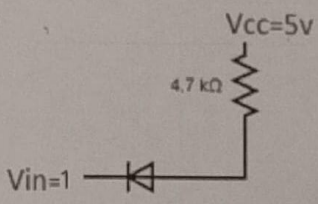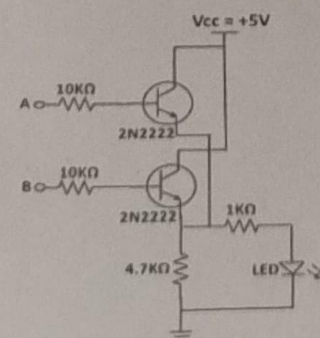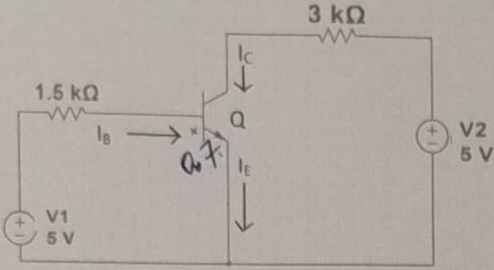
Instructions:

a) Answer all questions

Sl. No.	PART A	Marks	L1-L6	CO
1.	When a material with the stable electronic configuration 2-8-18-5 is doped into silicon, it creates a _____ type of semiconductor.	1	L2	CO1
2.	Evaluate whether the diode's state (ON or OFF) aligns with the intended circuit functionality based on its voltage and current requirements.	1	L4	CO1
3.	Represent 0xAC in Gray code format	1	L2	CO1
4.	Convert the signed binary number 1010 to decimal value.	1	L2	CO2
5.	Which IC is designed for NAND gates a) 7408 b) 7402 c) 7400 d)7432	1	L1	CO2

Sl.No	PART B	Marks	L1-L6	CO
6.	a. Evaluate the circuit's design for the input condition A = 0 and B = 0, considering whether the LED's state aligns with the intended logic operation. (2 Marks) 	5	L4	CO1

L1- Remember, L2- Understand, L3 – Apply, L4- Analyse, L5 – Evaluate, L6 – Create

	b. Find the dual and complement of the expression given below. Also mention the number of terms, literals, gates and variables $Y = [(AB'+C')D+E'].F$ (3 marks)		L2	CO2

7. a. Analyse the below given circuit and find IB and IC if 8.5mA of current is produced at the Emitter junction. Assume that the transistor is made up of silicon.   (2 Marks) — 5, L4, CO1

b. Design a 4 bit odd Parity Generator .   (3 marks) — L3, CO2

8.
a. Construct a NPN transistor and discuss the biasing and doping of the transistor.   (2 marks) — 5, L2, CO1

b. Verify the following statement and prove it using truth table and logic diagram.
"The complement of a sum of variables is equal to the product of the complements of the variables"   (2 Marks) — L3, CO2

c. Divide 37 by 4 using shift operations   (1 mark) — L2, CO1

9.
a. Simplify the following expression using Boolean laws
$Y=[AB'(C+BD)+A'B']C$ (2 Marks) — 5, L3, CO2

b. Evaluate and construct the truth table for the following SOP expression: $Y = (A'B'C' + A'BC + AB'C + ABC')$.
Then, synthesize the logic diagram required to implement the expression.   (2 Marks) — L2, CO2

c. Construct an OR gate using NAND gates only and verify using Truth table.   (1 Mark) — L3, CO2

Course Outcomes

1. Understand the Fundamental Principles of Electronic Circuits to develop efficient logic systems
2. Apply the Concepts of Combinational and Sequential Circuit to handle data processing of systems.
3. Analyze the instruction cycle, execution cycle, data transfer processes, and overall functioning of the CPU within a computer system
4. Build Analog and Digital Logic Circuits using discrete components for real time problems

Marks Distribution

L1	L2	L3	L4	L5	L6	CO1	CO2	CO3	CO4
1	11	8	5	0	0	11	14	0	0

L1- Remember, L2- Understand, L3 – Apply, L4- Analyse, L5 – Evaluate, L6 – Create