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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - APR 2023**

Semester : Semester II - 2022

Course Code : EEE2015

Course Name : Sem II - EEE2015 - Digital Electronics

Program : EEE

Date : 18-APR-2023

Time : 9:30AM - 11AM

Max Marks : 50

Weightage : 25%

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

(5 X 2 = 10M)

1. Binary coded decimal (BCD) is a way to express each of the decimal digits with a binary code. There are only ten code groups in the BCD system, so it is very easy to convert between decimal and BCD. What decimal number is represented by the given BCD code 000101010111
a) 157 (CO1) [Knowledge]
b) 175
c) 167
d) None of the above
2. Logic symbols used to represent the logic gates are in accordance with ANSI/IEEE Standard 91-1984/ Std. 91a-1991. This standard has been adopted by private industry and the military for use in internal documentation as well as published literature. An inverter performs an operation known as
a) complementation (CO1) [Knowledge]
b) assertion
c) inversion
d) both answers (a) and (c)
3. A logic expression can be reduced to its simplest form or changed to a more convenient form to implement the expression most efficiently using Boolean algebra. Which one of the following is *not* a valid rule of Boolean algebra?
a) $A + 1 = 1$ (CO1) [Knowledge]
b) $A = A$
c) $A.A' = A$
d) $A + 0 = A$

4. *Variable, complement, and literal* are terms used in Boolean algebra. In Boolean algebra, a sum term is a sum of literals. The Boolean expression $A + B + C$ is
- a sum term (CO2) [Knowledge]
 - a literal term
 - an inverse term
 - a product term
5. According to DeMorgan's theorems, the complement of a product of variables is equal to
- the complement of the sum (CO2) [Knowledge]
 - the sum of the complements
 - the product of the complements
 - answers (a), (b), and (c)

PART B

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

6. As part of an aircraft's functional monitoring system, a circuit is required to indicate the status of the landing gears prior to landing. A green LED display turns on if all three gears are properly extended when the "gear down" switch has been activated in preparation for landing. A red LED display turns on if any of the gears fail to extend properly prior to landing. When a landing gear is extended, its sensor produces a LOW voltage. When a landing gear is retracted, its sensor produces a HIGH voltage. Implement a circuit to meet this requirement. (CO1) [Comprehension]
7. Two tanks store certain liquid chemicals that are required in a manufacturing process. Each tank has a sensor that detects when the chemical level drops to 25% of full. The sensors produce a HIGH level of 5 V when the tanks are more than one-quarter full. When the volume of chemical in a tank drops to one-quarter full, the sensor puts out a LOW level of 0 V. It is required that a single green light-emitting diode (LED) on an indicator panel show when both tanks are more than one-quarter full. Show how a NAND gate can be used to implement this function. (CO1) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

8. A table is used to represent the Boolean expression of a logic gates function is called the logic gates. A logic gates truth table shows each possible input combination to the circuit with the resultant output depending upon the combination of the inputs.
- Find the Boolean expression in the standard sum of product (SOP) from the given truth table.
 - Simplify the expression using KMap.
 - Implement the standard SOP using logic gates.

Inputs			Outputs
X	Y	Z	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

(CO2) [Application]