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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: III - THEORY EXAMINATION (2021 - 2022) (ONLINE)

Subject: Digital System Design

Time: 02:00 Hours

Max. Marks: 100

General Instructions:

1. *All questions are compulsory. It comprises of two Sections A and B.*
 - *Section A - Question No- 1 has 35 objective type questions carrying 2 marks each.*
 - *Section B - Question No- 2 has 12 subjective type questions carrying 3 marks each. You have to attempt any 10 out of 12 question.*
 - *No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.*

SECTION A

35 x 2 = 70

1. Attempt ALL parts:-

- | | | |
|-------|---|---|
| 1.1.a | Hamming code is capable of (CO1) | 1 |
| | (a) Only detect single-bit error | |
| | (b) Only correct single-bit error | |
| | (c) Detect and correct single bit error | |
| | (d) Detect and correct multiple bit errors | |
| 1.1.b | The logical expression $Y = \sum m(0, 3, 6, 7, 10, 12, 15)$ is equivalent to | 1 |
| | (a) $\prod M(0, 3, 6, 7, 10, 12, 15)$ | |
| | (b) $\prod M(1, 2, 4, 5, 8, 9, 11, 13, 14)$ | |
| | (c) $\sum m(1, 2, 4, 5, 8, 9, 11, 13, 14)$ | |
| | (d) $\sum m(0, 2, 4, 6, 8, 10, 12, 14)$ | |
| 1.1.c | Find the 2's complement of 1101011101000. (CO1) | 1 |
| | (a) 1101011101000 | |
| | (b) 1001011101000 | |
| | (c) 1011101001 | |
| | (d) None of these | |
| 1.1.d | Find the binary equivalent of decimal number 0.875 | 1 |
| | (a) 0.111 | |
| | (b) 0.0101 | |
| | (c) 01.0101 | |
| | (d) 1.0101 | |
| 1.1.e | The SOP form of logical expression is most suitable for designing logic circuits using only | 1 |
| | (a) XOR gates | |
| | (b) AND gates | |
| | (c) NAND gates | |
| | (d) NOR gates | |
| 1.1.f | How many AND gates are required to realize $Y = CD + EF + G$? | 1 |
| | (a) 4 | |
| | (b) 5 | |

- (c) 3
(d) 2
- 1.1.g A switching function $f(A, B, C, D) = A'B'CD + A'BC'D + AB'C'D + AB'CD + A'BCD$ can also be written as 1
- (a) $\Sigma m(1, 3, 5, 7, 9)$
(b) $\Sigma m(3, 5, 7, 9, 11)$
(c) $\Sigma m(3, 5, 9, 11, 13)$
(d) None of these
- 1.2.a How many data select lines are required for selecting eight inputs? 1
- (a) 1
(b) 2
(c) 3
(d) 4
- 1.2.b A half adder circuit has two inputs and 1
- (a) one output
(b) two output
(c) three output
(d) none of these
- 1.2.c In four-variable K-map simplification, a group of eight adjacent ones leads to a term with (CO2) 1
- (a) one literal
(b) two literal
(c) three literal
(d) four literal
- 1.2.d For a 4-bit parallel adder, if the carry-in is connected to a logical HIGH, the result is: 1
- (a) The same as if the carry-in is tied LOW since the least significant carry-in is ignored.
(b) That carry-out will always be HIGH
(c) One will be added to the final result.
(d) The carry-out is ignored.
- 1.2.e The binary subtraction $0 - 1 =$ 1
- (a) difference = 0, borrow = 0
(b) difference = 1, borrow = 0
(c) difference = 1, borrow = 1
(d) difference = 0, borrow = 1
- 1.2.f How many NAND gates are needed to implement a full adder? 1
- (a) 12
(b) 13
(c) 14
(d) 15
- 1.2.g A code converter is a logic circuit that _____ 1
- (a) Inverts the given input
(b) Converts into decimal number
(c) Converts data of one type into another type
(d) Converts to octal
- 1.3.a Why latches are called memory devices? 1
- (a) It has capability to store 8 bits of data

- (b) It has internal memory of 4 bit
(c) It can store one bit of data
(d) It can store infinite amount of data
- 1.3.b When both inputs of SR latches are high, the latch goes _____. (CO3) 1
(a) Unstable
(b) Stable
(c) Indeterminate state
(d) Bistable
- 1.3.c How many types of sequential circuits are? 1
(a) 2
(b) 3
(c) 4
(d) 5
- 1.3.d What is a trigger pulse? (CO3) 1
(a) A pulse that starts a cycle of operation
(b) A pulse that reverses the cycle of operation
(c) A pulse that prevents a cycle of operation
(d) A pulse that enhances a cycle of operation
- 1.3.e The difference between a flip-flop & latch is _____ 1
(a) Both are same
(b) Flip-flop consist of an extra output
(c) Latches has one input but flip-flop has two
(d) Latch has two inputs but flip-flop has one
- 1.3.f What is one disadvantage of an S-R flip-flop? 1
(a) It has no Enable input
(b) It has a RACE condition
(c) It has no clock input
(d) Invalid State
- 1.3.g What is the hold condition of a flip-flop? 1
(a) Both S and R inputs activated
(b) No active S or R input
(c) Only S is active
(d) Only R is active
- 1.4.a The basic function of TTL gate is which of the following functions? (CO4) 1
(a) AND
(b) OR
(c) NOR
(d) NAND
- 1.4.b Which of the following is the propagation delay of TTL circuits? 1
(a) 1 s
(b) 1 ms
(c) 1 ns
(d) 1 ps
- 1.4.c The logic '0' of ECL is represented as _____V and logic '1' is represented as _____V. 1
(a) 1, 1.65
(b) 0.9, 1.75

- (c) 1.2, 2.35
(d) 1.9, 4.3
- 1.4.d The inverter is 1
 (a) NOT gate
 (b) OR gate
 (c) AND gate
 (d) None of the above
- 1.4.e Which of the following logic families has the highest fan-out? 1
 (a) TTL
 (b) CMOS
 (c) ECL
 (d) Schottky TTL
- 1.4.f Which of the following statements is incorrect? 1
 (a) TTL logic has very low power consumption and is therefore widely used in highly integrated components
 (b) TTL devices have logic levels of about 3.4 V and 0.2V
 (c) TTL logic normally operates from a single 5V supply.
 (d) standard TTL devices have a propagation delay that is dominated by the storage time of the bipolar transistors used.
- 1.4.g Which of the following logic family dissipates minimum power? 1
 (a) CMOS
 (b) ECL
 (c) TTL
 (d) DTL
- 1.5.a A Flip flop stores ----- number of bits. 1
 (a) one
 (b) two
 (c) three
 (d) four
- 1.5.b How many 1024 * 1 RAM chips are required to construct a 1024 * 8 memory system? 1
 (a) 4
 (b) 8
 (c) 10
 (d) 9
- 1.5.c For 5K memory, how many address lines are needed? (CO5) 1
 (a) 10
 (b) 13
 (c) 12
 (d) 9
- 1.5.d Flash memory is Also Known as..... 1
 (a) Flash RAM
 (b) Flash ROM
 (c) Flash DROM
 (d) Flash SRAM
- 1.5.e Memory is a part of 1
 (a) Input device

- (b) Output device
 - (c) CPU
 - (d) Control Unit
- 1.5.f Which of the following medium is used between CPU & RAM to speed up the processing power of a CPU ? 1
- (a) Virtual Memory
 - (b) DRAM
 - (c) Flash Memory
 - (d) Cache Memory
- 1.5.g What is the permanent memory built into your computer called ? 1
- (a) RAM
 - (b) ROM
 - (c) CPU
 - (d) CD-ROM

SECTION B

10 X 3 = 30

2. Answer any TEN of the following:-

- 2.1.a Write the truth table of BCD (2421) code? 2
- 2.1.b Draw the logical circuit of OR Gate using NAND Gate 2
- 2.2.a List out the different combinational logic circuits. 2
- 2.2.b $F(X,Y,Z)=\prod M(0,1,2,4)$ minimize the given using K-MAP in POS form. 2
- 2.2.c What is the major difference between half-adders and full-adders? 2
- 2.3.a What is Excitation Table of Flip Flops? 2
- 2.3.b Design a MOD-10 ripple counter. 2
- 2.3.c what is Synchronous counter ? 2
- 2.4.a Compare TTL and CMOS logic families on the basis of following: i) Propagation delay ii) Power dissipation iii) Fan-out iv) Basic gate 2
- 2.4.b Write the advantages of Totem pole arrangement. 2
- 2.5.a Mention the two types of erasable PROM. 2
- 2.5.b Classify PLDs. 2