

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), April-May 2018

B. Tech in Electrical Engineering, Semester IV

Roll No.....

ECE303: Digital Electronics

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

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- i. The two digits hexadecimal number which has largest value is ____ which corresponds to ____
(a) FE, 255 decimal (b) FF, 254 decimal (c) FF, 255 decimal (d) EF, 245 decimal
- ii. The addition of +19 and +43 results as _____ in 2's complement system.
(a) 11001010 (b) 101011010 (c) 00101010 (d) 00111110
- iii. De Morgan's theorem states that
(a) $(AB)' = A' + B'$ (b) $(A + B)' = A' * B$
(c) $A' + B' = A'B'$ (d) None of the Mentioned
- iv. Most demultiplexers facilitate which type of conversion?
(a) Decimal-to-hexadecimal (b) Single input, multiple outputs
(c) AC to DC (d) Odd parity to even parity
- v. The SOP form of logical expression is most suitable for designing logic circuits using only: (a) XOR gates (b) NOR gates (c) NAND gates (d) OR gates
- vi. If A, B and C are the inputs of a full adder then the sum is given by
(a) A AND B AND C (b) A OR B AND C
(c) A OR B OR C (d) A XOR B XOR C
- vii. The truth table for an S-R flip-flop has how many VALID entries?
(a) 1 (b) 2 (c) 3 (d) 4
- viii. High speed counter is
(a) Ring counter (b) Ripple counter
(c) Synchronous counter (d) Asynchronous counter
- ix. The group of bits 11001 is serially shifted (right-most bit first) into a 5-bit parallel output shift register with an initial state 01110. After three clock pulses, the register contains ____
(a) 01110 (b) 00001 (c) 00101 (d) 00110
- x. Which programming is done during manufacturing process?
(a) Mask Programming (b) PROM
(c) Both PROM and mask programming (d) None of the Mentioned

Q.2 Short answer type questions (4 questions @ 2.5 marks)

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- (i). What is the advantages of using Gray code? Explain any one area of its application with the help of a block diagram.
- (ii). Design logic circuit using only NAND gate to generate the function $Y = (A+BC)$.
- (iii). On subtracting $(01010)_2$ from $(11110)_2$ using 1's complements, the output will be?
- (iv). Differentiate between PAL and PLA?

- Q.3A Perform the arithmetic operation of following numbers in BCD. 05
 (i) $19 + 22$ (ii) $91 + 81$ (iii) $68 - 24$
- Q.3B How the hamming code is useful for detecting and correcting error in digital transmission system? Find the number and position of parity bit to be added to construct hamming code for an 8-bit data word. 05
- Q.4A Design BCD-Excess 3 code converter using basic logic gates with proper truth table. 05
- Q.4B What do you mean by Prime implicant? Simplify the following Boolean expression using Kmap. 05
 $F(A, B, C, D) = \sum m(0, 2, 3, 6, 8, 11, 12, 14) + d(1, 4, 9, 10)$
- Q.5A What is the mean by standard SOP form? Convert the following function in standard SOP form. 05
- Q.5B Design 16:1 multiplexer using 8:1 multiplexer IC 05
- Q.6A Construct a combinational circuit to convert given binary coded decimal number into an excess 3 code. 05
- Q.6B What is magnitude comparator 9 Design a two-bit comparator using logic gates. 05
- OR**
- Q.6B How does the operation of an asynchronous input differ from the synchronous input? Explain in details the working of an edge triggered J-K flip-flop. 05
- Q.7A Design a combinational circuit with 4 inputs and 1 output. The output is 1 if input is even number. 05
- Q.7B Discuss the types of memory used in digital circuits and explain the purpose of address lines, data lines and control signals in memory circuits. 05
- OR**
- Q.7B The memory unit that follow are specified by the number of words time the number of bits per word. How many address lines and input-output data lines are needed in each case? 05
 (i) $8 K \times 16$ (ii) $2 G \times 8$ (iii) $16 M \times 32$ (iv) $256 K \times 64$
- Q.8A What is the role of register? How the information is transferred into and out of a shift register? Discuss the operation of a 4-bit J-K shift register. 10
- Q.9A How the PAL is differ than PROM? Implement the function using PAL. 10
 $F1 = A'BC + ABC' + A'B'C + AB'$ and $F2 = ABC + AB'C' + BC$
- Q.9B With the help of an excitation table, explain how a 3 - bit synchronous up counter can be designed using T - flip - flops. 10
- OR**
- Q.9B Where the Quine-Mc Cluskey method is most suitable to simplify Boolean expression. Find the minimal expression using Quine-Mc Cluskey method. 10
 $Y(A, B, C, D) = \sum m(1, 5, 6, 12, 13, 14)$