

QP CODE 2073511102

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DMI-ST. EUGENE UNIVERSITY

ZAMBIA

DEGREE EXAMINATION – JUNE 2024

Semester: I 351 HE 11 FUNDAMENTALS OF DIGITAL ELECTRONICS

Time: 3:00 Hours

Max. Marks: 100

Answer any FIVE Questions (5 x 20 = 100 Marks)

1. a) Solve the following binary numbers and show your working:
 - (i) $(11011)_2 + (11010)_2$
 - (ii) $(11011)_2 \% (11)_2$
 - (iii) Multiply 10111 by 11 . (9 Marks)
- b) Perform 2's complement addition on the given numbers in binary. Use 5 bit. Show your working.
 - (i) $+6$ and $+7$ (2 Marks)
 - (ii) $+13$ and -6 (2 Marks)
 - (iii) -15 and $+9$ (2 Marks)
- c) What is a half adder? Construct the circuit and obtain the truth table. (5 Marks)
2. a) State and prove associative AND law and OR law with the help of circuits. (6 Marks)
- b) For the Logical SOP expression written, $F = A'B'C' + A'BC' + A'BC + ABC' + ABC$, Construct the truth table. (4 Marks)
- c) Given the function, $F(A,B,C,D) = \sum(0,1,2,5,8,9,10)$. Obtain the simplified SOP expression using K-map. (10 Marks)
3. a) Explain in detail on 4X1 multiplexer. Give block diagram, truth table, logical expression and circuit. (10 Marks)
- b) Elaborate on 2 to 4 line decoder .give the block diagram, truth table logical expression and circuit. (10 Marks)
4. a) Differentiate combinational circuits from sequential circuits with 5 points. (5 Marks)
- b) Discuss SR flip flop. Draw a circuit. (8 Marks)

- c) Describe JK flip flop. Construct a circuit and truth table. **(7 Marks)**
5. a) Elaborate on ring counters. Give a circuit and waveform. **(6 Marks)**
b) Explain Dynamic RAM (DRAM) and Static RAM (SRAM). **(4 Marks)**
c) Explain in detail any five types of Read Only Memory. **(10 Marks)**
6. a) Compute the following binary numbers and show your working:
(i) $(1100)_2 - (1010)_2$ **(2.5 Marks)**
(ii) $(1011.01)_2 \times (110.1)_2$ **(2.5 Marks)**
b) Briefly explain sign magnitude representation of binary numbers. Give an example. **(6 Marks)**
c) Describe AND gate, NOR gate and XNOR gate. State the truth table and symbols respectively. **(9 Marks)**
7. a) Describe Binary to BCD code converter. Obtain a truth table, expression and logical circuit. **(12 Marks)**
b) Produce an octal to binary encoder logical circuit. Show the truth table, logical expression. **(8 Marks)**