

# CBCS SCHEME



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17CS/IS32

Third Semester B.E. Degree Examination, Aug./Sept. 2020

## Analog & Digital Electronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- With circuit symbol and characteristic curves, explain the working of N-Channel E-MOSFET. (08 Marks)
  - List out the differences between JFETs and MOSFETs. (06 Marks)
  - Briefly discuss the working principles of CMOS. (06 Marks)

OR

- Explain with a neat diagram current to voltage and voltage to current converter (using opamp) (06 Marks)
  - Explain the performance parameter of opamp. (08 Marks)
  - With necessary circuit diagram and waveforms, explain the operation of a relaxation oscillator using opamp. (06 Marks)

### Module-2

- Give simplified logic equation of  $y = \sum m(0, 1, 2, 3, 10, 11, 12, 13, 14, 15)$  using Quine-Mcclusky method. (10 Marks)
  - Find the minimal sum and minimal product using K-map.  
 $f(a, b, c, d) = \sum m(6, 7, 9, 10, 13) + d(1, 4, 5, 11)$  (08 Marks)
  - Implement the following using NAND gates only. (02 Marks)

OR

- Draw the timing diagram and write a verilog HDL code (using structural model) for the Boolean function  $Y = \text{NAND}(y_1, y_2)$  where  $y_1 = A + B$  and  $y_2 = B + C$ . (08 Marks)
  - Write the truth table of the logic circuit having three inputs A, B and C and the output expression as  $y = \overline{ABC} + ABC$ . Also simplify the expression using Boolean algebra and implement the logic circuit using NAND gates. (06 Marks)
  - Realize basic gates using only NAND gates and only NOR gates. (06 Marks)

### Module-3

- Implement the following Boolean function using 4 : 1 MUX.  
 $F(A, B, C, D) = \sum m(0, 1, 2, 4, 6, 9, 12, 14)$  (06 Marks)
  - Construct 16 : 1 MUX using 4 to 1 and 2 to 1 MUX. (06 Marks)
  - What is magnitude comparator? Design and explain 2-bit magnitude comparator. (08 Marks)

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OR

- Explain the positive edge-triggered JK flip flop with necessary logic diagram, truth table and waveforms. (08 Marks)
  - Illustrate the three basic circuits used in arithmetic building blocks. (06 Marks)
  - Design a 4 to 1 MUX, using conditional assign and case statements. (06 Marks)

**Module-4**

- 7 a. Briefly discuss the various representations of flip flops. (12 Marks)  
b. Explain parallel-in-serial out shift register with example. (08 Marks)

**OR**

- 8 a. With block diagram, truth table and output waveforms, explain the 3-bit binary ripple down counter. (10 Marks)  
b. Design synchronous mod-5 up counter using JK flip flops. (10 Marks)

**Module-5**

- 9 a. Design and construct divide by 60 counter. (10 Marks)  
b. Design a self-correcting modulo-6 counter in which all unused state leads to state CBA = 000. (10 Marks)

**OR**

- 10 a. With necessary circuit diagram and waveform, explain continuous analog-to-digital converter. (10 Marks)  
b. Explain 4-bit digital to analog converter. (10 Marks)

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