



University of Engineering & Management, Kolkata
End Semester Examination, November - December, 2022
Programme Name: B.Tech in CSE/CSE(AI ML)/CSE(IOT)/CSBS
Semester: 3rd
Course Name: Digital Electronics
Course Code: ESCE302

Full Marks: 100

Time: 3 Hours

Group - A

Answer 10 questions. Each question carries 2 marks. (2 × 10)

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| 1.A. Demonstrate the BCD addition for $(57)_{10}$ and $(26)_{10}$. | 2,CO2,Understand |
| Or | |
| 1.B. Convert 62.0458 to binary, octal and hexadecimal. | 2,CO2,Understand |
| 2.A. Demonstrate 1's complement subtraction on: $1310 - 1110$. | 2,CO2,Understand |
| Or | |
| 2.B. Convert 23D916 to binary, decimal and octal. | 2,CO2,Understand |
| 3.A. Explain the difference between asynchronous and synchronous counters. | 2,CO2,Understand |
| Or | |
| 3.B. Convert Decimal $(432)_{10}$ to BCD code. | 2,CO2,Understand |
| 4.A. If $J=K=1$ and $CLEAR=0$, what will be the output of the JK flip flop? | 2,CO1,Remember |
| Or | |
| 4.B. Write 4 properties of TTL. | 2,CO1,Remember |
| 5.A. What is toggle? | 2,CO1,Remember |
| Or | |
| 5.B. What is meant by edge triggering? | 2,CO1,Remember |
| 6.A. If $J=K=0$ and $PRESET=0$, what will be the output of the JK flip flop? | 2,CO1,Remember |
| Or | |
| 6.B. State 2 advantages and 2 disadvantages of MOS. | 2,CO1,Remember |

- 7.A. Why is Gray code called a unit distance code? Explain with the help of an example. 2,CO1,Remember
- 7.B. Define excess 3 code? Why it is known as self-complementing code? Or 2,CO1,Remember
- 8.A. What is the difference between a latch and a flip-flop? 2,CO1,Remember
- 8.B. What is the primary disadvantage of asynchronous counter? Or 2,CO1,Remember
- 9.A. Draw the state diagram of a 4 bit Ring counter. 2,CO3,Apply
- 9.B. Solve for the 2's complement of 1001001. Or 2,CO3,Apply
- 10.A. Construct the basic block diagram of a 2 bit magnitude comparator. 2,CO3,Apply
- 10.B. Implement XOR gate using NAND gate. Or 2,CO3,Apply

Group - B

Answer 8 questions. Each question carries 5 marks. (5 × 8)

- 11.A. Assess the logic circuit diagram for a 2:4 decoder with enable input. Explain its working. 5,CO5,Evaluate
- 11.B. Reframe a combinational circuit for excess -3 code to BCD conversion using minimum number of logic gates. Or 5,CO5,Evaluate
- 12.A. Calculate canonical SOP for the following: $f = ABC + BD' + AC'$. 5,CO5,Evaluate
- 12.B. Assess binary multiplication: $1101.1 * 1101$ Or 5,CO5,Evaluate
- 13.A. Evaluate the circuit of ECL 2 input NOR gate. 5,CO5,Evaluate
- 13.B. Judge the function using single 8:1 Mux and any other logic gates, if required: $F(A,B,C,D) = \sum m(0,1,2,5,9,11,13,15)$. Or 5,CO5,Evaluate
- 14.A. What is a magnitude comparator? Construct a 1-bit magnitude comparator circuit and explain its working. 5,CO4,Analyze
- 14.B. Construct and explain the working of a 4 bit SIPO register circuit. Or 5,CO4,Analyze

- 15.A. Explain the operation of a 4-bit ring counter with the help of suitable tables and diagrams. **5,CO4,Analyze**
- Or**
- 15.B. Construct a code converter circuit to show BCD to excess-3 code conversion. Explain its working with suitable examples. **5,CO4,Analyze**
- 16.A. Construct a code converter circuit to show excess-3 to BCD code conversion. Explain its working with suitable examples. **5,CO4,Analyze**
- Or**
- 16.B. Construct a 3:8 decoder circuit and explain its working. **5,CO4,Analyze**
- 17.A. Write the universal gates. Implement NOT, AND, OR and XOR using any one of the universal gates. **5,CO6,Create**
- Or**
- 17.B. Evaluate the following in 9's complement form: (245) and (7865). **5,CO6,Create**
- 18.A. Evaluate a combinational circuit to identify whether an input number to the circuit is prime or not. Draw the circuit, truth table, derive expression (if any) and explain. **5,CO5,Evaluate**
- Or**
- 18.B. Construct binary division: ($\underline{11111111} / 1001$) **5,CO5,Evaluate**

Group - C

Answer 4 questions. Each question carries 10 marks. (10 × 4)

- 19.A. Write short note on TTL - include characteristics, circuit diagram, advantages and disadvantages. **10,CO6,Create**
- Or**
- 19.B. Write short note on CMOS - include characteristics, circuit diagram, advantages and disadvantages. **10,CO6,Create**
- 20.A. a) Evaluate the following Boolean function using 4 variable map: $F(w,x,y,z) = \Sigma(2,3,10,11,12,13,14,15)$
b) Formulate the expression for Odd Parity **10,CO5,Evaluate**
- Or**
- 20.B. a) Evaluate and implement a comparator that can compare between two 3-bit binary numbers. **10,CO5,Evaluate**
b) Judge the logic diagram of a full adder using only NAND gate

- 21.A. a) Compare the following: Asynchronous counter vs synchronous counter. 10,CO4,Analyze
b) Compare the following: Ring counter vs Johnson counter
Or
- 21.B. Using Quine-McCluskey (tabular minimization method) minimize $F(a, b, c, d) = \sum m(1, 2, 3, 4, 5) + \sum d(12, 13, 14, 15)$ 10,CO4,Analyze
- 22.A. Construct a 2-bit asynchronous up-down counter. Explain its working as UP & DOWN separately. 10,CO3,Apply
Or
- 22.B. Construct a synchronous counter circuit with the specific count sequence as $0 \rightarrow 2 \rightarrow 4 \rightarrow 7 \rightarrow 0$. Avoid the data lock out condition. 10,CO3,Apply
