

2023
B.A./B.Sc.
Fourth Semester
CORE – 10
PHYSICS
Course Code: PHC 4.31
(Digital Systems & Applications)

Total Mark: 70
Time: 3 hours

Pass Mark: 28

Answer five questions, taking one from each unit.

UNIT-I

1. (a) What is the difference between analog and digital signals? 5
(b) Design a NOR gate using a transistor. 2
(c) Mention the various IC logic families. 7
2. (a) Why is NAND gate known as universal gate? Convert a NAND gate into OR, AND and NOT gates using necessary circuit diagram. 5
(b) Explain classification of IC's and discuss its advantages and disadvantages. 7
(c) Design a two input XOR gate exclusively with the help of NOR gates. 2

UNIT-II

3. (a) Write a short note on sum of products (SOP) method for three input variables. Give its truth table and logic circuit. 5
(b) Draw a full adder circuit and explain its operation with truth table. 5
(c) Convert 01101101 into decimal number. 2
(d) Using Boolean algebra verify $(A + B)(\bar{A} + C) = AC + \bar{A}B$ 2
4. (a) Discuss the working of 1:4 demultiplexer with the help of an example. 6
(b) Minimize the expression $y = \sum m(0, 1, 2, 3, 4, 5, 6, 7, 8, 12, 13, 14)$ using K-map. 4

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- (c) Reduce the following expression $\overline{A}\overline{B} + ABC + A(B + \overline{A}\overline{B})$ 4

UNIT-III

5. (a) Design a monostable multivibrator using IC 555 and explain its operation. 6
(b) Explain the operation of clocked RS flip flop. Give its truth-table and timing diagram. 6
(c) Draw the block diagram for 4-bit SISO. 2
6. (a) Describe a J-K master-slave flip flop. 6
(b) State the difference between a flip flop and latch. 3
(c) What is a shift register? Explain the operation of a 4-bit shift register. 5

UNIT-IV

7. (a) Explain with necessary diagrams the working of 4 bit synchronous counter. 7
(b) Describe the working of a 4-bit ordinary ring counter. 7
8. (a) What is meant by ROM? Explain the types of ROM, their characteristics and its advantages? 7
(b) Give an account of memory system and measures for the speed of a memory. 4
(c) How many flip flops are required to construct a mod-32 counter? What is the largest decimal number that can be stored in a mod-64 counter? 3

UNIT-V

9. (a) What is microprocessor? Explain the features of 8085 microprocessor. 1+6=7
(b) Describe the timing diagram of MOV instruction with an example. 7
10. (a) Explain the register structure of 8085. 7
(b) What is a bus? Name the different buses used by a microprocessor and explain their functions. 7