

This question paper contains 2 printed pages

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Unique Paper Code : 2223510018  
Name of the Paper : **Digital Electronic (DSE Paper)**  
Name of the Course : **B.Sc. Prog.-(Physics)\_NEP:UGCF-2022**  
Semester : **V-Semester**  
Duration : **2 Hours**  
Maximum Marks : **60**

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Attempt *four* questions in all including Q. No. 1 which is compulsory.

Non programmable scientific calculator is allowed

1. Attempt any five of the following:

**5x3=15**

a) Realize the three basic gates using NAND gates .

b) Simplify the following expression using Boolean laws:

$$(A+AB)(B+BC)(C+AB)$$

c) Use a multiplexer to implement the following logic function

$$F(A,B,C)=\Sigma m(1,2,4,7)$$

d) Subtract  $(1101)_2$  from  $(1100)_2$  using 2's complement method.

e) Write four advantages of an IC. Give full form of SSI, MSI, LSI and VLSI

f) Draw circuit diagram of a 3-bit asynchronous up-counter.

2. (a). Draw truth-table and logic diagram of octal to binary encoder.

8

(b) Minimize the following logic function using Karnaugh map and realize it using NAND gates only:

$$F(A, B, C, D) = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 10, 11, 13, 15) \quad 7$$

3. (a) What is the output of AND, NAND, OR, NOR, XOR, and XNOR gates if one of the inputs is A and the other input is (i) 1 (ii) 0. Draw circuit diagram of an even parity checker and briefly explain its working. 9
- (b) Convert hexadecimal number  $(AB)_H$  into its binary, octal and decimal equivalents. 6
4. (a) Write truth table of a full adder and using SOP method, design a logic circuit for it using basic gates. 10
- (b) What is the function of a demultiplexer. Draw truth-table and logic diagram of 1-line to 4-line demultiplexer. 5
5. (a) Draw circuit diagram and truth-table of a positive-edge triggered J-K flip-flop and explain how race-around condition is averted with edge triggering. 9
- (b) Draw circuit diagram of a 4-bit serial-in parallel-out shift register using D flip-flops and show how a binary number (1010) is entered in the shift register. 6