FACULTY OF SCIENCE
SCHOOL OF BASIC SCIENCES
BCA – I Semester
Make-up Examination: 2018-19
CA 1102 – Fundamentals of Digital Electronics
(CLOSED BOOK)

Duration: 3 Hours **Max. Marks: –100**

Instructions:

- Answer any five full questions
- Missing data, if any, may be assumed suitably.

1. **a)** Show That : [4]
   (i) **B+B'C=B+C**

   (ii) **(X+Y)(X+Z)=X+YZ**

   b) **(i)** $(1BC)_{16} = (?)_8$ **(ii)** $(12.48)_{10} = (?)_2$ [8]

   (iii) $(110.111)_2 = (?)_{10}$ **(iv)** $(534)_8 = (?)_{16}$

   c) Perform Binary Arithmetics: [8]
   (i) $(34)_{10} + (39)_{10}$ **(ii)** $(38)_{10} - (23)_{10}$

   (iii) $(11101)_2 * (110)_2$ **(iv)** $(100100)_2 / (100)_2$

2. **a)** Distinguish between sum-of-Products and Product-of-sum form. [4]

   b) Use Boolean algebra techniques, simplify following expressions: [6]
   (i) **AB+A(B+C)+B(B+C)**

   (ii) **[AB'(C+BD)+A'B']C**

   c) In a 7-segment display, each of the seven segments is activated for various digits. For example, segment ***a*** is activated for the digits 0,2,3,5,6,7,8 and 9 as shown in the figure .find the expression for each segment using the variables A,B,C,D and minimize the expression using K-Map. [10]

3. **a)** Discuss Don't care conditions in brief. [4]

   b) What are universal gates? Construct a logic circuit using NAND gates only for the Expression x = A. (B + C). [6]

   c) Develop look-ahead carry logic for adders. State the advantage of look ahead carries addition. Define ***carry generation*** (C_g) and ***carry propagation*** (C_p) and explain the difference between C_g and C_p. [10]

4. a) Design a 4-bit Gray-to-Binary converter using truth table, K-maps, and logic Diagram. [10]

b) Determine and draw the logic required to decode the binary number **1011** by producing a **HIGH** level on the input. [10]

5. a) Give the difference between synchronous and asynchronous sequential circuit. [4]

b) What is a **S-R** latch? Develop an excitation table for active-HIGH input **S-R** latch. [6]

c) What do you mean by toggle? Explain the function of a J-K flip flop using a Suitable diagram and discuss how it works. [10]

6. a) Explain the operation of 16:1 multiplexer with the help of logic circuit. [10]

b) Define race around condition? Explain in detail the operation of master-slave flip-flop and show how the race around condition is eliminated in it. [10]