

Bachelor Level/ First Year/ Second Semester/ Science  
**Computer Science and Information Technology (CSc. 151)**  
(Digital Logic)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours.

Candidates are required to give their answers in their own words as far as practicable.  
The figures in the margin indicate full marks.

**Long Answer Questions:**

**Attempt any TWO questions.**

**(2x10=20)**

1. Design the 4 bit Synchronous up/down counter with timing diagram, logic diagram and truth table.
2. Design a Full subtractor with truth table and logic gates.
3. Design a decimal adder with logic diagram and truth table.

**Short Answer Questions:**

**Attempt any EIGHT questions.**

**(8x5=40)**

4. Differentiate between Analog and Digital system.
5. Convert the following octal numbers to hexadecimal.
  - a) 1760.46
  - b) 6055.263
6. Which gates can be used as inverters in addition to the NOT gate and how?
7. Draw a logic gates that implements the following
  - a)  $A = (Y_1 \oplus Y_2)(Y_3 \odot Y_4) + (Y_5 \oplus Y_6 \oplus Y_7)$
  - b)  $A = (X_1 \odot X_2) + (X_3 \odot X_4) + (X_4 \odot X_5) \oplus (X_6 \odot X_7)$
8. State and prove De-Morgan's theorem 1<sup>st</sup> and 2<sup>nd</sup> with logic gates and truth table.
9. Reduce the following expressions using K map
  - a.  $\bar{A} + B(A + \bar{B} + D)(\bar{B} + C)(B + C + D)$
10. Differentiate between a MUX and DEMUX.
11. Explain the operation of Decoder.
12. What are the various types of shift registers?
13. What do you mean by synchronous counter?