



**WEST BENGAL STATE UNIVERSITY**  
B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

**ELSACOR06T-ELECTRONICS (CC6)**

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.  
Candidates should answer in their own words and adhere to the word limit as practicable.  
All symbols are of usual significance.*

**GROUP-A**

1. Answer any **five** questions from the following:  $2 \times 5 = 10$
- (a) Design a four-input NAND gate using two two-input NAND gates.
  - (b) Convert a J-K flipflop to a D flip-flop.
  - (c) State De Morgan's theorems.
  - (d) Draw the circuit diagram of TTL NAND gate.
  - (e) Express the two numbers **926** and **827** in BCD form and add them.
  - (f) Do the following subtraction using 10's complement method:  
$$827 - 329$$
  - (g) What is the difference between a latch and a flipflop?
  - (h) Define fan-out of a gate.

**GROUP-B**

**Answer any six questions from the following**

$5 \times 6 = 30$

2. What is meant by RACE condition in a flip-flop? Show how it is overcome in a J-K Flip-flop by realising a J-K Flip-flop using S-R flip-flop.
3. Minimize the following expression using K-map and realize with NOR gates:  
$$y = f(A, B, C, D) = \prod M(2, 7, 8, 9, 10, 12)$$
4. Design a 3 to 8 line decoder using NAND gates only.
5. Draw and explain the realisation of a 16:1 multiplexer using 2:1 multiplexer.
6. Draw and explain operation of a TTL NAND gate.

7. Realise the function  $f = m(1, 3, 6, 9, 10, 12, 13, 14)$  using an 8:1 multiplexer.
8. Design and implement a half-adder using NOR gates only.
9. How decoder can be used as demultiplexer? Draw the circuit and explain.
10. Explain with the help of timing diagram, the operation of mod-5 up counter.
11. Draw and explain operation of a 3 bit Johnson counter.

**N.B. :** *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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