

THE OPEN UNIVERSITY OF SRI LANKA  
 DEPARTMENT COMPUTER SCIENCE  
 B. SC. DEGREE PROGRAMME 2019/2020  
 FINAL EXAMINATION



**CSU5306: DIGITAL ELECTRONICS**  
**CPU3141: DIGITAL COMPUTER FUNDAMENTALS**  
 DURATION: TWO HOURS (2 HOURS)

**Date: 16.01.2020**

**Time: 1.30 pm –3.30 pm**

Answer **FOUR** Questions **ONLY**. All questions carry equal marks.

**Q1.**

- (i) Simplify the following truth table for the output Q using Minterm Canonical form.

A	B	C	Q
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

- (ii) Draw the simplified logic circuit.
- (iii) Draw the K'Map for the above truth table using Maxterm Canonical form.
- (iv) Derive the simplified PoS term for the output Q using the K'Map in (iii).

**Q2.**

- (i) What are the differences of Serial transfer and Parallel transfer? (Give 02 points)
- (ii) "Hexadecimal representation is easier and more convenient than binary representation." Do you agree with this statement? Justify your answer using the example decimal value 265.

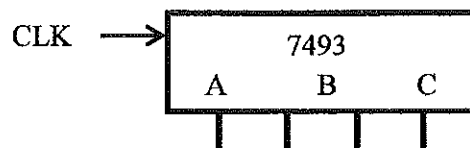
- (iii) List two advantages and two disadvantages of two's complement representation.
- (iv) Add the following BCD numbers. (Clearly indicate the steps).
  - a. 1001 + 0100
  - b. 0001 0110 + 0001 0101
  - c. 0110 0111 + 0101 0011

**Q3.**

- (i) Draw the block diagram and logic symbol for 4-bit parallel Full Adder.
- (ii) Describe the function of basic binary decoder with aid of an example circuit diagram.
- (iii) Design an 8-to-1 Multiplexer using only 2-to-1 Multiplexers.
- (iv) Draw the logic circuit of the 8-to-1 Multiplexer in (iii) using Only NAND gates.

**Q4.**

- (i) Draw the block diagram of Master Slave J-K flip flop
- (ii) How can a Serial In / Parallel Out register be used as Serial In / Serial Out register?
- (iii) Draw the block diagram of 4 bit Johnson Ring Counter and describe counting function.
- (iv) Explain how a divide by n counter can be used as a frequency divider. Use TTL 7493 IC as an example to describe the function.



**Q5.**

- (i) Draw a block diagram of CPU and describe the Fetch- Execute cycle of an Instruction.
- (ii) Briefly describe following terms related to digital memory.
  - a. Writing
  - b. Reading
  - c. Read-Only

- d. Random Access
  - e. Volatile
- (iii) Describe the following Interaction Policy combinations related to memory.
- a. Write Through with No Write Allocate
  - b. Write Back with Write Allocate
- (iv) Draw the Fuse Map of PLA described by following Programming Table.

	Product	Inputs			Outputs	
	Term	A	B	C	(T)	(C)
A'B	1	0	1	-	1	1
AC	2	1	-	1	-	1
BC	3	-	1	1	1	-
AB'C	4	1	0	1	1	-

**Q6.**

- (i) Convert following Binary values to Decimal, Octal and Hexadecimal.
- a. 1011011
  - b. 10011101
  - c. 100010001111
- (ii) Convert the following Decimal values into 8421 code.
- a. 170
  - b. 98
  - c. 1001
- (iii) Solve the following Binary sums.
- a.  $1001 + 1011$
  - b.  $10001 / 100$
  - c.  $11011 - 1101$
  - d.  $10011 * 110$
- (iv) Use Two's complement representation to solve the following
- a.  $-12-5$
  - b.  $100 - 34$

**\*\*\*End of Examination Paper\*\*\***

