NSPIRED BY LIFE

INTERNATIONAL CENTRE FOR APPLIED SCIENCES (MAHE)

Reg.No.

III SEMESTER B.Sc. (Applied Sciences) MAKE -UP EXAMINATION – January 2022 SUBJECT: SWITCHING CIRCUITS AND LOGIC DESIGN (ICS 232)

(BRANCH: CS)

Timing: 3 hours

Date: 10th January 2022

Max. Marks: 50

- ✓ Answer All questions
- ✓ Missing data, if any, may be suitably assumed
- **1A** Simplify the following expressions using algebraic manipulation.
 - i) f = x2x3'x4+x1x3x4+x1x2'x4
 - ii) f = (x1'+x2+x3).(x1'+x2'+x4').(x1'+x3+x4)
- **1B** A circuit with two outputs has to implement the following functions $F(x1, x2, x3, x4) = \sum m(0, 2, 4, 6, 7, 9) + d(10,11)$ $G(x1, x2, x3, x4) = \sum m(2, 4, 9, 10, 15) + d(0, 13, 14)$. Design the minimum cost SOP implementation and compare its cost with combined costs of two SOP implementations that implement F and G separately. Assume that the input variables are available in both uncomplemented and complemented forms.

((2+2)+6)

- 2A Design and write Verilog code for 4-bit Adder/Subtractor.
- **2B** Derive and Design the four-bit comparator expressions for A=B, A>B, and A<B, Where A and B are two four-bit numbers. Write the Verilog code for the same.

(5+5)

- 3A Implement three-input XOR using onlya) 2-to-1 MUXb) 4-to-1 MUX
- **3B** A combinational circuit is specified by the following three functions: F1=X'Y'Z'+XZ F2=XY'Z'+X'Y F3=X'Y'Z+XYDesign a circuit for F1, F2 and F3 using a decoder and other gates. ((4+3)+3)
- **4A** Using RS Flip-Flop draw the logic diagram of a Master-Slave Flip-Flop. With the help of a sample waveform explain its working.
- **4B** Design a 4-bit bi-directional shift register for the following operations using D flip flops and MUXs.

Shift	Load	Operation
0	0	No change
0	1	Load parallel data
1	d	Shift right

4 C	Deigr		
	_		(4+2+4)
5	Expla		
	i.	CMOS realization of a NOT gate.	
	ii.	Multiplexer circuit using Transmission gates	
	iii.	NMOS realization of a NAND gate.	
	iv.	NMOS realization of a NOR gate.	
	v.	Application of tristate buffers.	
			(5 x 2)