Name: **Enrolment No:**	

UPES

End Semester Examination, May 2025

Course: Digital Electronics **Semester: II**

Program: MSc Physics **Time : 03 hrs.**

Course Code: ECEG7137 **Max. Marks: 100**

Instructions: Use of scientific calculator is allowed.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Convert the following hexadecimal numbers into decimal and, then, into binary; (i) $(A3B)_{16}$, (ii) $(2F3)_{16}$	**4**	**CO2**
Q2	Multiply the following binary numbers; (i) (1011) and (1101), (ii) (1.01) and (10.1).	**4**	**CO3**
Q3	Subtract $(1010)_2$ from $(1111)_2$ using; (i) direct method, (ii) 1's complementary method and (iii) 2's complementary method.	**4**	**CO2**
Q4	With the aid of a suitable truth table, draw the timing diagram of RS latch.	**4**	**CO3**
Q5	Determine the number of bits required to represent in floating point notation the exponent for decimal numbers in the range of $10^{\pm 86}$.	**4**	**CO1**
	SECTION B **(4Qx10M= 40 Marks)**		
Q6	Obtain (a) minimal sum of product and (b) minimal product of sum expressions for the function given below; F (A,B,C,D) = Σm (0,1,2,5,8,9,10)	**10**	**CO2**
Q7	Apply the Resistors, capacitors, and transistors to prepare; (a) Resistor-transistor Logic circuit (b) Resistor-Capacitor-Transistor logic circuits. Also, write the working of such devices with different combinations of inputs.	**10**	**CO3**
Q8	Write the principle and operation of Full adder. Also, provide block diagram, circuit diagram and truth table for its operation.	**10**	**CO4**
Q9	Apply more than one Full adders to add multibits and, thus, systematically add A + B. A = $(0101)_2$, B = $(1010)_2$ OR Using the half subtractors, construct a block diagram, circuit diagram, truth table, and Boolean equation for full subtractor.	**10**	**CO1**
	SECTION-C **(2Qx20M=40 Marks)**		

<table>
<tr>
<td>Q10</td>
<td>a) Draw an edge triggered J-K Flip- Flop system. Explain the various operation stages. (10)
b) Explain the working of a D- flip flop with suitable example. (10)</td>
<td>20</td>
<td>CO2</td>
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<td>Q11</td>
<td>a) What are the de-multiplexers? Apply the various gates to prepare a circuit of one-to-Four de-multiplexer. Also prepare truth table and give expression for final output (10)
b) Generate the logic function given in the following table for 8-to-1 MUX. (10)

<table>
<tr><td colspan="3">INPUTS</td><td>OUT PUT</td></tr>
<tr><td>C</td><td>B</td><td>A</td><td>Y</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td></tr>
</table>

OR
With the aid of a vibrators, derive the principle, construction and working of a Multivibrator. Take any example and find the truth table and circuit diagram for the same. (20)</td>
<td>20</td>
<td>CO1</td>
</tr>
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