Name: **Enrolment No:**	

UPES

End Semester Examination, May 2025

Course: Digital System and Application **Semester: IV**

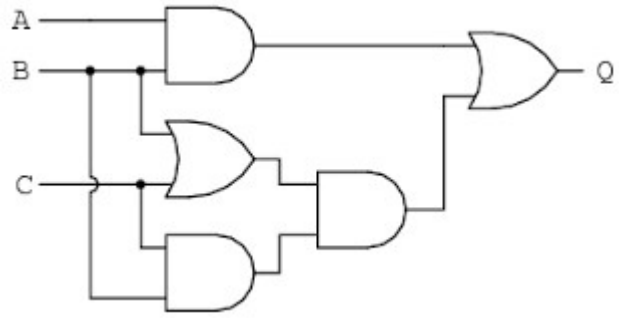
Program: B.Sc. Physics by Research **Time : 03 hrs.**

Course Code: PHYS 2003 **Max. Marks: 100**

Instructions: Use of scientific calculator is allowed.

SECTION A

(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	The X – deflection plates in a CRT are 20 mm long and 5 mm apart. The center of the plates is 0.25 m from the screen. The accelerating voltage is 3000V. Determine the deflection sensitivity and deflection factor of the CRT.	**4**	**CO2**
Q2	Determine the Boolean expression for the output Q of a logic circuit shown in the figure below: 	**4**	**CO3**
Q3	With the help of a suitable circuit diagram, explain the working of the transistor latch.	**4**	**CO2**
Q4	Differentiate between synchronous and asynchronous counters.	**4**	**CO3**
Q5	What negative value does the binary number 10011011 represent?	**4**	**CO1**

SECTION B

(4Qx10M= 40 Marks)

Q6	Using a K-map, simplify the following function and realize it using NOR gate: $f(A,B,C,D) = \sum(1,4,6,7,8,9,10,11,15)$	**10**	**CO2**
Q7	A 555 timer is used as a monostable multivibrator. If R_A=10kΩ, and C=0.1μF, determine the output pulse width. Determine the value of C which is necessary to change the pulse width to 10ms.	**10**	**CO3**

Q8	Draw the schematic of a 4 bit shift register with parallel loading using D Flip-Flops. Furthermore, demonstrate its working.	**10**	**CO4**
Q9	Design a 8:1 multiplexer and demonstrate how it works. OR Differentiate between the active and passive components of an IC?	**10**	**CO1**
SECTION-C (2Qx20M=40 Marks)			
Q10	a) Draw a master-slave J-K Flip Flop system. Explain the various operation stages. How is the race around condition eliminated by using this Flip Flop? (10) b) With the help of a circuit diagram, explain the working of a full subtractor. (10)	**20**	**CO2**
Q11	Draw and explain the internal architecture of the Intel 8085 microprocessor with implicit stress upon program counter, stack counter and registers. OR With the aid of suitable pinout diagram, explain the operation of the 40 pins of the 8085 microprocessor.	**20**	**CO1**