[This question paper contains 02 printed pages.] **5851**

Your Roll No.....

Name of the Course	:	**B.Sc. Hons. – (Physics)_NEP_UGCF-2022**
Semester	:	**V**
Name of the Paper	:	**Digital Electronics**
Unique Paper Code	:	**2222013503**
S. No. of Question Paper	:	

Duration: **3 hours** Maximum marks: **90**

Instructions for Candidates

Write your Roll No. on the top immediately on receipt of this question paper.

Attempt **five** questions in all.

Question No. **1** is compulsory.

All questions carry equal marks.

1. Attempt any **Six** parts (all parts carry equal marks) $(6 \times 3 = 18)$

(a) Show that NAND and NOR gates are universal gates.

(b) Explain scale of integrations: SSI, MSI, LSI and VLSI.

(c) Explain race around condition in JK Flip Flop. Write two ways by which race around condition may be prevented.

(d) Write excitation table for S-R Flip Flop.

(e) Describe Pin – Out diagram for IC 555.

(f) Simplify, $Y = (A + B).(A'(B' + C'))' + A'(B + C)$

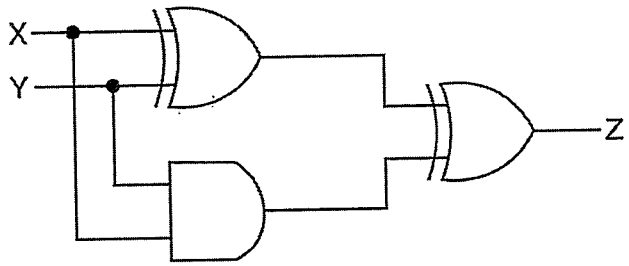
(g) Calculate the frequency and duty cycle of the 555 Astable Multivibrator output for $C = 0.01\ \mu F$, $R_A = 10\ k\Omega$, and $R_B = 50\ k\Omega$

2. (a) Minimize the following expressions using K-map:

$F(A, B, C, D) = \sum m(4, 5, 7, 12, 14, 15) + \sum d(3, 8, 10)$

Design the logic circuit using basic gates. (10)

(b) Redraw the following circuit after simplification:



(8)

3. (a) Draw the circuit diagram for full adder using NAND Gates. Write its truth table. (8)

(b) Distinguish between a 4 – bit multiplexer and an encoder using appropriate diagrams. Using block diagram realize 8 × 1 multiplexer using two 4 × 1 multiplexers and a OR Gate and explain its functioning. (10)

4. (a) Draw the circuit diagram of Master – Slave JK Flip Flop using gates. Write its truth table. Explain its working. Explain how race around condition is prevented in this circuit. (10)

(b) Convert SR Flip flop to JK Flip Flop using excitation table. (8)

5. (a) Design Synchronous 3-bit Down-counter using JK Flip Flops. (10)

(b) Draw circuit diagram for 4 bit Parallel – in – Serial – out shift register. Explain its working. (8)

6. (a) Draw the circuit diagram of an Astable Multivibrator using IC555 and explain its operation. Derive an expression for frequency and duty cycle of the output waveform. Discuss the condition for 50% duty cycle. (12)

(b) What is the function of the control voltage (pin 5) in a 555 timer? (2)

(c) Explain the working of XOR gate as parity checker. (4)

(2000)