

Question Paper Set B

Name of Course: **B.Sc. (Hons) Physics –CBCS Core**

Semester: **III Semester**

Name of Paper: **Digital Systems and Applications**

Unique Paper Code: **32221303 - 00**

Duration: **3 Hours**

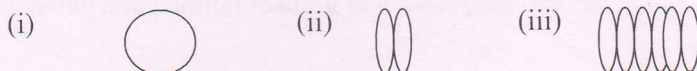
Maximum Marks: **75**

**Instructions for the Candidates:**

- (a) Attempt **four** questions in all
- (b) All questions carry equal marks
- (c) Symbols have their usual meanings

1. (a) Discuss with the help of a labeled diagram how electrostatic focusing is achieved for an electron beam in a CRT.

(b) When signals of different frequencies were applied to the vertical deflection plates of a cathode ray oscilloscope, the following patterns were observed. If the frequency applied to the horizontal deflection plates in each case is 5 KHz, determine the frequency of the unknown signals.



(c) Justify the statement that NOR gates is a universal gate. Convert  $(37.75)_{10}$  into (i) binary number (ii) octal number, (iii) hexadecimal number and (iv) BCD code

2. (a) Minimize the following expression using K-map and realize it using minimum number of 2-input NAND gates.  $F(A,B,C,D) = \sum(0,2,3,6,8,9,14,15) + d(1,4,10,11)$ .

(b) Discuss the working of a positive level triggered JK flip flop using suitable logic circuit. What is RACE AROUND CONDITION and how it can be avoided.



3. (a) Design an astable multivibrator of time period 100 ms and duty cycle 90 %. Draw the circuit diagram along with the waveform at the output terminal and across capacitor. Specify what modifications are required in the above design to achieve 50% duty cycle.
- (b) Design an encoder which generates the following truth table:

Input	Output
X	ABC
0	0 0 0
3	0 0 1
1	0 1 0
7	0 1 1
2	1 0 0
6	1 0 1
5	1 1 0
4	1 1 1

4. (a) Design an adder-subtractor circuit that can handle two 4-bit binary numbers. Explain the working with an example.
- (b) Design a MOD-10 asynchronous down counter and display its output waveform. For what minimum value of propagation delay in each flip flop will a 10-bit ripple counter skip a count when it is clocked at 10MHz?
- (c) Draw the circuit diagram of SIPO and explain the difference between serial loading and parallel loading in a 4-bit shift register.
5. (a) What is the function of flag register, program counter register and stack pointer register in 8085 microprocessor? Draw and explain timing diagram for the op-code fetch cycle.
- (b) Write an assembly language program to subtract 3EH from FCH stored in memory locations 2007H and 2008H, respectively using direct addressing mode. The difference is to be stored in the memory location 2009H and borrow in 200AH.
6. (a) Design a 4:1 multiplexer with an active low enable input using NAND gates. Realize the half subtractor circuit using the block diagram of 4:1 multiplexer.



(b) What is the role of monitor program in 8085 microprocessor and where it is stored. What is the difference between an interpreter and compiler.

(c) How many machine cycles are required for the following instructions: ADDM; MOV B,C; LDA 2030; and MVI 20H.