U.G. 3rd Semester Examination - 2019

PHYSICS

[HONOURS]

Course. Code : PHYS(H)CC-07-T

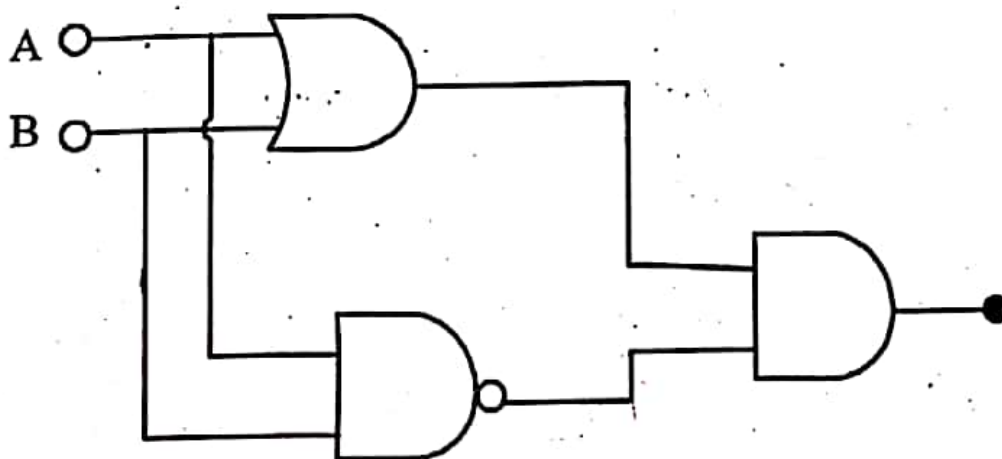Full Marks : 40   Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **five** questions: 2×5=10

   a) Give examples of 'linear' and 'discrete' IC's.

   b) Give the Boolean expression of the given logic circuit. Identify the gate it reduces to.

   e) What is 'post acceleration' employed in CRT?

d) i) Subtract binary number 10101 from 11011 by 2's complement method.

ii) Find the binary and decimal equivalent of HEX number A3.8C.

e) Define 'word' and 'nibble' in a microprocessor.

f) What is a digital multiplexer? What is its function?

g) Give the number of HEX digits required to specify addresses of memory chip. What is the minimum and maximum HEX addresses.

h) Write down the truth table and logic diagram of an 'inhibitor' circuit.

2. Answer any two questions: 5×2=10

a) i) An uniform magnetic field B acts in a perpendicular direction on the path of an e⁻ beam in a CRT, over a length 'l'. Find the magnitude of the momentum of the e⁻s if its deflected a distance 'd' above its original path at the point of emergence from the field, charge of electron being 'e'. Also find the direction of the beam on emergence.

ii) What are 'flags' in a microprocessor? Where are they used? 3+2

b) i) Give the Boolean expression for obtaining the decimal digit '9' in a 4→10 BCD decoder. Draw the necessary part of the logic circuit.

ii) What are 'sequential digital circuits'? Give examples. 3+2

c) i) From the given truth table, express the Boolean expression of the output, either by Boolean Algebra or by Karnaugh map.

ii) Draw the logic circuit.

iii) Simplify it and give the diagram.

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	1
1	0	0	1
0	1	1	0
1	1	0	0
1	0	1	0
1	1	1	1

2+1+2

d) i) Draw a schematic diagram of a memory chip with 1k Registers.

ii) Calculate the address lines required for a 8-k byte cone. 3+2

3. Answer any **two** questions : 10×2=20

a) i) Derive an expression for the electrostatic deflection sensitivity in a CRT, sketching it schematically.

   ii) Explain how a sinusoidal signal waveform may be displayed on the screen explaining 'sweep voltage' and 'time base'. How is a stable display of the signal obtained?

   iii) What is VLSI technology with IC?

   4+(3+1)+2

b) i) Explain why a 'shift' register is so named? Give its classification depending upon the mode of data shifting in digital computers.

   ii) Design a two-input XOR gate with the help of NAND gates exclusively.

   iii) In the given logic circuit. Find the Boolean expression.
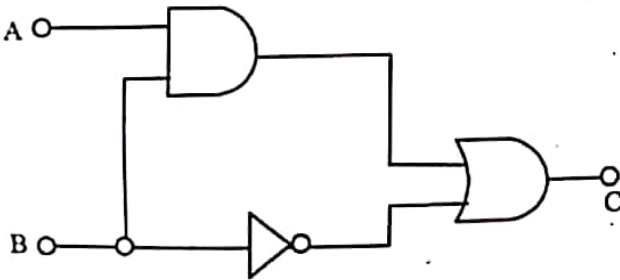
for C and its value.

for $(A=1, B=1), (A=1, B=0),$
$(A=0, B=1), (A=0, B=0)$

   (1+3)+3+3

c) i) Give Boolean expression and design the construction of an encoder for coding 10 decimal single digits into binary. How many output channels are required?

   ii) What are EPROM and CD-ROM?

   (5+1)+4

d) i) Describe the range of memory addresses of a 8-bit microprocessor system. What is memory map?

   ii) Describe with the help of a block diagram data flow operation from memory to MPU.

   iii) Give a schematic logic diagram of 8085 microprocessor unit. (3+1)+3+3