U.G. 4th Semester Examination - 2022

PHYSICS

[HONOURS]

Course Code : BPHSCCHC 403

Course Title : Digital Systems and Applications

Full Marks : 30 Time : 2 Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words with proper sketch or circuit diagram where necessary.

All abbreviations have their usual meanings.

1. Answer any **ten** questions: 1×10=10

a) Give the full form of VLSI. How many circuit components are there in a VLSI chip?

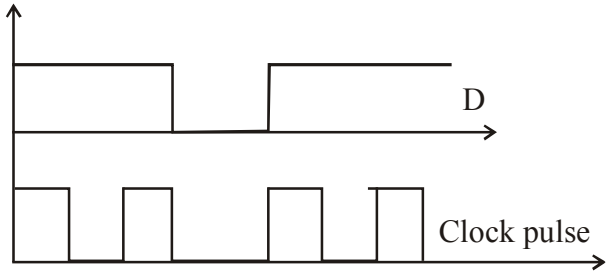
b) Perform the binary subtraction 1011-110.

c) Design a NOR gate using NAND gate only.

d) What do you mean by combinational logic circuit?

e) How does a multiplexer differ from an Encoder?

f) Draw the output waveform of a positive edge triggered D type flipflop if the input waveform is given as below:



g) What do you mean by propagation delay?

h) Mention the names of different types of shift register.

i) What do you mean by a monostable state?

j) Write down the full form of PROM. How does it differ from EPROM?

k) Verify the Boolean identity $A + \bar{A}B = A + B$.

l) What is the function of comparators in 555 timer circuit?

m) What is the main difference between a latch and a flip flop?

n) What do you understand by BCD code?

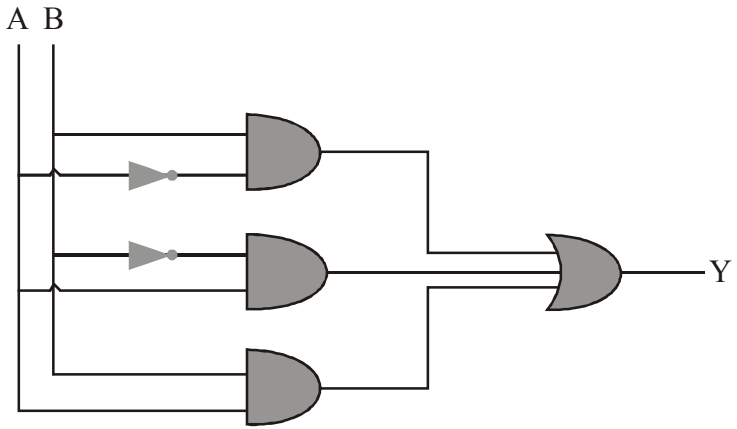
o) Find the binary equivalent of the hexadecimal number 2B.F4.

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

a) Write down the four advantages of ICs over the discrete component circuits.

b) With the help of truth table write down the logical expression for the outputs of a half subtractor.

c) Write down the simplified logical expression for the circuit given below:

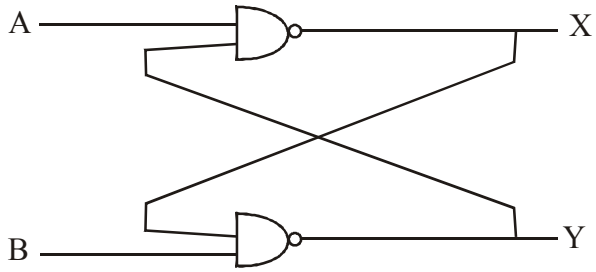


d) Draw a labelled circuit diagram of the internal structure of a 555 timer.

e) What is a decade counter? How many Flip-flop are needed in a decade counter?

f) Draw the truth table and the circuit of an encoder for encoding decimal numbers 0 to 9 as BCD.

g) In figure A = 1 and B = 1. The input B is now replaced by a sequence 101010 .... What will be the ouputs X and Y?



h) A three variables truth table has high output for the input conditions 111, 010, 100 and 110. Find the Boolean expression for the output and draw the corresponding logic circuit.

3. Answer any **two** questions: 5×2=10

a) With the help of logic block diagram and logical expression explain the working principle of an 8:1 multiplexer (MUX). 3+2

b) Simplify the Boolean expression using Karnaugh map and draw the logic diagram:

$$F(A,B,C,D)=\Sigma m(0,1,5,12,13,15)+d(1,3,5,6).$$

c) Construct a 4-bit ripple counter circuit and draw the timing diagram.

What are up counters and down counters? 2+2+1

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