2020

PHYSICS (Honours)

Paper : PHYH - DC-7T

[CBCS]

Full Marks : 25 Time : Two Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

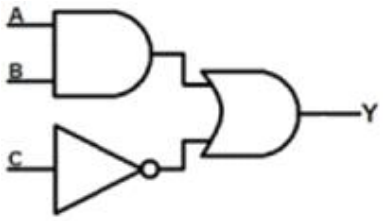
1. Answer any *five* questions : 2×5=10

(a) Show that $\overline{\overline{A}B + A\overline{B}} = AB + \overline{A}\overline{B}$.

(b) Convert a hexadecimal number C5E2 to binary number. Convert a decimal number 2478 to hexadecimal number.

(c) Design a two-input XOR gate exclusively with the help of NAND gate.

(d) Obtain the Boolean expression for the output Y in the logic circuit of the figure given below



(e) Simplify the Boolean expression $Y = \overline{A}\overline{B}\overline{C} + \overline{A}\overline{B}C + AB\overline{C}$ using a Karnaugh map.

(f) Design a full adder using half adder.

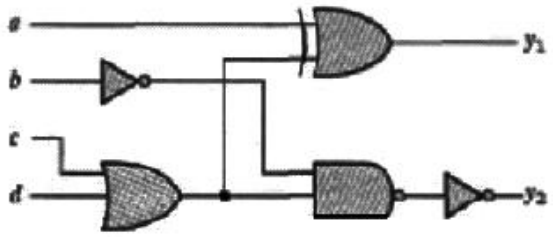
(g) Write the truth table of JK - flip-flop.

(h) Write down the Boolean function corresponding to the following standard sum-of-product notation $f(A,B,C,) = \sum_m (3,4,6,7)$.

2. Answer any *three* questions : 5×3=15

(a) (i) Show that a positive logic NAND gate is a negative logic NOR gate and vice versa.

(ii) Write a Boolean expression and construct the truth table describing the outputs of the circuits described by the logic diagram in the following figure. 2+3=5



(b) What is encoder ? How encoder circuit can perform the decimal to BCD operation ? 1+4=5

(c) What is a latch and how does it differ from a flip-flop ? Realize a D-flip-flop using NAND gates. 2+3=5

(d) (i) Design a four bit shift registrar with parallel load using D flip-flop.

(ii) Design a four-bit binary synchronous up counter with D flip-flop. 3+2=5

(e) Design an astable multivibrator using a 555-timer. 5