B.C.A. (Part - I)

## B.C.A. (Part - I) EXAMINATION, 2017
### (Faculty of Science)
### (Three - Year Scheme of 10 +2 + 3 Pattern)
### Paper - 131
# ELEMENTARY PHYSICS

*Time : Three Hours]*                                    *[Maximum Marks : 100*

Answer of all the questions (short answer as well as descriptive) are to be given in the main answer -book only. Answers of short answer type questions must be given in sequential order. Similarly all the parts of one question of descriptive part should be answered at one place in the answer-book. One complete question should not be answered at different places in the answer-book. Write your roll numbers on question paper before start writing answers of questions.

## PART - I

Each question is of 2 marks.
Words limit for the answers is 40 words.

1.  a)  Define Ohm's law.           $i = \frac{v}{R}$
                                    $V = IR$

    b)  What is Capacitor?

    e)  What is Magnetic field?

    d)  What is electromagnetic induction?

    e)  What is Logic Gates?

    f)  Define de Morgan's theorems.           $b = \frac{dq}{dt}$

    g)  What is Multiplexer?

    h)  Define Combinational Circuits.

    i)  What is RS flip flop.

    j)  Draw the pinout diagram for IC 7496.

                                                        $[10 \times 2 = 20]$

                                                        **P.T.O.**

## PART - II

Each question is of 4 marks

Word limit for the answers is 80 words.

2. Find the charge density and the total charge of the system which gives rise to the electric field.

$$E(x) = \frac{qe^{-\omega}}{r^3}\, \hat{x}.$$

3. A long Solenoid of length L having N turns carries a current I. Deduce the expression for the magnetic field in the interior of the solenoid.

4. Simplify the following expression into sum of products using karnaugh map

$$F(A, B, C, D) = \Sigma\,(1, 3, 4, 5, 6, 7, 9, 12, 13)$$

5. Design a 32:1 multiplexer using tow 16:1 multiplexers and a 2:1 multiplexer.
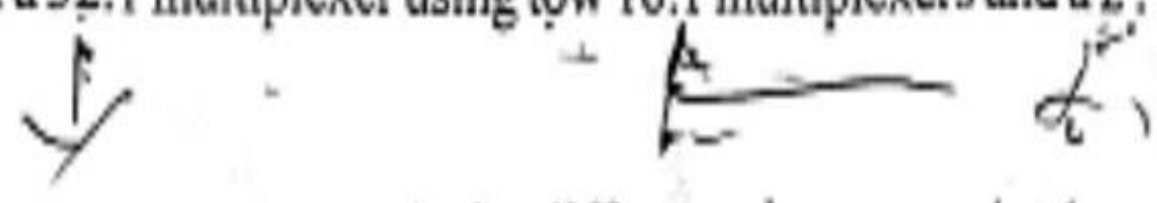
6. What is a filp-flop? What is the difference between a latch and a flip-flop? List out of application of flip-flop?

$$[5 \times 4 = 20]$$

## PART - III

Each question is of 12 marks

7. Write short note on:

a) Kirchoff's current law.

b) Kirchoff's voltage law.

$$[6 + 6 = 12]$$

OR

Write short note on:

a) Coulomb's Law.

b) Gauss' law of electrostatics.

$$[6 + 6 = 12]$$

8. Using Biot - Savart's law, derive the expression for the magnetic field in the vector form at a point on the axis of a circular current loop.

[12]

OR

Write short note on:

a) LR Circuits.

b) Magnetic flux.

[6 + 6 = 12]

9. Simplify and draw the logic diagram for the given expression

$$F = \overline{ABC} + \overline{A}\overline{B}C + \overline{A}B\overline{C} + A\overline{B}\overline{C} + A\overline{B}C$$

[12]

OR

Minimize the logic function

$Y(A, B, C, D) = \Sigma m(0,1,2,3,5,7,8,9,11,14)$. Use karnaugh map. Draw logic circuit for the simplified function.

[12]

10. Design a 4 to 1 multiplexer by using the three variable function given by $F(A,B,C) = \Sigma m(1,3,5,6)$.

[12]

OR

A 2-digit BCD D/A converter is a weighted resistor type with $E_R = 1$ volt, with $R = 1M\Omega$, $R_f = 10K\Omega$. Find resolution in percent and volts.

[12]

11. Using D flip flops and waveforms explain the working of a 4-bit SISO shift register.

[12]

OR

With relevant diagram explain the working of master - slave JK flip flop.

[12]

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