

B.C.A. (Pt.-I)

131

B.C.A. (Part-I) EXAMINATION, 2019

[Also Common for (Hons.) Part I]

(Three Year Scheme of 10+2+3 Pattern)

ELEMENTARY PHYSICS - 131

Time Allowed : Three Hours

Maximum Marks : 100

No supplementary answer-book will be given to any candidate. Hence the candidates should write their answer precisely in the main answer-book only.

All the parts of one question 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 number on question paper before start writing answers of questions.

PART - I

10x2=20

1. (a) What is the Gauss's law ?
- (b) Why electric field lines never cross ?
- (c) Define the flux associated with a magnetic field.
- (d) What do you mean by domain ?
- (e) Determine the total number of possible input combinations for a 4-input AND gate.
- (f) Determine the values of A, B, C and D that make the product term $A\bar{B}C\bar{D}$ equal to 1.
- (g) What is multiplexer (MUX) ?
- (h) Identify each device : (i) IC 7485 and (ii) IC 7446.
- (i) What do you mean by flip-flops ?
- (j) How many flip-flops are required to produce a divide-by-32 device ?

PART - II

5x4=20

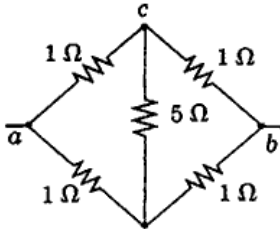
2. Prove that "The capacitance of a parallel-plate capacitor is proportional to the area of its plates and inversely proportional to the plate separation."
3. Classify the substances on the basis of magnetic susceptibility.
4. Write the output expression and Truth table for a 2-input NOR with input variables A and B.
5. Explain the basic operation of a Demultiplexer.
6. Draw the Logic symbol and give the Truth table for a positive edge-triggered D flip-flop.

PART - III

7. (a) Draw the current-potential difference curve for an ohmic material. What does the slope of the curve represent? Explain the difference between resistance and resistivity. 8+4
- (b) Calculate the resistance of an aluminum cylinder that is 10.0 cm long and has a cross-sectional area of $2.00 \times 10^{-2} \text{ m}^2$. (Resistivity of aluminum = $2.82 \times 10^{-8} \Omega\text{-m}$)

OR

- (a) Write a short note on Kirchhoff's rules. 6+6
- (b) Consider five resistors connected as shown in Figure below. Find the equivalent resistance between points a and b.



8. A toroid having N closely spaced turns of wire, calculate the magnetic field in the region occupied by the torus, a distance r from the center. 12

OR

Derive an expression of the magnetic force between two parallel conductors.

9. (a) Using Boolean algebra techniques, simplify this expression: 8+4
 $AB + A(B + C) + B(B + C)$
- (b) Convert the following SOP expression to an equivalent POS expression:
 $\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}\bar{C} + ABC$

OR

- (a) What do you mean by Karnaugh maps? Explain briefly. 6+6
- (b) Map the following SOP expression on a Karnaugh map: $\bar{A} + A\bar{B} + ABC$.

10. Explain the concept of parity. Implement a basic parity circuit with exclusive-OR gates and explain the operation of basic parity generating and checking logic. 3+5+4

OR

Describe the 7447 decimal-to-BCD priority encoder. 12

11. What is race-around condition? Explain the basic operation of Master-Slave J-K flip-flop. 4+8

OR

What do you mean by up/down counters? Draw the 3-bit up/down synchronous counter and write its truth table. 2+10

- o O o -