LJ-542

M.Sc. Physics

3rd Semester Examination, July-Dec., 2020

Paper - IV

Electronics - III

Time : Three Hours] [*Maximum Marks* : 80

Note : Answer **all** questions. All questions carry equal marks.

Unit-I

1. (*a*) What do you mean by K-map ? What types of Boolean expressions can be represented on K-map ? Give different styles of representing two, three and four variable expression is K-map.

(*b*) Write short notes on any **three** of the following :

(*i*) Negative logic in gates

(*ii*) Excess-3code

(*iii*) BCD-code

(*iv*) Binary code

OR

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(*a*) State and prove De-Morgan's theorem. Justify your answer with necessary examples.

(*b*) What do you mean by universal gates ? Explain why NAND and NOR gates are known as universal gates.

Unit-II

2. (*a*) What is an Ex-OR gate ? How is it different from an ordinary OR gate ? Draw the symbol of Ex-OR gate using NAND and NOR gates.

(*b*) Write short notes on any **two** of the following :

(*i*) DTL

(*ii*) ECL

(*iii*) TTL

(*iv*) CMOS

OR

(*a*) Design the logic diagram of 4-input multiplexer and discuss its operation in detail.

(*b*) Differentiate between half adder and full adder. Compare their capabilities to perform binary addition. Draw the circuit of half adder using NAND gates and write its expression.

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Unit-III

3. (*a*) Explain the working of a 4-bit binary counter with the help of logic diagram and time diagram.

(*b*) Design a 3-bit synchronous counter using JK flip-flop. Explain its working using time diagram.

OR

Describe the operation of a J-K flip-flop using logic diagram and truth table. Explain why this flip-flop is known as the universal flip-flop. How does it differ from a R-S flip-flop ?

Unit-IV

4. (*a*) Explain the fabrication of various components of a monolithic IC.

(*b*) What is an integrated circuit (IC) ? Write advantages and disadvantages of an IC.

OR

(*a*) Describe the operation of an analog to digital (A/O) converter.

(*b*) Explain the circuit and operation of a R-2R ladder type digital to analog (D/A) convertor using a neat diagram.

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