G-2/242/21 Roll No. ....

M.Sc. II Semester Examination, 2021
PHYSICS
Paper IV

(Digital Electronics)

Time : 3 Hours] [Max. Marks : 80

Note : *All questions are compulsory. Question Paper comprises of 3 sections. Section A is objective type/multiple choice questions with no internal choice. Section B is short answer type with internal choice. Section C is long answer type with internal choice.*

SECTION A 1×10=10
(Objective Type Questions)

1. How many binary digits (bits) are required to represent decimal 15 ?

2. A product of sums expression leads to what kind of logic circuit ?

3. What is the meaning of 111_2 ? or 111_{10} ?

4. What is an encoder ?

5. What does an entry X-mean in a flip-flop truth table ?

6. What is the setup time for a 74164 shift register ? P.T.O.

7. What is the LSB weight of a 6-bit resistive ladder ?

8. The most important advantage of an IC is its extremely high .... ?

SECTION B 6×4=24
(Short Answer Type Questions)

Note : *Attempt one question from each unit.*

Unit-I

1. Using 2's complement, solve the following :

   (i) 110011 – 100111 (ii) 101.1101 – 101.0111

   Or

   Reduce the Boolean Function :

   $$A\bar{B} + \overline{AB} + AB + \bar{A}\bar{B} \cdot$$

Unit-II

2. Describe the operation of Half and full adder.

   Or

   Discuss 4 : 1 multiplexer and 1 : 4 Demultiplexer.

Unit-III

3. Explain JK Flip-flop in detail.

   Or

   Write a notes on Shift Register.

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Unit-IV

4. Explain R-2R ladder D/A converter.

Or

Write the fabrication of components on monolithic IC.

SECTION C   **12×4=48**

(Long Answer Type Questions)

Note : *Attempt one question from each unit.*

Unit-I

1. Explain Universal Building Block gate and D'Morgan's law.

Or

Simplify the following logic function in SOP form using K-map and realise it by using minimum number of NAND gates and NOT gates.

$F = \Sigma m$ (0, 2, 3, 5, 7, 8, 12, 13)

Unit-II

2. (a) Describe Ex-OR gates in detail.

   (b) Draw 1's complement and 2's complements subtractor circuit.

Or

(a) Explain DTL as a AND and OR gates.

(b) Discuss Transistor-Transistor Logic (TTL).

Unit-III

3. (a) Describe RS-flip-flop using UBB gates in detail.

   (b) Discuss JKMSFF in detail.

Or

Explain Binary ripple counter and Ring counter in detail with time diagram.

Unit-IV

4. (a) Explain Successive approx. A/D converter.

   (b) Write the applications of DACs and ADCs.

Or

(a) Describe the Basic technology of monolithic IC.

(b) Define the scale of integration.

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