Exam. Code : 209001
Subject Code : 3750

M.Sc. Physics 1ˢᵗ Semester

ELECTRONICS

Paper : PHY-401

Time Allowed—3 Hours]   [Maximum Marks—100

Note :— Attempt **five** questions in all by selecting at least **one** from each section. All questions carry equal marks.

SECTION—A

1. (a) Draw the structure of n-channel enhancement type MOSFET and explain its operation and characteristics.   10

   (b) Discuss the application of UJT as waveform generator using appropriate equations and waveforms.   10

2. (a) Draw two transistor equivalent circuit of SCR and discuss its operation and I-V characteristics.   10

   (b) Draw and explain typical drain characteristics for an n-channel enhancement type MOSFET and show how its transfer characteristics be obtained from drain characteristics.   10

2366(2118)/DAG-10380   1   (Contd.)

SECTION—B

3. (a) Draw the circuit of a differential amplifier and explain its operation for differential and common mode inputs. 10

   (b) What is the need of Schmitt trigger circuit ? Draw its diagram and explain its operation.

   10

4. (a) Draw the circuit of a logarithmic amplifier and obtain the expression for output voltage. Give the utility of this circuit. 10

   (b) What is an operational amplifier ? Show how it is used as inverting, non-inverting, scaling and summing amplifiers. 10

SECTION—C

5. (a) What are logic gates ? Give truth tables of all logic gates. Justify why NAND and NOR gates are called universal gates. 10

   (b) Simplify the following expression using K-map and implement the resulting reduced expression using logic gates :

   $F(w, x, y, z) = \Sigma\ m(1, 4, 5, 6, 7, 9, 12)$. 10

6. (a) Distinguish between encoders and decoders. Design a decimal to BCD encoder. 10

2366(2118)/DAG-10380   2   (Contd.)

(b) Describe the need and operation of basic parity generating and checking circuits. 10

SECTION—D

7. (a) What is a flip flop ? Give its different types. Draw the diagram of positive edge triggered SR flip flop and explain its working using suitable waveforms. 10

(b) What are Up/Down counters ? Describe the working of Mod-8 Up/Down counter. 10

8. (a) What is the need of D/A converter ? Describe the working of ladder type D/A converter using suitable diagram and expressions. 10

(b) What are the performance parameters of A/D converters ? Describe the working of counter type A/D convertor. 10

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