

Exam. Code : 209001

Subject Code : 4762

M.Sc. Physics 1st Semester

ELECTRONICS

Paper-PHY-401

Time Allowed—3 Hours]

[Maximum Marks—100

Note :— Attempt **FIVE** questions in all, selecting at least **ONE** question from each section. The **fifth** question may be attempted from any section. All questions carry equal marks.

SECTION—A

1. (a) Draw the structure of n-channel depletion type MOSFET and explain its operation with the help of drain and transfer characteristics. 10
- (b) What is UJT ? Discuss its construction, equivalent circuit and characteristics. 10
2. (a) What is SCR ? Explain its two transistor equivalent circuit and discuss its operation using $I-V$ characteristics. 10
- (b) Draw the structure of a p-channel enhancement type MOSFET and explain its operation using drain and transfer characteristics. 10

SECTION—B

3. (a) Draw the circuit of a single op-amp differential amplifier and derive the expression for its output voltage. What are its limitations and how they can be eliminated? 10
- (b) How op-amp can be used as integrator? Obtain the expression for output voltage of an integrator and explain its working with the help of an example. 10
4. (a) What is an operational amplifier? How it is used as inverting amplifier? If the input signal 1V (p-p) is fed to an inverting amplifier with feedback resistor as $10\text{k}\Omega$ and input resistor as $1\text{k}\Omega$, find the value of the closed loop gain and output voltage. 10
- (b) How Schmitt trigger is different from a simple comparator? Draw the circuit of a Schmitt trigger and explain its operation using hysteresis curve. 10

SECTION—C

5. (a) What is a NAND gate? How it is used to realize OR, NOT and AND gates? If two inputs $A = 101010$ and $B = 100101$ are applied to NAND gate, find the output waveform. 10
- (b) What is a K-map? Explain how it can be used to simplify the 4-variable Boolean expression using an example. 10

6. (a) What is the need of decoder ? Design a BCD to 7-segment decoder and explain its operation. 10
- (b) What are parity generating and checking circuits ? Design and give the operation of these circuits with the help of an example. 10

SECTION—D

7. (a) What is SR flip flop ? Discuss the operation of clocked and edge triggered SR flip flops. 10
- (b) What is modulus of a counter ? Describe the working of Mod-5 Up/Down counter. 10
8. (a) What is the need of D/A converters ? Describe the working of 4-bit weighted resistor D/A converter. 10
- (b) What are the characteristics of A/D converters ? Describe the working of successive approximation type A/D converter. 10