

Exam. Code : 209001

Subject Code : 4868

M.Sc. Physics 1<sup>st</sup> Semester (Batch 2021-23)

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) What is UJT ? And what are the applications of UJT and discuss its construction and equivalent circuit and characteristics of UJT ? 10
- (b) What are Astable, Monostable and Bistable Multivibrators ? Explain. 10
2. (a) Give the structure and detailed explanation of n-type MOSFET and explain its working with the help of drain and transfer characteristics. 10
- (b) Give the principle, construction and working of SCR and discuss its operation using I-V characteristics. 10

### SECTION—B

3. (a) What is Op-amp ? Give two reasons why an open loop of Op-amp is unsuitable for linear applications and explain the effect of negative feedback in non-inverting amplifier. 10
- (b) Explain the difference between the integrator and differentiator and give one application of each. 10
4. (a) What is Schmitt Trigger ? How does a Schmitt Trigger work ? And also give its applications. 10
- (b) What is Logarithmic amplifier ? What is the role of diode in logarithmic amplifier ? Write its applications ? 10

### SECTION—C

5. (a) For Logic expression,  
$$Y = AB + AB$$
- (i) Obtain the truth table
- (ii) Name operation performed
- (iii) Realize this operation using AND, OR, NOT gate. 10
- (b) Convert the following binary number to octal and then to decimal :
- (a) 11011100.101010
- (b) 10110011. 10

6. (a) (i) Minimize the following functions and realize using minimum number of gates :
- (a)  $f_1 = \Sigma m(0, 3, 5, 6, 9, 10, 12, 15)$
- (b)  $f_2 = \Sigma m(0, 1, 2, 3, 11, 12, 14, 15)$
- (ii) What is adder and subtractor circuit ? How do you create a-bit adder subtractor circuit ? 10
- (b) Design the functions of four variable using :
- (i) 8:1 multiplexers
- (ii) 16:1 multiplexers. 10

### SECTION—D

7. (a) What is difference between A/D and D/A convertors and by giving their operations and list their applications ? 10
- (b) Determine the number of flip-flops that are required to build the following counters :
- (i) MOD-12
- (ii) MOD-31 10
8. (a) What are characteristics of A/D convertor ? Describe its working. 10
- (b) Give detailed working of registers. Give its characteristics and working by discussing the advantages. 10