G-1/188/22

Roll No. .....

I Semester Examination, January 2022

M.Sc.

PHYSICS

Paper IV

(Electronic Devices)

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 **1×8=8**

(Objective Type/Multiple Choice Questions)

Choose the correct answer :

1. A change of 200 mv in base emitter voltage causes a change of 100 μA in the base current. The input resistance of the transistor is :

(a) 0.2 kΩ (b) 2 kΩ

(c) 2 Ω (d) 20 kΩ

P.T.O.

2. In N channel JFET, the current is due to the flow of :

(a) holes alone

(b) holes and electron both

(c) electrons alone

(d) either holes or electron.

3. Digital camera works on a principle of :

(a) IMPATT diode (b) Backward diode

(c) Gun diode (d) CCD

4. In P-type semiconductor MIS diode which of the following occurs when V < 0 :

(a) Depletion (b) Inversion

(c) Accumulation (d) All of these

5. Piezoelectricity is shown by substance which are :

(a) Polar (b) Non-Polar

(c) Symmetric (d) Asymmetric

6. The optical properties of liquid crystals depends on the direction of :

(a) Air (b) Solid

(c) Light (d) Water

7. A carrier wave of 1 MHz is modulated with audio frequency varying between 20 Hz to 20 kHz. The frequency possible in lower side band is :

(a) 900 kHz (b) 930 kHz

(c) 960 kHz (d) 990 kHz

8. In the single side band transmission :

(a) The channel width decreases

(b) The power consumption increases

(c) The distortion increases

(d) The secrecy of information is lost

SECTION B **6×4=24**

(Short Answer Type Questions)

Note : *Answer the following questions.*

1. Explain current gain in different modes and determine relation between them.

Or

Explain working principle of e-MOSFET.

2. Explain tunnel diode with the help of energy band diagram.

Or

Explain transferred electron mechanism.

3. Explain electro-optic device.

Or

Explain electrostrictive effects.

4. What is Amplitude Modulation ? Explain percentage of modulation.

Or

Explain working of linear detector.

SECTION C **12×4=48**

(Long Answer Type Questions)

Note : *Answer the following questions.*

1. Describe construction working principle and characteristic curve of UJT.

Or

Explain the construction and working of a P-channel DE-MOSFET and describe its characteristics curves.

2. What is CCD ? Explain construction and working of CCD.

Or

Derive an expression for electric field for an MIS diode and explain variation of space-charge density as a function of surface potential.

3. Explain the following :

(a) Piezoelectric resonators

(b) Liquid crystal.

Or

(a) Acousto-optic material as sensor

(b) Magneto strictive effect.

4. How is a transistors used as an amplitude modolator ? Draw the circuit diagram and explain its working.

Or

Obtain an expression of output voltage for square law detector.

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