

**CARMEL COLLEGE OF ARTS, SCIENCE & COMMERCE FOR WOMEN,
NUVEM - GOA.**

SEMESTER END EXAMINATION, August 2020

B Sc. Semester: VI Physics -PYC109 :Solid State Devices and Instrumentation

Total Marks: **30**

Date: 05/08/2020

Duration: **2 Hours**

Total No of pages: **1**

Instructions: 1. All questions are compulsory.

2. Figures to the right indicate full marks.

3. Symbols have their usual meaning unless specified.

4. Use of nonprogrammable calculator is permitted.

Q I. Answer any five of the following. (5 x 2 marks = 10)

- a) Explain with a sketch why the emission of Light emitting diode can give an estimate of the band gap energy of the solid.
- b) Draw the current-voltage characteristics of p-n junction photodiode, how can one use the photodiode as a photosensor.
- c) Draw the current - voltage characteristics of Silicon Controlled Rectifier (SCR) and Silicon Controlled Switch (SCS). Give advantage of SCS over an SCR and any one application
- d) Draw the circuit diagram of UJT relaxation oscillator. An UJT relaxation oscillator has $R = 20K\Omega$, $C = 0.5\mu f$ and intrinsic stand off ratio $\eta = 0.7$, calculate the period of oscillation.
- e) Give the concept of loading effect with reference to measurement of voltages using an analog Voltmeter.
- f) Design a multi-range analog Ammeter to read 10 mA, 100 mA and 1A using a D'Arsonval movement of 1 mA full scale deflection and 120Ω meter resistance.
- g) What are the major components of a cathode ray tube in a cathode ray oscilloscope (CRO)? Why are the operating voltages of a cathode ray tube so arranged that the deflection plates are at ground potential?
- h) What is Hall Effect? Mention one application of Hall Effect.

Q II. Answer any four from the following. (4 x 5marks =20)

- 1) Explain how light signal is converted into electrical signal in a solar cell. Distinguish between the photovoltaic and photoconductive mode of operation solar cell.
- 2) Explain with the help of neat circuit diagram the working of a DIAC-TRIAC phase control circuit.
- 3) Draw the static current-voltage characteristics of SCR and explain its modes of operation. What are the conditions to be satisfied for turning ON an SCR. Define latching and holding currents.
- 4) With the help of a block diagram, explain any one technique employed for the design of a digital voltmeter.
- 5) Obtain an expression for gauge factor of a strain gauge in terms of Poisson's ratio.
- 6) Discuss the working of a function generator using a block diagram.