

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

**SEMESTER END EXAMINATION, JUNE 2020
B. Sc Semester: VI old course PHYSICS (Paper I)
Solid state devices and Instrumentation**

Total Marks: 30 Date: 08/08/2020 Duration: 2 Hours Total No of pages: 2

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- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate marks.
 - 3) Symbols have their usual meaning, unless otherwise stated.
 - 4) Draw illustrated diagrams if necessary to support your answers.
 - 5) Use of log tables and non programmable calculators is allowed.

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

- a) Explain the voltage - current characteristics of a tunnel diode. What resistance property is found in tunnel diodes but not in normal diodes?
- b) What is LED? Give its principle of working, circuit symbol, and two applications.
- c) What is silicon controlled switch (SCS), Give its basic structure equivalent transistor circuit and schematic symbol.
- d) What is a vidicon tube, and Plumbicon?
- e) What is charge-coupled image sensor (CCD) and how does it work?
- f) What is meant by the resolution of a digital instrument? What will be the resolution of a 4 ½ digit display on 10 V range?
- g) What are the basic requirements of a transducer? Distinguish between active and passive electrical transducers.
- h) Give the principle of operation of a capacitive transducer.

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

1. a) Draw the static voltage - current characteristics curves of an SCR, indicating the different regions.
b) With the help of characteristic curve explain the working of Diac as a triggering device.
2. a) Explain the working principle and the characteristics of a semiconductor photoconductive cell.
b) Draw the circuit diagram of UJT relaxation oscillator and explain its operation with waveforms.
3. Draw the voltage - current characteristic curves of the photodiode. Distinguish between the photovoltaic and photoconductive mode of operation of a pn junction photodiode. Give example in each case.

4. a) Draw the circuit diagrams of a series type and shunt type ohm-meter. Why are series type ohm-meters preferred over shunt type ohm-meters?

b) Design a voltmeter to measure 1V and 10V using a de Arsonval meter movement of $R_m=100\ \Omega$ and $I_{fsd}=1\text{ mA}$.
5. a) Draw the block diagram of basic CRO and give the function of each block.

b) Draw a block diagram of a function generator and state the function of each block.
6. Explain the principle of operation of resistance wire strain gauges. Obtain an expression for gauge factor of a strain gauge in terms of Poisson's ratio.