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B. Sc. Course (CBCS) Ordinance Sem-VI

EXAMINATION APRIL 2023

PHYSICS - SOLID STATE DEVICES & INSTRUMENTATION

[Time: 2:00 Hours]

[Max. Marks: 80]

- Instructions:** 1) All questions are Compulsory. However, internal choice is available.
2) Figures to the right indicate marks.
3) Symbols have their usual meanings unless otherwise stated.
4) Draw neat diagrams wherever necessary
5) Use of non-programmable calculator is permitted.

Q1 Answer any four of the following:-

(4×4=16)

- Draw and explain I-V characteristics of silicon Controlled Rectifier.
- What is an electrical transducer? Explain any three advantages of electrical transducers.
- Show a neat labelled block diagram of Digital Frequency Meter
- What is phototransistor? Show it's symbol. Sketch its Volt-Ampere characteristics.
- Explain Aryton shunt Ammeter with a neat diagram:
- What is Light Emitting Diode? Give it's working principle and two applications.

Q2 Answer any four of the following:-

(4×4=16)

- What is Optocoupler? Give any three advantages of optocoupler
- Obtain expression for Gauge factor in terms of Poisson's ratio.
- Draw a neat labelled block diagram of C.R.O.
- Explain the Construction and working of hot carrier diode.
- With the help of Circuit diagram explain the application of Photo conductive cell in a Voltage Regulator.
- Design a multirange Voltmeter with Voltage ranges (0-10 v) and (0-100 v) Using D'Arsonval Meter movement having $R_m = 50\Omega$ and $I_{fsd} = 1\text{mA}$. Draw the necessary Circuit diagram.

Q3

- With a neat diagram explain Piezoelectric transducer.
- Explain the working of electronic transistor Voltmeter with a neat Circuit diagram.

(3)

(3)

OR

- Explain the construction and working of Linear Variable Differential Transformer. Show graphically the variation output voltage with displacement of core.

(6)

- Draw a neat Circuit diagram of Q-meter and discuss it's working.

(6)

- Q4 A) p) What is Charge Coupled Device? Show it's structure. (3)
 q) A 0.5mA meter movement with an internal resistance of 50Ω is to be (3)
 Converted into a (0-100 mA) Ammeter. Calculate the value of shunt resistance required.

OR

- A) What is Uni Junction Transistor? Draw its electrical equivalent diagram. Explain (6)
 stand off Voltage, intrinsic Standoff ratio and peak point voltage for U.J.T.
 B) Show the block diagram of Ramp type Digital Voltmeter and explain it's working (6)
 principle with the help of waveforms.

- Q5 A) p) What is Shockley diode? Show it's Symbol and Volt-Ampere characteristic. (3)
 q) Explain how to calibrate Shunt type Ohmmeter with a neat Circuit diagram. (3)

OR

- A) Explain bonded type resistance wire strain gauge and Semiconductor strain gauge (6)
 with diagrams.
 B) Show a neat labelled block diagram of Function Generator and explain it's (6)
 working

- Q6 A) p) What is Tunnel diode? Sketch it's symbol. Give two applications (3)
 q) What is Photovoltaic effect? Show I-V characteristics solar cell. (3)

OR

- A) Two resistors R_1 and R_2 of $10\text{ k}\Omega$ each forms a Voltage divider with 100 vdc (6)
 Source. If voltage across R_2 is to be measured by Voltmeters having sensitivity of
 $1\text{ k}\Omega/\text{V}$ and $50\text{ k}\Omega/\text{V}$ respectively. Both meters are used on 50 v range.
 Find 1) Voltage across R_2 for each Voltmeter. 2) Percentage error in Voltage
 readings of Voltmeter.
 B) What is Gate Turn off switch? Explain it's application as a sawtooth Waveform (6)
 generator with a neat diagram.