Reg.No. [redacted]

23723

Velammal College of Engineering and Technology

Viraganoor, Madurai – 625 009
(Autonomous)

B.E./B.Tech. End Semester Examinations April 2024

Second Semester | **Regulation 2021**
Time : 3 Hours | **Max. Marks 100**

21PH103 – Physics for Information Science
(Common to CSE , IT and AI&DS branches)

Answer ALL Questions
PART-A (10 x 2 = 20 Marks)

1. List the success of classical free electron theory.
2. What is degenerate state?
3. What happens to the conductivity of a semiconductor when the temperature increases?
4. What is meant by intrinsic semiconductor?
5. Define magnetic permeability and susceptibility.
6. Define Curie temperature.
7. Classify optical materials based on their interaction with visible light.
8. Name any two optical data storage techniques.
9. What will happen to the band gap when a material reduced to nanomaterials from its bulk?
10. List any four advantages of quantum computing over classical computing.

Part – B (5 x 16 = 80 marks)

11. a) Derive the mathematical expression for electrical conductivity and thermal conductivity of a conducting material. (8 + 8 Marks)

OR

b) Derive an expression for energy eigen value and energy eigen function for a particle in a three-dimensional box.

12. a) Obtain an expression for carrier concentration of holes in a valance band of a p -type semiconductor with neat sketch.

OR

b) (i) What is Hall effect? Deduce an expression for Hall Coefficient in terms of Hall Voltage for a given p-type semiconductors.

(ii) Describe an experimental set up for the measurement of Hall voltage. 12 + 4 Marks)

13. a) Explain anti-ferromagnetism and ferrimagnetism with properties and examples.

OR

b) Describe the principle, construction and working of writing and reading of data in magnetic hard disc based on GMR sensor.

14. a) Briefly explain the concepts involved in absorption and emission of light in metals, insulators and semi-conductors.

OR

b) (i) Explain the principle, construction and working of P-N photodiode.

(ii) Explain the principle, construction and working of Laser diode. (8 + 8 Marks)

15. a) Explain quantum confinement and quantum structures in nanomaterial.

OR

b) (i) Briefly explain Q-Bits.
(ii) How does a CNOT gate work? Also explain the working of any two quantum gates based on its matrix. (4 + 12 Marks)