Reg. No.											

Question Paper Code	11740

B.E/B.Tech - DEGREE EXAMINATIONS, NOV/DEC 2022

Second Semester

Artificial Intelligence and Data Science

(Common to Computer Science and Engineering, Information Technology & M.Tech. -
Computer Science and Engineering)

20BSPH203 - PHYSICS FOR INFORMATION SCIENCE

(Regulations 2020)

Duration: 3 Hours   Max. Marks: 100

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

		Marks, K-Level, CO
1.	What is relaxation time?	2,K1,CO1
2.	What is Fermi energy level? Give its significance.	2,K2,CO1
3.	Mention the classification of semiconductors based on purity.	2,K1,CO2
4.	How do you increase the conductivity of semiconductors?	2,K2,CO2
5.	Define drift and diffusion current.	2,K1,CO3
6.	What happens to the magnetic flux when a diamagnetic material is kept in a magnetic field?	2,K2,CO3
7.	Calculate the wavelength emitted by a semiconductor whose band gap energy is 1.44 eV.	2,K2,CO4
8.	Define critical temperature.	2,K1,CO4
9.	What are single electron phenomena?	2,K1,CO6
10.	How does Fermi energy vary with size?	2,K1,CO6

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11.	a)	Derive an expression for the density of states and based on that calculate the carrier concentration in metals.	13,K2,CO1

OR

	b)	Deduce mathematical expression for electrical conductivity and thermal conductivity of a conducting material and hence obtain Wiedemann-Franz law.	13,K2,CO1

12.	a)	Obtain an expression for the carrier concentration of electrons in the conduction band of an n-type semiconductor.	13,K2,CO2

OR

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **11740**

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OR

b) Obtain an expression for the carrier concentration of holes in the valence band of a p-type semiconductor. *13,K2,CO2*

13. a) Describe ferromagnetic domain theory. Also, explain the different types of energy involved in domain growth. *13,K2,CO3*

OR

b) Derive an expression for the Hall coefficient for an n-type semiconductor. Also, deduce the Hall voltage in terms of Hall coefficient. *13,K2,CO3*

14. a) (i) List out the differences between Type-I and Type-II superconductors. *8,K2,CO4*

(ii) Write short notes on: Isotope effect, Persistent current. *5,K2,CO4*

OR

b) Explain in detail carrier generation and recombination in semiconductors. *13,K2,CO4*

15. a) Describe carbon nanotubes with types of structures, properties and applications. *13,K2,CO6*

OR

b) Write short notes on:
   a) Quantum structures. *6,K2,CO6*
   b) Tunneling mechanism. *3,K2,CO6*
   c) Band gap energy of nanomaterials. *4,K2,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) Explain the principle, construction and working of quantum dot lasers. Also, list out the advantages, drawbacks and applications of it. *15,K2,CO5*

OR

b) Describe the principle, construction and working of solar cells. *15,K2,CO5*