Reg. No.													

Question Paper Code	12128

B.E. / B.Tech - DEGREE EXAMINATIONS, APRIL / MAY 2023

Second Semester

Computer Science and Engineering

(Common to Computer Science and Engineering (AIML), Computer Science and Engineering (Cyber Security), Computer Science and Engineering (IOT), Information Technology, Artificial Intelligence and Data Science & 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.	State any four postulates of the classical free electron theory of solids.	*2,K1,CO1*
2.	What is periodic potential?	*2,K1,CO1*
3.	Explain how to get n - type and p - type semiconductors.	*2,K2,CO2*
4.	Why do we prefer silicon for transistors and GaAs for laser diodes?	*2,K2,CO2*
5.	Define drift and diffusion current.	*2,K1,CO3*
6.	What is Bohr Magneton?	*2,K1,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.	Relate the size of the material with its optical absorption wavelength and band gap energy.	*2,K2,CO6*
10.	Define quantum confinement.	*2,K1,CO6*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Deduce mathematical expression for electrical conductivity and thermal conductivity of a conducting material and hence obtain Wiedemann-Franz law.	*13,K2,CO1*
		OR	
	b)	(i) Write an expression for the Fermi energy distribution function. Explain its behavior with change in temperature.	*8,K2,CO1*
		(ii) Explain the classification of conductors, semiconductors and insulators based on the band theory of solids.	*5,K2,CO1*

12. a) Derive an expression for the carrier concentration of an intrinsic semiconductor. *13,K2,CO2*

OR

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

13. a) 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*

OR

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

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

OR

b) (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*

15. a) Derive expressions for the density of states in a quantum well and quantum wire. *13,K4,CO6*

OR

b) Discuss in detail about the principle, construction and working of a Single Electron Transistor (SET). *13,K2,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) Discuss principle, construction, working, advantages, drawbacks and applications of OLED. *15,K2,CO5*

OR

b) What is magnetic data storage? How can one read/write data on a hard disc using a GMR spin valve? Explain in detail. *15,K2,CO5*