Question Paper Code | 13758

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025
Second Semester

Computer Science and Engineering

(Common to Artificial Intelligence and Data Science, Computer Science and Engineering (AIML), Computer Science and Engineering (Cyber Security), Computer Science and Engineering (IoT), Information Technology & M.Tech. - Computer Science and Engineering (5 Years Integrated))

24BSPH203 – PHYSICS FOR INFORMATION SCIENCE

Regulations - 2024

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K-Level	CO
1.	The microscopic form of Ohm's law is : (a) V= IR (b) J=σE (c) J = IR (d) J= F/Q	1	K1	CO1
2.	Based on Band theory, electrons are moving in —----- potential. (a) periodic (b) constant (c) infinite (d) None of them	1	K1	CO1
3.	A semiconductor is formed by ……… bonds. (a) Covalent (b) Electrovalent (c) Coordinate (d) None of the above	1	K1	CO2
4.	Uneven distribution of charge carriers causes the current is known as (a) Drift current (b) Diffusion current (c) current density (d) Seebeck current.	1	K1	CO2
5.	Which type of magnetic material has negative susceptibility (a)Dia (b) Para (c) Ferro (d) Ferri	1	K1	CO3
6.	The boundaries separating the domains are called (a) Domain rotation (b) Movement of domain (c) Domain wall (d) none of this	1	K1	CO3
7.	If the transition temperature is above 30 K, such kind of superconductors are known as (a) soft (b) hard (c) low temperature (d) high temperature	1	K1	CO4
8.	Which device emits photons when electron transitions occur between molecular orbitals (a) LED (b) LCD (c) QLED (d) OLED	1	K1	CO4
9.	The bulk material is reduced to three dimensions is known as (a)quantum well (b) quantum wire (c) quantum dot (d) bulk material	1	K1	CO5
10.	Instead of bits, quantum computers use (a) Quantum byte (b) qubit (c) Byte (d) Kilobyte	1	K1	CO6

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

		Marks	K-Level	CO
11.	State the Wiedemann-Franz law.	2	K1	CO1
12.	Explain effective mass of an electron.	2	K2	CO1
13.	List out the differences between n-type and p-type semiconductors.	2	K1	CO2
14.	What is a direct bandgap semiconductor?	2	K1	CO2
15.	Define Bohr magneton.	2	K1	CO3
16.	Iron has a relative permeability of 5000. Calculate its magnetic susceptibility.	2	K2	CO3
17.	Classify the types of optical materials.	2	K2	CO4
18.	Define Meissner effect.	2	K1	CO4
19.	What is quantum confinement?	2	K1	CO5
20.	Give any two applications of CNT.	2	K1	CO5
21.	Write the differences between classical bits and qubits.	2	K1	CO6
22.	Write the column vector for |0> and |1>.	2	K1	CO6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13758**

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Derive an expression for the electrical and thermal conductivity of a metal.	*11*	*K3*	*CO1*
		OR			
	b)	Derive an expression for the density of states of a solid.	*11*	*K3*	*CO1*
24.	a)	Derive an expression for the density of electrons in the conduction band for an intrinsic semiconductor.	*11*	*K3*	*CO2*
		OR			
	b)	Derive an expression for the Hall coefficient for an n-type semiconductor.	*11*	*K3*	*CO2*
25.	a)	Differentiate between dia, para and ferromagnetic materials.	*11*	*K2*	*CO3*
		OR			
	b)	Explain the different types of energy involved in domain growth for ferromagnetic materials.	*11*	*K2*	*CO3*
26.	a)	Describe the construction and working of an OLED.	*11*	*K3*	*CO4*
		OR			
	b)	(i) Explain type-I and type-II superconductors.	*6*	*K3*	*CO4*
		(ii) Explain the following phenomenon, (a) Persistent current (b) Isotope effect.	*5*	*K3*	*CO4*
27.	a)	Derive the expression for the density of states of a quantum well, quantum wire and quantum dot.	*11*	*K3*	*CO5*
		OR			
	b)	Describe the construction and working of a single-electron transistor.	*11*	*K3*	*CO5*
28.	a)	Explain truth tables of X-Gate, Y-Gate, Z-gate and H-Gate using their matrix form.	*11*	*K2*	*CO6*
		OR			
	b)	Describe how does a CNOT gate work.	*11*	*K2*	*CO6*