Reg. No.												

Question Paper Code	14122

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025
Second Semester

Electronics and Instrumentation Engineering

24BSPH206 - PHYSICS FOR INSTRUMENTATION ENGINEERING

Regulations - 2024

Duration: 3 Hours   Max. Marks: 100

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

		Marks	K–Level	CO
1.	Fermi-Dirac statistics is for the _____ (a) Distinguishable particles (b) Symmetrical Particles (c) Particles with half integral spin (d) Particles with integral spin	1	K2	CO1
2.	Negative mass behaviour of electron in E-K diagram is explained by the presence of — (a) positron (b) electron (c) hole (d) neutrino	1	K2	CO1
3.	---------- charge carrier(s) are responsible for conduction in a semiconductor (a) Electrons (b) Holes (c) Both electrons and holes (d) Neither electrons nor holes	1	K1	CO2
4.	What happens when the doping concentration in a semiconductor increases? (a) Mobility increases (b) Conductivity increases (c) Bandgap decreases (d) None of the above	1	K1	CO2
5.	The core of a transformer for microwave frequency should be made of-------- (a) Ferrites (b) Iron (c) silicon (d) silicon carbide	1	K1	CO3
6.	The materials which can be easily magnetized and demagnetized are called as_____materials (a) Paramagnetic (b) Hard magnetic (c) Soft magnetic (d) Reduced magnetic material	1	K1	CO3
7.	Solar cell works based on---------------- (a) Laser technology (b) Photo conduction (c) Tyndall effect (d) Thermal emission	1	K1	CO4
8.	Which of the following is not a type of optical disk? (a) DVD (b) CD (c) WORM (d) Winchester	1	K1	CO4
9.	Find the dielectric constant for material with electric susceptibility of 7 is (a) 6 (b) 4 (c) 7 (d) 8	1	K1	CO5
10.	Zero dimensional Nanomaterials are-------- (a) CNT (b) quantum dots (c) C60 (d) All of them	1	K1	CO6

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

11.	Define Lorentz number and give its value.	2	K1	CO1
12.	Evaluate the Fermi function for an energy KT above Fermi energy.	2	K2	CO1
13.	Compare elemental and compound semiconductors.	2	K2	CO2
14.	List out the characteristics of semiconductors.	2	K1	CO2
15.	Define magnetic flux density.	2	K1	CO3
16.	Summarize the advantages of ferrites for the transformer core.	2	K2	CO3
17.	What are the types of optical materials?	2	K1	CO4
18.	Calculate the wavelength emitted by a semiconductor whose band gap energy is 1.44 ev.	2	K2	CO4
19.	What do you mean electric dipole and dipole moment?	2	K1	CO5
20.	Write down the temperature dependence of polarization.	2	K2	CO5
21.	Explain the fullerenes.	2	K2	CO6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **14122**

22. What is the difference between bits and qubits? *2   K1   CO6*

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23. a) Derive an expression for the density of states using quantum free electron theory of solids. *11   K3   CO1*

OR

b) Derive an expression for the effective mass of an electron based on the band theory of solids. *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 density of holes in P-type semiconductor with a neat energy band diagram. *11   K3   CO2*

25. a) (i) Bring out the differences between soft and hard magnetic materials. *6   K2   CO3*
   (ii) Explain the B-H curve behavior of ferromagnetic materials. *5   K2   CO3*

OR

b) (i) Write a short notes on ferrites structures and its properties. *6   K2   CO3*
   (ii) Explain the principle, construction of GMR sensor. *5   K2   CO3*

26. a) Explain the construction and working of a LED with an energy band diagram. *11   K2   CO4*

OR

b) Explain optical data storage techniques in optical disc equipment. *11   K2   CO4*

27. a) Obtain an expression for internal field expression using the Lorentz method. *11   K2   CO5*

OR

b) Determine the dielectric constant and loss of a solid using a Schering bridge. *11   K2   CO5*

28. a) Describe the construction and working of single-electron transistors. *11   K3   CO6*

OR

b) Identify the difference between classical and quantum computing. *11   K3   CO6*