Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.Tech (Full Time) - END SEMESTER EXAMINATIONS, May & 2025

Information Technology

II Semester

PH3202 PHYSICS OF ELECTRONIC MATERIALS AND DEVICES

(Regulation 2023)

Time: 180 minutes | Answer ALL Questions | Max.Marks : 100

CO 1	To understand and apply the electrical properties of materials
CO 2	To explore the principles of semiconductor and display devices
CO 3	To make use of magnetic and optical data storage devices
CO 4	To implement the essential principles of digital electronics for communication
CO 5	Understand the basics of quantum structures and their applications and basics of quantum computing

BL – Bloom's Taxonomy Levels

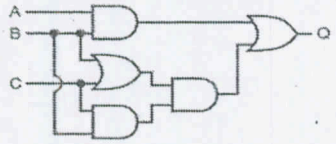
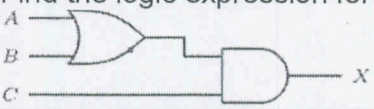
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)

Q. No	Questions	Marks	CO	BL
1	Mention the merits of classical theory.	2	1	L3
2	What is meant by compensation doping?	2	1	L2
3	Mention the types of luminescence.	2	2	L1
4	Determine the wavelength of LED fabricated by GaAs material with the bandgap of 1.43eV.	2	2	L3
5	Mention the properties of ferromagnetic materials.	2	3	L1
6	Compare CD, DVD and Blur-ay Disc.	2	3	L2
7	Convert the decimal number 85 to its equal binary number.	2	4	L3
8	State De Morgan's theorem.	2	4	L1
9	How are quantum confined structures classified?	2	5	L1
10	What is qubit?	2	5	L2

PART- B (5 x 13 = 65 Marks)

Q. No	Questions	Marks	CO	BL
11 (a) (i)	Derive an expression of electron concentration in intrinsic semiconductor.	10	1	L2
(ii)	Metallic silver is an excellent conductor. It has 5.86 x 10^{28} conduction electrons per cubic meter. Calculate its Fermi energy.	3	1	L3
	OR			
11 (b) (i)	Derive an expression for carrier concentration in p-type semiconductor.	10	1	L2
(ii)	Consider a sample of p type semiconductor, with the acceptor density $10^{20}/m^3$. If the intrinsic carrier concentration is 2.5 x 10^{19} $/m^3$, determine the electron and hole densities at 300K.	3	1	L3
12 (a) (i)	What is Hall effect and derive an expression for the Hall coefficient.	10	2	L2
(ii)	Explain the working of any one Hall effect device.	3	2	L2
	OR			
12 (b) (i)	Describe the construction and working of LED.	10	2	L2
(ii)	Briefly explain the principle of OLED.	3	2	L2

13 (a) (i)	Describe the working of magnetic hard disk based on GMR sensor.	10	3	L3
(ii)	Differentiate soft and hard magnetic materials. Give any six points.	3	3	L2
	OR			
13 (b) (i)	Explain in detail construction and reconstruction of hologram.	10	3	L3
(ii)	Compare photography and holography	3	3	L2
14 (a) (i)	Write the Boolean expression for the following circuit and minimize it to simplest form. 	10	4	L5
(ii)	Construct XOR gate using NAND gates	3	4	L5
	OR			
14 (b) (i)	Solve the following using K-map $F(A, B, C, D) = \Sigma m (1, 3, 4, 6, 8, 9, 11, 13, 15) + \Sigma d (0, 2, 14)$. Here d denotes the don't care condition.	10	4	L5
(ii)	Find the logic expression for the circuit below. 	3	4	L5
15 (a)	Describe the construction and working of single electron transistor.	13	5	L3
	OR			
15 (b)	Explain in detail how a two qubit CNOT gate works and also mention the advantages of quantum computing.	13	5	L3

PART- C (1 x 15 = 15 Marks)

Q. No	Questions	Marks	CO	BL
16 (i)	What is density of states and derive an expression for the number of allowed states for unit volume of a solid.	11	1	L3
(ii)	Compare direct and indirect bandgap semiconductors.	4	1	L2