BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : III**
BRANCH: ECE **SESSION : MO/2025**

SUBJECT: EC24201 ELECTRONIC DEVICES

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	A Silicon crystal is doped with Phosphorus donors at a concentration of assume complete ionization and $n_i=1.5\times10^{10}\ cm^{-3}$ at 300K. (a) Calculate the concentration of free electrons (n) and holes (p). (b) Is this material n-type or p-type? Justify your answer. (c) Calculate the resistivity of this material if.	[5]	CO1	3,2
Q.1(b)	How does the probability f(E) of an electron occupying a state at the bottom of the conduction band differ from the probability [1 - f(E)] of a hole occupying a state at the top of the valence band in an intrinsic semiconductor?	[5]	CO1	2
Q.2(a)	What do you understand by indirect recombination and trapping?	[5]	CO21	2
Q.2(b)	Discuss various high-field effects in semiconductors?	[5]	CO2	4
Q.3(a)	Define the diffusion length for minority carriers, $L_p=(D_p\tau_p)^{1/2}$. Explain what the diffusion coefficient (D) and the lifetime (τ) represent physically.	[5]	CO3	2
Q.3(b)	Explain how the drift velocity of the carrier packet is used to determine the minority carrier mobility.	[5]	CO3	4
Q.4(a)	Describe the physical process of electroluminescence with suitable examples.	[5]	CO4	2
Q.4(b)	Explain with characteristic curve the operation of tunnel diode.	[5]	CO4	4
Q.5(a)	Describe in detail the three primary operational of an ideal MOS capacitor built on a p-type semiconductor.	[5]	CO5	4
Q.5(b)	Explain the working principle and advantages of modern field-effect transistors like HEMT.	[5]	CO5	4

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