MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL
DEPARTMENT OF PHYSICS
EXAMINATION: MID-TERM EXAMINATION **MONTH & YEAR: November, 2024**

Course: B. Tech.	**Semester: I**	**Sections: A, B, C, D, E**
Subject – Physics		**Subject Code: PHY-102**
Time – 1:00 hour		**Max. Marks: 20**
NOTE: Answer all questions		

Q. No.		Questions	Marks	COs
1.	a.	What do you understand by Fermi energy?	2.0	CO1
	b.	Why the fringe at the apex is dark in wedge shaped thin film experiment?	2.0	CO1
2.	a.	Consider the case of interference due to thin film of uniform thickness t and refractive index μ. If the angle of refraction is r, then prove that the total path difference between the waves reflected from two surfaces is: $\Delta = 2\mu t \cos r + \lambda/2$ where, λ is the wavelength of the used coherent light source.	3	CO2
	b.	In a transmission grating spectrum, which spectral line in 4th order will overlap with 3rd order line of 5491 Å?	3	CO3
3.	a.	Show that the total energy of an electron confined in a one dimensional infinite potential well of length L is quantized.	4	CO4
	b.	Is the electron trapped in infinite potential well allowed to take zero energy? If not, why?	2	CO2
4.		A rectangular n-type semiconductor specimen of thickness 1 mm carrying a current of 10 mA is placed in a transverse magnetic field of 0.2 T. If the Hall voltage is 20 mV, calculate the electron concentration in the sample.	4	CO3

Some Useful Constants:
Boltzmann constant (k_B) = 8.617 x 10^{-5} eV.K^{-1}
1 a.m.u. = 1.66 × 10^{-27} kg
Speed of light (c) = 3 × 10^{8} m/s