K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

	In-Sem Examination-I Winter 2023		
	Exam Seat No.:		
	Academic Year: 2023-2024	Semester: I	
	Name of Programme: F. Y. B. Tech	Pattern: 2023	
	Name of Course: Applied Physics (A)	Course Code: 2300103A	
	Max. Marks:30	Duration: 1 Hr.	

Instructions: Candidates should read carefully the instructions printed on the Question Paper
and on the cover page of the Answer Book, which is provided for their use.
1. This question paper contains _____page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of
the Question/sub-question

6. Given constant: - Charge (e) = 1.6×10^{-19} C
Permeability in free space ($\mu_o = 4\pi \times 10^{-7}$ H/m)

Question No. 1 Attempt following Question

a)	State the Faradays laws of induction and write types of induced e.m.f. Derive dynamically induced emf.	(6)	CO1
	OR		
b)	What is a magnetic circuit and derive the formulas for total magnetomotive force and reluctance in a series magnetic circuit.	(6)	CO1
c)	How are electrical and magnetic circuits similar, Explain the main similarities in their essential features.	(5)	CO1
	OR		
d)	Define the Permeance and state the following electromagnetic principles:	(5)	CO1

1) Flemings Right-Hand Rule

2) Ampere circuital law

e)	Imagine a situation where a solenoid, which is like a tightly wound coil with 1000 turns and a length of 20 cm, carries a current of 2 Amperes. Calculate the magnetic field strength at the centre of the solenoid. Also, determine the magnetic flux at this point considering that the solenoid has a diameter of 4 cm.	(4)	CO5
	OR		
f)	Imagine you have an air-cored solenoid, which is essentially a coil with a length of 15 cm and an inside diameter of 1.5 cm. This coil has 900 turns, and it's carrying a current of 100 milliamperes (mA). Calculate the total magnetic flux enclosed within the solenoid in this scenario.	(4)	CO5

Question No. 2 Attempt following Question

a)	What is fermi-level? Obtain the equation describing the conductivity of both intrinsic and extrinsic semiconductors.	(6)	CO1
	OR		
b)	Explain the Hall Effect, including an appropriate diagram. Derive the formula for the Hall coefficient and Hall voltage.	(6)	CO1
c)	How are type-I and type-II superconductors different from each other?	(5)	CO2
	OR		
d)	What is superconductivity? Differentiate between superconductors at low temperatures and those at high temperatures.	(5)	CO2
e)	Calculate the conductivity of Ge sample if the donor impurity is added to an extent of one part in 10^8 Ge atoms at room temperature. (Given: Na=6.023×10^{23} atoms /gm-mole. At. Wt. of Ge=72.6 Density of Ge=5.32gm/cc., μ_e =3800 cm^2/v-s.)	(4)	CO4
	OR		
f)	Calculate the number of acceptor atoms that need to be doped in germanium sample to obtain the resistivity of 8 Ω cm. (Given: μ = 1600 cm^2/V. s).	(4)	CO4