	In-Sem Examination-II Summer 2024		
	Exam Seat No.:		
	Academic Year: 2023-2024	Semester: II	
	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 __2__ 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.

Question No. 1 Attempt following Question

a) Define statistically induced EMF and write its types. Derive self-induced emf and coefficient of self-inductance for the same. (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) Derive the equation for the energy stored in the magnetic field in form of current and inductance. (5) CO1

OR

d) State and explain Fleming Right -Hand rule in electromagnetism. How is electromagnetism used in everyday appliances like doorbells? (5) CO1

e) A toroidal coil has a magnetic path length of 33 cm and a magnetic field strength of 650 A/m. The coil current is 250 mA. Determine the number of coils turns. ($\mu_0 = 4\pi \times 10^{-7}$) (4) CO5

OR

f) Determine the m.m.f. required to generate a total flux of 100μWb in an air gap 0.2 cm long. The cross-sectional area of the air gap is 25 cm^2. ($\mu_0 = 4\pi \times 10^{-7}$) (4) CO5

Question No. 2 Attempt following Question

a) Derive the expression for the conductivity of intrinsic and extrinsic semiconductor. (6) CO1

OR

b)	Define Fermi energy level. Explain Fermi- Dirac distribution function under various conditions, specifying the meaning of each term in it.	(6)	CO1

c)	What is nanotechnology? Explain how quantum confinement the properties of nanomaterials.	(5)	CO3

OR

d)	What is superconductivity? Explain the terms: Persistent current and critical current.	(5)	CO3

e)	A slab of silicon 2 cm in length 1.5 cm wide and 2 mm thick is applied with magnetic field of 0.4 T along its thickness. When a current of 75 A flows along the length, the voltage measured across the width is 0.81 μV. Calculate the concentration of mobile electrons in silicon.	(4)	CO4

OR

f)	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=6.023x10^{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

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