	SUMMER-2023		
	Exam Seat No.:		
	Academic Year: 2022-2023	Semester: II	
	Name of Programme: F. Y. B. Tech	Pattern: 2022	
	Name of Course: Applied Physics-A	Course Code: FYE221003	
	Max. Marks:60	Duration: 2:30 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 3 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 of electron / proton $= 1.6 \times 10^{-19}$ C
   Mass of electron $= 9.1 \times 10^{-31}$ Kg
   Mass of proton $= 1.673 \times 10^{-27}$ Kg
   Mass of neutron $= 1.673 \times 10^{-27}$ Kg
   Planks constant $= 6.626 \times 10^{-34}$ J.s
   Permeability $\mu_0 = 4\pi \times 10^{-7}$

Question No. 1 Attempt following Question

a) Define or state the following terms.

    1) Lenz law   2) Permeability in free space   (2)   CO1

b) Determine the magneto motive force required to generate a total flux of 100 μWb in an air gap 0.2 cm long. The cross-sectional area of the air gap is 25 cm^2.   (4)   CO4

Question No. 2 Attempt following Question

a) Write two differences between type-I and type-II superconductors.   (2)   CO2

b) Calculate the number of acceptors to be added to a germanium sample to obtain the resistivity of 10 Ω cm. (Given: $\mu = 1700$ cm^2/V).   (4)   CO5

Question No. 3 Attempt following Question

a) Explain interference due to wedge shape film and hence explain how the planeness of a surface can be tested by air   (6)   CO1

wedge shape film.

OR

b) Explain the interference in reflected light due to uniform thickness film and describe its mathematical condition for interference. (6) CO1

c) Write a short note on the diffraction grating and describe the conditions of maxima and minima in a diffraction grating. (6) CO1

OR

d) State the phenomena of double refraction. Explain Huygens principle of double refraction. (6) CO1

e) A plane diffraction grating has the value of grating element equal to 15×10^{-4} cm. Calculate the position of the third order maxima for wavelength (λ) is 2.4×10^{-4}cm. (4) CO5

OR

f) A parallel beam of light 622 nm incident on a glass plate of refractive 1.5 such that angle of refraction into the plate is $60°$. Calculate the smallest thickness of the plate which will appear dark by reflection. (4) CO5

Question No. 4 Attempt following Question

a) State the De-broglie hypothesis. Explain the postulates of quantum mechanics. (6) CO3

OR

b) What is a wave function? Explain its physical significance. (6) CO3

c) Derive the Schrodinger time-dependent wave equation. (6) CO1

OR

d) Explain the experimental set-up and working method of the stern-Gerlach experiment. (6) CO1

e) Determine the velocity and kinetic energy of a neutron having de-broglie wavelength $1A°$. (4) CO5

OR

f) An electron beam is accelerated from rest through a potential difference of 200 V. Calculate the wavelength associated with it. (4) CO5

Question No. 5 Attempt following Question

a) What is the photovoltaic effect? Explain the process of electron-hole pair generation and recombination. (6) CO1

OR

b) Explain how quantum dot technology is used in third-generation solar cells. (6) CO1

c) Explain the construction and working of solar cells. Also, draw the IV characteristic of the solar cell, and define I_{SC}, V_{OC} and fill factor. (6) CO3

OR

d) Explain wind farms and their three types. (6) CO3

e) At a particular site, where air density is 1.2 Kg/m^3, the wind is available at 8 m/sec. Find out the power density available in the wind. (4) CO5

OR

f) Explain the first and second-generation solar cell. (4) CO5