



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

	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 column indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question
6. Given Constant : - Charge of electron / proton = 1.6×10^{-19} C
Mass of electron = 9.1×10^{-31} Kg
Mass of proton = 1.673×10^{-27} Kg
Mass of neutron = 1.673×10^{-27} Kg
Planks constant = 6.626×10^{-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) Permeance 2) Flemings Left-hand Rule

(2) CO1

b) A specimen of iron is uniformly magnetised by a magnetising field of 500 A/m. If the magnetic field density in the specimen is 0.2 Wb/m^2 , find the relative permeability.

(4) CO4

Question No. 2 Attempt following Question

a) Define the Hall effect and the Hall voltage.

(2) CO1

b) How much impurity should be added in a germanium sample by a manufacturer to manufacture the semiconductor having resistivity of $20 \Omega \text{ cm}$. (Given - $\mu_e = 1700 \text{ cm}^2/\text{Vs}$)

(4) CO5

Question No. 3 Attempt following Question

a) Write a short note on wedge shape film with a ray diagram

(6) CO1

and describe its conditions for maxima and minima.

OR

b) Define unpolarised and polarised light. Hence state and prove the law of malus. (6) CO1

c) Define double refraction and Explain Huygens principle of double refraction. (6) CO1

OR

d) Define below mentioned terms with a suitable diagram.

i) Stimulated emission ii) Population Inversion (6) CO1

iii) Resonant Cavity.

e) When a parallel wave of monochromatic light of wavelength 6000 \AA fall normally on a grating 2.40 cm wide. The first-order spectrum is produced at an angle of 25° from the normal. Calculate the number of lines of grating. (4) CO5

OR

f) A soap film having a refractive index of 1.33 , and thickness $5 \times 10^{-5} \text{ cm}$ is viewed at an angle of 35° to the normal. Find the wavelength of light in the visible spectrum which will be absent from the reflected light. (4) CO5

Question No. 4 Attempt following Question

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

OR

b) State and explain the properties of matter waves. (6) CO3

c) Show that the De-Broglie wavelength of an electron (charged particle) is inversely proportional to the potential by which it is accelerated. (6) CO1

OR

d) Derive the expression of the Schrodinger time-dependent wave equation. (6) CO1

e) A proton is accelerated in a large hadron collider through a potential difference of 182 volts . Find the De-Broglie wavelength associated with the particle. (4) CO5

OR

f) Determine the velocity and kinetic energy of a neutron having De-Broglie wavelength 1 \AA . (4) CO5

Question No. 5 Attempt following Question

a) Explain the principle, construction and working of a solar cell. (6) CO2

OR

b) Explain how quantum dot technology is used in third generation solar cell. (6) CO2

c) Explain wind farms and their three types. (6) CO2

OR

d) Explain the first, second and third generations of solar cells. (6) CO2

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 with an example -

i) Renewable and non-renewable energy sources (4) CO5

ii) Commercial and non-commercial energy sources.