



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

End Sem Examination 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-B	Course Code: FYE221004	
Max. Marks:60	Duration: 2.30 Hrs.	

This question paper contains 3 pages.

1. Answer to each new question is to be started on a new page.
2. Assume suitable data wherever required, but justify it.
3. Draw the neat labelled diagrams, wherever necessary.
4. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

$$\text{Constants : } e = 1.6 \times 10^{-19} \text{ C}$$

$$m = 9.1 \times 10^{-31} \text{ Kg}$$

Que. No.1 REGULAR

- 1.a) Define average velocity & instantaneous velocity. (2) CO2
The position of a particle is given by $x = t^4 - 3t^2 + 1$.
- 1.b) Determine velocity 'v' & acceleration 'a' of a particle when $t = 4$ sec. (4) CO4

Que. No.2 REGULAR

- 2.a) Define the terms horizontal range and angle of projection related to a projectile motion. (2) CO1
- 2.b) A particle is traversing a curved path of radius 200 m with a speed of 108 kmph and a tangential acceleration 3 m/s^2 . Determine total acceleration of the particle. (4) CO4

Que. No.3 INDIVIDUAL_OR

- 3.a) State Hall effect and hence derive the equation for Hall voltage and Hall coefficient. (6) CO1
- OR

- 3.b) What is Fermi level in Semiconductor? With the help of neat labeled diagram draw position of Fermi level in intrinsic semiconductor. Also draw Fermi level in p-type semiconductor at 0K and 300K. (6) CO1
- 3.c) State and explain Meissner effect and hence show that superconductivity is influenced by perfect diamagnetism. (6) CO3
- OR
- 3.d) What is nanotechnology? Explain how quantum confinement affects properties of nano particles? (6) CO3
- 3.e) Calculate the number of acceptor atoms that need to be doped in germanium sample to obtain the resistivity of $20 \Omega \text{ cm}$. (Given: $\mu = 1600 \text{ cm}^2/\text{V.s}$). (4) CO4
- OR
- 3.f) The transition temperature for lead is 7.26 K. The maximum critical field for the material is $8 \times 10^5 \text{ A/m}$ at 0K. At what maximum temperature Lead will be used as a superconductor subjected to a magnetic field of $4 \times 10^5 \text{ A/m}$. (4) CO4

Que. No.4 INDIVIDUAL_OR

- 4.a) State the phenomena of Double Refraction. Hence explain Huygens's Wave Theory of Double Refraction. (6) CO1
- OR
- Explain :
- 4.b) i) Stimulated emission (6) CO1
 ii) Population inversion
 iii) Optical or resonant cavity
- 4.c) Explain types of diffraction. Write conditions for the maxima and minima intensity due to grating. Draw intensity curve for it. (6) CO1
- OR
- 4.d) Explain the working of optical fibre communication with block diagram. Give its advantages over the others. (6) CO1
- 4.e) Polarizer and Analyzer are adjusted in such a way that they transmit maximum light. Calculate the angle of analyzer for which intensity reduces (i) $1/4$ and (ii) $2/3$ of the original intensity. (4) CO4
- OR
- 4.f) A parallel beam of light 660 nm incident on a glass plate of refractive index 1.50 such that angle of refraction into the plate is 45° . Calculate the smallest thickness of the plate which will appear dark by reflection. (4) CO4

Que. No.5 INDIVIDUAL_OR

- 5.a) Derive the unit of force, energy and power. (6) CO1
- OR
- 5.b) Explain the principle, construction & working of a solar cell. (6) CO1

- 5.c) Explain first, second and third generations of solar cell. (6) CO5
OR
- 5.d) Explain wind farms and its three types. (6) CO5
- 5.e) Explain the merits and demerits of solar cell. (4) CO5
OR
- Explain with example
- 5.f) i) renewable and nonrenewable energy sources (4) CO5
ii) commercial and noncommercial energy sources