



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

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester: I
Class: F.Y.B.Tech.	Program: F.Y.B.Tech.
Branch Code: FYE	Pattern:2022
Name of Course: Applied Physics-B	Course Code: FYE221004
Max. Marks: 60	Duration: 2.30 Hrs.

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.

This question paper contains 3 page(s).

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.

Constants : Charge of electron = 1.6×10^{-19} C
 Mass of electron = 9.1×10^{-31} Kg
 Acceleration due to gravity = 9.81 m/s^2

Question No. 1 Attempt following Question

- 1a) How do we define rectilinear motion, What are the definitions of the terms used to describe rectilinear motion? (2) CO1
- 1b) $x = t^4 - 3t^3 + t$. Determine position i.e. x, velocity v, & acceleration when $t = 3\text{sec}$. (4) CO4

Question No. 2 Attempt following Question

- 2a) Explain the projectile motion of object with example. (2) CO3
- 2b) A particle is traversing a curved path of radius 250 m with a speed of 80 kmph and a tangential acceleration 2 m/s^2 . Determine total acceleration of the particle. (4) CO4

Question No. 3 Attempt following Question

- 3a) Explain the terms a} Valance Band b} Conduction Band c} Energy band gap d}Fermi Level in metal e} Fermi Level in semiconductor (6) CO3

OR

- 3b) What is Fermi Energy in Semiconductor? With the help of labeled diagram draw position of Fermi level in p-type semiconductor at 0K and 300K. (6) CO1

- 3c) What is nano technology? Describe the role of surface-to-volume ratio in determining the behavior and characteristics of nanoparticles. (6) CO1

OR

- 3d) What are the application of superconductor? (6) CO1

- 3e) Calculate the number of acceptor atoms that need to be doped in germanium sample to obtain the resistivity of $12\ \Omega\ \text{cm}$. (Given: $\mu = 1600\ \text{cm}^2/\text{V.s}$). (4) CO4

OR

- 3f) The superconducting transition temperature of Lead is 7.26 K. The initial field at 0 K is $64 \times 10^3\ \text{Amp m}^{-1}$. Calculate the critical field at 5 K. (4) CO4

Question No. 4 Attempt following Question

- 4a) Write short note on uniform thin film interference and explain the conditions of constructive and destructive interference. (6) CO1

OR

- 4b) State and prove Law of Malus. (6) CO5

- 4c) Explain Fibre optic communication system with block diagram. (6) CO3

OR

- 4d) Define: (6) CO1

- 1) Spontaneous emission
- 2) Stimulated emission
- 3) Pumping.

- 4e) The thin layer of Magnesium fluoride (MgF_2) is deposited on thin glass plate, if refractive index of MgF_2 is 1.25, then minimum thickness of film required is? (Take $\lambda=500\text{nm}$) (4) CO4

OR

- 4f) What is the highest order of spectrum which may be seen with light of wavelength $5430\ \text{\AA}$ by means of a grating with 5000 lines/cm? (4) CO4

Question No. 5 Attempt following Question

- 5a) Define Fill factor. Explain the construction and working of solar cell. (6) CO3

OR

- 5b) Explain the concept of wind farms and what are the different types of wind farms, and how do they differ? (6) CO3

- 5c) What is solar energy. Give classification of solar technology. (6) CO2

OR

- 5d) Explain how quantum dot technology is used in third generation solar cell. (6) CO3

- 5e) How do primary and secondary energy resources differ fundamentally and provide examples to illustrate it ? (4) CO1

OR

- 5f) Explain the differences between commercial and non-commercial energy sources, give examples of each category? (4) CO3

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