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First/Second Semester B.E. Degree(CBCS)Examination

Engineering Physics

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.

2. Physical Constants: Velocity of light, $c = 3 \times 10^8$ m/s, Planck's constant, $h = 6.625 \times 10^{-34}$ JS; Mass of electron $m = 9.1 \times 10^{-31}$ kg; Boltzmann constant, $k = 1.38 \times 10^{-23}$ J/K; Avagadro number, $N_A = 6.02 \times 10^{26}$ /K mole

Module-1

- 1 a. State Planck's law of black body radiation. Show that Planck's law reduces to Wien's law and Rayleigh Jeans law at lower and higher wavelength limits respectively. (07 Marks)
- b. Based on Heisenberg's uncertainty principle, show that electrons cannot exist within the nucleus. (05 Marks)
- c. Calculate the de Broglie wavelength of an electron moving with a K.E. of 50 Kev. (04 Marks)

OR

- 2 a. What is phase velocity and group velocity? Show that group velocity is equal to particle velocity. (05 Marks)
- b. Obtain the solution of Schrodinger's time independent wave equation for a particle in a one dimensional potential box of infinite height. (07 Marks)
- c. X-rays of wavelength 0.75 \AA are scattered from a target at an angle of 45° . Calculate the wavelength of scattered X-rays. (04 Marks)

Module-2

- 3 a. What is Fermi level? Describe the variation of Fermi factor with temperature. (05 Marks)
- b. What is Meissner effect? Write a note on Type – I and Type – II super conductors. (07 Marks)
- c. For intrinsic gallium arsenide, the room temperature electrical conductivity is $10^{-6} \text{ ohm}^{-1} \text{ m}^{-1}$. The electron and hole mobilities are respectively $0.85 \text{ m}^2/\text{Vs}$ and $0.04 \text{ m}^2/\text{Vs}$. Calculate the intrinsic carrier concentration at room Temperature. (04 Marks)

OR

- 4 a. Explain the BCS theory of super conductivity. (05 Marks)
- b. State law of mass action. Obtain an expression for the intrinsic carrier density. (07 Marks)
- c. Calculate the probability of finding an electron at an energy level 0.02 eV above Fermi level at 300K . (04 Marks)

Module-3

- 5 a. Explain the construction and working of carbon dioxide Laser. (08 Marks)
- b. Obtain an expression for the numerical aperture of an optical fiber. (04 Marks)
- c. The average power output of a laser beam of wavelength 6500 \AA is 10 mw . Find the number of photons emitted per second by the laser source. (04 Marks)

OR

- 6 a. What is holography? Explain the principle and method of recording an image on a hologram. (06 Marks)
- b. Explain the different types of optical fibers. (06 Marks)
- c. An Optical signal propagating in a fiber retains 85% of input power after travelling a distance of 500 m in the fiber. Calculate the attenuation coefficient. (04 Marks)

Engineering Physics Model Question Paper

Lingsheng Yao



Engineering Physics Model Question Paper:

Engineering Physics Model Question Paper Book Review: Unveiling the Power of Words

In a world driven by information and connectivity, the energy of words has become more evident than ever. They have the ability to inspire, provoke, and ignite change. Such is the essence of the book **Engineering Physics Model Question Paper**, a literary masterpiece that delves deep to the significance of words and their effect on our lives. Published by a renowned author, this captivating work takes readers on a transformative journey, unraveling the secrets and potential behind every word. In this review, we shall explore the book's key themes, examine its writing style, and analyze its overall effect on readers.

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Table of Contents Engineering Physics Model Question Paper

1. Understanding the eBook Engineering Physics Model Question Paper
 - The Rise of Digital Reading Engineering Physics Model Question Paper
 - Advantages of eBooks Over Traditional Books
2. Identifying Engineering Physics Model Question Paper
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Engineering Physics Model Question Paper
 - User-Friendly Interface
4. Exploring eBook Recommendations from Engineering Physics Model Question Paper
 - Personalized Recommendations
 - Engineering Physics Model Question Paper User Reviews and Ratings
 - Engineering Physics Model Question Paper and Bestseller Lists
5. Accessing Engineering Physics Model Question Paper Free and Paid eBooks

- Engineering Physics Model Question Paper Public Domain eBooks
 - Engineering Physics Model Question Paper eBook Subscription Services
 - Engineering Physics Model Question Paper Budget-Friendly Options
6. Navigating Engineering Physics Model Question Paper eBook Formats
- ePub, PDF, MOBI, and More
 - Engineering Physics Model Question Paper Compatibility with Devices
 - Engineering Physics Model Question Paper Enhanced eBook Features
7. Enhancing Your Reading Experience
- Adjustable Fonts and Text Sizes of Engineering Physics Model Question Paper
 - Highlighting and Note-Taking Engineering Physics Model Question Paper
 - Interactive Elements Engineering Physics Model Question Paper
8. Staying Engaged with Engineering Physics Model Question Paper
- Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Engineering Physics Model Question Paper
9. Balancing eBooks and Physical Books Engineering Physics Model Question Paper
- Benefits of a Digital Library
 - Creating a Diverse Reading Collection Engineering Physics Model Question Paper
10. Overcoming Reading Challenges
- Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Engineering Physics Model Question Paper
- Setting Reading Goals Engineering Physics Model Question Paper
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Engineering Physics Model Question Paper
- Fact-Checking eBook Content of Engineering Physics Model Question Paper
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
- Utilizing eBooks for Skill Development

- Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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