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S.B. Roll No.

APPLIED PHYSICS-I
1st/ Common/ 2355/ 0351/ 5403/ Nov'15

Duration: 3 hrs

M. Marks=75

SECTION A

Q.1.Fill in the Blanks:

1x5=5

- Plane angle and solid angle are the two _____ units in SI system.
- Speed is a _____ quantity and velocity is a _____ quantity.
- Rolling friction is _____ as compared to sliding friction.
- Change in length per unit original length is called _____ strain.
- Device most convenient for measuring temperature of a furnace is _____.

True & False:

- One Fermi is equal to 10^{15} .
- Angular velocity is defined as rate of change of displacement of a body.
- When we lower a bucket into a well to fetch water, the work done will be negative.
- Meniscus of tap water in capillary tube is convex.
- Expansion during heating decreases the density of material.

1x5=5

Multiple Choice Questions:

1x5=5

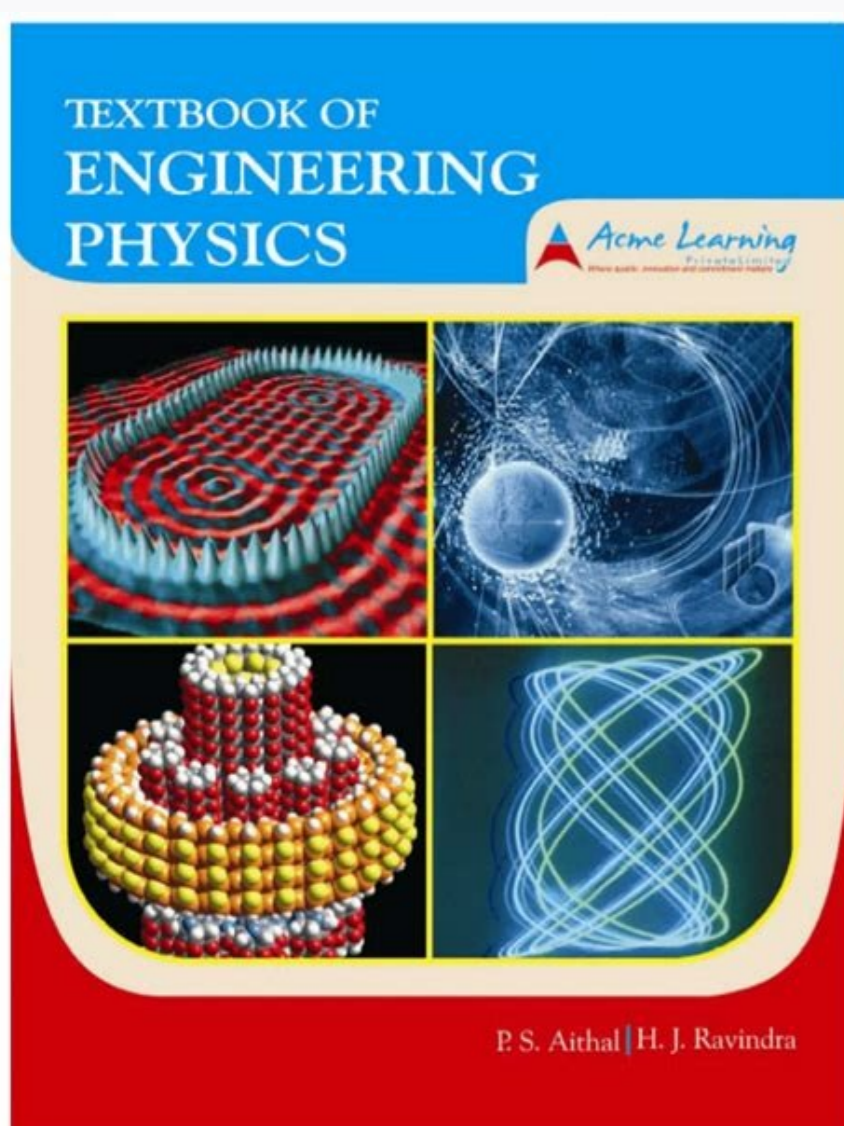
- Which of the following is a dimensionless constant quantity?
a) Young's modulus b) Poisson's ratio
c) Bulk modulus d) Modulus of rigidity
- A body is moving in a circular path. The acceleration of the body acts along the
a) Circumference b) radius c) tangent d) always zero
- When torque acting on a system is zero, which of the following is constant?
a) Force b) linear momentum c) angular momentum d) velocity
- Pressure is defined as force per unit
a) Length b) volume c) mass d) area
- Which of the following temperature scales is independent of the physical properties of the substance used in the thermometer?
a) Celsius scale b) Fahrenheit scale c) Kelvin scale d) Reumer scale

SECTION B

Q.2.Attempt any SIX Questions:

6x5=30

- Convert a velocity of 12 cm/s into km/hr using dimensional analysis.
- Impulsive force of 200 N acts on a body for 1 second. Find the change in linear momentum.
- It is easier to pull than to push a lawn roller. Why?
- Show that for a freely falling body, mechanical energy remains constant.
- What is moment of inertia? Differentiate between inertia and moment of inertia.
- What is capillary action or capillarity? Explain by giving at least five examples.
- What is the force required to stretch steel wire 1cm^2 in cross-section to double its length? Given $Y=2 \times 10^{11} \text{ N/m}^2$
- Convert 90°F into Kelvin scale.
- Define free, forced and resonant vibrations.



POLYTECHNIC SECOND SEMESTER
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APPLIED PHYSICS-2
(अनुप्रयुक्त भौतिकी-2)
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Effect of Concentration on the Optical and Solid State Properties of ZnO Thin Films Deposited by Aqueous Chemical Growth (ACG) Method

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ABSTRACT

Thin films of Zinc Oxide (ZnO) having different concentrations were deposited using the Aqueous Chemical Growth (ACG) method. The films were characterized using Rutherford Back Scattering (RBS) spectroscopy for chemical composition and thickness, X-Ray Diffraction (XRD) for crystallographic structure, a UV-VIS spectrophotometer for the analysis of the optical and solid state properties which include spectral absorbance, transmittance, reflectance, refractive index, direct band gap, real and imaginary dielectric constants, absorption and extinction coefficients and a photomicroscope for photomicrographs. The average deposited film thickness was 100 nm. The results indicate that the values of all the optical and solid state properties investigated vary directly with concentration except transmittance which is the reverse. Thus, the optical and solid state properties of ZnO thin film deposited by the Aqueous Chemical Growth method can be tuned by deliberately controlling the concentration of the precursors for various optoelectronic applications including its application as absorber layer in solar cells.

Keywords: Component; Formatting; Style; Styling; Insert

1. Introduction

Zinc Oxide is an amphoteric oxide which exist in the form of white powder (zinc white) at room temperature [1]. Though zinc oxide exist naturally in the earth crust (zincite), it is the synthetic ZnO produced in laboratories that are usually used in industries [2].

Crystalline zinc oxide is thermochromic [3]. Apart from the ability of ZnO to react with acids, it also react with bases to produce soluble zincates [4-6]. Zinc oxide has high stability at room temperature and decomposes into zinc vapour and oxygen at about 1975°C [7]. Though zinc oxide can exist in either of hexagonal wurtzite, cubic zinc blende and cubic (rock salt) structure, the hexagonal wurtzite structure is the most common at room temperature. The different polymorphs of ZnO do not possess the property of symmetry inversion. This and other properties such as ionic bonding account for the strong piezoelectricity of both hexagonal and zinc blende ZnO [8,9].

The hexagonal wurtzite structure has the point group 6mm (Hermann-Mauguin notation) or C_{6v} (schoenflies notation) and a space group of $P6_3$ mc or C_{6v}^4 . Its lattice

constants are $a = 3.25 \text{ \AA}$ and $c = 5.2 \text{ \AA}$ [10].

The many applications to which ZnO can be put has made it to be a material for constant scientific study. The diverse applications of ZnO are derived from its unique properties which include non-toxicity, good electrical conductivity, high luminous transmittance, good substrate adherence, good optical behaviour and stability in plasma atmosphere [11,12].

ZnO has been tested and found to behave as a semiconductor having a wide bulk direct band gap of about 3.37 eV at room temperature [13]. ZnO has been used for the fabrication of light emitting diodes, varistors, photo detectors, piezoelectric cantilever, gas sensors, buffer layer in solar cells and in photonic crystals [14-21].

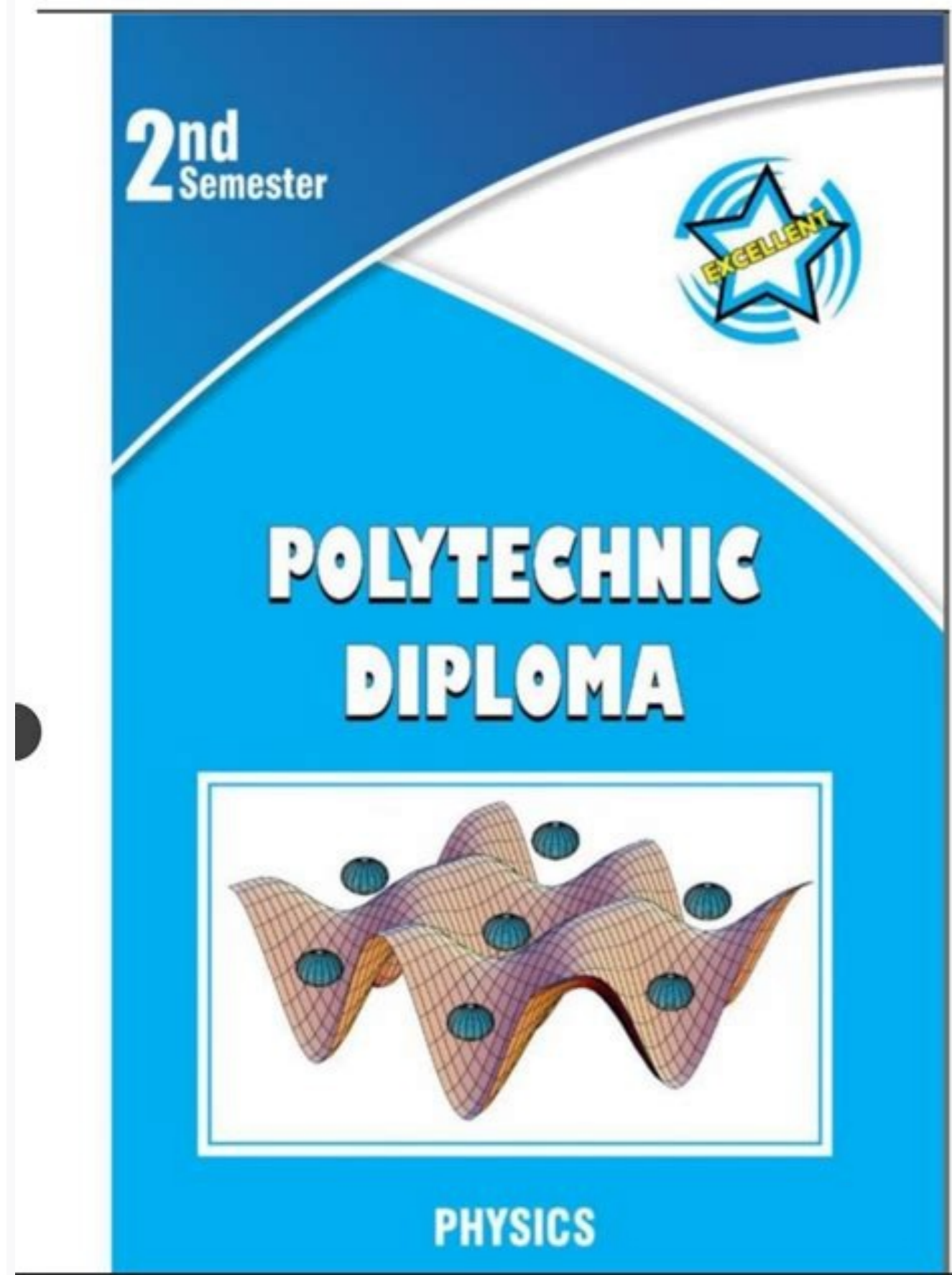
As a result of the strategic importance of ZnO to humanity, various deposition methods have been used for its production in the form of thin films. Among these methods are the chemical bath deposition (CBD) [22-26].

Successive Ionic Layer Adsorption and Reaction (SILAR) method [27,28].

Spray pyrolysis method [29].

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JMP



Due weightage has been given to every chapter taking into consideration the pattern of the examination papers. Table of Contents Relativistic Mechanics Fields Electromagnetics nterference Diffraction Polarization Lasers Fiber Optics and Holography Some Useful Tables Previous Years Papers Rreference SKU PH04 Author Dr. M. In these days of high technology, it is impossible to condense all the topics in a single book, but an effort has been made for the basics. In writing up the present book, numerous books and materials have been consulted and the authors feel obliged to all the people who helped to procure the writing material used for the book. Table of Contents1. Saranya Dr. S.K. Bhattacharya Dr. S.K. Sen Dr. S.L. Uppal Dr. S.L. Uppal and Prof. 978-93-5192-060-1 Binding Paper Back Number of Pages 294 Size 6.5 x 9.5 inch View Complete Details Interested in this product? S.K. Sinha Dr. J.K. Jain Dr. J.P. Singh Dr. J.P. Tewari Dr. Janardan Jha Dr. Jitender Kumar and Neha Dr. K.C. 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