

**M.Phil/Pre Ph.D Regular & Supplementary Examinations – OCTOBER, 2023**

**R181103**

**Paper –III: ADVANCED PHYSICS.**

**Physics**

Time : 3 hrs

Maximum Marks : 100

**Answer One Question from Each Unit**

**All Questions Carry Equal Marks**

**UNIT-I**

1. (A) (i) Describe the Newton-Raphson method to evaluate the roots of an equation.  
(ii) Find the roots of the equation  $x^3 - x^2 - 1 = 0$  using Bisection method and write its algorithm.
- OR
- (B) (i) Derive the trapezoidal rule for numerical integration.  
(ii) Evaluate the integral  $\int_0^1 \frac{\sin x}{\sqrt{x}} dx$  using Simpson's 1/3 rule.

**UNIT-II**

2. (A) Discuss in detail Top – down and Bottom – up approaches in nano-materials. Explain the physical and chemical properties of nano-materials.
- OR
- (B) With a neat diagram discuss the synthesis of nano-materials by Ball Milling method. Describe the applications of nano-technology in Electronics, Diagnosis, Energy and Advanced Materials.

**UNIT-III**

3. (A) (i) Describe the process of Production of Ultrasonic waves by Piezo Electric method.  
(ii) Discuss briefly on the measurement of Ultrasonic velocity.
- OR
- (B) Explain the applications of Ultrasonics in thickness gauging, Cavitation, Emulsification, Ultrasonic welding and Medical field.

**UNIT-IV**

4. (A) Define Glass. What is Glass transition temperature? Explain the importance of Enthalpy Verses Temperature diagram of a Melt.
- OR
- (B) Explain the Electronic applications, Optical applications and Magnetic applications of Glasses.

**UNIT-V**

5. (A) Narrate the different types of liquid crystals and explain in detail Lyotropic and Thermotropic types. Discuss the different phases of liquid crystals.
- OR
- (B) Discuss the applications of liquid crystals in Thermal Mapping, Non-destructive testing, Medical field and Technological field.

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