

Roll No. \_\_\_\_\_

**SIIS-N 57 A-16**  
**B.Sc. IInd Semester Degree Examination**  
**Physics**  
**(Thermodynamics, Waves and Oscillations, Electrical Measurements and**  
**Circuits, Theory of relativity)**  
**Paper : II (New)**

Time : 3 Hours

Maximum Marks : 80

**Instructions to Candidates:**

- 1) Answer **all** questions from Section - I
- 2) Answer any **five** questions from Section - II
- 3) Answer any **four** questions from Section - III

**Section - I**

- I** Answer the following questions in **one** or **two** sentences. **(15×1=15)**
1. What do you mean by thermodynamic equilibrium?
  2. State third law of thermodynamics.
  3. When the carnot's engine efficiency will be maximum?
  4. Define melting point and boiling point.
  5. What is a progressive wave?
  6. Define particle acceleration.
  7. What is phase velocity?
  8. What are stationary wave?
  9. Define magnetic deflection sensitivity.
  10. Why LCR - parallel circuit is called "rejector" circuit?
  11. What is quality factor for an a.c. circuit?

12. State Galilean principle of relativity.
13. In Lorentz - Transformation, why is it taken  $y = y'$  and  $z = z'$  ?
14. Mention energy - momentum relation.
15. Define proper length.

**Section - II**

- II.** Answer a short note one any **Five** of the following. **(5×5=25)**
16. State the first law of thermodynamics and discuss its physical significance.
  17. Obtain an expression for stationary longitudinal vibration in a rod.
  18. Derive the expression for kinetic energy of a progressive wave.
  19. Explain the sharpness of resonance of LCR - series circuit.
  20. Explain the theory of Maxwell's bridge for finding the unknown inductance of coil in terms of a known capacitance.
  21. Discuss the equivalence of mass energy with examples.
  22. Briefly explain Minowski's world.

**Section - III**

- III.** Write explanatory note on any **Four** of the following : **(4×10=40)**
23. a) State and explain the significance of second law of thermodynamics.  
b) Describe the porus - plug experiment for idea of low temperature. **(5+5)**
  24. a) Define wave velocity and group velocity. Establish the relation between them.  
b) The angular frequency is five times the propagation constant. Calculate phase and group velocity. **(6+4)**
  25. a) Define entropy. What is its physical significance.  
b) Show that the entropy remains constant in a reversible process.  
c) Calculate the change in entropy when 4 kg of water at 100°C is converted into steam at the same temperature. **(3+4+3)**

26. a) Explain the construction and working of Cathod Ray Tube (CRT), with neat diagram.  
b) Mention the application of Cathod Ray Oscilloscope (CRO). (7+3)
27. a) Obtain an expression for variation of current in series RL - circuit to which an alternating emf is applied by j - operator method.  
b) Derive an expression for growth of charge in series RC - circuit. Represent it graphically. (5+5)
28. a) Obtain an expression of relativistic velocity transformation equation.  
b) A particle of rest mass  $9.1 \times 10^{-31}$  kg is moving with a velocity of  $0.9 C$ . Calculate its relativistic mass and kinetic energy. (7+3)
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