21BSC4C4PHL

B.Sc. IV Semester Degree Examination, September/October - 2023
PHYSICS
IV : Thermal Physics and Electronics
(NEP)

Time : 2 Hours   Maximum Marks : 60

Note :   *(i)*   *Answer **all** sections.*

       (ii)   *Non-programmed scientific calculators are allowed.*

SECTION - A

1. Answer the following Sub-questions, each Sub-question carries **one** mark.   **10x1=10**

    (a)   State Zeroth Law of Thermodynamics.

    (b)   What is irreversible process ?

    (c)   Why is it impossible to reach absolute zero ?

    (d)   What is Joule-Thomson effect ?

    (e)   Define Degrees of freedom.

    (f)   State Wein's displacement Law.

    (g)   What is extrinsic semiconductor ?

    (h)   Write the relation between α and β of a transistor.

    (i)   What are Integrated Circuits ?

    (j)   Convert $(EC)_{16}$ into binary number.

SECTION - B

Answer **any four** of the following. Each carries **five** marks.   **4x5=20**

2. Derive an expression for work done during Isothermal process.

3. Explain how low temperature is obtained by adiabatic demagnetisation.

4. State and prove Steafan's Boltzmann Law.

5. Explain the working of a full-wave rectifier.

6. Explain the working of a transistor as an amplifier.

7. Derive an expression for voltage gain of an Op-Amp in inverting mode.

SECTION - C

Answer **any three** of the following. Each carries **ten** marks. **3x10=30**

8. (a) What is heat engine ? Explain the construction and working of a carnot engine. **7+3**

    (b) Calculate the efficiency of a carnot engine working between the Steam Point and Ice Point.

9. (a) Deduce $Cp - Cv = R$ using Maxwell's relations for a perfect gas. **7+3**

    (b) Find the value of Joule-Thomson Co-efficient for a perfect gas.

10. Explain Maxwell-Boltzmann Law of distribution of velocities in an ideal gas and hence obtain expression for mean velocity. **10**

11. (a) Explain how zener diode act as a voltage regulator. **5+5**

    (b) Explain the characteristics of field effect transistor.

12. (a) State and prove De Morgan's Theorem. **5+5**

    (b) With truth table explain AND and OR gates.

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