(Please write your Enrolment No immediately) Enrolment No.

# Mid Term Examination

B. TECH PROGRAMMES (UNDER THE AEGIS OF USICT)
First Semester, November, 2023

Paper Code: BS 105 Paper: Applied Physics-I
Time: 1.5 Hours Max. Marks: 30

**Note: Attempt Question no. 1 which is compulsory and any two more questions from remaining.**

| | Question 1 | Marks | COs |
|---|---|---|---|
| 1(a) | State Kelvin- Planck and Clausius statements of the second law of thermodynamics. | 2.5 | CO1 |
| 1(b) | A particle of mass 5gm executes SHM and has amplitude of 8 cm. Determine the maximum velocity and energy of the particle at mean position if it makes 10 vibrations per second. | 2.5 | CO2 |
| 1(c) | What new concept did Maxwell's modified form of Ampere's law includes? | 2.5 | CO2 |
| 1(d) | What is Continuum Model in thermodynamics? | 2.5 | CO1 |

| | Question 2 | Marks | COs |
|---|---|---|---|
| 2(a) | Derive an equation of state for a perfect gas undergoing adiabatic change using First Law of thermodynamics. | 5 | CO1 |
| 2(b) | Explain the physical significance of entropy | 2 | CO1 |
| 2(c) | Calculate the work done when one-gram molecules of a gas expands isothermally at 27°C to double its original volume. | 3 | CO1 |

| | Question 3 | Marks | COs |
|---|---|---|---|
| 3(a) | Write Maxwell's equations in both integral and differential forms. State the Physical significance of each. | 5 | CO2 |
| 3(b) | A mercury lamp is radiating light of 10 watts power. Calculate the electric field strength at a distance 5m from the lamp. | 2 | CO2 |
| 3(c) | What is Poynting Theorem? Brief on concept of Poynting Vector in an electromagnetic waves. | 3 | CO2 |

| | Question 4 | Marks | COs |
|---|---|---|---|
| 4(a) | Explain Carnot cycle. Hence, derive the efficiency of a Carnot engine for an ideal gas. | 5 | CO1 |
| 4(b) | Show that electromagnetic waves travel with speed of light in free space. | 5 | CO2 |