MANIPAL INSTITUTE OF TECHNOLOGY
MAHE, MANIPAL

DEPARTMENT OF PHYSICS

End Semester Examination – APRIL 2019

PHY 1061: ENGINEERING PHYSICS LAB

Time: 2 hrs. **Max. Marks:** 40

Model Question Paper

Note: *Perform one experiment assigned to you. Write the formula with the explanation of symbols, their units, circuit /ray diagrams if any, tabular columns, qualitative plot of graphs of the experiment allotted to you in the first 20 minutes. Perform the experiment showing at least one reading of each measurement and report the result.*

1. Determine the radius of curvature of the given plano-convex lens by **Newton's rings** experiment. Wavelength of the light $\lambda = 5.893 \times 10^{-5}$ cm.

2. Determine the forbidden **energy bad gap** of the given semiconductor diode by measuring the forward voltage across the diode as a function of temperature for a constant forward current less than 0.1 mA.

3. Determine the resistivity of Germanium crystal by **four probe method**.
Distance between the probes, $S = 2 \times 10^{-3}$ m; Sample thickness, $W = 0.5 \times 10^{-3}$ m; Dimension correction function, $f(W/S) = 5.85$.

4. Determine the **Fermi energy** of Copper. Also calculate Fermi temperature and Fermi speed.
Length of copper wire L = 3.6 m; Radius of cross section of copper wire, $r = 0.26 \times 10^{-3}$ m; Boltzmann Constant, $k = 1.38 \times 10^{-23}$ J/K; Electron mass, $m = 9.1 \times 10^{-31}$ kg.

5. Determine the velocity of sound in the given liquid using **Ultrasonic Interferometer** and hence calculate the impendence offered by the liquid to the propagation of sound waves.
Given: Frequency of the ultrasonic wave, $f = 2$ MHz, Density of the liquid, $\rho = 880$ kg/m^3.

6. Determine Planck's constant and the work function of the material of the photo cathode in the given photo-emissive cell.

7. Determine Stefan constant by measuring the temperature and power emitted by a **black body**.

8. Determine the **Hall coefficient** of a given semiconductor and hence calculate its charge carrier density.
Thickness of the specimen $t = 0.1$ mm, Current to be passed through the specimen, $I = 50$ mA.

9. Determine **Boltzmann constant** k using a silicon transistor.
Ideality factor for silicon p-n junction at room temperature, $\eta = 1.2$; Electronic charge, $e = 1.6 \times 10^{-19}$ C

10. Build up **Series / Parallel LCR Circuit**. Determine the inductance of the inductor used and the quality factor of the circuit.

11. Determine the **refractive indices of uniaxial crystals** for O-ray and E-ray using prism of the crystal and long-arm spectrometer with laser.

12. Determine the wavelength of a given laser beam using a **Diffraction Grating**.