# MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

**Department/Centre : Department of Physics**

**Course Code : 21PHP 503**

**Course Name : Electronics Lab**

**Credits** : 4 **L -** 0 **T -** 0 **P -** 8

**Course Type** : Core

**Prerequisites** : none

**Course Contents**

1. To determine the Offset voltage, Offset current, and Bias Current of an op-amp
2. To study the application of op-amps as Inverting Amplifier, Non-inverting Amplifier, and Summing Amplifier
3. To study the application of op-amps as Integrator and Differentiator
4. To study the characteristics of Filters: Low pass, High Pass, and Band Pass
5. To study Astable, and Monostable Multivibrator
6. To study the application of op-amps as Comparator, Function Generation, and The Triangle-Square generator
7. To study the Wien Bridge Oscillator
8. To design Active Half-Wave and Full-wave Rectifier
9. To design and study Unregulated and Regulated Power supply
10. To study the behavior of Basic flip-flops
11. To study Counter and Shift register
12. To study D/A and A/D convertor

**Recommended Readings**

1. Text books-
    1. Electronics Principles, A. P. Malvino (McGraw-Hill Education)
    2. The art of electronics, P. Horowitz and W. Hill
    3. Digital Electronics, S. Ghoshal (Cengage India Private Limited)
    4. Op-Amps and Linear Integrated Circuits, R. A. Gayakwad (PHI)
2. Reference books-
    1. Fundamentals of Digital Circuits, A. Anand Kumar (Prentice-Hall of India Pvt. Ltd)
    2. Electronic Devices and Circuit Theory, Robert Boylestad and Louis Nashdsky (PHI)
    3. Digital Fundamentals, Floyd & Jain (Pearson Education)
    4. Operational Amplifiers & Linear Integrated Circuits: Theory and Application Laboratory Manual/3E, James M. Fiore

# MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

**Department/Centre : Department of Physics**

**Course Code : 21PHP 509**

**Course Name : Nuclear Physics and Spectroscopy Lab**

**Credits** : 4 **L -** 0 **T -** 0 **P -** 8

**Course Type** : Core

**Prerequisites** : none

**Course Contents**

1. To calibrate and determine the resolution of the Gamma ray spectrometer.
2. Experimental studies of gamma ray spectrometer.
   (a) To calibrate the energy of the spectrometer.
   (b) To identify the unknown source.
3. (a) To study the characteristics of the GM tube and determine its operating voltage, plateau length and slope with determination of efficiency for beta and gamma radiation.
   (b) To determine the linear and mass attenuation coefficients using gamma source using GM counter.
4. To study the electron spin resonance and to determine the Lande's g- factor.
5. To study normal Zeeman effect in transverse and longitudinal configurations.
6. To study the optical properties of polymer thin films grafted by fluorescence dye.
7. To measure the emission spectra of Hydrogen atom.

**Recommended Readings**

1. Text books-
   1. Introduction to experimental nuclear physics, R. M. Singru (Wiley Eastern Pvt.Ltd.)
   2. Introductory Nuclear Physics: K. S. Keane (Wiley).
   3. Fundamentals of Molecular Spectroscopy: C. N. Banwell and E. M. McCash (McGraw)
2. Reference books-
   1. Techniques for Nuclear and Particle Physics Experiments: W. R. Leo (Springer, 1994).
   2. Molecular Spectroscopy: K. V. Raman, R. Gopalan and P.S. Raghavan (Thomson).

# MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

**Department/Centre : Department of Physics**

**Course Code : 21PHP 603**

**Course Name : Solid State Physics Lab**

**Credits** : 4 **L -** 0 **T -** 0 **P -** 8

**Course Type** : Core

**Prerequisites** : none

**Course Contents**

1. (a) To plot the I-V characteristics of a solar cell and measure the short circuit current, open circuit voltage and maximum power point.
   (b) To calculate the energy conversion efficiency of a solar cell.
2. (a) To measure the Hall coefficient of a given material.
   (b) To study the temperature dependence of Hall coefficient of a given material.
3. To study the Gaussian nature of laser beams and carry out the diffraction experiments.
4. To study the speed of ultrasonic velocity in liquids and measure elasticity parameters.
5. To record a Frank Hertz curve for Mercury and measure the energy emission of free electrons in a gas filled triode.
6. To measure the magnetic susceptibility of paramagnetic solution by Quincke's method and to find the ionic molecular susceptibility and magnetic moment.
7. To determine the Curie temperature of a given solid and study the magnetic transition.
8. To study Bragg's law by microwave diffraction.
9. To study the Faraday Effect and calculate the Verdet's constant.
10. To study the performance of different rechargeable batteries by using Battery tester.

**Recommended Readings**

1. Text books-
   1. Introduction to Solid State Physics: C. Kittel, 7th Ed. (John Wiley and Sons)
   2. Solid State Physics: N. Ashcroft and N.D. Mermin (Holt, Rinehart and Winston).
   3. Solid State Physics: A.J. Dekker (Prentice Hall of India, New Delhi).
   4. Magnetism in Condensed Matter: Stephen Blundel (Oxford Master Series in Condensed Matter Physics).
2. Reference books-
   1. Solid State Physics: Azaroff (McGraw Hill).
   2. Solid State Physics: M.S. Rogalski and S.B. Palmer (Gordon & Breach Science Pub.).
   3. Solid State Physics: Gerald Burns (Academic Press).