

# The Islamia University of Bahawalpur

## Department of Physics

### PHYSICS LAB-VI (Phy-01604/Phy-21205)

#### Experiment No. 1 Measurement of speed of light in various media by modulation technique

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| <ol style="list-style-type: none"><li>1. What is light?</li><li>2. What is a wave?</li><li>3. What do you know about Newton's corpuscular theory of light?</li><li>4. Who was Newton?</li><li>5. What do you know about electromagnetic (e.m.) wave theory of light?</li><li>6. Who was James Clark Maxwell?</li><li>7. What do you know about quantum theory of light?</li><li>8. Who was Max Planck?</li><li>9. What is a transmitter?</li><li>10. What is a receiver?</li><li>11. Briefly describe the term LED.</li><li>12. Briefly describe the term photodiode.</li><li>13. What is a coaxial cable?</li><li>14. What is the value of light speed in air, water and glass media?</li><li>15. Write down a relation for the calculation of light speed in various media.</li></ol> | <ol style="list-style-type: none"><li>16. What is modulation? What are its major types?</li><li>17. What is demodulation?</li><li>18. Define refraction. How light behaves as it enters from a rarer to a denser medium and from denser to a rarer medium?</li><li>19. What is a rarer medium?</li><li>20. What is a denser medium?</li><li>21. What is Snell's law?</li><li>22. Define refractive index? Learn its values for air, water and glass media.</li><li>23. What is CRO?</li><li>24. What is a photon?</li><li>25. What do you know about photon theory of light?</li><li>26. Who was Einstein?</li><li>27. Define lens. How many various types of lenses are there?</li><li>28. Define principal axis, principal focus, focal length, focal plane and optical center.</li><li>29. Describe ray properties of concave and convex lenses.</li></ol> |
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#### Experiment No. 2 Measuring the dark I-V characteristics and efficiency of solar cell

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| <ol style="list-style-type: none"><li>1. Define conductors, insulators and semiconductors.</li><li>2. What is doping?</li><li>3. Differentiate intrinsic semiconductors from extrinsic semiconductors.</li><li>4. What are n-type and p-type substances?</li><li>5. What are majority and minority charge carriers?</li><li>6. What is the net charge on n-type and p-type substances?</li><li>7. What is a solar cell?</li><li>8. Define the term fill factor. What is its significance?</li><li>9. Define dark current. What is the cause of it?</li><li>10. Briefly describe the working of a solar cell.</li><li>11. How does a p-n junction be used as a source of power?</li></ol> | <ol style="list-style-type: none"><li>12. What is a source of current?</li><li>13. What do you know about power supply?</li><li>14. Define electrical power along with its expression and SI unit.</li><li>15. How do we get light from an electric lamp?</li><li>16. Define light intensity along with its unit.</li><li>17. Briefly describe the effect of intensity on working of solar cell.</li><li>18. What do you know about a short circuit?</li><li>19. What do you know about an open circuit?</li><li>20. What is a multi-meter?</li><li>21. What is a Solar panel?</li><li>22. In which quadrant does a solar cell work?</li><li>23. What is generated current?</li></ol> |
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### **Experiment No. 3 Charge to mass ratio of an electron by fine beam tube method (e/m)**

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| <ol style="list-style-type: none"><li>1. Define the term charge. What is its SI unit? Also define the unit.</li><li>2. Define the term mass. What is its SI unit? Also define the unit.</li><li>3. Write down the values of charge and mass of electron. Calculate e/m ratio.</li><li>4. Why was the e/m ratio of electron measured?</li><li>5. What are Helmholtz coils?</li><li>6. Can a single coil act as Helmholtz coil?</li><li>7. Define the term pressure. Write down its mathematical relation. Also define its SI unit.</li><li>8. What are the pressure requirements in this experiment?</li><li>9. What is a fine beam tube?</li><li>10. Which gas has been used in fine beam tube working in your laboratory?</li><li>11. What is an Ammeter? What is an ideal Ammeter?</li><li>12. What is a Voltmeter? What is an ideal voltmeter?</li><li>13. Write down the expression of force exerted by the magnetic field on a moving charge?</li><li>14. How much force is being exerted by the magnetic field on a stationary charge?</li><li>15. Can a stationary charge be set into motion by electric field?</li><li>16. Can a stationary charge be set into motion by magnetic field?</li><li>17. Write down the mathematical expression for e/m.</li><li>18. What is Lorentz force? Briefly describe.</li><li>19. What is permeability? Write down the value of permeability of free space.</li><li>20. Write down the expression for the magnetic field B at the midpoint between the Helmholtz coils.</li></ol> | <ol style="list-style-type: none"><li>21. What do you know about excitation and excitation potential?</li><li>22. Define ionization phenomenon and Ionization potential?</li><li>23. Is excitation energy greater than ionization energy?</li><li>24. What is de-excitation phenomenon?</li><li>25. What is a battery?</li><li>26. What is rheostat? What is its role in e/m experiment?</li><li>27. Define thermionic emission.</li><li>28. What is an electron gun? How does it work?</li><li>29. Define magnetic field. Write down its SI unit. Also define it.</li><li>30. What is Gauss? Establish a relation between Gauss and Tesla.</li><li>31. What are cathode rays? Who discovered it?</li><li>32. Who performed the e/m experiment for the first time?</li><li>33. Define ampere and volt.</li><li>34. How many electrons will be passing per unit time when we say that one ampere electric current is there in a wire?</li><li>35. Calculate the e/m ratio for a proton.</li><li>36. For which the e/m ratio be greatest/smallest: (i) electron, (ii) proton and (iii) alpha-particle?</li><li>37. What is the effect of accelerating potential on diameter of the circular trajectory in fine-beam tube?</li><li>38. Why does the size of circular trajectory contract on increasing the value of current through Helmholtz coils?</li></ol> |
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### **Experiment No. 4 Measuring the linear absorption coefficient of lead/aluminum sheets and maximum energy of beta particles by GM tube apparatus**

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| <ol style="list-style-type: none"><li>1. Define radiation. What is nuclear radiation?</li><li>2. What are radiation detectors?</li><li>3. What is a GM counter?</li><li>4. Who and when was the GM counter designed?</li><li>5. Define avalanche.</li><li>6. What do you know about quenching?</li><li>7. Differentiate primary electrons from secondary electrons.</li><li>8. Define dead time. Estimate its value.</li><li>9. What is the root cause of dead-time issue?</li><li>10. Is dead-time issue a merit or demerit of GM counter?</li><li>11. Is GM counter a slow or fast nuclear radiations detector?</li><li>12. Define linear absorption co-efficient. Write down its mathematical expression.</li><li>13. What do you know about excitation and excitation potential?</li><li>14. Define ionization phenomenon and Ionization potential?</li><li>15. Is excitation energy greater than ionization energy?</li><li>16. Why do we use a gas mixture instead of single gas in GM counter?</li><li>17. Draw the Geiger voltage plateau curve and label its various parts.</li></ol> | <ol style="list-style-type: none"><li>18. Define radioactivity. Who discovered this phenomenon?</li><li>19. Who was Henry Becquerel?</li><li>20. What are the units of radioactivity?</li><li>21. Define half-life.</li><li>22. How long does it take the entire radioactive sample to decay?</li><li>23. What is mean-life?</li><li>24. Write down the decay equation.</li><li>25. What is alpha-decay? Write down its nuclear equation.</li><li>26. What is beta-decay? Write down its nuclear equation.</li><li>27. What is positron emission? Write down its nuclear equation.</li><li>28. What is gamma-decay? Write down its nuclear equation.</li><li>29. Which among alpha, beta and gamma is e.m. in nature?</li><li>30. Enlist at least six major properties of alpha, beta and gamma rays each.</li><li>31. Define the term pressure. Write down its mathematical relation. Also define its SI unit.</li><li>32. What are the pressure requirements in this experiment?</li></ol> |
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## **Experiment No. 5 Frank-Hertz experiment by using Hg-tube**

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| <ol style="list-style-type: none"><li>1. Define collision. What are its types?</li><li>2. Define Quantum and Quantum Mechanics.</li><li>3. What is the key concept of Max. Planck's Quantum Theory of Light?</li><li>4. Who was James Frank?</li><li>5. Who was Gustav Hertz?</li><li>6. Who was Max Planck?</li><li>7. What do you know about excitation and excitation potential?</li><li>8. Define ionization phenomenon and Ionization potential?</li><li>9. Is excitation energy greater than ionization energy?</li><li>10. What is CRO?</li><li>11. What is a sensor? Which sort of sensor has been used in Frank-Hertz experiment?</li><li>12. What is Joule's law?</li><li>13. What is meant when we say that atoms have quantized energy levels?</li><li>14. Which instrument is being used to record current in this experiment?</li><li>15. Which instrument is being used to record potential in this experiment?</li><li>16. What are prefixes? Learn the table of prefixes.</li><li>17. Draw the schematic diagram for Frank-Hertz experiment.</li></ol> | <ol style="list-style-type: none"><li>18. Who was Bohr?</li><li>19. Write down the postulates of Bohr's theory.</li><li>20. Provide some fundamental information about mercury (Hg).</li><li>21. Define temperature and heat.</li><li>22. Differentiate heat from temperature.</li><li>23. What do you know about temperature scales?</li><li>24. How will you convert temperature from (i) Kelvin to Celsius, (ii) Fahrenheit to Celsius and (iii) Kelvin to Fahrenheit?</li><li>25. Define electric current and its unit.</li><li>26. Define electric potential and its unit.</li><li>27. What is meant by accelerating potential?</li><li>28. Is accelerating potential greater than ionization potential?</li><li>29. What is the role of grid in Hg-tube of Frank-Hertz experiment?</li><li>30. Briefly describe the term momentum.</li><li>31. What role is being served by decelerating potential?</li><li>32. Plot and discuss the results of Frank-Hertz experiment.</li><li>33. How do we get the useful information from the data plotted in Frank-Hertz experiment?</li></ol> |
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## **Experiment No. 6 Charge on an electron by Millikan's method**

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| <ol style="list-style-type: none"><li>1. Define the term electric charge.</li><li>2. What is an electron?</li><li>3. Write down the values for mass and charge of an electron.</li><li>4. Define the term Electric field.</li><li>5. What do you know about a force field? Is electric field a force field?</li><li>6. Write down the mathematical expression for electric intensity and its units.</li><li>7. Define Electric force. What are its units?</li><li>8. Define Terminal velocity. Which are those factors on which it depends?</li><li>9. What are X-rays? For what are they used in experiment of charge on an electron by Millikan's method?</li><li>10. Which sort of oil is being used in Charge on an electron by Millikan's method experiment?</li><li>11. What is the function of windows in this experiment?</li><li>12. Define weight, gravity and their units.</li><li>13. Define stress and write its mathematical form.</li><li>14. What is the difference between pressure and stress?</li><li>15. Draw the schematic diagram of Millikan's experiment.</li><li>16. What is a buoyant force? On which factors does it depend?</li><li>17. Define the term fluid.</li></ol> | <ol style="list-style-type: none"><li>18. What is Drag force? Write down its formula.</li><li>19. State Stokes law.</li><li>20. Define viscosity. Does it depend upon temperature?</li><li>21. What are optical instruments?</li><li>22. What is a microscope?</li><li>23. Define lens. How many types of lenses are there?</li><li>24. What is meant when we say that electronic charge is quantized?</li><li>25. What is a battery?</li><li>26. Define electric potential and potential difference.</li><li>27. Write down the formulae of electric potential and potential difference.</li><li>28. Define volt. Is it a base or derived unit? Write it down into its simplest form.</li><li>29. What is an atomizer?</li><li>30. Define the term pressure. Write down its mathematical relation. Also define its SI unit.</li><li>31. What are the pressure requirements in this experiment?</li><li>32. Which of the two is vector quantity: Stress or pressure.</li><li>33. How do we make the oil droplets stationary in Millikan's oil drop experiment?</li><li>34. What do you know about a basic force?</li><li>35. How many basic forces are there in nature? Enlist these.</li><li>36. Out of <math>F_g</math> and <math>F_e</math> which one basic force in nature?</li></ol> |
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