

Shahjalal University of Science and Technology, Sylhet
Department of Physics
2nd Year 1st Semester Examination-2012
Course: PHY 205B, Course Title: Physics for Biologists-II
Credits: 2, Total Marks: 60, Time: 2.00 hours

Answer any four questions from the following

- | | | |
|------|---|----|
| 1(a) | Define Coulomb and electric field. | 5 |
| (b) | Using Coulomb's law, find an expression for the electric field strength \vec{E} for a point on the axis of a ring of charge q and radius a at a distance x from its center. Hence show that at great enough distances the ring behaves like a point charge. | 10 |
| 2(a) | State and explain Gauss's law. | 4 |
| (b) | Using Gauss's law find the electric field due to a long charged cylinder. | 8 |
| (c) | Calculate the electric flux due to a point charge 5×10^{-7} coul at the center of a spherical surface of radius 0.2 m. | 3 |
| 3(a) | How can a uniform electric field be produced? | 2 |
| (b) | Define a dielectric. Find an expression for the Gauss's law in the presence of a dielectric. | 8 |
| (c) | Establish a relation among the three electric vectors. | 5 |
| 4(a) | Compare electric and magnetic force. | 2 |
| (b) | Define Lorentz relation and state Ampere's law. | 6 |
| (c) | What is a solenoid? Show that a constant magnetic field can be produced by the solenoid. | 7 |
| 5(a) | Describe the nature of light. | 4 |
| (b) | What are coherent sources? How are they realized in practice? | 4 |
| (c) | Find an expression for the intensity due to coherent sources. And also describe under what conditions the intensity becomes maximum and minimum. | 7 |
| 6(a) | Discuss the diffraction of light by a narrow slit. | 4 |
| (b) | Explain the formation of spectra by a plane diffraction grating. | 5 |
| (c) | A plane grating has 15000 lines per inch. Find the angle of separation of the 5048 Å and 5016 Å lines of helium in the second order spectrum. | 6 |