Exam.Code:0033
Sub. Code: 17962

2114
B.Sc. (Hons.) Biotechnology
First Semester
BIOT-105T: Physics

Time allowed: 3 Hours **Max. Marks: 67**

NOTE: Attempt five questions in all, including Question No. IX (Unit-V) which is compulsory and selecting one question each from Unit I -IV.

x-x-x

I(a) State Coulomb law. (2)
(b) State Gauss Law. (2)
(c)Three capacitors C_1, C_2, C_3 are connected in parallel. Find the total capacitance? (2)
(d) Nitrogen boils at -196°C. What is the Fahrenheit equivalent to this temperature.(2)
(e)What is the resolving power of a telescope. (2)
(f) State Ohm's law in vector form. (2)
(g) State Uncertainty principle. (1.4)

Unit I

II(a)Explain the relevance of the study of physics in life sciences, with particular reference to biotechnology, with suitable examples. (8)
(b) The smallest bacteria have a radius about 0.25 micrometer and the largest bacteria have a radius about 80 micrometers. What is the surface area -to-volume ratio for each of these? (5.4)

III(a) Roughly estimate the following in appropriate units / range. i) size of a largest atom ii) diameter of your little finger iii) mass of a paper clip iv) range of visible spectrum v) time it takes light to travel 10^3 km, in free space. (8)
(b)Explain two biotechnology applications in medical sciences. (5.4)

Unit II

IV(a)An infinite plane carries a uniform charge σ. Find its electric field at any point perpendicularly above to the plane. (8)
(b) What is continuity equation? Explain. (5.4)

V(a) Obtain the expression for energy stored in the electric field of a capacitor (8)
(b)Obtain the expression for electric field due to a electric dipole, at a point on equatorial line. (5.4)

P.T.O.

Unit III

VI(a) Describe the construction and working of a compound Microscope (8)

(b) Explain the terms (i) Interference (ii) diffraction. (5.4)

VII(a) Using Fresnel Biprism arrangement how can one determine the wavelength of monochromatic light. (8)

(b) Discuss the interference pattern in Young's double slit experiment. (5.4)

Unit IV

VIII(a) What is Bragg's Law? How does Bragg's law help in finding structure of a crystal. Explain. (8)

(b)What are de-Broglie waves? Find the de-Broglie wavelength of an electron moving with a velocity of 10^6 m/s. ($h = 6.63 \times 10^{-34} J.S$) (5.4)

IX(a) State and explain the Compton effect. Obtain the expression for the change in the wavelength of photon when it gets scattered by electron. (8)

(b)A typical atomic nucleus radius is about 5×10^{-15} meters. Argue using uncertainty principle that it is not possible for it to contain electron. (5.4)

x-x-x