ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION **WINTER SEMESTER, 2020-2021**

DURATION: 1 Hour 30 Minutes **FULL MARKS: 75**

Phy 4141: Physics

Answer all **three (3)** questions.
Figures in the right margin indicate marks.

N.B. The name of the pdf must be in the following format <Student ID Course Code FINAL>

1. a) Define Resistance , Resitivity, and Conductivity.With the help of an example show that a given conductor can have a number of resistances depending on how a potential difference is applied to it. (7)

   b) (10)

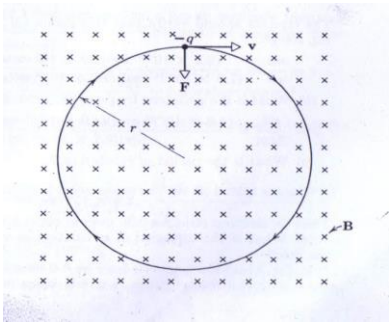

Fig.1.b

Fig. 1.b shows a negatively charged particle introduced with velocity **v** into a uniform magnetic field of magnetic induction **B**. Derive an expression for the cyclotron frequency **f** .

   c) A 10-ev electron is circulating in a plane at right angles to a uniform field of magnetic induction **B** = 1.0 x 10^{-4} weber/meter^2 (1.0 gauss). Calculate the orbit radius, the cyclotron frequency, and the direction of circulation of the charge as viewed by an observer sighting along the field. (8)

2. a) Define five types of radio-active decay processes with example for each process. (7)

   b) Derive radio-active decay law $N = N_0e^{-\lambda t}$ where the symbols have their usual meaning. (10)

   c) A hundred turns of insulated copper wire wrapped around an iron cylinder of cross-sectional area 0.001 m^2 and are connected to a resistor. The total resistance in the circuit is 10 ohms. If the longitudinal magnetic induction in the iron changes from 1 weber/m^2 in one direction to 1 weber/m^2 in the opposite direction, how much charge flows through the circuit? (8)

3. a) Define Diffraction of light. Distinguish Fresnel diffraction and Fraunhofer diffraction with examples. (7)

   b) Define Polarization of light. Discuss how an unpolarized light can be plane-polarized by a polarizing sheet. Derive Brewster's law. (10)

   c) Given a plate of glass (n = 1.50) as the polarizer, find the polarizing angle and the angle of refraction. (8)