FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION
SECOND SEMESTER EXAMINATION 2021/2022 SESSION

Course Code: ITE 225. Course Title: Electrostatic and Electromagnetism
Instruction: Answer Question one and any other two questions. **Time: 2 hours**

1A. Explain the concept of electromagnetic induction
1B.State the following laws as they relate to Electromagnetic induction
i. Farradays law ii. Lenzs law

1C. . Differentiate between self and mutual inductance
1D. State the factors which affect the inductance of an inductor include:
1E, A conductor moves with a velocity of 15 m/s at an angle of (a) 90°, (b) 60° and (c) 30° to a magnetic field produced between two square-faced poles of side length 2 cm. If the flux leaving a pole face is 5 μWb, find the magnitude of the induced e.m.f. in each case.
1F A flux of 25 mWb links with a 1500 turn coil when a current of 3 A passes through the coil. Calculate (a) the inductance of the coil, (b) the energy stored in the magnetic field, and (c) the average e.m.f. induced if the current falls to zero in 150 ms.

2a. State the two laws of Electrostatics
2b. State 5 applications of Electrostatics
3c. Determine the force of attraction between two charged bodies of 2.4×10^{-6} and 5×10^{-8} coulomb respectively placed 25cm apart from each other in vacuum. If the same charges of the distance in sulphur ($\varepsilon r = 3.8$) what is the corresponding force of attraction?

3a. What is Electrostatic?
3b. Mention 5 properties of Electromagnetic Line of Force
3c. A capacitor consists of two similar square plates each 12cm by 12cm mounted parallel and opposite each other. What is their capacitance in PF when the distance between them is 0.1cm and the dielectric is air? If the capacitor is given a charge of 1000μC. What will be the difference of potential between plates? How will this be with affected if the space between the plates is filled with glass which as a relative permittivity of 8.0?

4a. Define energy stored in a Capacitor
4b. Explain the following types of capacitor
i. Mica capacitors, ii. Ceramic capacitors: ii. Tantalum capacitors iv. Electrolytic capacitors
4c. A capacitor consisting of two plates each of area $50cm^2$ and spaced 0.2mm apart in air, is connected across a 120V supply calculate (a) energy stored (b)the flux density and (c) the potential gradient.

5a.Differentiate between natural and artificial magnets
5b. Explain magnetic effect of electric current
5c. An electromagnetic contactor has a magnetic circuit of length 250mm and a uniform cross-sectional area of $400mm^2$. Calculate the number of ampere-turns require to produce a flux of 500μwb. Given that the relative permeability of the material under these conditions is 2500. $\mu o = 4\pi\times10^{-7}H/m$