## St John Baptist De La Salle Catholic School, Addis Ababa Grade 10 Physics Final Prep $^{\rm 3^{rd}}$ Quarter

## March, 2023

- 1. Define inductance and its SI unit. What types of inductance are there? What causes inductance? Show your reasoning using flowcharts.
- 2. Define ans state Lenz's and Faraday's Laws. Try to explain the reason for each.
- 3. Explain the dynamo and motor effects. Also, explain how we can find the direction of induced current during dynamo effect.
- 4. Show how we can find the magnitude and direction of magnetic force on moving charges and current carrying wires.
- 5. When is emf/current induced? What is the immediate cause? What factors affect the magnitude and direction of induced emf?
- 6. What is the difference in the process of induction between inductors, generators and motional emf?
- 7. A square loop of wire is placed in a uniform magnetic field perpendicular to the magnetic lines that are going out of the plane of the page on which the loop is staying. The strength of the magnetic field is decreased from 10 T to 5T and the side length of the loop is 1m. If the magnetic field change occurred in a span of 10 seconds, how much emf would be induced on average? If the loop had a resistance of  $10\Omega$ , what is the current in the loop?
- 8. Plot the magnetic field lines of bar magnet, a straight current carrying wire and of a solenoid.
- 9. What are the factors affecting the induced emf in a generator? When we double the frequency of its rotation by how much does the induced emf change?
- 10. How do transformers work? How do they multiply current or voltage?
- 11. What is the inductive time constant? express it in terms of inductance and resistance.
- 12. What is the inductance of a solenoid if a current changing at a rate of 5A/s produces an emf of 30V to oppose the change?
- 13. If the windings on a cylindrical solenoid are doubled, but we decrease the radius of its cross section by 4 folds times, by how much does its self-inductance change?
- 14. A straight current carrying wire is standing vertically and current through it is going vertically upwards. There is a circular coil to the right of this wire. When the current in the straight wire is decreased, to what direction is current introduce in the coil?

- 15. A 5000-turn coil lies in the plane of this page in a uniform magnetic field of 4 T that is directed into the page. If the coil is stretched from having an area of  $1m^2$  to having an area of  $3m^2$  in 0.300 s. What is the **direction** of the current and **magnitude** of the current if the loop has a resistance of  $2\Omega$ ?
- 16. The Concorde had a wingspan of 26m and it could fly up to speeds of 686 m/s. What emf is induced between wing tips if the vertical component of the Earth's field is  $4 \times 10^{-5}T$ ? What if the concorde was hypothetically flying upwards at the north pole?
- 17. A solenoid has a self-inductance of 800.0 H.
  - What **induced emf** opposes turning it on when 200 A of current through it is turned on in 0.5s?
  - How much **energy** would be stored at full current(when it reaches 200A)?