

Name of the Student: \_\_\_\_\_

**Question No. 1. Encircle the correct option.****(20)**

- i. Lenz's law is another form of law of conservation of
  - a. energy
  - b. mass
  - c. momentum
  - d. charge
- ii. Transformer works on the principal of
  - a. self induction
  - b. mutual induction
  - c. self inductance
  - d. mutual inductance
- iii. When magnetic flux linked with a circuit, the unit current which flows through it is known as
  - a. induced current
  - b. induced emf
  - c. self inductance
  - d. none of these
- iv. The component in a generator which consumes electrical energy is called
  - a. capacitor
  - b. load
  - c. Commutator
  - d. split rings
- v. If we make the magnetic field stronger, the value of induced current is
  - a. decreased
  - b. increased
  - c. vanished
  - d. kept constant
- vi. Alternating current generators use
  - a. coiled rings
  - b. split rings
  - c. slip rings
  - d. solenoid ring
- vii. If velocity of a conductor moving through a magnetic field B is made zero, then motional emf is
  - a.  $-vBL$
  - b.  $-v/BL$
  - c.  $-BL/v$
  - d. zero
- viii. The energy density of an inductor is given by the relation
  - a.  $B^2/2\mu_0^2$
  - b.  $\mu_0^2/B^2$
  - c.  $B^2/2\mu_0$
  - d.  $B/2\mu_0^2$
- ix. The inductance is more in self induction in
  - a. air cored coil
  - b. iron cored
  - c. tungsten cored
  - d. steel cored
- x. When the back emf in a circuit is zero, it draws
  - a. zero current
  - b. maximum current
  - c. minimum current
  - d. steady average current
- xi. An alternating current generator converts mechanical energy into
  - a. electrical energy
  - b. heat energy
  - c. chemical energy
  - d. does not convert energy
- xii. In step up transformer the number of turns of the secondary are
  - a. greater than primary
  - b. lesser than primary
  - c. equal to primary
  - d. none of these
- xiii. The practical application of the mutual induction phenomena is
  - a. electric motor
  - b. transformer
  - c. A.C. Generator
  - d. transistor
- xiv. When a coil is rotated in a uniform magnetic field, an induced emf is produced due to change in
  - a. electric flux
  - b. flux density
  - c. magnetic flux
  - d. electric field strength
- xv. When resistance of the coil is negligible small, then back emf in the motor is
  - a. less than applied voltage
  - b. greater than applied voltage
  - c. equal to applied voltage
  - d. zero
- xvi. The current in the primary of transformer is
  - a. directly proportional to the voltage in secondary
  - b. inversely proportional to the voltage in secondary
  - c. directly proportional to the voltage in primary
  - d. inversely proportional to the voltage in primary
- xvii. A transformer steps down 220 V to 40 V. If the secondary turns are 40 then primary turns are
  - a. 20
  - b. 40
  - c. 120
  - d. 220
- xviii. The principal of electric generator is based on
  - a. Gauss' law
  - b. Faraday's law
  - c. Lenz's law
  - d. Ampere's law
- xix. The direction of induce current is found by
  - a. Faraday's law
  - b. Lenz's law
  - c. Gauss's law
  - d. ampere's law
- xx. A wire loop is moved perpendicular to a uniform magnetic field, the induced emf in the loop is
  - a. maximum
  - b. minimum
  - c. zero
  - d. none of these

**Question No. 2 Write short answers any six.****2x6=12**

- i. Does the induced emf always act to decrease the magnetic flux through a circuit?
- ii. Does the induced emf in a circuit depend on the resistance of the circuit? Does the induced current in a circuit depend on the resistance of the circuit?
- iii. Differentiate between A.C. generator and D.C generator?
- iv. State Faraday's law of electromagnetic induction and give its mathematical form.
- v. In a certain region the earth's magnetic field points vertically down. When a plane flies due north, which wing tip is positively charged.
- vi. Is it possible to change both area of the loop and magnetic field passing through the loop and still not have an induced emf in the loop?
- vii. Can a D.C. motor be turned into a D.C. Generator? What changes are required to be done?
- viii. Show that  $\epsilon$  and  $\Delta\phi/\Delta t$  have the same units.

**Question No. 3**

- (a). Define mutual induction. Calculate emf induced in the secondary coil using this phenomena. Also define unit of mutual inductance? **(5)**
- (b). A pair of adjacent coils has a mutual inductance of 0.75 H. If the current in the primary changes from zero to 10A in 0.025 s, what is the average induced e.m.f in secondary. What is the change in flux in it if the secondary has 500 turns? **(3)**

**OR****Question No. 4**

- (a) Derive an expression for energy stored in an inductor. **(5)**
- (b) A metal rod of length 25 cm at a speed of 0.5 m/s in a direction perpendicular to a 0.25 T magnetic field. Find the emf produced in the rod. **(3)**