

Haik Higher Education Preparatory and Secondary School

ETHIOPIAN UNIVERSITY ENTRANCE EXAMINATION (EUEE)

Five Year PHYSICS Questions

(2005E.C-2009E.C)

Unit 7- Electromagnetic Induction & a.c circuits

**INSTRUCTION: CHOOSE THE BEST ANSWER FROM
THE GIVEN ALTERNATIVES.**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

2005 E.C

①. On which of the following does the induced emf in a coil NOT depend when a magnet is inserted into it?

- A. Resistance of the coil. B. Number of turns in the coil.
C. Speed of approach of the magnet. D. Magnetic moment of the magnet

②. A step-up transformer is used to

- A. increase the power. B. decrease the power
C. increase the voltage. D. decrease the voltage

③. Which device uses the principle of electromagnetic induction for its operation?

- A. Ac generator B. Moving coil meter C. Cathode ray tube D. Light emitting diode

④. An alternating current is represented by $I(t) = (10.0 \text{ A})\sin(100\pi t)$ What are the amplitude and frequency of the alternating current?

- A. 100 A, 75Hz. B. 10.0 A, 100Hz. C. 10.0 A, 50Hz. D. 5.0 A, 25Hz

⑤. A series RLC circuit has a resistance of 45.0Ω and an impedance of 75.0Ω . What average power is delivered to this circuit when $\Delta V_{\text{rms}} = 210 \text{ V}$?

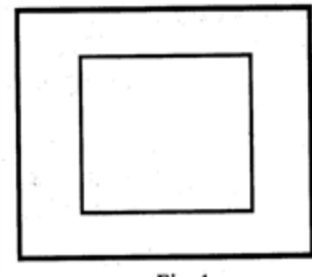
- A. 573 W. B. 353 W. C. 255 W. D. 247 W

2006 E.C

⑥. A 6.00-V battery is connected across the primary coil of a transformer having 20 turns. If the secondary coil of the transformer has 100 turns, what voltage appears across the secondary?

- (A) 24.0 V (B) 12.0 V (C) 6.00 V (D) 3.00 V

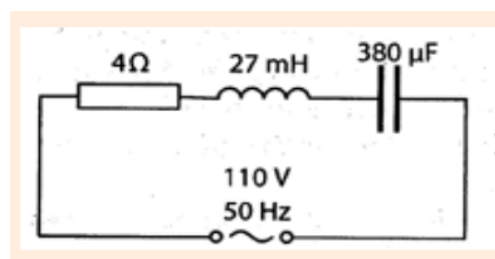
7. Two rectangular loops of wire lie in the plane of this paper as shown below. If the current I in the outer loop is counter clockwise and increases with time, which one of the following statements is correct about the current induced in the inner loop?



- (A) A current is induced in the inner loop in the clockwise direction.
- (B) A current is induced in the inner loop in the counterclockwise direction.
- (C) The induced current in the inner loop creates a magnetic field inside the area bounded by the inner loop in the same direction of the magnetic field that the outer loop produces in this same area.
- (D) It is zero.

8. Determine the total impedance for the circuit shown below

- (A) $0\ \Omega$
- (B) $4\ \Omega$
- (C) $27\ \Omega$
- (D) $31\ \Omega$



9. A coil formed by wrapping 50 turns of wire in the shape of a square is positioned in a magnetic field so that the normal to the plane of the coil makes an angle of 37° with the direction of the field. When the magnetic field is increased uniformly from 200 mT to 600 mT in 4.00 s, an emf of magnitude 160.0 mV is induced in the coil. What is the total length of the wire in the coil?

- (A) 100 m (B) 200 m (C) 300 m (D) 400 m

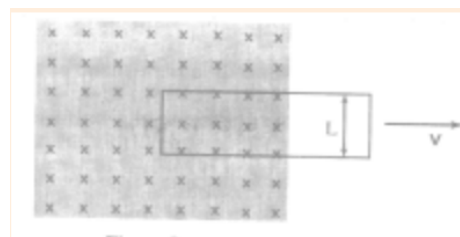
2007 E.C

10. Which one of the following actions increases the magnetic energy density in the interior of a very long current-carrying solenoid?

- A. Increasing the number of turns per unit length of the solenoid.
- B. Increasing the cross sectional area of the solenoid.
- C. Increasing the length of the solenoid keeping the number of turns per unit length fixed.
- D. Decreasing the cross sectional area of the solenoid.

11. Figure (below) shows a rectangular loop of wire of width L and resistance R . One end of the loop is in a uniform magnetic field of strength B directed perpendicular into the plane of the page. The loop is, pulled to the right at a constant speed v . What are the magnitude and direction of the induced current in the loop?

- A. $I = BLvR$ and clockwise
- B. $I = BLv/R$ and clockwise
- C. $I = BLvR$ and counterclockwise
- D. $I = BLv/R$ and counterclockwise



12. A series RLC circuit has a total impedance of $75.0\ \Omega$. If the resistance is $R = 45.0\ \Omega$ and the average power delivered to the circuit is $P = 352.8\ \text{W}$, what is the root-mean square value of the ac voltage source?

- A. 83 V B. 116 V C. 210 V D. 297 V

2008 E.C

13. The torque experienced by a current carrying loop, in an external, magnetic field is:

- A. independent of the number of turns of the loop. B. independent of the current in the loop.
C. dependent on the orientation of the loop. D. dependent on magnetic field generated according to Lenz's law.

14. Self inductance is a quantity that describes:

- A. the number of turns in a circuit. B. the induction of an electric field by an AC current in a lone coil.
C. the induction of a magnetic field by an AC current in a lone coil. D. the steady state current in a coil.

15. Which conversion process forms the basis for the function of an electric generator?

- A. alternating current to direct. B. mechanical energy to electrical.
C. electrical energy to mechanical. D. low Voltage to high or Vice versa.

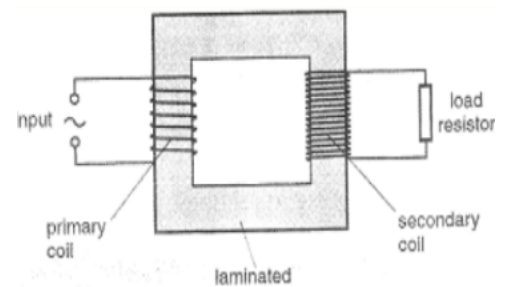
16. What is the change in magnetic flux in a coil of area 5m^2 as its orientation relative to the perpendicular of a uniform 3.0T magnetic field changes from 45° to 90° ?

- A. 0 Wb . B. -11 Wb . C. 7.5 Wb . D. 11 Wb

17. A simple transformer is illustrated in the figure below.

Why is it that the core is laminated?

- A. To increase the induced current in the primary coil.
B. To increase the induced current in the secondary coil.
C. To avoid heat exchange between the primary and secondary coils.
D. To reduce the loss in power in the core due to eddy currents.

**2009 E.C**

18. The induced electromotive force in a current carrying coil placed in a magnetic field does not depend on which of the following?

- A. The speed at which the coil moves if the relative motion doesn't result in changing the magnetic flux.
B. The change of magnetic flux density.
C. The length of the coil that is moving in a direction perpendicular to that of the magnetic field.
D. The area of the coil outside the field

19. Which of the following statement is correct?

- A. The direction of the induced e.m.f is in such a direction as rainforce the change produce it.
B. Self inductance of a coil is e.m.f divided by magnitude of rate change of current with time.
C. The induced e.m.f in a coil is inversely proportional to its number of turns.
D. The inductance of a coil is inversly proportional to the cross sectional area of the coil.

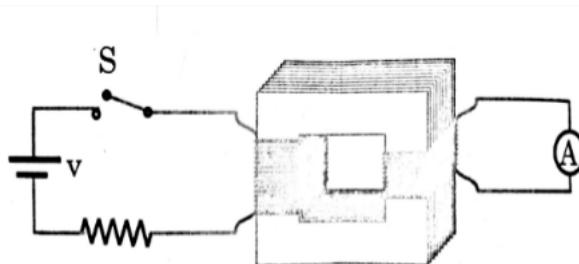
20. The primary coil of transformer is connected to a battery, a resistor, and switch. The secondary coil is connected to an ammeter. What does the ammeter show when the switch is thrown closed.

A. Zero current as transformer is not working on DC.

B. A nonzero current for a short instant.

C. A steady current.

D. e.m.f will be induced but not a current.



21. An electric generator has a coil of 400 turns and cross-sectional area 5m^2 rotating at angular frequency 0.52rad/s in a uniform magnetic field of 0.2T . What is the induced e.m.f produced from the electric generator in each second?

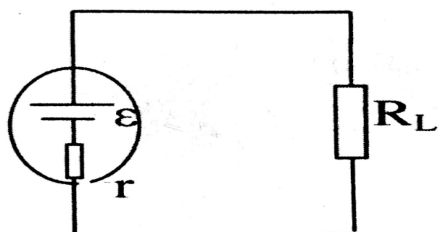
A. 209.6V

B. 104.8V

C. 200V

D. 182.4V

22. Which of the following is not correct about the circuit shown below?



A. Voltage across R_L is $(R_L/(r+R_L))\epsilon^2$

B. Current flowing through R_L is $\epsilon/(r+R_L)$

C. Current flowing through R_L is $(r/(r+R_L))\epsilon$

D. Power drop in R_L is $(R_L/(r+R_L))\epsilon^2$