PHYSICS MCQ BOOKLET

Grade 10 · Chapter 10 · Electromagnetism

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on magnetic fields of currents, motors, electromagnetic induction, generators, transformers, and the CRO. Not copied from the book exercise. Total: 108 questions. Each item has four options, the correct letter, and a short explanation of why it is correct.

A. Important / Main Topics

1. Electromagnetism is best described as the study of the connection between:

(A) electricity and magnetism
(B) only heat and temperature
(C) only sound and light
(D) only gravity and mass

Correct Answer: A

Explanation: The unit treats electromagnetism as the linked behaviour of electric currents and magnetic fields.

2. Hans Christian Oersted discovered the magnetic effect of current when a nearby:

(A) thermometer rose
(B) compass needle deflected
(C) prism split white light
(D) pendulum stopped

Correct Answer: B

Explanation: A compass near a live wire moved from north, showing that current produces a magnetic field.

3. A current-carrying straight wire produces magnetic field lines that are:

(A) radial straight arrows from the wire
(B) always parallel to the wire
(C) concentric circles centred on the wire
(D) random zigzags

Correct Answer: C

Explanation: Compasses around a vertical wire line up on circles, so the field is circular about the conductor.

4. If the current in a straight wire is reversed, the magnetic field around it:

(A) vanishes completely
(B) becomes a bar-magnet dipole only
(C) changes from circular to radial
(D) reverses direction

Correct Answer: D

Explanation: Reversing the battery reverses compass needles, so field direction follows current direction.

5. The magnetic field of a long straight wire is strongest:

(A) nearest the conductor
(B) infinitely far from the wire
(C) only at Earth's geographic poles
(D) only inside a vacuum flask

Correct Answer: A

Explanation: Field strength falls with distance, so compasses closer to the wire show a stronger effect.

6. Ampere is associated with the discovery that a current-carrying conductor:

(A) loses all resistance
(B) produces a magnetic field around it
(C) emits only sound waves

(D) becomes electrically neutral

Correct Answer: B

Explanation: A live wire is a source of magnetism, which is the starting idea of electromagnetism.

7. In the right-hand grip rule for a straight wire, the thumb points along the:

(A) magnetic field circles
(B) geographic north only
(C) conventional current
(D) force on a nearby proton always

Correct Answer: C

Explanation: Grasp the wire with the right hand: thumb along current I, curling fingers along B.

8. In that same right-hand grip rule, the curling fingers indicate the:

(A) direction of conventional current
(B) temperature of the wire
(C) charge of the Earth
(D) direction of the magnetic field

Correct Answer: D

Explanation: Fingers curl with the circular field lines around the wire.

9. Magnetic field lines are drawn so that they emerge from:

(A) north poles and end on south poles
(B) south poles and end on north poles
(C) the equator only
(D) electric batteries only

Correct Answer: A

Explanation: Magnetic field lines are drawn so that they emerge from north poles and end on south poles.

10. A property of magnetic field lines is that they:

(A) always intersect at right angles
(B) never intersect or cross each other
(C) exist only in iron
(D) stop at the equator

Correct Answer: B

Explanation: Crossing would imply two field directions at one point, which is not allowed.

11. The direction of B at a point is given by:

(A) the length of a compass needle
(B) the colour of the magnet
(C) the tangent to the field line at that point
(D) the mass of the wire

Correct Answer: C

Explanation: A tangent to a field line shows the local field direction.

12. Where magnetic field lines are packed more closely, the field is:

(A) weaker
(B) exactly zero
(C) always vertical
(D) stronger

Correct Answer: D

Explanation: Where magnetic field lines are packed more closely, the field is stronger.

13. Two long parallel wires carrying current in the same direction:

(A) attract each other
(B) repel each other
(C) produce no fields

(D) must carry zero current

Correct Answer: A

Explanation: Their fields interact so that opposite magnetic effects lie between the wires and they attract.

14. Two long parallel wires carrying current in opposite directions:

(A) attract each other
(B) repel each other
(C) fuse into one wire
(D) lose all magnetism

Correct Answer: B

Explanation: Opposite currents reverse the field pattern between the wires, so the force is repulsive.

15. A solenoid is best described as a:

(A) single straight bar of copper
(B) hollow glass prism
(C) long tightly wound coil of wire
(D) permanent horseshoe only

Correct Answer: C

Explanation: It is a spring-like coil; many loops add their fields along the axis.

16. Inside a long current-carrying solenoid the magnetic field is typically:

(A) negligible and random
(B) zero at every point
(C) circular about a single wire only
(D) strong and nearly uniform along the axis

Correct Answer: D

Explanation: Inside a long current-carrying solenoid the magnetic field is typically strong and nearly uniform along the axis.

17. Outside a long solenoid the magnetic field is typically:

(A) negligibly weak compared with the interior
(B) stronger than inside
(C) identical to Earth's field always
(D) radial like a point charge

Correct Answer: A

Explanation: The exterior field of a long solenoid is very weak compared with the interior.

18. The field pattern of a current-carrying solenoid is nearly the same as that of a:

(A) single isolated proton
(B) bar magnet
(C) sound wave in air
(D) static uncharged sphere

Correct Answer: B

Explanation: The field pattern of a current-carrying solenoid is nearly the same as that of a bar magnet.

19. Increasing the current in a solenoid:

(A) always demagnetises it to zero
(B) turns it into an insulator
(C) makes its magnetic field stronger
(D) reverses gravity

Correct Answer: C

Explanation: Field strength of an electromagnet increases with the current in the windings.

20. For a solenoid, curl the fingers of the right hand in the direction of conventional current; the thumb then points toward the:

(A) south pole of the coil

(B) centre of the Earth
(C) positive battery terminal always
(D) north pole along the solenoid axis

Correct Answer: D

Explanation: For a solenoid, curl the fingers of the right hand in the direction of conventional current; the thumb then points toward the north pole along the solenoid axis.

21. Earth behaves magnetically like a huge dipole. Near geographic north, the magnetic pole of that equivalent magnet is:

(A) a magnetic south pole
(B) a magnetic north pole
(C) uncharged
(D) a magnetic monopole

Correct Answer: A

Explanation: A compass north pole is attracted to Earth's magnetic south, which lies near geographic north.

22. Earth's magnetic axis is tilted relative to its spin axis by about:

(A) 90°
(B) 11°
(C) 180°
(D) 0.11°

Correct Answer: B

Explanation: The magnetic dipole is offset by roughly eleven degrees from the rotation axis.

23. At Earth's surface the geomagnetic field is typically of order:

(A) 25 to 65 tesla
(B) 25 to 65 millitesla only
(C) 25 to 65 microtesla
(D) zero everywhere

Correct Answer: C

Explanation: The surface field is about 25–65 μT (0.25–0.65 G), far weaker than a laboratory bar magnet.

24. Compared with a typical lab bar magnet, Earth's surface field is:

(A) several hundred times stronger
(B) exactly equal
(C) infinitely large
(D) several hundred times weaker

Correct Answer: D

Explanation: Geomagnetism is a weak but planetary-scale field.

25. Near the magnetic equator, Earth's field lines are approximately:

(A) parallel to the surface
(B) perpendicular to the surface
(C) absent
(D) radial from the Sun only

Correct Answer: A

Explanation: At the equator the field is roughly horizontal; at the magnetic poles it is nearly vertical.

26. Near Earth's magnetic poles, field lines are approximately:

(A) parallel to the surface
(B) normal (perpendicular) to the surface
(C) always east–west
(D) confined to the oceans

Correct Answer: B

Explanation: Near Earth's magnetic poles, field lines are approximately normal (perpendicular) to the surface.

27. The geomagnetic field is theorised to arise from Earth's rotation together with:

(A) a solid plastic crust only
(B) only the ozone layer
(C) a molten iron-rich core with moving charges
(D) only cosmic dust

Correct Answer: C

Explanation: Convection in conducting molten iron and nickel, plus rotation, drives currents that make the magnetosphere.

28. A loudspeaker converts electrical energy mainly into:

(A) nuclear binding energy
(B) static charge on a balloon
(C) direct current in a transformer core
(D) mechanical vibration that produces sound

Correct Answer: D

Explanation: A loudspeaker converts electrical energy mainly into mechanical vibration that produces sound.

29. In a loudspeaker the coil attached to the cone is commonly called the:

(A) voice coil
(B) primary winding of a grid transformer
(C) split-ring commutator
(D) slip ring

Correct Answer: A

Explanation: An alternating signal in the voice coil interacts with a permanent magnet.

30. A larger amplitude of current in the voice coil typically makes the sound:

(A) always higher in pitch only
(B) louder, because the cone vibrates with larger amplitude
(C) completely silent
(D) ultraviolet

Correct Answer: B

Explanation: A larger amplitude of current in the voice coil typically makes the sound louder, because the cone vibrates with larger amplitude.

31. A relay uses the magnetic effect of a current mainly to:

(A) measure temperature
(B) split white light
(C) control a separate output circuit with a small input current
(D) generate gamma rays

Correct Answer: C

Explanation: A weak input energises an electromagnet that opens or closes a stronger output circuit.

32. When a relay coil is energised, the armature is:

(A) repelled to infinity
(B) unchanged in position always
(C) melted by Lenz's law
(D) attracted toward the electromagnet

Correct Answer: D

Explanation: The electromagnet pulls the armature so the moving contact can close the output.

33. The return spring in a relay is there to:

(A) restore the armature when the coil current stops
(B) increase the coil current
(C) produce alternating voltage
(D) magnetise the Earth

Correct Answer: A

Explanation: When the input is off, the spring opens the contacts again.

34. A circuit breaker is similar in purpose to a fuse because it:

(A) increases household voltage
(B) disconnects the supply if current becomes dangerously large
(C) stores magnetic energy forever
(D) reverses Earth's field

Correct Answer: B

Explanation: It is a safety switch that opens an overloaded circuit.

35. A current-carrying conductor in an external magnetic field generally experiences a:

(A) purely gravitational pull to the Moon
(B) loss of all charge instantly
(C) mechanical force
(D) rise in mass number A

Correct Answer: C

Explanation: The wire's own field interacts with the external field, producing a force on the conductor.

36. That force on the wire can be reversed by reversing:

(A) only the room temperature
(B) only the length of the laboratory
(C) Planck's constant
(D) the current or the external field direction

Correct Answer: D

Explanation: That force on the wire can be reversed by reversing the current or the external field direction.

37. The force on a current-carrying wire in a magnetic field increases if you increase:

(A) the current, the field strength, or the length in the field
(B) only the colour of the insulation
(C) only the mass of the magnet's paint
(D) the frequency of visible light

Correct Answer: A

Explanation: The force on a current-carrying wire in a magnetic field increases if you increase the current, the field strength, or the length in the field.

38. Fleming's left-hand rule is used to find the direction of the:

(A) induced e.m.f. in a transformer only
(B) force on a current-carrying conductor in a magnetic field
(C) speed of light in vacuum
(D) half-life of carbon-14

Correct Answer: B

Explanation: It is the motor rule linking force, field, and current.

39. In Fleming's left-hand rule the forefinger represents:

(A) force
(B) current
(C) magnetic field
(D) temperature

Correct Answer: C

Explanation: Forefinger = B, middle finger = I, thumb = F, with the three mutually perpendicular.

40. In Fleming's left-hand rule the middle finger represents:

(A) magnetic field
(B) force
(C) north geographic pole

(D) conventional current

Correct Answer: D

Explanation: In Fleming's left-hand rule the middle finger represents conventional current.

41. In Fleming's left-hand rule the thumb represents:

(A) force (motion)
(B) magnetic field
(C) current
(D) resistance

Correct Answer: A

Explanation: In Fleming's left-hand rule the thumb represents force (motion).

42. The force, magnetic field, and current in Fleming's left-hand rule are:

(A) always parallel
(B) mutually perpendicular
(C) scalar quantities only
(D) undefined in motors

Correct Answer: B

Explanation: The three directions are at right angles to one another.

43. A rectangular coil carrying current in a uniform magnetic field can experience a:

(A) net charge of +2e only
(B) complete loss of mass
(C) couple (torque) that tends to rotate it
(D) permanent stop of all electrons

Correct Answer: C

Explanation: A rectangular coil carrying current in a uniform magnetic field can experience a couple (torque) that tends to rotate it.

44. The turning effect on a current-carrying coil in a magnetic field is increased by increasing:

(A) only the room's volume
(B) only the frequency of radio waves
(C) Earth's orbital speed
(D) the number of turns, the current, or the field strength

Correct Answer: D

Explanation: The turning effect on a current-carrying coil in a magnetic field is increased by increasing the number of turns, the current, or the field strength.

45. An electric motor is a device that converts:

(A) electrical energy into mechanical (rotational) energy
(B) mechanical energy into electrical energy
(C) heat into nuclear energy
(D) light into gravity

Correct Answer: A

Explanation: A current-carrying coil in a magnetic field is made to rotate continuously.

46. In a simple d.c. motor, current usually enters the coil through:

(A) only slip rings that never reverse current
(B) brushes, often graphite, pressing on a commutator
(C) a glass prism
(D) an optical fibre

Correct Answer: B

Explanation: Brushes contact the split ring so the coil remains in the circuit as it turns.

47. The split-ring commutator in a d.c. motor is needed to:

(A) increase the supply frequency to 50 Hz always

(B) convert the motor into a transformer
(C) reverse the coil current every half-turn so rotation continues
(D) remove the magnetic field

Correct Answer: C

Explanation: The split-ring commutator in a d.c. motor is needed to reverse the coil current every half-turn so rotation continues.

48. In a practical motor the many-turn coil on a shaft is called the:

(A) voice coil of a loudspeaker only
(B) primary of a street transformer
(C) magnetosphere
(D) armature

Correct Answer: D

Explanation: The armature is the rotating winding assembly.

49. Electromagnetic induction is the production of an e.m.f. when:

(A) a conductor is in a changing magnetic field or cuts field lines
(B) a resistor is painted blue
(C) gravity is switched off
(D) the temperature is exactly 0 °C

Correct Answer: A

Explanation: A changing flux, or relative motion that cuts flux, induces an e.m.f.

50. A magnet held completely still inside a coil connected to a galvanometer typically shows:

(A) a large steady induced current forever
(B) no induced e.m.f. while everything is stationary
(C) only gamma emission
(D) a step-up of voltage

Correct Answer: B

Explanation: Relative motion or a changing field is required; a static magnet gives no induced current.

51. Pushing the north pole of a magnet toward a coil induces a current that lasts:

(A) forever after you stop
(B) only at night
(C) only while the magnet is moving (flux is changing)
(D) only if the coil is made of wood

Correct Answer: C

Explanation: The galvanometer deflects during motion and returns when motion stops.

52. Moving a magnet away from a coil typically deflects the galvanometer:

(A) in the same sense as moving it toward the coil
(B) not at all even while moving
(C) only if Earth stops rotating
(D) in the opposite sense to approaching the coil

Correct Answer: D

Explanation: Opposite relative motion reverses the change of flux and so reverses the induced current.

53. The magnitude of an induced e.m.f. is increased by increasing:

(A) the rate of change of field (or rate of cutting flux) and the number of turns
(B) only the colour of the magnet
(C) only the mass of the laboratory bench
(D) the wavelength of red light

Correct Answer: A

Explanation: The magnitude of an induced e.m.f. is increased by increasing the rate of change of field (or rate of cutting flux) and the number of turns.

54. Lenz’s law states that the induced current:

(A) always flows from south to north on maps
(B) opposes the change that produces it
(C) doubles Earth’s field
(D) cancels Ohm’s law

Correct Answer: B

Explanation: Lenz’s law states that the induced current opposes the change that produces it.

55. If a north pole approaches a coil, the near end of the coil behaves as a:

(A) south pole, attracting the magnet in
(B) neutral point with no field
(C) north pole, repelling the approaching magnet
(D) gamma-ray source

Correct Answer: C

Explanation: Opposition to the approach means the coil end facing the magnet becomes a north pole.

56. An a.c. generator converts:

(A) electrical energy into heat only
(B) chemical energy into sound only
(C) nuclear mass into photons only
(D) mechanical energy into electrical energy

Correct Answer: D

Explanation: An a.c. generator converts mechanical energy into electrical energy.

57. In a simple a.c. generator the coil ends are connected to:

(A) two slip rings
(B) a split-ring commutator only
(C) a loudspeaker cone
(D) a gold foil

Correct Answer: A

Explanation: In a simple a.c. generator the coil ends are connected to two slip rings.

58. Carbon brushes on an a.c. generator:

(A) generate the magnetic field of Earth
(B) slide on the slip rings to connect the coil to the external circuit
(C) split white light
(D) store nuclear fuel

Correct Answer: B

Explanation: They are the sliding contacts to the external load.

59. For the simple generator in the unit, induced e.m.f. is zero when the coil is:

(A) horizontal (maximum flux cutting)
(B) made of plastic only
(C) vertical
(D) outside any laboratory

Correct Answer: C

Explanation: In the vertical position the instantaneous rate of flux change is zero, so e.m.f. is zero.

60. In that same simple generator the induced e.m.f. is a maximum when the coil is:

(A) vertical
(B) at 45° only forever
(C) stationary
(D) horizontal

Correct Answer: D

Explanation: In that same simple generator the induced e.m.f. is a maximum when the coil is horizontal.

61. A graph of e.m.f. against time for a simple a.c. generator is typically a:

(A) sine wave that reverses each half-turn
(B) horizontal straight line at a constant e.m.f.
(C) series of radioactive decay spikes
(D) circle on the screen

Correct Answer: A

Explanation: A graph of e.m.f. against time for a simple a.c. generator is typically a sine wave that reverses each half-turn.

62. Mains electricity in the unit is described as having frequency:

(A) 50 kHz
(B) 50 Hz, so the generator makes fifty revolutions each second
(C) 50 MHz
(D) one cycle per year

Correct Answer: B

Explanation: Fifty hertz means fifty complete cycles — and fifty coil revolutions — per second.

63. A transformer is used to:

(A) convert d.c. into permanent magnets
(B) measure half-life
(C) increase or decrease an alternating voltage
(D) split alpha particles

Correct Answer: C

Explanation: A transformer is used to increase or decrease an alternating voltage.

64. The three essential parts of a simple transformer are:

(A) prism, screen, and voice coil
(B) slip rings, brushes, and split ring
(C) gold foil, zinc sulfide, and polonium
(D) primary coil, secondary coil, and laminated iron core

Correct Answer: D

Explanation: A changing flux in the iron links the two windings.

65. The basic transformer equation relating voltages and turns is:

(A) Vs / Vp = Ns / Np
(B) Vs / Vp = Np / Ns always inverted wrongly
(C) Vs Vp = Ns + Np
(D) Vs = Np only

Correct Answer: A

Explanation: Secondary to primary voltage equals secondary to primary turns for an ideal transformer.

66. A step-up transformer has:

(A) Ns less than Np, so Vs less than Vp
(B) Ns greater than Np, so Vs greater than Vp
(C) no iron core by definition
(D) only a d.c. battery input

Correct Answer: B

Explanation: A step-up transformer has Ns greater than Np, so Vs greater than Vp.

67. A step-down transformer has:

(A) Ns greater than Np
(B) infinite secondary voltage
(C) Ns less than Np, so Vs less than Vp
(D) no primary coil

Correct Answer: C

Explanation: Fewer secondary turns reduce the voltage, as in street transformers feeding homes.

68. A transformer with Vp = 220 V, Vs = 11 V, and Np = 1200 turns has Ns equal to:

(A) 24000
(B) 11
(C) 2200
(D) 60

Correct Answer: D

Explanation: A transformer with Vp = 220 V, Vs = 11 V, and Np = 1200 turns has Ns equal to 60.

69. Street distribution often uses step-down transformers to deliver about:

(A) 220 V for residential use
(B) 220 kV directly into lamps
(C) 12 V only to whole cities
(D) zero voltage for safety

Correct Answer: A

Explanation: High grid voltage is reduced to a household value near 220 V.

70. In an ideal transformer, power into the primary equals power out of the secondary, so:

(A) Is = Ip always regardless of voltage
(B) Is Vs = Ip Vp
(C) the core must be wooden
(D) frequency must be zero

Correct Answer: B

Explanation: With no losses, Ip Vp = Is Vs; a higher secondary voltage means a smaller secondary current.

71. Power is transmitted at high voltage mainly to:

(A) increase I^2R heating in the cables
(B) make transformers unnecessary
(C) reduce current and therefore I^2R heat loss in the lines
(D) stop all a.c.

Correct Answer: C

Explanation: Heat in cables is I^2Rt; raising V lowers I for the same power, so losses fall.

72. When an electron beam passes between charged plates, electrons are deflected toward the:

(A) negative plate
(B) neutral geometric centre always
(C) infrared lamp
(D) positive plate

Correct Answer: D

Explanation: Electrons are negative, so the electric force pulls them toward the positive plate.

73. The deflection of an electron in a magnetic field depends on its speed, the field strength, and:

(A) the angle at which it enters the field
(B) only the colour of the vacuum tube
(C) the half-life of carbon-14
(D) the mass of the Sun only

Correct Answer: A

Explanation: The deflection of an electron in a magnetic field depends on its speed, the field strength, and the angle at which it enters the field.

74. A cathode-ray oscilloscope displays electrical signals by steering a beam of:

(A) alpha particles from radon
(B) electrons onto a phosphor-coated screen
(C) sound waves into a cone
(D) neutrons into lead

Correct Answer: B

Explanation: A cathode-ray oscilloscope displays electrical signals by steering a beam of electrons onto a phosphor-coated screen.

75. On a typical CRO display of an a.c. supply, the horizontal axis represents:

(A) potential difference
(B) magnetic flux only
(C) time
(D) nucleon number

Correct Answer: C

Explanation: The spot is swept in time while the vertical deflection follows voltage.

76. On that same CRO display the vertical axis represents:

(A) time
(B) temperature in kelvin
(C) mass number A
(D) potential difference (voltage)

Correct Answer: D

Explanation: On that same CRO display the vertical axis represents potential difference (voltage).

77. The working of a CRO described in the unit is based mainly on:

(A) electrostatic deflection of an electron beam
(B) nuclear fission of uranium
(C) Rayleigh scattering in air
(D) alpha decay of americium only

Correct Answer: A

Explanation: The working of a CRO described in the unit is based mainly on electrostatic deflection of an electron beam.

78. Generators and transformers both rely on:

(A) only electrostatic attraction of pith balls
(B) electromagnetic induction
(C) only chemical cells
(D) only gravitational potential

Correct Answer: B

Explanation: Generators and transformers both rely on electromagnetic induction.

79. The unit's applications of the magnetic effect of current include loudspeakers and:

(A) optical prisms
(B) carbon-14 dating
(C) relays
(D) Rayleigh sunsets

Correct Answer: C

Explanation: The unit's applications of the magnetic effect of current include loudspeakers and relays.

80. If the coil of a simple a.c. generator is rotated faster, the frequency of the output:

(A) decreases
(B) must become exactly zero
(C) becomes a constant d.c.
(D) increases

Correct Answer: D

Explanation: Each revolution is one cycle, so more revolutions per second means a higher frequency.

B. Less Important / Secondary Topics

81. Oersted's compass result showed that electricity and magnetism are:

(A) inseparably interrelated
(B) completely unrelated
(C) the same as radioactivity
(D) only properties of light

Correct Answer: A

Explanation: Oersted's compass result showed that electricity and magnetism are inseparably interrelated.

82. Magnetic field lines form:

(A) open paths that end in empty space always
(B) closed paths
(C) only straight infinite lines
(D) random polygons

Correct Answer: B

Explanation: They continue through the magnet as closed loops.

83. Soft-iron cores are used in electromagnets and relays because they:

(A) cannot be magnetised
(B) emit gamma rays
(C) magnetise strongly while current flows
(D) replace the need for current

Correct Answer: C

Explanation: Soft-iron cores are used in electromagnets and relays because they magnetise strongly while current flows.

84. A laminated iron transformer core is used to:

(A) increase eddy-current heating on purpose
(B) store a.c. as d.c.
(C) act as a loudspeaker cone
(D) carry the changing flux between windings efficiently

Correct Answer: D

Explanation: The iron guides flux from primary to secondary.

85. Moving a conductor parallel to magnetic field lines typically induces:

(A) little or no e.m.f. because flux is not cut
(B) maximum e.m.f.
(C) nuclear fusion
(D) a step-up of 220 V always

Correct Answer: A

Explanation: Moving a conductor parallel to magnetic field lines typically induces little or no e.m.f. because flux is not cut.

86. A galvanometer in induction experiments is used to:

(A) heat the coil
(B) detect small induced currents
(C) produce Earth's field
(D) split the commutator

Correct Answer: B

Explanation: Its needle shows that an e.m.f. has driven a current.

87. Heinrich Lenz proposed the law of induced-current direction in:

(A) the 20th century only
(B) 1896 with Becquerel
(C) 1834
(D) 2018 with a solar probe

Correct Answer: C

Explanation: Lenz's law dates from the nineteenth-century study of induction.

88. Household printers and chargers often contain:

(A) only split-ring motors
(B) polonium gold-foil sources
(C) solenoids that replace all magnets
(D) transformers to change a.c. voltage

Correct Answer: D

Explanation: Household printers and chargers often contain transformers to change a.c. voltage.

89. If a transformer is ideal and Vs is ten times Vp, then Is is:

(A) one tenth of Ip
(B) ten times Ip
(C) equal to Ip
(D) zero

Correct Answer: A

Explanation: Power balance Ip Vp = Is Vs implies the current ratio is the inverse of the voltage ratio.

90. High-voltage transmission can mean fewer heavy cables for the same power because:

(A) resistance becomes infinite
(B) current can be smaller, so conductors need not carry huge I
(C) transformers stop working
(D) I^2R loss increases without limit

Correct Answer: B

Explanation: Lower current for the same power reduces both heating and the required conductor size.

91. The phosphor on a CRO screen:

(A) absorbs all electrons without glowing
(B) is a split-ring commutator
(C) emits light where high-speed electrons strike
(D) measures half-life

Correct Answer: C

Explanation: The visible spot is fluorescence of the phosphor coating.

92. The electron gun in a CRO:

(A) detects alpha particles from gold foil
(B) is the iron core of a transformer
(C) is the voice coil
(D) produces the electron beam

Correct Answer: D

Explanation: It is the source of the beam that the deflection plates then steer.

93. Focusing electrodes in a CRO are used to:

(A) concentrate the beam onto a small spot on the screen
(B) increase Earth's magnetic tilt to 11°
(C) step down 220 V
(D) induce Lenz poles

Correct Answer: A

Explanation: Focusing electrodes in a CRO are used to concentrate the beam onto a small spot on the screen.

94. A horseshoe magnet in a force-on-wire demonstration provides:

(A) an electric field only
(B) a concentrated magnetic field across the conductor
(C) a source of gamma rays
(D) alternating 50 Hz exclusively

Correct Answer: B

Explanation: The gap between the poles is where the current-carrying rod sits.

95. Graphite is a usual brush material because it:

(A) is a perfect insulator
(B) is a nuclear fuel
(C) conducts while sliding with relatively little wear
(D) emits X-rays

Correct Answer: C

Explanation: Brushes must stay in electrical contact as the ring turns.

96. If both current and magnetic field are reversed together, the force on the wire:

(A) reverses
(B) becomes infinite
(C) vanishes forever
(D) keeps the same direction

Correct Answer: D

Explanation: If both current and magnetic field are reversed together, the force on the wire keeps the same direction.

97. The magnetosphere is the:

(A) magnetic shield formed by Earth's field around the planet
(B) iron core of a transformer
(C) voice coil of a speaker
(D) split ring of a motor

Correct Answer: A

Explanation: Currents in the molten core sustain a field that extends into space.

98. Molten iron in Earth's outer core acts as a good:

(A) electrical insulator
(B) electrical conductor, allowing dynamo currents
(C) optical fibre
(D) phosphor screen

Correct Answer: B

Explanation: A conducting fluid plus rotation can maintain a magnetic field.

99. When a d.c. motor coil is vertical, forces on the two sides are:

(A) still a maximum couple
(B) nuclear in origin
(C) aligned so the net turning effect drops unless the commutator reverses current
(D) due to Rayleigh scattering

Correct Answer: C

Explanation: That is why the split ring must switch the current to keep rotation going.

100. Slip rings are characteristic of:

(A) a simple d.c. motor commutator
(B) a loudspeaker magnet
(C) a relay spring
(D) a simple a.c. generator

Correct Answer: D

Explanation: Slip rings are characteristic of a simple a.c. generator.

101. A changing magnetic field in a transformer primary is produced because the supply is:

(A) alternating current
(B) steady d.c. only
(C) a beam of neutrons
(D) static charge on amber

Correct Answer: A

Explanation: A changing magnetic field in a transformer primary is produced because the supply is alternating current.

102. If Np = Ns in an ideal transformer, then Vs compared with Vp is:

(A) much smaller always
(B) approximately equal
(C) infinite
(D) exactly zero

Correct Answer: B

Explanation: If Np = Ns in an ideal transformer, then Vs compared with Vp is approximately equal.

103. Deflection plates in a CRO come in:

(A) only a single horizontal pair
(B) nuclear decay pairs
(C) horizontal and vertical pairs to sweep the whole screen
(D) slip-ring pairs

Correct Answer: C

Explanation: Deflection plates in a CRO come in horizontal and vertical pairs to sweep the whole screen.

104. The couple on a motor coil is made of two forces that are:

(A) unequal and parallel in the same sense
(B) both toward geographic north
(C) electrostatic only
(D) equal in magnitude and opposite in direction on opposite sides

Correct Answer: D

Explanation: A couple is a pair of equal opposite forces that produce rotation.

105. Conventional current in the right-hand rules is the direction of:

(A) positive-charge flow (opposite to electron drift)
(B) electron drift only
(C) north-seeking compass motion only
(D) sound in the loudspeaker cone

Correct Answer: A

Explanation: School rules use conventional current, from positive to negative externally.

106. If a coil has more turns, an induced e.m.f. for the same flux change is:

(A) smaller
(B) larger
(C) always zero
(D) independent of turns

Correct Answer: B

Explanation: Each turn contributes; total e.m.f. scales with the number of turns.

107. A relay separates input and output so that a small current can:

(A) never affect a lamp
(B) generate 50 Hz mechanically
(C) switch a larger current in another circuit
(D) measure μT fields

Correct Answer: C

Explanation: Galvanic isolation plus magnetic actuation is the point of the device.

108. The big idea of the unit is that currents make fields, fields make forces, and changing fields:

(A) have no electrical effect
(B) only heat the atmosphere
(C) only scatter blue light

(D) induce e.m.f.s used in generators and transformers

Correct Answer: D

Explanation: Motors, loudspeakers, relays, generators, and transformers all sit on that link.