Unit 19: Electromagnetism

60 MCQs. Correct option in bold. 1 mark each.

1. The magnetic effect of a current was discovered accidentally by the Danish scientist
A. Isaac Newton B. Heinrich Lenz
C. Hans Christian Oersted D. Michael Faraday

2. A current-carrying straight wire produces a magnetic field in the form of
A. parabolas B. radial lines
C. straight lines parallel to the wire **D. concentric circles**

3. The direction of the magnetic field around a straight current-carrying wire is found using the
A. left-hand rule **B. right-hand rule**
C. Fleming's right-hand rule D. Lenz's law

4. In the right-hand rule for a wire, the thumb points in the direction of the
A. current B. motion
C. force D. magnetic field

5. In the right-hand rule for a wire, the curled fingers show the direction of the
A. force B. electron flow only
C. magnetic field D. current

6. Magnetic field lines form
A. straight lines only **B. closed paths**
C. crossing paths D. open paths

7. Two long parallel wires carrying currents in the same direction
A. repel each other B. do not interact
C. rotate **D. attract each other**

8. Two long parallel wires carrying currents in opposite directions
A. repel each other B. do not interact
C. cancel the current D. attract each other

9. The magnetic field of a current-carrying solenoid is
A. circular around the axis
B. zero everywhere
C. strong and uniform along its axis and very weak outside
D. weak inside and strong outside

10. The magnetic field of a solenoid resembles that of a
A. single charge B. straight wire
C. dipole of electric charges **D. bar magnet**

11. In the right-hand rule for a solenoid, the curled fingers show the direction of the
A. electron flow only **B. conventional current**
C. force D. magnetic field outside

12. In the right-hand rule for a solenoid, the thumb points to the
A. north pole of the coil B. centre of the coil
C. wire D. south pole of the coil

13. The Earth's magnetic south pole is near the
A. geographic South Pole B. Moon
C. geographic North Pole D. equator

14. The north pole of a compass needle is attracted to the
A. magnetic north pole of Earth near the geographic North Pole
B. magnetic south pole of Earth near the geographic North Pole
C. Sun
D. magnetic north pole of Earth near the geographic South Pole

15. The magnitude of Earth's magnetic field at its surface ranges from about
A. 25 to 65 mT B. 25 to 65 nT
C. 25 to 65 T **D. 25 to 65 μT**

16. Earth's magnetic field is generated by
A. rotation of the Earth and its molten iron core containing moving charged particles
B. the Moon
C. the Sun
D. the atmosphere only

17. In a loudspeaker, electrical energy is converted into
A. chemical energy B. light
C. mechanical energy that produces sound D. heat only

18. In a loudspeaker, the volume of the sound is determined by the
A. amplitude of the electrical signal B. colour of the cone
C. size of the magnet only D. frequency only

19. A relay uses the _____ of a current to control the output circuit.
A. heating effect B. light effect
C. chemical effect **D. magnetic effect**

20. A current-carrying conductor in a magnetic field experiences a
A. change in colour **B. force**
C. decrease in resistance D. no effect

21. The force on a current-carrying conductor in a magnetic field increases if the current
A. is decreased B. is reversed
C. is zero **D. is increased**

22. The direction of the force on a current-carrying conductor can be reversed by reversing
A. the direction of the current or the magnetic field
B. the length of the wire
C. the temperature
D. the colour of the wire

23. The force on a current-carrying wire in a magnetic field is always
A. along the wire
B. perpendicular to both the magnetic field and the current
C. parallel to the field
D. parallel to the current

24. The direction of force on a current-carrying conductor is given by
A. Fleming's right-hand rule B. Lenz's law
C. Fleming's left-hand rule D. right-hand grip rule

25. In Fleming's left-hand rule, the forefinger points in the direction of the
A. magnetic field B. current
C. force D. motion of the wire only

26. In Fleming's left-hand rule, the middle finger points in the direction of the
A. magnetic field B. force
C. current D. induced emf

27. In Fleming's left-hand rule, the thumb points in the direction of the
A. resistance B. magnetic field
C. current **D. force**

28. The turning effect on a current-carrying coil is increased by increasing the number of turns, the current and the
A. temperature **B. strength of the magnetic field**
C. length of the magnet D. resistance of the coil

29. An electric motor converts
A. electrical energy into mechanical energy B. chemical energy into electrical energy
C. heat into electrical energy D. mechanical energy into electrical energy

30. The working principle of an electric motor is that a current-carrying coil in a magnetic field
A. emits light **B. experiences a torque**
C. stores charge D. produces an emf

31. In a motor, the split ring commutator
A. produces the magnetic field
B. stores charge
C. reverses the direction of current in the coil every half turn
D. increases the voltage

32. Electromagnetic induction is the production of an emf across a conductor exposed to a
A. constant temperature B. static charge
C. constant electric field **D. varying magnetic field**

33. An emf is induced in a coil when there is
A. a constant magnetic field only
B. no motion between them
C. relative motion between the coil and the magnet
D. heat applied to the coil

34. Lenz's law states that the direction of induced current is such that it

A. is always from north to south
B. opposes the cause which produces it
C. is always clockwise
D. helps the cause which produces it

35. Lenz's law is explained when the north pole of a magnet moves towards a coil: the nearer end of the coil becomes a

A. south pole
B. alternate pole
C. neutral
D. north pole

36. Which of the following devices works on the principle of electromagnetic induction?

A. Transformer
B. Oscilloscope
C. Magnetic compass
D. Motor

37. An AC generator converts

A. electrical energy into mechanical energy
B. heat into light
C. light into heat
D. mechanical energy into electrical energy

38. The output emf of a simple AC generator

A. alternates in direction and strength as the coil rotates
B. is always zero
C. flows in only one direction
D. is constant

39. In a simple AC generator, the emf is maximum when the coil is

A. vertical
B. stationary
C. horizontal
D. tilted at 45° only

40. The domestic electricity supply has a frequency of

A. 25 Hz **B. 50 Hz** C. 100 Hz D. 60 Hz

41. A transformer is an electrical device used to

A. increase or decrease an alternating voltage
B. produce electricity
C. convert AC to DC
D. store charge

42. A transformer is ineffective with DC because DC does not produce a

A. heating effect
B. voltage
C. changing magnetic field
D. current

43. The basic transformer equation is

A. Vs + Vp = Ns + Np
B. Vs/Vp = Ns/Np
C. Vs.Vp = Ns.Np
D. Vs/Vp = Np/Ns

44. A step-up transformer has

A. fewer turns in the secondary than in the primary
B. no secondary coil
C. equal turns in both coils
D. more turns in the secondary than in the primary

45. A step-down transformer has

A. no primary coil
B. equal turns in both coils
C. fewer turns in the secondary than in the primary
D. more turns in the secondary than in the primary

46. A step-down transformer converts 240 V into 12 V. With 2000 turns in the primary, the secondary has

A. 100 turns
B. 50 turns
C. 40,000 turns
D. 240 turns

47. A step-up transformer has a turns ratio of 1:100 and 20 V on the primary. The secondary voltage is

A. 120 V B. 0.2 V C. 200 V **D. 2000 V**

48. A step-up transformer has a transformation ratio of 3:2. If the primary voltage is 30 V, the secondary voltage is

A. 20 V **B. 45 V** C. 60 V D. 15 V

49. A transformer steps up 115 V to 230 V for a hair dryer drawing 5 A. The current drawn from the mains is

A. 20 A B. 5 A C. 2.5 A **D. 10 A**

50. Which quantity remains constant in an ideal step-up transformer?

A. Heat **B. Power** C. Voltage D. Current

51. Which quantity does not change in an ordinary transformer?

A. Voltage
B. Current
C. Frequency
D. Number of turns

52. Power is transmitted over long distances at high voltage to

A. minimise heat loss in the cables
B. increase current
C. increase the speed of electricity
D. increase heat in the cables

53. Heat dissipation in a transmission cable of resistance R is

A. IR^2 B. R/I^2 C. I/R **D. I^2R**

54. A step-up transformer is used before electricity is transmitted by overhead cables because it

A. increases the voltage to increase the speed of electricity
B. decreases voltage
C. increases the voltage to reduce energy loss in the cables
D. increases current to reduce loss

55. When an electron beam passes through an electric field, the electrons are deflected towards the

A. both plates equally
B. positive plate
C. neither plate
D. negative plate

56. The deflection of electrons in a magnetic field depends on their velocity, the strength of the field and the

A. angle at which they enter the field
B. size of the plates
C. colour of the beam
D. temperature of the plates

57. The cathode ray oscilloscope (CRO) converts

A. light into sound
B. visual signals into electric signals
C. sound into light
D. electric signals into visual signals

58. The CRO screen is coated with a thin layer of

A. silver
B. phosphor
C. copper
D. aluminium foil

59. The horizontal and vertical plates of a CRO are used to

A. stop the beam
B. produce the beam
C. deflect the electron beam
D. focus the beam

60. On a CRO waveform, the horizontal axis shows

A. time
B. current
C. potential difference
D. resistance