PHYSICS MCQ BOOKLET

Grade 10 · Chapter 8 · Electric Circuits

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on circuit symbols, colour codes, series and parallel, potential dividers, thermistors and LDRs, e.m.f. combinations, power, energy, and household safety. 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. An electric circuit is best described as:

(A) an interconnection of electrical elements forming a closed loop
(B) a pile of unconnected cells
(C) only an open air gap
(D) only a magnet

Correct Answer: A

Explanation: A circuit needs a closed path so charge can leave and return to the source.

2. A basic working circuit normally includes conductors, a power source, a load, and a:

(A) barometer
(B) switch to open or close the loop
(C) geiger tube
(D) lens

Correct Answer: B

Explanation: A basic working circuit normally includes conductors, a power source, a load, and a switch to open or close the loop.

3. Active circuit elements are those that:

(A) only absorb energy
(B) must have colour bands
(C) can supply or generate electrical energy
(D) are always fuses

Correct Answer: C

Explanation: Batteries and generators are active; they are sources.

4. Resistors, capacitors, and inductors are classed as:

(A) active sources
(B) e.m.f. sources
(C) earth spikes only
(D) passive elements (they absorb, store, or dissipate energy)

Correct Answer: D

Explanation: Resistors, capacitors, and inductors are classed as passive elements (they absorb, store, or dissipate energy).

5. If the conducting path is broken, the circuit is:

(A) open, so current stops
(B) shorted with infinite current
(C) always a.c.
(D) a perfect earth fault

Correct Answer: A

Explanation: An open circuit has no closed loop for charge.

6. The circuit symbol for a cell is:

(A) a circle with M inside

(B) a long line and a short thick line (positive and negative plates)
(C) three decreasing earth lines only
(D) a zigzag only

Correct Answer: B

Explanation: The long thin line is the positive plate of a single cell.

7. The lamp (bulb) symbol in school diagrams is commonly a:

(A) zigzag
(B) triangle and bar
(C) circle with a cross (X) inside
(D) rectangle with a fuse wire

Correct Answer: C

Explanation: The crossed circle stands for a filament lamp.

8. The earth/ground symbol is a vertical line ending in:

(A) a sine wave
(B) the letter G
(C) an LED arrow pair
(D) three horizontal lines that get shorter

Correct Answer: D

Explanation: The earth/ground symbol is a vertical line ending in three horizontal lines that get shorter.

9. A fuse symbol is typically a:

(A) small rectangle with a line through it
(B) circle with V inside
(C) zigzag with arrows toward it
(D) transformer pair of coils

Correct Answer: A

Explanation: A fuse symbol is typically a small rectangle with a line through it.

10. An LDR symbol is a resistor with:

(A) an inward emitter arrow of a transistor
(B) two arrows pointing toward it (incoming light)
(C) three earth bars
(D) a sine wave inside a circle

Correct Answer: B

Explanation: The arrows stand for light falling on the photoresistor.

11. A thermistor symbol is a resistor with a:

(A) letter M in a circle
(B) plus and minus of a cell
(C) diagonal stroke that has a small bar (temperature-sensitive R)
(D) bridge hump

Correct Answer: C

Explanation: The extra mark distinguishes it from an ordinary resistor.

12. A resistor is a passive component whose job is to provide a specified:

(A) e.m.f.
(B) capacitance
(C) magnetic north
(D) resistance, dissipating some electrical energy as heat

Correct Answer: D

Explanation: A resistor is a passive component whose job is to provide a specified resistance, dissipating some electrical energy as heat.

13. The most common small resistors in electronics are:

(A) carbon resistors
(B) lead-acid cells
(C) a.c. generators
(D) kWh meters

Correct Answer: A

Explanation: Carbon types are cheap, small, and colour-coded.

14. On a four-band carbon resistor the first two bands are:

(A) tolerance only
(B) the first two significant digits of the resistance
(C) only the multiplier
(D) the power rating in watts

Correct Answer: B

Explanation: On a four-band carbon resistor the first two bands are the first two significant digits of the resistance.

15. The third band on a four-band resistor is the:

(A) first digit
(B) only the wattage
(C) decimal multiplier (power of ten)
(D) earth connection

Correct Answer: C

Explanation: The third band on a four-band resistor is the decimal multiplier (power of ten).

16. A gold fourth band means a tolerance of:

(A) ±20%
(B) ±50%
(C) ±0%
(D) ±5%

Correct Answer: D

Explanation: Gold is ±5%; silver is ±10%; no colour band is ±20%.

17. A silver fourth band means a tolerance of:

(A) ±10%
(B) ±5%
(C) ±1%
(D) ±20%

Correct Answer: A

Explanation: Silver as the tolerance band is ±10%.

18. Colourless (no fourth band) means a tolerance of about:

(A) ±5%
(B) ±20%
(C) ±0.1%
(D) ±50%

Correct Answer: B

Explanation: Colourless (no fourth band) means a tolerance of about ±20%.

19. In the colour code, black, brown, red, orange, yellow are digits:

(A) 5, 6, 7, 8, 9
(B) 9, 8, 7, 6, 5
(C) 0, 1, 2, 3, 4
(D) 2, 2, 2, 2, 2

Correct Answer: C

Explanation: In the colour code, black, brown, red, orange, yellow are digits 0, 1, 2, 3, 4.

20. Green, blue, violet, grey, white are digits:

(A) 0 to 4
(B) only multipliers
(C) tolerance values only
(D) 5, 6, 7, 8, 9

Correct Answer: D

Explanation: Green, blue, violet, grey, white are digits 5, 6, 7, 8, 9.

21. A resistor banded green–blue–orange–gold is:

(A) 56 kΩ ±5%
(B) 56 Ω ±5%
(C) 56 MΩ ±10%
(D) 5.6 Ω ±20%

Correct Answer: A

Explanation: Digits 5, 6 with multiplier 10^3 give 56 000 Ω = 56 kΩ, gold ±5%.

22. Linear resistors are those for which current is:

(A) independent of voltage
(B) proportional to voltage (they obey Ohm's law)
(C) always zero
(D) proportional to V^2 only

Correct Answer: B

Explanation: Fixed carbon resistors and many wire-wound parts are linear in a working range.

23. A rheostat is a variable resistor used mainly to control:

(A) only frequency
(B) only kWh tariff
(C) current in a circuit
(D) only earth leakage

Correct Answer: C

Explanation: Changing R changes I = V/R for a given supply.

24. A potentiometer is used as a:

(A) fuse in the live wire only
(B) kWh meter
(C) GFCI sensor only
(D) variable potential divider (adjustable voltage)

Correct Answer: D

Explanation: A potentiometer is used as a variable potential divider (adjustable voltage).

25. A potential divider produces V_out that is:

(A) a fraction of V_in set by the resistance ratio
(B) always larger than V_in
(C) always zero
(D) independent of the resistors

Correct Answer: A

Explanation: A potential divider produces V_out that is a fraction of V_in set by the resistance ratio.

26. If two equal resistors form a divider, V_out is:

(A) 2 V_in
(B) ½ V_in
(C) zero always
(D) infinite

Correct Answer: B

Explanation: Equal R means the input splits into two equal halves.

27. For R□ = 3.0 kΩ, R□ = 1.0 kΩ and V_in = 12 V, V_out across R□ is:

(A) 12 V
(B) 9.0 V
(C) 3.0 V
(D) 4.0 V

Correct Answer: C

Explanation: The lower resistor is one quarter of the total, so V_out = 3.0 V.

28. Moving the slider of a potential divider from one end to the other can take V_out from:

(A) only 220 V to 221 V
(B) only negative values
(C) only the e.m.f. of a lemon
(D) zero up to the full V_in

Correct Answer: D

Explanation: You tap from the bottom (0) to the top (V_in).

29. A common use of a potential divider is:

(A) volume control in a music system
(B) measuring mass in kilograms
(C) storing kWh
(D) generating a.c. at 50 Hz

Correct Answer: A

Explanation: A common use of a potential divider is volume control in a music system.

30. Non-linear resistors include thermistors, LDRs, and:

(A) ideal ohmic copper bars at constant T
(B) varistors (VDRs)
(C) perfect 1 Ω shunts
(D) only earth wires

Correct Answer: B

Explanation: Non-linear resistors include thermistors, LDRs, and varistors (VDRs).

31. An NTC thermistor's resistance:

(A) increases when it warms
(B) is independent of temperature
(C) decreases when temperature rises
(D) is infinite at all T

Correct Answer: C

Explanation: Negative temperature coefficient means R falls as T rises.

32. A PTC thermistor's resistance:

(A) falls when it warms
(B) is used only as an LDR
(C) is always 0 Ω
(D) increases when temperature rises

Correct Answer: D

Explanation: Positive temperature coefficient means R rises with T.

33. NTC thermistors can limit inrush current because when cold they have:

(A) relatively high resistance that later falls as they heat
(B) zero resistance
(C) infinite current
(D) only a gold tolerance band

Correct Answer: A

Explanation: NTC thermistors can limit inrush current because when cold they have relatively high resistance that later falls as they heat.

34. An NTC in an overheating alarm works because warming:

(A) raises R so current falls to zero forever
(B) lowers R so more current can flow and trigger the alarm
(C) opens the live fuse only
(D) reverses the battery

Correct Answer: B

Explanation: More current at high T can drive a buzzer or lamp.

35. A light-dependent resistor (LDR) has resistance that is:

(A) lowest in the dark
(B) independent of light
(C) high in the dark and falls as light intensity rises
(D) infinite in sunlight

Correct Answer: C

Explanation: Photons free more carriers, so R drops in bright light.

36. LDRs are often made using:

(A) pure gold leaf only
(B) only tungsten filaments
(C) only vacuum tubes
(D) cadmium sulfide or lead sulfide

Correct Answer: D

Explanation: Those photoconductive compounds are the usual school materials.

37. The surface of an LDR often shows a serpentine track in order to:

(A) expose a long path to light
(B) store kWh
(C) act as a 60 A main fuse
(D) generate e.m.f. chemically

Correct Answer: A

Explanation: The surface of an LDR often shows a serpentine track in order to expose a long path to light.

38. Two or more resistors may be replaced by a single equivalent resistance that gives the same:

(A) colour bands
(B) total current and p.d. as the combination
(C) mass
(D) temperature coefficient of silicon

Correct Answer: B

Explanation: R_eq is defined by V_total / I_total for that network.

39. In a series connection the same:

(A) voltage appears across every resistor always
(B) power is dissipated in each resistor always
(C) current flows through each resistor
(D) colour code is required

Correct Answer: C

Explanation: There is only one path, so I is common.

40. In series, the supply p.d. equals:

(A) the smallest individual V only
(B) zero if three bulbs are used
(C) only the e.m.f. of one cell in parallel
(D) the sum of the p.d.s across the resistors

Correct Answer: D

Explanation: V = V□ + V□ + V□, which is why voltages add.

41. For series resistors, R_eq is:

(A) R□ + R□ + R□ + … and larger than any single R
(B) always less than the smallest R
(C) the harmonic mean only
(D) zero

Correct Answer: A

Explanation: Resistances add; the total is greater than each part.

42. Three series resistors 8 Ω, 12 Ω, and 20 Ω have R_eq =

(A) 4 Ω
(B) 40 Ω
(C) 8 Ω
(D) 1/40 Ω

Correct Answer: B

Explanation: "40 Ω" is correct: it matches the idea asked in the question ("Three series resistors 8 Ω, 12 Ω, and 20 Ω have R_eq ="), while the other choices do not.

43. A 24 V battery drives 6 Ω, 6 Ω, and 12 Ω in series. The current is:

(A) 4.0 A
(B) 24 A
(C) 1.0 A
(D) 0.50 A

Correct Answer: C

Explanation: Total R is 24 Ω, so I = V/R = 24/24 = 1.0 A through the whole string.

44. In that series circuit the p.d. across the 12 Ω resistor is:

(A) 1.0 V
(B) 24 V
(C) 6.0 V
(D) 12 V

Correct Answer: D

Explanation: In that series circuit the p.d. across the 12 Ω resistor is 12 V.

45. In a parallel connection each branch has the same:

(A) potential difference (the supply p.d. if connected directly across it)
(B) current
(C) resistance
(D) colour band

Correct Answer: A

Explanation: In a parallel connection each branch has the same potential difference (the supply p.d. if connected directly across it).

46. In parallel, the total current equals:

(A) the smallest branch current only
(B) the sum of the branch currents
(C) zero if one lamp fails
(D) the product of the currents

Correct Answer: B

Explanation: In parallel, the total current equals the sum of the branch currents.

47. For parallel resistors:

(A) R_eq = R□ + R□
(B) R_eq is always larger than each R
(C) 1/R_eq = 1/R□ + 1/R□ + … and R_eq is less than the smallest R
(D) R_eq = R□ R□ (R□ + R□)

Correct Answer: C

Explanation: More paths make it easier for current, so R_eq falls.

48. Two 10 Ω resistors in parallel have R_eq =

(A) 20 Ω
(B) 10 Ω
(C) 100 Ω
(D) 5.0 Ω

Correct Answer: D

Explanation: Two equal resistors in parallel share current equally, so R_eq = R/2 = 5.0 Ω.

49. A 6.0 Ω and a 3.0 Ω resistor in parallel have R_eq =

(A) 2.0 Ω
(B) 9.0 Ω
(C) 0.50 Ω
(D) 18 Ω

Correct Answer: A

Explanation: 1/R_eq = 1/6 + 1/3 = 1/2, so R_eq = 2.0 Ω.

50. A 12 V supply feeds 4.0 Ω, 6.0 Ω, and 12 Ω in parallel. The current in the 4.0 Ω branch is:

(A) 1.0 A
(B) 3.0 A
(C) 12 A
(D) 0.33 A

Correct Answer: B

Explanation: Each branch sees 12 V, so I = 12/4.0 = 3.0 A.

51. Household lamps are wired in parallel so that if one lamp fails the others:

(A) all go out
(B) share 220 V into tiny fractions
(C) stay on, because they have independent paths
(D) reverse the live and neutral

Correct Answer: C

Explanation: Household lamps are wired in parallel so that if one lamp fails the others stay on, because they have independent paths.

52. Domestic supplies are connected in parallel also so that each appliance gets:

(A) a random fraction of 220 V
(B) zero volts if another appliance is on
(C) only the fuse rating in amperes
(D) the full mains voltage (about 220 V)

Correct Answer: D

Explanation: Domestic supplies are connected in parallel also so that each appliance gets the full mains voltage (about 220 V).

53. Identical cells in series: connect + of one to − of the next. The net e.m.f. is:

(A) the sum of the individual e.m.f.s
(B) equal to one cell only
(C) zero
(D) the product of the e.m.f.s

Correct Answer: A

Explanation: ε_net = ε□ + ε□ + … ; voltage adds, Ah rating stays that of one cell.

54. Four identical 1.5 V, 2.0 Ah cells in series give:

(A) 1.5 V and 8.0 Ah
(B) 6.0 V and 2.0 Ah

(C) 6.0 V and 8.0 Ah
(D) 1.5 V and 2.0 Ah

Correct Answer: B

Explanation: Four identical 1.5 V, 2.0 Ah cells in series give 6.0 V and 2.0 Ah.

55. Identical cells in parallel: all + together and all − together. The net e.m.f. is:

(A) n times one cell
(B) zero
(C) equal to the e.m.f. of one of the cells
(D) the sum of all e.m.f.s

Correct Answer: C

Explanation: Identical cells in parallel: all + together and all − together. The net e.m.f. is equal to the e.m.f. of one of the cells.

56. Four identical 12 V, 2.0 Ah batteries in parallel give:

(A) 48 V and 2.0 Ah
(B) 12 V and 2.0 Ah
(C) 3.0 V and 8.0 Ah
(D) 12 V and 8.0 Ah

Correct Answer: D

Explanation: Four identical 12 V, 2.0 Ah batteries in parallel give 12 V and 8.0 Ah.

57. n identical cells each of e.m.f. 0.50 V in series to make 10 V requires:

(A) 20 cells
(B) 5 cells
(C) 10 cells
(D) 2 cells

Correct Answer: A

Explanation: n identical cells each of e.m.f. 0.50 V in series to make 10 V requires 20 cells.

58. Electrical energy delivered to a device is:

(A) $E = I / V\ t$
(B) $E = V\ I\ t$ (also $I^2\ R\ t$ or $(V^2/R)\ t$)
(C) $E = V / I$
(D) $E = P / V$

Correct Answer: B

Explanation: Electrical energy delivered to a device is $E = V\ I\ t$ (also $I^2\ R\ t$ or $(V^2/R)\ t$).

59. An iron at 230 V drawing 6.0 A for 30 minutes uses energy:

(A) 690 J
(B) 1380 J
(C) 2.48×10^6 J
(D) 41.4 J

Correct Answer: C

Explanation: An iron at 230 V drawing 6.0 A for 30 minutes uses energy 2.48×10^6 J.

60. Electric power is the:

(A) total charge stored
(B) resistance × time
(C) e.m.f. of one lemon
(D) rate of using electrical energy, $P = E/t = I\ V$

Correct Answer: D

Explanation: Power is energy per second; also $P = I^2\ R = V^2/R$.

61. 1 W means that 1 V drives:

(A) 1 A through the device ($P = I\ V$)

(B) 1 C of stored charge
(C) 1 Ω of resistivity
(D) 1 kWh

Correct Answer: A

Explanation: 1 W means that 1 V drives 1 A through the device (P = I V).

62. A heater of 25 Ω on 200 V dissipates about:

(A) 8.0 W
(B) 1600 W
(C) 5000 W
(D) 8.0 kWh per second

Correct Answer: B

Explanation: Power is V^2/R = 40 000/25 = 1600 W for that heater.

63. If current through a resistor doubles, the power I^2R becomes:

(A) twice as large
(B) half
(C) four times as large
(D) unchanged

Correct Answer: C

Explanation: If current through a resistor doubles, the power I^2R becomes four times as large.

64. A 100 Ω, 0.50 W resistor on 12 V dissipates:

(A) 0.50 W, so it is safe
(B) 12 W exactly equal to rating
(C) 0.12 W
(D) 1.44 W, which exceeds 0.50 W, so it can be damaged

Correct Answer: D

Explanation: A 100 Ω, 0.50 W resistor on 12 V dissipates 1.44 W, which exceeds 0.50 W, so it can be damaged.

65. The kilowatt-hour is a unit of:

(A) electrical energy
(B) power
(C) current
(D) resistance

Correct Answer: A

Explanation: Despite the word kilowatt, kWh is energy: power × time.

66. 1 kWh equals:

(A) 1000 J
(B) 3.6×10^6 J
(C) 3600 W
(D) 1 J

Correct Answer: B

Explanation: 1 kW lasting 3600 s is 3.6 million joules, so 1 kWh = 3.6×10^6 J.

67. A 0.40 kW lamp on for 5.0 h uses:

(A) 0.080 kWh
(B) 5.0 kWh
(C) 2.0 kWh
(D) 200 kWh

Correct Answer: C

Explanation: Energy is power times time: 0.40 kW × 5.0 h = 2.0 kWh.

68. If a unit costs Rs 20, that 2.0 kWh costs:

(A) Rs 10

(B) Rs 20
(C) Rs 400
(D) Rs 40

Correct Answer: D

Explanation: If a unit costs Rs 20, that 2.0 kWh costs Rs 40.

69. A commercial unit of electrical energy is:

(A) 1 kWh
(B) 1 J
(C) 1 W
(D) 1 A

Correct Answer: A

Explanation: Meters and bills use the kilowatt-hour as one unit.

70. Components must be chosen with a suitable power rating so that:

(A) they always run red-hot
(B) the heat they dissipate does not destroy them
(C) their colour bands melt
(D) Ohm’s law is optional

Correct Answer: B

Explanation: Rating is the maximum safe power the part can shed as heat.

71. A mains circuit consists of live (line), neutral, and:

(A) only a thermistor
(B) only an LDR
(C) an earth (ground) wire
(D) a lemon cell

Correct Answer: C

Explanation: Three-core flex is live, neutral, and earth.

72. The live wire:

(A) is always at zero potential
(B) is only the metal case
(C) is the green-yellow earth only
(D) carries current from the supply at mains potential

Correct Answer: D

Explanation: Live is the dangerous, energised conductor.

73. The neutral wire:

(A) completes the circuit as the return path
(B) is the only fuse
(C) is disconnected in every plug
(D) carries no current in normal use

Correct Answer: A

Explanation: In normal use live and neutral currents are equal and opposite.

74. The earth wire provides:

(A) the only path for useful lamp current
(B) a low-resistance path to ground if a live fault touches a metal case
(C) extra e.m.f.
(D) a.c. to d.c. conversion

Correct Answer: B

Explanation: Fault current through earth should blow the fuse or trip the breaker.

75. Fuses and circuit breakers are placed in the live wire so that when they open they:

(A) leave the appliance still live

(B) only break the earth
(C) disconnect the dangerous live conductor
(D) increase the current

Correct Answer: C

Explanation: Fuses and circuit breakers are placed in the live wire so that when they open they disconnect the dangerous live conductor.

76. A fuse protects against overload because its metal strip:

(A) glows forever
(B) has infinite resistance always
(C) converts a.c. to d.c.
(D) melts at a rated current and opens the circuit

Correct Answer: D

Explanation: A fuse protects against overload because its metal strip melts at a rated current and opens the circuit.

77. A common thermal circuit breaker uses a:

(A) bimetallic strip that bends when overheated and breaks contact
(B) lemon and copper nail
(C) only an LDR
(D) kWh tariff chip

Correct Answer: A

Explanation: Heat from excess I bends the strip and opens the switch.

78. Replacing a blown fuse with a much higher rating is dangerous because:

(A) the lamp will be dimmer
(B) the wiring can overheat and start a fire before the fuse melts
(C) earth resistance falls
(D) the meter stops counting kWh

Correct Answer: B

Explanation: The fuse must melt before the cables do.

79. If a live wire touches an earthed metal case, a large fault current should:

(A) leave the case live forever
(B) charge the case as a battery
(C) flow through the earth path and blow the fuse or trip the breaker
(D) reduce body current to 200 mA

Correct Answer: C

Explanation: The low-R earth path is meant to clear the fault quickly.

80. The outer case of an appliance must be earthed or:

(A) painted any colour
(B) connected to the live pin
(C) fitted with a 60 A heater fuse only
(D) made non-conducting (double-insulated)

Correct Answer: D

Explanation: Plastic double insulation is the alternative to an earth wire.

B. Less Important / Secondary Topics

81. A varistor (VDR) is used mainly to:

(A) clamp high-voltage spikes and protect circuits
(B) store kWh
(C) measure mass
(D) generate 50 Hz

Correct Answer: A

Explanation: Its resistance falls at high V so surges are absorbed.

82. Metal-oxide varistors are commonly based on:

(A) pure silicon dioxide glass only
(B) zinc oxide grains with other metal oxides
(C) tungsten filaments
(D) lemon juice

Correct Answer: B

Explanation: Metal-oxide varistors are commonly based on zinc oxide grains with other metal oxides.

83. An RTD (resistance temperature detector) often uses a coil of:

(A) rubber
(B) fused quartz
(C) platinum, nickel, or copper wire
(D) cadmium sulfide only

Correct Answer: C

Explanation: An RTD (resistance temperature detector) often uses a coil of platinum, nickel, or copper wire.

84. Platinum is favoured for RTDs because its R–T graph is:

(A) random
(B) exactly like an NTC bead
(C) independent of temperature
(D) very linear and repeatable over a wide range (about −185 °C to 630 °C)

Correct Answer: D

Explanation: Platinum is favoured for RTDs because its R–T graph is very linear and repeatable over a wide range (about −185 °C to 630 °C).

85. Thermistor means:

(A) thermal resistor (R strongly depends on temperature)
(B) thermal insulator only
(C) a type of cell
(D) a kWh meter

Correct Answer: A

Explanation: The name is a blend of thermal and resistor.

86. Thermistors are typically made from:

(A) pure copper bus-bars
(B) semiconductor ceramic or polymer
(C) only earth wire
(D) kWh meter coils

Correct Answer: B

Explanation: Thermistors are typically made from semiconductor ceramic or polymer.

87. A lemon ‘cell’ uses juice as electrolyte with electrodes that are typically:

(A) two identical copper nails
(B) two thermistors
(C) copper and a galvanized (zinc) nail
(D) two LDRs

Correct Answer: C

Explanation: A lemon ‘cell’ uses juice as electrolyte with electrodes that are typically copper and a galvanized (zinc) nail.

88. Connecting several lemon cells + to − of the next is a:

(A) parallel combination to keep 0.4 V
(B) short circuit of the LED
(C) earth fault

(D) series combination to raise total e.m.f. for an LED

Correct Answer: D

Explanation: Series adds voltages so a red LED can light.

89. On a standard LED the longer lead is the:

(A) anode (positive), which goes toward the more positive side
(B) cathode (negative)
(C) earth pin
(D) fuse

Correct Answer: A

Explanation: The long anode must be the more positive terminal for forward bias.

90. Electric heating appliances work mainly by:

(A) photoelectric emission
(B) I^2R heating in a resistive element
(C) nuclear fusion
(D) LDR dark resistance

Correct Answer: B

Explanation: Electric heating appliances work mainly by I^2R heating in a resistive element.

91. Electric motors convert electrical energy mainly into:

(A) only kWh on a bill
(B) only chemical energy in lemons
(C) mechanical (kinetic) energy
(D) only sound with no motion

Correct Answer: C

Explanation: Electric motors convert electrical energy mainly into mechanical (kinetic) energy.

92. An EV charger is bulkier than a phone charger mainly because it must handle:

(A) 5–30 W only
(B) only LED lighting
(C) only a 0.5 W resistor
(D) much higher power (kilowatts), needing thicker conductors and extra protection

Correct Answer: D

Explanation: Phone chargers are tens of watts; EV chargers can be kilowatts to hundreds of kilowatts.

93. We pay the electricity company for:

(A) the energy used to drive charge through our appliances
(B) the electrons themselves, which are used up
(C) the mass of the copper wires
(D) only the colour of the live insulation

Correct Answer: A

Explanation: Electrons are not consumed; energy is.

94. A typical school figure of a ring-main shows sockets supplied with:

(A) only two wires named X and Y
(B) live, neutral, and earth
(C) only a thermistor pair
(D) only a series lamp string

Correct Answer: B

Explanation: A typical school figure of a ring-main shows sockets supplied with live, neutral, and earth.

95. In a breaker box, lighting, a fan, and a heater may be on separate fuses such as:

(A) all 60 A
(B) all 1 mA
(C) smaller ratings (e.g. 5 A lighting, 15 A fan, 30 A heater) matched to the load

(D) no fuses at all

Correct Answer: C

Explanation: Fuse rating must exceed normal current but protect the cable.

96. A residual current device (RCD / GFCI) trips when it detects:

(A) equal live and neutral currents
(B) only a high kWh reading
(C) a gold resistor band
(D) an imbalance between live and neutral currents (leakage to earth)

Correct Answer: D

Explanation: A residual current device (RCD / GFCI) trips when it detects an imbalance between live and neutral currents (leakage to earth).

97. A typical GFCI trip level is of order:

(A) 5 mA (0.005 A)
(B) 10 A
(C) 200 A
(D) 1 kA

Correct Answer: A

Explanation: Milliamperes through the body are already dangerous, so the device is sensitive.

98. In a textbook ground-fault sketch, live 10.1 A and neutral 10 A means about:

(A) 0 A leaking
(B) 0.1 A leaking to earth (possibly through a person)
(C) 10 A stored in the kettle
(D) equal safe currents

Correct Answer: B

Explanation: The missing 0.1 A is the fault current that an RCD should clear.

99. Damaged insulation, damp, and overloaded sockets are listed as:

(A) ways to raise efficiency
(B) required for double insulation
(C) common electrical hazards from neglect or malpractice
(D) colour-code steps

Correct Answer: C

Explanation: Those faults can cause shock or fire.

100. Electric shock can cause burns and also:

(A) only a change of resistor colour bands
(B) an increase in kWh tariff
(C) superconductivity
(D) cardio-respiratory failure or seizures

Correct Answer: D

Explanation: Electric shock can cause burns and also cardio-respiratory failure or seizures.

101. A current of about 2–3 mA through the body is typically felt as:

(A) a slight tingling
(B) certain death by fibrillation
(C) no sensation possible
(D) immediate muscle paralysis

Correct Answer: A

Explanation: The lowest listed band is a mild tingle.

102. Around 20–30 mA a person may be unable to let go because of:

(A) zero resistance of dry skin
(B) muscle contraction that grips the conductor

(C) the kWh meter reversing
(D) double insulation melting

Correct Answer: B

Explanation: That is the dangerous ‘let-go’ threshold.

103. About 100–200 mA through the body is often fatal because the heart may enter:

(A) a resting alpha rhythm
(B) a superconducting state
(C) fibrillation (quivering without effective pumping)
(D) only a 5 mA tingle

Correct Answer: C

Explanation: About 100–200 mA through the body is often fatal because the heart may enter fibrillation (quivering without effective pumping).

104. Body resistance, and therefore shock current at a given voltage, depends on:

(A) only the colour of the plug
(B) only the fuse’s gold band
(C) only the LDR light level
(D) sweat, path length, and the person

Correct Answer: D

Explanation: Body resistance, and therefore shock current at a given voltage, depends on sweat, path length, and the person.

105. A weaker cell in a series battery pack can:

(A) limit performance and overheat or be damaged
(B) raise the pack voltage above the sum
(C) convert the pack to parallel automatically
(D) remove the need for a fuse

Correct Answer: A

Explanation: The weak cell is overworked; balancing or matched cells are safer.

106. Sensory circuits often put an LDR or thermistor in a:

(A) nuclear reactor
(B) potential divider so that light or temperature changes V_out
(C) 60 A main fuse
(D) kWh tariff table

Correct Answer: B

Explanation: Changing R changes the fraction of V_in that appears at the output.

107. Nickel–chromium wire is chosen for some variable resistors because it has a:

(A) huge α like pure silicon
(B) negative α only
(C) low temperature coefficient, so R is stable
(D) resistivity of fused quartz

Correct Answer: C

Explanation: Low α keeps the setting from drifting as the wire warms.

108. The unit’s practical message is that series and parallel rules, power, and:

(A) ignoring earth wires
(B) using any fuse rating
(C) wiring lamps only in series at 220 V
(D) correct fusing, earthing, and parallel household wiring keep people and appliances safe

Correct Answer: D

Explanation: The unit’s practical message is that series and parallel rules, power, and correct fusing, earthing, and parallel household wiring keep people and appliances safe.