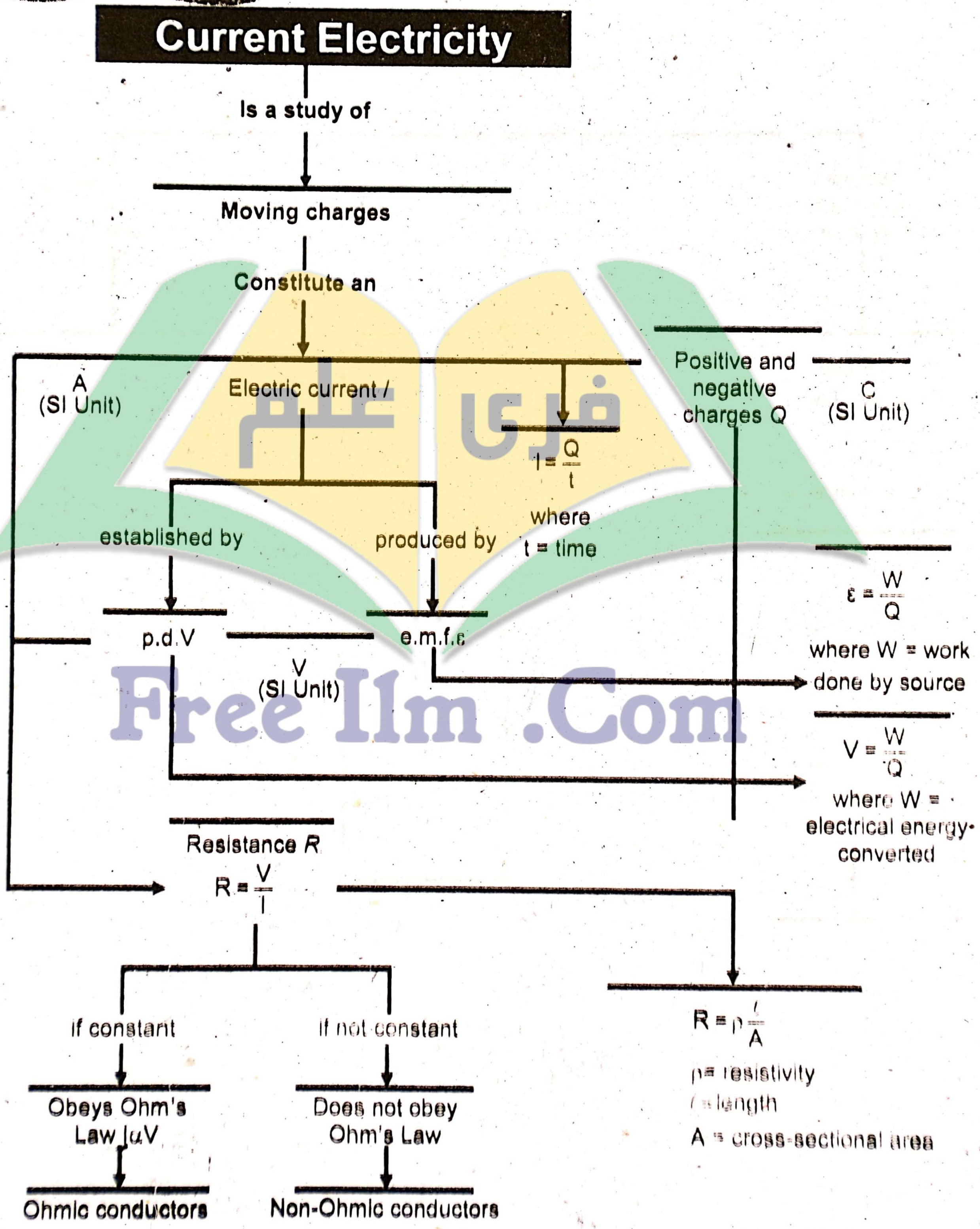
CHAPTER 14

CURRENT ELECTRICITY

CONCEPT MAP



Practical Electricity

deals with the use of electric in

- Electric heating
- Electric lighting
- Electric motors

consumes power and energy given by

$P = IV$ where
P = power (W)
I = current (A)
V = potential difference (V)

$E = Pt$ where
E = energy (J)
P = power (W)
t = times (s)

Or expressed in units of electricity usage

Kilowatt hours (kWh) or domestic units of electricity

can cause electric shocks of fires in situations such as

- Damaged insulation
- Overheating of cables
- Damp conditions

which can be prevented by using

Safety measure

such as

requires safety measures such as

1. Fuses or circuit breakers
2. Switches fitted on the live wire
3. Earthing
4. Double insulation

TOPICAL MULTIPLE CHOICE QUESTIONS

14.1 Electric Current

(1) **In metals, current is produced only due to the flow of**
(a) Protons (b) Electrons (c) Free electrons (d) Neutrons

(2) **In electrolyte, current is produced due to the flow of**
(a) Positive charge (b) Negative charges
(c) Both positive and negative charges (d) None of these

(3) **The rate of flow of electric charge through any cross-sectional area is called**
(a) Electrostatics (b) Electric current (c) e.m.f (d) Voltage

(4) **The SI unit of electric current is**
(a) Volt (b) Farad (c) Capacitance (d) Ampere

(5) **The equivalent current of positive charges which flows through a conductor is known as**
(a) Electronic current (b) Conventional current (c) Electrostatic (d) Ampere

(6) **The current due to negative charges and an equivalent current due to positive charges always flow in the**
(a) Opposite direction (b) Same direction
(c) Perpendicular to each other (d) None of these

(7) **In electricity, we assume that electric current is always due to the flow of**
(a) Negative charges (b) Neutral particles
(c) Positive charges (d) Both negative and positive charges

(8) **The conventional current of positive charges flows from a point of**
(a) Higher potential to a point of lower potential (b) Lower potential to a point of higher potential
(c) Lower potential to a point of lower potential (d) Higher potential to a point of higher potential

(9) **The current constituted by negative charges flows from a point of**
(a) Higher potential to a point of a lower potential
(b) Lower potential to a point of higher potential
(c) Lower potential to a point of lower potential
(d) Higher potential to a point of higher potential

(10) **When we connect a battery across a conductor, the energy is provided to the charges in the conductor by the**
(a) Magnetic field produced in the conductor
(b) Electromagnetic field produced in the conductor
(c) Electric field produced in the conductor
(d) None of the above

(11) **Energy is produced to transfer the electrons from positive terminal of the battery to the negative terminal by the**
(a) Electrical process (b) Chemical process (c) Thermal process (d) Magnetic process

(12) **The current through a metallic conductor is due to the motion of**
(a) Protons (b) Neutrons (c) Electrons (d) Free electrons

(13) **In liquids and gases, the current is due to the motion of**
(a) Negative charges (b) Positive charges
(c) Both negative and positive charges (d) Neutral particles

(14) **Free electrons are**
(a) Tightly bound (b) Fixed (c) Loosely bound (d) Tightly fixed

(15) **The direction of conventional current flowing in a circuit is**
(a) from negative to positive in the external circuit and from positive to negative within the source of potential difference (battery)
(b) from positive to negative in the external circuit and from negative to positive within the source of P.D.
(c) From positive to negative throughout the circuit.
(d) From negative to positive throughout the circuit.

(16) **The direction of the electronic current in the closed circuit is**
(a) along the flow of electrons
(b) opposite to the flow of electrons
(c)from positive to negative in the external circuit
(d) along the direction of positive charges.

(17) **If a charge 'Q' flows through any cross-section of the conductor in time 't' second, the current 'I' is given by**
(a) I = Qt (b) I = Q/t (c) I = t/Q (d) I = Q2/t

(18) **One coulomb per second is equal to**
(a) One volt (b) One Ampere (c) One watt (d) One Ohm

(19) **Which of the following represents an electric current?**
(a) Erg C^{-1} (b) Cs^{-1} (c) J S^{-1} (d) Dyne S^{-1}

(20) **If 1 ampere current flows through 2m long conductor, the charge flow through this in 1hour will be**
(a) 3600 C (b) 7200 C (c) 1C (d) 2C

(21) **Batteries convert**
(a) electrical energy into heat energy (b) electrical energy into chemical energy
(c) chemical energy into electrical energy (d) heat energy into chemical energy

(22) **The electronic current is due to the flow of**
(a) negative charge (b) positive charge (c) both (a) and (b) (d) none of the above

(23) **The conventional current is due to the flow of**
(a) negative charge carriers (b) neutral charge
(c) positive charge carriers (d) both negative and positive charges carriers.

14.2 Potentional Difference
14.3 E.M.F

(24) **The energy required to move a charge from one point to another in the circuit is called**
(a) e.m.f (b) Potential difference (c) Resistance (d) Volt

(25) **Volt is a unit of**
(a) Potential difference (b) e.m.f
(c) Potential difference and e.m.f. (d) None of these

(26) **The energy supplied in driving one coulomb of charge round a complete circuit in which the cell is connected is called**
(a) e.m.f (b) Potential difference (c) Resistance (d) Volt

(27) **The instrument with which we can detect the presence of current in a circuit is knows as**
(a) Voltmeter (b) Ammeter (c) Galvanometer (d) Ohm meter

(28) **In order to detect the current, galvanometer is connected**
(a) In parallel (b) In series
(c) May be parallel or in series (d) Any where in the circuit

(29) **If the needle of galvanometer shows some deflection, it would indicate the**
(a) Presence of current (b) Absence of current
(c) A large current (d) None of these

(30) **A galvanometer is a very**
(a) Large instrument (b) Small instrument
(c) Insensitive instrument (d) Sensitive instrument

(31) **A resistance which is connected with the galvanometer in order to convert it into ammeter should have**
(a) High resistance (b) Very high resistance
(c) Low resistance (d) Very low resistance

(32) **The resistance of an ammeter should be**
(a) Height (b) Very high (c) Low (d) Very low

(33) **In order to measure the current in a circuit, ammeter should be connected**
(a) Parallel to battery (b) In series in the circuit
(c) May be parallel or in series (d) None of these

(34) **When ammeter is connected in the circuit, the positive terminal of ammeter should be connected with the**
(a) Negative terminal of the battery (b) Positive terminal of the battery
(c) Any terminal of the battery (d) None of these

(35) **The potential difference can be directly measured by the instrument known as**
(a) Ammeter (b) Potentio-meter (c) Voltmeter (d) Ohm meter

(36) **The series resistance which is connected with galvanometer to convert it into voltmeter usually has value in**
(a) Ohms (b) Several hundred ohms
(c) Several thousand ohms (d) Hundred thousand ohms

(37) **Voltmeter is always connected in a circuit in**
(a) Series (b) Parallel
(c) May be in series or parallel (d) None of these

(38) **A good voltmeter is that which draws**
(a) No current (b) Small current (c) Large current (d) Very large current

14.4 Ohm's Law
14.5 V-I Characteristics of Ohmic and Non Ohmic Conductors

(39) **The relation V = IR represents**
(a) Ampere law (b) Coulomb's law
(c) Faraday's law (d) Ohm's law

(40) **Ohm's law is applicable to**
(a) Liquids only (b) Gases only
(c) Liquid conductors only (d) Metallic conductors only

(41) **Ohm is the unit of**
(a) Current (b) Capacitance (c) Electric intensity (d) Resistance

(42) **Ohm is defined as**
(a) Volt/Coulomb or VC^{-1} (b) Volt/Ampere or VA^{-1}
(c) Ampere/Volt or CV^{-1} (d) Ampere/Volt or AV^{-1}

(43) **The resistance of a conductor through which a current of one ampere is flowing when the potential difference across its ends is one volt, is called**
(a) One volt (b) One coulomb (c) One Ohm (d) One ampere

(44) **Thermistor is**
(a) A heat sensitive resistor (b) potential divider
(c) constant resistor (d) An ordinary resistor

(45) **The graphical representation of Ohm's law is**
(a) Hyperbola (b) Ellipse (c) Parabola (d) Straight line

(46) **The value of current passing through a conductor is directly proportional to the**
(a) Resistance (b) Capacitance (c) Potential difference (d) None of these

(47) **The property of a substance which opposes the flow of current through it is called**
(a) Conductivity (b) Capacitance (c) Resistance (d) Conduction

(48) **If a potential of 220V is applied across a conductor and a current of 2A flows through it. What would be the resistance of the conductor?**
(a) 210Ω (b) 440Ω (c) 880Ω (d) 110 ohm

14.6 Specific Resistance (Resistivity)
14.7 and 14.8 Conductors and Insulators

(49) **The resistance of a meter cube of the substance is called**
(a) conductivity (b) permittivity (c) resistivity (d) susceptibility

(50) **At a certain temperature, the resistance of a wire is directly proportional to its**
(a) Length (b) Area of cross-section (c) Shape (d) Colour

(51) **At a certain temperature, the resistance of a wire is inversely proportional to its**
(a) Length (b) Area of cross-section (c) Temperature (d) Colour

(52) **If we increase the length of a wire to four times of its original length, what will be its resistance?**
(a) The same (b) Doubled (c) Four times (d) Eight times

(53) **If we increase the cross-sectional area of the wire to double of its original area, its resistance will become**
(a) The same (b) Halved (c) One fourth (d) Doubled

(54) **If L is the length and A is the cross-sectional area of a wire, then its resistance is gives by the relation**
(a) $R = \frac{1}{\rho}\frac{L}{A}$ (b) $R = \frac{1}{\rho}\frac{A}{L}$ (c) $R = \rho\frac{A}{L}$ (d) $R = \rho\frac{L}{A}$

(55) **The SI unit of specific resistance is**
(a) $\Omega - m$ (b) $\Omega - m$ (c) $\Omega - m^{-1}$ (d) $\Omega - m^{2}$

(56) **If we increase the temperature of a conductor, its resistance will**
(a) Increase (b) Decrease (c) Remains the same (d) None of these

(57) **The resistance of a conductor does not depend on its**
(a) Length (b) Cross sectional area (c) Resistivity (d) Mass

(58) **When the temperature of a conductor is raised, its resistance**
(a) Always decreases (b) Always increases
(c) Remains the same (d) First increases and then decrease

14.9 Combination of Resistors

(59) **The resistances are connected end to end and provide only one path for current in**
(a) Parallel circuit (b) Series circuit
(c) Both parallel and series circuit (d) None of these

(60) **The potential drop across each of resistors will be same in**
(a) Parallel circuit (b) Series circuit
(c) Both parallel and series circuit (d) None of these

(61) In series circuit, the magnitude of current that flows through each resistor is
(a) Very small (b) Very large (c) Same (d) Different

(62) In parallel circuit, the magnitude of current that flows through each resistor will be
(a) Very small (b) Very large (c) Same (d) Different

(63) In series combination of resistors, the expression of equivalent voltage is given by
(a) $V = V_1 + V_2 + V_3$ (b) $V = \frac{1}{V_1} + \frac{1}{V_2} + \frac{1}{V_3}$
(c) $V = V\left[\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right]$ (d) $\frac{1}{V} = \frac{1}{V_1} + \frac{1}{V_2} + \frac{1}{V_3}$

(64) The equivalent resistance for series combination of 3 resistors is given by
(a) $\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ (b) $\frac{1}{R_e} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$
(c) $Re = R_1 + R_2 + R_3$ (d) $R_e = VR_1 + VR_2 + VR_3$

(65) The equivalent resistance for parallel combination of 3 resistors is given by
(a) $\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ (b) $\frac{1}{R_e} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$
(c) $Re = R_1 + R_2 + R_3$ (d) $R_e = VR_1 + VR_2 + VR_3$

(66) The expression for total current through parallel combination is
(a) $I = I_1 = I_2 - I_3$ (b) $I = I_1 + I_2 + I_3$
(c) $I = I_1 - I_2 - I_3$ (d) $I = 2_1 - 2I_2 - 2I_3$

(67) If three resistances of 6Ω each are connected in series combination, what will be the equivalent resistance?
(a) 6Ω (b) 12Ω (c) 18Ω (d) 24Ω

(68) When resistors are connected in series, the equivalent resistance is equal to
(a) Sum of the reciprocals of the individual resistance
(b) Product of the reciprocals of the individual resistances
(c) Sum of the individual resistances
(d) Product of the individual resistance

(69) If the resistors are connected in parallel, then
(a) The current through each is the same
(b) The total resistance is the sum of individual resistance
(c) The voltage across each is the same
(d) The total resistance is the product of individual resistance

(70) If the resistance of 2 ohm and 4 ohm are connected in parallel, the equivalent resistance will be
(a) 11.0 ohms (b) 1.33 ohms (c) 3.0 ohms (d) 5.0 ohms

(71) Three resistance 5000, 500 and 50 ohms are connected in series across 555 volts mains. The current flowing through them will be
(a) 1A (b) 100 mA (c) 10 mA (d) 10A

14.10 Electrical Energy and Joule's Law and
14.11 Electric Power

(72) When Q coulomb of charge flows between the two points having potential difference of V volts then the energy in joules is represented by
(a) $W = \frac{Q}{V}$ (b) $W = \frac{V}{Q}$ (c) $W = QV$ (d) W = F.S

(73) If a current I ampere flows through a resistance R in time seconds, then the energy supplied will be
(a) W = IRt (b) $W = I^2Rt$ (c) $W = IR^2t$ (d) $W = IRt^2$

(74) The energy supplied $W = I^2Rt$ is the mathematical expression for
(a) Ohm's law (b) Fleming's law (c) Faraday's law (d) Joule's law

(75) The amount of energy supplied by current in unit time is known as
(a) Electrical energy (b) Electrical power (c) Electrical work (d) Potential difference

(76) When current I is flowing through a resistance R the electrical power that generates heat in the resistance is given by
(a) IR (b) I/R (c) I^2R (d) IR^2

(77) The SI unit of electrical power is
(a) Watt (b) Joule (c) Ampere (d) Volt

(78) One watt is equal to
(a) Js (b) Js^{-1} (c) J^2s (d) sJ^{-1}

(79) Heat energy dissipated in a resistor R when connected to a battery of V volts and current I ampere flowing through it for time t is given by
(a) I^2R (b) IRt (c) VIt (d) I^2Rt

(80) How will you calculate power from current (I) and voltage (v)
(a) power = I/V (b) power = VI (c) power = V^2I (d) power = VI^2

(81) Electrical energy is measured in
(a) watt (b) horse power (c) kilo watt (d) kilowatt hour

(82) Which one of the following bulbs has least resistance?
(a) 100 watt (b) 200 watt (c) 500 watt (d) 1000 watts

(83) Electrical energy is commonly consumed in very large quantity and hence a large unit of energy is required which is know as
(a) Watt-hour (b) Milli-watt hour (c) Killowatt-hour (d) Megawatt - hour

(84) One kilowatt-hour is equal to
(a) 13.6 MJ (b) 13.6 kJ (c) 3.6 kJ (d) 3.6 MJ

(85) We can calculate the amount of electricity bill by the following formula
(a) $\frac{\text{watt} \times \text{time(in hours)}}{1000} \times$ cost of one unit (b) $\frac{\text{watt} \times 1000}{\text{time(in hours)}} \times$ cost of one unit
(c) $\frac{1000 \times \text{time(in hours)}}{\text{Watt}} \times$ cost of one unit (d) $\frac{1000 \times \text{watt} \times \text{time (in hours)}}{\text{cost of one unit}}$

(86) Kilowatt – hour is a unit of
(a) Power (b) Work (c) Energy (d) Current

14.12 Direct Current and Alternating Current
14.13 Hazards of Electricity

(87) The current which always flows in one direction is called
(a) Alternating current (b) Direct current (c) Stationary current (d) Multi-directional

(88) The current which changes its direction again and again is called
(a) Alternating current (b) Direct current
(c) Multi-directional current (d) Uni – directional current

(89) The time interval after which the voltage repeats its value is known as
(a) Frequency (b) Wavelength (c) Time period (d) None of these

(90) The number of cycles completed by current in one second is called its
(a) Time period (b) Frequency (c) Wavelength (d) Amplitude

(91) The frequency of a.c used in our houses is
(a) 30 cycles / second (b) 50 cycles/ second (c) 60 cycles/ second (d) 100cycles/ second

14.14 Safe Use Of Electricity In Homes

(92) All electrical appliances are connected in parallel to each other between the main live and neutral wire to get
(a) same current (b) same current and potential difference
(c)different currents and potential differences (d) same potential differences

(93) Insulated covered wire is called:
(a) Extension (b) Cable (c) Lead (d) None of these

(94) The wire at certain potential is called:
(a) Live wire (b) Neutral wire (c) Earth wire (d) Ground wire

(95) The wire at zero potential is called:
(a) Live wire (b) Neutral wire (c) Earth wire (d) Ground wire

(96) The wire grounded in the earth is called:
(a) Live wire (b) Neutral wire (c) Earth wire (d) Ground wire

(97) A small wire connected in series with the live wire is called:
(a) Neutral wire (b) Earth wire (c) Fuse (d) Circuit breaker

(98) Safety device used in place of fuse is:
(a) Socket (b) Earth wire (c) Plug (d) Circuit breaker

(99) Circuit breaker works on the principle of:
(a) Electric current (b) Joule's law (c) Electromagnetism (d) None of them

(100) An additional wire used in devices having the metallic bodies is:
(a) Live wire (b) Neutral wire (c) Earth wire (d) Ground wire

ANSWER KEY

Q.No	Ans	Q.No	Ans	Q.No	Ans	Q.No	Ans	Q.No	Ans
1.	c	21.	c	41.	d	61.	c	81.	d
2.	c	22.	a	42.	b	62.	d	82.	a
3.	b	23.	c	43.	c	63.	a	83.	c
4.	d	24.	b	44.	a	64.	c	84.	d
5.	b	25.	c	45.	d	65.	a	85.	a
6.	a	26.	a	46.	c	66.	b	86.	c
7.	d	27.	c	47.	c	67.	c	87.	b
8.	a	28.	b	48.	d	68.	c	88.	a
9.	b	29.	a	49.	c	69.	c	89.	c
10.	c	30.	d	50.	a	70.	b	90.	b
11.	b	31.	d	51.	b	71.	b	91.	b
12.	d	32.	c	52.	c	72.	c	92.	d
13.	c	33.	b	53.	b	73.	b	93.	b
14.	c	34.	b	54.	d	74.	d	94.	a
15.	b	35.	c	55.	b	75.	b	95.	b
16.	a	36.	c	56.	a	76.	c	96.	c
17.	b	37.	b	57.	d	77.	a	97.	c
18.	b	38.	b	58.	b	78.	b	98.	d
19	b	39.	d	59.	b	79.	d	99.	c
20.	a	40	d	60.	a	80.	b	100.	c