a) Stating Columbs Law and expressing it mathematically:

The force between 2 charged particles is directly proportional to the product of the amount of charges accumulated on these particles and inversely proportional to the square of the distance between them. The force act along a straight line joining th centers of these particles.

$$F = K \frac{QaQb}{r^2_{ab}}$$

b) Two charges are attracted by a force of 25N when separated by 10cm. What is the force between the charges when the distance between them is 50cm?

F = 25N d = 10cm
F=? d = 50cm

$F = 8.99x10^9 \frac{QaQb}{r^2_{ab}}$ In this case, the distance is multiplied by 5, so therefore force is divided by 5 sq.,

25N / 25 = 1N

c) Calculate the magnitude of the electric filed, E strength at a point $5x10^{-8}$ m from an electron which is in a vacuum.

Permeability of free space, μo=4π x 10-7 Tm/A or 4π x 10-7 H/M
E = Force/Charge

d) 3 Factors that determine the magnetic force of a current carrying conductor placed in a region with magnetic field.
1. Strength of the magnetic field.
2. Current flowing through the wire.
3. Length of the wire.

e) A solenoid 20 cm long is wound with 300 turns of wire and carries a current of 1.5 A. Calculate the magnetic field inside the solenoid.
B = mu.nl
=(4π x 10-7)x(300/0.200m)x(1.5A)
$=2.8274 \times 10^{-3}$ T

f) 3 types of Atomic Bonding and Examples.
Metallic Bonds - Atoms are held together by many nuclei attracting a sea of valence electrons. Nuclei are positively charged hence attract the electrons. Eg. Metals, hence having the ability to conduct current
Covalent Bonds - A type of bond formed when atoms share electrons. The mother nuclei attract the shared electrons. E.g. two hydrogen atoms combine to form hydrogen molecules.
Ionic Bonds - They are formed between two ions with opposite charges. Example Na lose its outer electron to become Na^+

g) Definitions:
Electric current - This is the flow of electric charge through a conductor
Terminal Voltage - The voltage of a device/load as measured across its terminals
Resistance - The opposition to the flow of current(electric) in a conductor.

h) Resistivity

Resistivity = RA/L

$10x0.000015m^2/200m$
$=7.5x10^{-7}$

i) i) Total current in the circuit = 330V/6.7Ohms = 49.25A

ii) Current flowing through each resistor = 330V/5Ohms= 66A, 330V/2Ohms = 165A, 330V/5Ohms = 55A

iii) Voltage drop across each resistor = Taking the parallel resistors to be 1 resistor:
Total i = 330/6.7 = 49.25
V = IR
= 49.25x0.7 = 34.37V
= 49.25x6 = 295.5V