

A. Calculate the resistance of e and h for the circuits configuration.

$$1\text{amp} \quad E \text{ diode} = 0.6\text{V} \quad 0.6/1 = 0.6\text{ohms}$$

$$1\text{amp} \quad H \text{ diode} = 0.7\text{V} \quad 0.7/1 = 0.7\text{ohms}$$

B. B and c are identical and the current passing through a is 0.5A, calculate the current passing through b and c.

$$1 - 0.5 = 0.5$$

$$0.5/2 = 0.25$$

B and c = 0.25A as they are identical

c (i) The Resistance of A.

$$\text{Resistance of A} = 1.25\text{j/s} / 0.5 = 2.5\text{V} \quad \text{coulombs} = 0.5 \times 1 = 0.5$$

$$2.5/0.5 = 5\text{ohms}$$

c (ii) The Resistance of B and C

$$0.25/1 = 0.25$$

$$1.25/0.25 = 5\text{V}$$

$$5/0.25 = 20\text{ohms}$$

c (iii) The potential difference across A, B and C

$$\text{pd of A} = 0.5 \times 5 = 2.5\text{V}$$

$$\text{pd of b} = 0.25 \times 20 = 5\text{V}$$

$$\text{pd of c} = 0.25 \times 20 = 5\text{V}$$

c (iv) Since the total potential difference across L to M is 6V, calculate the potential difference across D and find its Resistance

$$\text{Resistance of d} = 6/1 = 6\text{ohms}$$

d. The 'lost volts across one of the cells in the parallel arrangement is 2 V. Calculate r and hence the total resistance of the parallel combination of cells.

$$\text{Total resistance} = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2 \text{ ohms}$$

e. Given that the resistance F is  $6\Omega$ , calculate the voltage drop across it.

f. Calculate the total resistance of the circuit; this includes total internal and the resistance cause by the reverse polarity battery and the open diodes in given scenario (ignore any "non-open diodes").

$$ABC = \frac{1}{5} + \frac{1}{20} + \frac{1}{20} = 0.3$$

$$D = 6$$

$$E = 0.6$$

$$FG = \frac{1}{6} + \frac{1}{0.6} = 1.8$$

$$\text{All 4 battery's} = 2$$

$$\text{Total resistance} = 10.7$$

g. Calculate the emf of each of the cells in the parallel combination.

$$\text{EMF} = V + Ir$$

$$V = 2$$

$$I = 1$$

$$R = 2$$

$$2 + (1 \times 2) = 4$$

$$4 \times 4 = 16V \text{ for the 4 battery's}$$