31. (3)

$R_1 \propto \frac{1}{A} \Rightarrow R_2 \propto \frac{2l}{2A}$ i.e. $R_2 \propto \frac{1}{A}$

$\therefore R_1 = R_2$

32. (3)

From Kirchoff's junction Law

$\Rightarrow 4+2+i-5-3=0 \Rightarrow i=2A$

33. (3)

During charging, $V = \varepsilon + Ir$

$\therefore 7.2 = 6.0 + 2 \times r$

$r = 0.6\ \Omega$

34. (1)

Current through R is maximum when total internal resistance of the circuit is equal to external resistance.

35. (3)

$r = R\left(\frac{l_1 - l_2}{l_2}\right) = 10\left(\frac{110-100}{100}\right) = 1\Omega$

Section B

36. (1)

Resistance between P and

$R_{PQ} = R \parallel \left(\frac{R}{3} + \frac{R}{2}\right) = \frac{R \times \frac{5}{6}R}{R + \frac{5}{6}R} = \frac{5}{11}R$

Resistance between Q and R

$R_{QR} = \frac{R}{2} \parallel \left(R + \frac{R}{3}\right) = \frac{\frac{R}{2} \times \frac{4R}{3}}{\frac{R}{2} + \frac{4R}{3}} = \frac{4}{11}R$

Resistance between P and R

$R_{PR} = \frac{R}{3} \parallel \left(\frac{R}{2} + R\right) = \frac{\frac{R}{3} \times \frac{3R}{2}}{\frac{R}{3} + \frac{3R}{2}} = \frac{3}{11}R$

Hence it is clear that P_{PQ} is maximum.

37. (3)

The voltage across cell terminal will be given by

$= \frac{E}{R+r} \times R = \frac{2}{(3.9+0.1)} \times 3.9 = 1.95V$

38. (1)

Reading of galvanometer remains same whether switch S is open or closed, hence no current will flow through the switch i.e. R and G will be in series and same current will flow through them. $I_R = I_G$.

39. (1)

Balancing length is independent of the cross-sectional area of the wire.

40. (2)

E.m.f. is the value of voltage, when no current is drawn from the circuit so E = 2V.

Also $r = \text{slope} = \frac{2}{5} = 0.4\Omega$