PHYSICS

CAPACITORS AND CURRENT ELECTRICITY

71. (3)

Resistance r_2 and r_3 are in parallel so potential difference across $r_2 = r_3 = V$

$$\therefore i_2 r_2 = i_3 r_3 \Rightarrow i_2 = \frac{i_3 r_3}{r_2} \quad \ldots (i)$$

Current, $i_1 = i_2 + i_3 \Rightarrow i_1 = \left(\frac{r_3}{r_2} + 1\right) i_3$

$$\therefore \frac{i_3}{i_1} = \frac{r_2}{r_2 + r_3}$$

72. (4)

$$\mu = \frac{eT}{m} \Rightarrow \mu \propto T$$

73. (1)

Given circuit is in the form of balanced Wheatstone bridge.

$$\left(\frac{2\times 4}{2+4}\right) + \left(\frac{1\times 2}{1+2}\right)$$

$$\Rightarrow \frac{8}{6} + \frac{2}{3} = \frac{8+4}{6} = \frac{12-2}{6} = 2$$

74. (2)

$$C = \frac{\varepsilon_0 A}{d}$$

$$C' = C_1 + C_2 = \frac{5\varepsilon_0 A}{2d} + \frac{\varepsilon_0 A}{2d} = 3C$$

75. (2)

$$V = \frac{Q}{C}$$

$$V = \frac{Q_1 - Q_2}{2C}$$

76. (1)

$$V_A = -\frac{10}{1} + \frac{10-10}{2} = V_B \Rightarrow V_A - V_B = +5$$

77. (4)

78. (2)

$$C = \frac{\varepsilon_0 A}{d}$$

$$q_2 = -2CV = \frac{-2\varepsilon_0 AV}{d}$$

79. (4)

$$\frac{\Delta E}{E} = \frac{\frac{1}{2}\frac{C_1 C_2}{C_1 + C_2}(V_1 - V_2)^2}{\frac{1}{2} C_1 V_1^2}$$

$$= \frac{C_2}{C_1 + C_2} = \frac{C_2}{C_1 + C_2}$$

$$= \frac{C}{2C} \times 100 = 50\%$$

80. (4)

$$V_C = \frac{C_1 V_1 + C_2 V_2}{C_1 + C_2}$$

$$V_C = \frac{kC(0) + CV}{kC + C} = \frac{V}{k+1}$$