PHYSICS

101. (4)

Force on dipole $= \frac{pdE}{dx} = p(1) = p$

102. (2)

$$\text{Energy density} = \frac{\text{Energy stored}}{\text{Total volume}}$$

$$= \frac{\frac{1}{2}CV^2}{Ad} = \frac{\varepsilon_0 V^2}{2d^2}$$

103. (3)

Work done $\propto$ change in stored energy

or $W \propto \left(V_2^2 - V_1^2\right)$

$$\frac{W_2}{W_1} = \frac{15^2 - 10^2}{10^2 - 5^2} = \frac{225 - 100}{100 - 25} = \frac{125}{75} = \frac{5}{3}$$

$$W_2 = \frac{5W}{3}$$

104. (3)

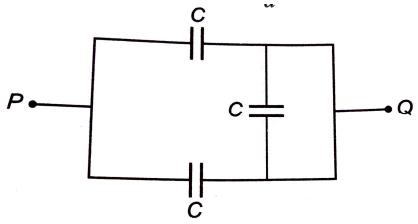
$$\frac{4}{3}\pi R^3 = 8 \times \frac{4}{3}\pi r^3 \Rightarrow R = 2r$$

$$\Rightarrow C_{big} = 2C_{\text{ small}}$$

105. (2)

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

So, $C_{PQ} = 2C = 2\frac{A\varepsilon_0}{d}$



106. (2)

$$I = neAV_d \Rightarrow V_d = \frac{I}{neA}$$

107. (3)

108. (3)

In stretching $R \propto l^2$

$$\frac{\Delta R}{R} = 2\frac{\Delta l}{l} = 2\%$$

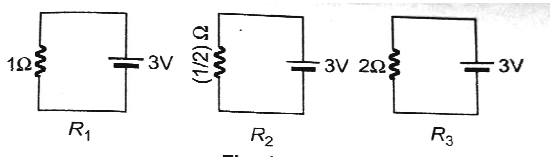
109. (4)

Given circuit can be reduced to

$$I = \frac{8}{12} = \frac{2}{3}A$$

110. (3)

Given circuits can be reduced to



$$P_1 = \frac{3^2}{1} = 9\text{ W} \qquad P_2 = \frac{3^2}{\frac{1}{2}} = 18\text{ W}$$

$$P_3 = \frac{3^2}{2} = 4.5\text{ W}$$