Sri Chaitanya IIT Academy, India

A.P, TELANGANA, KARNATAKA, TAMILNADU, MAHARASHTRA, DELHI, RANCHI

A right Choice for the Real Aspirant

ICON CENTRAL OFFICE, MADHAPUR-HYD

Sec: Sr. IPLCO **JEE ADVANCED** **DATE : 08-11-15**

TIME : 02:00 AM TO 05: 00 PM **2013_P2 MODEL** **MAX MARKS : 180**

KEY & SOLUTIONS

PHYSICS

1	**B**	2	**AB**	3	**BCD**	4	**ABC**	5	**ABC**
6	**ABD**	7	**ACD**	8	**BCD**	9	**B**	10	**A**
11	**B**	12	**B**	13	**C**	14	**B**	15	**A**
16	**D**	17	**D**	18	**B**	19	**C**	20	**A**

CHEMISTRY

21	**ABC**	22	**BCD**	23	**ABCD**	24	**BCD**	25	**ABCD**
26	**ABC**	27	**ABCD**	28	**ABCD**	29	**B**	30	**C**
31	**C**	32	**C**	33	**C**	34	**B**	35	**A**
36	**C**	37	**C**	38	**A**	39	**D**	40	**B**

MATHEMATICS

41	**AC**	42	**ABC**	43	**ABD**	44	**BC**	45	**ABD**
46	**ABCD**	47	**ABCD**	48	**ABD**	49	**C**	50	**B**
51	**B**	52	**C**	53	**A**	54	**B**	55	**A**
56	**D**	57	**D**	58	**A**	59	**D**	60	**C**

PHYSICS

1. [Sol. (B)]

Method I

Force between plates

$F = \frac{Q^2}{2n\varepsilon_0} = \frac{\left(\frac{\varepsilon_0 A}{x}V\right)^2}{2A\varepsilon_0} = \frac{\varepsilon_0 AV^2}{2x^2}$ where x is separation between plates

$dW = F\,dx$

$W = \int_d^{2d} \frac{\varepsilon_0 AV^2}{2x^2}dx = \frac{\varepsilon_0 AV^2}{4x} = \frac{CV^2}{4} = 200\ \mu J$

Method II

$U_\lambda + W_B + W_{ext} = U_f + \text{loss}$

Process is slow so energy loss is zero work done by battery = $W_B = QE$

$Q = Q_f - Q_i = 20 - 40 = -20$

$W_B = -20 \times 20$

$2 \times 20^2 - 20 \times 20 + W_{ext} = 1 \times 20^2 + 0$

$W_{ext} = 200\ \mu J$

2. [Sol. (A,B)]

Potential difference across 'C_1'

$V_1 = \frac{C_2 V}{C_1 + C_2} = \frac{V}{1 + C_1/C_2}$

When dielectric is inserted C_2 will increase.

3. [Sol. (B,C,D)]

Rate of change of energy = V.I.

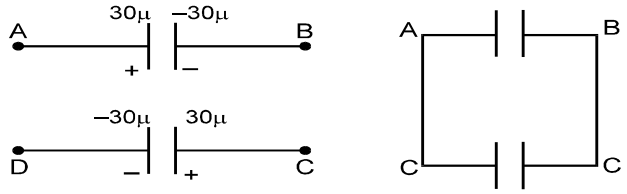
Initially V = 0 hence VI = 0

finally I = 0 hence VI = 0

$\therefore$ first increases then decreases

4. [Sol. (A,B,C)]

$V = \frac{Q_1 + Q_2}{C_1 + C_2} = 0$



Final potential difference = zero

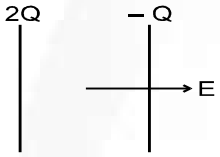
Final charge = Zero

Charge flow 30 μc A to D from A to D

5. [Sol. (A,B,C)]

$E = \frac{2Q}{2A\varepsilon_0} + \frac{Q}{2A\varepsilon_0} \Rightarrow E = \frac{3Q}{2A\varepsilon_0}$

$E = \frac{3}{2}\frac{Q}{Cd} \Rightarrow Ed = \frac{3Q}{2C} = V$



(ii) F = EQ

$F = \left(\frac{2Q}{2A\varepsilon_0}\right) \times (-Q) = -\frac{Q^2}{A\varepsilon_0}$

$F = \frac{Q^2}{A\varepsilon_0}$

(iii) Energy $= \frac{1}{2}\varepsilon_0 E^2 Ad$ $= \frac{1}{2}\varepsilon_0\left(\frac{3Q}{2cd}\right)^2 Ad = \frac{9}{8}\frac{Q^2}{C}$

6. [Sol. (A,B,D)]

As voltage applied across capacitor is same i.e. 10V in both case. Therefore in both case

$Ed = 10 \Rightarrow E = \frac{10}{d}$, as d is constant . Therefore electric field remians the same as 10 V/m

7. [Sol. (A,C,D)]

8. [Sol. (B,C,D)]

Capacitor is directly connected with 1 V cell in parallel to it

$\therefore$ $Q = CV = 1 \times 1 = 1\ \mu C$

9. [Sol. (B)

$$\frac{1}{\rho} = \frac{Ne^2\tau}{m}$$

hence $\tau = \frac{m}{\rho Ne^2} = \frac{9.1\times10^{-31}}{\left(1.6\times10^{-8}\times8\times10^{28}\times1.6\times10^{-19}\times1.6\times10^{-19}\right)} \cong 2.77\times10^{-14}$ sec.

10. [Sol (A)

$S = 2 \times 10^{-4} \times 10 = 2 \times 10^{-3}$

$E = \rho J = 1.6 \times 10^{-8} \times \frac{2.56}{10^{-6}}$

$v = Es = 80\ \mu V$]

11,12 [Sol. (b,b) At $E_2 = 4$ No current from E_2 & 0.1 A from E_1

$E_1 - 0.1(R_1 + R_2) = 0$ ...(1)

$E_1 - 0.1R_1 = 4$ ...(2)

At $E_2 = 6$ No current from E_1 $\Rightarrow$ $E_1 = 6$ V

$\therefore$ $R_1 = 20\ \Omega$

& $6 = 0.1(20 + R_2) \Rightarrow R_2 = 40\ \Omega$]

13. [Sol. (C)]

14. [Sol. (B)]

15. [Sol. (A) Electric field will be from A to B]

16. [Sol. (D) Electric field can be either from A to B or from B to A depending on which is plate is positively charged.]

17. [Sol. (D)]

18. [Sol. (B)]

19. [Sol. (C)]

20. [Sol. (A)]