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 Date: 07-11-15

Time: 9:00 AM to 12:00 Noon RPTM-11 Max.Marks: 360

KEY SHEET

CHEMISTRY		PHYSICS		MATHS	
Q.NO	ANSWER	Q.NO	ANSWER	Q.NO	ANSWER
1	1	31	3	61	3
2	1	32	1	62	2
3	1	33	2	63	4
4	1	34	1	64	4
5	1	35	2	65	3
6	3	36	2	66	3
7	3	37	3	67	3
8	4	38	1	68	3
9	3	39	1	69	4
10	1	40	3	70	2
11	2	41	2	71	3
12	1	42	4	72	3
13	4	43	1	73	2
14	1	44	4	74	3
15	3	45	2	75	4
16	4	46	1	76	2
17	3	47	3	77	2
18	1	48	3	78	1
19	4	49	2	79	3
20	3	50	3	80	2
21	4	51	2	81	4
22	4	52	2	82	4
23	4	53	4	83	3
24	2	54	4	84	3
25	2	55	2	85	4
26	2	56	1	86	3
27	4	57	1	87	3
28	4	58	3	88	2
29	4	59	2	89	4
30	2	60	2	90	3

PHYSICS

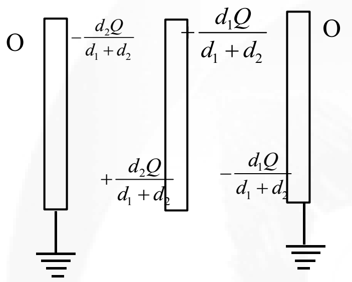
31. $V_{Shell} + V_{metallic\,sphere} = 0$

$$\frac{Kq}{R} + \frac{Kq_e}{r} = 0$$

$$q_e = \frac{qr}{R}$$

$$E_p = \frac{K\,qr}{Rd^2} = \frac{1}{4\pi \in_0}\frac{qr}{Rd^2}$$

32. When the switches S_1, S_2 are closed then the charges distributed.



Hence a,c,d are correct

33. Intial charge on the inner surface of the $\frac{-3Q}{2}$

Before neutral closing the switch

Final charge on the inner surface of the neutral plate = $\frac{-2Q}{3}$

After closing the switch

Amount of the charge through switches = $\frac{5Q}{6}$

Ans : 5

34. Initially A, B at same potential V_1, C, D at same potential V_2 $(V_1 > V_2)$ After E, F contacts current is passing through AB, CD

35. Due to Gauss law Galvanometer under goes deflection

36. Conceptual

37. $V_{p.d} = E.M - F$

Hence current passing variable resister is zero

38. From Kirchoff's loop law

39. Apply the Balance wheatstone Bridge principle

40. Effective resistance of the circuit =3R

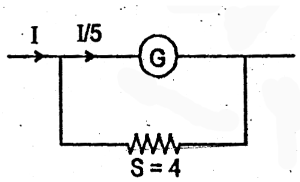
$$i = \frac{E}{3R} = \frac{12}{3K\Omega} = 4mA$$

41. After closing the switch the charge on $1\mu F$ is $3\mu F$ and $3\mu C$ is $9\mu C$

Hence charge passing through the switch $= -3 + 9 = 6\mu C$

42. Conceptual

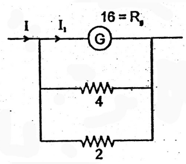
43. Case I



$$R_g \times \frac{I}{5} = \left(I - \frac{I}{5}\right) \times 4$$

$$\Rightarrow R_g = 16\Omega$$

Case II

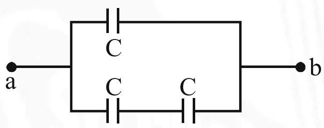


$$16I_1 = \frac{4 \times 2}{6}(I - I_1)$$

$$\Rightarrow I_1 = I/13$$

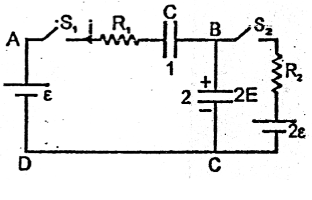
So decrease in current to previous current

$$= \frac{I/5 - I/13}{I/5} = \frac{8}{13}$$

44. 

$$\Rightarrow \quad C_{eq} = \frac{3C}{2} = \frac{3\varepsilon_0 A}{2d}.$$

45. Just before S_1 closed the potential difference across capacitor 2 is 2E



Just after S_1 is closed the potential difference across capacitors 1 and 2 are 0 and 2E respectively. Applying KVL to loop ABCD immediately after S_1 is closed.

46. Rate of change of energy = V.I.

Initially $V=0$ hence $VI=0$

Finally $I=0$ hence $VI=0$

First increases then decreases

47. $R_{PR}=\frac{5R}{11}, R_{PQ}=\frac{3R}{11}, R_{QR}=\frac{4R}{11}\Rightarrow R_{PR}>R_{QR}>R_{PQ}$

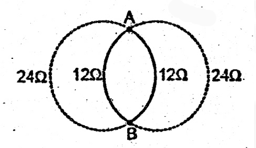
48. Current flowing in the circuit

$i=\frac{E}{R_1}=\frac{15}{500+250}=0.02A$

At junction Y this current is divided equally in parts

∴ reading of ammeter = 0.01A

49. From the figure.



$AC_1=AC_2=C_1C_2=raidus$

$\therefore \angle AC_1B=120^0$

Hence the resistance of four sections are

Hence equivalent resistance R across AB is

$\frac{1}{R}=\frac{1}{24}+\frac{1}{12}+\frac{1}{12}+\frac{1}{24}$ or $R=4\Omega$ $\therefore$ Power $=\frac{V^2}{R}=\frac{(20)^2}{4}=100\,watt$.

50. $i=\frac{dq}{dt}=$ slope of $q-t$ graph

$=-5$ (which is constant)

Amount of heat generated in time t

$H=i^2RT \qquad H\propto t$.

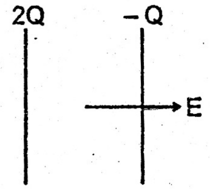
51. 8.5 = E-3r and 11 = E + 2r

Showing r = 0.5Ω and E = 10V

52. Preferable of meter bridge $\frac{x}{R}=\frac{l}{100-l}\Rightarrow R_t=R_o(1+\alpha\Delta t)$

53. Conceptual

54. $E = \frac{2Q}{2A\in_0} + \frac{Q}{2A\in_0}$



$\Rightarrow \quad E = \frac{3Q}{2A\in_0}$

$E = \frac{3}{2}\frac{Q}{Cd}$

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

(ii) F=EQ/2

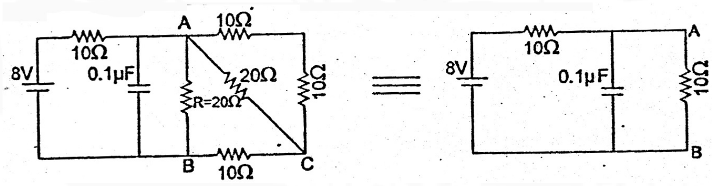
$F = \left(\frac{2Q}{2A\in_0}\right)\times\frac{(-Q)}{1} = -\frac{Q^2}{A\in_0}$

$F = \frac{Q^2}{A\in_0}$

(iii) $Energy = \frac{1}{2}\in_0 E^2 Ad \quad = \frac{1}{2}\in_0\left(\frac{3Q}{2Cd}\right)^2 Ad = \frac{9}{8}\frac{Q^2}{C}$

55. Conceptual

56. The equaivalent circuit is as shown in figure (b)



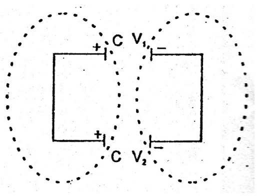
In the steady state the potential difference across AB is 4 volts.

$\therefore$ Charge on capacitor in steady state is

$q = CV = 0.4\mu C$

Current through resistor R is $I = \frac{V}{R} = \frac{4}{20} = 0.2A$

57. As the charge of isolated system remains conserved, so the sum of charges of plates having –ve polarity remains constant. As potential of two capacitors are different so some charge flows into the circuit till both aquire the same potential.



As charge flows, $\Delta H \neq 0$, and hence $\sum u_i \neq \sum U_f$

Let final common potential be V, then

$$V = \frac{C_1V_1 + C_2V_2}{C_1 + C_2} = \frac{V_1 + V_2}{2} \qquad [\text{as } C_1 = C_2 = C]$$

58. Charge on outer surface of C=- charge on inner surface of C

Hence potential at B due to charge on conductor C=0

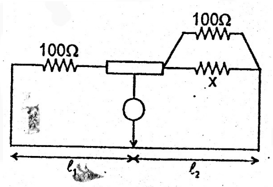
Charge on outer surface of dielectric=-charge on inner surface of dielectric

$\therefore$ Potential at B due to charge on dielectric =0

Potential at B due to charge on $A = \dfrac{Q}{4\pi \in_0 b}$

$\therefore$ net potential at $B = \dfrac{Q}{4\pi \in_0 b}$

59. $\because$ Wheat stone bridge is in balanced condition



So $\dfrac{100}{\ell_1} = \dfrac{\frac{100x}{100+x}}{\ell_2}$

$\because \dfrac{\ell_1}{\ell_2} = 2 \qquad \Rightarrow \qquad x = 100\Omega$

60. $V = E - ir$. When $i = 0$, the potential reading is 2V. Hence e.m.f = 2V

When $V = 0, i = 5A$. This gives $r = 0.4\Omega$