AVIRAL CLASSES
CREATING SCHOLARS
JEE (ADVANCED), PMT & FOUNDATIONS

ULTIMATE TEST SERIES NEET -2020
TEST-07 SOLUTION

Test Date :20-03-2020

[PHYSICS]

1. Potential at earthed conductor becomes zero.

2. Due to slab.

$C \to KC, \quad E = \frac{1}{2} CV^2$

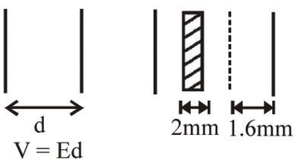
$V \to V/K, \quad E = E/K$

$Q = CV = \text{constant}$

$V \to$ Decrease, Energy decrease.

$Q \to$ Remain constant

3. Potential at earthed conductor becomes zero and by induction charge will not remain uniform.

4. 

$$Ed = V = (d + 1.6 - 2)E + \frac{E}{K}.2$$

$$\frac{2}{K} = \frac{4}{10} \quad \boxed{K = 5}$$

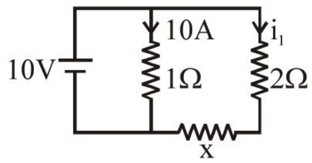
5. Flux donot depend upon shape

6. $w = \vec{F} \cdot \vec{d}$

$= q_0 \vec{E} \cdot \vec{d}$

$= q_0 \left(E_0 \hat{i}\right) \cdot \left(a\hat{i} - a\hat{j}\right)$

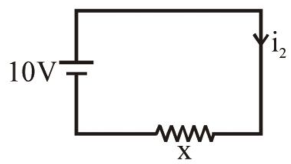
$= q_0 E_0 a$

7. 

(when switch is opened)

$10 \times 1 = i_1 \times (2 + x)$

$$i_1 = \frac{10}{2 + x} \qquad \text{....(1)}$$

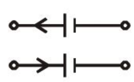


$$i_2 = \frac{10}{x}$$

$\therefore i_2 = 2i_1$

$$\frac{10}{x} = 2\left(\frac{10}{2 + x}\right)$$

$x = 2\Omega$

8.  T.P.D = E – I r ⇒ 12 = E – 2r ...(1)

T.P.D = E + I r ⇒ 15 = E + 3r ...(2)

Solve eq^n (1) & (2)

9. When wire is stretched

Volume = constant

$Al = \pi r^2 l$ = constant

$l \times \frac{1}{r^2}$

Resistance $R = \frac{\rho l}{A}$ so $R \propto \frac{1}{r^4}$

10. $V = x\ell$

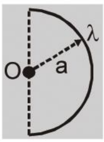
$IR = x \times 100$

$I(R + R) = x \times \ell'$

$\frac{1}{2} = \frac{100}{\ell'}$

$\Rightarrow \ell' = 200$ cm

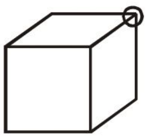
11. $E_{arc} = \frac{2k\lambda}{a}\sin(\alpha/2)$



for this figure $\alpha = 180^o$

hence $E = \frac{2k\lambda}{a} = \frac{\lambda}{2\pi \epsilon_0 a}$

12. Faces which are related to the corner will have zero flux ($E \perp A$).



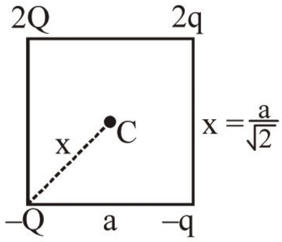
13. Deviation $y = \frac{1}{2}\left(\frac{qE}{m}\right)\left(\frac{x^2}{v^2}\right)$

But putting the values we get y = 1.76 mm

14. As charge moves towars 'A' more number of field lines will be related with 'A' hence ϕ_B will decreases.

15. $V_c = \frac{k(-Q)}{x} + \frac{k(-q)}{x} + \frac{k(2q)}{x} + \frac{k(2Q)}{x}$

As per question $V_c = 0$



a + q = 2q + 2Q

Q = –q

16. The given point of observation for the given sphere is inside. Hence field inside the conducting sphere is zero.

17. $F = -\frac{dU}{dx}$

$\boxed{F = \vec{p}\cdot\frac{d\vec{E}}{dx}}$

as $\theta = 90$

$F = 0$

$\theta \neq 90$

$F \neq 0$

If dipole is aligned with EF lines hence $\tau = 0$

18. $\begin{pmatrix}\text{Energy loss}\\ \text{during the process}\end{pmatrix} = \frac{c_1c_2}{2(c_1+c_2)}(V_1 - V_2)^2$

for no loss of energy $V_1 - V_2 = 0 \Rightarrow V_1 = V_2$

If $Q_1R_2 \neq Q_2R_1$ then there is alway a loss in energy of the system hence option (4) is correct.

19. Capacity when dielectric is filled partially is

$$c' = \frac{\epsilon_0 A}{d - t\left(1 - \frac{1}{\varepsilon_r}\right)}$$

Hence $c = \frac{\epsilon_0 A}{d}$

and $c' = \frac{\epsilon_0 A}{d - d/2\left(1 - \frac{1}{\infty}\right)} = \frac{2\epsilon_0 A}{d} = 2c$

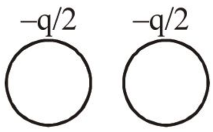
$\frac{c'}{c} = 2$ for copper $\epsilon_r = \infty$

20. $C_{PR} = C/3 + C/2 = \frac{5}{6}C$

$C_{PQ} = \frac{C}{4} + C = \frac{5}{4}C$

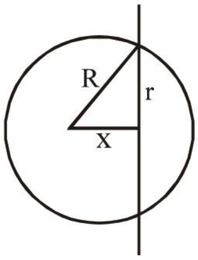
$C_{PR} = C_{PQ} = \frac{1}{6} : \frac{1}{4} = 2:3$

21. $F = \frac{K(q)(2q)}{r^2} = \frac{2Kq^2}{r^2}$ (before touching)

(After touching) 

$F' = \frac{K(q/2)(q/2)}{r^2} = \frac{kq^2}{4r^2} \Rightarrow F' = F/8$

22. Charge enclosed $q_{en} = \sigma\pi(R^2 - x^2)$



Here $r = \sqrt{R^2 - x^2}$

$\phi_{sphere} = \frac{\sigma\pi(R^2 - x^2)}{\epsilon_0}$

23. Work done = change in energy

$eEd = \frac{1}{2}m(V\cos 60°)^2 = \frac{1}{4}\left(\frac{1}{2}mV^2\right)$

but $\frac{1}{2}mV^2 = K$

$E = \frac{K}{4ed}$

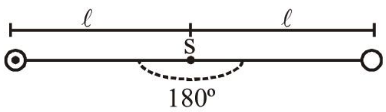
24. for surface points, net charge = 0
hence potential at surface = 0

(a) $\phi = \frac{q_{in}}{\epsilon_0}$ but $q_{in} = 0$
Hence $\phi = 0$

(d) Concentric circle which lies on equitorial plane will have zero potential.

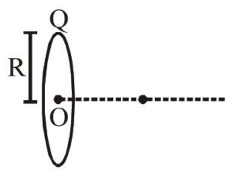
25. Potential difference does not depend upon charge of outer sphere.

26. In absence of gravity only electrostatic force will work.



$T = \frac{K(Q)(Q)}{(2\ell)^2}$ and angle between strings = 180º

27. $TE_i = TE_f$

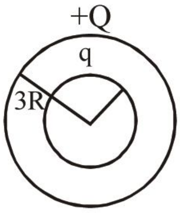


$\frac{KQq}{R} = \frac{1}{2}mv^2$

$v = \sqrt{\frac{2KQq}{mR}}$

28. If inner sphere is earthed then its potential will be zero.

Let charge on inner sphere is q.

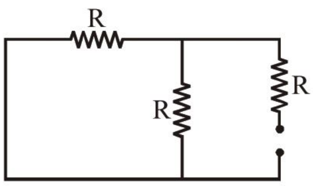


$$V_{inner} = \frac{KQ}{3R} + \frac{Kq}{R} = 0$$

$$q = -\frac{Q}{3}$$

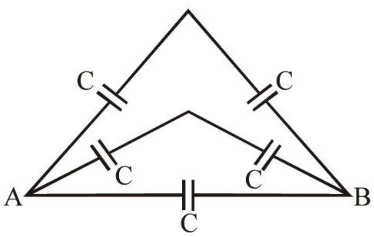
29. If cell is connected potential difference will remain same but capacitance increases so charge will increase.

30. Net resistance across capacitor is $\frac{3R}{2}$



$$\tau = R_N C = \frac{3}{2}RC$$

31. Balanced (ws bridge)



$C_N = 2C$

32. $$V - V_{(0,0,0)} = \int_0^1 E_x dx + \int_0^1 E_y dy$$

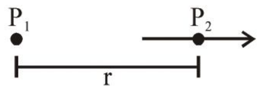
$$V - 2 = \left[x^2\right]_0^1 + \frac{1}{3}\left[y^3\right]_0^1$$

$$V = 2 + 1 + \frac{1}{3} = \frac{10}{3}\text{volt}$$

33. $x = \frac{r\sqrt{q_1}}{\sqrt{q_1} + \sqrt{q_2}}$ x is distance from q_1.

$$x = \frac{30\sqrt{e}}{\sqrt{e} + \sqrt{9e}} = \frac{30}{3} = 10\text{ cm from e}$$

34. $$F = P_2 \frac{d}{dr}\left(\frac{2KP_1}{r^3}\right)$$

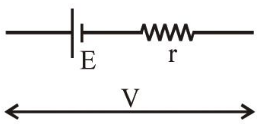


$$F = 2KP_1P_2 \frac{d}{dr} r^{-3}$$

$$\boxed{F = -6\frac{KP_1P_2}{r^4}}$$

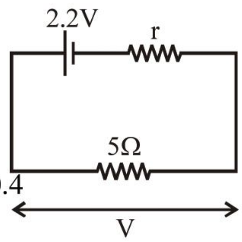
35. When circuit is open V = E

$\therefore$ E = 2.2 V



V = IR = 1.8

$$\therefore \quad I = \frac{1.8}{5} = 0.36 \text{ Amp.}$$

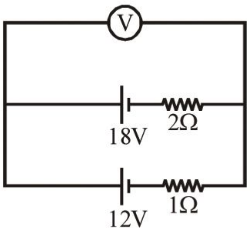


V = E – Ir

Ir = E – V = 2.2 – 1.8 = 0.4

$$r = \frac{0.4}{I} = \frac{0.4}{0.36} = \frac{10}{9}\Omega$$

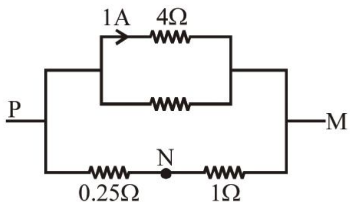
36. $E_{net} = \dfrac{E_1 r_2 + E_2 r_1}{r_1 + r_2}$



$= \dfrac{(18\times1)+(12\times2)}{(2+1)}$

$E_{net} = \dfrac{18+24}{3} = \dfrac{42}{3} = 14$ volt

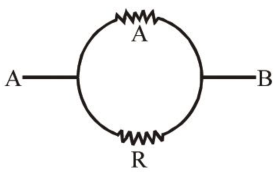
37. $V_{pm} = 4V$



$\therefore \quad V_{MN} = \dfrac{1}{1+0.25}\times 4$

= 3.2 volt

38. $R = \dfrac{(2\pi\times0.1)12}{2}$



$R = 1.2\ \pi$

$\therefore \quad R_{AB} = R/2 = \dfrac{1.2\pi}{2} = 0.6\pi\Omega$

39. $I_g.G = (I - I_g).S$

$\therefore \quad S = \dfrac{I_g.G}{(I-I_g)}$

Given I = 5A, I_g = 1 Amp., G = 60 M

$\therefore \quad S = \dfrac{60\times1}{4} = 15\,\Omega$ in parallel

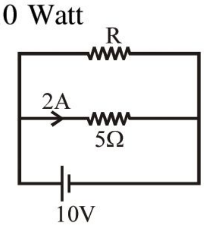
40. Power dissipated in 5Ω

$= i^2R$

$= (2)^2 \times 5 = 20$ W

$\therefore$ Power dissipated in R = 30 – 20

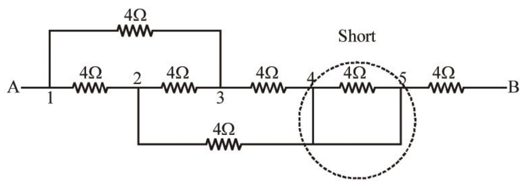
= 10 Watt

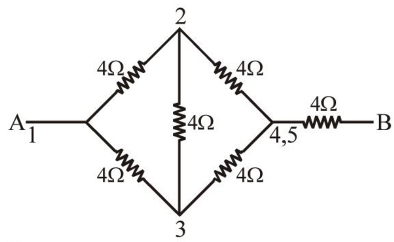


$\therefore \quad 10 = \dfrac{(10)^2}{R}$

$R = \dfrac{100}{10} = 10\,\Omega$

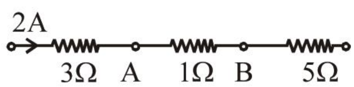
41.





= 8Ω

42. Given circuit can be redrawn as



$V_A - V_B = IR = 2\times1 = 2V$

43. Current in 6Ω $I = \sqrt{\dfrac{P}{R}} = \sqrt{\dfrac{6}{6}} = 1$

$I = \dfrac{12}{6+\dfrac{8P}{8+R}}$

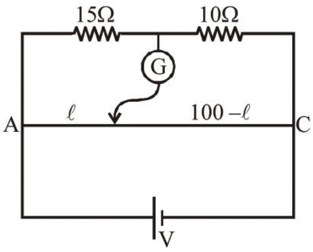
$1 = \dfrac{12}{48+14R}(8+R)$

R = 24Ω

44. $\frac{R_1}{R_2} = \frac{\ell}{100-\ell}$

$\Rightarrow \frac{15}{10} = \frac{\ell}{100-\ell}$

$\Rightarrow \ell = 60$ cm



45. T.P.D. = $E - Ir = E - \left(\frac{E}{r}\right)r = 0$

(here 4Ω is shot circuited so it is use less)

[CHEMISTRY]

46. $\Delta S = \ominus$ve, $\Delta H = \ominus$ve

47. Fe^{+3} ion, according to Hardy – Schulze law.

48. $R = K[RCl]^1 [H_2O]^0$

49. $E_{cell} = E^0_{cell} = \frac{0.0591}{2}\log_{10}\frac{[Zn^{+2}]}{[Cu^{+2}]}$

50. $kt = 2.303\log\frac{a}{a-x}$

51. Only C reduceses H^+ therefore element A, B and D are below in E.C.S. than hydrogen

$\Rightarrow$ A reduceses only ion of D therefor it's position in E.C.S. is above than D.

$\Rightarrow$ Increaseing order of SRP$\rightarrow$C < H < B < A < D

52. In this reaction :

Intermediates $\Rightarrow N_2O_2$ and N_2O

53. specific resistance ($k = \frac{1}{\rho} = \frac{1}{R}\times\frac{l}{a}$)

$\pi_m = \frac{k\times 1000}{\text{molarity}}$

54. $r = k(A_2)^x (B)^y$

55. $\alpha = \frac{\wedge_m}{\wedge_m^\infty}$

$K_a = \frac{C\alpha^2}{1-\alpha}$

56. Conductivity of strong electrolyte increasing on dilution due to increase in inter ionic distance.

57. Mg is obtain by electrolyesis of molten solution of $MgCl_2$.

58. $kt_{1/4} = 2.303\log_{10}\frac{a}{3a/4}$

59. $SO_3^{2-} \Rightarrow 1(x) + 3(-2) = -2 \therefore x = +4$

$S_2O_4^{2-} \Rightarrow 2(x) + 4(-2) = -2 \therefore x = +3$

$S_2O_6^{2-} \Rightarrow 2(x) + 6(-2) = -2 \therefore x = +5$

60. $t_{1/2} = \frac{0.693}{K}$

$\log\frac{a}{a-x} = \frac{kt}{2.303}$

61. Central atom nitrogen (O.N. = +3) present in intermediate oxidation state so it can act as oxidant as well as reductant.

62. R.O.R. = $-\frac{d[A]}{dt} = -\frac{d[B]}{dt} = \frac{1}{2}\frac{d[C]}{dt} = \frac{d[D]}{dt}$

R.O.D. of A = $-\frac{d[A]}{dt}$

R.O.D. of B = $-\frac{d[B]}{dt}$

63. $R = k[NO_2]^1$

order of reaction = 1

$t_{1/2} = \frac{0.693}{k}$

64. $NO_3^- \longrightarrow NH_2.NH_2$

$2N^{5+} + 14e^- \longrightarrow 2N^{2-}$

$N^{5+} + 7e \longrightarrow \frac{1}{2}[N_2H_4]$

65. $K = \frac{1}{R}\left(\frac{\ell}{A}\right)$

$\left(\frac{\ell}{A}\right) = 0.013 \times 300\ cm^{-1}$

66. fact (refer theory of catalyst

67. $w = \frac{E}{F} \times It$

$24 \times 5 = \frac{27/3}{96500} \times 9650 \times t \times \frac{90}{100}$

68. Only C is correct rest are incorrect

69. fact

70. In peptization freshly prepared precipitate is converts into sol.

71. On iron surface iron itself act as anode an get oxidised an O_2 in water get reduced

72. $\ln k = \ln A - \frac{E_a}{R \times T}$

73. $E° = \frac{0.0591}{2}\log_{10} Keq.$

$0.2955 = \frac{0.0591}{2}\log Keq. \Rightarrow Keq. = 10^{10}$

74. π = i CRt i = 1

75. -

76. B is present in octahedral void

77. $T°_f - T_f = i \times k_f\ m$

78. fact

79. $d = \frac{z \times m}{a^3 \times N_A}$

80. $\Delta T_f = i \times kf \times\ m$

81. $r = \frac{a}{2\sqrt{2}}$

82. $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
65 g of Zn evolve 22400 ml H_2
therefore 0.5×10^{-2} mol H_2 evolved by 0.32g Zn

83. More the value of vant'Hoff facto more will be boiling point

84. $m = \frac{x_B 1000}{x_A \times M_A}$

85. 50 ml of 5.6 % w/v – KOH contain 4.91 mol of KOH & mol 5.6% w/v HCl contain 7.67 mol of HCL. SO acid is more and base neutralises completely

86. $r_{new} = r_{old} \times \mu^{\Delta T/10}$

$\Delta T = 55 - 25 = 30$

87. $E = E° - \frac{0.059}{2}\log\frac{[Cu^{2+}]}{[Ag^+]^2}$

As $[Ag]^+$ increase twice $\frac{[Cu^{2+}]}{[Ag^+]^2}$ become $\frac{1}{4}$ and

E shows more change and on halving the $[Cu^{2+}]$

$\frac{[Cu^{2+}]}{[Ag^+]^2} = \frac{1}{2}$ of intial value

88. $W = \frac{E}{96500} \times Q$

$710 = \frac{35.5}{96500} \times Q$

$Q = 1930000 = 1.93 \times 10^6\ C$

89. Physisorption is multilayered

90. Fact