JEE EXPERT

ANSWER KEY & SOLUTIONS

Module Test - [MT - 01]

JEE ADV. Paper - 02

Batch : 12th (Zenith- 1820 - X01 & X02)

Date :[04.08.2019]

PHYSICS

1	**(A, B, C)**	**2**	**(B, D)**	**3**	**(A, B, C, D)**	**4**	**(A, B, D)**
5	**(A, B, D)**	**6**	**(B, D)**	**7**	**(C)**	**8**	**(A, D)**
9	**(3)**	**10**	**(9)**	**11**	**(5)**	**12**	**(4)**
13	**(5)**	**14**	**(4)**				

15 A → s; B → q; C → q; D → q **16** A → s; B→ q; C→ r; D → p, s

17 A → p, r, s, t; B→ p, r; C→ p, r, s , t ; D → q **18** A → p, s; B→ q, r, s; C→ q, r, s; D → p

CHEMISTRY

19	**(A, B, C, D)**	**20**	**(B, D)**	**21**	**(A, B, C, D)**	**22**	**(A, C)**
23	**(B, C, D)**	**24**	**(A, D)**	**25**	**(A, B, C, D)**	**26**	**(A, B, D)**
27	**(5)**	**28**	**(8)**	**29**	**(3)**	**30**	**(4)**
31	**(6)**	**32**	**(GRACE)**				

33 A → p, t; B→ q, r; C→ p, t; D → q, r **34** (A)→ p, s; (B) → p, r; (C) → p, q; (D) → t;

35 A→ p, q, s, t; B → p, r, s; C → q, s, t; D → q, s, t;

36 A→ q, s; B → t; C → p; D → r;

MATHEMATICS

37	(A, B, C, D)	**38**	**(A, D)**	**39**	**(A, D)**	**40**	**(A, B, C)**
41	**(A, C)**	**42**	**(A, B)**	**43**	**(A, B)**	**44**	**(A, C)**
45	**(1)**	**46**	**(4)**	**47**	**(4)**	**48**	**(2)**
49	**(4)**	**50**	**(2)**				

51 **A** → r; **B** → q; **C** → s; **D** → p **52** **A** → r; **B** → q; **C** → p; **D** → s;

53 **A** → q; **B** → s; **C** → p; **D** → r, s; **54** **A** → p; **B** → r; **C** → s; **D** → q;

JEE EXPERT

SOLUTIONS

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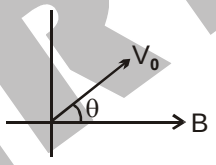
PHYSICS

SECTION-1

1. **Sol. (A, B, C)** Pitch = $\frac{2\pi m}{qB} V_0 \cos\theta$



2. **Sol. (B, D)**

Resistance absorbs energy at the rate of 2W.

Potential difference across AB $\Rightarrow V_{AB}$. I = 50 W

V_{AB} = 50 V

Drop across resistor is 2V, therefore EMF of E is 48 V.

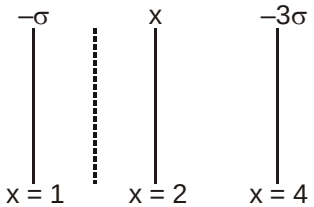
As AB is absorbing energy at the rate of 50 W, 48 W is being absorbed by E. Thus, E is charging. i.e., current is entering from + ve terminal of E.

3. **Sol. (A,B,C,D)**

The total charge on inner surface of conductor will be zero & change on outer surface is Q (uniform).

4. **Sol. (A,B,D)**

$\frac{-\sigma}{2\varepsilon_0} = \frac{x}{2\varepsilon_0} - \frac{3\sigma}{2\varepsilon_0} \Rightarrow x = 2\sigma$



At x = –2

$E = \frac{2\sigma}{2\varepsilon_0}\hat{i} = \frac{\sigma}{\varepsilon_0}\hat{i}$

At x = 3

$E = \frac{-\sigma}{2\varepsilon_0} + \frac{2\sigma}{2\varepsilon_0} + \frac{3\sigma}{2\varepsilon_0} = \frac{4\sigma}{2\varepsilon_0} = \frac{2\sigma}{\varepsilon_0}\hat{i}$

At x = 6

$E = \frac{-\sigma}{\varepsilon_0}\hat{i}$

5. **Sol. (A,B,D)** Potential gradient on the wire = $\frac{2V}{L}$. S_1 closed $\rightarrow$ only R is there in lower cricuit. PD across it is $\frac{V}{3}$.

When only S_2 closed, PD across (R + 2R) is V.

6. **(B, D)**

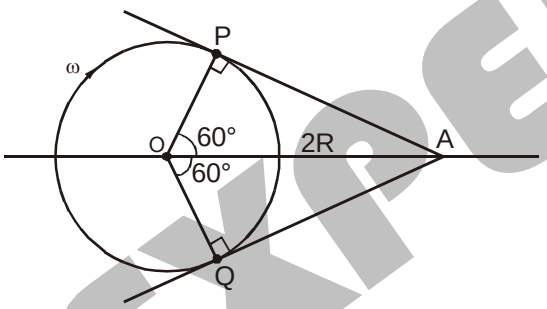
7. **(C)**

8. **(A, D)**

SECTION - 2

9. **Sol. (3)**

Point A shall record zero magnetic field (due to α-particle) when the a-particle is at position P and Q as shown in figure. The time taken by α-particle to go from P to Q is



$t = \frac{1}{3}\frac{2\pi}{\omega}$ or $\omega = \frac{2\pi}{3t} \in$ =>*w=3 rad/sec*

10. **Sol. (9)**

$dV = -Edx = -\vec{E} \cdot \vec{dr} = -\left(y^2\hat{i} + 2yx\hat{j}\right) \cdot \left(dx\hat{i} + dy\hat{j}\right) = -(y^2dx + 2yxdy) = -d(xy^2) = -[-9 - (0)] = 9$ volt.

11. **Sol. (5)**

For ammeter

$99\ I_g = (I - I_g)1$

or $I = 100\ I_g$

I_g is the full scale deflection current of the galvanometer and I is the range of ammeter

For the circuit in the adjacent figure,

$$\frac{12\ V}{2 + r + \frac{99 \times I}{99 + 1}} = 3A$$

$\Rightarrow r = 1.01\ \Omega$

For voltmeter, range

$V = I_g(99 + 101) = 200\ I_g$

Also resistance of the voltmeter = $99 + 101 = 200\ \Omega$ …(1)

In the adjacent figure, resistance across the terminals of the battery

$$R_1 = r + \frac{200 \times 2}{202} = 2.99\ \Omega$$

$\therefore$ Current drawn from the battery, $I_1 = \frac{12}{2.99} = 4.01\ A$

$\therefore$ Voltmeter reading

$$\frac{4}{5}V = 12 - I_1 r = 12 - 4.01 \times 1.01$$

$$V = 7.96 \times \frac{5}{4} = 9.95V$$

Using eq. (2), $I_g = \frac{9.95}{200} = 0.05\ A$

Using eq. (1), range of the ammeter

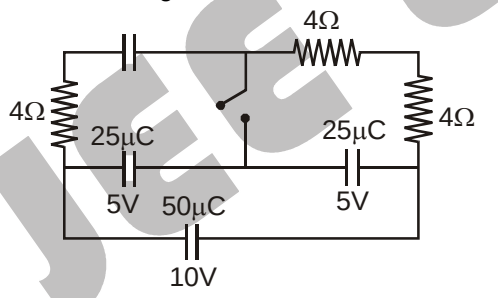
$I = 100\ I_g = 5\ A$

12. Sol. (4)

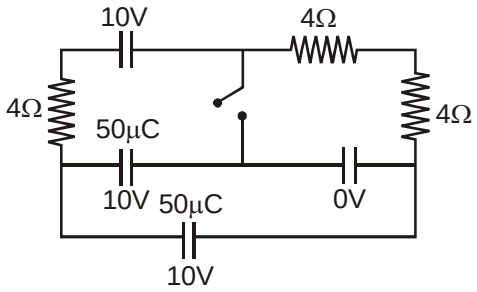
$$\text{Field} = \frac{\mu_0 i}{4\pi a} \times 2 + \frac{\mu_0 i}{2a}\left(\frac{\pi}{2 \times 2\pi}\right) = \frac{\mu_0 i}{2\pi a} + \frac{\mu_0 i}{8\pi a}\pi = \frac{\mu_0 i}{8\pi a}(4 + \pi)$$

13. Sol. (5)

Before closing switch,



Initial energy $U = \left(\frac{1}{2} \times 5 \times 5^2\right) \times 2 + \left(\frac{1}{2} \times 5 \times 10^2\right)$ = 125 + 250 = 375 μJAfter closing switch,



$U_f = \frac{1}{2} \times 5 \times 10^2 + \frac{1}{2} \times 5 \times 10^2 = 500\ \mu J$

Heat = $W_b - \Delta U = (25)(10) - (500 - 375) = 125\ \mu J$

14. Ans. 4

SECTION - 3

15. Ans. (A ì s), (B ì q), (C ì q), (D ì q)

16. Ans. A ì s; B ì q; C ì r; D ì p, s

17. Ans. A ì p, r, s, t; B ì p, r; C ì p, r, s , t ; D ì q

18. Ans. A ì p, s; B ì q, r, s; C ì q, r, s; D ì p