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A right Choice for the Real Aspirant

ICON Central Office , Madhapur – Hyderabad

2019_Jee Main(Jan)_Key Changes with Question & Sol's

SNO	ExamDate	SUB	Shift	Question ID	Key ID Old	Key ID New
1	09-01-2019	Che	Slot-1	41652910097	41652939847	41652939846
2	09-01-2019	Mat	Slot-1	41652910119	41652939935	41652939935, 41652939937
3	09-01-2019	Phy	Slot-2	4165298792	41652934628	41652934629
4	09-01-2019	Phy	Slot-2	4165298815	41652934719	41652934718
5	10-01-2019	Mat	Slot-1	4165299406	41652937083	41652937082, 41652937083, 41652937084, 41652937085
6	10-01-2019	Phy	Slot-1	4165299340	41652936819	41652936818, 41652936819
7	10-01-2019	Phy	Slot-2	41652910433	41652941193	41652941190
8	11-01-2019	Mat	Slot-1	4165299228	41652936370	41652936370, 41652936373
9	11-01-2019	Phy	Slot-1	4165299159	41652936095	41652936094
10	11-01-2019	Phy	Slot-1	4165299166	41652936123	41652936122, 41652936124, 41652936125
11	11-01-2019	Phy	Slot-2	4165299526	41652937564	41652937562

09th Jan - Slot-1 - Che

1. 0.5 moles of gas A and x moles of gas B exert a pressure of 200 Pa in a container of volume 10 m^3 at 1000 K, given R is the gas constant in $\text{JK}^{-1}\text{mol}^{-1}\text{m}$, x is

1) $\frac{2R}{4+12}$ 2) $\frac{2R}{4-R}$ 3) $\frac{4-R}{2R}$ 4) $\frac{4+R}{2R}$

Ans. 3(Sri Chaitanya Key)

Sol. $n_T = (0.5 + x)$ $PV = n \times R \times T$ $200 \times 10 = (0.5 + x) \times R \times 1000$ $2 = (0.5 + x)R$

$\frac{2}{R} = \frac{1}{2} + x$ $\frac{4}{R} - 1 = 2x$ $\frac{4-R}{2R} = x$

In final key: 3 but in primary key option 4 is correct

09th Jan - Slot-1 - Mat

2. For $x^2 \neq n\pi + 1, n \in \mathbb{N}$ (the set natural numbers). The integral

$$\int x \sqrt{\frac{2\sin(x^2 - 1) - \sin 2(x^2 - 1)}{2\sin(x^2 - 1) + \sin 2(x^2 - 1)}} dx \text{ Is equal to: (where } c \text{ is a constant of integration)}$$

1) $\log_e \left| \sec \left(\frac{x^2 - 1}{2} \right) \right| + c$ 2) $\log_e \left| \frac{1}{2} \sec^2(x^2 - 1) \right| + c$

3) $\frac{1}{2} \log_e \left| \sec^2 \left(\frac{x^2 - 1}{2} \right) \right| + c$ 4) $\frac{1}{2} \log_e \left| \sec(x^2 - 1) \right| + c$

Ans. 1 (Sri Chaitanya Key)

Sol. Given $x^2 \neq n\pi + 1, n \in \mathbb{N}$ and we have $\left(\frac{2\sin\theta - \sin 2\theta}{2\sin\theta + \sin 2\theta} \right) = \left(\frac{1 - \cos\theta}{1 + \cos\theta} \right) = \tan^2(\theta/2)$

$$\begin{aligned} \therefore \int x \sqrt{\frac{2\sin(x^2 - 1) - \sin 2(x^2 - 1)}{2\sin(x^2 - 1) + \sin 2(x^2 - 1)}} dx &= \int x \tan \left(\frac{x^2 - 1}{2} \right) dx = \int \tan \left(\frac{x^2 - 1}{2} \right) \cdot d \left(\frac{x^2 - 1}{2} \right) \\ &= \log \left| \sec \left(\frac{x^2 - 1}{2} \right) \right| + c \end{aligned}$$

In final key: 1 & 3 but in primary key only option 1 is correct

09th Jan - Slot-2 - Phy

1. A rod of mass 'M' and length '2L' is suspended at its middle by a wire. It exhibits torsional oscillations; If two masses each of 'm' are attached at distance 'L/2' from its centre on both sides, it reduces the oscillation frequency by 20%. The value of ratio m/M is close to:

- 1) 0.17 2) 0.37 3) 0.57 4) 0.77

Ans. 2 (Sri Chaitanya Key)

Sol. $f = \frac{1}{2\pi} \sqrt{\frac{K}{I}}$ and $f^1 = \frac{1}{2\pi} \sqrt{\frac{K}{I^1}}$ where K is torsional constant

$$\text{so, } \frac{f - f^1}{f} = \frac{20}{100} \Rightarrow 1 - \sqrt{\frac{I}{I^1}} = \frac{1}{5} \quad \Rightarrow \sqrt{\frac{I}{I^1}} = \frac{4}{5} \Rightarrow \frac{I}{I^1} = \frac{16}{25}$$

$$I = \frac{M \times 4L^2}{12} \text{ and } I^1 = I + \frac{mL^2}{2} \quad \text{So, } \frac{m}{M} \approx 0.37$$

In final key: 2 but in primary key option 3 is correct

09th Jan - Slot-2 - Phy

2. The pitch and the number of divisions, on the circular scale, for a given screw gauge are 0.5 mm and 100 respectively. When the screw gauge is fully tightened without any object, the zero of its circular scale lies

3 divisions below the mean line.

The readings of the main scale and the circular scale, for a thin sheet, are 5.5 mm and 48 respectively, the thickness of this sheet is

- 1) 5.755 mm 2) 5.725 mm 3) 5.740 mm 4) 5.950 mm

Ans. 2 (Sri Chaitanya Key)

Sol. $LC = \frac{\text{Pitch}}{\text{No of Divisions}} = 0.5 \times 10^{-2} \text{ mm}$

Positive zero error $3 \times 0.5 \times 10^{-2} \text{ mm} = 1.5 \times 10^{-2} \text{ mm}$

Reading = MSR + CSR - (+ve zero error) = 5.725 mm

In final key: 2 but in primary key option 1 is correct

10th Jan - Slot-1 - Mat

1. If the parabolas $y^2 = 4b(x - c)$ and $y^2 = 8ax$ have a common normal, then which one of the following is a valid choice for the ordered triad (a, b, c) ?

- 1) $\left(\frac{1}{2}, 2, 3\right)$ 2) (1, 1, 3) 3) $\left(\frac{1}{2}, 2, 0\right)$ 4) (1, 1, 0)

Key: 2(Sri Chaitanya Key)

Sol: Equation of normal to $y^2 = 80x$ & $y^2 = 46(x - c)$ having slope 'm' is

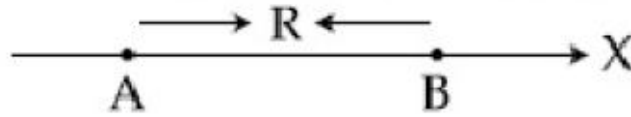
$$y = mx - 4am - 2a m^3 \text{ \& } y = m(x - c) - 2bm - bm^3$$

$$\therefore m = 0 \text{ or } 4a + 2am^2 = c + 2b + bm^2 \Rightarrow m^2 = \frac{2b + c - 4a}{2a - b}$$

In final key: 1,2,3 &4 but in primary key only option 2 is correct

10th Jan - Slot-1 - Phy

2. Two electric dipoles, A, B with respective dipole moments $\vec{d}_A = -4qa\hat{i}$ and $\vec{d}_B = -2qa\hat{i}$ are placed on the x-axis with a separation R as shown in the figure



The distance from A at which both of them produce the same potential is:

- 1) $\frac{R}{\sqrt{2}+1}$ 2) $\frac{\sqrt{2}R}{\sqrt{2}+1}$ 3) $\frac{R}{\sqrt{2}-1}$ 4) $\frac{\sqrt{2}R}{\sqrt{2}-1}$

Key: 4(Sri Chaitanya Key)

Sol: Potential due to dipole is $\frac{2P\cos\theta}{4\pi\epsilon_0 r^2}$. To get the same potential point should not lie

between the points A and B on line joining them and not near to point B $\frac{4}{r^2} = \frac{2}{(r-R)^2}$

In final key: 4, 2 but in primary key only option 2 is correct

10th Jan - Slot-2 - Phy

1. The modulation frequency of an AM radio station is 250 kHz, which is 10 % of the carrier wave. If another AM station approaches you for license what broadcast frequency will you allot ?

- 1) 2750 kHz 2) 2900 kHz 3) 2250 kHz 4) 2000 kHz

Key: 4(Sri Chaitanya Key)

Sol: $f_c = 2500$ $f_m = 250$ Side bands are 2250, 2750

In final key: 4 but in primary key option 2 is correct

11th Jan - Slot-1 - Mat

1. The direction ratios of normal to the plane through the points (0, -1, 0) and (0, 0, 1) and making an angle $\frac{\pi}{4}$ with the plane $y - z + 5 = 0$ are:

- 1) $2\sqrt{3}, 1, -1$ 2) $2, \sqrt{2}, -\sqrt{2}$ 3) $2, -1, 1$ 4) $\sqrt{2}, 1, -1$

Ans. 2, 4 (Sri Chaitanya Key)

Sol. Let the equation of plane be $a(x - 0) + b(y + 1) + c(z - 0) = 0$

It passes through (0, 0, 1) then

$$b + c = 0 \dots\dots\dots(1)$$

$$\text{Now } \cos \frac{\pi}{4} = \frac{a(0) + b(1) + c(-1)}{\sqrt{2}\sqrt{a^2 + b^2 + c^2}}$$

$$\Rightarrow a^2 = -2bc \text{ and } b = -c$$

$$\text{We get } a^2 = 2c^2$$

$$\Rightarrow \text{direction ratio } (a, b, c) = (\sqrt{2}, -1, 1) \text{ or } (\sqrt{2}, 1, -1)$$

In final key: 2, 4 but in primary key only option 4 is correct

11th Jan - Slot-1 - Phy

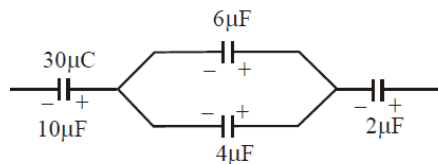
2. In the figure shown below, the charge on the left plate of the $10\mu\text{F}$ capacitor is $-30\mu\text{C}$. The charge on the right plate of the $6\mu\text{F}$ capacitor is:



- 1) $-18\mu\text{C}$ 2) $-12\mu\text{C}$ 3) $+12\mu\text{C}$ 4) $+18\mu\text{C}$

Ans: 4 (Sri Chaitanya Key)

Sol: $6\mu\text{F}$ & $4\mu\text{F}$ are in parallel & total charge on this combination is $30\mu\text{C}$

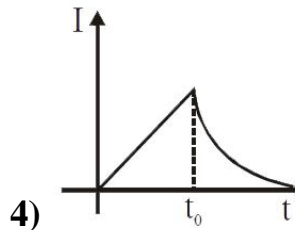
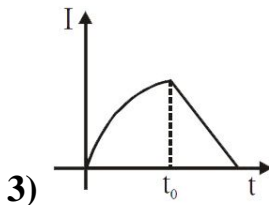
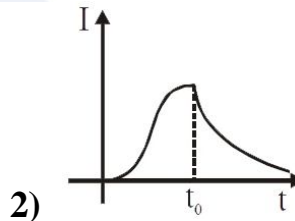
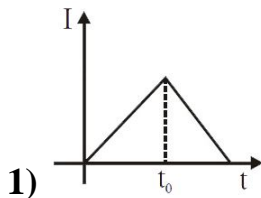
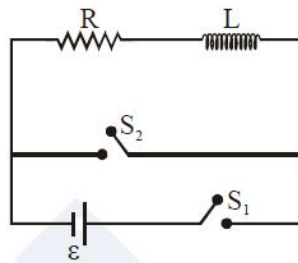


$$\therefore \text{Charge on } 6\mu\text{F capacitor} = \frac{6}{6+4} \times 30 = 18\mu\text{C}$$

Since charge is asked on right plate therefore is $+18\mu\text{C}$

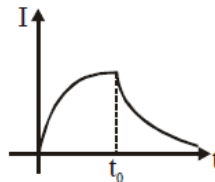
In final key: 4 but in primary key option 1 is correct

3. In the circuit shown, the switch S_1 is closed at time $t = 0$ and the switch S_2 is kept open. At some later time (t_0), the switch S_1 is opened and S_2 is closed. The behaviors of the current I as a function of time 't' is given by"



Ans: 2(Sri Chaitanya Key)

Sol: From time $t = 0$ to $t = t_0$, growth of current takes place and after that decay of current takes place. Most appropriate is 2.



In final key: 1,3 & 4 but in primary key only option 2 is correct

11th Jan - Slot-2 – Phy

1. A copper wire is wound on a wooden frame, whose shape is that of an equilateral triangle. If the linear dimension of each side of the frame is increased by a factor of 3, keeping the number of turns of the coil per unit length of the frame the same, then the self inductance of the coil :

- 1) Decreases by a factor of $9\sqrt{3}$ 2) Increases by a factor of 3
3) Decreases by a factor of 9 4) Increases by a factor of 27

Key: 2 (Sri Chaitanya Key)

Sol: Total length L will remain constant $L = (3a) N$ (N = total turns)

And length of winding = $(d) N$ (d = diameter of wire)

$$\text{Self inductance} = \mu_0 n^2 A \ell = \mu_0 n^2 \left(\frac{\sqrt{3}a^2}{4} \right) dN = \alpha a^2 N \alpha a$$

So self inductance will become 3 times

In final key: 2 but in primary key option 4 is correct

Jee-Main 2019(Jan)_Key Changes / Deletes

Paper 1 - B.E./B.Tech

Exam Date	Slot	PHY		CHE		MAT		Total	
		Key Changes	Key Delete	Key Changes	Key Delete	Key Changes	Key Delete	Key Changes	Key Delete
09-01-19	Shitft-1		1	1		1		2	1
09-01-19	Shitft-2	2						2	0
10-01-19	Shitft-1	1	1			1	1	2	2
10-01-19	Shitft-2	1	1					1	1
11-01-19	Shitft-1	2	1			1		3	1
11-01-19	Shitft-2	1	1				1	1	2
12-01-19	Shitft-1							0	0
12-01-19	Shitft-2		2					0	2
Grand Total		7	7	1		3	2	11	9