

29/01/2025

Evening



Aakash

Medical | IIT-JEE | Foundations

Corporate Office : AESL, 3rd Floor, Incuspaze Campus-2, Plot-13, Sector-18, Udyog Vihar,
Gurugram, Haryana-122018

Memory Based Answers & Solutions

Time : 3 hrs.

for

M.M. : 300

JEE (Main)-2025 (Online) Phase-1

(Physics, Chemistry and Mathematics)

IMPORTANT INSTRUCTIONS:

- (1) The test is of **3 hours** duration.
- (2) This test paper consists of 75 questions. Each subject (PCM) has 25 questions. The maximum marks are 300.
- (3) This question paper contains **Three Parts**. **Part-A** is Physics, **Part-B** is Chemistry and **Part-C** is **Mathematics**. Each part has only two sections: **Section-A** and **Section-B**.
- (4) **Section - A** : Attempt all questions.
- (5) **Section - B** : Attempt all questions.
- (6) **Section - A (01 – 20)** contains 20 multiple choice questions which have **only one correct answer**. Each question carries **+4 marks** for correct answer and **-1 mark** for wrong answer.
- (7) **Section - B (21 – 25)** contains 5 **Numerical value** based questions. The answer to each question should be rounded off to the **nearest integer**. Each question carries **+4 marks** for correct answer and **-1 mark** for wrong answer.

Delivering Champions Consistently

JEE (Advanced) 2024

AIR	Name	Classroom
25	Rishi Shekher Shukla	2 Year Classroom
67	Krishna Sai Shishir	2 Year Classroom
78	Abhishek Jain	2 Year Classroom
93	Hardik Aggarwal	2 Year Classroom
95	Ujjwal Singh	2 Year Classroom
98	Rachit Aggarwal	2 Year Classroom

JEE (Main) 2024

AIR	Name	Classroom	State
1	Sarvvi Jais	2 Year Classroom	Karnataka
15	M Sai Divya Teja Reddy	2 Year Classroom	Telangana
19	Rishi Shekher Shukla	2 Year Classroom	Telangana

Sol. $L = mvr$

$$L = m\sqrt{\frac{GM}{r}}r$$

$$L = m\sqrt{GMr}$$

$$\frac{L_B}{L_A} = \frac{1}{4\sqrt{3}} \cdot \frac{1}{2} = \frac{1}{8\sqrt{3}}$$

9. A capacitor $C_1 = 6 \mu\text{F}$, initially charged with a cell of emf 5V is disconnected and connected to another capacitor $C_2 = 12 \mu\text{F}$ which is initially neutral. The charges on C_1 and C_2 after connection are

- (1) $0 \mu\text{C}, 30 \mu\text{C}$ (2) $10 \mu\text{C}, 20 \mu\text{C}$
(3) $20 \mu\text{C}, 10 \mu\text{C}$ (4) $30 \mu\text{C}, 0 \mu\text{C}$

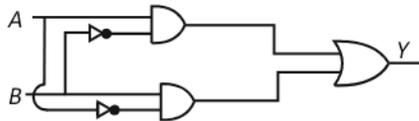
Answer (2)

Sol. Potential difference at equilibrium

$$V = \frac{C_1V_1 + C_2V_2}{C_1 + C_2} = \frac{(6\mu\text{F})(5\text{V})}{(6\mu\text{F}) + (12\mu\text{F})} = \frac{5}{3}\text{V}$$

$$q_1 = C_1V = (6\mu\text{F})\left(\frac{5}{3}\text{V}\right) = 10 \mu\text{C}$$

10. The truth table for the logical circuit shown below is



(1)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(2)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

(3)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(4)

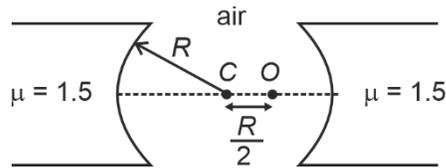
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

Answer (2)

Sol. $Y = \overline{AB} + \overline{BA}$

This is a XOR gate

11. Figure shows two spherical surfaces of radius R having common centre. If the object is placed at O , find the distance between the first images formed by both the surfaces



- (1) $\frac{4R}{35}$ (2) $\frac{4R}{27}$
(3) $\frac{4R}{70}$ (4) $\frac{2R}{35}$

Answer (1)

Sol. For right surface

$$\frac{1.5}{v_1} - \frac{1}{-R/2} = \frac{0.5}{-R}$$

$$\frac{1.5}{v_1} = \frac{-2}{R} - \frac{0.5}{R}$$

$$v_1 = \frac{-3R}{5}$$

For left surface

$$\frac{1.5}{v_2} - \frac{1}{-3R} = \frac{0.5}{-R}$$

$$v_2 = \frac{-9R}{7}$$

$$d = 2R - \left(\frac{3R}{5} + \frac{9R}{7}\right)$$

$$d = \frac{4R}{35}$$

Delivering Champions Consistently

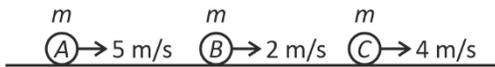
JEE (Advanced) 2024

- AIR 25 Rishj Shekher Shukla (2 Year Classroom)
- AIR 67 Krishna Sai Shishir (2 Year Classroom)
- AIR 78 Abhishek Jain (2 Year Classroom)
- AIR 93 Hardik Aggarwal (2 Year Classroom)
- AIR 95 Ujjwal Singh (2 Year Classroom)
- AIR 98 Rachit Aggarwal (2 Year Classroom)

JEE (Main) 2024

- Karnataka Topper: AIR 1 Sarvi Jais (100 Percentile Score)
- Telangana Topper: AIR 15 M Sai Divya Tuja Reddy (100 Percentile Score)
- Telangana Topper: AIR 19 Rishi Shekher Shukla (100 Percentile Score)

12. Three particles of same mass are moving as shown. (all collisions are elastic)



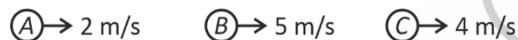
S_1 : After all collisions velocities are 4 m/s, 2 m/s and 5 m/s.

S_2 : Velocities are get interchanged in elastic collision of same mass.

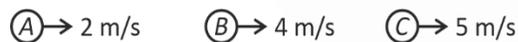
- (1) S_1 : Correct, S_2 : Correct
- (2) S_1 : Incorrect, S_2 : Correct
- (3) S_1 : Incorrect, S_2 : Incorrect
- (4) S_1 : Correct, S_2 : Incorrect

Answer (2)

Sol. After 1st collision



After 2nd collision



13. An electromagnetic wave propagates in +X-direction.

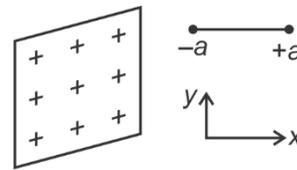
Then, electric field and magnetic field are directed along

- (1) X, Y
- (2) Y, Z
- (3) Z, Y
- (4) Y, X

Answer (2)

Sol. $\hat{C} = \hat{E} \times \hat{B}$

14. A dipole is placed such that its axis is perpendicular to the infinite charged sheet. Select the correct options



- (a) $T_{net} = 0$, F_{net} is along -ve x-axis
- (b) $T_{net} = 0$, $U = \min$
- (c) $T_{net} = 0$, $F_{net} = 0$
- (d) T_{net} and U both are maximum

- (1) (a), (b), (c) and (d)
- (2) (b) and (c)
- (3) (a) and (c)
- (4) (b) and (d)

Answer (2)

Sol. $T = \vec{p} \times \vec{E} = pE \sin\theta = 0$

$$U = -\vec{p} \cdot \vec{E} = -pE$$

$$\therefore T = 0, U = \min$$

$$F_{net} = 0$$

15. A cup of coffee take a time 't' to cool from 90°C to 80°C in a surrounding of 20°C. If a similar cup of coffee is cooled from 80°C to 60°C in the same surrounding, it takes a time

- (1) $\frac{13t}{5}$
- (2) $\frac{5t}{13}$
- (3) $\frac{12t}{5}$
- (4) 2t

Answer (1)

Delivering Champions Consistently

JEE (Advanced) 2024						JEE (Main) 2024		
 AIR 25 Rishi Shekher Shukla 2 Year Classroom	 AIR 67 Krishna Sai Shishir 2 Year Classroom	 AIR 78 Abhishek Jain 2 Year Classroom	 AIR 93 Hardik Aggarwal 2 Year Classroom	 AIR 95 Ujjwal Singh 2 Year Classroom	 AIR 98 Rachit Aggarwal 2 Year Classroom	 Karnataka Topper 100 PERCENTILE AIR 1 Sarvi Jain 2 Year Classroom	 Telangana Topper 100 PERCENTILE AIR 15 M Sai Divya Tuja Reddy 2 Year Classroom	 Telangana Topper 100 PERCENTILE AIR 19 Rishi Shekher Shukla 2 Year Classroom

Sol. From Newtons law of cooling

$$-\frac{\theta_2 - \theta_1}{t} = C \left(\frac{\theta_2 + \theta_1}{2} - \theta_s \right)$$

$$\Rightarrow -\left(\frac{80^\circ\text{C} - 90^\circ\text{C}}{t} \right) = C \left(\frac{90^\circ\text{C} + 80^\circ\text{C}}{2} - 20^\circ\text{C} \right)$$

$$\frac{10^\circ\text{C}}{t} = C(65^\circ\text{C})$$

$$C = \frac{2}{13t}$$

Also,

$$-\left(\frac{60^\circ\text{C} - 80^\circ\text{C}}{t'} \right) = C \left(\frac{60^\circ\text{C} + 80^\circ\text{C}}{2} - 20^\circ\text{C} \right)$$

$$\frac{20^\circ\text{C}}{t'} = C(50^\circ\text{C})$$

$$C = \frac{2}{5t'}$$

$$\frac{2}{13t} = \frac{2}{5t'}$$

$$t' = \frac{13t}{5}$$

16.

17.

18.

19.

20.

SECTION - B

Numerical Value Type Questions: This section contains 5 Numerical based questions. The answer to each question should be rounded-off to the nearest integer.

21. A converging lens of focal length 24 cm, made of glass ($\mu_{\text{glass}} = 1.5$) is immersed completely in water ($\mu_{\text{water}} = 1.33$). It will now behave like a converging lens of focal length _____ cm.

Answer (96)

$$\text{Sol. } f_{\text{air}} (\mu_{\text{glass}} - 1) = f_{\text{water}} \left(\frac{\mu_{\text{glass}}}{\mu_{\text{water}}} - 1 \right)$$

$$(+24 \text{ cm}) (1.5 - 1) = f_{\text{water}} \left(\frac{1.5}{1.33} - 1 \right)$$

$$24 \times \frac{1}{2} = f \times \frac{1}{8}$$

$$f = 12 \times 8$$

$$f_{\text{water}} = 96 \text{ cm}$$

22. Find the number of spectral lines in H-atom when de-excite from $n = 4$ to ground state

Answer (6)

Sol. Number = 3×2

$$= 6$$

23. For a certain mechanical system the rate of accretion $\frac{dm}{dt}$

is proportional to \sqrt{v} , where m is mass, t is time and v is velocity, then the power is proportional to $v^{n/2}$ where n is _____.

Answer (5)

$$\text{Sol. } F = \left(\frac{dm}{dt} \right) v = (R\sqrt{v})v = Rv^{3/2}$$

$$P = Fv = (Rv^{3/2})v = Rv^{5/2}$$

24.

25.

Delivering Champions Consistently

JEE (Advanced) 2024

AIR 25 Rishi Shekher Shukla 2 Year Classroom	AIR 67 Krishna Sai Shishir 2 Year Classroom	AIR 78 Abhishek Jain 2 Year Classroom	AIR 93 Hardik Aggarwal 2 Year Classroom	AIR 95 Ujjwal Singh 2 Year Classroom	AIR 98 Rohit Aggarwal 2 Year Classroom
---	--	--	--	---	---

JEE (Main) 2024

Karnataka Topper 1 Sarvi Jain 2 Year Classroom	Telangana Topper 100 M Sai Divya Teja Reddy 2 Year Classroom	Telangana Topper 100 Rishi Shekher Shukla 2 Year Classroom
---	---	---