

JEE Main 2024 Question Paper Feb 1 Shift 1 (B.E./B.Tech)

JEE Main Physics Questions

Ques 1. Determine Min. Energy released when an electron jumps to ground state in Balmer series from infinity.

Ans. $+1.9\text{eV}$

Ques 2. Determine ratio of de broglie wavelength of α - particle and proton

Ans. 1:2

Ques 3. If current in a conductor $3t^2 + 4t^3$, charge = ?, flow $t = 1$ to $t = 2\text{s}$

Ans. 22C

Ques 4. With rise in temperature the young's modulus of elasticity

- A. Increases**
- B. Decreases**
- C. Remaining constant**
- D. None of these**

Ans. B

Ques 5. Find percentage change in capacitance if potential difference across it has been changed from V to $2V$.

Ans. 100%

Ques 6. A vernier caliper has 10 main scale divisions coinciding with 11 vernier scale division equals 5 mm. the least count of the device is :

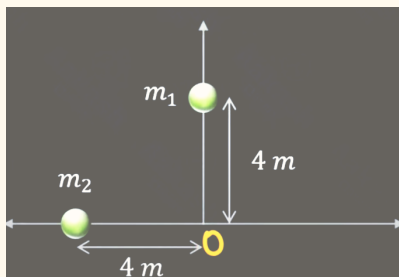
- A. $\frac{1}{2}$
- B. $\frac{5}{12}$
- C. $\frac{5}{11}$
- D. 0.3

Ans. C

Ques 7. The length of a seconds pendulum if it is placed at height $2R$ from the surface of the earth (R : radius of earth) is $\frac{10}{x\pi^2}$ m. Find x

Ans. 9

Ques 8. Two particles each of mass 2 kg are placed as shown in $x \rightarrow y$ plane. If the distance of centre of mass from origin is $\frac{4\sqrt{2}}{x}$ find x :



Ans. 2

Ques 9. A bullet of mass 10^{-2} kg and velocity 200 m/s gets embedded inside the bob of mass 1 kg of a simple pendulum. The max. height that the system rises by is _____ cm.

Ans. 20

Ques 10. De Broglie wavelength of proton = λ and that of an α particle 2λ . The ratio of velocity of proton to that of a particle is :De Broglie wavelength of proton = λ and that of an α particle 2λ . The ratio of velocity of proton to that of α particle is :

- A. 8
- B. $\frac{1}{8}$
- C. 4
- D. $\frac{1}{4}$

Ans. B

JEE Main Chemistry Questions

Ques 1. In case of isoelectronic species the size of F^- , Na and Na^+ is affected by:

- A. Principle of Quantum number(n)
- B. Electron - electron interaction
- C. Nuclear change (z)
- D. None of the factors because their size is the same

Ans. C

Ques 2. **S.I:** $[Ni(H_2O)_6]^{2+}$ is green in colour

S.II: $[Ni(ON)_4]^{2-}$ is colourless

Ans. Both the statements are correct

Ques 3. In Kjeldahl's method for estimation of nitrogen, $CuSO_4$ acts as

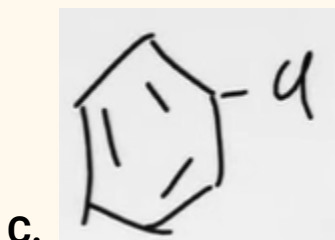
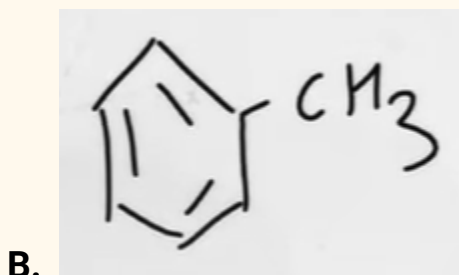
- A. Oxidizing agent
- B. Reducing agent
- C. Catalytic agent
- D. Hydrolysis agent

Ans. C

Ques 4. Which is homoleptic complex

Ans. $[\text{Ni}(\text{CN})_4]^{2-}$

Ques 5. Which is following compound is easily attacked by electrophile



Ans. D

Ques 6. The dimensions of angular impulse is equal to :

- A. [ML²T⁻¹]**
- B. [ML²T]**
- C. [ML²T²]**
- D. [MLT⁻¹]**

Ans. A

Ques 7. Complementary stand of DNA ATGCTTCA is:

- A. TACGAAGA**
- B. TACGAAGT**
- C. TAGCAACA**
- D. TAGCTACT**

Ans. B

Ques 8. We are given with 3 NaCl samples and their Van 't Hoff factors

Sample	van 't Hoff factor
Sample – 1 (0.1M)	i_1
Sample – 2 (0.01M)	i_2
Sample – 3 (0.001M)	i_3

- A. $i_1 = i_2 = i_3$**
- B. $i_1 > i_2 > i_3$**
- C. $i_1 > i_2 > i_3$**
- D. $i_1 > i_3 > i_2$**

Ans. A

Ques 9. Which of the following is correct for adiabatic free expansion against vacuum?

- A. $q = 0, \Delta U = 0, w = 0$**

- B. $q \neq 0, w \neq 0, \Delta U = 0$
- C. $q = 0, \Delta U \neq 0, w \neq 0$
- D. $q = 0, \Delta U \neq 0, w \neq 0$

Ans. A

**Ques 10. Which of the following have a trigonal bipyramidal shape?
PF₅, PBr₅, [PtCl₄], SF₆, BF₃, BrF₅, PCl₅, [Fe(CO)₅]**

- A. PF₅, PBr₅, PCl₅, [Fe(CO)₅] only
- B. PF₅, PBr₅, PCl₅, BrF₅ only
- C. PF₅, PCl₅, [Fe(CO)₅] only
- D. PF₅, PBr₅, BrF₅, PCl₅, [Fe(CO)₅] only

Ans. A

JEE Main Mathematics Questions

Ques 1. Number of ways of arranging 5 officers in 4 rooms

Ans. 1024

Ques 2. 3, a, b, c are in Ap 3, a-1, b+1, c+9 → GP Then AM of a, b, c is

Ans. 11

Ques 3. 3, 7, 1,, 404 and 4, 7, 10,, 403 sum of common terms

Ans. 6970

Ques 4. The value of integral

$$\int_0^{\pi/4} \frac{x dx}{\cos^4 2x + \sin^4 2x} =$$

Ans. $\pi^2/16\sqrt{2}$

Ques 5. $L_1: \vec{r} = (i + 2j + 3k) + \lambda(i - j + k); L_2: \vec{r} = (4i + 5j + 6k) - \mu(i + j - k)$

intersect L_1 and L_2 at P and Q respectively. If (α, β, γ) is the mid point of the line segment PQ , then $2(\alpha, \beta, \gamma)$ is equal to

Ans. (1, 2, 3)

Ques 6. Five people are distributed in four identical rooms. A room can also contain zero people. Find the number of ways to distribute them.

- A. 47
- B. 53
- C. 43
- D. 51

Ans. D

Ques 7. If the hyperbola $x^2 - y^2 \operatorname{cosec}^2\theta = 5$ and ellipse $x^2 \operatorname{cosec}^2\theta + y^2 = 5$ has eccentricity e_H and e_E respectively and $e_H = \sqrt{7}e_E$, then θ is equal to

- A. $\pi/6$
- B. $\pi/3$
- C. $\pi/2$
- D. $\pi/4$

Ans. A

Ques 8. Given: $5f(x) + 4f(1/x) = x^2 - 4$ & $y = 9f(x) \cdot x^2$ If y is strictly increasing, then find interval of x .

- A. $(-\infty, -1/\sqrt{5}] \cup (1/\sqrt{5}, 0)$
- B. $(-1/\sqrt{5}, 0) \cup (0, 1/\sqrt{5})$
- C. $(0, 1/\sqrt{5}) \cup (1/\sqrt{5}, \infty)$

D. $(-\sqrt{\frac{2}{5}}, 0) \cup (\sqrt{\frac{2}{5}}, \infty)$

Ans. D

Ques 9. Let $S = \{1, 2, 3, \dots, 20\}$, $R_1 = \{(a, b): a \text{ divide } b\}$,
 $R_2 = \{(a, b): a \text{ is integral multiple of } b\}$ and $a, b \in S$. $n(R_1 - R_2) = ?$

Ans. 46

Ques 10. If $(t + 1) dx = (2x + (t + 1)^3)dt$ and $x(0) = 2$, then $x(1)$ is equal to:

- A. 5
- B. 6
- C. 12
- D. 8

Ans. C