

JEE Main 2024 Question Paper April 9 Shift 1 (B.E./B.Tech)

JEE Main Physics Questions

Ques 1. The dimension of latent heat is:

- A. $[M^{\circ}L^2T^{-1}]$
- B. $[M^{\circ}L^2T^{-2}]$
- C. $[M^{\circ}LT^{-2}]$
- D. $[M^{-1}L^2T^{-2}]$

Ans. B

Ques 2. In the pulley-block system shown, the pulley and the block are ideal. If the acceleration of the block is $g/8$, find $m_1:m_2$

(Given $m_2 > m_1$)



- A. 7:9
- B. 5:7
- C. 3:4
- D. 9:11

Ans. A

Ques 3. Velocity of a particle of mass m as a function of displacement x is given by $v = \alpha\sqrt{x}$. Work done to move it from $x = 0$ to $x = d$ is:

- A. $ma^2 / 2 \cdot d$
- B. $ma^2 \cdot d$
- C. $3ma^2 \cdot d/2$
- D. $2ma^2 \cdot d$

Ans. A

Ques 4. Two persons are pulling a rope towards themselves with a force of 200 N each. If the Young's modulus is 2×10^{11} N/m² and area of cross-section is 2 cm² for the rope, the elongation in the rope is _____.

(distance between the persons holding the ropes is 2 m.)

- A. 10 μm
- B. 20 μm
- C. 5 μm
- D. 40 μm

Ans. A

Ques 5. A particle oscillates in simple harmonic motion such that its speed and acceleration at distance 2 m from mean position are 4 m/s

and 16 m/s^2 respectively. Find the amplitude of oscillation of the particle.

- A. $\sqrt{10} \text{ m}$
- B. $\sqrt{6} \text{ m}$
- C. $\sqrt{8} \text{ m}$
- D. $\sqrt{3} \text{ m}$

Ans. B

Ques 6.

Assertion (A): Object at radius of curvature of biconvex lens made by glass ($\mu = 1.5$) form image at same distance on other side of the lens.

Reason (R): Image of a real object formed by concave lens is always virtual and erect.

- A. Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
- B. Both Assertion (A) and Reason (R) are true but Reason (R) is not an explanation of Assertion (A).
- C. Assertion (A) is true and Reason (R) is false.
- D. Assertion (A) is false and Reason (R) is true.

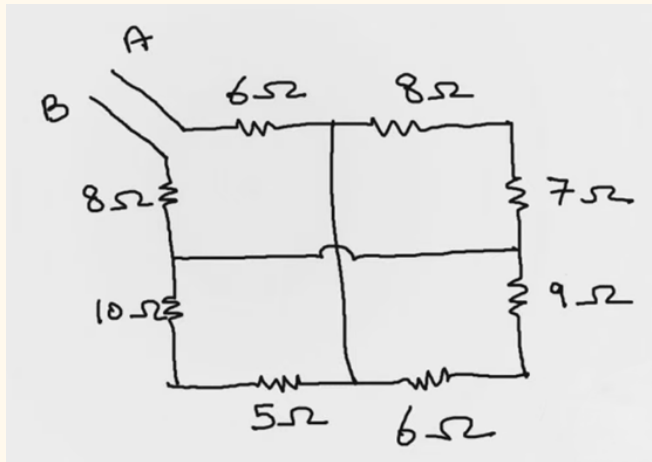
Ans. B

Ques 7. The equivalent energy of 1 gm mass is equal to:

- A. $8.3 \times 10^{26} \text{ MeV}$
- B. $5.6 \times 10^{26} \text{ MeV}$
- C. $8.3 \times 10^{12} \text{ MeV}$
- D. $5.6 \times 10^{12} \text{ MeV}$

Ans. B

Ques 8. Find the equivalent resistance between terminal A and B for the given network.



- A. $16\ \Omega$
- B. $20\ \Omega$
- C. $15\ \Omega$
- D. $19\ \Omega$

Ans. D

Ques 9. A galvanometer having resistance of $200\ \Omega$ shows full deflection at $20\ \mu\text{A}$. If the galvanometer has to measure current up to $20\ \text{mA}$, the shunt resistance required is

- A. $200/99\ \Omega$
- B. $200/999\ \Omega$
- C. $20/99\ \Omega$
- D. $200 \times 999\ \Omega$

Ans. B

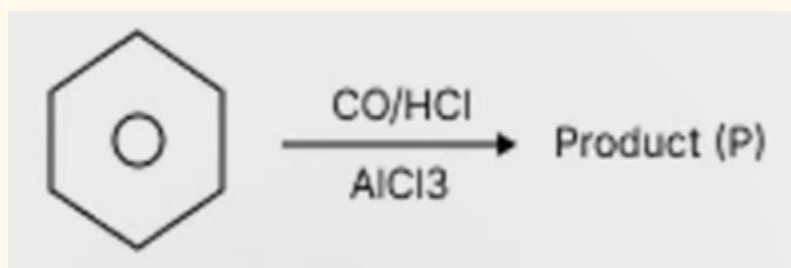
Ques 10. A person covers the first half of the distance with 6 m/s and the rest half with 9 m/s and 15 m/s in two equal time intervals. Find the average speed of the journey.

- A. 12 m/s
- B. 9 m/s
- C. 10 m/s
- D. 8m/s

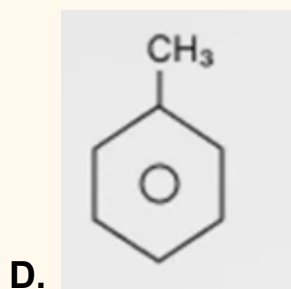
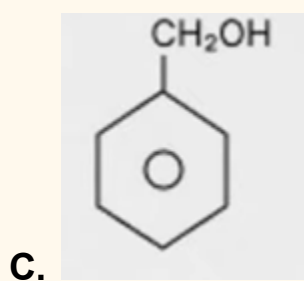
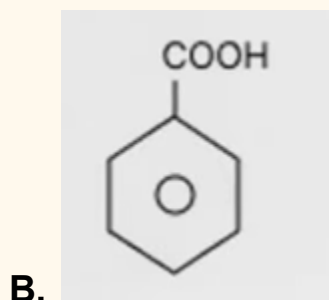
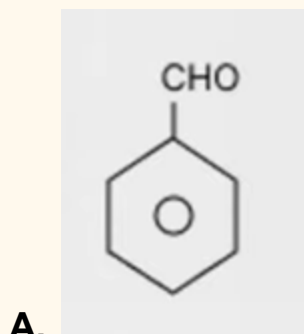
Ans. D

JEE Main Chemistry Questions

Ques 1. For the reaction:



Product (P) is



Ans. A

Ques 2. Which of the following has sp^2 hybridisation?

- A. BF_3
- B. H_2SO_4
- C. NH_4^+
- D. NH_3

Ans. A

Ques 3. Consider the following electronic configuration:



Which option is correct?

- A. Cu^{2+} is more stable in aqueous solution
- B. Cu^+ is more stable in aqueous solution
- C. Cu^+ and Cu^{2+} are equally stable in aqueous solution
- D. Depends upon copper salt

Ans. A

Ques 4. Chemical formula of compound present in tooth enamel?

- A. $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$
- B. $\text{Ca}_8(\text{PO}_4)_4(\text{OH})_2$
- C. $\text{Ca}_6(\text{PO}_4)_2(\text{OH})_2$
- D. $\text{Ca}_8(\text{PO}_4)_6(\text{OH})_2$

Ans. A

Ques 5. Equal volume of 1 M HCl and 1 M H_2SO_4 neutralized by dil. NaOH and heat released is x and y kcal respectively, then which is correct?

- A. $x = y$
- B. $x = 0.5 y$
- C. $x = 0.4 y$
- D. $x = 2 y$

Ans. B

Ques 6. Number of ambidentate nucleophiles among the following is:

CN^- , SCN^- , NO_2^- , CH_3COO^- , $\text{C}_2\text{O}_4^{2-}$, NH_2^- , SO_4^{2-}

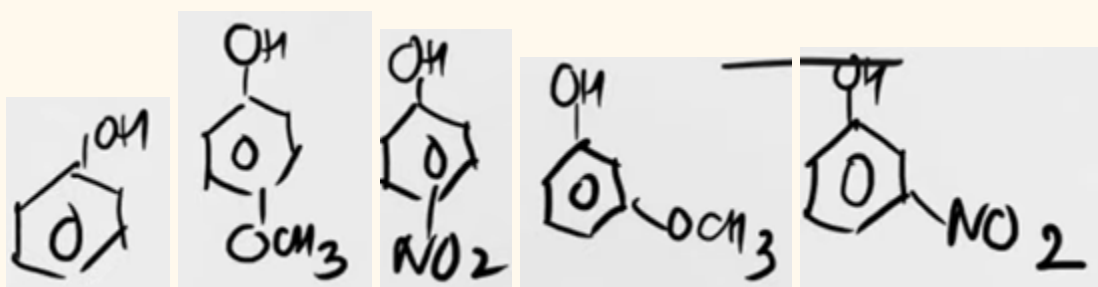
Ans. 3

Ques 7. Which of the following orbitals has the highest energy?

- A. $n = 6, l = 0$
- B. $n = 5, l = 2$
- C. $n = 4, l = 2$
- D. $n = 3, l = 1$

Ans. B

Ques 8. Arrange the following in increasing order of acidity.



- A. $\text{I} < \text{II} < \text{III} < \text{IV} < \text{V}$
- B. $\text{II} < \text{I} < \text{IV} < \text{V} < \text{III}$
- C. $\text{III} < \text{V} < \text{IV} < \text{I} < \text{II}$
- D. $\text{II} < \text{IV} < \text{III} < \text{I} < \text{V}$

Ans. B

Ques 9. Consider the following compound.



Correct order of their basicity is:

- A. III > II > I
- B. I > II > III
- C. II > I > III
- D. II > III > I

Ans. B

Ques 10. Which of the following is colorless?

- A. Eu^{3+}
- B. Lu^{3+}
- C. Nd^{3+}
- D. Sm^{3+}

Ans. B

Ques 11. Which among the following have a single unpaired electron?

N_2 , O_2 , CN^- , O_2^- , C_2^{2-} , N^{2-}

- A. O_2 , N_2
- B. CN^- , C_2^{2-}
- C. CN^- , O_2^-
- D. N_2^- , O_2^-

Ans. D

Ques 12.

S-I: Sulphur exists as S_8 while oxygen exists as O_2 .

S-II: In oxygen, $p\pi-p\pi$ bonding occurs while it is not effective in sulphur.

- A. Both S-I and S-II are true**
- B. S-I is true and S-II is false**
- C. S-I is false and S-II is true**
- D. Both S-I and S-II are false**

Ans. A

Ques 13. Consider the reaction between PbS and HNO_3 .



Which of the following is not formed.

- A. NO**
- B. NO_2**
- C. S**
- D. $Pb(NO_3)_2$**

Ans. B

Ques 14. Which of the following statements is incorrect?

- A. $KMnO_4$ and NaOH can be used as secondary standard**
- B. Primary standard should not undergo change in air**

- C. Reaction of primary standard with another substance should not be instantaneous
- D. Primary standard should be soluble in H_2O

Ans. C

JEE Main Mathematics Questions

Ques 1. A ray of light passing through $(1, 2)$ after reflecting on x-axis at point Q passes through $R(3, 4)$. If $S(h, k)$ is such that PQRS is a parallelogram, then find the value of hk^2 .

- A. 90
- B. 84
- C. 96
- D. 108

Ans. B

Ques 2. Tetrahedral dice having outcomes (1, 2, 3, 4) has 3 outcomes a, b, c (which are visible). Probability that $ax^2 + bx + c = 0$ has real roots is m/n (m, n are coprime), then $m + n = ?$

- A. 4**
- B. 5**
- C. 6**
- D. 7**

Ans. B

Ques 3. A circle passes through (0, 0) and (1, 0) and touches the circle $x^2 + y^2 = 9$. Then the locus of the centre of the circle is:

- A. Circle**
- B. Parabola**
- C. Hyperbola**
- D. Straight Line**

Ans. A

Ques 4. \vec{A}, \vec{B} and \vec{C} are given as

$$\vec{A} = a\hat{i} + 4\hat{j} + 5\hat{k}$$

$$\vec{B} = 2\hat{i} + 5\hat{j} + 6\hat{k}$$

$$\vec{C} = \vec{A} + \vec{B}$$

$$|\vec{C}| = |\vec{A} - \vec{B}|$$

- A. 25,731**
- B. 25,669**
- C. -25,731**
- D. -25,669**

Ans. C

Ques 5. If set $A = \{z : |z - 1| \leq 1\}$ and set $B = \{z : |z - 5i| \leq |z - 5|\}$, if $z = a + ib$, where $a, b \in \mathbb{R}$, then sum of modulus squares of $A \cap B$ is:

- A. 0
- B. 2
- C. 4
- D. 5

Ans. B

Ques 6.

$$\text{If } \frac{1}{(1+d)(1+2d)} + \frac{1}{(1+2d)(1+3d)} + \dots + \frac{1}{(1+9d)(1+10d)} = 1,$$

then the value of $50d$ is __ . ($d > 0$)

- A. 50
- B. 60
- C. 25
- D. 30

Ans. C

Ques 7. The remainder when $(428)^{2024}$ is divided by 21 is:

Ans. 1

Ques 8. If A is a 3×3 matrix, $\det(3\text{adj}(2\text{adj} A)) = 2^{-13} \cdot 3^{-10}$ and $\det(3\text{adj}(2A)) = 2^{-m} \cdot 3^{-n}$ then $2m + 2n$ is equal to:

Ans. 14

Ques 9. If $f(x)=3ax^3+ bx^2 + cx+ 1$ and $f(1) = 41$, $f'(1) = 2$ and $f''(1) = 4$ then $(a^2 + b^2 + c^2)$ is

Ans. 8

Ques 10. If domain of

$$f(x) = \sin^{-1} \left(\frac{x-1}{2x+3} \right)$$

is $R - (a, \beta]$ then $12a\beta$ is equal to:

Ans. 32

Ques 11. $A = \{2,4,6,8\}$, $B = \{3,7,6,9\}$. $R: A \times B \Rightarrow A \times B$ such that $(a_1, b_1)R(a_2, b_2)$ $a_1 + a_2 = b_1 + b_2$ where $(a_1, b_1) \in A$, $(a_2, b_2) \in B$. Find the number of elements in the relation.

Ans. 9