

JEE Main 2024 Question Paper April 6 Shift 1 (B.E./B.Tech)

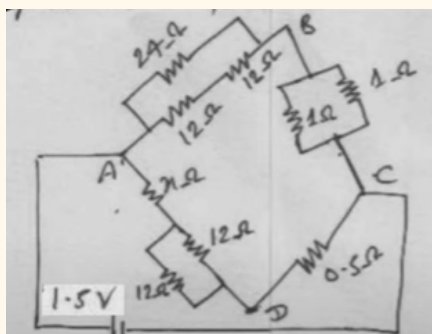
JEE Main Physics Questions

Ques 1. For a given single electron atom, ratio of shortest wavelength in Balmer and Lyman series is

- A. 4:1
- B. 1:4
- C. 1:2
- D. 2:1

Ans. A

Ques 2. The value of unknown resistance x for which potential difference between point B and D is zero is _____.



- A. 12 Ω
- B. 6 Ω

- C. 3Ω
- D. 2Ω

Ans. B

Ques 3. Which of the following does not depend on the wave nature of light?

- A. Reflection of light
- B. Diffraction
- C. Photoelectric effect
- D. Polarization
- E. Interference

- A. C only
- B. A, B
- C. A,B, C
- D. D,E

Ans. A

Ques 4. Four particles A, B, C & D have masses $m/2$, $2m$ & $4m$. If they have equal momentum, the particle that has highest kinetic energy is:

- A. A
- B. B
- C. C
- D. D

Ans. A

Ques 5. Ratio of angle of prism and minimum deviation is one for a prism whose refractive index is $\sqrt{3}$. Then the angle of the prism (in Degree) is _____.

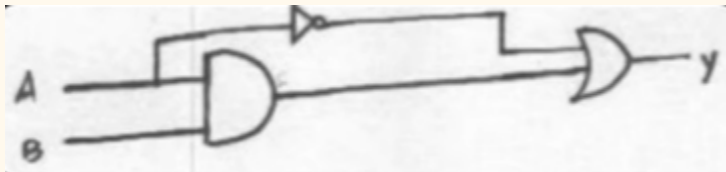
Ans. 60

Ques 6. A bullet of mass 50 gm enters a metal sheet with speed of 100 m/s and emerges with speed of 40 m/s. the loss in kinetic energy of bullet is

- A. 105 J**
- B. 42 J**
- C. 210J**
- D. 140 J**

Ans. C

Ques 7. Find the truth table for the following circuit



A.

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

B.

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

C.

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

D.

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

Ans. B

Ques 8. A ball of mass m and density p made to free fall into viscous liquid of density p_o , the viscous force in the ball (where terminal velocity is upwards) is

- A. $mg (1 - p/p_o)$**
- B. $mg (1 - p_o/p)$**
- C. $mg / (1 - p/p_o)$**
- D. $mg / (1 - p_o/p)$**

Ans. B

Ques 9. For a spring block system, the error in time period calculation is 2% and the error in mass calculation is 1 %. Find the percentage error in spring constant K

- A. 2 %**
- B. 4%**
- C. 5 %**
- D. 10 %**

Ans. C

Ques 10. Kinetic energy to move a body of mass m from surface of earth to infinite distance from the earth is (g is acceleration due to gravity on surface of earth & R is radius of earth)

- A. 2mgR**
- B. $\frac{1}{2}$ mgR**
- C. mgR**
- D. $\frac{1}{4}$ mgR**

Ans. C

Ques 11. Find the ratio of the root mean square speed of oxygen and helium molecules at the same temperature.

- A. $2\sqrt{2}$**
- B. $1 / 2\sqrt{2}$**
- C. $\frac{1}{4}$**
- D. $1/32$**

Ans. B

Ques 12. The specific heat capacity for a gas following the relation $PV^\gamma = RT$ is (C_v is heat capacity at constant volume of R is gas constant)

- A. C_v
- B. $C_v + R$
- C. $R/3 + C_v$
- D. R

Ans. A

Ques 13. A screw gauge has 100 divisions with pitch 1 mm circular scale. Upon keeping a wire between the studs, main scale reading is 1 mm and 42nd coincides circular scale division with the reference line. Find the diameter of the circular cross sectional wire in mm.

- A. 1.42
- B. 1.40
- C. 1.38
- D. 0.39

Ans. A

Ques 14. Time period of a simple harmonic motion is 3.14 seconds, with an amplitude of 0.06 m. If the maximum velocity of the particle is $k \times 10^{-2} \text{ m/s}$, find the value of k .

Ans. 12

Ques 15. A body uniformly accelerates (starting from rest) to a speed of 80 km/h in time t and then maintains this speed for a time interval of $3t$. Average speed for whole motion is _____ km/h.

Ans. 7

JEE Main Chemistry Questions

Ques 1. Among the given molecules, identify the one which undergoes nucleophilic addition reaction at fastest rate

- A. HCHO
- B. CH₃CHO
- C. CH₃CH₂CHO
- D. CH₃CH₂CH₂CHO

Ans. A

Ques 2. Which compound will absorb light at more frequency?

- A. [Cr(H₂O)₆]³⁺
- B. [CrCl₅]³⁻
- C. [Cr(CN)₆]³⁻
- D. [CrCl₃(H₂O)₃]

Ans. C

Ques 3. Find out the ratio of t_{99.9} and t₉₀ for first order.

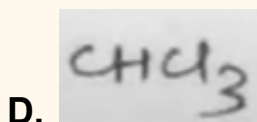
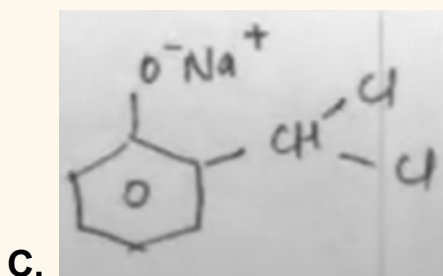
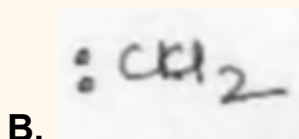
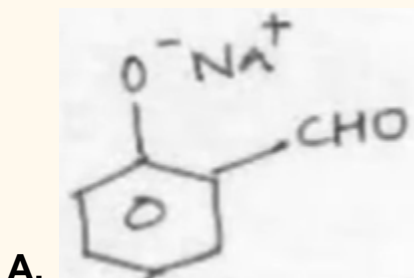
Ans. 3

Ques 4. Which of the following is not a semiconductor?

- A. Silicon
- B. Germanium
- C. Copper oxide
- D. Graphite

Ans. D

Ques 5. Which of the following is not the intermediate observed in Reimer-Tiemann reaction



Ans. D

Ques 6. Density of x M solution of NaOH is 1.12 g/mL and molality is 3 m, Then the value of x is:

- A. 3
- B. 2.8
- C. 3.8
- D. 3.5

Ans. A

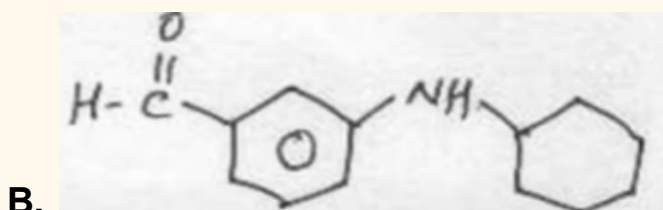
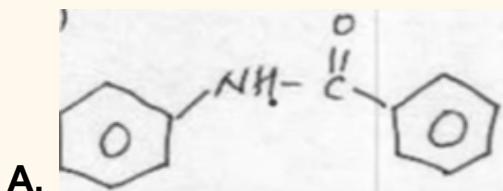
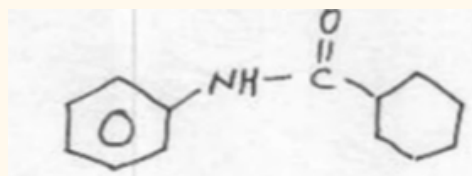
Ques 7. Match List I and List II and choose the correct option

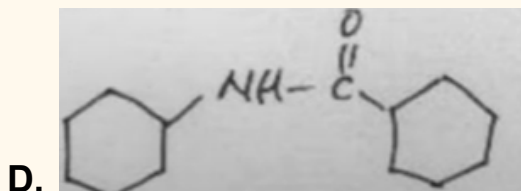
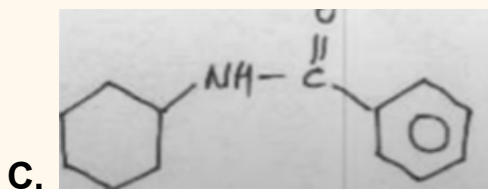
	List -I (Reagent)		List-II (radical)
(I)	Dil. HCl	(A)	Pb ²⁺
(II)	NH ₄ Cl + NH ₄ OH + (NH ₄) ₂ CO ₃	(B)	Al ³⁺
(III)	NH ₄ Cl + NH ₄ OH + H ₂ S	(C)	Mn ²⁺
(IV)	NH ₄ Cl + NH ₄ OH	(D)	Sr ²⁺

- A. I-(A), II-(D), III-(C), IV-(B)
- B. I-(D), II-(A), III-(C), IV-(B)
- C. I-(A), II-(D), III-(B), IV-(C)
- D. I-(B), II-(C), III-(D), IV-(A)

Ans. A

Ques 8. Correct metamer of the following compound is





Ans. C

Ques 9. How many of the following do not belong to Lanthanoids?
Eu, Er, Lu, Cm, Yb, Tb

- A. 5
- B. 4
- C. 3
- D. 1

Ans. D

Ques 10. Choose the correct option based on matching:

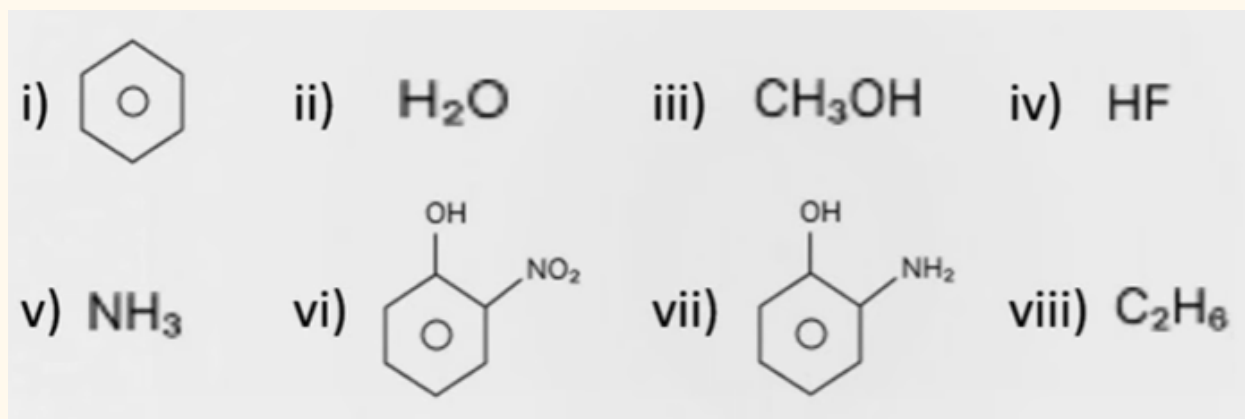
Hybridisation	Shape
(A) sp^3	(I) Octahedral
(B) sp^3d	(II) Tetrahedral
(C) sp^2	(III) Trigonal bipyramidal
(D) sp^3d^2	(IV) Trigonal planar

A. A → I; B → II; C → III; D → IV

- B. A \rightarrow II; B \rightarrow III; C \rightarrow IV; D \rightarrow I
 C. A \rightarrow II; B \rightarrow III; C \rightarrow I; D \rightarrow IV
 D. A \rightarrow III; B \rightarrow II; C \rightarrow IV; D \rightarrow I

Ans. B

Ques 11. How many of the following show H-bonding?



Ans. 6

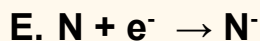
Ques 12. $\text{KMnO}_4 \xrightarrow{\text{H}^+} \text{X}$ (Product having Mn)

What is the difference in spin only magnetic moment (in B.M) between the given reactant and product. (Nearest integer)

Ans. 6

Ques 13. Which of the following will have positive electron gain enthalpy?

- A. $\text{Na} + \text{e}^- \rightarrow \text{Na}^-$
 B. $\text{O} + 2\text{e}^- \rightarrow \text{O}^{2-}$
 C. $\text{F} + \text{e}^- \rightarrow \text{F}^-$
 D. $\text{Be} + \text{e}^- \rightarrow \text{Be}^-$



A. (B, C, E)

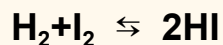
B. (A, B, E)

C. (A, C, D)

D. (A, B, C)

Ans. A

Ques 14. Consider the given reaction:



If equal number of molecule of H_2 , I_2 and HI are present at equilibrium. Then $K_p = t \times 10^{-1}$. Find out t.

A. 10

B. 0.01

C. 0.1

D. 1

Ans. A

Ques 15. Choose the correct option regarding the following statements.

Statement-I: 2,4,6-trinitrotoluene is picric acid.

Statement-II: Reaction of 4-hydroxybenzene-1,3-disulphonic acid gives picric acid.

A. Both statement-I and statement-II are true

B. Both statement-I and statement-II are false

C. Statement-I is true but statement-II is false

D. Statement-I is false but statement-II is true

Ans. D

Ques 16. Statement I: Gallium has low melting point, so it is used in thermometers.

Statement II: A substance having 253 K can be measured by Ga thermometer.

- A. Both S-I and S-II are correct.**
- B. Both S-I and S-II are incorrect.**
- C. S-I is correct and S-II is incorrect.**
- D. S-II is correct and S-I is incorrect.**

Ans. C

Ques 17. Among the following which is not a base of DNA

- A. Adenine**
- B. Uracil**
- C. Guanine**
- D. Cytosine**

Ans. B

Ques 18. Which of the following statement is incorrect

- A. Glycerol is purified by vacuum distillation**
- B. Aniline is purified by steam distillation**
- C. Chloroform and aniline can be separated by distillation**
- D. Ethanol and water are azeotropic mixture and can be separated by distillation**

Ans. D

JEE Main Mathematics Questions

Ques 1. If $A_r =$

$$\begin{vmatrix} r & 1 & \frac{n^2}{2} + \alpha \\ 2r & 2 & n^2 - \beta \\ 3r - 1 & 3 & \frac{n}{2}(3n - 1) \end{vmatrix}$$

then the value of $2A_{10} - A_8$ is equal to

- A. $4\alpha + 2\beta$
- B. $2n$
- C. 0
- D. $2\alpha + 4\beta$

Ans. A

Ques 2. The value of

$$\int_0^{\frac{\pi}{4}} \frac{(\cos^2 x \sin^2 x)}{(\cos^3 x + \sin^3 x)} dx$$

is equal to:

- A. $\frac{1}{6}$
- B. $\frac{1}{3}$
- C. $\frac{1}{2}$
- D. 1

Ans. A

Ques 3. Let α, β be the distinct roots of the quadratic equation $x^2 - (t^2 - 5t + 6)x + 1 = 0$ and $a_n = \alpha^n + \beta^n$, then the minimum value of

$$\frac{a_{2023} + a_{2025}}{a_{2024}} \text{ is ?}$$

- A. $-\frac{1}{4}$
- B. $\frac{1}{4}$
- C. $-\frac{1}{2}$
- D. $\frac{1}{2}$

Ans. A

Ques 4. Find the shortest distance between two lines

$$\frac{x-3}{2} = \frac{y+15}{-7} = \frac{z-9}{5} \text{ and } \frac{x-1}{2} = \frac{y-1}{1} = \frac{z-9}{-3} .$$

- A. $4\sqrt{3}$
- B. $8\sqrt{3}$
- C. $6\sqrt{3}$
- D. $2\sqrt{3}$

Ans. A

Ques 5. R is defined on set $X = \{1, 2, \dots, 20\}$ and $R_1 = \{(x, y) : 2x - 3y = 23\}$, $R_2 = \{(x, y) : 5x - 4y = 0\}$. If M, N represent the number of elements to be added to make R_1 & R_2 symmetric respectively. Then find the value of $M + N$.

- A. 10
- B. 8
- C. 12
- D. 11

Ans. A

Ques 6. If $\frac{dy}{dx} + \frac{y}{x \ln x} = \frac{1}{x^2 \ln x}$ and $y^{(e-1)} = 0$. The $y(e)$ is equal to:

- A. $(e^2 + 1) / e$
- B. $(e^2 - 1) / e$
- C. $(e^2 + 2) / e$
- D. $(e^2 - 2) / e$

Ans. B

Ques 7. Solve the differential equation:

$$\frac{dy}{dx} + \frac{y}{1+x^2} = e^{-\tan^{-1} x}$$

- A. $y e^{\tan^{-1} x} = x^2/2 + c$
- B. $y e^{\tan^{-1} x} = 1/x + c$
- C. $y e^{\tan^{-1} x} = x + c$
- D. $y e^{\tan^{-1} x} = -x + c$

Ans. C

Ques 8. If $\cot^{-1}3 + \cot^{-1}4 + \cot^{-1}5 + \cot^{-1}n = \pi/4$, value of n is:

Ans. 47

Ques 9. Find the interval in which x^x is strictly increasing.

- A. $(0, \infty)$
- B. $(0, 1/e)$
- C. $(1/e^2, \infty)$
- D. $(1/e, \infty)$

Ans. D

Ques 10. A company produces automobiles. It has two factories. Factory A produces 60% of the automobiles and rest is produced by the factory B. 80% of the automobiles produced by A is upto the standards and 90% of the automobiles produced by B is upto the standards. If an automobile is selected we found it as standard, the probability if came from B is P. find 126P

- A. 54
- B. 52
- C. 48
- D. 27

Ans. A

Ques 11. If $\sigma = 4$ (standard deviation) and $x = 10$ (mean) of 20 observations. One term was taken wrong i.e. instead of 12 they have taken 8. find the correct standard deviation.

- A. 1.8
- B. $\sqrt{3.96}$
- C. $\sqrt{3.84}$
- D. 1.93

Ans. B

