

JEE Main 2024 Question Paper April 6 Shift 2 (B.E./B.Tech)

JEE Main Physics Questions

Ques 1. There are two fixed charged spheres P and Q repelling each other with a force of 16 N. A third neutral sphere is placed between the charged spheres. The new force between the spheres is _____ (assuming all the spheres are insulating)

- A. 8N
- B. 32 N
- C. 16 N
- D. 4N

Ans. C

Ques 2. A tree branch holds a weight of 200 N by a uniform chain of mass 10 kg. The force applied by branch to hold this weight is _____ (Take $g = 10 \text{ m/s}^2$)

- A. 150 N
- B. 100 N
- C. 200 N
- D. 300 N

Ans. D

Ques 3. If the kinetic energy of a block of mass m becomes 36 times by keeping its mass constant, by what percentage will the momentum increase?

- A. 6 %
- B. 600 %
- C. 60 %
- D. 500 %

Ans. D

Ques 4. A ball is projected vertically upwards from a building. The time taken to reach ground is T_1 . Another ball is projected downwards from the same building, with the same speed. The time taken to reach ground is T_2 . If a third ball is released from the same building, the time taken to reach the ground is

- A. $\sqrt{T_1 T_2}$
- B. $\sqrt{T_1^2 + T_2^2}$
- C. $\sqrt{T_1^2 - T_2^2}$
- D. $2\sqrt{T_1 T_2}$

Ans. A

Ques 5. The weight of an object measured on the surface of earth is 300 N. What will be weight of the same object at depth $R/4$ inside the earth? (Given R = Radius of earth)

- A. 220 N
- B. 225 N
- C. 200 N
- D. 210 N

Ans. B

Ques 6. An isolated system contains one mole of helium, given a heat of 48 J. If the temperature of the system changes by 2°C , then find work done. (take $R = 8.35/\text{mole-K}$)

- A. 32.20 J**
- B. 37.34 J**
- C. 40.74 J**
- D. 41.74 J**

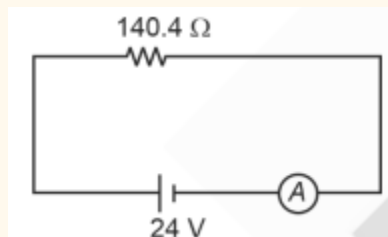
Ans. D

Ques 7. Find the longest wavelength of the Paschen series for hydrogen atom. (Rydberg constant = $10^7 / \text{m}$)

- A. $2.06 \mu\text{m}$**
- B. $20.6 \mu\text{m}$**
- C. $4.86 \mu\text{m}$**
- D. $48.6 \mu\text{m}$**

Ans. A

Ques 8. An ammeter consisting of 240Ω galvanometer and 10Ω shunt resistance is connected in circuit as shown. Reading of ammeter is



- A. 0.18 A**
- B. 0.16 A**
- C. 0.32 A**
- D. 3.2 A**

Ans. B

Ques 9. Find net kinetic energy (maximum possible) associated with 20 diatomic molecules (Here k_B is Boltzmann constant and T is absolute temperature of diatomic gas).

- A. $35 k_B T$**
- B. $70 k_B T$**
- C. $60 k_B T$**
- D. $30 k_B T$**

Ans. B

Ques 10. A convex lens has a focal length of $f = 20$ cm, $R_1 = 15$ cm, $R_2 = 30$ cm. The refractive index of the lens is $x/2$ The value of x is

_____ .

Ans. 3

Ques 11. For a device, power consumed = 110 W and voltage supplied is 220 V. The number of electrons that flow in 1 is $x/4 \times 10^{17}$. Find x.

Ans. 125

Ques 12. A car of mass 800 kg is moving in a circular path of radius 300 m on a banked road with an angle 30° . Coefficient of friction between the car and road is 0.2. Find the maximum safe speed (to the nearest integer in m/s) with which the car can travel. (Take $\sqrt{3} = 1.7$)

Ans. 52

JEE Main Chemistry Questions

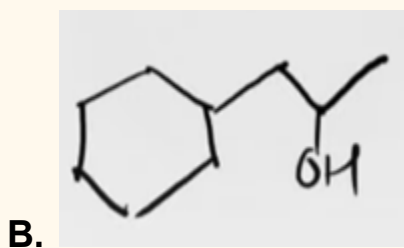
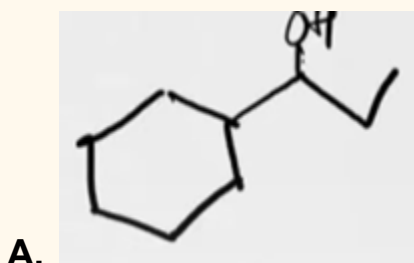
Ques 1. The molarity of NaCl solution is 3 M. Calculate the morality of the solution.

(Given density of the solution = 1.25 g/mL)

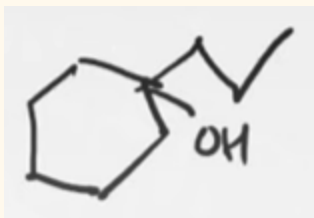
- A. 2.9
- B. 2.79
- C. 1.85
- D. 3.85

Ans. B

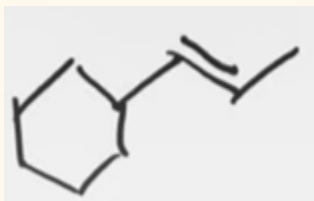
Ques 2. Identify the product formed in the following reaction:



C.

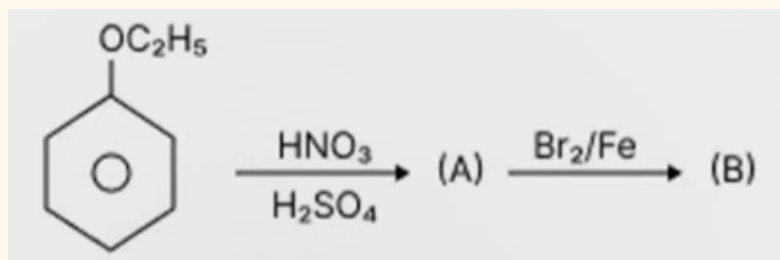


D.

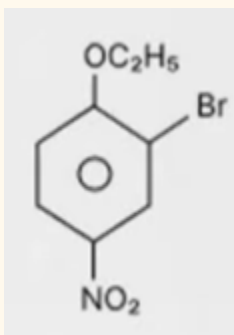


Ans. C

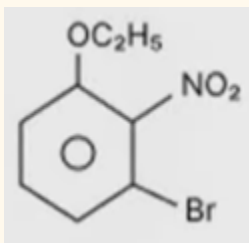
Ques 3. Product B is:

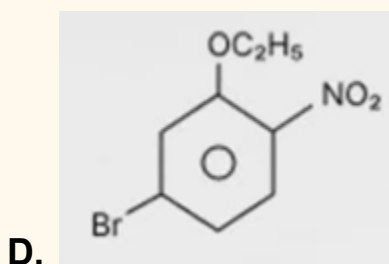
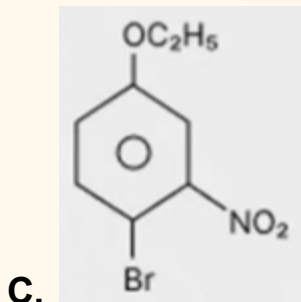


A.



B.





Ans. A

Ques 4. For a certain reaction, ΔH_r is 400 kJ/mol and $\Delta S=0.2$ kJ/mol K. Above what minimum temperature in Kelvin, the reaction becomes spontaneous.

Ans. 2000

Ques 5. Find out the shortest wavelength of paschen series for H-atom

- A. $9/R$
- B. $16/R$
- C. $144/7R$
- D. $7R/144$

Ans. A

Ques 6. Which of the following d-block elements has maximum unpaired electron in ground state electronic configuration?

- A. Ti (22)
- B. V (23)
- C. Mn (25)
- D. Cr (24)

Ans. D

Ques 7. Match the column.

Column-I (Compounds)	Column-II (Configurations)
A. TiCl_4	(1) $e^3t_2^3$
B. FeO_4^{2-}	(2) $e^2t_2^0$
C. FeCl_4^{2-}	(3) $e^2t_2^3$
D. MnCl_4^{2-}	(4) $e^0t_2^0$

- A. A(4), B(2), C(1), D(3)
- B. A(4), B(3), C(2), D(1)
- C. A(1), B(2), C(3), D(4)
- D. A(2), B(4), C(3), D(1)

Ans. A

Ques 8. Which of the following statement is incorrect-

- A. Enzymes are biocatalyst
- B. Enzymes are not specific
- C. Enzymes are globular protein
- D. Oxidase enzymes catalyse the oxidation of CN and C-O bonds

Ans. B

Ques 9. Among the following anions, identify the anion which gives pale yellow precipitate with aq. AgNO_3 . The precipitate is partially soluble in aq. NH_4OH solution.

- A. I^-
- B. Cl^-
- C. Br^-
- D. NO_2^-

Ans. C

Ques 10. IUPAC name of complex compound $[\text{Pt}(\text{Br})_2(\text{PPh}_3)_2]$.

- A. Dibromido di(triphenyl phosphine) platinum(II)
- B. Dibromido bis(triphenyl phosphine) platinum(II)
- C. bis(triphenyl phosphine) dibromide platinum(II)
- D. bis(triphenyl phosphine) dibromide platinate(II)

Ans. B

JEE Main Mathematics Questions

Ques 1. If $\int \frac{dx}{a^2 \sin x + b^2 \cos^2 x} = \frac{1}{12} \tan^{-1}(3 \tan x) + c$, then the maximum value of $a \sin x + b \cos x$ is____

- A. $\sqrt{10}$
- B. $\sqrt{20}$
- C. $2\sqrt{10}$
- D. $2\sqrt{5}$

Ans. C

Ques 2. Find the range of $1/7 - \sin 5x$

A. $\left[\frac{1}{7}, \frac{1}{5}\right]$

B. $\left[\frac{1}{7}, \frac{1}{6}\right]$

C. $\left[\frac{1}{8}, \frac{1}{5}\right]$

D. $\left[\frac{1}{8}, \frac{1}{6}\right]$

Ans. D

Ques 3. If α, β are the roots of the equation $x^2 - \sqrt{2}x - 8 = 0$ and $A_n = \alpha^n + \beta^n, n \in \mathbb{N}$, then the value of $(A_{10} - \sqrt{2}A_9) / 2A_8$

Ans. 4

Ques 4. If ${}^{n+1}C_{r+1} : {}^nC_r : {}^{n-1}C_{r-1} = 55 : 35 : 21$ then the value of $n + r$ is _____.

Ans. 16

Ques 5. Sides of a triangle are $AB = 9, BC = 7, AC = 8$. Then $\cos 3C$ equals to

A. $-262 / 343$

B. $181/247$

- C. 81/93
- D. -283/285

Ans. A

Ques 6. The locus of P such that the ratio of distance P from A(3, 1) and B(1, 2) is 5 : 4 is

- A. $81x^2 - 92x + 81y^2 - 180y = 35$
- B. $81x^2 + 92x + 81y^2 - 19y = 35$
- C. $81x^2 - 48x + 81y^2 + 20y = 35$
- D. $81x^2 - 90x + 81y^2 - 180y = 35$

Ans. D

Ques 7. If the orthocentre of triangle formed by (8, 3), (5, 1) and (h, k) is (6, 1), then (h, k) lie on

- A. $x^2 + y^2 = 64$
- B. $x^2 + y^2 = 68$
- C. $x^2 + y^2 = 65$
- D. $x^2 + y^2 = 71$

Ans. B

Ques 8.

$$\lim_{n \rightarrow \infty} \frac{\sum (n^4 - 2n^3 + n^2)}{\sum ((3n)^4 + n^3 - n^2)} \text{ is equal to}$$

- A. 1/81
- B. 1/72
- C. 1/57
- D. 1/93

Ans. A

Ques 9. Let $A = [1, 2, 3, 4, 5]$, m be the number of relations such as $4x \leq 5y$ XRY and n be the minimum number of elements to be added from $A \times A$ to make a symmetric relation. Then the value of $n + m$.

- A. 26**
- B. 25**
- C. 24**
- D. 23**

Ans. B

Ques 10. The 315th word in dictionary arranged in order for the word 'NAGPUR' is

- A. NRAGPU**
- B. NRPGUA**
- C. NPRGUA**
- D. NRAPGU**

Ans. D