

# JEE Main 2023 Question Paper with Answer Key

## April 15 Shift 1 (Memory-based)

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### JEE Main 2023 Physics Question Paper

**Question 1.** A has a half life of 5 years. Find the amount of life left after 15 years.

- A.  $1/8$  of initial value
- B.  $7/8$  of initial value
- C.  $1/4$  of initial value
- D.  $3/4$  of initial value

**Answer. A**

**Question 2.** A variable force  $F = 5x$  N acts on a body moving along  $x$  - axis. Find the work done by this force in displacing the body from  $x=2\text{m}$  to  $x=4\text{m}$  ( $K$  is constant)

- A.  $(205/2 K)$  J
- B.  $(105/2 K)$  J
- C.  $52K$  J
- D.  $51K$  J

**Answer. B**

**Question 3.** If the position of a particle is changing with time as  $r = t^2 - 2t$  (m). Find the velocity at  $t = 2\text{s}$ .



- A. 2 m/s
- B. 3 m/s
- C. 0 m/s
- D. 4 m/s

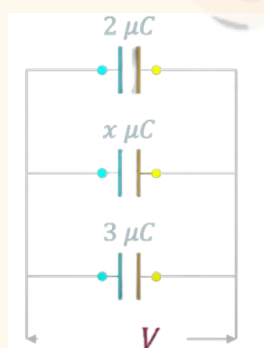
**Answer. A**

**Question 4.** If de-Broglie wavelength is  $\lambda$  when energy is E. Find the wavelength at E/4 (Kinetic Energy).

- A.  $2\lambda$
- B.  $\sqrt{2}\lambda$
- C.  $\lambda$
- D.  $\lambda/\sqrt{2}$

**Answer. A**

**Question 5.** If the total charge stored in capacitors is equal to  $100\mu\text{C}$ , then find the value of x. (10V)



**Answer. 5**

**Question 6.** Height of the receiving and transmitting antenna in communication of a signal are 245 m and 180 m respectively. Find the

**maximum distance between the two antennas for proper communication.**

- A. 104 km
- B. 208 km
- C. 52 km
- D. 96 km

**Answer. A**

**Question 7. A particle is released from a height equal to radius of Earth. Find its velocity when it strikes the ground.**

- A.  $\sqrt{gR}$
- B.  $\sqrt{gR/2}$
- C.  $\sqrt{2gR}$
- D.  $\sqrt{4gR}$

**Answer. A**

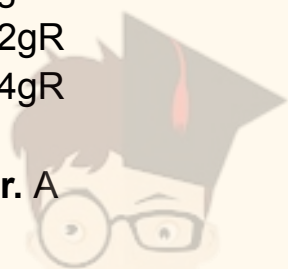
**Question 8. Two identical particles each of mass  $m$ , move in circular path due to their own mutual gravitational force. Find the velocity of the particle if the radius of the circular path is  $a$ .**

- A.  $\sqrt{4Gm/a}$
- B.  $\sqrt{Gm/2a}$
- C.  $\sqrt{2Gm/a}$
- D.  $\sqrt{Gm/4a}$

**Answer. D**

**Question 9. Electric field due to a dipole at a equatorial point depends upon  $r^{-n}$  . Value of  $n$  is**

**Answer. 3**



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**Question 10. Match the list-I with list-II and choose the correct option.**

List-I	List-II
(A). Micro-wave	(p). $1\text{ nm} - 400\text{ nm}$
(B). Ultra violet	(q). $1\text{ nm} - 1\text{ pm}$
(C). X-rays	(r). $2.5\text{ }\mu\text{m} - 750\text{ nm}$
(D). Infrared	(s). $1\text{ }\mu\text{m} - 1\text{ mm}$

- A. A - (s), B - (q), C - (r), D - (p)**  
**B. A - (s), B - (p), C - (q), D - (r)**  
**C. A - (p), B - (s), C - (q), D - (r)**  
**D. A - (r), B - (q), C - (s), D - (p)**

**Answer. B**

### JEE Main 2023 Chemistry Question Paper

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**Question 1. Number of P-O-P bonds in  $\text{H}_3\text{PO}_4$ ,  $\text{P}_4\text{O}_{10}$ ,  $(\text{HPO}_3)_3$**

**Answer. 0, 6, 3**

**Question 2. In which of the following cities photochemical smog is minimum?**

- A. New Delhi**  
**B. Mumbai**  
**C. J & K**  
**D. Kolkata**

**Answer. C**

**Question 3. Calculate the ratio of radii of second and third bohr orbit of H-atoms**

**Answer.** 4/9

**Question 4. Statement-1: According to Bohr's Model, angular momentum is Quantized for stationary orbits.**

**Statement-2: Bohr's Model doesn't follow Heisenberg's Uncertainty Principle.**

- A. Both Statement - 1 and statement - 2 are true
- B. Statement - 1 is true and statement - 2 is false
- C. Statement - 1 is false and statement - 2 is true
- D. Both Statement - 1 and statement - 2 are false

**Answer. A**

**Question 5. How many of the following statements are correct:**

1. Conductivity (K) decreases with increase in dilution for both strong and weak electrolyte.
2. Molar conductivity increases with increase in dilution for both strong and weak electrolyte.
3. Molar conductivity increases with increase in ' $\alpha$ ' for weak electrolyte.
4. Change in molar conductivity is same for both strong and weak electrolyte with increase in dilution.

**Answer.** 1,2 and 3

**Question 6. Lowering of vapour pressure of 30% of aqueous solution of glucose. (in mmHg)**

**Given:**  $P_{H_2O} = 760$  mm of Hg

**Answer.** 729 mm Hg

**Question 7. How many of the following have 10 electrons:**

$O^{2-}$ , O,  $Al^{3+}$ , Al, F,  $F^-$ ,  $Mg^{2+}$ , Mg,  $N^{-3}$

**Answer.** 5 ( $O^{2-}$ ,  $Al^{3+}$ ,  $F^-$ ,  $Mg^{2+}$ ,  $N^{-3}$ )

**Question 8.** Oxidation state of Cr in chromyl chloride is:

**Answer.** 6

**Question 9.** Out of the following which has maximum CFSE? (consider with sign)

- A.  $[Fe(H_2O)_6]^{3+}$
- B.  $[Ti(H_2O)_6]^{3+}$
- C.  $[Mn(H_2O)_6]^{3+}$
- D.  $[Cr(H_2O)_6]^{3+}$

**Answer.** A

**Question 10.** The ratio of silica to alumina in cement is:

- A. 5.5
- B. 2
- C. 3
- D. 1.5

**Answer.** C

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**JEE Main 2023 Mathematics Question Paper**

**Question 1.** There are 5 black and 3 white balls in the bag. A die is rolled, we need to pick the number of balls appearing on the die. The probability that the balls are white is?

- A.  $1/12$
- B.  $1/18$
- C.  $2/9$
- D.  $1/2$

**Answer.** A

**Question 2.** The mean and variance of 15 observations is 20 and 64 respectively. If 55 is wrongly read as 40 as one of the observation, then the correct variance is:

- A.  $243/3$
- B.  $167/2$
- C. 118
- D. 96

**Answer.** C

**Question 3.** The number of solution of equation  $x|x| - 5|x+2| + 6 = 0$  is?

**Answer.** 1

**Question 4.** Let  $f(x) = \log(4x^2 + 11x + 9) + \sin^{-1}(4x + 3) \cos^{-1}(10x+6 / 3)$  and if domain of  $f(x)$  is  $[a, \beta]$ , then  $|10(a - \beta)|$  is?

**Answer.** 4

**Question 5.** How many three digit numbers can be formed which are divisible by 3 using the digits 1, 3, 5, 8. Repetition is allowed.

**Answer.** 22



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**Question 6.** Matrix A having order m has the value of its determinant as  $(m)^{-n}$ . The value of  $\det n \operatorname{adj}(\operatorname{adj}(mA))$  is

- A.  $n^m m^{(m-n)} (m-1)^2$
- B.  $n^m m^{(m-n)} (m-1)$
- C.  $n^m m^{(m-n)}$
- D.  $n^m m^{(n-m)^2}$

**Answer.** A

**Question 7.** Orthocentre of triangle having vertices as A (1,2), B(3,-4), C(0,6) is

- A. (-129, -37)
- B. (9, -1)
- C. (7, -3)
- D. (28, -16)

**Answer.** A

**Question 8.** Area bounded by the curve  $2y^2 = 3x$  and the line  $x+y = 3$  outside the circle  $(x-3)^2 + y^2 = 2$  and above the x-axis is A. The value of  $4(\pi + 4A)$  is?

**Answer.** 42

**Question 9.** If  $n \in [10, 100]$  and  $n \in \mathbb{N}$ , then how many such n are possible where  $3n - 3$  is divisible by 7?

**Answer.** 15

**Question 10.** If  $y = \max\{\sqrt{x}, x^2 - 4, x^3 + 2\}$ , then the number of solution(s) of  $y = 1$  is/are \_\_\_\_\_?



**Answer. 0**

