

# JEE Main 2023 Question Paper with Answer Key April 11 Shift 1 (Memory-based)

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## JEE Main 2023 Physics Question Paper

**Question 1.** Force acting on a particle moving along the  $x$  - axis is given by  $F = (2 + 3x)\mathbf{i}$ . The work done by this force from  $x = 0$  to  $x = 4$  m is

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

**Answer. B**



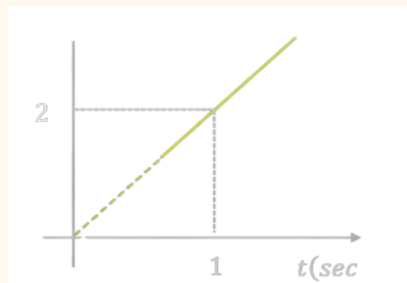
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**Question 2.** If half life of a radio-active nuclide A is equal to average life of another radio-active nuclide B. Find the ratio of decay constant of A to that of B.

- A.  $\ln 2:1$
- B.  $1: \ln 2$
- C.  $2: \ln 2$
- D.  $\ln 2:2$

**Answer. A**

**Question 3.** Variation of magnetic field through a coil of area  $4 \text{ m}^2$  is shown in figure. What is the EMF induced in the coil (in mV)?



- A. 8
- B. 16
- C. 4
- D. 2

**Answer. A**

**Question 4.** The characteristics of two coil is given below-  
If the magnetic moment of both coil A and B are equal then choose the correct relation,

Coil A	Coil B
Radius $r_A = 10 \text{ cm}$	$r_B = 20 \text{ cm}$
Number of turns $N_A$	$N_B$
Current $I_A$	$I_B$

- A.  $2N_A I_A = N_B I_B$
- B.  $N_A I_A = N_B I_B$
- C.  $N_A I_A = 4N_B I_B$
- D.  $N_A I_A = 2N_B I_B$

**Answer. C**

**Question 5.** Equation of progressive wave is  $y = A \sin(160t - 0.5x)$ .  
Let the speed of the wave be  $10x$  then, find  $x$ .

**Answer. 32**

**Question 6. If light is passing through a medium of critical angle  $45^\circ$ , then the wave speed will be**

- A.  $3/\sqrt{2} \times 10^8$  m/s
- B.  $3\sqrt{2} \times 10^8$  m/s
- C.  $3/2 \times 10^8$  m/s
- D.  $3 \times 10^8$  m/s

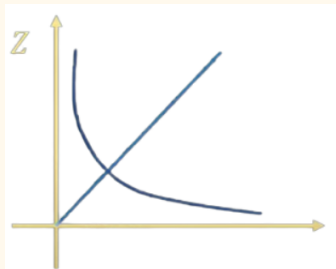
**Answer. A**

**Question 7. In a moving coil galvanometer if the number of turns increases by 25%, then change in voltage sensitivity is?**

- A. 0
- B. 1%
- C. 25%
- D. 50%

**Answer. A**

**Question 8. The variation of impedance (Z) with angular frequency ( $\omega$ ) for two electrical elements is shown in the graph given. If  $X_L, X_C$ , and R are inductive reactance, capacitive reactance and resistance respectively, then**

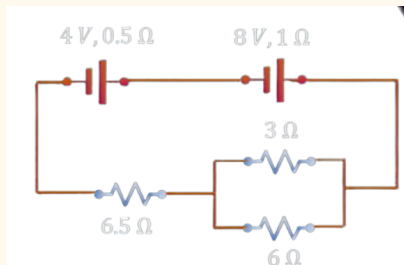


- A. A is resistor B is inductor

- B. A is inductor B is capacitor
- C. A is inductor B is resistor
- D. A is capacitor B is inductor

**Answer. B**

**Question 9. Find the current flowing in  $3\Omega$  resistor in the given circuit**

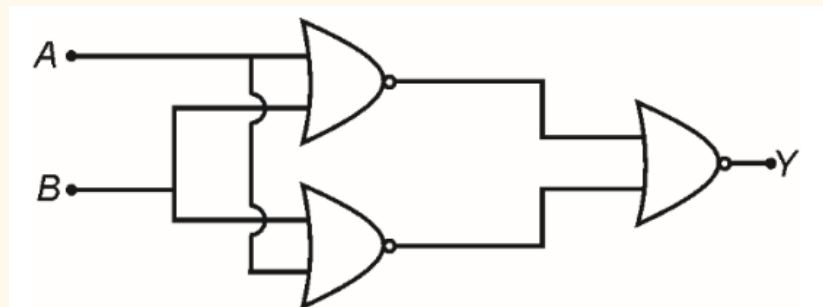


- A. 0.4A
- B. 0.2A
- C. 0.8A
- D. 0.6A

**Answer. C**

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**Question 10. Identify the logic operation of following circuit.**



- A. AND
- B. OR
- C. NOR
- D. NAND

Answer. B

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## JEE Main 2023 Chemistry Question Paper

Question 1. Find the spin magnetic moment ratio for complexes  $[\text{Cr}(\text{Cn})_6]^{-3}$  &  $[\text{Cr}(\text{H}_2\text{O})_6]^{+3}$

Answer. 1:1

Question 2. 25% of 250g sugar solution & 40% of 500g sugar solution are mixed then find out the mass percentage in the solution.

Answer. 35 %

Question 3. In a container at a constant temperature, arrange the RMS velocity of the following: Ne,  $\text{Cl}_2$ ,  $\text{UF}_6$

Answer.  $\text{Ne} > \text{Cl}_2 > \text{UF}_6$

Question 4. Correct order of first ionization energy of Li, Be, C, B, N, O, F

Answer.  $\text{F} > \text{N} > \text{O} > \text{C} > \text{Be} > \text{B} > \text{Li}$

Question 5. Match the Column

Column I	Column II
A. $\text{ClO}_2^-$	1. Linear
B. $\text{N}_3^-$	2. Tetrahedral

C. $\text{NH}_4^+$	3. Bent
D. $\text{SF}_4$	4. See-Saw

**Answer.** A-3 , B-1, C-2, D-4

**Question 6.** Which of the following is not ambidentate ligand

- A.  $\text{C}_2\text{O}_4^{2-}$ ,  $\text{H}_2\text{O}$
- B.  $\text{EDTA}^{4-}$ ,  $\text{NO}_2^-$
- C.  $\text{NO}_2^-$ ,  $\text{SCN}^-$
- D.  $\text{SCN}^-$ ,  $\text{CN}^-$

**Answer.** A

**Question 7.** Which of the following can be represented as a meridional isomer?

- A.  $[\text{Pt}(\text{NH}_3)_3\text{Cl}_3]^+$
- B.  $[\text{Pt}(\text{en})_3]^{4+}$
- C.  $[\text{Pt}(\text{en})_2\text{Cl}_2]^{2+}$
- D.  $[\text{Pt}(\text{en})_2(\text{NH}_3)_2]^{4+}$

**Answer.** A

**Question 8.** Find the number of atoms per unit cell if edge length is 300pm, density =  $3 \text{ g/cm}^3$ , molecular mass = 40 g(nearest integer)

**Answer.** 3

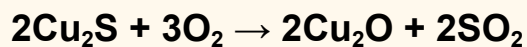
**Question 9.** Identify the correct statement about the compound  $\text{GaAlCl}_4$

- A. Chlorine atom is bonded to both Ga and Al
- B. Ga is cationic part and less electronegative than Al

- C. Chlorine atom forms co — ordinate bond with Ga
- D. Chlorine atom is bonded to Al

**Answer. D**

**Question 10. Which type of copper is formed by the following reactions?**



- A. Blister copper
- B. Copper crisp
- C. Reduced copper
- D. Copper slag

**Answer. A**



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## JEE Main 2023 Mathematics Question Paper

**Question 1. A rectangle is drawn by lines  $x = 0$ ,  $x = 2$ ,  $y = 0$  and  $y = 5$ . Points A and B lie on coordinate axes. If line AB divides the area of rectangle in 4 : 1, then the locus of mid-point of AB is?**

- A. Circle
- B. Hyperbola

- C. Ellipse
- D. Straight line

**Answer. B**

**Question 2.** 5 boys with allotted roll numbers and seat numbers are seated in such a way that no one sits on the allotted seat. The number of such seating arrangements is?

**Answer. 44**

**Question 3.** Let  $M = [a_{ij}]_{2 \times 2}$ ,  $0 \leq i, j \leq 2$ , where  $[a_{ij}] \in \{0,1,2\}$  and A be the event such that M is invertible then  $P(A)$  is?

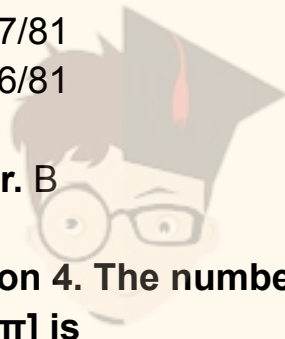
- A. 49/81
- B. 16/27
- C. 47/81
- D. 46/81

**Answer. B**

**Question 4.** The number of solutions of  $\cos^4\theta - 2\cos 2\theta + 3\sin^6\theta + 1 = 0$  in  $[0, 2\pi]$  is

- A. 1
- B. 2
- C. 3
- D. 4

**Answer. C**



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**Question 5.** Let awards in event A is 48 and awards in event B is 25 and awards in event C is 18 and also  $n(A \cup B \cup C) = 60$ ,  $n(A \cap B \cap C) = 5$ , then how many got exactly two awards is?

- A. 21
- B. 25
- C. 24
- D. 23

**Answer.** A

**Question 6.** Consider the plane  $2x + y - 3z = 6$ . If  $(\alpha, \beta, \gamma)$  is the image of point  $(2, 3, 5)$  in the given plane, then  $\alpha + \beta + \gamma = \underline{\hspace{2cm}}$

**Answer.** 10

**Question 7.** Consider two sets A and B. Set A has 5 elements whose mean & variance are 5 and 8 respectively. Set B has also 5 elements whose mean & variance are 12 & 20 respectively. A new set C is formed by subtracting 3 from each element of set A and by adding 2 to each element of set B. The sum of mean & variance of the set C is           .

**Answer.** 58

**Question 8.** The number of rational terms in the expansion of  $(3^{3/4} + 5^{3/2})^{60}$  ?

**Answer.** 16

**Question 9.** Let  $a$  and  $b$  are roots of  $x^2 - 7x - 1 = 0$ . The value of  $(a^{21} + b^{21} + a^{17} + b^{17}) / (a^{19} + b^{19})$  is?

- A. 29
- B. 49
- C. 53
- D. 51

**Answer.** D

**Question 10.** The mean of coefficients of  $x, x^2, \dots, x^7$  in the binomial expansion of  $(2 + x)^9$  is?

**Answer.** 2736



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