# JEE Main 2024 Question Paper Jan 29 Shift 2 (B.E./B.Tech)

## JEE Main Physics Questions

**Ques 1. An electromagnetic wave has electric field given by** $\vec{E} = (9.6\hat{j})\sin\left[2\pi\left\{30\times10^{6}t - \frac{1}{10}x\right\}\right]$ **, x and t are in SI units. The maximum magnetic field is**

A. 3.2 × 10−8
B. 9.6 × 10−8
C. 1.7 × 10−8
D. 10−7

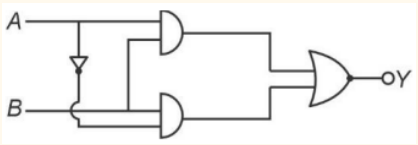
**Ans. A**

**Ques 2. A planet at distance r from the sun takes 200 days to complete one revolution around the sun. What will be the time period for a planet at distance r/4 from the sun?**

A. 50 days
B. 25 days
C. 100 days
D. 12.5 days

**Ans. B**

**Ques 3. The truth table for the combination of logical gates**




**A.**

| A | B | Y |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

**B.**

| A | B | Y |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 1 |
| 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 | 1 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |

**Ans. C**

**Ques 4. A uniform wire has length L and radius r. It is acted on by a force F as shown. The elongation is l. If F and r are both halved, the new elongation will be :**

**A. $\Delta l/2$**
**B. $\Delta l$**
**C. $4\Delta l$**
**D. $2\Delta l$**

**Ans. D**

**Ques 5. Two forces F1 and F2 are applied on two rods P and Q of same materials such that elongation in rods are same. If ratio of their radii is x : y and ratio of length is m : n, then ratio of F1 : F2 is**

**A. $(y/x)^2$ n/m**
**B. $(x/y)^2$ n/m**
**C. $(y/x)^2$ m/n**
**D. $(y/x)^2$ m/n**

**Ans. B**

**Ques 6. In a simple pendulum of length 10 m, the string is initially kept horizontal and the bob is released. 10% of energy is lost till the bob reaches the lowest position. Then find the speed of the bob at the lowest position.**

- **A. 6 m/s**
- **B. $6\sqrt{5}$ m/s**
- **C. $7\sqrt{5}$ m/s**
- **D. $4\sqrt{2}$ m/s**

**Ans.** B

**Ques 7. The intensity at each slit is equal for a YDSE and it is maximum $I_{max}$ at 7π central maxima. If I is intensity for phase difference 7π/2 between two waves on screen. Then $I/I_{max}$ is?**

- **A. ½**
- **B. ¼**
- **C. ⅜**
- **D. $1/\sqrt{2}$**

**Ans.** A

**Ques 8. Two charged particles A and B have charge q each while masses are m1 & m2. Both have the same velocity v and enter into a transverse magnetic field B such that their radii are r1 & r2. Then the ratio m1 : m2 is**

- **A. $r_2/r_1$**
- **B. $(r_1/r_2)^2$**
- **C. $r_1/r_2$**
- **D. $(r_2/r_1)^2$**

**Ans. C**

**Ques 9. A liquid drop of radius R is divided into 27 identical drops. If the surface tension of the drops is T, then find work done in this process.**

A. $4\pi R^2T$
B. $3\pi R^2T$
C. $8\pi R^2T$
D. $1/8\pi R^2T$

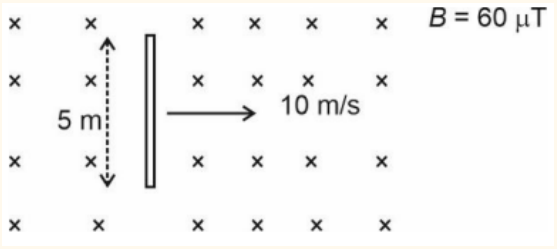
**Ans. C**

**Ques 10. Alternating voltage and current in circuit is given as V = (100 sin ωt) volt**
**I = 100sin(ωt+π/3)mA**
**Find average power dissipated in circuit.**

A. 2.5 w
B. 5 w
C. 10 w
D. 20 w

**Ans. A**

**Ques 11. Consider a rod moving in a magnetic field as shown:**

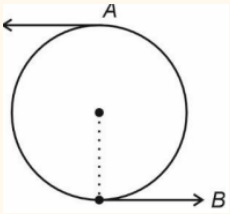



**The induced emf across the ends of the rod is**

A. 3 mV
B. 6 mV
C. 0 V
D. 1 mV

**Ans. A**

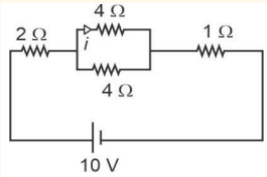
**Ques 12. A particle connected with light thread is performing vertical circular motion. Speed at point B (Lowermost point) is sufficient, so that it is able to complete its circular motion. Ignoring air friction, find the ratio of kinetic energy at A to that at B. (A being top-most point)**




A. 1 : 5
B. 5 : 1
C. 1: 7√2
D. 1: 5√2

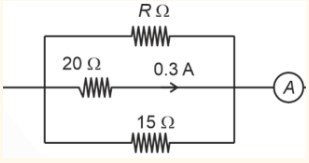
**Ans. A**

**Ques 13. In a given circuit, an ideal battery is connected with four resistances as shown. Find current i as mentioned in the diagram.**




A. 2 A
B. 1 A
C. 4 A
D. 0.5 A

**Ans. B**

**Ques 14. Consider the circuit shown :** 

**. The ammeter reads 0.9 A. Value of R is**

**Ans. 30**

**Ques 15.Distance between twice-magnified virtual image of an object placed in front of mirror is 15 cm. Find focal length of spherical mirror in cm.**

**Ans. 10**

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## JEE Main Chemistry Questions

**Ques 1. Which of the following elements has the highest 1st ionization energy ?**

- **A. N**
- **B. C**
- **C. Si**
- **D. Al**

**Ans.** A

**Ques 2. Which reagent gives bright red ppt. With Ni2+ in basic medium?**

- **A. DMG**
- **B. Nessler's Reagent**
- **C. KCNS**
- **D. K4[Fe(CN)6]**

**Ans.** A

**Ques 3. Match the following:**

**(A) Lyman (i) IR**
**(B) Balmer (ii) IR**
**(C) Paschen (iii) Visible**

**(D) p-fund (iv) UV**

A. **A -> (iv), B -> (iii), C-> (i), D-> (ii)**
B. **A -> (iv), B-> (i), C-> (iii), D-> (ii)**
C. **A -> (i). B -> (iii). C. -> (ii). D -> (iv)**
D. **A -> (i). B-> (ii). C-> (iii). D-> (iv)**

**Ans.** A

**Ques 4. IUPAC name of K2MnO4 is**

A. **Potassium tetraoxomanganate(VI)**
B. **Potassium tetraoxomanganate(III)**
C. **Potassium tetraoxomanganate(VI)**
D. **Tetraoxomanganate(VI) potassium**

**Ans.** A

**Ques 5. If standard enthalpy of vaporization of CCl4 is 30.5 kJ/mol, find heat absorbed for vaporization of 294 gm of CCl4. [Nearest integer] [in kJ/mol]**

**Ans.** 57

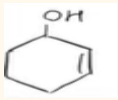
**Ques 6. Best reducing agent among the given ions are:**

A. **$Ce^{4+}$**
B. **$Gd^{2+}$**
C. **$Lu^{3+}$**
D. **$Nd^{3+}$**

**Ans.** B

**Ques 7. Oxidation state of Fe(iron) in complex formed in brown ring test**

**Ans.** +3

**Ques 8. IUPAC Name of the compound**  **is**

- **A. Hex-2-en-1-ol**
- **B. Cyclohex-2-en-1-ol**
- **C. 3-Hydroxycyclohexane**
- **D. Cyclohex-1-en-3-ol**

**Ans.** B

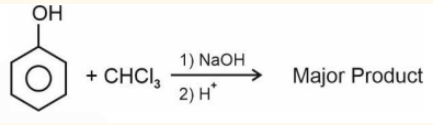
**Ques 9 . Why does oxygen show anomalous behavior**

- **A. Large size, high electronegativity**
- **B. Small size, small electronegativity**
- **C. Small size, high electronegativity, absence of vacant d- orbital**
- **D. Large size high electronegativity presence of vacant d orbital**

**Ans.** C

**Ques 10. How many of the following compounds have zero dipole moment.**
**$NH_3$, $H_2O$, HF, $CO_2$, $SO_2$, $BF_3$, $CH_4$**

**Ans.** 3

**Ques 11.** 

**The major product in the above reaction is**

- **A. 2-hydroxybenzaldehyde**
- **B. 2-hydroxybenzoic acid**
- **C. 4-hydroxybenzaldehyde**
- **D. 3-hydroxybenzaldehyde**

**Ans. A**

**Ques 12. The correct statement about Zn, Cd, Hg are**

A. All are solid metals at room temperature B.
B. They have high enthalpy of atomization
C. All are paramagnetic
D. Zn, Cd cannot show variable oxidation state but Hg can show variable oxidation state

**Ans. D**

**Ques 13. . In chromatographic techniques, which of the following follows preferential adsorption?**
**(A) Column chromatography**
**(B) Thin layer chromatography**
**(C) Paper chromatography**

A. A only
B. B only
C. C only
D. A and B both

**Ans. D**

**Ques 14. Find the total number of sigma and pi bonds in 2-formyl hex-4-enoic acid.**

A. 20
B. 22
C. 18
D. 24

**Ans. B**

**Ques 15. A gas 'X' is added to Nessler's reagent then brown precipitate is formed, gas X is**

A. $NH_3$
B. $SO_2$
C. $Cl_2$

**D. Br2**

**Ans. A**

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## JEE Main Mathematics Questions

**Ques 1. Given set = {1, 2, 3, ..., 50} one number is selected randomly from the set. Find the probability that number is multiple of 4 or 6 or 7.**

**A. 21/50**
**B. 18/50**
**C. 8/25**
**D. 21/25**

**Ans.** A

**Ques 2. The value of** $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \sqrt{1-\sin 2x}\, dx$ **is**

**A. √2-√3+1**
**B. 2√2-√3-1**
**C. 2√2+√3-1**
**D. √2+√3-1**

**Ans.** B

**Ques 3. The remainder when** $64^{32^{32}}$ **is divided by 9 is**

**Ans.** 1

**Ques 4. Area bounded by 0 <= y <= min{$x^2$+ 2, 2x + 2}, x ∈ in [0, 3] then 12A is**

**Ans.** 164

**Ques 5. A={1, 2, 3, 4} minimum number of elements added to make an equivalence relation on set A containing (1, 3) & (1, 2) in it.**

- **A. 8**
- **B. 9**
- **C. 12**
- **D. 16**

**Ans.** A

**Ques 6. If ln a, ln b, ln c are in AP and ln a – ln 2b, ln 2b – ln 3c, ln 3c – ln a are in AP then a : b : c is**

- **A. 1 : 2 : 3**
- **B. 7 : 7 : 4**
- **C. 9 : 9 : 4**
- **D. 4 : 4 : 9**

**Ans. C**

**Ques 7. If r = |z|, θ = arg(z) and z = 2 – 2i 5 tan (5π/8) then find (r, θ)**

- **A. (2sec((5π)/8), (3π)/8)**
- **B. (2sec((3π)/8), (3π)/8)**
- **C. (2tan((3π)/8), (5π)/8)**
- **D. (2tan((3π)/8), (3π)/8)**

**Ans. B**

**Ques 8. In which interval the function f(x) = x/(x2-6x-16) is increasing?**

- **A. φ**
- **B. [1,¾) ∪ (5/4, ∞)**
- **C. ( 5/4 ,∞)**
- **D. (¾, 5/4)**

**Ans. A**

**Ques 9. (α, β) lie on the parabola y2 = 4x and (α, β) also lie on chord with midpoint (1,5/4)of another parabola x2 = 8y, then value of |(8 – β)(α – 28)| is**

A. 192
B. 92
C. 64
D. 128

**Ans. A**

**Ques 10. If first term of non-constant GP be 1/8 and every term is AM of next two, then** $\sum_{r=1}^{20} T_r - \sum_{r=1}^{18} T_r$ **is**

A. $2^{15}$
B. $-2^{15}$
C. $-2^{18}$
D. $2^{18}$

**Ans. B**

**Ques 11. The mean of 5 observations is 24/5 and variance is 194/25 . If the mean of first four observations is 7/2 , then the variance of first four observations is**

A. 3/2
B. 5/2
C. 5/4
D. 2/3

**Ans. C**

**Ques 12. The number of ways to distribute 8 identical books into 4 distinct bookshelf is (where any bookshelf can be empty)**

**Ans. 165**

**Ques 13. If $f(x) = \ln((1-x^2)/(1+x^2))$ then value of $225(f'(x) - f''(x))$ at $x=½$**

**Ans. 736**

**Ques 14.** $\frac{3\cos 2x + \cos^3 2x}{\cos^6 x - \sin^6 x}$ **=x3-x2+6 then find sum of roots,**

**Ans. 1**