JEE MAIN 2026 – Memory-Based Questions and Answers

Session 1 | Date: 24 January 2026 **Shift:** 2

Duration: 3 Hours

Maximum Marks: 300

Note: This paper is prepared based on students' memory and post-exam discussions. Questions may not be exact replicas of the actual exam and are meant only for practice and analysis.

PHYSICS

Section A – MCQs

1. A block of mass mmm is pulled with a force FFF at an angle θ\thetaθ above the horizontal on a rough surface. Which of the following expressions correctly gives the acceleration of the block?

2. A circuit contains a capacitor and resistor in series connected to a battery. If the initial charge on the capacitor is Q0Q_0Q0, find the charge after time ttt.

3. A ray of light enters from air into a medium with refractive index 1.5. If the angle of incidence is 30°, find the angle of refraction.

4. A particle moves with position x=4t3−9t2+6tx = 4t^3 - 9t^2 + 6tx=4t3−9t2+6t. Find the time when velocity is zero.

5. A metallic wire of length LLL is stretched to increase its length by 1%. What is the percentage change in its resistance?

6. A sphere of radius RRR carrying charge QQQ is placed in a uniform electric field EEE. Determine the induced surface charge distribution.

7. During Young's double-slit experiment, if the slit separation is halved and the wavelength is doubled, describe how the fringe width changes.

8. In a series LCR circuit, the frequency is varied. At resonance, which of the following quantities is maximized?

9. A projectile is fired with speed uuu at an angle of 60°. Neglecting air resistance, find the range of the projectile.

10. A thermodynamic system undergoes an isothermal expansion from volume V1V_1V1 to V2V_2V2. Which of the following expressions gives the work done by the system?

Section B – Numerical Questions

11. Find the time period of a simple pendulum of length 1.96 m in terms of ggg.

12. A potentiometer wire shows null at 70 cm when connected to a cell of emf 1.4 V. Find the potential gradient.

13. Find the electric field at a distance RRR from the center of a uniformly charged ring of total charge QQQ.

14. A gas obeys the equation PV=nRTPV = nRTPV=nRT. If the volume is doubled and temperature is also doubled, find the ratio of pressures.

15. A particle moving in SHM has maximum acceleration amax=2π2a_{\text{max}} = 2\pi^2amax=2π2 at amplitude 0.1 m. Find the time period.

CHEMISTRY

Section A – MCQs

1. Which of the following has the highest lattice energy?
   (Options: NaF, MgO, KCl, CsBr)

2. Arrange the following species in increasing order of atomic radius:
   O2−,F−,Na+,Mg2+O^{2-}, F^-, Na^+, Mg^{2+}O2−,F−,Na+,Mg2+

3. Which compound will show geometrical isomerism?
   (Options based on given structures)

4. Identify the hybridization of the central atom in PCl5PCl_5PCl5.

5. Which of the following solutions will have the highest boiling point?
   (Options with different solutes and solvents)

6. Which of the following organic compounds undergoes Aldol condensation?

7. Which molecule exhibits optical activity?

8. Identify the strongest oxidizing agent among the given halogens.

9. In an aqueous solution, which pair forms a buffer?

10. Which one of the following statements about periodic trends is incorrect?

Section B – Numerical Questions

11. Calculate the pH of a 0.1 M solution of a strong acid.

12. Find the number of moles of Cl2Cl_2Cl2 produced when 8.74 g of MnO2MnO_2MnO2 reacts with excess HCl.

13. Calculate the mole fraction of H2SO4H_2SO_4H2SO4 when 100 g of 98% H2SO4H_2SO_4H2SO4 is mixed with 100 g of 49% H2SO4H_2SO_4H2SO4.

14. Determine the oxidation state of the central atom in K2Cr2O7K_2Cr_2O_7K2Cr2O7.

15. Calculate the percentage by mass of carbon in a given organic compound.

MATHEMATICS

Section A – MCQs

1. If the roots of the equation x2−6x+8=0x^2 - 6x + 8 = 0x2−6x+8=0 are α\alphaα and β\betaβ, find α2+β2\alpha^2 + \beta^2α2+β2.

2. Evaluate
   ∫0π/2sin3x dx\int_0^{\pi/2} \sin^3 x \, dx∫0π/2sin3xdx
3. Find the domain of the function f(x)=1x−2f(x) = \frac{1}{\sqrt{x - 2}}f(x)=x−21.

4. A line passes through (1, 2) and is perpendicular to 3x−4y+5=03x - 4y + 5 = 03x−4y+5=0. Find its equation.

5. Solve the inequality
   ∣2x−5∣≤3|2x - 5| \le 3∣2x−5∣≤3
6. Find the determinant of
   ∣231415023∣\begin{vmatrix} 2 & 3 & 1 \\ 4 & 1 & 5 \\ 0 & 2 & 3 \end{vmatrix}∣240312153∣
7. If sinA+cosA=1\sin A + \cos A = 1sinA+cosA=1, find sin2A\sin 2Asin2A.

8. Find the range of
   y=4−x2y = \sqrt{4 - x^2}y=4−x2
9. A circle has center (3, –2) and radius 5. Write its equation.

10. For vectors a⃗=(1,2,3)\vec{a} = (1,2,3)a=(1,2,3) and b⃗=(2,−1,4)\vec{b} = (2,-1,4)b=(2,−1,4), find the dot product.

Section B – Numerical Questions

11. Evaluate

∫xex2dx\int x e^{x^2} dx∫xex2dx

12. Find the area under the curve y=x2y = x^2y=x2 from x=0x = 0x=0 to x=2x = 2x=2.

13. Find the sum of the first 20 natural numbers.

14. Solve the differential equation

dydx=3x2\frac{dy}{dx} = 3x^2dxdy=3x2

15. Find the distance between the points (2, –1, 5) and (3, 4, 9).