



THE VOLUME DEFENCE AND EDUCATION ACADEMY

"Your Success, Our Commitment"

JEE ADVANCED MOCK TEST — PAPER 1

PHYSICS

SECTION 1 — Single Correct Answer Type

1. A ball is projected horizontally from the top of an 80 m high tower with speed 20 m/s. The time of flight and horizontal range are ($g = 10 \text{ m/s}^2$):
(A) 4 s, 80 m
(B) 4 s, 40 m
(C) 2 s, 40 m
(D) 4 s, 60 m
2. Two capacitors of $4 \mu\text{F}$ and $6 \mu\text{F}$ are connected in series across 100 V. The voltage across the $4 \mu\text{F}$ capacitor is:
(A) 40 V
(B) 60 V
(C) 50 V
(D) 80 V
3. A wire of resistance R is bent into a circle. The resistance between two diametrically opposite points is:
(A) $R/4$
(B) $R/2$
(C) R
(D) $2R$
4. In Young's double slit experiment, slit separation = 0.5 mm and screen distance = 1 m. If wavelength = 500 nm, fringe width is:
(A) 0.5 mm
(B) 1.0 mm
(C) 0.25 mm
(D) 2.0 mm
5. The de Broglie wavelength of an electron accelerated through potential V is proportional to:
(A) V
(B) $1/V$
(C) $\sqrt{V}$
(D) $1/\sqrt{V}$
6. A rigid body rotates with angular velocity ω . If its kinetic energy is doubled (moment of inertia constant), the new angular velocity is:
(A) $\omega\sqrt{2}$
(B) 2ω



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- (C) $\omega/\sqrt{2}$
- (D) 4ω

SECTION 2 — One or More Correct Answer(s) Type

7. For SHM $x = A \sin(\omega t)$, which are correct?

- (A) Velocity is maximum at $x = 0$
- (B) Acceleration is zero at $x = 0$
- (C) KE is maximum at extreme positions
- (D) Total energy = $\frac{1}{2}m\omega^2 A^2$

8. A charged particle moves in a uniform magnetic field. Which statements are true?

- (A) Speed remains constant
- (B) KE remains constant
- (C) Momentum magnitude remains constant
- (D) Direction of velocity changes continuously

9. In photoelectric effect, which factors affect stopping potential?

- (A) Frequency of incident light
- (B) Intensity of incident light
- (C) Work function of metal
- (D) Nature of emitting surface

10. For an ideal gas in an isothermal process:

- (A) $\Delta U = 0$
- (B) $Q = W$
- (C) $PV = \text{constant}$
- (D) Temperature increases

CHEMISTRY

SECTION 1 — Single Correct Answer Type

16. The hybridisation of carbon in CO_2 and its shape are:

- (A) sp, linear
- (B) sp^2 , linear
- (C) sp, bent
- (D) sp^3 , linear

17. Which of the following has the highest boiling point?

- (A) CH_4
- (B) C_2H_6
- (C) C_3H_8
- (D) C_4H_{10}



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18. The reaction of sodium with water produces:

- (A) NaOH and H_2
- (B) Na_2O and H_2O
- (C) NaH and O_2
- (D) Na_2O_2 and H_2

19. The IUPAC name of $CH_3-CH(OH)-CH_2-CH_3$ is:

- (A) 2-butanol
- (B) 3-butanol
- (C) 1-methylpropan-1-ol
- (D) Butan-3-ol

20. Which quantum number determines the shape of an orbital?

- (A) Principal (n)
- (B) Azimuthal (l)
- (C) Magnetic (m)
- (D) Spin (s)

21. The pH of a 0.001 M HCl solution at $25^\circ C$ is:

- (A) 1
- (B) 2
- (C) 3
- (D) 11

SECTION 2 — One or More Correct Answer(s) Type

22. Which are properties of ionic compounds?

- (A) High melting point
- (B) Conduct in molten state
- (C) Soluble in non-polar solvents
- (D) Conduct in aqueous solution

23. For an exothermic reaction, which are true?

- (A) $\Delta H < 0$
- (B) Products have lower energy
- (C) Heat released
- (D) ΔG always negative

24. Which of the following are alkenes?

- (A) C_2H_2
- (B) C_2H_4
- (C) C_3H_6
- (D) C_4H_8

25. Factors affecting rate of reaction:

- (A) Temperature



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- (B) Concentration
- (C) Catalyst
- (D) Colour

MATHEMATICS

SECTION 1 — Single Correct Answer Type

31. $\lim_{x \rightarrow 0} \frac{\sin(3x)}{x}$ is:

- (A) 0
- (B) 1
- (C) 3
- (D) ∞

32. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then $\det(A)$ is:

- (A) 2
- (B) -2
- (C) 10
- (D) -10

33. Number of solutions of $\sin(x) = x/2$ in $[0, \pi]$:

- (A) 0
- (B) 1
- (C) 2
- (D) 3

34. Derivative of x^x :

- (A) $x^x \ln x$
- (B) $x^x (1 + \ln x)$
- (C) x^{x-1}
- (D) x^x / x

35. Area enclosed by $y = x^2$ and $y = x$ ($x \geq 0$):

- (A) 1/6
- (B) 1/3
- (C) 1/2
- (D) 1/4

36. Equation of circle with centre (2, -3) and radius 5:

- (A) $(x+2)^2 + (y-3)^2 = 25$
- (B) $(x-2)^2 + (y+3)^2 = 25$
- (C) $(x-2)^2 + (y+3)^2 = 5$
- (D) $(x+2)^2 + (y-3)^2 = 5$



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SECTION 2 — One or More Correct Answer(s) Type

37. Which functions are continuous at $x = 0$?

- (A) $\sin x/x$
- (B) $|x|$
- (C) $1/x$
- (D) $x \cdot \sin(1/x)$

38. For parabola $y^2 = 4ax$ ($a > 0$):

- (A) Focus $(a, 0)$
- (B) Directrix $x = -a$
- (C) Vertex $(0, 0)$
- (D) Axis is x-axis

39. If $\det(A) = 0$ (3×3 matrix):

- (A) A is singular
- (B) A^{-1} does not exist
- (C) Rows are linearly dependent
- (D) A must be zero matrix

40. Which integrals are correct?

- (A) $\int \sin x \, dx = -\cos x + C$
- (B) $\int e^x \, dx = e^x + C$
- (C) $\int (1/x) \, dx = \ln|x| + C$
- (D) $\int x^n \, dx = x^{n+1}/(n+1) + C$ ($n \neq -1$)

SECTION 3 — Integer Answer Type (Q.41 to Q.45)

(+4 for correct | 0 for wrong or unattempted | No negative marking)

41. The number of real roots of $x^2 - 5x + 6 = 0$ is:

Answer (0–9):

[____]

42. If $f(x) = x^3$, then $f'(2)$ is:

Answer (0–9):

[____]

43. The value of nC_n is:

Answer (0–9):

[____]

44. The sum of the first 5 terms of the AP: 2, 4, 6, 8, 10, ... is:

Answer (0–9):

[____]

45. If $|z| = 3$ for the complex number $z = 3 + bi$, the value of $|b|$ is:

Answer (0–9):

[____]