

WBJEE - FULL SYLLABUS MOCK TEST

155 QUESTIONS | 200 MARKS

Paper I: Mathematics - 75 questions, 100 marks, 2 hours.

Paper II: Physics + Chemistry - 80 questions, 100 marks, 2 hours.

Name: _____
Batch: _____ Date: _____

INSTRUCTIONS

Use separate response sheets for the two papers.
Attempt all questions. No calculators. Each question has four options.

Category 1: One correct option. Correct: +1; incorrect or multiple selections: -1/4; unattempted: 0.

Category 2: One correct option. Correct: +2; incorrect or multiple selections: -1/2; unattempted: 0.

Category 3: One or more correct options. All correct options and no wrong option: +2. Any wrong option: 0. A correct subset earns $2 \times (\text{number of correct options selected}) / (\text{total correct options})$. Unattempted: 0.

This original full-length Prodigy mock covers the major syllabus units using the latest published WBJEE 2026 pattern.

PAPER I - MATHEMATICS

MATHEMATICS - CATEGORY 1 | Q1-50 | 1 MARK EACH

1. If $n(A) = 18$, $n(B) = 15$ and $n(A \cap B) = 7$, then $n(A \cup B)$ is:

- (A) 33 (B) 19
(C) 26 (D) 40

2. The number of bijections from a 4-element set onto another 4-element set is:

- (A) 24 (B) 256
(C) 16 (D) 64

3. On the integers, aRb means that $a - b$ is divisible by 5. This relation is:

- (A) An equivalence relation (B) Reflexive but not symmetric
(C) Symmetric but not transitive (D) Transitive but not reflexive

4. The real domain of $f(x) = \sqrt{x - 2}$ is:

- (A) $(2, \infty)$ (B) All real numbers
(C) $[2, \infty)$ (D) $(-\infty, 2]$

5. The sum of the first 20 terms of the AP 2, 5, 8, ... is:

- (A) 620 (B) 590
(C) 610 (D) 600

6. The sum to infinity of $6 + 3 + \frac{3}{2} + \dots$ is:

- (A) 15 (B) 12
(C) 9 (D) 18

7. If positive a, b, c are in HP, then b equals:

- (A) $\frac{2ac}{a + c}$ (B) $\sqrt{ac}$
(C) $\frac{ac}{a + c}$ (D) $\frac{(a + c)}{2}$

8. The value of $\log_2 8 + \log_3 9$ is:

- (A) 6 (B) 3
(C) 5 (D) 4

9. The modulus of $(1 + i)/(1 - i)$ is:

- (A) 2 (B) $\sqrt{2}$
(C) $\frac{1}{2}$ (D) 1

10. If ω is a non-real cube root of unity, $1 + \omega + \omega^2$ equals:

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

11. If α and β are roots of $x^2 - 7x + 10 = 0$, $\alpha^2 + \beta^2$ is:

- (A) 39 (B) 20
(C) 49 (D) 29

12. The equation $x^2 - 4x + k = 0$ has equal real roots when:

- (A) $k = 4$ (B) $k = 8$
(C) $k = -4$ (D) $k = 2$

13. The number of distinct arrangements of the letters of BANANA is:

- (A) 30 (B) 120
(C) 720 (D) 60

14. A committee of 3 is selected from 5 people. The number of possible committees is:

- (A) 60 (B) 10
(C) 20 (D) 15

WBJEE - FULL SYLLABUS MOCK TEST

15. The formula proved by induction for $1^2 + 2^2 + \dots + n^2$ is:

- (A) $n(2n + 1)/3$ (B) $n^2(n + 1)^2/4$
(C) $n(n + 1)/2$ (D) $n(n + 1)(2n + 1)/6$

16. The coefficient of x^3 in $(1 + 2x)^5$ is:

- (A) 80 (B) 40
(C) 160 (D) 20

17. The determinant of a 2×2 matrix with rows (2,1) and (3,4) is:

- (A) 5 (B) 8
(C) -5 (D) 11

18. The inverse of the diagonal matrix $\text{diag}(2,5)$ is:

- (A) $\text{diag}(-2,-5)$ (B) $\text{diag}(5,2)$
(C) $\text{diag}(1/2,1/5)$ (D) $\text{diag}(2/5,5/2)$

19. If $x + y = 5$ and $2x - y = 4$, then x is:

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

20. The arithmetic mean of 2, 4, 6 and 8 is:

- (A) 4 (B) 20
(C) 5 (D) 6

21. The variance (using divisor n) of 1, 3 and 5 is:

- (A) 4 (B) $16/3$
(C) 2 (D) $8/3$

22. Two fair coins are tossed. The probability of exactly one head is:

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

23. In four independent fair-coin tosses, the probability of exactly two heads is:

- (A) $1/4$ (B) $3/8$
(C) $1/8$ (D) $1/2$

24. If θ is acute and $\tan \theta = 3/4$, then $\sin \theta$ is:

- (A) $3/5$ (B) $3/4$
(C) $4/3$ (D) $4/5$

25. The value of $\sin^2 20^\circ + \cos^2 20^\circ$ is:

- (A) 0 (B) 2
(C) 1 (D) $1/2$

26. The principal value of $\sin^{-1}(-1/2)$ is:

- (A) $-\pi/6$ (B) $-5\pi/6$
(C) $\pi/6$ (D) $7\pi/6$

27. The point with polar coordinates $(2, \pi/3)$ has Cartesian coordinates:

- (A) $(\sqrt{3}, 1)$ (B) $(2, \sqrt{3})$
(C) $(-1, \sqrt{3})$ (D) $(1, \sqrt{3})$

28. The midpoint of (2, -1) and (6, 5) is:

- (A) (4, 2) (B) (4, -2)
(C) (8, 4) (D) (2, 3)

29. The area of the triangle with vertices (0,0), (4,0) and (0,3) is:

- (A) 12 (B) 7
(C) 3 (D) 6

30. The slope of a line perpendicular to $y = 2x + 1$ is:

- (A) -2 (B) $-1/2$
(C) $1/2$ (D) 2

31. The distance of (1,2) from the line $3x + 4y - 6 = 0$ is:

- (A) 5 (B) $1/5$
(C) 2 (D) 1

32. The centre of $x^2 + y^2 - 4x + 6y - 12 = 0$ is:

- (A) (4, -6) (B) (2, -3)
(C) (-4, 6) (D) (-2, 3)

33. The tangent to $x^2 + y^2 = 25$ at (3,4) is:

- (A) $x + y = 7$ (B) $3x + 4y = 25$
(C) $3x - 4y = 25$ (D) $4x + 3y = 25$

34. The focus of $y^2 = 8x$ is:

- (A) (0,2) (B) (4,0)
(C) (-2,0) (D) (2,0)

35. The eccentricity of $x^2/25 + y^2/9 = 1$ is:

- (A) $4/5$ (B) $3/5$
(C) $5/4$ (D) $2/5$

36. The asymptotes of $x^2/9 - y^2/16 = 1$ are:

- (A) $y = \pm 3x/4$ (B) $y = \pm x$
(C) $y = \pm 4x$ (D) $y = \pm 4x/3$

37. The distance between (1,2,3) and (3,5,9) is:

- (A) 8 (B) 7
(C) $\sqrt{41}$ (D) 6

WBJEE - FULL SYLLABUS MOCK TEST

38. The distance of the origin from the plane $2x + y + 2z = 9$ is:

- (A) 3 (B) $9/\sqrt{5}$
(C) 1 (D) 9

39. For unit vectors i and j along the positive x and y axes, $i \times j$ equals:

- (A) $i + j$ (B) $-k$
(C) 0 (D) k

40. The scalar triple product $i \cdot (j \times k)$ is:

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

41. The value of $\lim_{x \rightarrow 0} \sin(3x)/x$ is:

- (A) 3 (B) 1
(C) 0 (D) $1/3$

42. For $f(x) = (x^2 - 1)/(x - 1)$ when $x \neq 1$, continuity at $x = 1$ requires $f(1)$ to be:

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

43. The derivative of $\ln x$ for $x > 0$ is:

- (A) $1/x$ (B) $1/x^2$
(C) $\ln x$ (D) x

44. For $x^2 + y^2 = 25$, at a point where $y \neq 0$, dy/dx equals:

- (A) $-y/x$ (B) $-x/y$
(C) x/y (D) y/x

45. The function $f(x) = x^2 - 4x$ is increasing on:

- (A) $(0, 2)$ (B) $(-\infty, \infty)$
(C) $(-\infty, 2)$ (D) $(2, \infty)$

46. For $f(x) = x^2$ on $[1, 3]$, the point c in the mean value theorem is:

- (A) 3 (B) 2
(C) 1 (D) $\sqrt{3}$

47. An antiderivative of $\cos(2x)$ is:

- (A) $-\sin(2x)$ (B) $(1/2)\sin(2x)$
(C) $\sin(2x)$ (D) $2\sin(2x)$

48. The value of $\int_0^2 x \, dx$ is:

- (A) 2 (B) 1
(C) 4 (D) 8

49. If $dy/dx = 2y$ and $y(0) = 3$, then $y(x)$ is:

- (A) $3e^x$ (B) $3e^{2x}$
(C) $2e^{3x}$ (D) $e^{2x} + 2$

50. The area under $y = x^2$ from $x = 0$ to $x = 1$ is:

- (A) $1/3$ (B) 1
(C) $2/3$ (D) $1/2$

MATHEMATICS - CATEGORY 2 | Q51-65 | 2 MARKS EACH

51. If $z + 1/z = 1$ and $z \neq 0$, then z^3 is:

- (A) 1 (B) $-i$
(C) i (D) -1

52. The roots of $x^2 - 9x + k = 0$ are positive and in the ratio 1 : 2. Then k is:

- (A) 12 (B) 18
(C) 27 (D) 20

53. The number of distinct arrangements of MISSISSIPPI is:

- (A) 11550 (B) 69300
(C) 27720 (D) 34650

54. The sum of the coefficients of even powers of x in $(1 + x)^8$ is:

- (A) 128 (B) 64
(C) 255 (D) 256

55. For an invertible 3×3 matrix A with $\det A = 2$, $\det(2A^{-1})$ equals:

- (A) 1 (B) 4
(C) 8 (D) 16

56. Box I has 2 red and 1 blue ball; Box II has 1 red and 2 blue balls. A box is chosen with equal probability, then a red ball is drawn. The probability it came from Box I is:

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

57. A variable X has variance 4. The variance of $3X + 5$ is:

- (A) 41 (B) 17
(C) 12 (D) 36

WBJEE - FULL SYLLABUS MOCK TEST

58. The maximum value of $3 \sin x + 4 \cos x$ over all real x is:

- (A) 7 (B) 5
(C) 3 (D) 4

59. The line $y = mx + 1$ is tangent to $y^2 = 4x$ when:

- (A) $m = 1$ (B) $m = -1$
(C) $m = 0$ (D) $m = 2$

60. The angle between planes $x + y = 0$ and $y + z = 0$, taken as acute, is:

- (A) 30° (B) 45°
(C) 60° (D) 90°

61. The value of $\lim_{x \rightarrow 0} \frac{(e^{2x} - 1 - 2x)}{x^2}$ is:

- (A) 4 (B) 2
(C) 0 (D) 1

62. A curve is given by $x = t^2$ and $y = t^3$. At $t = 2$, $\frac{d^2y}{dx^2}$ equals:

- (A) $3/8$ (B) $3/4$
(C) 6 (D) $3/2$

63. The value of $\int_0^{\pi} x \sin x \, dx$ is:

- (A) $\pi/2$ (B) 0
(C) 2π (D) π

64. The solution of $dy/dx + y = e^x$ with $y(0) = 0$ is:

- (A) $e^x - e^{-x}$ (B) $(e^x - e^{-x})/2$
(C) $(e^x + e^{-x})/2$ (D) xe^x

65. The area enclosed between $y = x$ and $y = x^2$ is:

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

MATHEMATICS - CATEGORY 3 | Q66-75 | SELECT ALL CORRECT

66. For arbitrary sets A and B , select all identities that always hold.

- (A) $A \cap A = A$ (B) $A \cap (A \cup B) = A$
(C) $A - B = B - A$ (D) $A \cup B = B \cup A$

67. For $f: \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = x^3$, select all correct statements.

- (A) f is injective (B) f is bijective
(C) f is surjective (D) $f^{-1}(x) = x^2$

68. For $f(x) = x^2 - 6x + 8$, select all correct statements.

- (A) The minimum value is -1 (B) $f(x) < 0$ for $2 < x < 4$
(C) The roots are 2 and 4 (D) $f(0) = -8$

69. For A with rows $(1,1)$ and $(0,1)$, select all correct statements.

- (A) A is invertible (B) A^2 has rows $(1,2)$ and $(0,1)$
(C) $\det A = 1$ (D) $A^2 = A$

70. For independent events A and B with probabilities $1/2$ and $1/3$, select all correct statements.

- (A) $P(A \cap B) = 1/6$
(B) $P(A \text{ given } B) = 1/2$
(C) $P(A \cup B) = 2/3$
(D) A and B must be mutually exclusive

71. Select all statements true for every real x where the expressions are defined.

- (A) $1 + \tan^2 x = \sec^2 x$ (B) $\cos(2x) = 2 \sin^2 x - 1$
(C) $\sin^2 x + \cos^2 x = 1$ (D) $\sin(2x) = 2 \sin x \cos x$

72. For the parabola $y^2 = 4ax$ with $a > 0$, select all correct statements.

- (A) Its directrix is $x = -a$ (B) Its eccentricity is 0
(C) Its latus rectum has length $4a$ (D) Its focus is $(a,0)$

73. For $f(x) = x^3 - 3x$, select all correct statements.

- (A) $x = 1$ is a local minimum point (B) $f'(x) = 3x^2 - 3$
(C) f is increasing for every real x (D) $x = -1$ is a local maximum point

74. For nonzero vectors a and b , select all statements that always hold.

- (A) Magnitude of $a \times b$ equals magnitude of a times magnitude of b for every angle
(B) $a \cdot (a \times b) = 0$
(C) $a \cdot b = b \cdot a$
(D) $a \times b = -(b \times a)$

75. Select all solutions of $dy/dx = y$ on the real line.

- (A) $y = 2e^x$ (B) $y = e^x$
(C) $y = x$ (D) $y = 0$

WBJEE - FULL SYLLABUS MOCK TEST

PAPER II - PHYSICS AND CHEMISTRY

80 questions | 100 marks | Time: 2 hours

Physics: Q76-115; Chemistry: Q116-155. Apply the category-wise marking rules printed in Paper I.

PHYSICS - CATEGORY 1 | Q76-105 | 1 MARK EACH

76. The dimensional formula of Planck's constant is:

- (A) ML^2T^{-1} (B) ML^2T^{-2}
(C) $M^0L^2T^{-1}$ (D) MLT^{-2}

77. A particle has $x = 2t^2 + 3t$ (SI units). Its velocity at $t = 2$ s is:

- (A) 8 m/s (B) 14 m/s
(C) 11 m/s (D) 7 m/s

78. A 4 kg block on a horizontal surface has coefficient of static friction 0.25. For $g = 10 \text{ m/s}^2$, the maximum static friction is:

- (A) 1 N (B) 40 N
(C) 10 N (D) 16 N

79. A net force varies as $F = 2x$ N along the x-axis. The work done from $x = 0$ to 3 m is:

- (A) 3 J (B) 9 J
(C) 18 J (D) 6 J

80. The moment of inertia of a thin uniform ring of mass M and radius R about its central axis perpendicular to its plane is:

- (A) $2MR^2$ (B) $MR^2/4$
(C) MR^2 (D) $MR^2/2$

81. A satellite's orbital radius is increased from r to $4r$. Its orbital period becomes:

- (A) 16 times (B) 2 times
(C) 4 times (D) 8 times

82. A wire has stress $2 \times 10^8 \text{ Pa}$ and strain 10^{-3} . Its Young's modulus is:

- (A) $2 \times 10^{10} \text{ Pa}$ (B) $2 \times 10^5 \text{ Pa}$
(C) $2 \times 10^8 \text{ Pa}$ (D) $2 \times 10^{11} \text{ Pa}$

83. Water rises to height h in a capillary tube. If the tube radius is doubled, the rise is:

- (A) $h/2$ (B) $h/4$
(C) $4h$ (D) $2h$

84. A 0.2 kg sample with specific heat $500 \text{ J kg}^{-1} \text{ K}^{-1}$ is heated by 30 K. Heat supplied is:

- (A) 15000 J (B) 3000 J
(C) 300 J (D) 1000 J

85. A gas absorbs 500 J of heat and does 200 J of work. The increase in its internal energy is:

- (A) 200 J (B) 500 J
(C) 300 J (D) 700 J

86. The absolute temperature of an ideal gas becomes four times its initial value. The rms molecular speed becomes:

- (A) 2 times (B) Half
(C) Unchanged (D) 4 times

87. A mass-spring system has period T . Keeping the mass fixed, the spring constant is increased fourfold. The new period is:

- (A) $T/4$ (B) $T/2$
(C) $4T$ (D) $2T$

88. An open organ pipe has fundamental frequency f . An otherwise identical pipe closed at one end has fundamental frequency:

- (A) $f/4$ (B) f
(C) $2f$ (D) $f/2$

89. Two charges $+q$ and $-q$ are equidistant from a midpoint. At the midpoint, the electric potential is:

- (A) Zero (B) $2kq/r$
(C) kq/r (D) Infinite

90. A $3 \mu\text{F}$ and a $6 \mu\text{F}$ capacitor are connected in series. The equivalent capacitance is:

- (A) $9 \mu\text{F}$ (B) $2 \mu\text{F}$
(C) $3 \mu\text{F}$ (D) $4.5 \mu\text{F}$

91. A cell of emf 12 V and internal resistance 1Ω supplies a 5Ω external resistor. The current is:

- (A) 2 A (B) 12 A
(C) 3 A (D) 2.4 A

92. A proton enters a uniform magnetic field perpendicular to its velocity. If its speed doubles, the orbit radius becomes:

- (A) Four times (B) Half
(C) Twice (D) Unchanged

WBJEE - FULL SYLLABUS MOCK TEST

93. The magnetic flux through each turn of a 100-turn coil changes by 0.02 Wb in 0.1 s. The magnitude of average induced emf is:
(A) 20 V (B) 200 V
(C) 0.2 V (D) 2 V

94. Which electromagnetic radiation has the shortest wavelength among these?
(A) Gamma rays (B) Infrared
(C) Radio waves (D) Microwaves

95. An object is 30 cm from a convex lens of focal length 10 cm. Its real image is formed at:
(A) 30 cm on the other side (B) 15 cm on the other side
(C) 15 cm on the object side (D) 20 cm on the other side

96. In Young's experiment, $\lambda = 600$ nm, $D = 2$ m and slit separation $d = 0.5$ mm. Fringe width is:
(A) 0.6 mm (B) 4.8 mm
(C) 2.4 mm (D) 1.2 mm

97. Light of photon energy 5 eV falls on a metal with work function 2 eV. The stopping potential is:
(A) 3 V (B) 2 V
(C) 5 V (D) 7 V

98. The energy of hydrogen in its ground state is -13.6 eV. Its energy at $n = 2$ is:
(A) -27.2 eV (B) -3.4 eV
(C) -6.8 eV (D) -1.51 eV

99. A radioactive sample has half-life 4 h. After 12 h, the fraction remaining is:
(A) $1/2$ (B) $1/8$
(C) $1/16$ (D) $1/4$

100. Statement I: Forward bias narrows a p-n junction's depletion layer. Statement II: Forward bias lowers its potential barrier. Choose the correct option.
(A) Both statements are true (B) Both statements are false
(C) I true, II false (D) I false, II true

101. A car moves at 10 m/s on a circular track of radius 20 m. Its centripetal acceleration is:
(A) 10 m/s^2 (B) 20 m/s^2
(C) 2 m/s^2 (D) 5 m/s^2

102. A force of 10 N acts perpendicular to a lever arm of 0.3 m. The torque magnitude is:
(A) 0.03 N m (B) 30 N m
(C) 10.3 N m (D) 3 N m

103. A small sphere falls through a viscous liquid at terminal speed. The resultant force on it is:
(A) Equal to drag upward (B) Equal to its weight downward
(C) Zero (D) Always increasing

104. In an n-type semiconductor, the majority mobile charge carriers are:
(A) Holes (B) Neutrons
(C) Protons (D) Electrons

105. For a transistor, collector current is 9.8 mA and base current is 0.2 mA. The current gain β is:
(A) 9.6 (B) 50
(C) 49 (D) 0.02

PHYSICS - CATEGORY 2 | Q106-110 | 2 MARKS EACH

106. A solid cylinder rolls without slipping down a slope of angle 30° . For $g = 10 \text{ m/s}^2$, its acceleration is:
(A) $20/3 \text{ m/s}^2$ (B) $5/2 \text{ m/s}^2$
(C) 5 m/s^2 (D) $10/3 \text{ m/s}^2$

107. One mole of a monatomic ideal gas is heated at constant pressure through 40 K. Taking $R = 8.3 \text{ J mol}^{-1} \text{ K}^{-1}$, heat supplied is:
(A) 332 J (B) 830 J
(C) 498 J (D) 1660 J

108. A wire of resistance R is cut into three equal parts, which are connected in parallel. Equivalent resistance is:
(A) $R/6$ (B) $3R$
(C) $R/9$ (D) $R/3$

109. A series RLC circuit has $R = 30 \Omega$, $X_L = 80 \Omega$ and $X_C = 40 \Omega$. Its impedance is:
(A) 70Ω (B) 40Ω
(C) 150Ω (D) 50Ω

WBJEE - FULL SYLLABUS MOCK TEST

110. Unpolarised light of intensity I_0 passes through an ideal polariser and an analyser at 60° to it. Final intensity is:

- (A) $I_0/2$ (B) $I_0/8$
(C) $3I_0/8$ (D) $I_0/4$

PHYSICS - CATEGORY 3 | Q111-115 | SELECT ALL CORRECT

111. For ideal projectile motion with nonzero horizontal launch velocity, select all correct statements.

- (A) Acceleration is always vertically downward
(B) Acceleration is zero at the highest point
(C) Horizontal velocity is constant
(D) Vertical velocity is zero at the highest point

112. For a rigid body rotating about a fixed axis, select all correct relations (I is constant).

- (A) $K = I\omega^2/2$ (B) $\tau = I\alpha$
(C) $L = I\omega$ (D) $K = I\omega/2$

113. For a conductor in electrostatic equilibrium, select all correct statements.

- (A) Electric field just outside is always tangential
(B) Its surface is equipotential
(C) Excess charge lies on its surface
(D) Electric field within its bulk is zero

114. At resonance in an ideal series RLC circuit, select all correct statements.

- (A) Impedance equals R (B) Current amplitude is zero
(C) $X_L = X_C$ (D) Power factor equals 1

115. For photoelectric emission above threshold, select all correct statements under the usual ideal assumptions.

- (A) Increasing intensity increases saturation current
(B) Stopping potential is independent of intensity at fixed frequency
(C) Threshold frequency depends on light intensity
(D) Maximum kinetic energy increases with frequency

CHEMISTRY - CATEGORY 1 | Q116-145 | 1 MARK EACH

116. The number of molecules in 0.25 mol of CO_2 is ($N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$):

- (A) 2.4088×10^{24} (B) 1.5055×10^{23}
(C) 6.022×10^{23} (D) 3.011×10^{23}

117. The maximum number of electrons in the $n = 3$ shell is:

- (A) 9 (B) 18
(C) 8 (D) 32

118. Which species is smallest in radius?

- (A) Mg^{2+} (B) Na^+
(C) Al^{3+} (D) F^-

119. The molecular geometry of SF_6 is:

- (A) Octahedral (B) Square pyramidal
(C) Tetrahedral (D) Trigonal bipyramidal

120. Which pair is correctly matched?

- (A) Ideal gas isothermal process - constant PV^2
(B) Simple cubic unit cell - 2 atoms
(C) FCC unit cell - 4 atoms
(D) BCC unit cell - 4 atoms

121. If $\Delta H = -20 \text{ kJ mol}^{-1}$ and $\Delta S = +50 \text{ J mol}^{-1} \text{ K}^{-1}$, then ΔG at 300 K is:

- (A) -35 kJ mol^{-1} (B) $+35 \text{ kJ mol}^{-1}$
(C) -5 kJ mol^{-1} (D) $+5 \text{ kJ mol}^{-1}$

122. Adding a common ion to a sparingly soluble salt solution usually:

- (A) Makes K_{sp} zero
(B) Decreases its solubility
(C) Changes the salt's K_{sp} at fixed temperature
(D) Increases its solubility in every case

123. For an ideal solution containing a nonvolatile solute, solvent vapour pressure is:

- (A) $x_{\text{solute}} \times p^\circ_{\text{solvent}}$ (B) $p^\circ_{\text{solvent}}/x_{\text{solute}}$
(C) Independent of composition (D) $x_{\text{solvent}} \times p^\circ_{\text{solvent}}$

WBJEE - FULL SYLLABUS MOCK TEST

124. For a first-order reaction, its half-life is:

- (A) Inversely proportional to initial concentration
- (B) Directly proportional to initial concentration
- (C) Always equal to $1/k$
- (D) Independent of initial concentration

125. In acidic medium, reduction of one MnO_4^- ion to Mn^{2+} requires:

- (A) 3 electrons (B) 2 electrons
- (C) 7 electrons (D) 5 electrons

126. In a galvanic cell, oxidation takes place at the:

- (A) Voltmeter (B) Cathode
- (C) Salt bridge (D) Anode

127. Homolytic cleavage of a covalent bond produces:

- (A) Only neutral molecules with filled shells
- (B) Free radicals
- (C) Only carbocations
- (D) Only carbanions

128. Ozonolysis of ethene followed by reductive work-up chiefly yields:

- (A) Methanal (B) Methanol
- (C) Ethanal (D) Propanone

129. Under comparable conditions, which alkyl chloride is most favourable for $\text{S}_\text{N}1$ substitution?

- (A) tert-Butyl chloride (B) Ethyl chloride
- (C) n-Propyl chloride (D) Methyl chloride

130. Chlorobenzene is less reactive than chloroethane towards ordinary nucleophilic substitution mainly because:

- (A) Its carbon is sp^3 -hybridised
- (B) Chlorine cannot withdraw electrons
- (C) Its C-Cl bond has partial double-bond character
- (D) It has a weaker C-Cl bond

131. Oxidation of a primary alcohol under controlled conditions can first give an:

- (A) Alkane (B) Ether only
- (C) Aldehyde (D) Amine

132. Phenol is more acidic than ethanol mainly due to:

- (A) Presence of an ionic O-H bond in phenol
- (B) Greater stability of ethoxide by resonance
- (C) Absence of oxygen in ethanol
- (D) Resonance stabilisation of phenoxide

133. Williamson ether synthesis typically involves reaction of an alkoxide with a:

- (A) Suitable primary alkyl halide (B) Carboxylic acid alone
- (C) Ketone alone (D) Diazonium salt alone

134. Which compound gives both a silver mirror and the iodoform test?

- (A) Benzaldehyde (B) Ethanal
- (C) Methanal (D) Propanone

135. Which acid is strongest among these?

- (A) Propanoic acid (B) Chloroethanoic acid
- (C) Ethanoic acid (D) Butanoic acid

136. The carbylamine test is given by:

- (A) Only tertiary amines (B) All amides
- (C) Primary amines (D) Only secondary amines

137. Reduction of nitrobenzene with Sn/HCl followed by alkali chiefly yields:

- (A) Benzoic acid (B) Phenol
- (C) Benzaldehyde (D) Aniline

138. Complete acidic hydrolysis of CH_3CN chiefly yields:

- (A) Ethanol (B) Ethanoic acid
- (C) Ethanal (D) Methanoic acid

139. Benzenediazonium chloride heated with water produces:

- (A) Benzene exclusively (B) Aniline
- (C) Chlorobenzene exclusively (D) Phenol

140. Which carbohydrate is non-reducing?

- (A) Glucose (B) Lactose
- (C) Maltose (D) Sucrose

141. The linkage between amino-acid residues in a protein is:

- (A) Peptide (B) Phosphodiester
- (C) Glycosidic (D) Metallic

WBJEE - FULL SYLLABUS MOCK TEST

142. Which base is normally present in RNA but absent from DNA?

- (A) Guanine (B) Adenine
(C) Cytosine (D) Uracil

143. The monomer of PVC is:

- (A) Styrene (B) Tetrafluoroethene
(C) Vinyl chloride (D) Ethene

144. The characteristic flame colour of sodium salts is:

- (A) Lilac (B) Brick red
(C) Golden yellow (D) Apple green

145. The shape of XeF_4 is:

- (A) Tetrahedral (B) Octahedral
(C) Square planar (D) Trigonal planar

CHEMISTRY - CATEGORY 2 | Q146-150 | 2 MARKS EACH

146. An ideal dilute solution has $K_f = 2 \text{ K kg mol}^{-1}$, molality 0.2 and freezing-point depression 0.8 K. Its van't Hoff factor is:

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

147. A weak monoprotic acid has $K_a = 10^{-5}$ and concentration 0.1 M. Assuming small dissociation, its pH is approximately:

- (A) 1 (B) 2
(C) 3 (D) 5

148. For $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$, $E^\circ = 0.34 \text{ V}$. At 298 K and $[\text{Cu}^{2+}] = 0.01 \text{ M}$, the Nernst equation gives E approximately:

- (A) 0.281 V (B) 0.340 V
(C) 0.399 V (D) 0.222 V

149. A first-order reaction is 87.5% complete in 30 min. Its half-life is:

- (A) 15 min (B) 5 min
(C) 20 min (D) 10 min

150. In low-spin octahedral $[\text{Fe}(\text{CN})_6]^{4-}$, the number of unpaired electrons on Fe is:

- (A) 0 (B) 2
(C) 6 (D) 4

CHEMISTRY - CATEGORY 3 | Q151-155 | SELECT ALL CORRECT

151. Select all correct statements about d- and f-block chemistry.

- (A) All transition-metal ions are colourless
(B) Lanthanoid contraction involves poor shielding by 4f electrons
(C) Mn^{2+} has five unpaired electrons in the free ion
(D) Actinoids commonly show a wider range of oxidation states than lanthanoids

152. For $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$, select all correct statements.

- (A) Co has oxidation state +3
(B) Coordination number is 6
(C) There are three ionisable chlorides per formula unit
(D) NH_3 is bidentate

153. Select all correct statements.

- (A) Stratospheric ozone is chiefly harmful because it blocks visible light
(B) Photochemical smog can contain ozone and PAN
(C) CO can reduce the oxygen-carrying capacity of blood
(D) Green chemistry aims to reduce hazardous substances

154. Select all correct observations under appropriate test conditions.

- (A) A carboxylic acid can release CO_2 with NaHCO_3
(B) Glucose gives no Tollens' test
(C) Phenol can give violet colour with neutral FeCl_3
(D) AgCl dissolves in dilute aqueous NH_3

155. Select all correct statements.

- (A) PCl_5 is square pyramidal in the gas phase
(B) XeF_2 is linear
(C) B_2H_6 has bridging three-centre two-electron bonds
(D) White phosphorus consists of P_4 molecules