JEE MAIN 2027

20 Full-Length Mock Tests

Physics•Chemistry • Mathematics

Complete Answer Key with Detailed Solutions

Tests	20 (Full syllabus, latest pattern)
Questions	75 per test — 1500 unique questions in total
Sections	Section A: Physics (Q1–25) • Section B: Chemistry (Q26–50) • Section C: Mathematics (Q51–75)
Difficulty	Mixed (Easy → Hard), progressively challenging series
Marking	+4 for correct, −1 for incorrect (single correct MCQ)
Includes	Answer key for every test + brief worked solution for every question

Mock Test 16

Time Allowed: 3 Hours |Maximum Marks: 300 | 75 Questions

Instructions: This paper contains three sections — A (Physics, Q1–25), B (Chemistry, Q26–50) and C (Mathematics, Q51–75). Each question carries +4 for a correct response and −1 for an incorrect response. Choose the single best option.

Section A — PHYSICS

1. A net force of 30 N acts on a 5 kg object. Its acceleration is:
   (a) 30 m/s²
   (b) 6 m/s²
   (c) 0.17 m/s²
   (d) 150 m/s²

2. A particle starts at 15 m/s with constant acceleration 2 m/s². Its speed after 4 s is:
   (a) 27 m/s
   (b) 17 m/s
   (c) 8 m/s
   (d) 23 m/s

3. The value of Avogadro's number is approximately:
   (a) 9.1×10^{-31}
   (b) 3.14×10^{23}
   (c) 6.022×10^{23}
   (d) 1.6×10^{-19}

4. A particle starts at 5 m/s with constant acceleration 4 m/s². Its speed after 2 s is:
   (a) 8 m/s
   (b) 21 m/s
   (c) 13 m/s
   (d) 9 m/s

5. A particle starts at 5 m/s with constant acceleration 3 m/s². Its speed after 2 s is:
   (a) 8 m/s
   (b) 6 m/s
   (c) 17 m/s
   (d) 11 m/s

6. The work–energy theorem states that net work equals:
   (a) Change in potentialenergy
   (b) Change in momentum
   (c) Change in kinetic energy
   (d) Total energy

7. Heat required to raise 500 g of water by 20°C (c = 4.2 J/g°C) is:
   (a) 84J
   (b) 42000 J
   (c) 10000 J
   (d) 21000 J

8. Heat required to raise 100 g of water by 20°C (c = 4.2 J/g°C) is:
   (a) 8400 J
   (b) 2000 J
   (c) 84 J
   (d) 4200 J

9. A particle moves in a circle of radius 2 m at constant speed 4 m/s. Its centripetal acceleration is:
   (a) 2 m/s²
   (b) 8 m/s²
   (c) 16 m/s²
   (d) 4 m/s²

10. Newton's law of cooling states that the rate of cooling is proportional to:
   (a) Mass
   (b) Temperature difference with surroundings
   (c) Volume
   (d) Temperature

11. Poisson's ratio for an ideal rigid material is:
   (a) 0
   (b) −1
   (c) 0.5
   (d) 1

12. A coil of 100 turns has a flux change of 0.02 Wb in 0.1 s. The induced emf is:
   (a) 0.2 V
   (b) 10 V
   (c) 2 V
   (d) 20 V

13. The excess pressure inside a soap bubble of radius R and surface tension S is:
   (a) 8S/R
   (b) 4S/R
   (c) S/R
   (d) 2S/R

14. The coefficient of limiting friction depends on:
   (a) Area of contact
   (b) Nature of the surfaces
   (c) Mass of the body
   (d) Volume of the body

15. The number of degrees of freedom of a diatomic gas (room temperature) is:
   (a) 3
   (b) 6
   (c) 5
   (d) 7

16. The weight of a body at a place where g = 9.8 m/s² and mass 10 kg is:
   (a) 98 N
   (b) 9.8 N
   (c) 980 N
   (d) 10 N

17. The equation of continuity is a statement of conservation of:
   (a) Momentum
   (b) Energy
   (c) Mass
   (d) Charge

18. Sound waves in air are:
   (a) Transverse
   (b) Stationary
   (c) Longitudinal
   (d) Electromagnetic

19. The magnetic field at the centre of a circular coil of N turns, radius R, current I is:
    (a) $\mu_0 NI \cdot R$
    (b) $\mu_0 I/2\pi R$
    (c) $\mu_0 NI/4R$
    (d) $\mu_0 NI/2R$

20. Power dissipated in a resistor R carrying current I is:
    (a) IR^2
    (b) I/R^2
    (c) I^2R
    (d) IR

21. The radius of the circular path of a charge q, mass m, in field B with speed v is:
    (a) qmvB
    (b) mv/qB
    (c) qB/mv
    (d) mvB/q

22. In an isothermal expansion of an ideal gas, the change in internal energy is:
    (a) Positive
    (b) Zero
    (c) Negative
    (d) Equal to work

23. Two lenses of power +4 D and −2 D are combined. The net power is:
    (a) 6 D
    (b) 2 D
    (c) 0.5 D
    (d) −8 D

24. Eddy currents produce:
    (a) Magnetic levitationonly
    (b) No effect
    (c) Perfect insulation
    (d) Heating losses

25. The critical angle for glass (n = 1.5) in air is about:
    (a) 60°
    (b) 30°
    (c) 48°
    (d) 42°

Section B — CHEMISTRY

26. An ionic bond is formed by:
    (a) Sharing of electrons
    (b) Transfer of electrons
    (c) Overlap of orbitals
    (d) Metallic sea

27. A mixture has 1 mol of A and 1 mol of B. The mole fraction of A is:
    (a) 0.5
    (b) 0.25
    (c) 1.5
    (d) 1

28. The reactivity order of halides in SN^1 is:
    (a) 3° > 2° > 1°
    (b) All equal
    (c) 1° > 2° > 3°
    (d) 2° > 1° > 3°

29. For a first-order reaction, the rate constant has units:
    (a) L/mol·s
    (b) s^{-1}
    (c) mol/L·s
    (d) $mol^2/L^2 \cdot s$

30. Lassaigne's test is used to detect the presence of:
    (a) N,S andhalogensinorganiccompounds
    (b) Oxygen
    (c) Only hydrogen
    (d) Only carbon

31. The reason for the inert pair effect involves:
    (a) Small size
    (b) High electronegativity
    (c) Poor shielding of s-electrons
    (d) Ionic character

32. If the theoretical yield is 25 g and actual yield is 20 g, the percentage yield is:
    (a) 80%
    (b) 160%
    (c) 5%
    (d) 20%

33. Tollens' reagent is used to detect:
    (a) Aldehydes
    (b) Ketones
    (c) Alcohols
    (d) Ethers

34. The linkage joining two monosaccharides is:
    (a) Glycosidic linkage
    (b) Hydrogen bond
    (c) Peptide bond
    (d) Ester bond

35. The number of moles in 22 g of NaCl (M = 58.5) is:
    (a) 0.75 mol
    (b) 1287 mol
    (c) 0.38 mol
    (d) 58.5 mol

36. The C–X bond strength order is:
    (a) C–I > C–Br > C–Cl > C–F
    (b) C–F > C–Cl > C–Br > C–I
    (c) C–Cl > C–F
    (d) All equal

37. The number of structural isomers of butane (C_4H_{10}) is:
    (a) 1
    (b) 3
    (c) 2
    (d) 4

38. Osmotic pressure is given by:
    (a) $\pi = iCRT^2$
    (b) $\pi = C/RT$
    (c) $\pi = CR/T$
    (d) $\pi = iCRT$

39. Which forms an orange-red precipitate with 2,4-DNP?
    (a) Both aldehydesandketones
    (b) Only ketones
    (c) Only aldehydes
    (d) Alcohols

40. The shape of PCl_5 is:
    (a) Trigonal bipyramidal
    (b) Octahedral
    (c) Square pyramidal
    (d) Tetrahedral

41. If 0.5 F of charge is passed, the moles of electrons transferred are:
    (a) 1
    (b) 96500
    (c) 0.5
    (d) 2

42. Which polymer is a polyamide?
    (a) PVC
    (b) Bakelite
    (c) Terylene
    (d) Nylon-6

43. The packing efficiency of a body-centred cubic lattice is about:
    (a) 52%
    (b) 100%
    (c) 68%
    (d) 74%

44. Which 0.1 m solution has the lowest freezing point?
    (a) 0.1 m NaCl (b) 0.1 m $AlCl_3$ (c) 0.1 m glucose (d) 0.1 m $CaCl_2$

45. The normality of a 1 M solution of an acid with n-factor 1 is:
    (a) 1 N
    (b) 0.5 N
    (c) 2 N
    (d) 3 N

46. The main component of Dettol is:
    (a) Chloroxylenol
    (b) Iodine
    (c) Phenol
    (d) Ethanol only

47. Which colligative property is used to determine the molar mass of polymers?
    (a) Boiling pointelevation
    (b) Vapour pressure lowering
    (c) Osmotic pressure
    (d) Freezing point depression

48. 25 mL of 1 M solution is diluted to 100 mL. The new molarity is:
    (a) 0.25 M
    (b) 0.5 M
    (c) 4 M
    (d) 1 M

49. Bond order of O_2^- (superoxide) is:
    (a) 1.5
    (b) 1
    (c) 2
    (d) 2.5

50. Henderson equation relates pH to:
    (a) Kw
    (b) pKa and ratio of salt to acid
    (c) only $[H^+]$
    (d) only Ka

Section C — MATHEMATICS

51. The number of terms in the expansion of (x + y)^8 is:
    (a) 8
    (b) 16
    (c) 9
    (d) 64

52. The discriminant of $ax^2 + bx + c = 0$ is:
    (a) $b^2 + 4ac$
    (b) $b^2 - 4ac$
    (c) $4ac - b^2$
    (d) $-b^2 - 4ac$

53. The value of the determinant |[[4,2],[3,1]]| is:
    (a) -2
    (b) 10
    (c) -4
    (d) 2

54. The slope of the line 3x + 4y + 7 = 0 is:
    (a) 0.75
    (b) -0.75
    (c) 1.333
    (d) -1.333

55. If f(x) = 2x + 1, then f(f(1)) = :
    (a) 7
    (b) 5
    (c) 9
    (d) 3

56. The quadratic equation whose sum of roots is 2 and product is -15 is:
    (a) $x^2 + 2x + -15 = 0$
    (b) $x^2 - -15x + 2 = 0$
    (c) $x^2 - 2x - -15 = 0$
    (d) $x^2 - 2x + -15 = 0$

57. ∫e^(2x) dx equals:
    (a) e^(2x)/2x + C
    (b) e^(2x)/2 + C
    (c) e^(2x) + C
    (d) 2e^(2x) + C

58. The 10th term of the AP with first term 3 and common difference 4 is:
    (a) 39
    (b) 43
    (c) 35
    (d) 120

59. A differential equation is linear if the dependent variable appears:
    (a) In a product with itsderivative
    (b) To the first power only
    (c) Squared
    (d) In the denominator

60. ∫2x^3 dx equals:
    (a) 2x^4 + C
    (b) 2/4 x^4 + C
    (c) 8x^4 + C
    (d) 2/3x^3 + C

61. The midpoint of the segment joining (0,0) and (5,12) is:
    (a) (5, 12)
    (b) (2.5, 12)
    (c) (5, 6)
    (d) (2.5, 6)

62. The nature of the roots of $1x^2 + 1x + 1 = 0$ is:
    (a) Realand distinct
    (b) Cannot be determined
    (c) Complex (imaginary)
    (d) Real and equal

63. A function is continuous at x = a if LHL = RHL = :
    (a) f(a)
    (b) 0
    (c) f'(a)
    (d) ∞

64. The derivative of e^(4x) is:
    (a) e^(4x)/4
    (b) 4x e^(4x)
    (c) 4e^(4x)
    (d) e^(4x)

65. The dot product of vectors (5î + 1ĵ) and (1î + 5ĵ) is:
    (a) 20
    (b) 10
    (c) 26
    (d) 0

66. The sum of the first 20 terms of the AP with a = 3, d = 3 is:
    (a) 1260
    (b) 610
    (c) 630
    (d) 60

67. Adding a constant to every observation changes the mean by:
    (a) Zero
    (b) Double
    (c) Its square
    (d) The same constant

68. The value of tan 45° is:
    (a) 0 (b) 1 (c) 1/√3 (d) √3

69. The x-intercept of the line 1x + 1y = 1 is:
    (a) 0.5
    (b) 1
    (c) 2
    (d) 3

70. The number of circular arrangements of 5 people is:
    (a) 25
    (b) 120
    (c) 5
    (d) 24

71. Two lines are parallel if their slopes are:
    (a) Equal
    (b) Infinite
    (c) Negative reciprocals
    (d) Zero

72. The area of the triangle with vertices (0,0), (2,0), (0,2) is:
    (a) 1
    (b) 2
    (c) 4
    (d) 3

73. If two dice are thrown, the probability of a doublet is:
    (a) 1/12
    (b) 1/6
    (c) 1/3
    (d) 1/36

74. The coefficient of x^1 in the expansion of (1 + x)^5 is:
    (a) 10
    (b) 15
    (c) 5
    (d) 2.5

75. The inverse of the matrix [[2,3],[1,2]] is (1/1) times:
    (a) [[2,3],[1,2]]
    (b) [[4,-3],[-1,2]]
    (c) [[2,-3],[-1,2]]
    (d) [[-2,3],[1,-2]]

Mock Test 16 — Answer Key

1-b	2-d	3-c	4-c	5-d	6-c	7-b	8-a	9-b	10-b	11-a	12-d	13-b	14-b	15-c
16-a	17-c	18-c	19-d	20-c	21-b	22-b	23-b	24-d	25-d	26-b	27-a	28-a	29-b	30-a
31-c	32-a	33-a	34-a	35-c	36-b	37-c	38-d	39-a	40-a	41-c	42-d	43-c	44-b	45-a
46-a	47-c	48-a	49-a	50-b	51-c	52-b	53-a	54-b	55-a	56-d	57-b	58-a	59-b	60-b
61-d	62-c	63-a	64-c	65-b	66-c	67-d	68-b	69-b	70-d	71-a	72-b	73-b	74-c	75-c

Mock Test 17 — Answer Key

1-a	2-c	3-c	4-d	5-d	6-c	7-d	8-b	9-a	10-d	11-a	12-b	13-c	14-c	15-c
16-a	17-d	18-a	19-c	20-d	21-d	22-c	23-d	24-a	25-b	26-d	27-a	28-b	29-c	30-a
31-b	32-b	33-c	34-c	35-b	36-b	37-b	38-b	39-b	40-a	41-b	42-c	43-a	44-d	45-d
46-b	47-c	48-b	49-a	50-d	51-c	52-a	53-a	54-a	55-d	56-c	57-c	58-c	59-d	60-a
61-a	62-d	63-a	64-b	65-a	66-a	67-a	68-b	69-b	70-c	71-d	72-d	73-a	74-a	75-c

Mock Test 18 — Answer Key

1-c	2-a	3-d	4-a	5-d	6-d	7-c	8-d	9-c	10-c	11-d	12-a	13-d	14-a	15-a
16-c	17-c	18-b	19-c	20-a	21-c	22-a	23-c	24-c	25-a	26-c	27-d	28-a	29-c	30-d
31-c	32-d	33-d	34-d	35-c	36-b	37-b	38-c	39-a	40-a	41-d	42-c	43-d	44-d	45-a
46-c	47-a	48-b	49-d	50-b	51-c	52-d	53-b	54-b	55-c	56-a	57-c	58-b	59-d	60-c
61-c	62-b	63-c	64-c	65-c	66-b	67-b	68-a	69-a	70-a	71-d	72-b	73-b	74-a	75-c

Mock Test 16 — Solutions

1. (b) 6 m/s² — a = F/m = 6 m/s².
2. (d) 23 m/s — v = u + at = 15 + 2×4 = 23 m/s.
3. (c) 6.022×10^{23} — $N_A \approx 6.022\times10^{23}$ mol^{-1}.
4. (c) 13 m/s — v = u + at = 5 + 4×2 = 13 m/s.
5. (d) 11 m/s — v = u + at = 5 + 3×2 = 11 m/s.
6. (c) Change in kinetic energy — $W_{net} = \Delta K$.
7. (b) 42000 J — $Q = mc\Delta T$ = 42000 J.
8. (a) 8400 J — $Q = mc\Delta T$ = 8400 J.
9. (b) 8 m/s² — $a = v^2/r = 16/2 = 8$ m/s².
10. (b) Temperature difference with surroundings — $dQ/dt \propto (T - T_0)$.
11. (a) 0 — Perfectly rigid → no lateral strain → σ = 0.
12. (d) 20 V — $\varepsilon = N\Delta\Phi/\Delta t$ = 20 V.
13. (b) 4S/R — Soap bubble has two surfaces → $\Delta P = 4S/R$.
14. (b) Nature of the surfaces — μ depends on surface nature, not on area/mass.
15. (c) 5 — 3 translational + 2 rotational = 5.
16. (a) 98 N — W = mg = 10×9.8 = 98 N.
17. (c) Mass — $A_1v_1 = A_2v_2$ follows from mass conservation.
18. (c) Longitudinal — Sound in gases is a longitudinal wave.
19. (d) $\mu_0 NI/2R$ — $B = \mu_0 NI/2R$.
20. (c) I^2R — $P = I^2R = V^2/R$.
21. (b) mv/qB — r = mv/qB.
22. (b) Zero — ΔU = 0 for ideal gas at constant T.
23. (b) 2 D — $P = P_1 + P_2 = 4 - 2 = 2$ D.
24. (d) Heating losses — Eddy currents dissipate energy as heat.
25. (d) 42° — sin C = 1/1.5 = 0.667 → C ≈ 42°.
26. (b) Transfer of electrons — Electron transfer from metal to non-metal.
27. (a) 0.5 — $x_A = 1/(1+1) = 0.5$.
28. (a) 3° > 2° > 1° — More stable carbocation → faster SN^1.
29. (b) s^{-1} — First order → s^{-1}.
30. (a) N, S and halogens in organic compounds — Sodium fusion extract detects N, S, halogens.
31. (c) Poor shielding of s-electrons — Inert pair effect = reluctance of ns^2 to participate.
32. (a) 80% — % yield = 20/25×100 = 80%.
33. (a) Aldehydes — Silver mirror test → aldehyde.
34. (a) Glycosidic linkage — Sugars link via glycosidic bonds.
35. (c) 0.38 mol — n = mass/M = 22/58.5 = 0.38 mol.
36. (b) C–F > C–Cl > C–Br > C–I — Smaller halogen → stronger bond.
37. (c) 2 — n-butane and isobutane.
38. (d) π = iCRT — π = iCRT.
39. (a) Both aldehydes and ketones — 2,4-DNP reacts with carbonyl compounds.
40. (a) Trigonal bipyramidal — sp^3d → trigonal bipyramidal.
41. (c) 0.5 — n = Q/F = 0.5 mol.
42. (d) Nylon-6 — Nylon has amide linkages.
43. (c) 68% — bcc packing = 68%.
44. (b) 0.1 m $AlCl_3$ — $AlCl_3$ gives i = 4.
45. (a) 1 N — N = M × n-factor = 1 N.
46. (a) Chloroxylenol — Chloroxylenol + terpineol.
47. (c) Osmotic pressure — Osmotic pressure is measurable for very dilute polymer solutions.
48. (a) 0.25 M — M1V1 = M2V2 → M2 = 1×25/100 = 0.25 M.
49. (a) 1.5 — O_2^- has bond order 1.5.
50. (b) pKa and ratio of salt to acid — pH = pKa + log([salt]/[acid]).
51. (c) 9 — Number of terms = n+1 = 9.

52. (b) $b^2 - 4ac$ — $D = b^2 - 4ac$.
53. (a) -2 — det = 4×1 − 2×3 = -2.
54. (b) -0.75 — Slope = −a/b = -0.75.
55. (a) 7 — f(1)=3, f(3)=7.
56. (d) $x^2 - 2x + -15 = 0$ — $x^2 -$ (sum)x + (product) = 0.
57. (b) e^(2x)/2 + C — ∫e^(2x)dx = e^(2x)/2 + C.
58. (a) 39 — $T_n = a+(n-1)d = 3+9\times4 = 39$.
59. (b) To the first power only — Linear → degree one in y and its derivatives.
60. (b) 2/4 x^4 + C — ∫2x^3dx = 2x^4/4 + C.
61. (d) (2.5, 6) — Midpoint = ((0+5)/2, (0+12)/2).
62. (c) Complex (imaginary) — $D = b^2-4ac = -3$ → Complex (imaginary).
63. (a) f(a) — Continuity definition.
64. (c) 4e^(4x) — d/dx e^(4x) = 4e^(4x).
65. (b) 10 — a·b = 5×1 + 1×5 = 10.
66. (c) 630 — $S_n = n/2[2a+(n-1)d] = 630$.
67. (d) The same constant — Mean shifts by the constant.
68. (b) 1 — tan45° = 1.
69. (b) 1 — Put y=0 → x = 1/1 = 1.
70. (d) 24 — (n−1)! = 4! = 24.
71. (a) Equal — Parallel → equal slopes.
72. (b) 2 — Area = $\frac{1}{2}|x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)| = 2$.
73. (b) 1/6 — 6 doublets / 36 = 1/6.
74. (c) 5 — Coefficient = 5C1 = 5.
75. (c) [[2,-3],[-1,2]] — Inverse = (1/det)[[d,−b],[−c,a]], det = 1.