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

9. Gravitational force between two masses is:
   (a) Bothattractiveandrepulsive
   (b) Always repulsive
   (c) Always attractive
   (d) Zero

10. A NAND gate gives a HIGH output when:
   (a) Both inputs are HIGH
   (b) Both inputs are LOW
   (c) Any one input is LOW
   (d) Always

11. An object is placed at 2f from a concave mirror of focal length 15 cm. The image is formed at:
   (a) 7.5 cm
   (b) 30 cm
   (c) infinity
   (d) 15 cm

12. A rigid body rotates at 60 rpm. Its angular speed in rad/s is:
   (a) 2π
   (b) π
   (c) 60
   (d) 30π

13. A wire is stretched to double its length. If it obeys Hooke's law, its Young's modulus:
   (a) Becomesfourtimes
   (b) Halves
   (c) Doubles
   (d) Remains unchanged

14. A body with initial speed 10 m/s accelerates at 2 m/s². Distance in 5 s is:
   (a) 75 m
   (b) 85 m
   (c) 25 m
   (d) 50 m

15. At the mean position in SHM:
   (a) Velocity is maximumandacceleration is zero
   (b) Velocity is zero
   (c) Both are zero
   (d) Both are maximum

16. The energy of a photon of frequency ν is:
   (a) h/ν
   (b) hν²
   (c) hν
   (d) ν/h

17. For total internal reflection, light must travel:
   (a) From rarerto denser
   (b) At 90°
   (c) From denser to rarer medium with angle > critical angle
   (d) Along the normal

18. Electric potential due to a point charge q at distance r is:
   (a) kq²/r
   (b) kq/r
   (c) kq r
   (d) kq/r²

Mock Test 18

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 particle starts at 0 m/s with constant acceleration 2 m/s². Its speed after 4 s is:
   (a) 2 m/s
   (b) 16 m/s
   (c) 8 m/s
   (d) 12 m/s

2. A particle starts at 5 m/s with constant acceleration 3 m/s². Its speed after 4 s is:
   (a) 17 m/s
   (b) 23 m/s
   (c) 8 m/s
   (d) 12 m/s

3. 1 atomic mass unit equals:
   (a) 10^5 dyne
   (b) 10^7 erg
   (c) 3.6×10^6 J
   (d) 931.5 MeV

4. Which phenomenon proves light is transverse?
   (a) Polarisation
   (b) Refraction
   (c) Reflection
   (d) Diffraction

5. In vacuum, electromagnetic waves travel at:
   (a) 3×10^{10} m/s
   (b) 1.5×10^8 m/s
   (c) 3×10^6 m/s
   (d) 3×10^8 m/s

6. The moment of inertia of a thin rod of length L about a perpendicular axis through one end is:
   (a) $2MR^2/3$
   (b) $2MR^2/5$
   (c) $MR^2/2$
   (d) $ML^2/3$

7. The fundamental frequency of a stretched string of length L, tension T and μ is:
   (a) $2L\sqrt{(T/\mu)}$
   (b) $(1/L)\sqrt{(T/\mu)}$
   (c) $(1/2L)\sqrt{(T/\mu)}$
   (d) $(1/2L)T/\mu$

8. An object is placed at 2f from a concave mirror of focal length 20 cm. The image is formed at:
   (a) 40cm
   (b) infinity
   (c) 10.0 cm
   (d) 20 cm

19. A photon of energy 4 eV has wavelength (hc = 1240 eV·nm):
    (a) 4960 nm
    (b) 155 nm
    (c) 310 nm
    (d) 620 nm

20. Work done by an ideal gas in an isothermal process from V_1 to V_2 is:
    (a) $nRT\ln(V_2/V_1)$
    (b) $nRT(V_2-V_1)$
    (c) $P(V_2-V_1)$
    (d) $nR\Delta T$

21. Which EM radiation is used in RADAR?
    (a) X-rays
    (b) Gamma rays
    (c) Microwaves
    (d) Ultraviolet

22. The energy of the electron in the nth Bohr orbit of hydrogen is:
    (a) $-13.6/n^2$ eV
    (b) $-13.6/n$ eV
    (c) $-13.6n^2$ eV
    (d) $13.6/n^2$ eV

23. The reactance of a capacitor C at angular frequency ω is:
    (a) ωC
    (b) ω/C
    (c) $1/\omega C$
    (d) C/ω

24. Two bodies of masses m and 4m are separated by r. The gravitational potential at the point where field is zero is:
    (a) zero
    (b) $-3Gm/r$
    (c) $-9Gm/r$
    (d) $-Gm/r$

25. A metal block of volume 200 cm^3 ($\gamma = 6.9\times10^{-5}$ /°C) is heated by 10°C. Its volume change is about:
    (a) 0.138 cm^3
    (b) 0.014 cm^3
    (c) 1.38 cm^3
    (d) 0.276 cm^3

Section B — CHEMISTRY

26. Corrosion of iron is primarily due to:
    (a) Neutralisation
    (b) Reduction
    (c) Rusting (oxidation)
    (d) Sublimation

27. Milk is an example of:
    (a) Aerosol
    (b) Solid sol
    (c) Gel
    (d) Emulsion

28. The magnetic moment of $[Fe(CN)_6]^{3-}$ (one unpaired e^-) is about:
    (a) 1.73 BM
    (b) 0 BM
    (c) 3.87 BM
    (d) 2.83 BM

29. Magnesium burns in air to form:
    (a) MgO_2
    (b) MgN only
    (c) MgO
    (d) $Mg(OH)_2$

30. Aniline on reaction with $NaNO_2$/HCl at 0–5°C gives:
    (a) Nitrobenzene
    (b) Azobenzene
    (c) Phenol
    (d) Benzenediazonium chloride

31. The general formula of alkenes is:
    (a) CnH2n+2
    (b) CnHn
    (c) CnH2n
    (d) CnH2n−2

32. The number of moles in 44 g of H_2SO_4 (M = 98) is:
    (a) 0.9 mol
    (b) 4312 mol
    (c) 98 mol
    (d) 0.45 mol

33. Which has the highest boiling point at the same molality?
    (a) 0.1 m glucose
    (b) 0.1 m urea
    (c) 0.1 m sucrose
    (d) 0.1 m NaCl

34. Adsorption is accompanied by:
    (a) Noentropy change
    (b) Increase in entropy
    (c) Increase in enthalpy
    (d) Decrease in entropy

35. Naphthalene is:
    (a) Alicyclic
    (b) Saturated
    (c) An aromatic compound
    (d) Aliphatic

36. Freons are:
(a) Alcohols
(b) Chlorofluorocarbons
(c) Hydrocarbons
(d) Amines

37. Which complex is coloured?
    (a) $[Ni(CO)_4]$
    (b) $[Ni(CN)_4]^{2-}$
    (c) $[Cu(CN)_4]^{3-}$
    (d) $[Zn(NH_3)_4]^{2+}$

38. The Freundlich adsorption isotherm is:
    (a) $x/m = kP^2$
    (b) $x/m = k/P$
    (c) x/m = kP^(1/n)
    (d) $x/m = kP$

39. Resonance stabilises a molecule by:
    (a) Delocalisingπelectrons
    (b) Changing hybridisation
    (c) Removing electrons
    (d) Localising bonds

40. LiF is sparingly soluble in water because of:
    (a) High lattice energy
    (b) Hydration only
    (c) Low lattice energy
    (d) Large size

41. Chirality can be lost in SN^1 due to:
    (a) Substitution
    (b) Inversion
    (c) Retention
    (d) Racemisation

42. The entropy change for melting of ice at 0°C is:
    (a) Negative
    (b) Cannot say
    (c) Positive
    (d) Zero

43. 25 mL of 0.1 M HCl is neutralised by NaOH. Moles of NaOH needed:
    (a) 2.5
    (b) 0.1
    (c) 1
    (d) 2.5×10^{-3}

44. Silica reacts with HF to give:
    (a) SiC
    (b) SiO_2
    (c) SiH_4
    (d) SiF_4

45. The lanthanoid contraction is caused by:
    (a) Poor shieldingof4felectrons
    (b) Octet stability
    (c) High charge
    (d) Large size

46. The number of molecules in 4.4 g of CO_2 is:
    (a) 6.022×10^{23}
    (b) 1.204×10^{23}
    (c) 6.022×10^{22}
    (d) 3.011×10^{22}

47. 50 mL of 0.5 M solution is diluted to 100 mL. The new molarity is:
    (a) 0.25 M
    (b) 0.125 M
    (c) 0.5 M
    (d) 1 M

48. Which is the strongest oxidising agent among halogens?
    (a) Br_2
    (b) F_2
    (c) Cl_2
    (d) I_2

49. The equivalent mass of NaOH (M = 40) is:
    (a) 80
    (b) 120
    (c) 20
    (d) 40

50. The equivalent mass of Na_2CO_3 (M = 106) is:
    (a) 106
    (b) 53
    (c) 26.5
    (d) 212

Section C — MATHEMATICS

51. The value of 3! is:
    (a) 12
    (b) 2
    (c) 6
    (d) 9

52. The derivative of 3x^3 with respect to x is:
    (a) 3x^2
    (b) 9x^3
    (c) 18x^2
    (d) 9x^2

53. The sum of the first 10 natural numbers is:
    (a) 110
    (b) 55
    (c) 10
    (d) 100

54. The direction cosines of a line are (l,m,n) with l = 1/√3. If m = 1/√3, then n^2 is:
    (a) 2/3
    (b) 1/3
    (c) 1
    (d) 0

55. The midpoint of the segment joining (0,0) and (3,4) is:
    (a) (3, 2)
    (b) (3, 4)
    (c) (1.5, 2)
    (d) (1.5, 4)

56. The value of nCr is given by:
    (a) n!/(r!(n−r)!)
    (b) n·r
    (c) n!/r!
    (d) n!/(n−r)!

57. The 10th term of the AP with first term 5 and common difference 3 is:
    (a) 35
    (b) 150
    (c) 32
    (d) 29

Mock Test 19 — Answer Key

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

Mock Test 20 — Answer Key

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

Mock Test 18 — Solutions

1. (c) 8 m/s — v = u + at = 0 + 2×4 = 8 m/s.
2. (a) 17 m/s — v = u + at = 5 + 3×4 = 17 m/s.
3. (d) 931.5 MeV — Standard conversion: 1 atomic mass unit = 931.5 MeV.
4. (a) Polarisation — Only transverse waves can be polarised.
5. (d) 3×10^8 m/s — $c = 1/\sqrt{(\mu_0\varepsilon_0)} \approx 3\times10^8$ m/s.
6. (d) $ML^2/3$ — Standard result: $I = ML^2/3$.
7. (c) $(1/2L)\sqrt{(T/\mu)}$ — $f_1 = (1/2L)\sqrt{(T/\mu)}$.
8. (d) 20 cm — Object at 2f → image at 2f, same size, real inverted; distance = 2f.
9. (c) Always attractive — Gravitation is always attractive.
10. (c) Any one input is LOW — NAND output is 0 only when all inputs are 1.
11. (d) 15 cm — Object at 2f → image at 2f, same size, real inverted; distance = 2f.
12. (a) 2π — $\omega = 2\pi N/60 = 2\pi\ (60)/60 = 2\pi$ rad/s.
13. (d) Remains unchanged — Y is a material property, independent of dimensions.
14. (a) 75 m — $s = ut + \frac{1}{2}at^2 = 75$ m.
15. (a) Velocity is maximum and acceleration is zero — v max, a = 0 at x = 0.
16. (c) hν — $E = h\nu = hc/\lambda$.
17. (c) From denser to rarer medium with angle > critical angle — TIR requires denser→rarer and i > C.
18. (b) kq/r — $V = kq/r$.
19. (c) 310 nm — $\lambda = 1240/4 = 310$ nm.
20. (a) $nRT \ln(V_2/V_1)$ — $W = nRT \ln(V_2/V_1)$.
21. (c) Microwaves — Microwaves suit radar wavelengths.
22. (a) $-13.6/n^2$ eV — $E_n = -13.6/n^2$ eV.
23. (c) $1/\omega C$ — $X_C = 1/\omega C$.
24. (c) $-9Gm/r$ — Field zero at r/3 from m; potential $= -Gm/(r/3) - G(4m)/(2r/3) = -9Gm/r$.
25. (a) 0.138 cm^3 — $\Delta V = V\gamma\Delta T \approx 0.138\ cm^3$.
26. (c) Rusting (oxidation) — Fe oxidises to hydrated Fe_2O_3 (rust).
27. (d) Emulsion — Milk = liquid-in-liquid emulsion.
28. (a) 1.73 BM — $\sqrt{(1\times3)} = 1.73$ BM.
29. (c) MgO — $2Mg + O_2 \rightarrow 2MgO$ (with some Mg_3N_2).
30. (d) Benzenediazonium chloride — Diazotisation at low temperature.
31. (c) CnH2n — Alkenes = CnH2n.
32. (d) 0.45 mol — n = mass/M = 44/98 = 0.45 mol.
33. (d) 0.1 m NaCl — NaCl gives i = 2 particles.
34. (d) Decrease in entropy — Adsorbate–adsorbent interaction decreases entropy.
35. (c) An aromatic compound — Fused bicyclic aromatic.
36. (b) Chlorofluorocarbons — Freons = CFCs used as refrigerants.
37. (b) $[Ni(CN)_4]^{2-}$ — $[Ni(CN)_4]^{2-}$ (d^8, square planar) is coloured.
38. (c) x/m = kP^(1/n) — Empirical: x/m = kP^(1/n).
39. (a) Delocalising π electrons — Delocalisation lowers energy.
40. (a) High lattice energy — Small ion → high lattice energy.
41. (d) Racemisation — Planar carbocation → racemic mixture.
42. (c) Positive — Solid → liquid increases disorder → ΔS > 0.
43. (d) 2.5×10^{-3} — $n = MV = 0.1\times0.025 = 2.5\times10^{-3}$ mol.
44. (d) SiF_4 — $SiO_2 + 4HF \rightarrow SiF_4 + 2H_2O$.
45. (a) Poor shielding of 4f electrons — 4f electrons shield poorly → size decreases.
46. (c) 6.022×10^{22} — 0.1 mol × $N_A = 6.022\times10^{22}$.
47. (a) 0.25 M — M1V1 = M2V2 → M2 = 0.5×50/100 = 0.25 M.
48. (b) F_2 — Fluorine is the strongest oxidising agent.
49. (d) 40 — Equivalent mass = M/n-factor = 40/1 = 40.
50. (b) 53 — Equivalent mass = M/n-factor = 106/2 = 53.
51. (c) 6 — 3! = 6.

52. (d) 9x^2 — d/dx(3x^3) = 9x^2.
53. (b) 55 — Σn = n(n+1)/2 = 55.
54. (b) 1/3 — $l^2+m^2+n^2 = 1 \rightarrow n^2 = 1 - 1/3 - 1/3 = 1/3$.
55. (c) (1.5, 2) — Midpoint = ((0+3)/2, (0+4)/2).
56. (a) n!/(r!(n−r)!) — Combination formula.
57. (c) 32 — T_n = a+(n−1)d = 5+9×3 = 32.
58. (b) 48 — T_n = ar^(n−1) = 48.
59. (d) 2 — Factorise → limit = 2a = 2.
60. (c) 35 — Diagonals = n(n−3)/2 = 35.
61. (c) x = −1 — $y^2=4ax \rightarrow$ directrix $x = -a = -1$.
62. (b) $x^2 + 3x + C$ — Integrate termwise.
63. (c) 100 — Sum of first n odd numbers = $n^2 = 100$.
64. (c) 1.33 — $m = (y_2-y_1)/(x_2-x_1) = 1.33$.
65. (c) p and q have the same truth value — Biconditional truth condition.
66. (b) 0 — As x grows, 1/x → 0.
67. (b) 13 — $|z|^2 = 4 + 9 = 13$.
68. (a) 10 — 5C2 = 10.
69. (a) 2 — Put y=0 → x = 10/5 = 2.
70. (a) 3/2 — $e = \sqrt{(1 + 5/4)} = \sqrt{(9/4)} = 3/2$.
71. (d) 10 — n = ((last−first)/d)+1 = 10.
72. (b) Radius — Tangency condition.
73. (b) $1 - 2\sin^2\theta$ — $\cos2\theta = 1 - 2\sin^2\theta = 2\cos^2\theta - 1$.
74. (a) 12 — Area = $\frac{1}{2}|x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)| = 12$.
75. (c) −1 — $i^{10} = i^2 = -1$.