JEE Main

Sample Question Paper - 2025

Country: IN | Duration: 3 hours | Max Marks: 300 | Language: Hindi

Negative Marking: Yes (-1) | Total Questions: 75 | QuizVerse AI Tutor

General Instructions:

1. This paper contains 75 questions across 3 section(s): Physics, Chemistry, Mathematics.
2. Duration: 3 hours. Maximum marks: 300.
3. Negative marking: Yes (-1).
4. Read each question carefully before answering.

Section 1: Physics (25 Questions)

Q1. The binding energy per nucleon of Fe-56 is approximately:

(A) 6.5 MeV
(B) 7.6 MeV
(C) 9.2 MeV
(D) 8.8 MeV

Q2. The current through a 11 ohm resistor connected to a 12 V battery is:

(A) 2.22 A
(B) 2.81 A
(C) 2.51 A
(D) 2.50 A

Q3. Two masses 8 kg and 7 kg are connected by a string over a frictionless pulley. The acceleration of the system is:

(A) 1.73 m/s^2
(B) 4.13 m/s^2
(C) 1.16 m/s^2
(D) 2.54 m/s^2

Q4. The escape velocity from a planet of mass 3 x 10^24 kg and radius 6004 km is:

(A) 12.6 km/s
(B) 9.6 km/s
(C) 14.0 km/s
(D) 9.1 km/s

Q5. The work function of a metal is 1.6 eV. The threshold frequency is:

(A) 9.14 x 10^14 Hz
(B) 10.62 x 10^14 Hz
(C) 3.11 x 10^14 Hz
(D) 11.96 x 10^14 Hz

Q6. A convex lens of focal length 18 cm forms a real image of an object placed 46 cm away. The image distance is:

(A) 34 cm

(B) 19 cm

(C) 25 cm

(D) 35 cm

Q7. The work function of a metal is 3.3 eV. The threshold frequency is:

(A) 6.65 x 10^14 Hz

(B) 7.25 x 10^14 Hz

(C) 9.88 x 10^14 Hz

(D) 10.83 x 10^14 Hz

Q8. A wire of resistance 11 ohm is bent into a circle. Effective resistance between diametrically opposite points is:

(A) 2 ohm

(B) 4 ohm

(C) 3 ohm

(D) 7 ohm

Q9. A radioactive substance has half-life 14 days. The fraction remaining after 54 days is:

(A) 1/8

(B) 1/16

(C) 1/4

(D) 1/4

Q10. A convex lens of focal length 16 cm forms a real image of an object placed 22 cm away. The image distance is:

(A) 45 cm

(B) 51 cm

(C) 15 cm

(D) 25 cm

Q11. A body of mass 4 kg is moving in a circle of radius 8 m at 19 m/s. The centripetal force is:

(A) 124 N

(B) 176 N

(C) 146 N

(D) 65 N

Q12. Two capacitors 9 uF and 8 uF are connected in series. The equivalent capacitance is:

(A) 4.24 uF

(B) 2.76 uF

(C) 3.56 uF

(D) 2.11 uF

Q13. A Carnot engine operates between 781 K and 324 K. Its efficiency is:

(A) 28%

(B) 51%

(C) 54%

(D) 60%

Q14. The focal length of a concave mirror is 21 cm. An object at 25 cm forms image at:

(A) 47 cm, real inverted

(B) 15 cm, real inverted

(C) 34 cm, real inverted

(D) 53 cm, real inverted

Q15. A wire of resistance 19 ohm is bent into a circle. Effective resistance between diametrically opposite points is:

(A) 6 ohm

(B) 8 ohm

(C) 8 ohm

(D) 2 ohm

Q16. A ball is dropped from height 90 m. Its velocity just before hitting the ground is:

(A) 32.6 m/s

(B) 35.0 m/s

(C) 28.3 m/s

(D) 35.8 m/s

Q17. Two capacitors 9 uF and 9 uF are connected in series. The equivalent capacitance is:

(A) 1.37 uF

(B) 4.96 uF

(C) 3.34 uF

(D) 4.38 uF

Q18. A car of mass 1565 kg moving at 25 m/s brakes to rest in 7 s. The braking force is:

(A) 15156 N

(B) 17916 N

(C) 6477 N

(D) 6209 N

Q19. A projectile is launched at 45 degrees with initial velocity 36 m/s. The time of flight is approximately:

(A) 2.5 s

(B) 4.3 s

(C) 2.4 s

(D) 1.6 s

Q20. A car of mass 1593 kg moving at 44 m/s brakes to rest in 9 s. The braking force is:

(A) 3916 N

(B) 16867 N

(C) 4174 N

(D) 15289 N

Q21. The focal length of a concave mirror is 17 cm. An object at 30 cm forms image at:

(A) 17 cm, real inverted

(B) 43 cm, real inverted

(C) 32 cm, real inverted

(D) 23 cm, real inverted

Q22. The escape velocity from a planet of mass 4 x 10^24 kg and radius 7718 km is:

(A) 13.2 km/s

(B) 14.0 km/s

(C) 8.9 km/s

(D) 9.0 km/s

Q23. An ideal gas at 292 K is heated at constant pressure to 489 K. The ratio of final to initial volume is:

(A) 2.3

(B) 2.1

(C) 2.1

(D) 2.7

Q24. A spring with k = 494 N/m is compressed by 0.17 m. The stored PE is:

(A) 18.25 J

(B) 20.63 J

(C) 16.40 J

(D) 22.76 J

Q25. The focal length of a concave mirror is 12 cm. An object at 46 cm forms image at:

(A) 26 cm, real inverted

(B) 35 cm, real inverted

(C) 49 cm, real inverted

(D) 32 cm, real inverted

Section 2: Chemistry (25 Questions)

Q26. The pH of a 0.01 M HCl solution is:

(A) 4

(B) 2

(C) 3

(D) 1

Q27. Colligative properties depend on:

(A) Molar mass of solute

(B) Nature of solvent

(C) Nature of solute

(D) Number of solute particles

Q28. Lanthanide contraction is caused by:

(A) High ionization energy

(B) Electron capture

(C) Nuclear fusion

(D) Poor shielding by 4f electrons

Q29. The order of ionic radius: Na+ vs Mg2+ vs Al3+ is:

(A) All equal

(B) Al3+ > Mg2+ > Na+

(C) Na+ > Mg2+ > Al3+

(D) Mg2+ > Na+ > Al3+

Q30. Markovnikov's rule applies to the addition of HBr to:

(A) Benzene

(B) Methane

(C) Ethene

(D) Propene

Q31. The hybridization of Ni in [Ni(CN)4]2- is:

(A) sp3d

(B) d2sp3

(C) sp3

(D) dsp2

Q32. The van't Hoff factor for NaCl is approximately:

(A) 2

(B) 3

(C) 1

(D) 0.5

Q33. Which of the following has the highest lattice energy?

(A) NaCl

(B) NaI

(C) NaBr

(D) NaF

Q34. Perkin reaction produces:

(A) Ethers

(B) Amines

(C) Alcohols

(D) Alpha,beta-unsaturated acids

Q35. Hess's law states that:

(A) Volume is constant

(B) Rate depends on concentration

(C) Enthalpy change is path independent

(D) Entropy always increases

Q36. VSEPR theory predicts the shape of SF6 as:

(A) Square planar

(B) Trigonal bipyramidal

(C) Tetrahedral

(D) Octahedral

Q37. Which metal is extracted by thermite process?

(A) Chromium

(B) Iron

(C) Aluminium

(D) Sodium

Q38. The equilibrium constant Kp and Kc are related by:

(A) Kp = Kc

(B) Kp = Kc/RT

(C) Kp = Kc(RT)^delta_n

(D) Kp = RT*Kc

Q39. The crystal field splitting energy in octahedral complex is:

(A) Delta_oct

(B) Delta_sq

(C) 10Dq_tet

(D) Delta_tet

Q40. The shape of XeF4 is:

(A) Octahedral

(B) Square planar

(C) Tetrahedral

(D) See-saw

Q41. For a first-order reaction with k = 0.074 s^-1, the half-life is:

(A) 20.0 s

(B) 13.9 s

(C) 15.0 s

(D) 10.0 s

Q42. The reagent for converting aldehyde to carboxylic acid is:

(A) LiAlH4

(B) NaBH4

(C) Zn-Hg / HCl

(D) KMnO4 / K2Cr2O7

Q43. Which element has the highest electronegativity?

(A) Chlorine

(B) Fluorine

(C) Oxygen

(D) Nitrogen

Q44. Which element has the highest electronegativity?

(A) Oxygen

(B) Fluorine

(C) Nitrogen

(D) Chlorine

Q45. Gibbs free energy change for a spontaneous process is:

(A) Undefined

(B) Zero

(C) Positive

(D) Negative

Q46. The IUPAC name of CH3CH(OH)CH3 is:

(A) Propan-2-ol

(B) 2-Methylethanol

(C) Isopropyl ether

(D) Propan-1-ol

Q47. The colour of KMnO4 is due to:

(A) f-f transition

(B) d-d transition

(C) s-p transition

(D) Charge transfer transition

Q48. The hybridization of C in acetylene is:

(A) sp3

(B) sp2

(C) sp3d

(D) sp

Q49. Which test distinguishes aldehydes from ketones?

(A) Tollens' test (silver mirror)

(B) Lucas test

(C) Lassaigne test

(D) Beilstein test

Q50. d-block elements show variable oxidation states because:

(A) Close energy of (n-1)d and ns orbitals

(B) Large atomic size

(C) Filled d orbitals

(D) Low ionization energy

Section 3: Mathematics (25 Questions)

Q51. Integral of (x^3 + 1) dx from 0 to 1 equals:

(A) 23

(B) 99

(C) 33

(D) 8

Q52. The mean of a binomial distribution with n = 43 and p = 0.5 is:

(A) 26.4

(B) 20.5

(C) 39.2

(D) 37.9

Q53. The rank of the matrix [[1,2,3],[4,5,6],[8,10,11]] is:

(A) 2

(B) 3

(C) 0

(D) 1

Q54. Integral of (x^1 + 6) dx from 0 to 5 equals:

(A) 65

(B) 63

(C) 81

(D) 75

Q55. lim(x->0) sin(5x)/x =

(A) 1

(B) 6

(C) 3

(D) 3

Q56. The value of integral sin^6(x) dx from 0 to pi/2 is:

(A) 2pi/16

(B) 5pi/8

(C) 6pi/32

(D) 8pi/8

Q57. The number of ways to arrange 5 distinct objects in a circle is:

(A) 833

(B) 2295

(C) 410

(D) 297

Q58. The equation of tangent to y = x^3 at x = 2 is:

(A) y = 2x - 2

(B) y = 11x - 16

(C) y = 9x - 12

(D) y = 3x - 9

Q59. The distance between parallel lines 5x + 2y = 6 and 2x + 4y = 18 is:

(A) 4.16

(B) 2.11

(C) 0.57

(D) 2.76

Q60. The area under y = x^3 from x = 0 to x = 2 is:

(A) 73.8

(B) 27.6

(C) 170.4

(D) 76.4

Q61. The mean of a binomial distribution with n = 41 and p = 0.6 is:

(A) 3.9

(B) 15.7

(C) 25.0

(D) 25.1

Q62. The sum of first 22 terms of AP with a = 3, d = 4 is:

(A) 3114

(B) 3166

(C) 2203

(D) 2828

Q63. The derivative of x^6 sin(x) at x = pi is:

(A) -18.08

(B) -17.63

(C) 18.32

(D) -1.45

Q64. The value of integral sin^6(x) dx from 0 to pi/2 is:

(A) 14pi/16

(B) 9pi/4

(C) 5pi/8

(D) 12pi/8

Q65. The distance between parallel lines 4x + 3y = 2 and 3x + 2y = 16 is:

(A) 2.95

(B) 3.17

(C) 4.36

(D) 4.33

Q66. Integral of (x^4 + 8) dx from 0 to 2 equals:

(A) 48

(B) 97

(C) 18

(D) 59

Q67. The derivative of x^2 sin(x) at x = pi is:

(A) -10.70

(B) 16.30

(C) 5.37

(D) 11.37

Q68. The number of ways to arrange 3 distinct objects in a circle is:

(A) 2236

(B) 1188

(C) 4624

(D) 621

Q69. lim(x->0) sin(4x)/x =

(A) 1

(B) 4

(C) 1

(D) 6

Q70. If det(A) = 10 and A is 3x3, then det(2A) =

(A) 36

(B) 89

(C) 36

(D) 58

Q71. The area under y = x^2 from x = 0 to x = 4 is:

(A) 155.7

(B) 164.8

(C) 46.0

(D) 73.5

Q72. The sum of first 40 terms of AP with a = 5, d = 1 is:

(A) 3958

(B) 3946

(C) 4410

(D) 3093

Q73. The probability of getting exactly 2 heads in 7 tosses of a fair coin is:

(A) 23/64

(B) 29/128

(C) 7/64

(D) 37/128

Q74. If det(A) = 7 and A is 3x3, then det(2A) =

(A) 34

(B) 8

(C) 92

(D) 71

Q75. The area under y = x^4 from x = 0 to x = 5 is:

(A) 15.9

(B) 132.3

(C) 24.4

(D) 135.5

Answer Key

Q1: (D)	Q2: (B)	Q3: (A)	Q4: (B)	Q5: (D)
Q6: (C)	Q7: (C)	Q8: (A)	Q9: (A)	Q10: (C)
Q11: (C)	Q12: (A)	Q13: (A)	Q14: (A)	Q15: (B)
Q16: (B)	Q17: (D)	Q18: (B)	Q19: (C)	Q20: (C)
Q21: (B)	Q22: (A)	Q23: (D)	Q24: (C)	Q25: (C)
Q26: (C)	Q27: (D)	Q28: (D)	Q29: (C)	Q30: (D)
Q31: (D)	Q32: (A)	Q33: (D)	Q34: (D)	Q35: (C)
Q36: (D)	Q37: (A)	Q38: (C)	Q39: (A)	Q40: (B)
Q41: (B)	Q42: (D)	Q43: (B)	Q44: (B)	Q45: (D)
Q46: (A)	Q47: (D)	Q48: (D)	Q49: (A)	Q50: (A)
Q51: (B)	Q52: (D)	Q53: (A)	Q54: (A)	Q55: (A)
Q56: (C)	Q57: (B)	Q58: (C)	Q59: (D)	Q60: (B)
Q61: (D)	Q62: (C)	Q63: (C)	Q64: (C)	Q65: (C)
Q66: (B)	Q67: (D)	Q68: (D)	Q69: (D)	Q70: (A)
Q71: (B)	Q72: (B)	Q73: (A)	Q74: (B)	Q75: (A)