JEE Main

Sample Question Paper - 2022

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

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 electric field at 1 m from a point charge of 10 uC is:

(A) 2935 N/C

(B) 4338 N/C

(C) 6300 N/C

(D) 5784 N/C

Q2. A solenoid of 145 turns and length 0.1 m carries current 4 A. The magnetic field inside is:

(A) 16.56 mT

(B) 1.19 mT

(C) 17.15 mT

(D) 9.69 mT

Q3. A convex lens of focal length 16 cm forms a real image of an object placed 22 cm away. The image distance is:

(A) 25 cm

(B) 45 cm

(C) 15 cm

(D) 51 cm

Q4. A wire of resistance 19 ohm is bent into a circle. Effective resistance between diametrically opposite points is:

(A) 8 ohm

(B) 6 ohm

(C) 8 ohm

(D) 2 ohm

Q5. A ball is dropped from height 90 m. Its velocity just before hitting the ground is:

(A) 35.8 m/s

(B) 32.6 m/s

(C) 28.3 m/s

(D) 35.0 m/s

Q6. A radioactive substance has half-life 20 days. The fraction remaining after 14 days is:

(A) 1/16

(B) 1/4

(C) 1/16

(D) 1/32

Q7. Light passes from glass (n=1.6) to air. The critical angle is:

(A) 42 degrees

(B) 42 degrees

(C) 48 degrees

(D) 46 degrees

Q8. Two masses 8 kg and 7 kg are connected by a string over a frictionless pulley. The acceleration of the system is:

(A) 1.16 m/s^2

(B) 4.13 m/s^2

(C) 2.54 m/s^2

(D) 1.73 m/s^2

Q9. The electric field at 3 m from a point charge of 6 uC is:

(A) 672 N/C

(B) 8811 N/C

(C) 7047 N/C

(D) 1784 N/C

Q10. An ideal gas at 292 K is heated at constant pressure to 489 K. The ratio of final to initial volume is:

(A) 2.7

(B) 2.3

(C) 2.1

(D) 2.1

Q11. A force of 64 N acts on a 17 kg body initially at rest. The velocity after 4 s is:

(A) 49 m/s

(B) 37 m/s

(C) 26 m/s

(D) 7 m/s

Q12. The de Broglie wavelength of an electron accelerated through 50 V is approximately:

(A) 1.17 Angstrom

(B) 2.55 Angstrom

(C) 1.32 Angstrom

(D) 1.07 Angstrom

Q13. The de Broglie wavelength of an electron accelerated through 50 V is approximately:

(A) 2.14 Angstrom

(B) 1.53 Angstrom

(C) 2.64 Angstrom

(D) 1.20 Angstrom

Q14. In photoelectric effect, the stopping potential for light of wavelength 252 nm on a metal with work function 3.7 eV is:

(A) 2.45 V

(B) 3.59 V

(C) 3.34 V

(D) 1.49 V

Q15. The focal length of a concave mirror is 21 cm. An object at 25 cm forms image at:

(A) 15 cm, real inverted

(B) 34 cm, real inverted

(C) 53 cm, real inverted

(D) 47 cm, real inverted

Q16. A radioactive substance has half-life 14 days. The fraction remaining after 54 days is:

(A) 1/8

(B) 1/4

(C) 1/4

(D) 1/16

Q17. 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) 15289 N

(D) 4174 N

Q18. A body of mass 4 kg is moving in a circle of radius 8 m at 19 m/s. The centripetal force is:

(A) 146 N

(B) 65 N

(C) 176 N

(D) 124 N

Q19. The work function of a metal is 3.3 eV. The threshold frequency is:

(A) 10.83 x 10^14 Hz

(B) 9.88 x 10^14 Hz

(C) 7.25 x 10^14 Hz

(D) 6.65 x 10^14 Hz

Q20. Two capacitors 9 uF and 9 uF are connected in series. The equivalent capacitance is:

(A) 3.34 uF

(B) 4.96 uF

(C) 1.37 uF

(D) 4.38 uF

Q21. A solenoid of 268 turns and length 0.2 m carries current 10 A. The magnetic field inside is:

(A) 17.10 mT

(B) 13.54 mT

(C) 15.17 mT

(D) 2.75 mT

Q22. 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) 6209 N

(C) 6477 N

(D) 17916 N

Q23. A Carnot engine operates between 765 K and 254 K. Its efficiency is:

(A) 65%

(B) 30%

(C) 58%

(D) 52%

Q24. A Carnot engine operates between 781 K and 324 K. Its efficiency is:

(A) 28%

(B) 54%

(C) 51%

(D) 60%

Q25. An electron moves with velocity 1x10^6 m/s perpendicular to a magnetic field of 0.2 T. The radius of its path is:

(A) 3.91 cm

(B) 1.26 cm

(C) 1.43 cm

(D) 1.26 cm

Section 2: Chemistry (25 Questions)

Q26. Which element has the highest electronegativity?

(A) Fluorine

(B) Oxygen

(C) Chlorine

(D) Nitrogen

Q27. According to Raoult's law, the vapour pressure of a solvent in solution is:

(A) p = p0 / x_solvent

(B) p = RT/V

(C) p = p0 * x_solute

(D) p = p0 * x_solvent

Q28. The shape of XeF4 is:

(A) Tetrahedral

(B) See-saw

(C) Square planar

(D) Octahedral

Q29. The hybridization of Ni in [Ni(CN)4]2- is:

(A) d2sp3

(B) dsp2

(C) sp3d

(D) sp3

Q30. The van't Hoff factor for NaCl is approximately:

(A) 2

(B) 1

(C) 0.5

(D) 3

Q31. Hess's law states that:

(A) Entropy always increases

(B) Volume is constant

(C) Rate depends on concentration

(D) Enthalpy change is path independent

Q32. Gibbs free energy change for a spontaneous process is:

(A) Positive

(B) Zero

(C) Negative

(D) Undefined

Q33. The equilibrium constant Kp and Kc are related by:

(A) Kp = RT*Kc

(B) Kp = Kc

(C) Kp = Kc(RT)^delta_n

(D) Kp = Kc/RT

Q34. The hybridization of C in acetylene is:

(A) sp2

(B) sp

(C) sp3

(D) sp3d

Q35. The molar conductivity at infinite dilution can be obtained by:

(A) Kohlrausch's law

(B) Faraday's law

(C) Ohm's law

(D) Hess's law

Q36. The crystal field splitting energy in octahedral complex is:

(A) 10Dq_tet

(B) Delta_tet

(C) Delta_sq

(D) Delta_oct

Q37. VSEPR theory predicts the shape of SF6 as:

(A) Tetrahedral

(B) Square planar

(C) Octahedral

(D) Trigonal bipyramidal

Q38. According to Raoult's law, the vapour pressure of a solvent in solution is:

(A) p = p0 * x_solvent

(B) p = p0 * x_solute

(C) p = p0 / x_solvent

(D) p = RT/V

Q39. The lightest noble gas is:

(A) Krypton

(B) Argon

(C) Neon

(D) Helium

Q40. Which of the following has the highest lattice energy?

(A) NaCl

(B) NaI

(C) NaBr

(D) NaF

Q41. The reagent for converting aldehyde to carboxylic acid is:

(A) Zn-Hg / HCl

(B) KMnO4 / K2Cr2O7

(C) LiAlH4

(D) NaBH4

Q42. Which test distinguishes aldehydes from ketones?

(A) Tollens' test (silver mirror)

(B) Lassaigne test

(C) Beilstein test

(D) Lucas test

Q43. The product of dehydration of ethanol at 443 K is:

(A) Acetic acid

(B) Ethylene (C2H4)

(C) Diethyl ether

(D) Acetaldehyde

Q44. The major product of SN1 reaction of tert-butyl chloride with ethanol is:

(A) tert-Butyl ethyl ether

(B) 2-Methylpropene

(C) tert-Butanol

(D) Isobutane

Q45. d-block elements show variable oxidation states because:

(A) Filled d orbitals

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

(C) Large atomic size

(D) Low ionization energy

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 rate of reaction doubles when temperature increases by:

(A) 20 K

(B) 10 K

(C) 5 K

(D) 50 K

Q48. Williamson's synthesis is used to prepare:

(A) Esters

(B) Ethers

(C) Alcohols

(D) Amines

Q49. The order of ionic radius: Na+ vs Mg2+ vs Al3+ is:

(A) Mg2+ > Na+ > Al3+

(B) Al3+ > Mg2+ > Na+

(C) Na+ > Mg2+ > Al3+

(D) All equal

Q50. For a first-order reaction with k = 0.074 s^-1, the half-life is:

(A) 13.9 s

(B) 15.0 s

(C) 20.0 s

(D) 10.0 s

Section 3: Mathematics (25 Questions)

Q51. The rank of the matrix [[1,2,3],[4,5,6],[7,9,13]] is:

(A) 1

(B) 2

(C) 0

(D) 3

Q52. If det(A) = 8 and A is 3x3, then det(2A) =

(A) 98

(B) 44

(C) 77

(D) 52

Q53. The value of integral sin^6(x) dx from 0 to pi/2 is:

(A) 14pi/16

(B) 5pi/8

(C) 9pi/4

(D) 12pi/8

Q54. If det(A) = 7 and A is 3x3, then det(2A) =

(A) 92

(B) 71

(C) 8

(D) 34

Q55. Integral of (x^1 + 2) dx from 0 to 5 equals:

(A) 100

(B) 50

(C) 28

(D) 43

Q56. The probability of getting exactly 2 heads in 7 tosses of a fair coin is:

(A) 23/64

(B) 29/128

(C) 37/128

(D) 7/64

Q57. If det(A) = 10 and A is 3x3, then det(2A) =

(A) 36

(B) 89

(C) 36

(D) 58

Q58. The distance between parallel lines 4x + 3y = 2 and 3x + 2y = 16 is:

(A) 2.95

(B) 4.33

(C) 3.17

(D) 4.36

Q59. The number of ways to arrange 7 distinct objects in a circle is:

(A) 1166

(B) 570

(C) 3909

(D) 4480

Q60. The mean of a binomial distribution with n = 43 and p = 0.5 is:

(A) 39.2

(B) 20.5

(C) 37.9

(D) 26.4

Q61. The sum of first 40 terms of AP with a = 5, d = 1 is:

(A) 3958

(B) 3093

(C) 3946

(D) 4410

Q62. The area under y = x^4 from x = 0 to x = 5 is:

(A) 15.9

(B) 24.4

(C) 135.5

(D) 132.3

Q63. The equation of tangent to y = x^3 at x = 2 is:

(A) y = 11x - 16

(B) y = 9x - 12

(C) y = 3x - 9

(D) y = 2x - 2

Q64. The mean of a binomial distribution with n = 41 and p = 0.6 is:

(A) 25.0

(B) 3.9

(C) 25.1

(D) 15.7

Q65. The probability of getting exactly 4 heads in 5 tosses of a fair coin is:

(A) 14/32

(B) 36/64

(C) 43/32

(D) 20/256

Q66. If z = 1 + 5i, then |z| =

(A) 9.54

(B) 5.04

(C) 9.94

(D) 2.76

Q67. The derivative of x^6 sin(x) at x = pi is:

(A) -18.08

(B) -1.45

(C) -17.63

(D) 18.32

Q68. The sum of first 22 terms of AP with a = 1, d = 1 is:

(A) 1919

(B) 218

(C) 4913

(D) 4744

Q69. The area under y = x^2 from x = 0 to x = 4 is:

(A) 73.5

(B) 155.7

(C) 164.8

(D) 46.0

Q70. The equation of tangent to y = x^2 at x = 1 is:

(A) y = 8x - 17

(B) y = 8x - 2

(C) y = 8x - 3

(D) y = 3x - 7

Q71. The derivative of x^5 sin(x) at x = pi is:

(A) -0.65

(B) -17.43

(C) 17.80

(D) 11.55

Q72. The value of integral sin^6(x) dx from 0 to pi/2 is:

(A) 6pi/32

(B) 2pi/16

(C) 5pi/8

(D) 8pi/8

Q73. The rank of the matrix [[1,2,3],[4,5,6],[8,10,11]] is:

(A) 2

(B) 1

(C) 3

(D) 0

Q74. The eccentricity of the ellipse x^2/4 + y^2/6 = 1 is:

(A) 0.59

(B) 0.38

(C) 0.55

(D) 0.69

Q75. The distance between parallel lines 4x + 3y = 10 and 2x + 4y = 12 is:

(A) 4.75

(B) 4.15

(C) 4.25

(D) 3.08

Answer Key

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