JEE Advanced

Sample Question Paper - 2023

Country: IN | Duration: 3 hours/paper | Max Marks: 180 | Language: Hindi

Negative Marking: Yes (-1 or -2) | Total Questions: 54 | QuizVerse AI Tutor

General Instructions:

1. This paper contains 54 questions across 3 section(s): Physics, Chemistry, Mathematics.
2. Duration: 3 hours/paper. Maximum marks: 180.
3. Negative marking: Yes (-1 or -2).
4. Read each question carefully before answering.

Section 1: Physics (18 Questions)

Q1. 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) 1.26 cm

(B) 1.26 cm

(C) 3.91 cm

(D) 1.43 cm

Q2. A wire of resistance 19 ohm is bent into a circle. Effective resistance between diametrically opposite points is:

(A) 2 ohm

(B) 6 ohm

(C) 8 ohm

(D) 8 ohm

Q3. The de Broglie wavelength of an electron accelerated through 50 V is approximately:

(A) 1.32 Angstrom

(B) 1.17 Angstrom

(C) 1.07 Angstrom

(D) 2.55 Angstrom

Q4. The binding energy per nucleon of Fe-56 is approximately:

(A) 9.2 MeV

(B) 7.6 MeV

(C) 8.8 MeV

(D) 6.5 MeV

Q5. 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) 2.1

(C) 2.1

(D) 2.3

Q6. The focal length of a concave mirror is 12 cm. An object at 46 cm forms image at:

(A) 49 cm, real inverted

(B) 26 cm, real inverted

(C) 35 cm, real inverted

(D) 32 cm, real inverted

Q7. Two capacitors 9 uF and 9 uF are connected in series. The equivalent capacitance is:

(A) 4.96 uF

(B) 4.38 uF

(C) 3.34 uF

(D) 1.37 uF

Q8. A force of 64 N acts on a 17 kg body initially at rest. The velocity after 4 s is:

(A) 7 m/s

(B) 26 m/s

(C) 37 m/s

(D) 49 m/s

Q9. A spring with k = 494 N/m is compressed by 0.17 m. The stored PE is:

(A) 20.63 J

(B) 22.76 J

(C) 18.25 J

(D) 16.40 J

Q10. The focal length of a concave mirror is 21 cm. An object at 25 cm forms image at:

(A) 15 cm, real inverted

(B) 53 cm, real inverted

(C) 34 cm, real inverted

(D) 47 cm, real inverted

Q11. The escape velocity from a planet of mass 4 x 10^24 kg and radius 7718 km is:

(A) 8.9 km/s

(B) 14.0 km/s

(C) 13.2 km/s

(D) 9.0 km/s

Q12. A solenoid of 145 turns and length 0.1 m carries current 4 A. The magnetic field inside is:

(A) 1.19 mT

(B) 16.56 mT

(C) 17.15 mT

(D) 9.69 mT

Q13. The focal length of a concave mirror is 17 cm. An object at 30 cm forms image at:

(A) 17 cm, real inverted

(B) 23 cm, real inverted

(C) 32 cm, real inverted

(D) 43 cm, real inverted

Q14. A radioactive substance has half-life 20 days. The fraction remaining after 14 days is:

(A) 1/32

(B) 1/16

(C) 1/16

(D) 1/4

Q15. A solenoid of 268 turns and length 0.2 m carries current 10 A. The magnetic field inside is:

(A) 17.10 mT

(B) 2.75 mT

(C) 13.54 mT

(D) 15.17 mT

Q16. A Carnot engine operates between 765 K and 266 K. Its efficiency is:

(A) 35%

(B) 25%

(C) 56%

(D) 52%

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. An electron moves with velocity 1x10^6 m/s perpendicular to a magnetic field of 0.3 T. The radius of its path is:

(A) 2.09 cm

(B) 0.95 cm

(C) 0.80 cm

(D) 1.71 cm

Section 2: Chemistry (18 Questions)

Q19. Lanthanide contraction is caused by:

(A) High ionization energy

(B) Electron capture

(C) Poor shielding by 4f electrons

(D) Nuclear fusion

Q20. The major product of SN1 reaction of tert-butyl chloride with ethanol is:

(A) tert-Butyl ethyl ether

(B) 2-Methylpropene

(C) Isobutane

(D) tert-Butanol

Q21. The ore of aluminium is:

(A) Bauxite

(B) Galena

(C) Haematite

(D) Chalcopyrite

Q22. The IUPAC name of neopentane is:

(A) 2,2-Dimethylpropane

(B) Cyclopentane

(C) 2-Methylbutane

(D) Pentane

Q23. Gibbs free energy change for a spontaneous process is:

(A) Negative

(B) Undefined

(C) Zero

(D) Positive

Q24. Which metal is extracted by thermite process?

(A) Chromium

(B) Sodium

(C) Aluminium

(D) Iron

Q25. The reagent for converting aldehyde to carboxylic acid is:

(A) $KMnO_4$ / $K_2Cr_2O_7$

(B) $LiAlH_4$

(C) $NaBH_4$

(D) Zn-Hg / HCl

Q26. Which element has the highest electronegativity?

(A) Oxygen

(B) Fluorine

(C) Chlorine

(D) Nitrogen

Q27. The pH of a 0.01 M HCl solution is:

(A) 2

(B) 1

(C) 4

(D) 3

Q28. The lightest noble gas is:

(A) Neon

(B) Argon

(C) Helium

(D) Krypton

Q29. Which element has the highest electronegativity?

(A) Oxygen

(B) Nitrogen

(C) Fluorine

(D) Chlorine

Q30. The osmotic pressure of a solution is given by:

(A) pi = iMRT

(B) pi = nRT/V

(C) pi = mRT

(D) pi = PV

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. Which test distinguishes aldehydes from ketones?

(A) Beilstein test

(B) Lassaigne test

(C) Lucas test

(D) Tollens' test (silver mirror)

Q33. d-block elements show variable oxidation states because:

(A) Large atomic size

(B) Filled d orbitals

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

(D) Low ionization energy

Q34. 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

Q35. Kolbe's electrolysis of sodium acetate gives:

(A) Ethane

(B) Methane

(C) Propane

(D) Butane

Q36. Which reagent is used for Baeyer-Villiger oxidation?

(A) LiAlH4

(B) mCPBA / peracid

(C) NaBH4

(D) KMnO4

Section 3: Mathematics (18 Questions)

Q37. Integral of (x^3 + 1) dx from 0 to 1 equals:

(A) 99

(B) 33

(C) 23

(D) 8

Q38. The sum of first 40 terms of AP with a = 5, d = 1 is:

(A) 3958

(B) 3093

(C) 4410

(D) 3946

Q39. The area under y = x^4 from x = 0 to x = 5 is:

(A) 135.5

(B) 132.3

(C) 15.9

(D) 24.4

Q40. The area under y = x^2 from x = 0 to x = 4 is:

(A) 164.8

(B) 73.5

(C) 46.0

(D) 155.7

Q41. The distance between parallel lines 4x + 3y = 10 and 2x + 4y = 12 is:

(A) 4.25

(B) 4.15

(C) 4.75

(D) 3.08

Q42. The number of ways to arrange 5 distinct objects in a circle is:

(A) 833

(B) 297

(C) 410

(D) 2295

Q43. If z = 2 + 1i, then |z| =

(A) 9.14

(B) 7.42

(C) 3.82

(D) 4.05

Q44. The mean of a binomial distribution with n = 43 and p = 0.5 is:

(A) 37.9

(B) 39.2

(C) 20.5

(D) 26.4

Q45. The distance between parallel lines 4x + 3y = 2 and 3x + 2y = 16 is:

(A) 2.95

(B) 4.36

(C) 3.17

(D) 4.33

Q46. The eccentricity of the ellipse x^2/19 + y^2/2 = 1 is:

(A) 0.34

(B) 0.58

(C) 0.84

(D) 0.70

Q47. The mean of a binomial distribution with n = 41 and p = 0.6 is:

(A) 25.0

(B) 25.1

(C) 15.7

(D) 3.9

Q48. The derivative of x^3 sin(x) at x = pi is:

(A) -18.89

(B) -10.50

(C) 15.80

(D) -6.35

Q49. If z = 5 + 4i, then |z| =

(A) 9.55

(B) 1.87

(C) 4.13

(D) 1.85

Q50. The sum of first 22 terms of AP with a = 3, d = 4 is:

(A) 3166

(B) 2203

(C) 2828

(D) 3114

Q51. lim(x->0) sin(2x)/x =

(A) 6

(B) 5

(C) 1

(D) 5

Q52. The area under y = x^3 from x = 0 to x = 2 is:

(A) 76.4

(B) 73.8

(C) 170.4

(D) 27.6

Q53. The equation of tangent to y = x^4 at x = 3 is:

(A) y = 5x - 19

(B) y = 8x - 5

(C) y = 10x - 6

(D) y = 2x - 14

Q54. The rank of the matrix [[1,2,3],[4,5,6],[8,9,10]] is:

(A) 2

(B) 3

(C) 1

(D) 0

Answer Key

Q1: (A)	Q2: (C)	Q3: (C)	Q4: (C)	Q5: (A)
Q6: (A)	Q7: (B)	Q8: (B)	Q9: (D)	Q10: (D)
Q11: (C)	Q12: (C)	Q13: (D)	Q14: (A)	Q15: (B)
Q16: (B)	Q17: (D)	Q18: (C)	Q19: (C)	Q20: (A)
Q21: (A)	Q22: (A)	Q23: (A)	Q24: (A)	Q25: (A)
Q26: (B)	Q27: (D)	Q28: (C)	Q29: (C)	Q30: (A)
Q31: (D)	Q32: (D)	Q33: (C)	Q34: (A)	Q35: (A)
Q36: (B)	Q37: (A)	Q38: (D)	Q39: (C)	Q40: (A)
Q41: (A)	Q42: (D)	Q43: (C)	Q44: (A)	Q45: (B)
Q46: (D)	Q47: (B)	Q48: (B)	Q49: (C)	Q50: (B)
Q51: (A)	Q52: (D)	Q53: (D)	Q54: (A)	