JEE Advanced

Sample Question Paper - 2022

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

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. The current through a 26 ohm resistor connected to a 15 V battery is:

(A) 0.50 A

(B) 1.89 A

(C) 2.36 A

(D) 2.83 A

Q2. The electric field at 1 m from a point charge of 10 uC is:

(A) 4338 N/C

(B) 2935 N/C

(C) 6300 N/C

(D) 5784 N/C

Q3. The work function of a metal is 3.3 eV. The threshold frequency is:

(A) 9.88 x 10^14 Hz

(B) 7.25 x 10^14 Hz

(C) 6.65 x 10^14 Hz

(D) 10.83 x 10^14 Hz

Q4. Light passes from glass (n=1.6) to air. The critical angle is:

(A) 48 degrees

(B) 42 degrees

(C) 42 degrees

(D) 46 degrees

Q5. 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) 25 cm

(C) 35 cm

(D) 19 cm

Q6. An ideal gas at 292 K is heated at constant pressure to 489 K. The ratio of final to initial volume is:

(A) 2.1

(B) 2.7

(C) 2.1

(D) 2.3

Q7. A car of mass 1565 kg moving at 25 m/s brakes to rest in 7 s. The braking force is:

(A) 6209 N

(B) 15156 N

(C) 17916 N

(D) 6477 N

Q8. A Carnot engine operates between 765 K and 266 K. Its efficiency is:

(A) 35%

(B) 56%

(C) 25%

(D) 52%

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

(A) 1/4

(B) 1/16

(C) 1/4

(D) 1/8

Q10. A projectile is launched at 45 degrees with initial velocity 36 m/s. The time of flight is approximately:

(A) 1.6 s

(B) 4.3 s

(C) 2.4 s

(D) 2.5 s

Q11. The focal length of a concave mirror is 17 cm. An object at 30 cm forms image at:

(A) 43 cm, real inverted

(B) 17 cm, real inverted

(C) 32 cm, real inverted

(D) 23 cm, real inverted

Q12. In photoelectric effect, the stopping potential for light of wavelength 260 nm on a metal with work function 2.9 eV is:

(A) 2.43 V

(B) 3.39 V

(C) 0.69 V

(D) 2.94 V

Q13. The current through a 11 ohm resistor connected to a 12 V battery is:

(A) 2.81 A

(B) 2.22 A

(C) 2.50 A

(D) 2.51 A

Q14. The binding energy per nucleon of Fe-56 is approximately:

(A) 7.6 MeV

(B) 6.5 MeV

(C) 9.2 MeV

(D) 8.8 MeV

Q15. Two capacitors 9 uF and 8 uF are connected in series. The equivalent capacitance is:

(A) 2.11 uF

(B) 3.56 uF

(C) 2.76 uF

(D) 4.24 uF

Q16. A force of 64 N acts on a 17 kg body initially at rest. The velocity after 4 s is:

(A) 37 m/s

(B) 26 m/s

(C) 49 m/s

(D) 7 m/s

Q17. A convex lens of focal length 16 cm forms a real image of an object placed 22 cm away. The image distance is:

(A) 51 cm

(B) 15 cm

(C) 45 cm

(D) 25 cm

Q18. The work function of a metal is 1.6 eV. The threshold frequency is:

(A) 3.11 x 10^14 Hz

(B) 10.62 x 10^14 Hz

(C) 11.96 x 10^14 Hz

(D) 9.14 x 10^14 Hz

Section 2: Chemistry (18 Questions)

Q19. Which reagent is used for Baeyer-Villiger oxidation?

(A) LiAlH4

(B) KMnO4

(C) mCPBA / peracid

(D) NaBH4

Q20. 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

Q21. The van't Hoff factor for NaCl is approximately:

(A) 3

(B) 1

(C) 0.5

(D) 2

Q22. Kolbe's electrolysis of sodium acetate gives:

(A) Ethane

(B) Propane

(C) Butane

(D) Methane

Q23. Which element has the highest electronegativity?

(A) Chlorine

(B) Oxygen

(C) Fluorine

(D) Nitrogen

Q24. The pH of a 0.01 M HCl solution is:

(A) 1

(B) 4

(C) 2

(D) 3

Q25. The osmotic pressure of a solution is given by:

(A) pi = iMRT

(B) pi = mRT

(C) pi = nRT/V

(D) pi = PV

Q26. For a first-order reaction with k = 0.074 s^-1, the half-life is:

(A) 10.0 s

(B) 20.0 s

(C) 15.0 s

(D) 13.9 s

Q27. The lightest noble gas is:

(A) Krypton

(B) Helium

(C) Argon

(D) Neon

Q28. The cell potential for Zn|Zn2+||Cu2+|Cu cell is:

(A) 1.10 V

(B) 0.34 V

(C) 0.76 V

(D) -0.76 V

Q29. The reagent for converting aldehyde to carboxylic acid is:

(A) $LiAlH_4$

(B) Zn-Hg / HCl

(C) $KMnO_4$ / $K_2Cr_2O_7$

(D) $NaBH_4$

Q30. The molar conductivity at infinite dilution can be obtained by:

(A) Kohlrausch's law

(B) Hess's law

(C) Faraday's law

(D) Ohm's law

Q31. The rate of reaction doubles when temperature increases by:

(A) 5 K

(B) 50 K

(C) 10 K

(D) 20 K

Q32. Hess's law states that:

(A) Volume is constant

(B) Enthalpy change is path independent

(C) Entropy always increases

(D) Rate depends on concentration

Q33. Lanthanide contraction is caused by:

(A) Poor shielding by 4f electrons

(B) High ionization energy

(C) Nuclear fusion

(D) Electron capture

Q34. Markovnikov's rule applies to the addition of HBr to:

(A) Propene

(B) Methane

(C) Benzene

(D) Ethene

Q35. The shape of XeF_4 is:

(A) Tetrahedral

(B) See-saw

(C) Octahedral

(D) Square planar

Q36. Wurtz reaction involves coupling of:

(A) Alkyl halides with Na

(B) Aldehydes with NaOH

(C) Acids with $SOCl_2$

(D) Aryl halides with Cu

Section 3: Mathematics (18 Questions)

Q37. The sum of first 22 terms of AP with a = 3, d = 4 is:

(A) 2828

(B) 3114

(C) 2203

(D) 3166

Q38. The value of integral sin^4(x) dx from 0 to pi/2 is:

(A) 4pi/32

(B) 13pi/32

(C) 5pi/4

(D) 14pi/4

Q39. lim(x->0) sin(5x)/x =

(A) 3

(B) 3

(C) 6

(D) 1

Q40. The equation of tangent to y = x^2 at x = 1 is:

(A) y = 8x - 2

(B) y = 3x - 7

(C) y = 8x - 3

(D) y = 8x - 17

Q41. The area under y = x^3 from x = 0 to x = 2 is:

(A) 27.6

(B) 170.4

(C) 73.8

(D) 76.4

Q42. If z = 2 + 1i, then |z| =

(A) 9.14

(B) 7.42

(C) 3.82

(D) 4.05

Q43. The value of integral sin^6(x) dx from 0 to pi/2 is:

(A) 2pi/16

(B) 8pi/8

(C) 5pi/8

(D) 6pi/32

Q44. The equation of tangent to y = x^3 at x = 2 is:

(A) y = 2x - 2

(B) y = 9x - 12

(C) y = 11x - 16

(D) y = 3x - 9

Q45. The sum of first 40 terms of AP with a = 5, d = 1 is:

(A) 3093

(B) 3946

(C) 3958

(D) 4410

Q46. The rank of the matrix [[1,2,3],[4,5,6],[7,9,13]] is:

(A) 3

(B) 1

(C) 0

(D) 2

Q47. The probability of getting exactly 3 heads in 5 tosses of a fair coin is:

(A) 6/128

(B) 23/32

(C) 7/64

(D) 48/256

Q48. The sum of first 22 terms of AP with a = 1, d = 1 is:

(A) 1919

(B) 4744

(C) 218

(D) 4913

Q49. The derivative of x^5 sin(x) at x = pi is:

(A) 11.55

(B) -17.43

(C) 17.80

(D) -0.65

Q50. The equation of tangent to y = x^4 at x = 3 is:

(A) y = 8x - 5

(B) y = 10x - 6

(C) y = 2x - 14

(D) y = 5x - 19

Q51. The distance between parallel lines 4x + 3y = 10 and 2x + 4y = 12 is:

(A) 4.25

(B) 3.08

(C) 4.75

(D) 4.15

Q52. The number of ways to arrange 5 distinct objects in a circle is:

(A) 297

(B) 410

(C) 2295

(D) 833

Q53. If det(A) = 7 and A is 3x3, then det(2A) =

(A) 31

(B) 58

(C) 81

(D) 51

Q54. The distance between parallel lines 4x + 3y = 2 and 3x + 2y = 16 is:

(A) 3.17

(B) 4.33

(C) 2.95

(D) 4.36

Answer Key

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