JEE Advanced

Sample Question Paper - 2024

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

(A) 53 cm, real inverted
(B) 34 cm, real inverted
(C) 47 cm, real inverted
(D) 15 cm, real inverted

Q2. A wire of resistance 11 ohm is bent into a circle. Effective resistance between diametrically opposite points is:

(A) 4 ohm
(B) 2 ohm
(C) 3 ohm
(D) 7 ohm

Q3. The binding energy per nucleon of Fe-56 is approximately:

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

Q4. A radioactive substance has half-life 20 days. The fraction remaining after 14 days is:

(A) 1/16
(B) 1/4
(C) 1/32
(D) 1/16

Q5. A convex lens of focal length 16 cm forms a real image of an object placed 22 cm away. The image distance is:

(A) 15 cm
(B) 25 cm
(C) 45 cm
(D) 51 cm

Q6. A body of mass 4 kg is moving in a circle of radius 8 m at 19 m/s. The centripetal force is:

(A) 176 N

(B) 124 N

(C) 146 N

(D) 65 N

Q7. A radioactive substance has half-life 14 days. The fraction remaining after 54 days is:

(A) 1/4

(B) 1/8

(C) 1/4

(D) 1/16

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

(A) 1.73 m/s^2

(B) 4.13 m/s^2

(C) 2.54 m/s^2

(D) 1.16 m/s^2

Q9. Light passes from glass (n=1.6) to air. The critical angle is:

(A) 48 degrees

(B) 42 degrees

(C) 46 degrees

(D) 42 degrees

Q10. A solenoid of 268 turns and length 0.2 m carries current 10 A. The magnetic field inside is:

(A) 2.75 mT

(B) 13.54 mT

(C) 15.17 mT

(D) 17.10 mT

Q11. 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) 7 m/s

(D) 49 m/s

Q12. 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) 1.43 cm

(B) 1.26 cm

(C) 3.91 cm

(D) 1.26 cm

Q13. A Carnot engine operates between 765 K and 254 K. Its efficiency is:

(A) 52%

(B) 30%

(C) 58%

(D) 65%

Q14. A convex lens of focal length 18 cm forms a real image of an object placed 46 cm away. The image distance is:

(A) 35 cm

(B) 34 cm

(C) 25 cm

(D) 19 cm

Q15. In photoelectric effect, the stopping potential for light of wavelength 260 nm on a metal with work function 2.9 eV is:

(A) 0.69 V

(B) 2.94 V

(C) 2.43 V

(D) 3.39 V

Q16. The binding energy per nucleon of Fe-56 is approximately:

(A) 8.8 MeV

(B) 9.2 MeV

(C) 6.5 MeV

(D) 7.6 MeV

Q17. A block of mass 8 kg slides down a frictionless incline of angle 45 degrees. The acceleration is:

(A) 5.1 m/s^2

(B) 3.8 m/s^2

(C) 3.1 m/s^2

(D) 4.3 m/s^2

Q18. The current through a 26 ohm resistor connected to a 15 V battery is:

(A) 2.36 A

(B) 1.89 A

(C) 2.83 A

(D) 0.50 A

Section 2: Chemistry (18 Questions)

Q19. The reagent for converting aldehyde to carboxylic acid is:

(A) NaBH4

(B) Zn-Hg / HCl

(C) LiAlH4

(D) KMnO4 / K2Cr2O7

Q20. For an endothermic reaction, increasing temperature:

(A) Decreases equilibrium constant

(B) Decreases rate

(C) No effect

(D) Increases equilibrium constant

Q21. Which reagent is used for Baeyer-Villiger oxidation?

(A) LiAlH4

(B) NaBH4

(C) KMnO4

(D) mCPBA / peracid

Q22. Friedel-Crafts acylation uses which catalyst?

(A) FeCl3

(B) ZnCl2

(C) AlCl3

(D) CuCl2

Q23. The IUPAC name of CH3CH(OH)CH3 is:

(A) Propan-1-ol

(B) Isopropyl ether

(C) Propan-2-ol

(D) 2-Methylethanol

Q24. Hess's law states that:

(A) Volume is constant

(B) Rate depends on concentration

(C) Entropy always increases

(D) Enthalpy change is path independent

Q25. Kolbe's electrolysis of sodium acetate gives:

(A) Ethane

(B) Methane

(C) Propane

(D) Butane

Q26. The order of ionic radius: Na+ vs Mg2+ vs Al3+ is:

(A) Al3+ > Mg2+ > Na+

(B) Na+ > Mg2+ > Al3+

(C) All equal

(D) Mg2+ > Na+ > Al3+

Q27. Which test distinguishes aldehydes from ketones?

(A) Lucas test

(B) Tollens' test (silver mirror)

(C) Lassaigne test

(D) Beilstein test

Q28. The coordination number in BCC is:

(A) 4

(B) 6

(C) 12

(D) 8

Q29. The rate of reaction doubles when temperature increases by:

(A) 10 K

(B) 20 K

(C) 50 K

(D) 5 K

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

(A) Benzene

(B) Methane

(C) Propene

(D) Ethene

Q31. For an ideal gas, Cp - Cv equals:

(A) 0

(B) R/2

(C) 2R

(D) R (8.314 J/mol K)

Q32. The molar conductivity at infinite dilution can be obtained by:

(A) Ohm's law

(B) Hess's law

(C) Faraday's law

(D) Kohlrausch's law

Q33. The pH of a 0.01 M HCl solution is:

(A) 3

(B) 1

(C) 4

(D) 2

Q34. d-block elements show variable oxidation states because:

(A) Large atomic size

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

(C) Filled d orbitals

(D) Low ionization energy

Q35. Which element has the highest electronegativity?

(A) Chlorine

(B) Nitrogen

(C) Oxygen

(D) Fluorine

Q36. The magnetic moment of Fe^{2+} (d^6) in weak field is:

(A) 0 BM

(B) 4.9 BM (4 unpaired)

(C) 5.9 BM

(D) 2.83 BM

Section 3: Mathematics (18 Questions)

Q37. lim(x->0) sin(2x)/x =

(A) 6

(B) 5

(C) 1

(D) 5

Q38. The rank of the matrix [[1,2,3],[4,5,6],[8,9,10]] is:

(A) 3

(B) 1

(C) 0

(D) 2

Q39. The sum of first 22 terms of AP with a = 1, d = 1 is:

(A) 218

(B) 4913

(C) 4744

(D) 1919

Q40. The value of integral sin^6(x) dx from 0 to pi/2 is:

(A) 5pi/8

(B) 9pi/4

(C) 14pi/16

(D) 12pi/8

Q41. If z = 1 + 5i, then |z| =

(A) 2.76

(B) 9.94

(C) 5.04

(D) 9.54

Q42. The area under y = x^3 from x = 0 to x = 2 is:

(A) 27.6

(B) 73.8

(C) 170.4

(D) 76.4

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

(A) 4.05

(B) 9.14

(C) 7.42

(D) 3.82

Q44. The derivative of x^5 sin(x) at x = pi is:

(A) 11.55

(B) -17.43

(C) 17.80

(D) -0.65

Q45. The area under y = x^2 from x = 0 to x = 2 is:

(A) 73.2

(B) 73.1

(C) 77.9

(D) 113.7

Q46. If det(A) = 10 and A is 3x3, then det(2A) =

(A) 58

(B) 36

(C) 36

(D) 89

Q47. The equation of tangent to y = x^3 at x = 2 is:

(A) y = 3x - 9

(B) y = 11x - 16

(C) y = 2x - 2

(D) y = 9x - 12

Q48. The number of ways to arrange 7 distinct objects in a circle is:

(A) 570

(B) 1166

(C) 3909

(D) 4480

Q49. The distance between parallel lines 5x + 2y = 6 and 2x + 4y = 18 is:

(A) 4.16

(B) 2.11

(C) 2.76

(D) 0.57

Q50. lim(x->0) sin(6x)/x =

(A) 7

(B) 2

(C) 2

(D) 5

Q51. The probability of getting exactly 4 heads in 5 tosses of a fair coin is:

(A) 20/256

(B) 36/64

(C) 43/32

(D) 14/32

Q52. The equation of tangent to y = x^4 at x = 3 is:

(A) y = 10x - 6

(B) y = 5x - 19

(C) y = 2x - 14

(D) y = 8x - 5

Q53. The derivative of x^3 sin(x) at x = pi is:

(A) -10.50

(B) -18.89

(C) -6.35

(D) 15.80

Q54. Integral of (x^3 + 1) dx from 0 to 1 equals:

(A) 8

(B) 99

(C) 23

(D) 33

Answer Key

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