UNIVERSITY OF LUCKNOW

D.Pharm Entrance Examination

Mathematics Group — Model Test Paper Set 4

Total Questions: 100 | Section A: Chemistry & Physics (50) + Section B: Mathematics (50)

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SECTION A — Chemistry & Physics [50]

Chemistry

1. Meissner effect is shown by : ceerpevej :

(a) Anti-ferromagnetic substances (b) Diamagnetic substances

(c) Superconductors (d) Ferromagnetic substances

Answer: (c) Superconductors

2. The Structure of ClF is : 3 :

(a) T-shaped (b) Trigonal planar

(c) Pyramidal (d) Sea-saw

Answer: (a) T-shaped

3. Hybridization of XeF is represented by : 4 XeF :

(a) sp3 (b) sp3d

(c) sp3d2 (d) sp2

Answer: (c) sp3d2

4. Which of the following bonds is the strongest?

(a) Hydrogen (b) Covalent

(c) Van der wall (d) Ionic

Answer: (d) Ionic

5. Molar conductance, specific conductance ____

(a) increases, increases (b) decreases, increases

(c) decreases, decreases (d) increases, decreases

Answer: (d) increases, decreases

6. Slope = Zero when :

(a) infinity (b) minimum

(c) zero (d) maximum

Answer: (d) maximum

7. Ion association in electrolyte solution is given by : efJe :

(a) Vant'hoff theory (b) Debye-huckel theory

(c) Bjerrum theory (d) Electrolyte theory

Answer: (c) Bjerrum theory

8. Calculate the mean ionic activity of 0.01 molal NaCl. 0.01 ceesuej NaCl :

(a) 0.669 (b) 0.559

(c) 0.779 (d) 0.889

Answer: (d) 0.889

9. The half life of third-order reaction related to the initial concentration of reactant :

(a) Inversely proportional to 'a2' 'a2' kes (b) Inversely proportional to 'a1 2' a1 2'kes

(c) is : efke (d) Directly proportional to a1 2' a1 2'kes

Answer: (a) Inversely proportional to 'a2' 'a2' kes

10. The conversion :

(a) Parallel reaction (b) Reversible reaction

(c) Consecutive reaction (d) Simple reaction

Answer: (b) Reversible reaction

11. A first order reaction is 15% complete in 20 minutes. How long will it take to be 60% complete?

(a) 154.6 sec (b) 78.3 sec

(c) 112.7 sec (d) 61.2 sec

Answer: (c) 112.7 sec

12. Osmotic pressure of solution is 0.3284 atm at a temperature of 300 K. The concentration in mole :

(a) 0.066 (b) 0.133

(c) 0.0133 (d) 0.033

Answer: (c) 0.0133

13. 6g of urea is dissolved in 90g of boiling water. The vapour pressure of the solution :

(a) 760.3 mm (b) 744.8 mm

(c) 758.2 mm (d) 761.0 mm

Answer: (b) 744.8 mm

14. The SI unit of molality is : ceesueeefue :

(a) mole. lit (b) mole.Kg

(c) g.equivalent.Kg (d) mole.ml

Answer: (b) mole.Kg

15. Which of the following pairs of solutions shows large positive deviations from ideal behavior?

(a) Water-nitric acid (b) Acetone-chloroform

(c) Cyclohexane-carbon tetrachloride (d) Water-propyl alcohol

Answer: (d) Water-propyl alcohol

16. Which of the following is an extensive property?

(a) Density (b) Temperature

(c) Pressure (d) Volume

Answer: (d) Volume

17. The equilibrium constant of a reaction doubles on raising temperature from 25 :

(a) 76.3 (b) 98.2

(c) 37.2 (d) 52.8

Answer: (d) 52.8

18. For a given reaction N (g) + 3H (g) :

(a) High temperature, low pressure (b) High temperature, high pressure

(c) Low temperature, low pressure (d) Low temperature, high pressure

Answer: (d) Low temperature, high pressure

19. The PH of 0.01M solution of NH Cl in water at 4 25 :

(a) 4.32 (b) 12.26

(c) 5.63 (d) 10.24

Answer: (c) 5.63

20. The PH of a solution, obtained by mixing 5g of acetic acid 7.5g of sodium acetate, and making the volume equal to 500 ml, is (given that dissociation constant of acetic acid at 25 :

(a) 5.89 (b) 4.78

(c) 6.98 (d) 3.45

Answer: (b) 4.78

21. Which of the following expressions represents the criterion for a reaction to be labeled spontaneous?

(a) (dU)s,v > (b) (dG)t,p >0

(c) (dS)u,v > (d) (dH)s,p >

Answer: (c) (dS)u,v >

22. A transition for which first derivative of the chemical potential with respect to temperature at constant pressure is discontinuous is classified :

(a) Zero order phase transition (b) Second order phase transition

(c) Lambda transition (d) First order phase transition

Answer: (d) First order phase transition

23. The increase in entropy on mixing Neon and 1 Xenon, the mole fractions of which are, 5 4 and respectively, is : 5 (in cal degree :

(a) 4.36 (b) 5.76

(c) 3.64 ***** (d) 1.24

Answer: (c) 3.64 ***

24. C for Uranium metal is 6.08 :

(a) 2.02 (b) 1.01

(c) 3.03 (d) 4.04

Answer: (a) 2.02

25. The change in internal energy and change in entropy, respectively, for the reversible isothermal expansion of one mole of an ideal gas at 27 :

(a) 20 J, 0 J (b) 0 J, 20 J

(c) 0 J, 0 J (d) 10 J, 20 J

Answer: (c) 0 J, 0 J

Physics

26. A boat which has speed of 5km/hr in still water crosses a river of width 1 km along the shortest possible path in 15 minutes. The velocity of water of the river in km/hr is:

(a) 3 (b) 14

(c) 2 (d) 4

Answer: (a) 3

27. A 2.5 kg iron ball has the same diameter as a 1.25 kg aluminium ball. The balls are dropped at the same time from a cliff. Just before they reach the ground, they have same :

(a) Momentum (b) Potential energy

(c) Acceleration (d) Kinetic energy

Answer: (c) Acceleration

28. Planck's constant has the dimension of:

(a) Frequency (b) Momentum

(c) Energy (d) Angular momentum

Answer: (d) Angular momentum

29. If 1.20 V potential difference must be applied to stop the fastest photoelectrons emitted by a nickel surface under the action of ultraviolet light of wavelength 2000Å, calculate the work function of nickel ?

(a) 6.21 eV (b) 4.80 eV

(c) 5.01 eV (d) 4.50 eV

Answer: (c) 5.01 eV

30. Which of the following parameters is the same for hydrogen-like atoms and ions in ground states?

(a) Energy of the atom (b) Speed of the electron

(c) Radius of the orbit (d) Orbital angular momentum of the electron

Answer: (d) Orbital angular momentum of the electron

31. A coil having inductance 0.15 H and resistance 15Ω is connected across a 220 V, 50 Hz line. Compute the current in the coil ?

(a) 3.50 A (b) 4.45 A

(c) 4.00 A (d) 4.25 A

Answer: (b) 4.45 A

32. In Helium-Neon laser, helium atoms ?

(a) Act as quenching agents (b) Emit laser radiation

(c) Impart energy to the Neon atoms (d) Act as catalytic atom

Answer: (c) Impart energy to the Neon atoms

33. For D and D lines of Na ≅1000. In order 1 2 Δλ to resolve these lines by a grating in the fourth order of spectrum the total number of line on the grating should be ?

(a) 500 (b) 1000

(c) any number (d) 250

Answer: (d) 250

34. A zone plate behaves like a ?

(a) Plane mirror (b) Glass plate

(c) Convex lens (d) Concave lens

Answer: (c) Convex lens

35. The instrument used to measure optical rotation is known as ?

(a) Spectrometer (b) Microscope

(c) Polarimeter (d) Interferometer

Answer: (c) Polarimeter

36. In the diffraction of a plane wave due to a circular obstacle (disc) the axial point is always ?

(a) None of the above (b) may be bright of dark

(c) bright (d) dark

Answer: (c) bright

37. When a thin transparent plate is intro duced in the path of interfering beams, the fringe width will ?

(a) increase (b) decrease

(c) become zero (d) remains the same

Answer: (d) remains the same

38. A converging lenses of focal length f is placed in contact with a diverging lens of focal length 3f. The combination is ?

(a) A converging lens of focal length 3f/2 (b) A converging lens of focal length 2f

(c) A diverging lens of focal length 3f/2 (d) A diverging lens of focal length 3f

Answer: (a) A converging lens of focal length 3f/2

39. For which one of the following concave mirror is not used?

(a) Shaving glass (b) Inspection internal pasts of ear

(c) Rear-view mirror in cars (d) Reflector in search lights

Answer: (c) Rear-view mirror in cars

40. In Young's double slit experiment the slit separation is 0.12 mm, the wavelength of light used is 5893 Å and interference pattern is observed on a screen 1 m away. The separation between successive bright fringes will be ?

(a) 4.91 mm (b) 4.50 mm

(c) 5.50 mm (d) 6.50 mm

Answer: (a) 4.91 mm

41. When the length of an astronomical telescope tube increases, its magnifying power :

(a) Increases (b) Does not change

(c) Decreases (d) May decrease or increase

Answer: (c) Decreases

42. The number of cardinal points in a thin lens is :

(a) two (b) three

(c) zero (d) six

Answer: (d) six

43. The minimum distance between an object and its real image formed by a convex lens is ?

(a) 2f (b) f

(c) 4f (d) f/2

Answer: (c) 4f

44. The ratio of the speeds of sound in nitrogen gas to that in helium gas at 300 K is ?

(a) 5 (b) 1/7

(c) 3/7 (d) 2/7

Answer: (a) 5

45. A source of unknown frequency produces 8 beats with a source of 250 Hz and 12 beats with a source of 270 Hz. The frequency of the unknown source is ?

(a) 258 Hz (b) 282 Hz

(c) 262 Hz (d) 242 Hz

Answer: (a) 258 Hz

46. For a diatomic gas the root mean square velocity at room temperature is 1930 m/s. The gas will be:

(a) F 2 (b) H

(c) Cl 2 (d) O

Answer: (b) H

47. In a mixture of ideal gas which one of the following is same for all molecules :

(a) Mean translational kinetic energy (b) Speed

(c) Root mean square momentum (d) Root mean square speed

Answer: (d) Root mean square speed

48. The first law of thermodynamics is a special case of :

(a) Newton's law (b) Charles' law

(c) the law of heat exchange (d) the law of conservation of energy

Answer: (d) the law of conservation of energy

49. In an adiabatic process the quantity which remains constant is :

(a) Temperature (b) Total heat energy of the system

(c) Volume (d) Pressure

Answer: (b) Total heat energy of the system

50. A 10 V battery of negligible internal resistance is connected to 50 ohm resistance coil. The heat energy produced in 1 hour in joules will be:

(a) 6500 J (b) 7200 J

(c) 4500 J (d) 8000 J

Answer: (b) 7200 J

SECTION B — Mathematics [50]

51. Which theorem states that ,"if an entire function is bounded for all values of z, then it is constant"?

(a) Liouville's theorem (b) Cauchy theorem

(c) Fundamental theorem (d) Morera theorem

Answer: (a) Liouville's theorem

52. If f(z) = u + iv is an analytic function, in domain D, then the curves u = constant, v = constant form two ... families?

(a) orthogonal (b) diagnol

(c) symmetric (d) parametric

Answer: (a) orthogonal

53. What will be the rank of every non-singular matrix of order n?

(a) n + 1 (b) 2n

(c) n (d) 2n + 1

Answer: (c) n

54. Find total number of asymmetric relations on a set A = {e, f, g}?

(a) 128 (b) 34

(c) 64 (d) 27

Answer: (d) 27

55. Find the middle term of A.P. if it is given that sum of three numbers in A.P. is 15?

(a) 15 (b) 5

(c) 20 (d) 10

Answer: (b) 5

56. Find the gradient of the scalar field if f(x, y) = x + y at (1, 2)?

(a) i + j (b) j

(c) j + 2i (d) i + 2j

Answer: (a) i + j

57. How many subsets of set A occur if A = {1, 2, 3, 4}?

(a) 16 (b) 4

(c) 8 (d) 2

Answer: (a) 16

58. If the inner product between the vectors vanishes then what will be the angle between them?

(a) 45 (b) 0

(c) 35 (d) 90

Answer: (d) 90

59. The rank of a matrix in echelon form is equal to:

(a) Number of non zero rows of the matrix (b) Number of zero rows of the matrix

(c) Number of variables (d) Order of matrix

Answer: (a) Number of non zero rows of the matrix

60. Asymptotes are the tangents to the curve at which point?

(a) Three points (b) Two points

(c) One point (d) Infinite

Answer: (d) Infinite

61. What is domain of definition of exponential function?

(a) Rational numbers (b) Whole numbers

(c) Real numbers (d) Integers

Answer: (c) Real numbers

62. Which model is the one in which every set of variable states is uniquely determined by parameters in the model and by sets of previous states of these variables?

(a) probability model (b) continuous model

(c) deterministic model (d) discrete model

Answer: (c) deterministic model

63. Let f be a sequence of bounded function and series given by f is uniformly continuous to some function say g, then _____ ?

(a) g is bounded (b) g is infinite

(c) g occurs virtually to follow 1 (d) g is unbounded

Answer: (a) g is bounded

64. Which of the following is used in mathematical modeling in Boolean algebra?

(a) complex analysis (b) mines geometry

(c) lines figure (d) constructive solid geometry

Answer: (d) constructive solid geometry

65. How many singular solutions occur for nth order ordinary linear differential equation?

(a) two (b) three

(c) no singular solutions (d) one

Answer: (c) no singular solutions

66. The curve obtained in exponential growth is of which type?

(a) J shaped curve (b) W shaped curve

(c) S shaped curve (d) T shaped curve

Answer: (a) J shaped curve

67. Which model accounts for time dependent change of a model?

(a) static model (b) bi-model

(c) dynamic model (d) generalized model

Answer: (c) dynamic model

68. Every bounded sequence with a unique limit point is _____?

(a) divergent (b) convergent

(c) oscillatory (d) doesn't exist

Answer: (b) convergent

69. The sum of the series n(sin(n)) is _____ ?

(a) divergent (b) convergent

(c) oscillates infinitely (d) oscillates finitely

Answer: (a) divergent

70. The greatest limit point of a bounded sequence is called?

(a) minimum point of f (b) maximum point of f YCT

(c) limit inferior of f (d) limit superior of f

Answer: (d) limit superior of f

71. Any non-empty set of R, which is bounded above, has a _____?

(a) g.l.b (b) l.u.b

(c) one exists infinitely (d) both exists finitely

Answer: (b) l.u.b

72. When the per capita rate of increase (r) takes the same positive value regardless of the population size, then we get which growth?

(a) transversal growth (b) logistics growth

(c) exponential growth (d) both logistic and exponential

Answer: (c) exponential growth

73. Let f and g be two uniformly continuous functions on interval I and also each function is bounded on I, then what can you say about product f.g?

(a) f.g is bounded (b) f.g is uniformly continous on R

(c) f.g is integrable (d) f.g is continous

Answer: (b) f.g is uniformly continous on R

74. If f(x, y) = 0, then find the directional derivative at c = (0, 0) along the direction u = (a, b)?

(a) 0 (b) 1

(c) 3 (d) 2

Answer: (a) 0

75. Which function defined on R by f(x) = x for every x in R, is continuous in R?

(a) Dirichlet function (b) Identity function

(c) Constant function (d) Riemann function

Answer: (b) Identity function

76. When will be matrix of derivative of f given by f(x, y) = (x-y, xy) will be singular?

(a) if x = y (b) if y = 0

(c) if x = (d) if x = 0

Answer: (c) if x =

77. The oscillation of a bounded function f on an interval [a, b] is the _____ of the set {|f(x)- f(y)|}of the numbers ?

(a) infimum (b) maximum

(c) minimum (d) supremum

Answer: (d) supremum

78. The functions which are present on one side of Green's theorem are of which kind?

(a) only partial derivatives (b) complete derivatives

(c) Continuous partial derivative (d) discrete derivatives

Answer: (c) Continuous partial derivative

79. Which theorem is valid in calculating integral for a multiple connected domain R?

(a) Iterated integrals (b) Gauss divergence theorem

(c) Green's theorem (d) Stokes theorem

Answer: (c) Green's theorem

80. While finding maximum value of a function what will we get in the case if its second derivative becomes zero?

(a) we get both maxima and minima (b) we get possible inflection point

(c) we get maxima at that point (d) we get minima at that point

Answer: (b) we get possible inflection point

81. The sequence given by interval [0, 1] is _____ ?

(a) Bounded (b) unbounded

(c) convergent (d) divergent

Answer: (a) Bounded

82. Find the simultaneous limit of function y sin(1 ?

(a) 1 (b) 2

(c) 3 (d) 0

Answer: (d) 0

83. Find the limit point of the sequence < 1, 2, 1 ?

(a) 2 (b) 0

(c) 3 (d) 1

Answer: (b) 0

84. A group is called Abelian if it satisfies_____ property ?

(a) associative property (b) existence of identity

(c) commutative property (d) existence of inverse

Answer: (c) commutative property

85. Every absolutely convergent improper integral is _____ ?

(a) divergent (b) convergent

(c) infinite (d) oscillatory

Answer: (b) convergent

86. Which statement states that "Every complete metric space is of second category"?

(a) Baire category theorem (b) Fundamental theorem

(c) Baire sandwich theorem (d) Cantor Theorem

Answer: (a) Baire category theorem

87. Inner automorphism corresponding to every element of an abelian group is?

(a) infinite (b) trivial

(c) non trivial (d) bounded

Answer: (b) trivial

88. Every uniformly continuous function on an interval is _____ on that interval ?

(a) divergent (b) convergent

(c) oscillatory (d) continuous

Answer: (d) continuous

89. Which of the following metric space is not complete?

(a) set of real numbers (b) set of irrationals
(c) set of rationals (d) set of complex numbers
Answer: (c) set of rationals

90. What powers of x does expansion of sin(x) contains?
(a) all powers of x (b) odd powers of x
(c) even powers of x (d) any alternate powers of x
Answer: (b) odd powers of x

91. In metric space which function is always continuous?
(a) discrete function (b) distance function
(c) continuous function (d) bounded function
Answer: (b) distance function

92. Let (X, d) be a metric space and E is contained in X, E is called nowhere dense set if _____ ?
(a) closure of E is not defined (b) closure of E is finite
(c) closure of E is empty (d) closure of E terminate after some steps
Answer: (c) closure of E is empty

93. Which theorem states that" An integral function attains every finite value with at-most one possible exception?
(a) Jensen's formula (b) Jensen's inequality
(c) Picard's theorem (d) Schwartz' lemma
Answer: (c) Picard's theorem

94. What is order of convergence of cosh z?
(a) 0 (b) two
(c) infinite (d) one
Answer: (c) infinite

95. Which of the following group is not normal under usual ring operation?
(a) 5 ssg (b) 3 ssg
(c) 2 ssg (d) 7 ssg
Answer: (c) 2 ssg

96. Do C-R equations are necessary and sufficient for a function to be analytic?
(a) FALSE (b) TRUE
(c) can't say about nature of equations (d) depend on range of functions
Answer: (a) FALSE

97. The external direct product of two cyclic groups is _____ ?
(a) need not cyclic (b) abelian
(c) never cyclic (d) always cyclic
Answer: (a) need not cyclic

98. Let k be the number of the p-ssg of a finite group G. Then _____ ?
(a) k bipolarates (b) k doesn't exist
(c) k doesn't divide O(G) (d) k divides O(G)
Answer: (d) k divides O(G)

99. If f(z) is analytic function whose real part is constant then f(z) is _____ ?
(a) Function of x only (b) Function of y only
(c) constant (d) Function of x and y both

Answer: (c) constant

100. What are no. of elements of order 100 of Z(200)?

(a) 160 (b) 120

(c) 40 (d) 80

Answer: (c) 40