UNIVERSITY OF LUCKNOW

D.Pharm Entrance Examination

Mathematics Group — Model Test Paper Set 3

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

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SECTION A — Chemistry & Physics [50]

Chemistry

1. State whether true or false: 'The entropy of an isolated system tends to decrease with time.' yeleeSb efke :

(a) True Only time ~ (b) False 'Only at time t=

(c) False (d) True

Answer: (c) False

2. A particle in a box possesses an irremovable minimum energy called the _____.

(a) Transmission energy (b) Transition-state energy

(c) Zero-point energy (d) Barrier energy

Answer: (c) Zero-point energy

3. For a reaction with rate law V=k[A][B]2, if r reactant [A] is present in large excess of concentration and it remains constant throughout the reaction then the order of the reaction will be _____.

(a) Paeudo-second order reaction (b) Second order reaction

(c) First order reaction (d) Pseudo-first order reaction

Answer: (a) Paeudo-second order reaction

4. A cubic unit cell has _____

(a) 2 threefold axes (b) 4 threefold axes

(c) 3 threefold axes (d) 1 twofold axes

Answer: (b) 4 threefold axes

5. Which statement about Miller notation :

(a) Only (A) is true (b) Both (A) and (B) are true

(c) Both (A) and (B) are false (d) Only (B) is true

Answer: (a) Only (A) is true

6. A sample of mixture of molecules with various chain lengths and molar masses constitute _____.

(a) Polydisperse polymer (b) Monodisperse polymer

(c) Peptide (d) Protein

Answer: (a) Polydisperse polymer

7. If pure ribosomal preparation from E-coli is sedimented at a high Mg2+concentration, the preparation sediments given _____.

(a) 3 peaks at 70s, 50 s and 30 s (b) 1 peak at 70 s

(c) No peak at all (d) 2 peaks of 30s and 50 s enclosing more area

Answer: (b) 1 peak at 70 s

8. Compound used as intercalating agent is _____.

(a) EtBr (b) CsCl

(c) SDS (d) EDTA

Answer: (a) EtBr

9. A protein has a sedimentation coefficient value of 3.12 :

(a) 32700 (b) 34800

(c) 16200 (d) 33700

Answer: (d) 33700

10. The instrument that makes use of the current due to electrons that tunnel between the surface and the tip is called _____.

(a) Scanning electron microscopy (b) Scanning tunnelling microscopy

(c) Transmission electron microscopy (d) Atomic force microscopy

Answer: (b) Scanning tunnelling microscopy

11. Which statement(s) stands true for Langmuir isotherm?

(a) Only (B) is true (b) Both (A) and (B) are false

(c) Both (A) and (B) are true (d) Only (A) is true

Answer: (a) Only (B) is true

12. X-ray diffraction utilises electrons of energy range _____.

(a) >2000 eV (b) 200-2000 eV

(c) 10-200 eV (d) <10 eV

Answer: (c) 10-200 eV

13. Catalysts functionalised with siloxane anchors can be attached to SiO nano particles via [Si]- 2 :

(a) Achieving better catalytic yield (b) Decreasing the reactivity of a reaction

(c) Enhancing reactivity of Nanoparticles (d) Relatively easy separability of catalyst

Answer: (d) Relatively easy separability of catalyst

14. Catalyst used for heterogenous electrolysis for water oxidation are _____.

(a) Nickel oxides (b) Platinum (finely divide)

(c) Palladium complex (d) Siloxanes

Answer: (a) Nickel oxides

15. Shape selective catalysts are called _____.

(a) Zeolites (b) Enzymes

(c) Colloids (d) Silanols

Answer: (a) Zeolites

16. Materials possessing both amorphous and polycrystalline behaviour with abrupt changes 37 YCT in crystal orientation across individual grain boundaries in the extendedlattice are _____.

(a) Carbenes (b) Ceramics

(c) Silicates (d) Glass

Answer: (b) Ceramics

17. A common method used to grow a single crystal where the non-solvent is layered on the top of crystallisation solvent is called _____.

(a) X-ray diffraction (b) Interfacial method

(c) Vapour diffusion (d) Sublimation

Answer: (c) Vapour diffusion

18. HgS possesses a _____

(a) Cubic centre (b) FCC

(c) BCC (d) Rhombohedral

Answer: (b) FCC

19. Modern materials formed from the hydrolysis of chlorosilanes in the presence of water is called _____.

(a) LDPE (b) Carbosilanes

(c) HDPE (d) Polydimethylsiloxanes

Answer: (d) Polydimethylsiloxanes

20. The alkaloid found in Sarracenia flava, the yellow pitcher plant is _____.

(a) Nicotine (b) Piperine

(c) Quinine (d) Coniine

Answer: (d) Coniine

21. A preliminary confirmatory test that can be done for identification of flavonoids is _____.

(a) Silver mirror test (b) Conc. Sulphuric acid test

(c) Ferric chloride test (d) Sodium hydroxide test

Answer: (d) Sodium hydroxide test

22. Ionic solids are only soluble in _____.

(a) Non-polar solvents (b) Supercritical solvents

(c) Mix of non-polar and polar solvents (d) Extremely Polar solvents

Answer: (d) Extremely Polar solvents

23. Conversion between polymorphs can be observed by ____.

(a) Tensiometer (b) NMR

(c) Differential scanning calorimeter (d) Gravimetric analysis

Answer: (c) Differential scanning calorimeter

24. Which of the following systems has 7 symmetry elements?

(a) Orthorhombic (b) Triclinic

(c) Tetragonal (d) Cubic

Answer: (a) Orthorhombic

25. In body centered cubic structure. atoms occupy all the corers of the cube and body centre position in a unit cell. BCC Structure 8. The fluorite structure is adopted by which of following?

(a) CaF 2 (b) ZnS

(c) TiO (d) NaCl

Answer: (a) CaF 2

Physics

26. The Clausius – Mossotti relation holds best for ?

(a) Concentrate solutions (b) Gases and dilute solutions

(c) Polar molecules (d) Solids

Answer: (c) Polar molecules

27. In Young's experiment the distance between 10-3 the slits was obtained as m, the distance between the slits and the screen as 3.0 m. The 2.1×10-3 width of the fringe is obtained as m. The colour of light used in the experiment will be ?

(a) Violet (b) Red

(c) Yellow (d) Green

Answer: (b) Red

28. Two lenses of powers +4D and −2D are kept in contact. The combinations focal length will be ?

(a) 100cm (b) 50cm

(c) 25cm (d) 75cm

Answer: (b) 50cm

29. A person hears an explosion 17.7 s after it took 140 place. If the atmospheric–temperature is C, the approximate distance of the place of explosion from the person is:

(a) 4.0 km (b) 2.0 km

(c) 6.0 km (d) 3.0 km

Answer: (c) 6.0 km

30. For diffraction at a single slit, the width of the central maximum is_____ the wavelength of light ?

(a) Proportional to the square of (b) Inversely proportional

(c) Independent of (d) Proportional to

Answer: (d) Proportional to

31. Which of the following has least surface area for a given volume?

(a) Cube (b) Cone

(c) Sphere (d) Cylinder

Answer: (c) Sphere

32. A heat engine is operating between termperatures 500 K and 400 K. What is the efficiency of the engine?

(a) 0.20 (b) 0.80

(c) 0.50 (d) 1.25

Answer: (a) 0.20

33. A gas is kept in a rigid container. Heat equal to 500 J is supplied to the gas. Change in the internal energy of the gas is:

(a) 500 J (b) 50 J

(c) 23.8 J (d) 11.9 J

Answer: (a) 500 J

34. In a potentiometer experiment, two cells connected in series get balanced at 8 m length on wire. It the connection of the terminal of cell of lower emf are reversed, the balance length is obtained at 4 m. The ratio of emf's of two cells is ?

(a) 2 : (b) 3 :

(c) 1 : (d) 4 :

Answer: (b) 3 :

35. There is a diode connected to an external resistance and an e.m.f. source as shown in figure. Assuming that potential barrier developed in diode – is 0.5 V, the value of current in the circuit is ?

(a) 0.05 A (b) 0.025 A

(c) 0.02 A (d) 0.03 A

Answer: (c) 0.02 A

36. A bulb is stamped as 60 W/240 V. The resistance when lighted by 240 volt is:

(a) 480 ohm (b) 560 ohm

(c) 240 ohm (d) 960 ohm

Answer: (d) 960 ohm

37. Internal resistance of a cell depends on ?

(a) Nature of electrode (b) All of these

(c) Distance between electrode (d) Area of the electrode

Answer: (b) All of these

38. The population inversion in He-Ne laser is produced by ?

(a) inelastic atomic collisions (b) electron excitation
(c) chemical reaction (d) Photon excitation
Answer: (b) electron excitation

39. The total energy of a particle executing simple harmonic motion depends upon its ?
(a) frequency only (b) initial state
(c) amplitude only (d) frequency and amplitude both
Answer: (d) frequency and amplitude both

40. At a given temperature, mean free path of a gas is ?
(a) None of the above (b) Directly proportional to the pressure
(c) Inversely proportional to the pressure (d) Independent of pressure
Answer: (c) Inversely proportional to the pressure

41. When a perfect gas is supposed to expand freely against vacuum in an insulated vessel, the gas undergoes:
(a) a change in pressure (b) a change in pressure and phase both
(c) a change in temperature (d) a change in phase
Answer: (c) a change in temperature

42. The dimensions of Planck's constant are equivalent to which of the following ?
(a) Angular momentum (b) Energy
(c) Force (d) Linear momentum
Answer: (a) Angular momentum

43. A star is emitting yellow light. If it is accelerated towards earth, then to an observer on earth it will appear :
(a) gradually changing to red (b) gradually changing to blue
(c) shining yellow (d) unchanged
Answer: (b) gradually changing to blue

44. When water freezes, the distance between its molecules :
(a) increases (b) decreases
(c) not changes (d) becomes zero
Answer: (a) increases

45. Which thermometer is preferred for rapidly changing temperature ?
(a) Resistance thermometer (b) Liquid in glass
(c) Thermo couple thermometer (d) Gas thermometer
Answer: (c) Thermo couple thermometer

46. Heat transfers by the process of convection occurs:
(a) Only in liquids (b) Only in liquids and gases
(c) In solids, liquids and gases (d) Only in solids
Answer: (b) Only in liquids and gases

47. If the density of aluminium is 2600 and its Young modulus is 7.8 × 1010 N/m², the speed of sound in aluminium will be :
(a) 3000 m/s (b) 6431 m/s
(c) 5477 m/s (d) 340 m/s
Answer: (c) 5477 m/s

48. Three capillaries of lengths l, 2l and 4l with their radii r, 2r and 4r respectively are connected in series and a fluid is flowing through the capillaries placed horizontally. Pressure across the capillaries will be in the ratio ?
(a) 64:8:1 (b) 1:8:24

(c) 1:2:4 (d) 4:2:1

Answer: (a) 64:8:1

49. The fictitious force on a body of mass 5 kg in a frame of reference moving vertically upwards m/s² with an acceleration of 5 is ?

(a) 74 N, vertically downwards (b) 25 N, vertically downwards

(c) 25 N, vertically upwards (d) 74 N, vertically upwards

Answer: (b) 25 N, vertically downwards

50. Time period of a simple pendulum depends on its :

(a) m (b) both (a) and (b)

(c) l (d) none of these

Answer: (c) l

SECTION B — Mathematics [50]

51. The minimum value of the sum of real numbers a ?

(a) 8 (b) 9

(c) 6 (d) 7

Answer: (a) 8

52. What is the dimension of the vector space formed by the solution of the system of following equations?

(a) 2 (b) 1

(c) 3 (d) 0

Answer: (b) 1

53. Find the number of integers between 1 and 250, that are divisible by any of the integer 2, 3 and 7 ?

(a) 179 (b) 185

(c) 182 (d) 170

Answer: (a) 179

54. The value of k for which the pair of linear equations 4x+6y ?

(a) k=3 (b) k=

(c) k=4 (d) k=2

Answer: (a) k=3

55. For any positive integers 'a' and 3, there exist unique 'q' and 'r' such that a = 3q + r, where r must satisfy:

(a) 1 < r < 3 (b) 0 < r

(c) 0 (d) 0 < r < 3

Answer: (c) 0

56. The HCF of 4052 and 12576 is:

(a) 6 (b) 2

(c) 3 (d) 4

Answer: (d) 4

57. The order of 2 modulo 101 is:

(a) 97 (b) 98

(c) 100 (d) 99

Answer: (c) 100

58. The diagonal of a rectangular plot is 60 m more than the shorter side 'b'. If the longer side 'a' is 30 m more than the shorter side, then the size 'a ?

(a) 180 m (b) 90 m

(c) 120 m (d) 60 m

Answer: (c) 120 m

59. The sum of the first '2n' terms of the A.P. 2, 5, 8,... is equal to the sum of the first 'n' terms of the A.P. 57, 59, 61 ?

(a) 13 (b) 11

(c) 10 (d) 12

Answer: (b) 11

60. Section : Discipline-3 41. How many numbers must be selected form the set {1, 2, 3, 4, 5, 6} to guarantee that at least one pair of these numbers add up to 7?

(a) 3 (b) 4

(c) 2 (d) 5

Answer: (b) 4

61. How many positive integers less than 200 are NOT divisible by three or more primes?

(a) 65 YCT (b) 168

(c) 197 (d) 122

Answer: (b) 168

62. How many positive integers not exceeding 1000 are divisible by 7 or 11 ?

(a) 220 (b) 142

(c) 90 (d) 12

Answer: (a) 220

63. If the function f(x) = |x| ?

(a) 0.5, 0.5 (b) 0.5, 1.5

(c) 1, (d) 1, 2

Answer: (b) 0.5, 1.5

64. In a histogram, each class rectangle is constructed with base as:

(a) range (b) class interval

(c) frequency (d) size of the class

Answer: (b) class interval

65. If the median of the distribution given below is 28.5, Class: 0 ?

(a) 3, 7 (b) 8, 7

(c) 8, 5 (d) 2, 5

Answer: (b) 8, 7

66. Construction of a cumulative frequency table is useful in determining the:

(a) median (b) mean

(c) mode (d) all the three given measures

Answer: (a) median

67. If sec 4A = cosec (A ?

(a) 22 (b) 20

(c) 21 (d) 24

Answer: (a) 22

68. The wheels of a taxi are of diameter 80 cm each. How many complete revolutions does each wheel make is 10 minutes when the taxi is traveling at a speed of 66 km ?

(a) 4735 (b) 4375
(c) 4325 (d) 4355
Answer: (b) 4375

69. The perimeter of a triangle right angled at C is 70, and the in radius is 6. Then |a ?
(a) 8 (b) 2
(c) 9 (d) 1
Answer: (d) 1

70. If sign of > 0, then what can you say about nature of f?
(a) f neither increases nor decreasing (b) f is increasing
(c) f increases as well as decreasing (d) f is decreasing
Answer: (b) f is increasing

71. If a,b,c are vertices of an equilateral triangle, then $a^2 + b^2 + c^2$ = ...?
(a) ab + bc + ca (b) ab
(c) a (d) ab + bc
Answer: (a) ab + bc + ca

72. When per capitarate increases, we take same positive value we get ... growth?
(a) exponential (b) Carrying capacity
(c) logistic (d) linguistics
Answer: (a) exponential

73. According to which model, top down approach focuses on existing theory and begins with hypothesis is based on?
(a) deductive model (b) static model
(c) dynamic model (d) Dynamic static model
Answer: (a) deductive model

74. In engineering problems, there are some statements in which we have to use mathematical expression in terms of variable, function and equation , such expression are termed as...?
(a) ring solutions (b) terms of continuity
(c) models of time (d) mathematical models
Answer: (d) mathematical models

75. Which of the following is not a type of mathematical model?
(a) heuristics (b) abstractions
(c) presumptions (d) insilicators
Answer: (c) presumptions

76. What kind of information is given to us in mathematical models?
(a) accurate results (b) estimated results
(c) approximate wrong results (d) wrong results
Answer: (b) estimated results

77. Which growth curve indicates that, "living organisms is growing in natural environment "?
(a) parametric curve (b) logistic curve
(c) sigmoid growth curve (d) t curve
Answer: (c) sigmoid growth curve

78. Which theorem states that,"Between any two distinct numbers, there lies at least on rational number and hence there lies many rational numbers YCT ?

(a) Archimedean property (b) Hahn Banach theorem

(c) Cantor's theorem (d) Density theorem

Answer: (d) Density theorem

79. Find the terms of the sequence given by < 1 + 1 ?

(a) < 1, 1 (b) < 2, 5

(c) < 1, 2, 3,... > (d) < 1, 1, 1,... >

Answer: (b) < 2, 5

80. Which of the following is not a component of mathematical model?

(a) factors (b) constants

(c) variables (d) noise parameters

Answer: (a) factors

81. Taylor's theorem is mainly used in expressing the function as a sum with _____terms?

(a) infinite (b) partial

(c) complete (d) finite

Answer: (a) infinite

82. Find the limit of sin(y) ?

(a) 1 (b) infinite

(c) 0 (d) doesn't exist

Answer: (d) doesn't exist

83. Find the value of integral of f; where f(x, y) = (x2y (x^2 y^2)dy + xy)dx + + over the limits ?

(a) 2 (b) 3

(c) 0 (d) 1

Answer: (c) 0

84. If u and v are continuous on [a, b] and have equal finite derivatives in [a, b], then u ?

(a) g (b) f

(c) finite (d) constant

Answer: (d) constant

85. Check about the continuity of function given by f(x) = x in interval [0, 2] ?

(a) it is uniformly continuous (b) discontinuous everywhere

(c) it is not uniformly continuous (d) can't say about continuity of f

Answer: (a) it is uniformly continuous

86. Check about the nature of continuity of f(x) = x ?

(a) not uniformly continuous (b) Continuous but not uniformly continuous

(c) not continuous (d) uniformly continuous

Answer: (d) uniformly continuous

87. Find the radius of convergence of series 1 + x + x^2 x^3 + +...?

(a) 2 (b) 3

(c) 0 (d) 1

Answer: (d) 1

88. If U (8) = {1, 3, 5, 7} and U (10) = {1, 3, 7, 9}, then find how many element are there in U(8) ?

(a) 32 (b) 4

(c) 16 (d) 8

Answer: (c) 16

89. Find the cardinality of generating set for dihedral group ?

(a) 3 (b) 1

(c) 2 (d) 4

Answer: (c) 2

90. Find radius of convergence of 1 + x + +...?

(a) 0 (b) 10

(c) 5 (d) Infinite

Answer: (d) Infinite

91. Consider the following series < + >, and check whether the series is uniformly convergent on[0, 1]?

(a) it is uniformly continuous on [0, 1] n2x (b) it is uniformly continuous on (0, 1)

(c) it is not uniformly continuous on [0, 1] (d) none of the above options hold

Answer: (c) it is not uniformly continuous on [0, 1]

92. Hence, the convergence is not uniform on [0, 1] 7. The external direct product of two abelian group is abelian if and only if both are ....?

(a) infinite (b) non abelian

(c) finite (d) abelian

Answer: (d) abelian

93. Find point wise limit of the series < x ?

(a) 3 (b) 0

(c) 2 (d) 1 x

Answer: (b) 0

94. Let G be a multiplicative group defined by T(x) x^2; = then T satisfies which of the following property?

(a) all of the three options (b) isomorphism

(c) automorphism (d) Homomorphism

Answer: (a) all of the three options

95. A topological space is ...if every point x of X has neighbourhood base consisting of compact neighbourhoods ?

(a) finite metric (b) locally compact

(c) compact (d) connected

Answer: (b) locally compact

96. An automorphism is defined if it is ?

(a) isomorphism but not one one and onto (b) one one , onto

(c) isomorphism, one one, onto (d) isomorphism only

Answer: (c) isomorphism, one one, onto

97. C[a, b] i.e. the set of all continuous function from a to b is a subset of real valued ... function?

(a) discontinuous (b) finite

(c) infinite (d) bounded

Answer: (d) bounded

98. If the contour is closed and does not intersect itself, then it is called .... curve ?

(a) ternary (b) binary

(c) open (d) Jordan

Answer: (d) Jordan

99. Check about continuity and analyticity of f(z) = cos(z)?

(a) neither continuous nor analytic (b) continuous and analytic everywhere

(c) analytic but not continuous (d) Continuous but not analytic

Answer: (b) continuous and analytic everywhere

100. If a set G with binary operation satisfies closure property as well as associative property then it is called_____ ?

(a) group (b) semigroup

(c) quasiod (d) monoid

Answer: (b) semigroup