UNIVERSITY OF LUCKNOW

D.Pharm Entrance Examination

Mathematics Group — Model Test Paper Set 5

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

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SECTION A — Chemistry & Physics [50]

Chemistry

1. Cheese is an example :

(a) Solid in solid (b) Solid in liquid

(c) Liquid in solid (d) Gas in solid

Answer: (c) Liquid in solid

2. Which of the following types of catalysis can be explained by the adsorption theory?

(a) Heterogeneous catalysis (b) Enzyme catalysis

(c) Autocatalysis (d) Homogeneous catalysis

Answer: (a) Heterogeneous catalysis

3. How many times Al+3 ion is more effective than Na+ ion in flocculating a negatively charged sol?

(a) Six times (b) Three times

(c) Two times (d) Nine times

Answer: (d) Nine times

4. Which of the following are favourable conditions for physical adsorption?

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

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

Answer: (a) Low temperature, high pressure

5. At critical micelle concentration (CMC), the surfactant molecules :

(a) Become completely soluble (b) Dissociate

(c) Associate (d) Decompose

Answer: (c) Associate

6. What is the result for the following calculation with appropriate number of significant 72.46 figures?

(a) 42.6 (b) 42.643

(c) 42.64 (d) 42.6429

Answer: (a) 42.6

7. The percentage composition of nitrogen in urea :

(a) 20% (b) 46.67%

(c) 26.67% (d) 6.67%

Answer: (b) 46.67%

8. The ratio of the masses of oxygen that are combined with one gram of nitrogen in the compounds N O and NO is 3 : 2. 2 3 This statement is correct as per which law?

(a) Gay Lussac's law of gaseous volumes (b) Law of multiple proportions

(c) Law of conservation of mass (d) Law of definite proportions

Answer: (b) Law of multiple proportions

9. What is the limiting reactant, and what amount of Ni(OH) is formed when 25.9g of NiCl 2 2 reacts with 10 g of NaOH?

(a) NiCl and 5.8g of Ni (OH) 2 (b) NaOH and 11.6g of Ni (OH)

(c) NaOH and 5.8 g of Ni (OH) (d) NiCl and 11.6g of Ni(OH) 2

Answer: (b) NaOH and 11.6g of Ni (OH)

10. What is the frequency of the radiation corresponding to the spectral line of lowest energy in Lyman series in the H-atomic spectrum?

(a) 1.22 (b) 2.47

(c) 1.64 (d) 3.28

Answer: (b) 2.47

11. The Aufbau principle implies that a new electron will enter an orbital for which : nBhe :

(a) n has lower value (b) The value of (n + l) is maximum

(c) The value of (n + l) is minimum (d) l has lower value

Answer: (c) The value of (n + l) is minimum

12. Eka-aluminium and Eka-silicon, respectively, are references to : Fke :

(a) Aluminium and Silicon (b) Gallium and Germanium

(c) Silicon and Aluminium (d) Germanium and Gallium

Answer: (b) Gallium and Germanium

13. What is the IUPAC name of the element with atomic number 111?

(a) Ununbium (b) Unnilennium

(c) Ununnilium (d) Unununium

Answer: (d) Unununium

14. The ionization energy of Li in its ground state is 519 :

(a) 0.63 (b) 1.87

(c) 1.26 (d) 2.52

Answer: (c) 1.26

15. The correct order of first electron affinity values of Al, Si and P is : Al, Si :

(a) Si > P > Al (b) Si > Al > P

(c) Al > P > Si (d) P > Si > Al

Answer: (a) Si > P > Al

16. Based on the electronegativity difference between the bonded atoms in molecules, the correct order of ionic character is : DeCegDeeW ceW DeeyebefOele hejceeCegDeeW :

(a) HCl > Cl > LiCl (b) LiCl > HCl > Cl 2

(c) Cl > LiCl > HCl 2 (d) LiCl > Cl > HCl

Answer: (b) LiCl > HCl > Cl 2

17. Oxygen brings out the group oxidation state for many elements more readily than fluorine :

(a) Higher electronegativity (b) Higher ionization enthalpy

(c) Lower atomic radius (d) Decreased steric crowding

Answer: (d) Decreased steric crowding

18. Hydrogen is predicted to exits naturally in metallic state :

(a) Extremely high temperature (b) Room temperature

(c) Extremely low pressure (d) Extremely high pressure

Answer: (d) Extremely high pressure

19. Which of the following is the non-renewable energy source?

(a) Water (b) Coal

(c) Wind energy (d) Solar energy

Answer: (b) Coal

20. In the prolonged electrolysis of water to prepare heavy water, the anode and cathode, respectively, are : Yeejer heeveer yeveeves :

(a) Steel and nickel (b) Graphite and steel

(c) Nickel and steel (d) Nickel and graphite

Answer: (c) Nickel and steel

21. The dihedral angles in gas phase and solid phase, respectively, of hydrogen peroxide :

(a) 90.2 (b) 132.5

(c) 101.5 (d) 111.5

Answer: (d) 111.5

22. Which of the following is not a method for the commercial production of dihydrogen?

(a) Lane's process (b) Electrolysis of water

(c) Action of water on metals (d) Bosch's process

Answer: (c) Action of water on metals

23. The formula of phenacite is : Hes :

(a) Be Al Si O (b) MgCO .CaCO

(c) Be SiO 3 2 6 18 2 (d) MgSO .7H O 3 3 4

Answer: (c) Be SiO 3 2 6 18 2

24. Which of the following is not a polymorph of calcium carbonate?

(a) Perovskite (b) Aragonite

(c) Calcite (d) Vaterite

Answer: (a) Perovskite

25. The correct biological function of magnesium is cewiveerefMe :

(a) Electrochemical and enzyme-activating functions (b) Important in tertiary structure of protein

(c) Important constituent of DNA and RNA (d) Important in nerve functioning in animals

Answer: (a) Electrochemical and enzyme-activating functions

Physics

26. The laser material in He-Ne laser is activated by ?

(a) chemical reaction (b) electrical discharge

(c) supersonic gas explosion (d) optical pumping

Answer: (b) electrical discharge

27. The population inversion between energy states in a Ruby laser is achieved through ?

(a) lowering of temperature (b) optical pumping

(c) vacuum pumping (d) raising of temperature

Answer: (b) optical pumping

28. Fraunhofer spectrum is a ?

(a) Line absorption spectrum (b) Band absorption spectrum

(c) Band emission spectrum (d) Line emission spectrum

Answer: (a) Line absorption spectrum

29. Consider : A. The wavelength of scattered light may be greater or less than that of incident light. B. Above statement A is true for scattering of photons by electrons :

(a) A, B both are false (b) A is true, B is false

(c) A, B both are true (d) A is false, B is true

Answer: (b) A is true, B is false

30. The thermal conductivities of brick and pine wood are respectively 0.6 and 0.13W/(m0C). What thickness of brick has the same insulating ability at 5 cm of pine ?

(a) 23 cm (b) 4.6 cm

(c) 5 cm (d) 30 cm

Answer: (a) 23 cm

31. Transference of molecules from the vapour phase to the liquid phase is called ?

(a) Evaporation (b) Sublimation

(c) Condensation (d) None of these

Answer: (c) Condensation

32. A parallel plate capacitor has two layers of different dielectrics as shown in figure. The ratio of potential difference across the dielectric layers when connected to the battery is K Ka ?

(a) 1 K K b 2 2 K a (b) 1

(c) 2 (d) 1 : 1 Kb

Answer: (c) 2

33. Water rises to a height of 10 cm in a capillary. Mercury falls to a depth of 3.42 cm in same capillary. If the relative density of mercury is 13.6 g/cc and its angle of contact is 135°, the ratio of surface tension of water and mercury is :

(a) 0.10 (b) 0.05

(c) 0.20 (d) 0.15

Answer: (d) 0.15

34. If density of earth increased by 2% and radius by 1% the acceleration due to gravity g will change as follows :

(a) Increase 5% (b) Decrease 3%

(c) Increase 3% (d) Decrease 5%

Answer: (c) Increase 3%

35. The same retarding force is applied to stop a train. If the speed is doubled, then the distance will be :

(a) four times (b) The same

(c) doubled (d) half

Answer: (a) four times

36. The speed of a boat in still water is 10 km/hr. If the boat crosses a 2 km wide river in 15 min along the shortest possible route, the water velocity in the river is :

(a) 3 km/hr (b) 4 km/hr

(c) 6 km/hr (d) 5 km/hr

Answer: (c) 6 km/hr

37. The gauge transformation in which $\nabla.A=0$, is called ?

(a) Longitudinal gauge , (b) Gauss gauge

(c) Lorentz gauge (d) Coulomb gauge

Answer: (d) Coulomb gauge

38. Anderson's Bridge is used for measurement of ?

(a) Frequency of AC supply (b) Resistance

(c) Self-inductance (d) Capacitance

Answer: (c) Self-inductance

39. The given circuit diagram is equivalent to ?

(a) T Flip-flop (b) Clocked RS Flip-flop

(c) JK Flip-flop (d) D Flip-flop

Answer: (d) D Flip-flop

40. The amount of work done in rotating a magnet 1800 of moment M through from its position along the magnetic meridian is:

(a) zero (b) 1/2 MB

(c) MB (d) 2MB

Answer: (d) 2MB

41. A galvanometer connected in series with a high resistance is called :

(a) Voltmeter (b) None of these

(c) Wattmeter (d) Ammeter

Answer: (a) Voltmeter

42. The temperature of Sun is 6000 K and the 2.88×10−3 Wien's constant is mK. Assuming Sun to be a perfectly black body, the wavelength corresponding to the maximum intensity in the solar radiation must be ?

(a) 172.8 nm (b) None of the above

(c) 480 nm (d) 290 nm

Answer: (c) 480 nm

43. When a metal rod is heated it expands because ?

(a) The distance among its atom increase (b) The actual cause is unknown

(c) None of these (d) The size of its atoms increase

Answer: (a) The distance among its atom increase

44. The expansion of a string. obeying Hooke's law is x. The velocity of sound in this expended string is v. If the expansion is increased to 1.5x, then the velocity of sound in the string will be :

(a) 1.50v (b) 0.75v

(c) 0.61v (d) 1.22v

Answer: (d) 1.22v

45. Unit of surface tension is ?

(a) Dyne cm (b) None of these

(c) Dyne cm-1 (d) Dyne cm-2

Answer: (c) Dyne cm-1

46. A metal in which even Iron can float is :

(a) magnesium (b) sodium

(c) mercury (d) maganese

Answer: (c) mercury

47. The ratio of mass of a planet to that of the earth, if its radius is half that of the earth and acceleration due to gravity on its surface is twice that on earth's surface, is ?

(a) 0.25 (b) 0.33

(c) 0.5 (d) 2

Answer: (c) 0.5

48. How much force is required to change the velocity of a body of mass 1 kg from 20 m/s to 30 m/s in 2 seconds?

(a) 10 N (b) 1 N

(c) 5 N (d) 25 N

Answer: (c) 5 N

49. Scalar quantity is :

(a) displacement (b) temperature

(c) momentum (d) velocity

Answer: (b) temperature

50. The photoelectric threshold wavelength for tungsten is 2300 Å. If this surface is irradiated by ultra-violet light of wavelength 1800 Å, the kinetic energy of emitted electrons is ?

(a) 2.4 eV (b) 1.5 eV

(c) 1.8 eV (d) 2.7 eV

Answer: (b) 1.5 eV

SECTION B — Mathematics [50]

51. What is the slope of the tangent to the curve y = (x^2 4x ?

(a) 0 (b) 4

(c) 8 (d) 2 4x

Answer: (b) 4

52. dx x=2 13. Find out the number of equivalence classes that { 1,2,3}. can be defined by the set ?

(a) 16 (b) 125

(c) 72 (d) 5

Answer: (d) 5

53. Inner product spaces over the field of complex numbers are sometimes referred to as:

(a) real vector space (b) vector space

(c) abstract vector space (d) unitary space

Answer: (d) unitary space

54. Which of the following characteristic is included in the study of general procedure for tracing the algebraic curve?

(a) 1&2 correct (b) only 2

(c) only 1 (d) 1&3 are correct

Answer: (d) 1&3 are correct

55. What will be the value of + + if x + y + z = 0 ?

(a) xyz (xz + yz + zx) (b) xyz

(c) 2xyz (d) 3xyz

Answer: (d) 3xyz

56. In which option we can evaluate the limit by using L Hospital rule?

(a) lim cosx x (b) lim tanx x

(c) lim (d) lim lnx x

Answer: (a) lim cosx x

57. The half-life of radium is 1600 years, i.e. it takes 1600 years for half of any quantity to decay. If a sample initially contains 50 g, how long will it be until it contains 45 g ?

(a) 344.3 years (b) 243.2 years

(c) 212.3 years (d) 282.4 years

Answer: (b) 243.2 years

58. What is the sum of the next three numbers in the sequence?

(a) 76 (b) 108

(c) 109 (d) 74

Answer: (c) 109

59. Let us say a, b, c are in AP then, which of the following in not true?

(a) b (b) 2b = a + c

(c) b + a = c + b (d) b + b = a + c

Answer: (c) b + a = c + b

60. Find out the common ratio of the GP if the first term of a GP is 1 and the sum of the third term and fifth term is 90 ?

(a) 9 (b) 2

(c) 3 (d) 4

Answer: (c) 3

61. What is the order of this equation?

(a) 3 (b) 1

(c) 2 (d) 0

Answer: (c) 2

62. A vector field with a vanishing curl is known as__ ?

(a) Rotational (b) Irrotatioal

(c) Solenoidal (d) Cycloidal

Answer: (b) Irrotatioal

63. Find the volume V under the plane z= 8x+6y over the rectangle R=[0,1] ?

(a) 10 units (b) 40 units

(c) 20 units 1 2 (d) 30 units

Answer: (c) 20 units 1 2

64. Integration of (sin(x)+ cos (x)) ex is ___ ?

(a) ex sin (x) (b) (sin (x) + cos (x))

(c) ex tan (x) ex ex (d) cos (x)

Answer: (a) ex sin (x)

65. The Metric space is both complete and totally bounded is known as ____ ?

(a) Discrete (b) Compact

(c) Complete (d) Scalar

Answer: (b) Compact

66. If G is a finite group of order 217. Find out the number of generators of the group G ?

(a) 188 (b) 182

(c) 181 (d) 180

Answer: (d) 180

67. Which one is not in the automorphism group?

(a) decomposition (b) associativity

(c) identity (d) closure

Answer: (a) decomposition

68. Find the radius of convergence for the power ?

(a) (2x+a) (b) 7 < |3x

(c) 3 |x+1| (d) 3!

Answer: (b) 7 < |3x

69. A: All upper triangular matrices are in echelon form. B: All matrices in echelon form are upper triangular matrices ?

(a) Statement A is true and B is false (b) Statement A is true and B is true

(c) Statement A is false and B is true (d) Statement A is false and B is false

Answer: (a) Statement A is true and B is false

70. What is the area in between y = 6x, x = 3 and x ?

(a) 36 sq. unit (b) 18 sq. unit

(c) 9 sq. unit (d) 27 sq. unit YCT

Answer: (d) 27 sq. unit YCT

71. ap 11. If p is prime, then ?

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

(c) Pringsheim's theorem (d) Fermet's theorem

Answer: (d) Fermet's theorem

72. A relation is equivalence if the relation is:

(a) Symmetric, transitive (b) Reflexive, symmetric

(c) Reflexive, symmetric, and transitive (d) Transitive, reflexive

Answer: (c) Reflexive, symmetric, and transitive

73. What is the area of ellipse whose small axis is 2 and large axis is 4?

(a) 64 (b) 16

(c) 8 (d) 4

Answer: (c) 8

74. What is the order of the equation d2y dy + +y=0?

(a) 1 (b) 3

(c) 4 d2y dy (d) 2

Answer: (d) 2

75. What are infimum and the supremum of the set ?

(a) 1, 0 (b) 1, 2

(c) 0, 1 (d) 2, 1

Answer: (c) 0, 1

76. The sequence {1 + is:

(a) Divergent (b) Oscillates infinitely

(c) Convergent (d) Oscillates finitely

Answer: (d) Oscillates finitely

77. What is the third step of process of mathematical model?

(a) Define variables and parameters (b) Compute model output

(c) Validate mathematical model (d) Construct equation

Answer: (d) Construct equation

78. Every non-empty set of real numbers, which is bounded above, has:

(a) infimum in R (b) supremum, not in R

(c) infimum, not in R (d) supremum in R

Answer: (d) supremum in R

79. Image of a closed and bounded interval under continuous map is:

(a) closed and unbounded (b) open and bounded

(c) open and unbounded (d) closed and bounded

Answer: (d) closed and bounded

80. Surface integral of the curl of a function over a surface bounded by a closed surface is equal to the line integral of the particular vector function around that surface." Which theorem is this?

(a) Gauss Divergence theorem (b) Green's theorem

(c) Livouille's theorem (d) Stoke's theorem

Answer: (d) Stoke's theorem

81. Let {f}, {g} and {h} are real sequence and {f} < = {g} < = {h}, for all x ?

(a) 0 (b) 1

(c) a (d) I

Answer: (d) I

82. If f is a function, then it has ?

(a) unique limit point (b) unique continuous point

(c) unique differentiable point (d) unique limit

Answer: (d) unique limit

83. Which type of surface is circular cylinder?

(a) Topological surface (b) Algebraic and differential surface

(c) Fractal surface (d) Implicit surface

Answer: (b) Algebraic and differential surface

84. In metric space, if the function f is continuous, then:

(a) f is onto (b) f is uniformly continuous

(c) f is differentiable (d) f is sequentially continuous

Answer: (d) f is sequentially continuous

85. T is topology, then:

(a) may have infinitely many bases (b) may have two bases

(c) may have more than one basis (d) don't have any basis

Answer: (c) may have more than one basis

86. A closed and bounded subset of R is called ?

(a) path connected set (b) totally bounded set

(c) connected set (d) compact set

Answer: (d) compact set

87. What are the names numbers U(p, f) and L(p, f)?

(a) Upper and lower bound (b) Upper and lower Riemann integrals

(c) Upper and lower Reimann sums (d) Supremum and infimum

Answer: (c) Upper and lower Reimann sums

88. What is the order of Klein's four group?

(a) 1 (b) 3

(c) 4 (d) 2

Answer: (c) 4

89. The union of two disjoint open intervals on the real line is a space which is ?

(a) locally connected (b) connected

(c) compact (d) path connected

Answer: (a) locally connected

90. The area of the surface obtained by rotating the circle r = 2sin ?

(a) 2 (b) 3

(c) 5 (d) 4

Answer: (d) 4

91. The graph of the equation r = sin 4 ?

(a) Five leaved Rose (b) Ten leaved Rose

(c) Four leaved Rose (d) Eight leaved Rose

Answer: (d) Eight leaved Rose

92. The set of real number R is uncountable i.e., there is no bijection N ?

(a) Continuity theorem (b) Mean value theorem

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

Answer: (d) Cantor's theorem

93. If is divided by 8 then remainder is ?

(a) 1 (b) 3

(c) 2 (d) 4

Answer: (a) 1

94. The graph of r = a (1 + sin ?

(a) Symmetric about y = x (b) Not Symmetric

(c) Symmetric about y - axis (d) Symmetric about x-axis

Answer: (c) Symmetric about y - axis

95. Number of zeros in, 1000! is ?

(a) 30 (b) 248

(c) 25 (d) 249

Answer: (d) 249

96. If A and B are real square matrices then which of the following is correct AT ?

(a) A (b) A + AT is always skew-symmetric

(c) AB is not necessarily symmetric (d) AB is always symmetric

Answer: (c) AB is not necessarily symmetric

97. If the rate of growth is proportional to the amount x of the substance present and if dx ?

(a) C e (b) C e2kt

(c) C 1 1 (d) C

Answer: (d) C

98. A system by a set of variables and a set of equations that establish relationships between the variables is ?

(a) Multivariate calculus (b) mathematical model

(c) Theory of real functions (d) Algebra

Answer: (b) mathematical model

99. How many types of mathematical models are there ?

(a) 2 (b) 4

(c) 1 (d) 3

Answer: (a) 2

100. The law which enables an integral taken around a closed curve to be replaced by one taken over any surface bounded by the curve is ?

(a) Closure law (b) Divergence law

(c) Stoke's law (d) Gauss's law

Answer: (c) Stoke's law