

UNIVERSITY OF LUCKNOW

D.Pharm Entrance Examination

Mathematics Group — Model Test Paper Set 13

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

LUUPDATE

SECTION A — Chemistry & Physics [50]

Chemistry

1. The reagent used in the reaction :

- (a) aqueous NH_4Cl (b) alcoholic KCN
(c) alcoholic AgCN (d) alkaline CHCl_3

Answer: (b) alcoholic KCN

2. The states of hybridization of nitrogen in pyridine and piperidine, respectively are

- (a) sp^2 and sp^3 (b) sp^3 and sp^2
(c) sp^2 and sp (d) sp and sp^3

Answer: (a) sp^2 and sp^3

3. What is the final product (IV) in the following reaction sequence?

- (a) Bromobenzene (b) p-Methyltoluene
(c) Aniline (d) Benzylamine

Answer: (c) Aniline

4. Which of the following compounds will give only monosubstituted product upon further substitution reaction?

- (a) p-Dinitrobenzene (b) None of the above
(c) o-Dinitrobenzene (d) m-Dinitrobenzene

Answer: (a) p-Dinitrobenzene

5. Phosphorus pentachloride does not react readily with :

- (a) aniline (b) methanol
(c) diethyl ether (d) acetone

Answer: (a) aniline

6. The rate at which ethanol reacts with HCOOH (I), CH_3COOH (II), $(\text{CH}_3)_2\text{CHCOOH}$ (III), and $(\text{CH}_3)_3\text{CCOOH}$ (IV) in presence of an acid follows the order

- (a) $\text{IV} > \text{III} > \text{II} > \text{I}$ (b) $\text{III} > \text{IV} > \text{I} > \text{II}$
(c) $\text{II} > \text{III} > \text{I} > \text{IV}$ (d) $\text{I} > \text{II} > \text{III} > \text{IV}$

Answer: (d) $\text{I} > \text{II} > \text{III} > \text{IV}$

7. The reactivity of CH_3COCl (I), $(\text{CH}_3)_2\text{CO}$ (II), $\text{CH}_3\text{COOC}_2\text{H}_5$ (III), CH_3CONH_2 (IV) towards nucleophilic reagents follows the order :

- (a) $\text{II} > \text{I} > \text{III} > \text{IV}$ (b) $\text{III} > \text{I} > \text{IV} > \text{II}$
(c) $\text{I} > \text{II} > \text{III} > \text{IV}$ (d) $\text{IV} > \text{III} > \text{II} > \text{I}$

Answer: (c) $\text{I} > \text{II} > \text{III} > \text{IV}$

8. The boiling points of $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ (I), $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$ (II) and $(\text{CH}_3)_3\text{COH}$ (III) decrease in the order of

- (a) $\text{III} > \text{II} > \text{I}$ (b) $\text{I} > \text{II} > \text{III}$

(c) I > III > II (d) II > III > I

Answer: (b) I > II > III

9. On treatment with sodium hydroxide, glyoxal gives mainly sodium salt :

(a) glycolic acid (b) glycerol

(c) glyceric acid (d) glycine

Answer: (a) glycolic acid

10. End products obtained during ozonolysis of 1, 3-butadiene are 1, 3-y :

(a) formaldehyde and glycol (b) oxalic acid and formaldehyde

(c) formic acid and glycolic acid (d) formaldehyde and glycolic acid

Answer: (a) formaldehyde and glycol

11. The reducing agent used in the conversion :

(a) Tollen's reagent (b) Raney Nickel

(c) Stephen's reagent (d) Wittig's reagent

Answer: (c) Stephen's reagent

12. Formation of acetone cyanohydrin from acetone is an example of Smeer :

(a) nucleophilic addition (b) nucleophilic substitution

(c) free radical addition (d) electrophilic addition

Answer: (a) nucleophilic addition

13. What is the compound C in the following reaction sequence?

(a) 1-Bromopropane (b) 2, 2 Dibromopropane

(c) 1, 2-Dibromopropane (d) 2-Bromopropane

Answer: (d) 2-Bromopropane

14. The reaction intermediate formed during dehydration of ethanol by concentrated sulphuric acid is a meev :

(a) free radical (b) carbene

(c) carbonium ion (d) carbanion

Answer: (c) carbonium ion

15. Which among (A) cyclohexane (B) cyclopentane (C) cyclopropane (D) cyclobutane possesses a Bayer strain of 19 :

(a) cyclopropane (b) cyclopentane

(c) cyclobutane (d) cyclohexane

Answer: (c) cyclobutane

16. Which of the following is the end product when benzene is treated with excess of chlorine in presence of light?

(a) Trichlorobenzene (b) Monochlorobenzene

(c) Hexachlorocyclohexane (d) Dichlorobenzene

Answer: (c) Hexachlorocyclohexane

17. A Friedal-Craft's reaction of benzene with dichloromethane in presence of anhydrous AlCl₃ produces :

(a) Benzyl chloride (b) Diphenylmethane

(c) Benzal chloride (d) Triphenylmethane

Answer: (b) Diphenylmethane

18. Which of the following molecules is expected to be aromatic?

(a) Cyclopentadienylcation (b) Cycloheptatrienylcation

(c) Cyclobutadiene (d) Cyclooctatetraene

Answer: (b) Cycloheptatrienylation

19. The hydrocarbon obtained during the reaction : $\text{CH}_3\text{CH}_2\text{MgBr} +$:

- (a) ethane (b) propane
- (c) methane (d) butane

Answer: (a) ethane

20. Carbon tetrachloride is a commonly used liquid in fire extinguishers to combat small fires. This is because :

- (a) it has low melting point and boiling point (b) it has no flash point and non- inflammable
- (c) it is made up of only covalent bonds (d) its vapors are non-poisonous

Answer: (b) it has no flash point and non- inflammable

21. Chlorobenzene is less reactive towards nucleophilic substitution reactions when compared to chloroethane.

This :

- (a) the increased bond strength by resonance effect (b) the hyper conjugative effect
- (c) the formation of less stable carbonium ion (d) the inductive effect by phenyl group

Answer: (a) the increased bond strength by resonance effect

22. Which of the following statements is not true about enantiomers?

- (a) They have the same chemical reactivity (b) They have the same specific rotation
- (c) They are nothing but non super imposable mirror images (d) They have the same melting and boiling points

Answer: (b) They have the same specific rotation

23. butene on reaction with cold dilute 2% KMnO_4 solution meso butane 2, 3- diol. It is 4 dihydroxylation reaction and two OH group are added across bond. 63. The normal C = C bond length in cyclohexene is 0.134 nm and the normal :

- (a) 0.154 nm (b) Between 0.134 nm 0.154 nm
- (c) 0.134 nm (d) < 0.134 nm

Answer: (b) Between 0.134 nm 0.154 nm

24. When ethyne reacts with silver nitrate solution, ethyne shows peye efmeueJef veeF :

- (a) oxidizing property (b) basic property
- (c) reducing property (d) acidic property

Answer: (d) acidic property

25. On electrolysis of aqueous potassium maleate, the gas collected at anode is peueer :

- (a) a mixture of ethane and ethene (b) ethyne
- (c) ethane (d) ethene

Answer: (b) ethyne

Physics

26. 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) 1:8:24 (b) 64:8:1
- (c) 4:2:1 (d) 1:2:4

Answer: (b) 64:8:1

27. The fictitious force on a body of mass 5 kg in a frame of reference moving vertically upwards m/s^2 with an acceleration of 5 is ?

- (a) 25 N, vertically downwards (b) 74 N, vertically upwards
- (c) 74 N, vertically downwards (d) 25 N, vertically upwards

Answer: (a) 25 N, vertically downwards

28. 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

29. 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) 14 (b) 3
- (c) 4 (d) 2

Answer: (b) 3

30. 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) Acceleration (b) Kinetic energy
- (c) Potential energy (d) Momentum

Answer: (a) Acceleration

31. Planck's constant has the dimension of:

- (a) Momentum (b) Frequency
- (c) Angular momentum (d) Energy

Answer: (c) Angular momentum

32. 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 2000\AA , calculate the work function of nickel ?

- (a) 5.01 eV (b) 4.50 eV
- (c) 6.21 eV (d) 4.80 eV

Answer: (a) 5.01 eV

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

- (a) Radius of the orbit (b) Energy of the atom
- (c) Orbital angular momentum of the electron (d) Speed of the electron

Answer: (c) Orbital angular momentum of the electron

34. 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) 4.25 A (b) 3.50 A
- (c) 4.45 A (d) 4.00 A

Answer: (c) 4.45 A

35. In Helium-Neon laser, helium atoms ?

- (a) Emit laser radiation (b) Act as catalytic atom
- (c) Impart energy to the Neon atoms (d) Act as quenching agents

Answer: (c) Impart energy to the Neon atoms

36. For D and D lines of Na $\cong 1000$. In order $1/2 \Delta\lambda$ to resolve these lines by a grating in the fourth order of spectrum the total number of line on the grating should be ?

- (a) 1000 (b) 250
- (c) any number (d) 500

Answer: (b) 250

37. A zone plate behaves like a ?

- (a) Convex lens (b) Plane mirror

(c) Glass plate (d) Concave lens

Answer: (a) Convex lens

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

(a) Spectrometer (b) Interferometer

(c) Polarimeter (d) Microscope

Answer: (c) Polarimeter

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

(a) bright (b) None of the above

(c) may be bright or dark (d) dark

Answer: (a) bright

40. When a thin transparent plate is introduced in the path of interfering beams, the fringe width will ?

(a) remains the same (b) increase

(c) decrease (d) become zero

Answer: (a) remains the same

41. A converging lens 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 $2f$ (b) A diverging lens of focal length $3f$

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

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

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

(a) Reflector in search lights (b) Inspection internal parts of ear

(c) Shaving glass (d) Rear-view mirror in cars

Answer: (d) Rear-view mirror in cars

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

(a) 5.50 mm (b) 4.91 mm

(c) 6.50 mm (d) 4.50 mm

Answer: (b) 4.91 mm

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

(a) Decreases (b) May decrease or increase

(c) Increases (d) Does not change

Answer: (a) Decreases

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

(a) zero (b) three

(c) two (d) six

Answer: (d) six

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

(a) $4f$ (b) f

(c) $f/2$ (d) $2f$

Answer: (a) $4f$

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

(a) $2/7$ (b) 5

(c) $3/7$ (d) $1/7$

Answer: (b) 5

48. 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) 262 Hz (b) 258 Hz

(c) 282 Hz (d) 242 Hz

Answer: (b) 258 Hz

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

(a) Cl₂ (b) H₂

(c) O₂ (d) F₂

Answer: (b) H₂

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

(a) Speed (b) Root mean square momentum

(c) Root mean square speed (d) Mean translational kinetic energy

Answer: (c) Root mean square speed

SECTION B — Mathematics [50]

51. Find the radius of convergence of series $1 + x + x^2 + x^3 + \dots$?

(a) 2 (b) 1

(c) 0 (d) 3

Answer: (b) 1

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

(a) 32 (b) 16

(c) 8 (d) 4

Answer: (b) 16

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

(a) 1 (b) 2

(c) 3 (d) 4

Answer: (b) 2

54. Find radius of convergence of $1 + x + x^2 + \dots$?

(a) 0 (b) 10

(c) 5 (d) Infinite

Answer: (d) Infinite

55. Consider the following series $\sum_{n=0}^{\infty} x^n$, and check whether the series is uniformly convergent on $[0, 1]$?

(a) it is uniformly continuous on $[0, 1]$ (b) none of the above options hold

(c) it is not uniformly continuous on $[0, 1]$ (d) it is uniformly continuous on $(0, 1)$

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

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

(a) infinite (b) abelian

(c) non abelian (d) finite

Answer: (b) abelian

57. Find point wise limit of the series $\sum_{n=0}^{\infty} x^n$?

- (a) 2 (b) 0
(c) 3 (d) 1 x

Answer: (b) 0

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

- (a) Homomorphism (b) all of the three options
(c) automorphism (d) isomorphism

Answer: (b) all of the three options

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

- (a) finite metric (b) connected
(c) locally compact (d) compact

Answer: (c) locally compact

60. An automorphism is defined if it is ?

- (a) isomorphism only (b) isomorphism but not one one and onto
(c) isomorphism, one one, onto (d) one one , onto

Answer: (c) isomorphism, one one, onto

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

- (a) infinite (b) bounded
(c) discontinuous (d) finite

Answer: (b) bounded

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

- (a) open (b) Jordan
(c) binary (d) ternary

Answer: (b) Jordan

63. Check about continuity and analyticity of $f(z) = \cos(z)$?

- (a) Continuous but not analytic (b) continuous and analytic everywhere
(c) analytic but not continuous (d) neither continuous nor analytic

Answer: (b) continuous and analytic everywhere

64. If a set G with binary operation satisfies closure property as well as associative property then it is called _____ ?

- (a) semigroup (b) monoid
(c) group (d) quasioid

Answer: (a) semigroup

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

- (a) Cauchy theorem (b) Morera theorem
(c) Liouville's theorem (d) Fundamental theorem

Answer: (c) Liouville's theorem

66. If $f(z) = u + iv$ is an analytic function, in domain D , then the curves $u = \text{constant}$, $v = \text{constant}$ form two ... families?

- (a) orthogonal (b) parametric
(c) symmetric (d) diagonal

Answer: (a) orthogonal

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

- (a) $n + 1$ (b) n
(c) $2n$ (d) $2n + 1$

Answer: (b) n

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

- (a) 128 (b) 34
(c) 27 (d) 64

Answer: (c) 27

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

- (a) 20 (b) 10
(c) 15 (d) 5

Answer: (d) 5

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

- (a) $i + 2j$ (b) j
(c) $j + 2i$ (d) $i + j$

Answer: (d) $i + j$

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

- (a) 8 (b) 16
(c) 2 (d) 4

Answer: (b) 16

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

- (a) 90 (b) 45
(c) 0 (d) 35

Answer: (a) 90

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

- (a) Number of zero rows of the matrix (b) Order of matrix
(c) Number of variables (d) Number of non zero rows of the matrix

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

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

- (a) Infinite (b) Two points
(c) One point (d) Three points

Answer: (a) Infinite

75. What is domain of definition of exponential function?

- (a) Rational numbers (b) Whole numbers
(c) Real numbers (d) Integers

Answer: (c) Real numbers

76. 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) discrete model (b) probability model
(c) continuous model (d) deterministic model

Answer: (d) deterministic model

77. 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

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

(a) constructive solid geometry (b) complex analysis

(c) lines figure (d) mines geometry

Answer: (a) constructive solid geometry

79. How many singular solutions occur for n th order ordinary linear differential equation?

(a) two (b) three

(c) one (d) no singular solutions

Answer: (d) no singular solutions

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

(a) W shaped curve (b) S shaped curve

(c) J shaped curve (d) T shaped curve

Answer: (c) J shaped curve

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

(a) generalized model (b) dynamic model

(c) static model (d) bi-model

Answer: (b) dynamic model

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

(a) convergent (b) doesn't exist

(c) oscillatory (d) divergent

Answer: (a) convergent

83. The sum of the series $n(\sin(n))$ is _____?

(a) divergent (b) oscillates finitely

(c) oscillates infinitely (d) convergent

Answer: (a) divergent

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

(a) minimum point of f (b) limit superior of f

(c) maximum point of f (d) limit inferior of f

Answer: (b) limit superior of f

85. Any non-empty set of \mathbb{R} , which is bounded above, has a _____?

(a) both exists finitely (b) l.u.b

(c) g.l.b (d) one exists infinitely

Answer: (b) l.u.b

86. 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) both logistic and exponential (d) exponential growth

Answer: (d) exponential growth

87. 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 continuous (b) $f.g$ is bounded

(c) $f.g$ is uniformly continuous on \mathbb{R} (d) $f.g$ is integrable

Answer: (c) f.g is uniformly continuous on R

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

- (a) 2 (b) 0
- (c) 3 (d) 1

Answer: (b) 0

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

- (a) Riemann function (b) Dirichlet function
- (c) Constant function (d) Identity function

Answer: (d) Identity function

90. 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 $x = 0$
- (c) if $x = 0$ (d) if $y = 0$

Answer: (c) if $x = 0$

91. 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) minimum
- (c) maximum (d) supremum

Answer: (d) supremum

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

- (a) discrete derivatives (b) only partial derivatives
- (c) complete derivatives (d) Continuous partial derivative

Answer: (d) Continuous partial derivative

93. 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

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

- (a) we get possible inflection point (b) we get both maxima and minima
- (c) we get maxima at that point (d) we get minima at that point

Answer: (a) we get possible inflection point

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

- (a) convergent (b) divergent
- (c) unbounded (d) Bounded

Answer: (d) Bounded

96. Find the simultaneous limit of function $y \sin(1/y)$?

- (a) 0 (b) 1
- (c) 2 (d) 3

Answer: (a) 0

97. Find the limit point of the sequence $\langle 1, 2, 1 \rangle$?

- (a) 2 (b) 0
- (c) 3 (d) 1

Answer: (b) 0

98. A group is called Abelian if it satisfies _____ property ?

- (a) commutative property
- (b) existence of inverse
- (c) existence of identity
- (d) associative property

Answer: (a) commutative property

99. Every absolutely convergent improper integral is _____ ?

- (a) oscillatory
- (b) divergent
- (c) infinite
- (d) convergent

Answer: (d) convergent

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

- (a) Cantor Theorem
- (b) Baire category theorem
- (c) Baire sandwich theorem
- (d) Fundamental theorem

Answer: (b) Baire category theorem

