

# UNIVERSITY OF LUCKNOW

## D.Pharm Entrance Examination

### Mathematics Group — Model Test Paper Set 1

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

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#### SECTION A — Chemistry & Physics [50]

##### Chemistry

1. Diethyl ether is \_\_\_\_\_.

- (a) Unsymmetrical ether (b) Symmetrical ether  
(c) Heterocyclic compound (d) Mixed ether

Answer: (b) Symmetrical ether

2. Acetaminophen is an example of \_\_\_\_\_.

- (a) Anti-microbial (b) Anti-inflammatory  
(c) Antibiotic (d) Antipyretic and analgesic

Answer: (d) Antipyretic and analgesic

3. A powerful narcotic used for relief of pain and has high addictive property is \_\_\_\_\_.

- (a) Aspirin (b) Quinidine  
(c) Caffeine (d) Morphine

Answer: (d) Morphine

4. Acetylsalicylic acid, the most widely used mild analgesic is commonly known as \_\_\_\_\_.

- (a) Quinoid (b) Paracetamol  
(c) Aspirin (d) Morphin

Answer: (c) Aspirin

5. In ion exchange method, study of which factor helps in determination of stability constant of complexes in solution?

- (a) Conductivity (b) Heterogenous equilibrium  
(c) Solubility (d) Polarizability

Answer: (b) Heterogenous equilibrium

6.  $[\text{Co}(\text{NH}_3)_6]^{3+}$  complex is \_\_\_\_\_.

- (a) Thermodynamically unstable but kinetically inert (b) Both kinetically and thermodynamically stable  
(c) Both kinetically and thermodynamically unstable (d) Thermodynamically inert but kinetically unstable

Answer: (a) Thermodynamically unstable but kinetically inert

7. During photochemical reaction of alkenes having cis and trans isomer, photolysis causes generation of \_\_\_\_\_.

- (a) Mixture containing only trans isomer (b) Mixture richer in cis isomer  
(c) Mixture containing only cis isomer (d) Mixture richer in trans isomer

Answer: (b) Mixture richer in cis isomer

8. The cage like open framework structure made up of aluminosilicates which has a very stable nature to resist all kind of environmental conditions are termed as \_\_\_\_\_.

- (a) Carbene (b) Zeolites  
(c) Mesh (d) Fullerenes

Answer: (b) Zeolites

9. In Paterno-Buchi reaction, the major product formed is \_\_\_\_\_.

- (a) trans adduct (b) Racemic mixture
- (c) Adduct formed from a long lived diradical intermediate (d) cis adduct

Answer: (d) cis adduct

10. When for any atom in a molecule, an identical atom exists diametrically opposite this centre at an equal distance then the molecule has \_\_\_\_\_.

- (a) Identity (b) Symmetry axis
- (c) Centre of symmetry (d) Plane of symmetry

Answer: (c) Centre of symmetry

11. When Electro-Magnetic radiation interacts with a single atom and molecule, its behaviour depends on the amount of \_\_\_\_\_.

- (a) Wavelength (b) Electrons
- (c) Energy per quanta (photons) (d) Wavenumber

Answer: (c) Energy per quanta (photons)

12. The red color of oxy-haemoglobin is mainly due to \_\_\_\_\_.

- (a) Ligand to metal charge transfer (b) d-d transition
- (c) Metal to ligand charge transfer (d) Intraligand

Answer: (b) d-d transition

13. Cerium can be separated from lanthanide mixture quite easily because \_\_\_\_\_.

- (a) It has  $\text{Ln}^{3+}$  ion structure in aqueous solution (b) It has  $\text{Ln}^{4+}$  structure in aqueous solution
- (c) It has higher mass (d) It is inert in nature

Answer: (b) It has  $\text{Ln}^{4+}$  structure in aqueous solution

14. Catalyst used in Haber-Bosch process for making  $\text{NH}_3$  is \_\_\_\_\_.

- (a) Promoted Fe (b)  $\text{FeSO}_4$
- (c)  $\text{MnO}$  (d) Pt

Answer: (a) Promoted Fe

15. A metalloprotein have Fe central metal and functions in electron transfer is \_\_\_\_\_.

- (a) Catalase (b) Ferredoxin
- (c) Haemoglobin (d) Cytochrome

Answer: (d) Cytochrome

16. Rhodium dimer  $[\text{Cp}^* \text{Rh}(\text{CO})_2]_2$  has \_\_\_\_\_.

- (a) 2 bridging and 2 terminal groups (b) 4 bridging and 2 terminal groups
- (c) Only 2 bridging groups (d) 2 bridging and 4 terminal groups

Answer: (a) 2 bridging and 2 terminal groups

17. Quantum confinement effect results in \_\_\_\_\_.

- (a) Inactivity (b) Electric discharge
- (c) Increased kinetic energy (d) Magnetic dipole

Answer: (d) Magnetic dipole

18. Magnetic nanoparticle tends to behave as larger particle because of phenomena called \_\_\_\_\_.

- (a) Dispersion (b) Agglomeration
- (c) Suspension (d) Dissociation

Answer: (b) Agglomeration

19. Fragment ions with lower energy than normal appearing :

- (a) Base peak (b) Metastable peak  
(c) Fragment peak (d) Ion peak

**Answer: (b) Metastable peak**

**20. Hydrogenation of cyclohexene to form cyclohexane using Wilkinson's Catalyst  $[RhCl(PPh_3)_3]$  is an example of \_\_\_\_\_.**

- (a) Complexating reaction (b) Symmetric catalysis  
(c) Catalytic photolysis (d) Asymmetric catalysis

**Answer: (d) Asymmetric catalysis**

**21.  $d^4$  or  $d^10$  metal complexes where non-bonding orbitals are either partially or fully filled electronically favour which structure?**

- (a) Distorted Square planar (b) Tetrahedral  
(c) Square planar (d) Octahedral

**Answer: (b) Tetrahedral**

**22. The complex  $[Rh(CO)(Cl)(PPh_3)_2]$  has a  $3d$  \_\_\_\_\_**

- (a) Octahedral (b) Square planar  
(c) Tetrahedral (d) Distorted square planar

**Answer: (b) Square planar**

**23. An organometallic complex that is used as an anticancer drug that targets DNA to inhibit cell growth is called \_\_\_\_\_.**

- (a) Ferroquine (b) Salvarsan  
(c) Chloroquine (d) cis-Platin

**Answer: (d) cis-Platin**

**24. The closeness of obtained values to the true value is called \_\_\_\_\_.**

- (a) Error (b) Accuracy  
(c) Precision (d) Ruggedness

**Answer: (b) Accuracy**

**25. In thin-layer chromatography, the stationary phase used is \_\_\_\_\_.**

- (a) Copper plate (b) Silica packed aluminium plate  
(c) Glass beads (d) Carbon

**Answer: (a) Copper plate**

## Physics

**26. At curie point, a ferromagnetic material becomes?**

- (a) Strongly ferromagnetic (b) Diamagnetic  
(c) Non-magnetic (d) Paramagnetic

**Answer: (d) Paramagnetic**

**27. The wavelength of the radiations for which the energy is maximum in the spectrum is 490 nm. The effective temperature of the sun is ?**

- (a) 6920 K (b) 5820 K  
(c) 6000 K (d) 5914 K

**Answer: (d) 5914 K**

**28. Transmission of heat by molecular collision is ?**

- (a) Scattering (b) Conduction  
(c) Convection (d) Radiation

**Answer: (b) Conduction**

**29. Two photons each with velocity  $c$  are moving in opposite direction. Their relative velocity will be :**

- (a) None of these (b) Zero
- (c)  $2c$  (d)  $c$

**Answer: (d)  $c$**

**30. Two capillary tubes of same material having radii 1 mm and 2 mm respectively are immersed in a liquid. If the liquid rises to 30 cm in the first, then the height in second will be ?**

- (a) 120 cm (b) 15 cm
- (c) 60 cm (d) 7.5 cm

**Answer: (b) 15 cm**

**31. Critical velocity of a liquid may not possible be related to:**

- (a) coefficient of viscosity (b) mass of liquid
- (c) density of liquid (d) radius of tube

**Answer: (b) mass of liquid**

**32. The graph between square of time period and length of a simple pendulum is :**

- (a) Parabola (b) Hyperbola
- (c) Circle (d) Straight line

**Answer: (d) Straight line**

**33. Kepler's II law is a consequence of - ?**

- (a) Conservation of angular momentum (b) Conservation of linear momentum
- (c) Conservation of energy (d) None of these

**Answer: (a) Conservation of angular momentum**

**34. A body of mass 4 kg is moving in a circle of radius 1m with an angular velocity of 2 radian/sec. Find the Centripetal force acting on body ?**

- (a) 16N (b) 20N
- (c) 8N (d) 24N

**Answer: (a) 16N**

**35. Which of the following can NOT be obtained from rotational levels?**

- (a) Rotational frequencies (b) Force constant
- (c) Internuclear distance (d) Moment of inertia

**Answer: (b) Force constant**

**36. The packing fraction of a f.c.c. lattice is ?**

- (a) 0.48 (b) 0.74
- (c) 0.68 (d) 0.52

**Answer: (b) 0.74**

**37. With a decrease of current in primary coil from 2 Amp to 0 Amp in 0.01 sec, the e.m.f. generated in secondary coil is 100 Volt. The mutual inductance will be ?**

- (a) 0.5 Henry (b) 1 Henry
- (c) 10 Henry (d) 5 Henry

**Answer: (a) 0.5 Henry**

**38. Rotation of plane polarised light can be measured by :**

- (a) Polarimeter (b) Viscometer
- (c) Manometer (d) Galvanometer

Answer: (a) Polarimeter

39. Which property of light shows it is a transverse wave?

- (a) Polarization (b) Interference
- (c) Refraction (d) Diffraction

Answer: (a) Polarization

40. Best way to demonstrate temporal coherence is ?

- (a) Fabry Parot interferometer (b) Michelson interferometer
- (c) Fresnel biprism (d) Newton's ring

Answer: (b) Michelson interferometer

41. What is the number of nodal points in a coaxial lens system?

- (a) Two (b) Any number
- (c) One (d) Zero

Answer: (a) Two

42. A car moving at 30 m/s is approaching a factory, whose whistle has a frequency of 500 Hz. If the speed of sound in air is 340 m/s, what is the apparent frequency of whistle as heard by the car driver?

- (a) 544 Hz (b) 480 Hz
- (c) 600 Hz (d) 500 Hz

Answer: (a) 544 Hz

43. The volume of hollow hall is 2000 m<sup>3</sup> and total absorption coefficient is 165 unit. Then reverberation time of hall is ?

- (a) 4s (b) 1s
- (c) 0.5s (d) 2s

Answer: (d) 2s

44. The vibration of a string fixed at both ends are described by the equation  $y = 5 \sin \sin 100\pi t$  If the length of the string is 16 cm, the number of loops formed in vibration shall be ?

- (a) 4 (b) 16
- (c) 12 (d) 8

Answer: (d) 8

45. The speed of wave in a medium is 960 m/s. If 3600 waves are passing through a point in one minute, the wavelength will be :

- (a) 14 m (b) 32 m
- (c) 64 m (d) 16 m

Answer: (d) 16 m

46. Vibrations of the diaphragm of a microphone are ?

- (a) forced oscillations (b) free oscillation
- (c) Damped oscillations (d) resonant oscillations

Answer: (a) forced oscillations

47. A system in contact with a heat reservoir can most suitably be represented by ?

- (a) Coulomb ensemble (b) Micro canonical ensemble
- (c) Grand canonical ensemble (d) Canonical ensemble

Answer: (d) Canonical ensemble

48. Newton's Law of cooling is an approximate form of ?

- (a) Wien displacement law (b) Jeans's law

(c) Kirchoff's law (d) Stefan's law

Answer: (d) Stefan's law

49. Which of the following laws has the same place in magnetostatics as the Gauss's law has in electrostatics?

(a) Bio-Savart Law (b) Ampere's Law

(c) Faraday's Law (d) Coulomb's Law

Answer: (a) Bio-Savart Law

50. Current through a capacitive element is called :

(a) Transient current (b) Steady state current

(c) Displacement current (d) Conduction current

Answer: (c) Displacement current

### SECTION B — Mathematics [50]

51. Mother's age is three times the age of her son. After 5 years, their ages will add to 66 years. What is the present age of the mother?

(a) 42 years (b) 55 years

(c) 30 years (d) 45 years

Answer: (a) 42 years

52. The sum of the finite series  $5 + 8 + 11 + \dots + 47 + 50$  is heefjefcele ?

(a) 244 (b) 442

(c) 435 (d) 440

Answer: (d) 440

53. For any event E, if  $P(E) = 0.999$ , find the value of  $P(\text{not } E)$ . efke ?

(a) None of these (b) 0.01

(c) 0.1 (d) 0.001

Answer: (d) 0.001

54. Mean of 100 observations is 45. It was later found that two observations 19 and 31 were recorded incorrectly as 91 and 13, then the correct mean is 100 DeJeueeske ?

(a) 45 (b) 44.46

(c) None of these (d) 44

Answer: (b) 44.46

55. The remainder when the sum of  $0! + 1! + 2! + \dots + 99! + 100!$ , divided by 12 is  $0! + 1! + 2! + \dots + 99! + 100!$  ?

(a) 6 (b) 5

(c) 10 (d) 11

Answer: (c) 10

56. The number of positive divisors of 252 is 252 ?

(a) 5 (b) 18

(c) 11 (d) 2

Answer: (b) 18

57. The value of x satisfying  $150x = 35 \pmod{31}$  is ke ?

(a) 12 (b) 24

(c) 14 (d) 22

Answer: (b) 24

58. If  $A = \{a, b, c\}$   $B = \{b, c, d\}$  and  $C = \{a, d, c\}$ , then  $(A \cap B) \cap C$  ?

- (a)  $\{(c,a), (d,a)\}$  (b)  $\{(a,b), (c,d)\}$   
(c)  $\{(a,c), (a,d), (b,d)\}$  (d)  $\{(a,c), (a,d)\}$

Answer: (d)  $\{(a,c), (a,d)\}$

59. The digit in the unit's place of is 5834 ?

- (a) 3 (b) 0  
(c) 1 (d) 5

Answer: (d) 5

60. If they are 12 persons in a party and if each of them shake hands with each other, then number of handshakes in party are ?

- (a) 48 (b) 72  
(c) 132 (d) 66

Answer: (d) 66

61. Two angles of an isosceles triangle are always equal ?

- (a) Equal to 45 (b) Equal to 60  
(c) Equal (d) None of these

Answer: (c) Equal

62. Therefore the required limit is  $x+1$  ?

- (a) 1 (b) 2  
(c) 2 (d) None of these

Answer: (c) 2

63. A two-digit number is such that the product of its digits is 12. When 36 is added to this number, the digits interchange their places. The number is ?

- (a) 48 (b) 62  
(c) 26 (d) 36

Answer: (c) 26

64. If the roots of the quadratic equation  $(4+m)x^2 + (m+1)x + 1 = 0$  are equal then the value of  $m$  is ?

- (a) 5 (b) 2  
(c) None of these (d) 4

Answer: (a) 5

65. If  $\sin(A+B) = \cos(A)$  ?

- (a) 15 (b) None of these  
(c) 45 (d) 30

Answer: (c) 45

66. The number of points at which the function  $f(x) = \sin(x)$  is not continuous is ?

- (a) 2 (b) 3  
(c) 1 (d) None of these

Answer: (d) None of these

67. If  $f(x) = \sin(x)$  then  $f''(0)$  is equal to ?

- (a)  $ab$  (b) 0  
(c)  $2ab$  (d)  $ab(a+b)$

Answer: (d)  $ab(a+b)$

68. The hollow sphere, in which the circus motor cyclist performs his stunts, has a diameter of 7m. Then the area available to the motorcyclist for riding is ?

- (a) 49 (b) 50  
(c) None of these (d) 59

Answer: (a) 49

69. and thus is a basis for  $\mathbb{R}^3$  (b)  $2 \times 2 \times 0 = 24$  ?

- (a) 2 (b) 3  
(c) None of these (d) 0 ke

Answer: (a) 2

70. Therefore, by rank-nullity theorem  $\text{Rank}(T) = \dim(\mathbb{R}^3)$  ?

- (a) None of these (b) Skew symmetric  
(c) Symmetric matrix (d) Null

Answer: (b) Skew symmetric

71. The number of elements in the set  $S = \{(a, b) \mid 2a^2 + 3b^2 = 35 : a, b \text{ are integers}\}$  is  $2a^2 + 3b^2$  ?

- (a) 12 (b) 4  
(c) 8 (d) 2

Answer: (c) 8

72. In a frequency distribution, the mean and median are 21 and 23 respectively then its mode .....  
Approximately Skew ?

- (a) 20.5 (b) 25.5  
(c) 24 (d) 22

Answer: (c) 24

73. If altitudes of a triangle are in A.P. then sides of the triangle are in ?

- (a) None of these (b) H.P  
(c) A.P (d) G.P

Answer: (b) H.P

74. If three positive integers  $a, b, c$  are in GP then  $\log a, \log b, \log c$  are in ?

- (a) G. P (b) Both A.P. and G.P  
(c) None of these (d) A. P

Answer: (d) A. P

75. If  $\log_8 1 = x$ , then the value of  $x$  is ?

- (a) 16 (b) 4  
(c) 8 (d) 32

Answer: (c) 8

76. If  $nC = r$  then the sum  $r + r-1 + r-2 + \dots + 1$  ?

- (a) None of these (b)  $r+1 + n+1C$   
(c)  $r + nC$  (d)  $r+1$

Answer: (c)  $r + nC$

77. How many terms of the G.P.  $3, 9, 27, \dots$  are needed to give the sum ?

- (a) None of these (b) 8  
(c) 10 (d) 9 ke

Answer: (c) 10

78. If volume of a sphere is  $36\pi$  ?

- (a) 6 (b)  $36\pi$   
(c) 12 (d) 18

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Answer: (b) 36

79. The distance of the point (2, 3, 4) from the plane  $3x - 6y + 2z + 11 = 0$  is  $3x - 6y + 2z + 11 = 0$  meceleue efyevog (2,3,4) ke ?

- (a) 9 (b) 10  
(c) None of these (d) 7

Answer: (c) None of these

80. How many real solutions are there for the  $x^4$  equation ?

- (a) 3 (b) 1  
(c) 2 (d) 4

Answer: (b) 1

81. A five digit number is formed by using the digits 1,2,3,4,5 in a random order without repetitions. Then the probability that the number is divisible by 4 is Debke ?

- (a) 3 (b) 1  
(c) 8 (d) 6

Answer: (b) 1

82. The average of the squares of the numbers 0,1,2,..., n is mebk ?

- (a)  $\frac{n(n+1)(2n+1)}{6}$  (b) None of these  
(c)  $2 \frac{1}{3} n(2n+1)$  (d)  $\frac{6}{1}$

Answer: (a)  $\frac{n(n+1)(2n+1)}{6}$

83. A stone is dropped in quiet water and waves move in circles at the speed of 5 cms<sup>-1</sup>. At the instant when the radius of the circular wave is 8cm, how fast is the enclosed area increasing?

- (a) ke (b) None of these  
(c) 60 (d) 80

Answer: (c) 60

84. In a school there are 20 teachers who teach mathematics or physics of these, 12 teach mathematics and 4 teach both physics and mathematics. How many teach only physics?

- (a) None of these (b) 8  
(c) 12 (d) 16 ke

Answer: (b) 8

85. How many integers from 1 to 500 are divisible by at least one of 3, 5 and 7 ?

- (a) 271 (b) 337 ke  
(c) None of these (d) 2666

Answer: (a) 271

86. If A is skew symmetric matrix, then  $A^2$  is a ?

- (a) Symmetric (b) Skew  
(c) Null matrix (d) Unitary matrix

Answer: (a) Symmetric

87. Value of the limit  $\lim_{x \rightarrow 0} 2x \sin \frac{1}{x}$  is equal to x ?

- (a) none of these (b) not defined  
(c) 0 (d) 1

Answer: (c) 0

88. The number of factors and their sum of 360 are:

- (a) 24 & 1170 (b) 24 & 1080

(c) 12 & 810 (d) 12 & 540

Answer: (a) 24 & 1170

89. If  $a = \frac{1}{3}$ ,  $b = \frac{1}{4}$ , then the value of  $3$  ?

(a) 34 (b) 36

(c) 35 (d) 37

Answer: (a) 34

90. The number of ways in which 39312 can be resolved into two factors, which are prime to each other, are:

(a) 4 (b) 6

(c) 10 (d) 8

Answer: (d) 8

91. Which of the following is false?

(a) Every irrational number is a real number (b) 2 is a rational number

(c) Every rational number is a real number (d) Every integer is a real number

Answer: (b) 2 is a rational number

92. The sum of the first 20 terms of an arithmetic progression whose first term is 5 and common difference is 4 is ?

(a) 830 (b) 850

(c) 860 (d) 820

Answer: (c) 860

93. The general term of A.P. whose sum of  $n$  terms is given by  $4n^2 + 3n$ , is:

(a)  $8n + 1$  (b)  $6n + 2$

(c)  $8n$  (d)  $6n$

Answer: (c)  $8n$

94. Mukesh has some cows and some hens in the shed. The total number of legs is 92 and total number of heads is 29. Find the total number of cows in shed:

(a) 17 (b) 14

(c) 19 (d) 12

Answer: (a) 17

95. Which term of the arithmetic progression 21, 42, 63, 84 \_\_\_\_\_ is 420?

(a) 19 (b) 22

(c) 20 (d) 21

Answer: (c) 20

96. For what value of  $k$  do the equations  $3x + ky = 12$  and  $9x + 12y = 30$  have no solution?

(a) 1 (b) 3

(c) 4 (d) 2

Answer: (d) 2

97. The sum of the first 51 terms of the arithmetic progression, 2nd term is 2 and 4th term is 8, is : \_\_\_\_\_ ?

(a) 3477 (b) 7458

(c) 3774 (d) 7548

Answer: (c) 3774

98. In the following figure (not to scale),  $AB = CD$  and  $AB$  and  $CD$  are produced to meet at point  $P$ . If  $\angle A = 45^\circ$  and  $\angle C = 30^\circ$ , then  $\angle P =$  ?

(a) 45 (b) 50

(c) 30 (d) 40

Answer: (d) 40

99. If  $n$  be a positive integer, if the coefficient of 2nd, 3rd, 4th  $x^n$  terms in the expansion of  $(1 + x)^n$  are in A.P. Then the value of  $n$  is:

(a) 9 (b) 7

(c) 8 (d) 5

Answer: (b) 7

100. If  $f(x) = \begin{cases} 1 & x < 0 \\ 21 & x > 0 \end{cases}$  then at  $x = 0$  the function is: 1+21 ?

(a) Discontinuous because  $\lim_{x \rightarrow 0^-} f(x) \neq \lim_{x \rightarrow 0^+} f(x)$  (b) Discontinuous because  $\lim_{x \rightarrow 0} f(x)$  does not exist

(c) Continuous (d) Discontinuous because  $\lim_{x \rightarrow 0} f(x) \neq f(0)$

Answer: (d) Discontinuous because  $\lim_{x \rightarrow 0} f(x) \neq f(0)$

