Mathematics

1. The coefficient of x° is the quadratic equation $x(x-1)=5$

(a) 5

(b) $\frac{1}{2}$

(c) -5

(d) 1

2. If $r=\sqrt{3}\sec\theta$ and $r=\operatorname{cosec}\theta$, then the values of r and θ will be

(a) $r=2,\ \theta=30^\circ$

(b) $r=2,\ \theta=60^\circ$

(c) $r=1,\ \theta=30^\circ$

(d) $r=3,\ \theta=30^\circ$

3. If $a:b=3:4$ and $a-b=5$, then the value of $a+2b$ will be

(a) -44

(b) -33

(c) -55

(d) 55

4. If $\tan\theta\cdot\tan 2\theta=1$, then the value of $\cos 2\theta$ will be

(a) 1

(b) 2

(c) $\frac{1}{2}$

(d) $\frac{\sqrt{3}}{2}$

5. If $x=\sqrt{\frac{\sqrt{2}+1}{\sqrt{2}-1}}$, then the value of $x-\frac{1}{x}$ will be

(a) $\sqrt{2}$

(b) 2

(c) 1

(d) -2

6. If $x=\frac{1}{a}$, $y=\frac{1}{b}$ and $z=\frac{1}{c}$, then the value of $\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)^2-\left(\frac{2}{xy}+\frac{2}{yz}+\frac{2}{zx}\right)$ will be

(a) $a^2+b^2+c^2$

(b) 0

(c) 1

(d) $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}$

7. At 4% per annum, the difference between simple and compound interest for 2 years on a certain sum of money is Rs. 80. Then the principal sum is (the interest is compounded annually)

(a) Rs. 40,000

(b) Rs. 50,000

(c) Rs. 5,000

(d) Rs. 4,000

8. Time period of a simple pendulum varies directly as the square root of its length. If the time period is T when the length is l, then the time period when the length is $4l$ is

(a) $2T$

(b) $\frac{T}{2}$

(c) $4T$

(d) T

9. If $\sin\theta+\operatorname{cosec}\theta=2$, then the value of $\sin^{101}\theta+\operatorname{cosec}^{2001}\theta$ will be

(a) 1

(b) -2

(c) 2

(d) 0

10. The distance between the centres of two circles of radii 3 cm and 8 cm is 13 cm. If the points of contact of the direct common tangent of two circles be P and Q, then the length of PQ will be

(a) 10 cm

(b) 12 cm

(c) 11 cm

(d) 9 cm

11. If $p = 2 - a$, then the value of $a^3 + 6ap + p^3 - 8$ will be

(a) 3

(b) 1

(c) 2

(d) 0

12. If $x^3 - 3x^2 + 3x + 7 = (x + 1)(ax^2 + bx + c)$, then the value of $a + b + c$ will be

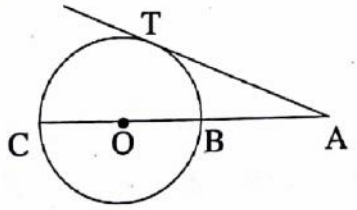
(a) 3

(b) -10

(c) 12

(d) 4

13. In the figure, 'O' is the centre of the circle, AT is a tangent drawn from A whose point of contact is T and if AT = 15 cm and AB = 7·5 cm, the radius of the circle is



(a) 11·25 cm

(b) 11·50 cm

(c) 22·5 cm

(d) 11 cm

14. The three sides of a triangle are tan θ unit, sec θ unit and 1 unit, then the nature of the triangle is

(a) Acute angled

(b) Right angled

(c) Isosceles

(d) Obtuse angled

15. If a, b, c be the lengths of the sides of a triangle and $a^2 + b^2 + c^2 - ab - bc - ca = 0$, then the triangle is

(a) isosceles

(b) right angled

(c) equilateral

(d) obtuse angled

16. $ax^2 + bx + c = 0$ will be a quadratic equation when:

(a) $c \neq 0$

(b) $a \neq 0$

(c) $b^2 = 4ac$

(d) $b \neq 0$

17. How many ice cubes with 2 cm side can be put in an icebox when dimensions are 4 cm × 4 cm × 4 cm?

(a) 64

(b) 4

(c) 8

(d) 16

18. Which of the following is quadratic equation?

(a) $(x-1)^2 = x^2 - 2x + 1$

(b) $x^3 - 1 = 0$

(c) $x^2 - \frac{1}{x^2} = x\left(x - \frac{1}{x}\right) + 1 - \frac{1}{x^2}$

(d) $x^2 - 2x + 1 = 0$

19. $\cos 1° \cdot \cos 2° \cdot \cos 3° \cdot \ldots\ldots \cos 101° = ?$

(a) -1

(b) 1

(c) 0

(d) 101

20. If $0° \leq \theta \leq 90°$, then the value of θ for which the value of $\sin\theta + \cos\theta$ will be maximum is

(a) 30°

(b) 90°

(c) 60°

(d) 45°

Physics

21. The displacement (x) of a particle with respect to time (t) is given by, $x = at + bt^2$, where a, b are constants. The acceleration of the particle is

(a) $2b$

(b) $2a$

(c) $\frac{b}{2}$

(d) $\frac{a}{2}$

22. The power of a lens is + 4D , then the focal length of the lens is

(a) 20 cm

(b) 40 cm

(c) 10 cm

(d) 25 cm

23. If the atom ${}_{Z}X^{A}$ emits two α-particles, then the number of neutrons in the produced atom is

(a) A – Z – 2

(b) A – Z – 4

(c) A – Z + 2

(d) A – Z + 4

24. If velocity of a particle at any instant 't' is given by $v = at + bt^2$, the dimension of 'b' will be

(a) [L]

(b) $[LT^{-1}]$

(c) $[LT^{-2}]$

(d) $[LT^{-3}]$

25. A body falling freely from rest describes distances S_1, S_2 and S_3 respectively in the 1st, 2nd and 3rd seconds of its fall. The ratio $S_1 : S_2 : S_3$ is

(a) 1 : 2 : 3

(b) 1 : 3 : 5

(c) 1 : 1 : 1

(d) 1 : 4 : 9

26. The lower and upper fixed points of a thermometer are 0·5° and 101° respectively. What would be reading of this thermometer corresponding to 30°C?

(a) 20·65°

(b) 30·65°

(c) 40·65°

(d) 50·65°

27. 60g of ice at 0°C and 40g of water at 60°C are mixed together. Taking heat exchange only between ice and water finally the mixture will contain (take latent heat of fusion of ice = 80 cal/g)

(a) at 0°C 40g of water, 60g of ice

(b) at 0°C 70g of water, 30g of ice

(c) at 0°C 120g of water

(d) at 0°C 100g of water

28. Light passes from glass to air. In which of the following cases critical angle is minimum?

(a) Red colour light

(b) Green colour light

(c) Yellow colour light

(d) Blue colour light

29. Which of the following is electromagnetic wave in nature?

(a) α-ray

(b) β-ray

(c) γ-ray

(d) Cathode ray

30. A body of mass m collides against a wall normally with a velocity $\vec{V}$ and rebounds with the same speed. The change of momentum of the body is given by

(a) zero

(b) $m\vec{V}$

(c) $-2m\vec{V}$

(d) $-3m\vec{V}$

31. Three resistances r_1, r_2 and r_3 are in parallel combination and $r_1 > r_2 > r_3$, then which of the following relation is correct for the equivalent resistance R?

(a) $R > r_1$

(b) $R > r_2$

(c) $R > r_3$

(d) $R < r_3$

32. A body covers half the distance of its journey with a speed 20m/s and the other half with 30m/s. Then the average speed of the body during the whole journey is

(a) zero

(b) 24m/s

(c) 25m/s

(d) 26m/s

33. Two bodies with Kinetic Energies in the ratio 2 : 3 are moving with equal momentum. The ratio of their masses will be

(a) 1 : 3

(b) 1 : 2

(c) 3 : 2

(d) $\sqrt{2} : \sqrt{3}$

Chemistry

34. How many moles of HCl gas upon dissolution in water making 100L of solution will make its pH 2?

(a) 0·1 mole
(b) 0·01 mole
(c) 1 mole
(d) 2 moles

35. Cyclohexane is produced by hydrogenation of Benzene. How many gm atoms of hydrogen will be added to 1 gm mole of Benzene?

(a) 2
(b) 3
(c) 4
(d) 6

36. An aqueous solution contains Cu^{2+}, Mg^{2+}, Zn^{2+} and Ca^{2+} ions in the form of chloride salts in presence of dil HCl (~0·3 mol/L). Which metal ion will be precipitated as its sulphide when H_2S is passed through it?

(a) Zn^{2+}
(b) Mg^{2+}
(c) Ca^{2+}
(d) Cu^{2+}

37. Which of the following reagents can be used to distinguish between But-1-yne and But-2-yne compounds?

(a) Br_2/CCl_4 solution
(b) Conc. H_2SO_4
(c) Cold, dil and neutral $KMnO_4$ solution
(d) Ammoniacal Cuprous Chloride solution

38. What is the minimum quantity of Iron required to react with steam to produce the same quantity of Hydrogen gas as produced by the reaction of 3 gm of Al with dil. NaOH?

(a) 14 gm
(b) 28 gm
(c) 3·5 gm
(d) 7 gm

39. An element with mass number 81 contains 31·7% more neutrons as compared to protons. The symbol of the atom will be

(a) $^{81}_{36}X$
(b) $^{81}_{35}X$
(c) $^{81}_{34}X$
(d) $^{81}_{33}X$

40. Under what conditions a real gas behaves as an ideal gas?

(a) Low pressure and Low temperature
(b) Low pressure and High temperature
(c) High temperature and High pressure
(d) High pressure and Low temperature

41. Which of the following compounds contains three bond pairs and one lone pair of electrons around the central atom?

(a) H_2O
(b) BF_3
(c) CH_4
(d) PCl_3

42. The triad of nuclides that represents isotones is

(a) $^{12}_{6}C$, $^{14}_{7}N$, $^{19}_{9}F$
(b) $^{14}_{6}C$, $^{14}_{7}N$, $^{19}_{9}F$
(c) $^{14}_{6}C$, $^{15}_{7}N$, $^{17}_{9}F$
(d) $^{14}_{6}C$, $^{14}_{7}N$, $^{17}_{9}F$

43. A certain compound has a molecular formula A_4O_6. 10 gm of A_4O_6 contains 5·72 gm of 'A'. Atomic weight of 'A' is

(a) 32
(b) 37
(c) 42
(d) 88

44. In Aluminothermic process Aluminium acts as

(a) an oxidising agent
(b) a reducing agent
(c) a flux
(d) a solder

45. Out of the following, the molecular formula of Pyrosulphuric acid is

(a) $H_2S_2O_4$
(b) $H_2S_2O_5$
(c) $H_2S_2O_6$
(d) $H_2S_2O_7$

46. Which of the following molecules have H_3CCO- as well as $CHO-$ functional groups?

(a) Acetone
(b) Acetaldehyde
(c) Ethyl alcohol
(d) Formaldehyde

Biology

47. Pseudocoelom found in which organism?
(a) Sponge
(b) Tapeworm
(c) Roundworm
(d) Coral

48. Bacteria is a prokaryote because it contains
(a) cell wall
(b) ribosome
(c) flagella
(d) nucleoid

49. When a blood vessel becomes damaged in the body, the type of blood corpuscles that quickly increases in number at that site is
(a) lymphocyte
(b) monocyte
(c) platelets
(d) eosinophils

50. Aerenchyma is usually seen in
(a) hydrophytes
(b) mesophytes
(c) halophytes
(d) xerophytes

51. In a certain area, it was observed that after spraying of DDT for a few years, the population of fish-eating birds began to decline. This was due to the phenomenon of
(a) biomagnification
(b) acidification
(c) nitrification
(d) eutrophication

52. Hormone responsible for secretion of milk after parturition is
(a) Interstitial Cell Stimulating Hormone
(b) Prolactin
(c) Leuitinizing Hormone
(d) Adreno Corticotropic Hormone

53. The recessive gene is one that express itself in
(a) heterozygous condition
(b) homozygous condition
(c) F_2 - generation
(d) Y - linked inheritance

54. Match the words in *column I* with those which are most appropriate in *Column II.*

Column –I	*Column–II*
(A) Lymphatic System	(i) Carries oxygenated blood
(B) Pulmonary Vein	(ii) Immune response
(C) Thrombocytes	(iii) Re-join the tissue fluid to the circulatory system
(D) Lymphocytes	(iv) Coagulation of blood

(a) A = ii, B = i, C = iii, D = iv
(b) A = iii, B = i, C = iv, D = ii
(c) A = iii, B = i, C = ii, D = iv
(d) A = ii, B = i, C = iii, D = iv

55. ADH takes parts in
(a) Water retention in urine
(b) Na^+ reabsorption
(c) Reducing urea formation
(d) Absorption of water from urine

56. 'Node of Ranvier' is found in neurone where
(a) Axon is covered with myelin sheath
(b) Neurilemma and myelin sheath are discontinuous
(c) Myelin sheath is discontinuous
(d) Neurilemma is discontinuous

57. Person with AB blood group has antigen over its erythrocytes
(a) B
(b) A
(c) A and B
(d) None of the above

58. Immunoglobulin found in mother's milk is
(a) IgE
(b) IgD
(c) IgA
(d) IgM

59. During flight, pigeon never gets tired easily because of
(a) pneumatic internal skeleton
(b) absence of teeth, stomach, urinary bladder, right ovary etc.
(c) additional air sacs attached with lungs
(d) All of the above

60. Gene Bank is
(a) Ex-situ conservation
(b) In-situ conservation
(c) Biosphere reserve
(d) Sanctuary

History

61. 'The Spirit of Laws' was written by
(a) Montesquieu
(b) Rousseau
(c) Voltaire
(d) Elembert

62. 'Steam Engine' was invented by
(a) John Kay
(b) Humphry Davy
(c) James Watt
(d) James Hargraves

63. The Treaty of Nanking was signed in
(a) 1839 AD
(b) 1842 AD
(c) 1845 AD
(d) 1858 AD

64. In 1921 'New Economic Policy' was adopted in Russia by
(a) Stalin
(b) Trotsky
(c) Lenin
(d) Kerensky

65. The U.N.O. day is
(a) 24th September
(b) 24th October
(c) 24th November
(d) 24th December

66. The full form of I. M. F. is
(a) International Monetary Fund
(b) Indian Monetary Fund
(c) International Mandatory Fund
(d) None of the above

67. Calcutta Medical College was founded by
(a) Lord Minto
(b) Lord Bentinck
(c) Lord Amherst
(d) David Hare

68. 'Indian Association for the Cultivation of Science' was established in
(a) 1857 AD
(b) 1876 AD
(c) 1885 AD
(d) 1898 AD

69. Indian Republican Army was founded by
(a) Surya Sen
(b) Bagha Jatin
(c) Bhagat Singh
(d) Khudiram Bose

70. The first Governor General of the Independent India was
(a) Lord Mountbatten
(b) Chakravorty Raja Gopalachari
(c) Dr. Rajendra Prasad
(d) Jawaharlal Nehru

71. Dalits were called 'Harijan' by
(a) B. R. Ambedkar
(b) Mahatma Gandhi
(c) Narayan Guru
(d) Jyotiba Phule

72. 'A Train to Pakistan' was written by
(a) Khusbant Singh
(b) Sadat Hossain Manto
(c) Md. Ali Jinnah
(d) M. K. Gandhi

Geography

73. The word 'Gradation' was first used by
(a) Powel
(b) Chemberlin
(c) Wegner
(d) Morgan

74. Jet plane flies into
(a) Troposphere
(b) Stratosphere
(c) Mesosphere
(d) None of the above

75. 'Saragasso Sea' is seen in
(a) Atlantic Ocean
(b) Indian Ocean
(c) Bay of Bengal
(d) Arabian Sea

76. The instrument used for burning solid waste in high temperature is
(a) Scrabber
(b) Incinarator
(c) Electrostatic Precipitator
(d) Blast Furnace

77. The International Boundary between India and Pakistan is known as
(a) Radcliff line
(b) Mac Mohan line
(c) Durand line
(d) None of the above

78. The youngest state in India is
(a) Jharkhand
(b) Goa
(c) Telangana
(d) Uttarakhand

79. Which of the following is not a saline water lake?
(a) Sambar
(b) Astamudi
(c) Loktak
(d) Pang-gong

80. Automobile Industry is developed in many cities in India of which "Detroit of India" is known as
(a) Chennai
(b) Mumbai
(c) Bengaluru
(d) Noida

81. 'Central Arid Zone Research Institute' (CAZRI) is situated in

(a) Gujarat

(b) Punjab

(c) Rajasthan

(d) West Bengal

82. The state with the lowest population density in India is

(a) Sikkim

(b) Goa

(c) Rajasthan

(d) Arunachal Pradesh

83. 'Rainbow revolution' is related to

(a) New Agricultural Policy

(b) Egg Production

(c) Artificial Rain Making

(d) Non-conventional energy

84. The Scale of 15′/15′ Topographical Sheet is

(a) 1 : 1000000

(b) 1 : 250000

(c) 1 : 100000

(d) 1 : 50000

Political Science

85. India is a _____.

I. Socialist
II. Secular
III. Sovereign
IV. Democratic
V. Republic

Identify the correct sequence as maintained in the Preamble of the Indian Constitution.

(a) III, I, II, IV, V
(b) II, III, V, I, IV
(c) III, V, I, IV, II
(d) III, V, I, IV, II

86. Parliament of India consists of

(a) Rajya Sabha and Lok Sabha
(b) Election Commission, Rajya Sabha and Lok Sabha
(c) President, Election Commission, Rajya Sabha and Lok Sabha
(d) President, Rajya Sabha and Lok Sabha

87. Which article is related to Equality before the Law in Indian Constitution?

(a) Art. 13
(b) Art. 14
(c) Art. 15
(d) Art. 16

88. The normal tenure of the members of the Rajya Sabha is

(a) 4 years
(b) 5 years
(c) 6 years
(d) 7 years

89. The President of India can proclaim ____ kind(s) of Emergency.

(a) One
(b) Two
(c) Three
(d) Four

90. The 'Veto' power can be exercised only by the

(a) General Assembly
(b) International Court of Justice
(c) Permanent Members of the Security Council
(d) Trusteeship Council

91. The first Summit of the Non-alignment Movement was held at

(a) New Delhi
(b) Belgrade
(c) New York
(d) Dhaka

92. The Panch-Sheel Agreement was signed between

(a) India and China
(b) India and Nepal
(c) India and Pakistan
(d) Pakistan and China