AP POLYCET 2021 QUESTION PAPER SET B

Time Allowed :2 Hours	**Maximum Marks :**120	**Total questions :**120

General Instructions

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1. This question paper consists of three sections: Section-I Mathematics (Questions 1-50), Section-II Physics (Questions 51-90), and Section-III Chemistry (Questions 91-120).
2. Each section contains objective type questions with four multiple-choice options (1, 2, 3, 4).
3. The total duration of the exam is 2 hours and the maximum marks are 120.

Section - I : MATHEMATICS

1. If $\sin\theta = 1/2$ and θ is acute, then the value of $\sin 2\theta$ is

(1) 1

(2) $\sqrt{3}/2$

(3) 1/2

(4) $-\sqrt{3}/2$

---

2. If $\sin\alpha = \cos\alpha$, then the value of α is

(1) 30°

(2) 45°

(3) 60°

(4) 90°

---

3. The angle of elevation of the sun, when shadow of a pole of 'h' metre height is $\sqrt{3}h$ metre long is

(1) 60°

(2) 30°

(3) 45°

(4) 50°

---

4. The probability that a non leap year will have 53 Thursdays is

(1) 1/221

(2) 1/7

(3) 6/7

(4) 9/13

---

5. A bag contains 4 black balls and 6 red balls. If one ball is drawn at random, then the probability of getting a red ball is

(1) 5/8

(2) 3/5

(3) 1/2

(4) 1/56

---

6. E_1 **and** E_2 **are mutually exclusive, then** $E_1 \cap E_2 =$

(1) 1

(2) 5

(3) ϕ

(4) None of these

---

7. If three coins are tossed, then the total number of outcomes are

(1) 2

(2) 4

(3) 6

(4) 8

---

8. The formula for median in a grouped data is (with usual notation)

(1) $L + [(N/2 - F)/f] \times C$

(2) $L - [(N/2 - F)/f]$

(3) $[(N/2 - F)/f] \times L$

(4) $L + [(N/2 + F)/f] \times C$

---

9. Mode of 1, 2, 3, 8, 10, 11, 16 is

(1) 11

(2) 1

(3) 16

(4) None of these

---

10. The arithmetic mean of a-3d, a-d, a+d and a+3d is

(1) a

(2) d

(3) 2a

(4) 2d

---

11. Which of the following is NOT a measure of central tendency?

(1) Mean

(2) Median

(3) Range

(4) Mode

---

12. The product of two numbers is 30. If their HCF is 5, then LCM is

(1) 5

(2) 6

(3) 4

(4) 8

---

13. The smallest odd composite number is

(1) 3

(2) 5

(3) 7

(4) 9

---

14. $\sqrt{2}$ **is**

(1) a rational number

(2) an irrational number

(3) a prime number

(4) a composite number

---

15. If $\log_3 x^2 = 2$**, then** $x =$

(1) 2

(2) -2

(3) 3

(4) -3

---

16. Set of even prime numbers is

(1) {3, 4}

(2) {4, 6, 8}

(3) {8, 10}

(4) {2}

---

17. If $A \cap B = B$, then the correct statement is

(1) $A \subset B$

(2) $B \subset A$

(3) $A = \phi$

(4) $B = \phi$

---

18. Which of the following sets are finite?

(1) Set of all natural numbers

(2) Set of all prime numbers

(3) Set of months in a year

(4) None of these

---

19. The number of zeroes a biquadratic polynomial can have at most is

(1) 1

(2) 2

(3) 3

(4) 4

---

20. The product of the zeroes of $x + 2x^2 + 1$ is

(1) -1

(2) 2

(3) 1

(4) 1/2

---

21. The zeroes of the polynomial $x^3 - x^2$ are

(1) 0, 0, 1

(2) 0, 1, 1

(3) 1, 1, 1

(4) 0, 0, 0

---

22. The quadratic polynomial whose zeroes are α, β is

(1) $x^2 - (\alpha + \beta)x + \alpha\beta$

(2) $x^2 + (\alpha + \beta)x$

(3) $x^2 - \alpha - +\alpha\beta^2$

(4) None of these

---

23. The equation $x - 4y = 5$ has

(1) no solution

(2) unique solution

(3) two solutions

(4) infinitely many solutions

---

24. If $ax + b = 0$, then $x =$

(1) -a

(2) a

(3) b/a

(4) $-b/a$

---

25. Which of the following is NOT a linear equation?

(1) $3x - 2y = y + x$

(2) $x + y = 1$

(3) $1 + 2x = y - 5$

(4) $3 - y = x^2 + 4$

---

26. Which of the following represents the situation where Siri bought 5 apples and 6 oranges and Laxmi bought 2 apples and 15 oranges for same amount of total money?

(1) $5x + 6y = 2x + 15y$

(2) $5x + 15y = 6x + 2y$

(3) $5x - 6y = 2x - 15y$

(4) $5x - 15y = 6x - 2y$

---

27. Which of the following is a quadratic equation?

(1) $x(x + 4) = 12$

(2) $x(x + 4) = x^2 + 2x + 1$

(3) $x(x + 4) - x(x - 2) = 0$

(4) $x(x + 4) = x(x + 5) - x$

---

28. Any equation of the form $p(x) = 0$, where $p(x)$ is a polynomial of degree 2 is called

(1) linear equation in one variable

(2) linear equation in two variables

(3) quadratic equation

(4) None of these

---

29. The equation $x^2 + x - 306 = 0$ represents that the

(1) sum of two consecutive positive integers is 306

(2) product of two consecutive positive integers is 306

(3) sum of squares of two consecutive positive integers is 306

(4) product of squares of two consecutive positive integers is 306

---

30. The degree of the equation $x^2(x^2 + x + 1) = x^4 + x^3 - x^2 + 3x - 1$ is

(1) 1

(2) 2

(3) 3

(4) 4

---

31. If 18, x, 36 are in Arithmetic Progression, then x =

(1) 9

(2) 18

(3) 27

(4) 26

---

32. If a, b, c are in Arithmetic Progression, then a + c =

(1) b

(2) 2b

(3) b - a

(4) b + a

---

33. The common difference of the Arithmetic Progression 781, 806, 831, ... is

(1) 26

(2) 24

(3) 25

(4) 23

---

34. The product of two numbers is 91 and their arithmetic mean is 10, then the two numbers are

(1) 10, 10

(2) 12, 8

(3) 13, 7

(4) 14, 6

35. The centroid divides each median in the ratio of

(1) 1 : 2

(2) 2 : 1

(3) 3 : 1

(4) 1 : 3

---

36. If the centroid of the triangle formed with (a, b), (b, c) and (c, a) is O(0, 0), then $a^3 + b^3 + c^3 =$

(1) abc

(2) 2abc

(3) -3abc

(4) 3abc

---

37. The vertices of a parallelogram are (2, -3), (6, 5), (-2, 1), (-6, -7) in this order. The point of intersection of the diagonals is

(1) (0, -1)

(2) (0, 0)

(3) (-1, 0)

(4) (4, 1)

---

38. Distance between the points (0, a) and (0, -a) is

(1) a^2

(2) 2a

(3) $4a^2$

(4) 2a

---

39. Two poles of height 6 m and 11 m stand on a plain ground and the distance between their feet is 12 m, then the distance between their tops is

(1) 11

(2) 12

(3) 13

(4) 14

---

40. $\triangle ABC \sim \triangle PQR$**, if** $\angle A = 50°$**, then** $\angle Q + \angle R =$

(1) $130°$

(2) $40°$

(3) $80°$

(4) $140°$

---

41. The point which is equidistant from the vertices of a triangle is called

(1) incentre

(2) orthocentre

(3) centroid

(4) circumcentre

---

42. The number of tangents that can be drawn to a circle from a point lying on the circle is

(1) 1

(2) 0

(3) 2

(4) infinite

---

43. The total surface area of a cuboid of length 'l', breadth 'b' and height 'h' in square units is

(1) lbh

(2) $2h(l+b)$

(3) $2(lb+bh+lh)$

(4) $2(l+b)$

---

44. With usual notation, if $r=7$ cm and $h=10$ cm in a cone, then its lateral height (approximately) $l=$

(1) 13.4 cm

(2) 10.3 cm

(3) 18.2 cm

(4) 12.2 cm

---

45. If the diameter of a sphere is d, then its volume is

(1) $(1/6)\pi d^3$

(2) $(4/3)\pi d^3$

(3) $(1/24)\pi d^3$

(4) $(1/3)\pi d^3$

---

46. The sharpened edge of the pencil gives an idea about the

(1) circle

(2) cone

(3) rectangle

(4) None of these

---

47. If $\tan\theta+\cot\theta=2$, then $\tan^2\theta+\cot^2\theta=$

(1) 4

(2) 2

(3) 6

(4) 1

---

48. If $\tan\theta = 1/\sqrt{3}$, then the value of $\cos\theta$ is

(1) 1/2

(2) $\sqrt{3}/2$

(3) $2/\sqrt{3}$

(4) $\sqrt{3}$

---

49. If $\sin\theta = 12/13$, then $\tan\theta =$

(1) 13/5

(2) 5/12

(3) 13/12

(4) 12/5

---

50. $\sin 18^\circ / \cos 72^\circ =$

(1) 1

(2) 1/4

(3) 0

(4) ∞

SECTION – II : PHYSICS

51. Dioptre is the unit of

(1) Refractive index

(2) Focal length

(3) Radius of curvature

(4) Power of the lens

---

52. For the children below the age of 10 years, the value of least distance of distinct vision is about

(1) 7-8 cm

(2) 25 cm

(3) 60 cm

(4) 2.27 cm

---

53. Pick the false statement on the magnetic field lines.

(1) They are imaginary lines

(2) They are two dimensional

(3) They are closed loops

(4) They never intersect with each other

---

54. The SI units of magnetic flux and magnetic flux density respectively are

(1) coulomb and weber

(2) coulomb and tesla

(3) weber and tesla

(4) weber and ampere

---

55. The development of electromagnetism lead to the invention of

(1) electric bulb

(2) electric geyser

(3) battery

(4) dynamo

---

56. The magnetic flux passing through a unit area perpendicular to the field is called

(1) magnetic flux density

(2) magnetic moment

(3) magnetic pole strength

(4) electromotive force

---

57. When freely suspended, the compass needle comes to rest along the geographic

(1) north-east directions

(2) east-west directions

(3) south-east directions

(4) north-south directions

---

58. If x and y are the temperatures of the hot and cold water samples respectively and z is the final temperature of their mixture, then

(1) y ¿ x ¿ z

(2) x ¿ y ¿ z

(3) x ¿ z ¿ y

(4) y ¿ z ¿ x

---

59. If i and r are the angle of incidence and angle of refraction, then the equation for Snell's law is

(1) Sin i + Sin r = Constant

(2) Sin i - Sin r = Constant

(3) Sin i $\times$ Sin r = Constant

(4) sin i / sin r = Constant

---

60. A lens is made up of

(1) a transparent material

(2) an opaque material

(3) both transparent and opaque materials

(4) None of these

---

61. The distance between the focal point and the optic centre gives the

(1) radius of curvature

(2) focal length

(3) object distance

(4) image height

---

62. The human eye functions on the principle of sensation of

(1) vision

(2) hearing

(3) taste

(4) smell

---

63. An amount of charge passing through any cross-section of the conductor in 1 second is called

(1) electric potential

(2) electric current

(3) electric resistance

(4) electromotive force

---

64. Which of the following materials obeys Ohm's law?

(1) Light emitting diode

(2) Silicon

(3) Aluminium

(4) Germanium

---

65. Pick the false statement on the metallic conductors.

(1) They obey the Ohm's law.

(2) The ratio of voltage and current is constant.

(3) The voltage-current graph is non-linear.

(4) Their resistance changes with temperature.

---

66. The device used to measure the potential difference or electromotive force is

(1) Ammeter

(2) Voltmeter

(3) Calorimeter

(4) Barometer

---

67. The amount of heat required to raise the temperature of 1 gram of water by 1°C is called

(1) joule

(2) kelvin

(3) calorie

(4) degree celsius

---

68. Two bodies A and B are at temperatures -100°C and 173 K respectively. The body at higher temperature is

(1) A

(2) B

(3) Both are at same temperature

(4) None of these

---

69. Which of the following pairs of substances have the same values of specific heat?

(1) Copper, aluminium

(2) Ice, water

(3) Brass, iron

(4) Ice, kerosene oil

---

70. When touched, we feel that a metal piece is colder than a wooden piece. This is due to the transfer of heat from our fingers to

(1) the metal piece only

(2) the wooden piece only

(3) both the metal and wooden pieces

(4) None of these

---

71. A samosa appears to be cool outside but it is hot when we eat because the curry inside it has ingredients of

(1) lower specific heat

(2) higher specific heat

(3) zero specific heat

(4) None of these

---

72. Which of the following is NOT an example of refraction?

(1) Bottom of the swimming pool with water appears to be raised

(2) Pencil placed in a tumbler of water appears to have a bent

(3) Lemon kept in a glass of water appears to be bigger than its size

(4) Appearance of our image in a plane mirror

---

73. The speed of light in benzene is 2×10^8 **m/s. Its refractive index is (speed of light in vacuum =** 3×10^8 **m/s)**

(1) 0.66

(2) 1

(3) 1.5

(4) 2

---

74. A light ray travels from air to glass with an angle of incidence of $45°$. The possible angle of refraction is

(1) $45°$

(2) $65°$

(3) $90°$

(4) $30°$

---

75. According to laws of refraction, which of the following lie in the same plane?

(1) Incident and refracted rays

(2) Incident ray, refracted ray and normal

(3) Incident ray and normal only

(4) Refracted ray and normal only

---

76. A focal plane is

(1) parallel to the principal axis

(2) perpendicular to the principal axis

(3) at $45°$ to the principal axis

(4) at $60°$ to the principal axis

---

77. Which of the following lens is used as magnifying lens?

(1) Double convex

(2) Double concave

(3) Plano-convex

(4) Plano-concave

78. A convex lens gives an image of the same size of the object when the object is placed

(1) between the focal point and the centre of curvature

(2) between the focal point and the optic centre

(3) beyond the centre of curvature

(4) at the centre of curvature

---

79. Pick the correct answer from the following two statements: (a) A lens has at least one curved surface. (b) A plano-concave lens has two curved surfaces.

(1) Only (a) is true

(2) Only (b) is true

(3) Both (a) and (b) are true

(4) Both (a) and (b) are false

---

80. The material suitable for making heating element of electric iron is

(1) copper

(2) nichrome

(3) silver

(4) germanium

---

81. Match the following: Physical quantity – SI Unit: (i) Electric current, (ii) Electric charge, (iii) Electric potential; (a) Coulomb, (b) Volt, (c) Ampere.

(1) (i)-(c), (ii)-(a), (iii)-(b)

(2) (i)-(c), (ii)-(b), (iii)-(a)

(3) (i)-(a), (ii)-(c), (iii)-(b)

(4) (i)-(b), (ii)-(a), (iii)-(c)

---

82. The materials which have resistivity in the order of 10^{14} to 10^{16} Ω-m are

(1) insulators

(2) conductors

(3) semiconductors

(4) None of these

---

83. The graph between potential difference (on X-axis) and current (on Y-axis) for a conductor gives a straight line

(1) parallel to X-axis

(2) parallel to Y-axis

(3) passing through origin

(4) intercepting both X-axis and Y-axis

---

84. 1 joule / 1 coulomb =

(1) 1 volt

(2) 1 ohm

(3) 1 watt

(4) 1 ampere

---

85. Pick the false statement from the following:

(1) Resistivity is also called specific resistance.

(2) Reciprocal of resistivity is called conductivity.

(3) Units of both resistivity and resistance are the same.

(4) Low resistivity metals are good conductors.

---

86. A current of 1.5 A passes through a conductor of resistance 20Ω. The potential difference across it is

(1) 13.33 V

(2) 30 V

(3) 5 V

(4) 20 V

---

87. The materials which are useful in making diodes, transistors and integrated chips (ICs) etc. are

(1) conductors

(2) insulators

(3) semiconductors

(4) alloys

---

88. The defect of vision in which the people cannot see the objects beyond far point is called

(1) presbyopia

(2) hypermetropia

(3) myopia

(4) the angle of vision

---

89. For a healthy eye, the accommodation of eye lens will be in the range of

(1) 2 to 2.5 cm

(2) 2.5 to 25 cm

(3) 1 to 2 cm

(4) 2.5 to 2.27 cm

---

90. A person cannot see the objects placed between near point and the point of least distance of distinct vision. His defect of vision can be corrected by using

(1) bi-concave lens

(2) bi-convex lens

(3) bi-focal lens

(4) concavo-convex lens

SECTION – III : CHEMISTRY

91. The impurities such as soil and sand associated with ore are called

(1) slag

(2) flux

(3) mineral

(4) gangue

---

92. The spot at which corrosion occurs on the surface of an iron material, behaves as

(1) cathode

(2) anode

(3) either cathode or anode

(4) It has no relation with electrode

---

93. Which of the following minerals contains manganese?

(1) Galena

(2) Cinnabar

(3) Pyrolusite

(4) Horn silver

---

94. Which of the following methods are used to prevent corrosion?

(1) Painting

(2) Electroplating

(3) Sacrificial electrode of another metal

(4) All of these

---

95. The ability of an element to form the longest chain with its own atoms is called as

(1) allotropy

(2) hybridization

(3) catenation

(4) isomerism

---

96. Hydrocarbons that contain only single bonds between the carbon atoms are called

(1) alkanes

(2) alkenes

(3) alkynes

(4) All of these

---

97. For hydrocarbons, if the molecular formula increases, then melting point

(1) increases

(2) decreases

(3) Either increases or decreases

(4) No relation

---

98. In hydrocarbons, which type of bonds does carbon form?

(1) Four single bonds

(2) Two double bonds

(3) One single bond and one triple bond

(4) All of these

---

99. The hydrocarbons containing -$CONH_2$ functional group are called

(1) carboxylic acids

(2) amides

(3) amines

(4) esters

---

100. What happens when litmus paper test is performed with an acid?

(1) Red litmus turns to blue

(2) Red litmus turns to yellow

(3) Blue litmus turns to red

(4) Blue litmus turns to yellow

---

101. Which of the following properties is used in the olfactory indicator?

(1) Colour change

(2) Odour

(3) Taste

(4) None of these

---

102. When Na_2CO_3 reacts with an acid, which of the following gases is evolved?

(1) H_2

(2) N_2

(3) O_2

(4) CO_2

---

103. An antacid is

(1) a salt

(2) an acid

(3) a base

(4) an acid or base

---

104. The nature of non-metal oxide is

(1) acidic

(2) basic

(3) neutral

(4) acidic or basic

---

105. Principal quantum number (n) is represented with

(1) 0, 1, 2, 3, ...

(2) K, L, M, ...

(3) X, Y, Z, ...

(4) A, B, C, ...

---

106. Which of the following properties was explained by Bohr's atomic model?

(1) Line spectra of H atom

(2) Fine spectra of H atom

(3) Both line and fine spectra of H atom

(4) None of the above

---

107. Maximum number of electrons held by p-orbital is

(1) 2

(2) 3

(3) 6

(4) 10

---

108. The electronic configuration of an element is based on

(1) Aufbau principle

(2) Hund's rule

(3) Pauli's exclusion principle

(4) All of the above

---

109. Which of the following quantum numbers can't have zero value?

(1) Principal quantum number

(2) Azimuthal quantum number

(3) Magnetic quantum number

(4) Both (1) and (2)

---

110. In which of the following, elements are arranged in ascending order of their atomic numbers?

(1) Dobereiner's law of triads

(2) Newland's law of octave

(3) Modern periodic table

(4) Mendeleev's periodic table

---

111. Which of the following quantum numbers increases down the group in the modern periodic table?

(1) Principal quantum number

(2) Azimuthal quantum number

(3) Magnetic quantum number

(4) Spin quantum number

---

112. Which of the following are called lanthanoids?

(1) s-block elements

(2) p-block elements

(3) d-block elements

(4) f-block elements

113. How many elements are present in 3rd period of the modern periodic table?

(1) 32

(2) 8

(3) 18

(4) 2

---

114. The valency of an element belonging to VA group of the modern periodic table is

(1) 5

(2) 3

(3) 7

(4) 1

---

115. Ionic bond is formed due to which of the following?

(1) Transfer of electrons from one atom to another atom

(2) Electrostatic attraction between two oppositely charged ions

(3) Sharing of electrons between two atoms

(4) Both (1) and (2)

---

116. Which of the following is a noble gas?

(1) F_2

(2) Cl_2

(3) I_2

(4) Ar

---

117. When a metal atom forms ionic bond with a non-metal atom, the metal atom will

(1) gain electrons

(2) lose electrons

(3) share electrons

(4) neither lose nor gain electrons

---

118. If the valency of sodium is 1 and oxygen is 2, then the formula of compound formed between sodium and oxygen is?

(1) NaO

(2) Na_2O_2

(3) Na_2O

(4) NaO_2

---

119. Triple bond between nitrogen atoms in N_2 molecule contains

(1) 1 sigma bond and 2 π bonds

(2) 2 sigma bonds and 1 π bond

(3) 3 sigma bonds

(4) 3 π bonds

---

120. In nature, gold metal is available in free state (native), because

(1) it is less reactive

(2) it is more reactive

(3) it is independent of reactivity

(4) None of these
