AP POLYCET 2023 Set D Question Paper

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

General Instructions

Read the following instructions very carefully and strictly follow them:

Exam Mode: The exam will be conducted in offline mode (pen and paper).

Exam Duration: The exam will be of 2 hours duration (120 minutes).

Number of Questions: A total of 120 multiple-choice questions will be asked.

Marking Scheme: Each question carries 1 mark, and there is no negative marking.

Syllabus: The syllabus includes topics from Mathematics, Physics, and Chemistry of Class 10.

Exam Pattern: The question paper will include multiple-choice questions with four options, one of which will be correct.

Question Paper Structure: The question paper will be divided into three sections: Mathematics (60 questions),Physics (30 questions), Chemistry (30 questions)

SECTION-I:MATHEMATICS

1. The X-axis divides the line joining the points $A(2,-3)$ and $B(5,6)$ in the ratio of

(1) $1:2$

(2) $2:1$

(3) $3:5$

(4) $2:3$

---

2. If four vertices of a parallelogram are $(-3,-1),(a,b),(3,3)$ and $(4,3)$, then the ratio of a and b is

(1) $4:1$

(2) $1:2$

(3) $1:3$

(4) $3:1$

---

3. If the points $(a,0),(0,b)$ and $(1,1)$ are collinear, then $\frac{1}{a}+\frac{1}{b}=$

(1) -1

(2) 0

(3) 1

(4) 2

---

4. If the centroid of the triangle formed by the points $(3,-5),(-7,4),(10,-k)$ is at the point $(k,-1)$, then the value of k is:

(1) 1

(2) 2

(3) 3

(4) 4

---

5. If AM and PN are the altitudes of two similar triangles $\triangle ABC$ and $\triangle PQR$ respectively and $(AB)^2 : (PQ)^2 = 4 : 9$, then $AM : PN$ is:

(1) $3 : 2$

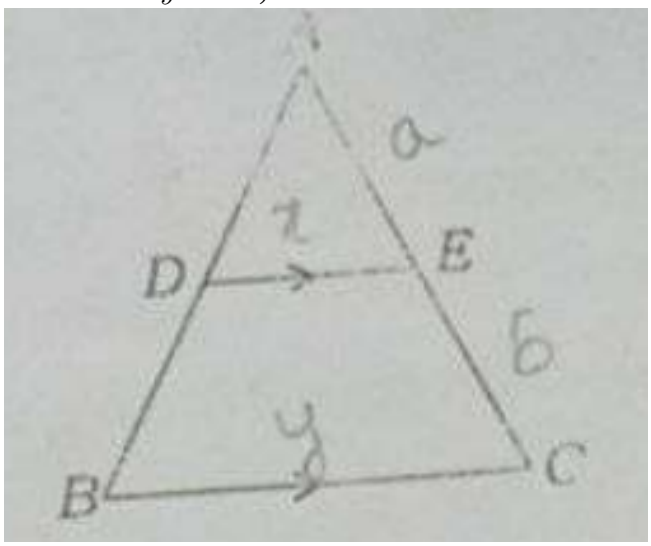
(2) $16 : 81$

(3) $4 : 9$

(4) $2 : 3$

---

6. In the given triangle $\triangle ABC$, if $DE \parallel BC$, $AE = a$ units, $EC = b$ units, $DE = x$ units, and $BC = y$ units, then which of the following is true?



(1) $x = \frac{ay}{a+b}$

(2) $y = \frac{ax}{a+b}$

(3) $x = \frac{a+b}{ay}$

(4) $\frac{x}{y} = \frac{a}{b}$

---

7. If the lengths of the diagonals of a rhombus are 24 cm and 10 cm, then each side of the rhombus is:

(1) $12\,\text{cm}$

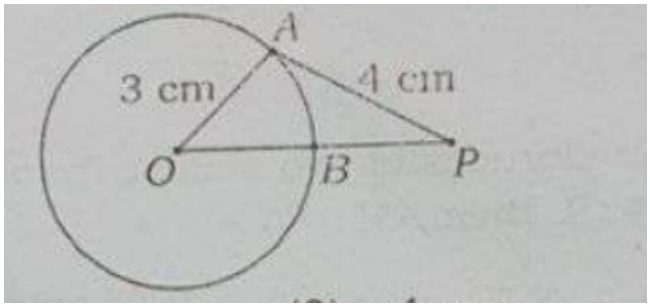
(2) $14\,\text{cm}$

(3) 15 cm

(4) 13 cm

---

8. In the given figure, PA is the tangent drawn from an external point P to the circle with center O. If the radius of the circle is 3 cm and $PA = 4$ cm, then the length of PB is:



(1) 3 cm

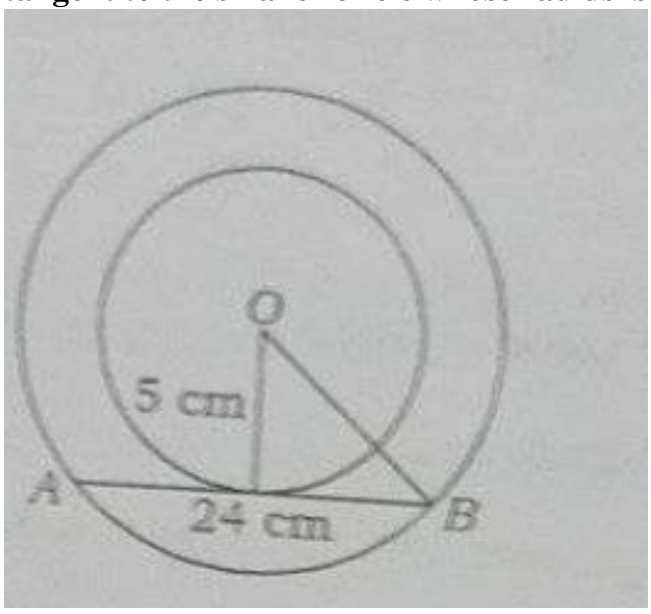
(2) 4 cm

(3) 5 cm

(4) 2 cm

---

9. In two concentric circles, a chord of length 24 cm of the larger circle becomes a tangent to the smaller circle whose radius is 5 cm. Then the radius of the larger circle is



(1) 8 cm

(2) 10 cm

(3) 12 cm

(4) 13 cm

---

10. The area of the circle that can be inscribed in a square of side 10 cm is

(1) 40 π cm^2

(2) 30 π cm^2

(3) 30 π cm^2

(4) 25 π cm^2

---

11. If the height of a conical tent is 3 m and the radius of its base is 4 m, then the slant height of the tent is:

(1) 3 m

(2) 4 m

(3) 5 m

(4) 7 m

---

12. If the radius of the base of a right-circular cylinder is halved, keeping the height the same, then the ratio of the volume of the cylinder thus obtained to the volume of the original cylinder is:

(1) 1 : 4

(2) 2 : 1

(3) 1 : 2

(4) 4 : 1

---

13. If $\tan\theta = \sqrt{3}$, then the value of $\sec\theta$ is:

(1) 2

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

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

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

---

14. A chord of a circle of radius 6 cm is making an angle 60° at the centre. Then the length of the chord is

(1) 3 cm

(2) 6 cm

(3) 12 cm

(4) $3\sqrt{3}$ cm

---

15. The value of $\tan 10^\circ \tan 15^\circ \tan 75^\circ \tan 80^\circ$ is

(1) -1

(2) 0

(3) 1

(4) None of these

---

16. If $\tan\theta + \cot\theta = 5$, then the value of $\tan^2\theta + \cot^2\theta$ is

(1) 1

(2) 7

(3) 23

(4) 25

---

17. If $\cos 36^\circ \cos 54^\circ = \cos 36^\circ \sin 54^\circ$, then the value of x is:

(1) 1

(2) 0

(3) -1

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

---

18. If two towers of heights h_1 and h_2 subtend angles of 60° and 30° respectively at the midpoint of the line segment joining their feet, then the ratio of their heights $h_1 : h_2$ is:

(1) $1 : 2$

(2) $2 : 1$

(3) $3 : 1$

(4) $2 : 3$

---

19. The angles of elevation and depression of the top and bottom of a lighthouse from the top of a 60 m high building are 30° and 60° respectively. Then the difference between the heights of the lighthouse and building is:

(1) $20\,\text{m}$

(2) $80\,\text{m}$

(3) $60\,\text{m}$

(4) $40\,\text{m}$

---

20. Which of the following cannot be the probability of an event?

(1) 0

(2) $\frac{4}{5}$

(3) $\frac{5}{4}$

(4) 1

---

21. If one card is drawn at random from a well-shuffled deck of 52 playing cards, then the probability of getting a non-face card is

(1) $\frac{3}{13}$

(2) $\frac{10}{13}$

(3) $\frac{7}{13}$

(4) $\frac{4}{13}$

---

22. A lot consists of 144 ball pens of which 20 are defective and the others are good. Rafia will buy a pen if it is good but will not buy if it is defective. The shopkeeper draws one pen at random and gives it to her. The probability that she will buy that pen is

(1) $\frac{5}{36}$

(2) $\frac{20}{36}$

(3) $\frac{31}{36}$

(4) $\frac{31}{144}$

---

23. A bag contains 3 red balls and 5 black balls. If a ball is drawn at random from the bag, then the probability of getting a red ball is

(1) $\frac{3}{8}$

(2) $\frac{4}{8}$

(3) $\frac{3}{5}$

(4) $\frac{3}{8}$

---

24. If the mean of the following frequency distribution is 15, then the value of y is:

x	5	10	15	20	25
f	6	8	6	y	5

(1) 8

(2) 7

(3) 9

(4) 10

---

25. If the difference between mode and mean of a data is k times the difference between median and mean, then the value of k is:

(1) 2

(2) 3

(3) 1

(4) Cannot be determined

---

26. The median of the first 10 prime numbers is:

(1) 11

(2) 12

(3) 13

(4) 14

---

27. For the given data with 50 observations 'the less than ogive' and 'the more than ogive' intersect at the point (15.5, 20). The median of the data is:

(1) 15.5

(2) 20

(3) 15

(4) 14.5

---

28. The modal class for the following frequency distribution is

x	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60
10	3	3	3	3	3	3
20	12	12	12	12	12	12
30	27	27	27	27	27	27
40	57	57	57	57	57	57
50	75	75	75	75	75	75
60	80	80	80	80	80	80

(1) $30 - 40$

(2) $20 - 30$

(3) $10 - 20$

(4) $50 - 60$

---

29. After how many decimal places, the decimal expansion of the rational number $\frac{22}{5}$ will terminate?

(1) 1

(2) 2

(3) 3

(4) 4

---

30. The sum of the exponents of the prime factors in the prime factorization of 156 is

(1) 2

(2) 3

(3) 4

(4) 6

---

31. For any natural number n, n^9 cannot end with which one of the following digits?

(1) 1

(2) 2

(3) 9

(4) None of these

32. If the LCM of 12 and 42 is 10m + 4, then the value of m is

(1) $\frac{1}{5}$

(2) $\frac{4}{5}$

(3) 5

(4) 8

---

33. The value of $\frac{1}{\log 60} + \frac{1}{\log 60} + \frac{1}{\log 60}$ is

(1) 0

(2) 1

(3) 5

(4) 60

---

34. Which of the following collections is not a set?

(1) The collection of natural numbers between 2 and 20

(2) The collection of numbers which satisfy the equation $x^2 - 5x + 6 = 0$

(3) The collection of prime numbers between 1 and 100

(4) The collection of all brilliant students in a class

---

35. If $P = \{3m : m \in \mathbb{N}\}$ and $Q = \{3m : m \in \mathbb{N}\}$ are two sets, then

(1) $P \subseteq Q$

(2) $Q \subseteq P$

(3) $P = Q$

(4) $P \cup Q = \mathbb{N}$

---

36. If A and B are disjoint sets and $n(A) = 4, n(A \cup B) = 7$, then the value of $n(B)$ is:

(1) 7

(2) 4

(3) 3

(4) 11

---

37. If the sum and product of the zeroes of a quadratic polynomial are 3 and -10 respectively, then the polynomial is:

(1) $x^2 - 3x + 10$

(2) $x^2 + 3x - 10$

(3) $x^2 - 3x - 10$

(4) $x^2 + 3x + 10$

---

38. If $x - 2$ is a factor of the polynomial $x^3 - 6x^2 + ax - 8$, then the value of a is:

(1) 10

(2) 12

(3) 14

(4) 18

---

39. If α, β and γ are the zeroes of the cubic polynomial $2x^3 + x^2 - 13x - 6$, then the value of $\alpha + \beta + \gamma$ is

(1) 3

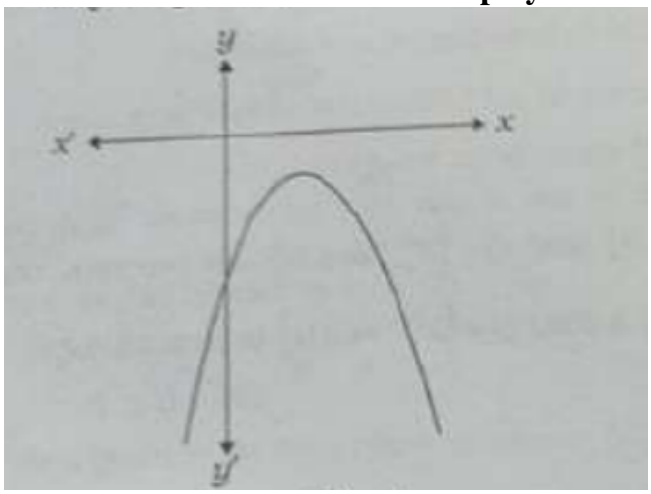
(2) -3

(3) -$\frac{1}{2}$

(4) -$\frac{13}{2}$

---

40. The number of zeroes of the polynomial shown in the graph is



(1) 0

(2) 1

(3) 2

(4) None of these

---

41. The pair of linear equations $x + 2y = 5$ and $3x + 12y - 10 = 0$ has

(1) No solution

(2) Two solutions

(3) Unique solution

(4) Infinitely many solutions

---

42. Which among the following statements on mirage is false?

(1) It is an optical illusion

(2) It is the real image of the sky

(3) It appears on the distant road

(4) It appears during hot summer day

---

43. If v_1 and v_2 are the speeds of light in the two media of refractive indices n_1 and n_2 respectively, then:

(1) $\frac{n_1}{v_1} = \frac{n_2}{v_2}$

(2) $\frac{v_1}{v_2} = \frac{n_2}{n_1}$

(3) $\frac{v_1}{v_2} = \frac{\sqrt{n_1}}{\sqrt{n_2}}$

(4) $\frac{n_1}{v_2} = \frac{\sqrt{n_2}}{v_1}$

---

44. Which of the following rays undergoes deviation by a lens?

(1) Ray passing along the principal axis

(2) Ray passing through the optic centre

(3) Ray passing parallel to the principal axis

(4) Ray passing towards the focus

---

45. Pick the correct answer from the following two statements:

(1) Only (a) is true

(2) Only (b) is true

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

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

---

46. The lens bounded by two spherical surfaces curved inwards is

(1) Biconvex

(2) Biconcave

(3) Plano-convex

(4) Plano-concave

---

47. If the object and image distances due to a convex lens are x each, then its focal length is

(1) $2x$

(2) $\frac{x}{2}$

(3) $\frac{2x}{3}$

(4) $\frac{x}{4}$

---

48. Irrespective of the position of the object on the principal axis, a concave lens always forms an image of nature:

(1) real, inverted

(2) real, erect

(3) virtual, erect

(4) Does not form any image

---

49. Usually doctors, after testing for defects of vision, prescribe the corrective lens indicating their:

(1) radius of curvature

(2) refractive index

(3) mass

(4) power

---

50. Farsightedness is called:

(1) hypermetropia

(2) myopia

(3) presbyopia

(4) cataract

---

51. Relationship among the speed of light wave (ν), wavelength (λ), and frequency (f) is given by:

(1) $f = \nu\lambda$

(2) $\nu = f\lambda$

(3) $\lambda = f\nu$

(4) $\lambda = \sqrt{f\nu}$

---

52. Which of the following statements on red colour light is true?

(1) It has low refractive index and suffers high deviation

(2) It has low refractive index and suffers low deviation

(3) It has high refractive index and suffers high deviation

(4) It has high refractive index and suffers low deviation

---

53. Blue colour of the sky is due to the scattering of light by the molecules of

(1) H_2

(2) H_2O

(3) CO_2

(4) N_2 and O_2

---

54. If i_1 and i_2 are the angle of incidence and angle of emergence due to a prism respectively, then at the angle of minimum deviation

(1) $i_1 = i_2$

(2) $i_1 > i_2$

(3) $i_1 < i_2$

(4) None of these

---

55. The minimum focal length of the eye-lens of a healthy human being is:

(1) 25 cm

(2) 2.5 cm

(3) 2.27 cm

(4) 1 cm

---

56. Volt per ampere is called:

(1) watt

(2) ohm

(3) coulomb

(4) joule

---

57. The device which maintains a constant potential difference between its ends is called:

(1) battery

(2) multimeter

(3) ammeter

(4) electric bulb

---

58. Two resistors of $0.4\,\Omega$ and $0.6\,\Omega$ are connected in parallel combination. Their equivalent resistance is

(1) $1\,\Omega$

(2) $0.5\,\Omega$

(3) $0.24\,\Omega$

(4) $0.1\,\Omega$

---

59. The junction law proposed by Kirchhoff is based on

(1) Conservation of mass

(2) Conservation of momentum

(3) Conservation of energy

(4) Conservation of charge

---

60. The materials which have a large number of free electrons and offer low resistance are called

(1) Semiconductors

(2) Conductors

(3) Insulators

(4) None of these

---

61. A fuse is made up of:

(1) thin wire of high melting point

(2) thin wire of low melting point

(3) thick wire of high melting point

(4) thick wire of low melting point

---

62. If the specific resistance of a wire of length 2 m and area of cross-section 1 mm^2 is $1 \times 10^{-8}\,\Omega$ m, then calculate the resistance.

(1) $10^{-2}\,\Omega$

(2) $2\,\Omega$

(3) $2 \times 10^{-2}\,\Omega$

(4) $2 \times 10^{-2}\,\Omega$

---

63. An evidence for the motion of charge in the atmosphere is provided by

(1) Rainbow

(2) Mirage

(3) Thunder

(4) Lightning

---

64. The electric energy (in kWh) consumed in operating a bulb of 60 W for 10 hours a day is

(1) 6

(2) 36

(3) 6 kWh

(4) 12 kWh

---

65. The scientific demonstration of H.C. Oersted is related to the study of

(1) Electric discharge through air

(2) Relationship between voltage and current

(3) Magnetic effect of current

(4) Refraction of light

---

66. Pick the correct answer from the following two statements:

(a) Within a bar magnet, magnetic field lines travel from south pole to north pole. (b) Outside a bar magnet, magnetic field lines travel from north pole to south pole.

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

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

(3) Only (a) is true

(4) Only (b) is true

---

67. Weber is the S.I. unit of:

(1) magnetic pole strength

(2) magnetic moment

(3) magnetic flux

(4) magnetic flux density

---

68. The magnetic force acting on a straight wire of length l carrying a current I which is placed perpendicular to the uniform magnetic field B is:

(1) lB

(2) $\frac{I}{Bl}$

(3) $\frac{B}{Il}$

(4) I^2Bl

---

69. Mechanical energy is converted into electrical energy in

(1) Motors

(2) Electric geysers

(3) Generators

(4) Televisions

---

70. The device which contains slip rings to reverse the direction of current through the coil is called

(1) Resistor

(2) Battery

(3) Electric motor

(4) Solenoid

---

71. An increase in magnetic flux through a coil of 500 turns in 0.1 s is 0.001 Wb. The maximum induced EMF generated in the coil is

(1) 50 V

(2) 10 V

(3) 0.5 V

(4) 5 V

---

72. If ε and Δt are the induced EMF and time respectively, then the change in magnetic flux is given by

(1) $\frac{\varepsilon}{\Delta t}$

(2) $\varepsilon \Delta t$

(3) $\sqrt{\frac{\varepsilon}{\Delta \varphi}}$

(4) $\sqrt{\varepsilon \Delta t}$

---

73. The value of -10°C temperature in Kelvin scale is:

(1) 283 K

(2) 263 K

(3) 273 K

(4) 0 K

---

74. According to the principle of method of mixtures, if A and B are the net heat loss and net heat gain respectively, then:

(1) $A = B$

(2) $A < B$

(3) $A > B$

(4) None of these

---

75. When wet cloths dry, water in it disappears. This is due to:

(1) freezing

(2) condensation

(3) melting

(4) evaporation

---

76. The relationship between average kinetic energy (E) of water molecules and its absolute temperature (T) is given by:

(1) $E \propto \frac{1}{T}$

(2) $E \propto \frac{1}{\sqrt{T}}$

(3) $E \propto T$

(4) E is independent of T

---

77. Pick the false statement on specific heat

(1) Its value is same for all the substances

(2) Its SI unit is J/kg-K

(3) Its value is high when the rate of rise (or fall) of temperature is low

(4) Its value for water is 1 cal/g-°C

---

78. Freezing of water takes place at a temperature and atmospheric pressure of

(1) $100°C$, 1 atm

(2) $1°C$, 100 atm

(3) $0°C$, 100 atm

(4) $0°C$, 1 atm

---

79. Refraction does not take place when the angle between the incident light ray and normal to the interface is

(1) 0°

(2) 22.5°

(3) 60°

(4) 45°

---

80. The refractive index of a medium is 2. The speed of light in that medium is

(1) 6×10^8 m/s

(2) 10^8 m/s

(3) 3×10^8 m/s

(4) 1.5×10^8 m/s

---

81. Which among the following are used in transport communication signals through light pipes?

(1) Plane mirrors

(2) Concave lenses

(3) Prisms

(4) Optical fibers

SECTION-III:CHEMISTRY

82. Electronic configurations of Mg^{2+} ion and Cl^- ion are:

(1) $2, 8$ and $2, 8$

(2) $2, 8$ and $2, 8, 8$

(3) $2, 8, 8$ and $2, 8$

(4) $2, 8, 2$ and $2, 8, 7$

83. Coordination number of Na^+ in NaCl crystal is:

(1) 1

(2) 6

(3) 2

(4) 8

---

84. Bonds present in Nitrogen molecule are:

(1) 3σ

(2) 1σ and 2π

(3) 3π

(4) 2π and 2σ

---

85. $1s^2\ 2s^2\ 2p\ 3s^2\ 3p$ configuration is related to

(1) p^{3-}

(2) Cl^-

(3) S^{2-}

(4) All of these

---

86. The number of electrons gained by a non-metal element is equal to its

(1) valency

(2) group number

(3) bond length

(4) All of these

---

87. Corrosion of copper produces:

(1) Copper oxide

(2) Copper carbonate

(3) Copper sulphate

(4) Pure copper

---

88. 22-carat Gold contains

(1) 22 parts of Gold + 2 parts of Nickel

(2) 22 parts of Gold + 2 parts of Copper

(3) 22 parts of Gold + 22 parts of Silver

(4) 22 parts of Gold + 2 parts of Chromium

---

89. Formula of Rust is

(1) $Fe_2O_3 \times H_2O$

(2) $Fe_2O_4 \times H_2O$

(3) $Fe(OH)_2$

(4) $Fe(OH)_3$

---

90. Chemical used to remove impurities from ore is called

(1) gangue

(2) mineral

(3) slag

(4) flux

---

91. By moving top to bottom in a group, valency will

(1) increase

(2) decrease

(3) no change

(4) increase and decrease

---

92. Atomic number of the element of VA group, coming after nitrogen is

(1) 7

(2) 15

(3) 14

(4) 17

---

93. Identify the element that belongs to the 2nd group and 3rd period.

(1) Na

(2) Al

(3) Mg

(4) Cl

---

94. Identify the correct statement.

(1) All s block elements are metals

(2) All p block elements are metals

(3) All s block elements are non-metals

(4) All p block elements are non-metals

---

95. VIA group elements are called

(1) chalcogens

(2) oxygen family

(3) halogens

(4) Both (1) and (2)

---

96. Identify the structure of propyne.

(1) $HC \equiv CH$

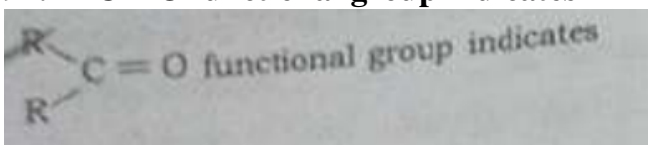
(2) $H_2C \equiv CH$

(3) $H_2C - CH_2 - CH_3$

(4) $H_3C - CH_3$

---

97. R-C = O functional group indicates



(1) aldehyde

(2) ester

(3) alcohol

(4) ketone

---

98. Ethyl alcohol upon oxidation produces

(1) ester

(2) aldehyde

(3) ether

(4) alkane

---

99. Ethene and ethyne differ in

(1) number of carbons

(2) number of bonds

(3) number of hydrogens

(4) Both (2) and (3)

---

100. Which of the following are called paraffins?

(1) Alkanes

(2) Alkenes

(3) Alkynes

(4) Alkyls

---

101. Cough Syrup contains:

(1) ethanol

(2) ethanoic acid

(3) ethanal

(4) ethyl acetate

---

102. CH_3COOH solution turns red litmus into:

(1) blue

(2) Remains red

(3) colourless

(4) None of these

---

103. Identify the hardest substance in the body:

(1) Calcium sulphate

(2) Calcium chloride

(3) Calcium phosphate

(4) Magnesium sulphate

104. 2HCl + Zn → ?

(1) $ZnCl_2$

(2) $ZnCl_2 + Cl_2$

(3) H_2

(4) $ZnCl_2 + H_2$

---

105. Methyl orange shows ___ colour in acidic solution.

(1) yellow

(2) red

(3) green

(4) blue

---

106. Which of the following is not correct?

(1) $2p^6$

(2) $3s^1$

(3) $4f^{12}$

(4) $2d^3$

---

107. Quantum numbers of a subshell are n = 3 and l = 1. Identify the subshell.

(1) 2s

(2) 1s

(3) 2p

(4) 2d

---

108. I values of subshells d, s, f, p are respectively:

(1) 1, 2, 0, 3

(2) 3, 2, 1, 0

(3) 0, 1, 2, 3

(4) 2, 0, 3, 1

---

109. In visible light, red colour possesses:

(1) high wavelength and high frequency

(2) high wavelength and low frequency

(3) low wavelength

(4) All of the above

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110. Identify the degenerated orbitals.

(1) $2p_x$, $2p_y$, $2p_z$

(2) 2s, 3s, 4s

(3) $3p_x$, $3p_y$, $3p_z$

(4) Both (1) and (3)

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111. Elements having 5, 6, 7 valency electrons are

(1) P, S, Cl

(2) P, Cl, Na

(3) P, Cl, S

(4) P, S
