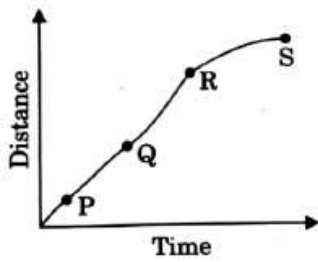


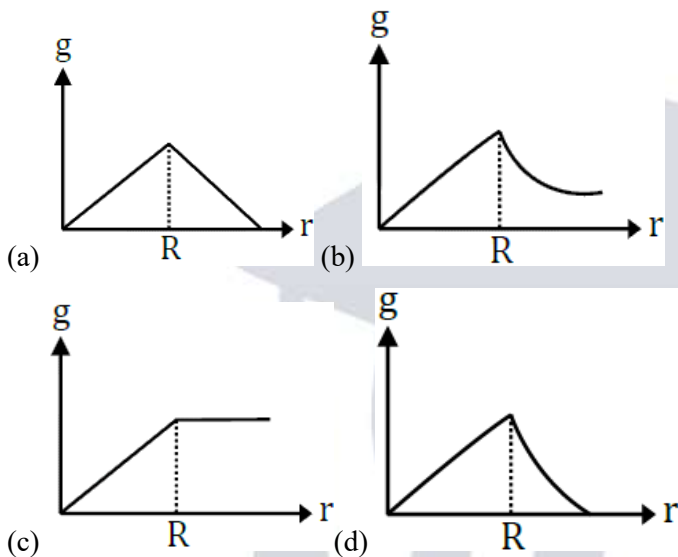
Physics

1. A particle show distance-time curve as shown in the figure. The maximum instantaneous velocity of the particle is around the point.



- (a) P (b) S
(c) R (d) Q

2. Which of the following graphs correctly represents the variation of 'g' on the Earth?



3. A cup of tea cools from 65.5°C to 62.5°C in 1 minute in a room at 22.5°C . How long will it take to cool from 46.5°C to 40.5°C in the same room?
(a) 4 minutes (b) 2 minutes
(c) 1 minute (d) 3 minutes
4. The dimensions of the ratio of magnetic flux (Φ) and permeability (μ) are
(a) $[M^0 L^1 T^0 A^1]$ (b) $[M^0 L^{-3} T^0 A^1]$
(c) $[M^0 L^1 T^1 A^{-1}]$ (d) $[M^0 L^2 T^0 A^1]$
5. A mass 'm' on the surface of the Earth is shifted to a target equal to the radius of the Earth. If 'R' is the radius and 'M' is the mass of the Earth, then work done in this process is
(a) $\frac{mgR}{2}$ (b) mgR
(c) $2 mgR$ (d) $\frac{mgR}{4}$
6. First overtone frequency of a closed pipe of length ' l_1 ' is equal to the 2nd harmonic frequency of an open pipe of length ' l_2 '. The ratio $\frac{l_1}{l_2} =$
(a) $\frac{3}{4}$ (b) $\frac{4}{3}$
(c) $\frac{3}{2}$ (d) $\frac{2}{3}$
7. The resistance $R = \frac{V}{I}$ where $V = (100 \pm 5)V$ and $I = (10 \pm 0.2)(A)$

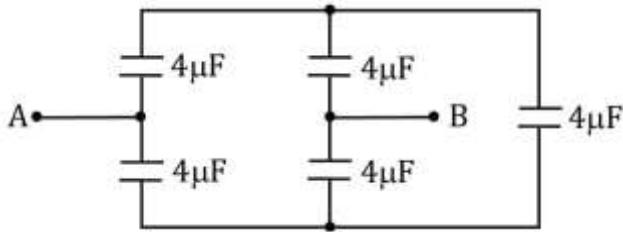
The percentage error in R is

- (a) 5.2% (b) 4.8%
(c) 7% (d) 3%

8. A block rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is 0.8. If the frictional force on the block is 10 N, the mass of the block is ($g = 10 \text{ ms}^{-2}$)
(a) 1 kg (b) 2 kg
(c) 3 kg (d) 4 kg
9. Two particles of masses m_1 and m_2 have equal kinetic energies. The ratio of their moments is
(a) $m_1 : m_2$ (b) $m_2 : m_1$
(c) $\sqrt{m_1} : \sqrt{m_2}$ (d) $m_1^2 : m_2^2$
10. The pressure at the bottom of a liquid tank is not proportional to the
(a) Acceleration due to gravity
(b) Density of the liquid
(c) Height of the liquid
(d) Area of the liquid surface
11. A Carnot engine takes 300 calories of heat from a source at 500 K and rejects 150 calories of heat to the sink. The temperature of the sink is
(a) 125 K (b) 250 K
(c) 750 K (d) 1000 K
12. Pressure of an ideal gas is increased by keeping temperature constant. The kinetic energy of molecules
(a) Decreases
(b) Increases
(c) Remains same
(d) Increases or decreases depending on the nature of gas
13. A man weighing 60 kg is in a lift moving down with an acceleration of 1.8 ms^{-2} . The force exerted by the floor on him is
(a) 588 N (b) 480 N
(c) Zero (d) 696 N
14. Moment of inertia of a body about two perpendicular axes X and Y in the plane of lamina are 20 kg m^2 respectively. Its moment of inertia about an axis perpendicular to the plane of the lamina and passing through the point of intersection of X and Y axes is
(a) 5 kg m^2 (b) 45 kg m^2
(c) 12.5 kg m^2 (d) 500 kg m^2
15. Two wires A and B are stretched by the same load. If the area of cross-section of wire 'A' is double that of 'B', then the stress on 'B' is
(a) Equal to that on A (b) Twice that on A
(c) Half that on A (d) Four times that on A
16. The magnitude of point charge due to which the electric field 30 cm away has the magnitude 2 NC^{-1} will be
(a) $2 \times 10^{-11} \text{ C}$ (b) $3 \times 10^{-11} \text{ C}$
(c) $5 \times 10^{-11} \text{ C}$ (d) $9 \times 10^{-11} \text{ C}$
17. A mass of 1 kg carrying a charge of 2 C is accelerated through a potential of 1 V. The velocity acquired by it is
(a) $\sqrt{2} \text{ ms}^{-1}$ (b) 2 ms^{-1}
(c) $\frac{1}{\sqrt{2}} \text{ ms}^{-1}$ (d) $\frac{1}{2} \text{ ms}^{-1}$
18. The force of repulsion between two identical positive charges when kept, with a separation 'r' in air is 'F'. Half the gap between the two charges is filled by a dielectric slab of dielectric constant = 4. Then, the new force of repulsion between those two charges becomes

- (a) $\frac{F}{3}$ (b) $\frac{F}{2}$
 (c) $\frac{F}{4}$ (d) $\frac{4F}{9}$

19. For the arrangement of capacitors as shown in the circuit, the effective capacitance between the point A and B is (capacitance of each capacitor is $4\mu\text{F}$)



- (a) $4\mu\text{F}$ (b) $2\mu\text{F}$
 (c) $1\mu\text{F}$ (d) $8\mu\text{F}$

20. The work done to move a charge on an equipotential surface is

- (a) Infinity (b) Less than 1
 (c) Greater than 1 (d) Zero

21. Two capacitors of $3\mu\text{F}$ and $6\mu\text{F}$ are connected in series and a potential difference of 900 V is applied across the combination. They are then disconnected and reconnected in parallel. The potential difference across the combination is

- (a) Zero (b) 100 V
 (c) 200 V (d) 400 V

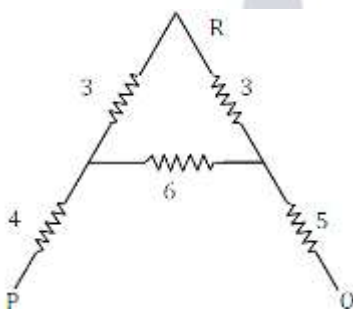
22. Ohm's Law is applicable to

- (a) Diode (b) Transistor
 (c) Electrolyte (d) Conductor

23. If the last band on the carbon resistor is absent, then the tolerance is

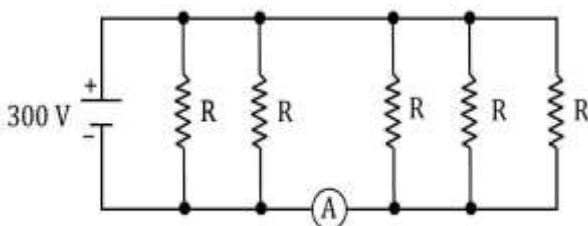
- (a) 5% (b) 20%
 (c) 10% (d) 15%

24. The effective resistance between P and Q for the following network is



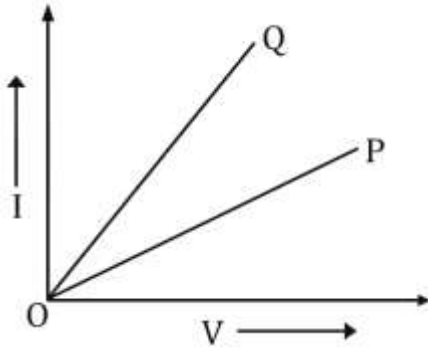
- (a) $1/12 \Omega$ (b) 21Ω
 (c) 12Ω (d) $1/21\Omega$

25. Five identical resistors each of resistance $R = 1500\Omega$ are connected to a 300 V battery as shown in the circuit. The reading of the ideal ammeter A is



- (a) $\frac{1}{5} \text{ A}$ (b) $\frac{3}{5} \text{ A}$
 (c) $\frac{2}{5} \text{ A}$ (d) $\frac{4}{5} \text{ A}$

26. Two cells of internal resistances r_1 and r_2 and of same emf are connected in series, across a resistor of resistance R . If the terminal potential difference across the cells of internal resistance r_1 is zero, then the value of R is
 (a) $R = 2(r_1 + r_2)$ (b) $R = r_2 - r_1$
 (c) $R = r_1 - r_2$ (d) $R = 2(r_1 - r_2)$
27. The $I - V$ graphs for two different electrical appliances P and Q are shown in the diagram. If R_P and R_Q be the resistances of the devices, then



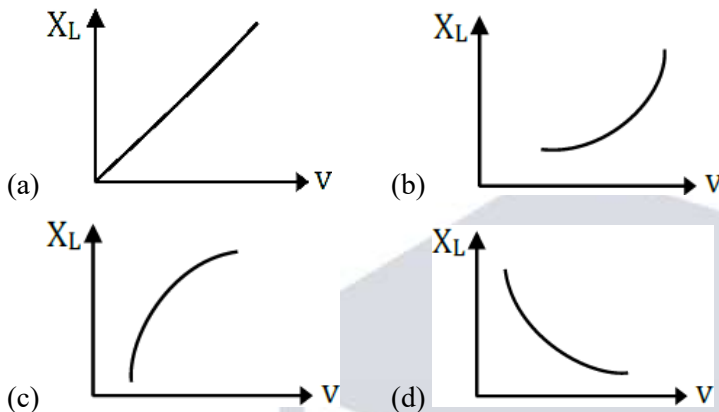
- (a) $R_P = R_Q$ (b) $R_P > R_Q$
 (c) $R_P < R_Q$ (d) $R_P = \frac{R_Q}{2}$
28. The correct Biot-Savart law in vector form is
 (a) $d\vec{B} = \frac{\mu_0}{4\pi} \frac{I(d\vec{l} \times \vec{r})}{r^2}$ (b) $d\vec{B} = \frac{\mu_0}{4\pi} \frac{I(d\vec{l} \times \vec{r})}{r^3}$
 (c) $d\vec{B} = \frac{\mu_0}{4\pi} \frac{Id\vec{l}}{r^2}$ (d) $d\vec{B} = \frac{\mu_0}{4\pi} \cdot \frac{Id\vec{l}}{r^3}$
29. An electron is moving in a circle of radius r in a uniform magnetic field B . Suddenly, the field is reduced to $\frac{B}{2}$. The radius of the circular path now becomes
 (a) $\frac{r}{2}$ (b) $2r$
 (c) $\frac{r}{4}$ (d) $4r$
30. A charge q is accelerated through a potential difference V . It is then passed normally through a uniform magnetic field, where it moves in a circle of radius r . The potential difference required to move it in a circle of radius $2r$ is
 (a) $2V$ (b) $4V$
 (c) $1V$ (d) $3V$
31. A cyclotron's oscillator frequency is 10 MHz and the operating magnetic field is 0.66 T . If the radius of its dees is 60 cm , then the kinetic energy of the proton beam produced by the accelerator is
 (a) 9 MeV (b) 10 MeV
 (c) 7 MeV (d) 11 MeV
32. Needles N_1 , N_2 and N_3 are made of a ferromagnetic, a paramagnetic and a diamagnetic substance respectively. A magnet when brought close to them will
 (a) Attract all three of them
 (b) Attract N_1 strongly, N_2 weakly and repel N_3 weakly
 (c) Attract N_1 strongly but repel N_2 and N_3 weakly
 (d) Attract N_1 and N_2 strongly but repel N_3
33. The strength of the Earth's magnetic field is
 (a) Constant everywhere

- (b) Zero everywhere
(c) Having very high value
(d) Varying from place to place on the Earth's surface

34. A jet plane having a wing-span of 25 m is travelling horizontally towards east with a speed of 3600 km/hour. If the Earth's magnetic field at the location is 4×10^{-4} T and the angle of dip is 30° , then, the potential difference between the ends of the wing is

- (a) 4 V (b) 5 V
(c) 2 V (d) 2.5 V

35. Which of the following represents the variation of inductive reactance (X_L) with the frequency of voltage source (ν)?



36. The magnetic flux linked with a coil varies as $\phi = 3t^2 + 4t + 9$. The magnitude of the emf induced at $t = 2$ seconds is

- (a) 8 V (b) 16 V
(c) 32 V (d) 64 V

37. A 100 W bulb is connected to an AC source of 220 V, 50 Hz. Then the current flowing through the bulb is

- (a) $\frac{5}{11}$ A (b) $\frac{1}{2}$ A
(c) 2 A (d) $\frac{3}{4}$ A

38. In the series LCR circuit, the power dissipation is through

- (a) R (b) L
(c) C (d) Both L and C

39. In Karnataka, the normal domestic power supply AC is 220 V, 50 Hz. Here 220 V and 50 Hz refer to

- (a) Peak value of voltage and frequency
(b) Rms value of voltage and frequency
(c) Mean value of voltage and frequency
(d) Peak value of voltage and angular frequency

40. A step-up transformer operates on a 230 V line and 1 load current of 2 A. The ratio of primary and secondary windings is 1:25. Then the current in the primary is

- (a) 25 A (b) 50 A
(c) 15 A (d) 12.5 A

41. The number of photons falling per second on a completely darkened plate to produce a force of 6.62×10^{-5} N is 'n'. If the wavelength of the light falling is 5×10^{-7} m, then $n = \times \text{_____ } 10^{22}$. ($h = 6.62 \times 10^{-34}$ J-s)

- (a) 1 (b) 5
(c) 0.2 (d) 3.3
42. An object is placed at the principal focus of a convex mirror. The image will be at
(a) Centre of curvature
(b) Principal focus
(c) Infinity
(d) No image will be formed
43. An object is placed at a distance of 20 cm from the pole of a concave mirror of focal length 10 cm. The distance of the image formed is
(a) +20 cm (b) +10 cm
(c) -20 cm (d) -10 cm
44. A candle placed 25 cm from a lens forms an image on screen placed 75 cm on the other side of the lens. The focal length and type of the lens should be
(a) +18.75 cm and convex lens
(b) -18.75 cm and concave lens
(c) +20.25 cm and convex lens
(d) -20.25 cm and concave lens
45. A plane wavefront of wavelength λ is incident on a single slit of width (a) The angular width of principal maximum is
(a) $\frac{\lambda}{a}$ (b) $\frac{2\lambda}{a}$
(c) $\frac{a}{\lambda}$ (d) $\frac{a}{2\lambda}$
46. In a Fraunhofer diffraction at a single slit, if yellow light illuminating the slit is replaced by blue light, then diffraction bands
(a) Remain unchanged (b) Become wider
(c) Disappear (d) Become narrower
47. In Young's double slit experiment, two wavelengths $\lambda_1 = 780 \text{ nm}$ and $\lambda_2 = 520 \text{ nm}$ are used to obtain interference fringes. If the n^{th} bright band due to λ_1 coincides with $(n+1)^{\text{th}}$ bright band due to λ_2 , then the value of n is
(a) 4 (b) 3
(c) 2 (d) 6
48. In Young's double slit experiment, slits are separated by 2 mm and the screen is placed at a distance of 1.2 m from the slits. Light consisting of two wavelengths $6500 \text{ \AA}$ and $5200 \text{ \AA}$ are used to obtain interference fringes. Then the separation between the fourth bright fringes of two different patterns produced by the two wavelengths is
(a) 0.312 mm (b) 0.123 mm
(c) 0.213 mm (d) 0.412 mm
49. The maximum kinetic energy of emitted photoelectrons depends on
(a) Intensity of incident radiation
(b) Frequency of incident radiation
(c) Speed of incident radiation
(d) Number of photons in the incident radiation
50. A proton and an α particle are accelerated through the same potential difference V . The ratio of their de Broglie wavelengths is
(a) $\sqrt{2}$ (b) $2\sqrt{2}$
(c) $\sqrt{3}$ (d) $2\sqrt{3}$
51. The total energy of an electron revolving in the second orbit of hydrogen atom is
(a) -13.6 eV (b) -1.51 eV
(c) -3.4 eV (d) Zero
52. The period of revolution of an electron in the ground state of hydrogen atom is T . The period of revolution of the electron in the first excited state is

- (a) 2 T (b) 4 T
(c) 6 T (d) 8 T
53. The energy equivalent to a substance of mass 1 g is
(a) 18×10^{13} J (b) 9×10^{13} J
(c) 18×10^6 J (d) 9×10^6 J
54. The half-life of tritium is 12.5 years. What mass of tritium of initial mass 64 mg will remain undecayed after 50 years?
(a) 32mg (b) 8mg
(c) 16mg (d) 4 mg
55. In a CE amplifier, the input ac signal to be amplified is applied across
(a) Forward biased emitter-base junction
(b) Reverse biased collector-base junction
(c) Reverse biased emitter-base junction
(d) Forward biased collector-base junction
56. If $A = 1$ and $B = 0$, then in terms of Boolean algebra, $A + B =$
(a) B (b) $\bar{B}$
(c) A (d) $\bar{A}$
57. The density of an electron-hole pair in a pure germanium is $3 \times 10^{16} \text{ m}^{-3}$ at room temperature. On doping with aluminium, the hole density increases to $4.5 \times 10^{22} \text{ m}^{-3}$. Now the electron density (in m^{-3}) in doped germanium will be
(a) 1×10^{10} (b) 2×10^{10}
(c) 0.5×10^{10} (d) 4×10^{10}
58. The dc common emitter current gain of a n-p-n transistor is 50. The potential difference applied across the collector and emitter of a transistor used in CE configuration is, $V_{CE} = 2 \text{ V}$. If the collector resistance, $R_C = 4\text{k}\Omega$, the base current (I_B) and the collector current (I_C) are
(a) $I_B = 10\mu\text{A}$, $I_C = 0.5 \text{ mA}$
(b) $I_B = 0.5\mu\text{A}$, $I_C = 10 \text{ mA}$
(c) $I_B = 5\mu\text{A}$, $I_C = 1 \text{ mA}$
(d) $I_B = 1\mu\text{A}$, $I_C = 0.5 \text{ mA}$
59. The radius of the Earth is 6400 km . If the height of an antenna is 500 m , then its range is
(a) 800 km (b) 100 km
(c) 80 km (d) 10 km
60. A space station is at a height equal to the radius of the Earth. If ' V_E ' is the escape velocity on the surface of the Earth, the same on the space station is _____ times V_E .
(a) $\frac{1}{2}$ (b) $\frac{1}{4}$
(c) $\frac{1}{\sqrt{2}}$ (d) $\frac{1}{\sqrt{3}}$

Chemistry

61. 1.0 g of Mg is burnt with 0.28 g of O_2 in a closed vessel. Which reactant is left in excess and how much?
(a) Mg, 5.8 g (b) Mg, 0.58 g
(c) O_2 , 0.24 g (d) O_2 , 2.4 g
62. The orbital nearest to the nucleus is
(a) 4 f (b) 5 d
(c) 4 s (d) 7p
63. Which of the following is the correct order of radius?
(a) $\text{H}^- > \text{H} > \text{H}^+$ (b) $\text{Na}^+ > \text{F}^- > \text{O}^{2-}$
(c) $\text{F}^- > \text{O}^{2-} > \text{Na}^+$ (d) $\text{Al}^{3+} > \text{Mg}^{2+} > \text{N}^{3-}$

64. The intramolecular hydrogen bond is present in

- (a) Phenol (b) o-Nitrophenol
(c) p-Nitrophenol (d) p-Cresol

65. The state of hybrid orbitals of carbon in CO_2 , CH_4 and CO_3^{2-} respectively is

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

66. For an ideal gas, compressibility factor is

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

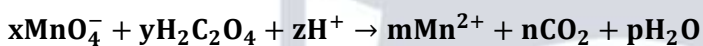
67. The relationship between K_p and K_c is $K_p = K_c(RT)^{\Delta n}$. What would be the value of Δn for the reaction,
 $\text{NH}_4\text{Cl(s)} \rightleftharpoons \text{NH}_3(\text{g}) + \text{HCl(g)}$?

- (a) 1 (b) 0.5
(c) 1.5 (d) 2

68. Acidity of BF_3 can be explained on which of the following concepts?

- (a) Arrhenius concept
(b) Bronsted-Lowry concept
(c) Lewis concept
(d) Bronsted-Lowry as well as Lewis concept

69. For the redox reaction



The values of x, y, m and n are

- (a) 10,2,5,2 (b) 2,5,2,10
(c) 6,4,2,5 (d) 3,5,2,10

70. H_2O_2 is

- (a) An oxidizing agent
(b) A reducing agent
(c) Both oxidizing and reducing agent
(d) Neither oxidizing nor reducing agent

71. Dead burnt plaster is.

- (a) CaSO_4 (b) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
(c) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$ (d) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

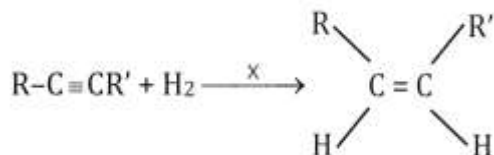
72. Identify the following compound which exhibits geometrical isomerism:

- (a) But-2-ene (b) But-1-ene
(c) Butane (d) Isobutane

73. During the fusion of organic compound with sodium metal, nitrogen present in the organic compound is converted into

- (a) NaNO_2 (b) NaNH_2
(c) NaCN (d) NaNC

74. The reagent 'X' used for the following reaction is



- (a) Ni (b) Pd/C
(c) LiAlH₄ (d) Na/ Liquid NH₃

75. Which of the following ions will cause hardness in water?

- (a) Ca²⁺ (b) Na⁺
(c) Cl⁻ (d) K⁺

76. Which of the following oxides shows electrical properties like metals?

- (a) SiO₂ (b) MgO
(c) SO₂(s) (d) CrO₂

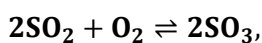
77. Which of the following aqueous solutions should have the highest boiling point?

- (a) 1.0MNaOH (b) 1.0MNa₂SO₄
(c) 1.0MNH₄NO₃ (d) 1.0MKNO₃

78. The charge required for the reduction of 1 mole of MnO₄⁻ to MnO₂ is

- (a) 1 F (b) 3 F
(c) 5 F (d) 7 F

79. For the reaction,



The rate of disappearance of O₂ is $2 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$. The rate of appearance of SO₃ is

- (a) $2 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ (b) $4 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$
(c) $1 \times 10^{-1} \text{ mol L}^{-1} \text{ s}^{-1}$ (d) $6 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$

80. Which of the following electrolytes will have maximum coagulating value for AgI/Ag⁺sol?

- (a) Na₂S (b) Na₃PO₄
(c) Na₂SO₄ (d) NaCl

81. Electrolytic refining is used to purify which of the following metals?

- (a) Cu and Zn (b) Ge and Si
(c) Zr and Ti (d) Zn and Hg

82. Dry ice is

- (a) Solid CO (b) Solid SO₂
(c) Solid CO₂ (d) Solid O₂

83. Which of the following is an amphoteric oxide?

- (a) V₂O₅, Cr₂O₃ (b) Mn₂O₇, Cr₂O₃
(c) CrO, V₂O₅ (d) V₂O₅, V₂O₄

84. The IUPAC name of [Co(NH₃)₄Cl(NO₂)]Cl is

- (a) tetraamminechloridonitrito-N-cobalt (III) chloride
(b) tetraamminechloridonitrocobalt (II) chloride
(c) tetraamminechloridonitrocobalt (I) chloride
(d) tetraamminechloridodinitrocobalt (III) chloride

85. Which of the following statements is true in case of alkyl halides?

- (a) They are polar in nature
(b) They can form hydrogen bonds
(c) They are highly soluble in water
(d) They undergo addition reactions

86. Phenol can be distinguished from ethanol by the reagent

- (a) Bromine water (b) Sodium metal
(c) Iron metal (d) Chlorine water

87. Which of the following compounds undergoes haloform reaction?

- (a) CH₃COCH₃ (b) HCHO
(c) CH₃CH₂Br (d) CH₃ - O - CH₃

88. Which of the following will be the most stable diazonium salt (RN_2^+X^-)?
 (a) $\text{CH}_3\text{N}_2^+\text{X}^-$ (b) $\text{C}_6\text{H}_5\text{N}_2^+\text{X}^-$
 (c) $\text{CH}_3\text{CH}_2\text{N}_2^+\text{X}^-$ (d) $\text{C}_6\text{H}_5\text{CH}_2\text{N}_2^+\text{X}^-$
89. Which of the following bases is not present in DNA?
 (a) Adenine (b) Guanine
 (c) Cytosine (d) Uracil
90. Which one of the following is a polyamide polymer?
 (a) Terylene (b) Nylon-6, 6
 (c) Buna-S (d) Bakelite
91. In F.C(C) the cell is shared equally by how many unit cells?
 (a) 10 (b) 8
 (c) 6 (d) 2
92. At a particular temperature, the ratio of molar conductance to specific conductance of 0.01 M NaCl solution is
 (a) $10^5\text{ cm}^3\text{ mol}^{-1}$ (b) $10^3\text{ cm}^3\text{ mol}^{-1}$
 (c) $10\text{ cm}^3\text{ mol}^{-1}$ (d) $10^5\text{ cm}^2\text{ mol}^{-1}$
93. Isotonic solutions are solutions having the same
 (a) Surface tension (b) Vapour pressure
 (c) Osmotic pressure (d) Viscosity
94. The temperature coefficient of a reaction is 2. When the temperature is increased from 30°C to 90°C , the rate of reaction is increased by
 (a) 150 times (b) 410 times
 (c) 72 times (d) 64 times
95. Gold sol is not a
 (a) Lyophobic sol
 (b) Negatively charged sol
 (c) Macromolecular sol
 (d) Multimolecular colloid
96. The common impurity present in bauxite is
 (a) CuO (b) ZnO
 (c) Fe_2O_3 (d) Cr_2O_3
97. Very pure N_2 can be obtained by
 (a) Thermal decomposition of ammonium dichromate
 (b) Treating aqueous solution of NH_4Cl and NaNO_2
 (c) Liquefaction and fractional distillation of liquid air
 (d) Thermal decomposition of sodium azide
98. Which of the following oxidation states is common for all lanthanides?
 (a) +2 (b) +3
 (c) +4 (d) +5
99. The electronic configuration of transition element "X" is +3, oxidation state is $[\text{Ar}]3d^5$. What is its atomic number?
 (a) 25 (b) 26
 (c) 27 (d) 24
100. n-Propyl chloride reacts with sodium metal in dry ether to give
 (a) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$
 (b) $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$
 (c) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$
 (d) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$
101. When the vapours of tertiary butyl alcohol are passed through heated copper at 573 K, the product formed is

- (a) But-2-ene (b) 2-Butanone
(c) 2-Methyl propene (d) Butanal

102. What is the increasing order of acidic strength among the following?

- (i) p-methoxy phenol (ii) p-methyl phenol

(iii) p-nitro phenol

- (a) ii < iii < I (b) iii < ii < i
(c) i < ii < iii (d) i < iii < ii

103. Which of the following is more basic than aniline?

- (a) Diphenylamine (b) Triphenylamine
(c) p-nitroaniline (d) Benzylamine

104. The two forms of D-Glucopyranose are called

- (a) Diastereomers (b) Anomers
(c) Epimers (d) Enantiomers

105. Among the following, the branched chain polymer is

- (a) Polyvinyl chloride
(b) Bakelite
(c) Low density polythene
(d) High density polythene

106. Edge length of a cube is 300 pm. Its body diagonal would be

- (a) 600pm (b) 423pm
(c) 519.6pm (d) 450.5pm

107. Which of the following is not a conductor of electricity?

- (a) Solid NaCl (b) Cu
(c) Fused NaCl (d) Brine solution

108. For a cell reaction involving two electron changes, $E_{\text{cell}}^0 = 0.3 \text{ V}$ at 25°C The equilibrium constant of the reaction is

- (a) 10^{-10} (b) 3×10^{-2}
(c) 10 (d) 10^{10}

109. The value of rate constant of a pseudo first order reaction

- (a) Depends only on temperature
(b) Depends on the concentration of reactants present in small amounts
(c) Depends on the concentration of reactants present in excess
(d) Is independent of the concentration

110. $(\text{CH}_3)_3\text{SiCl}$ is used during polymerization of organosilicons because

- (a) The chain length of organosilicon polymers can be controlled by adding $(\text{CH}_3)_3\text{SiCl}$
(b) $(\text{CH}_3)_3\text{SiCl}$ does not block the end terminal of silicone polymer
(c) $(\text{CH}_3)_3\text{SiCl}$ does not block the end terminal of silicone polymer
(d) $(\text{CH}_3)_3\text{SiCl}$ acts as a catalyst during polymerisation

111. When PbO_2 reacts with concentrated HNO_3 , the gas evolved is

- (a) NO_2 (b) O_2
(c) N_2 (d) N_2O

112. KMnO_4 acts as an oxidizing agent in alkaline medium. When alkaline KMnO_4 is treated with KI, iodide ion is oxidized to

- (a) I_2 (b) IO^-
(c) IO_3^- (d) IO_4^-

113. $[\text{Fe}(\text{NO}_2)_3\text{Cl}_3]$ and $[\text{Fe}(\text{O} - \text{NO})_3\text{Cl}_3]$ shows

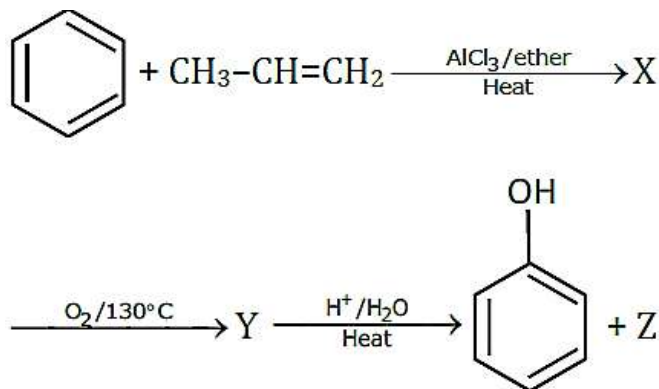
- (a) Linkage isomerism

- (b) Geometrical isomerism
- (c) Optical isomerism
- (d) Hydrate isomerism

114. Tertiary alkyl halide is practically inert to substitution by S_N2 mechanism because of

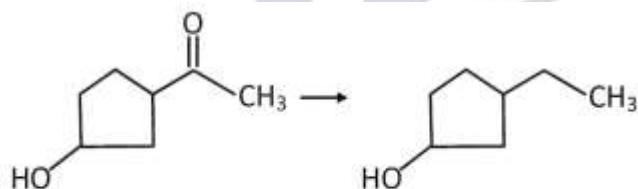
- (a) Insolubility
- (b) Instability
- (c) Inductive effect
- (d) Steric hindrance

115. The products X and Z in the following reaction sequence are



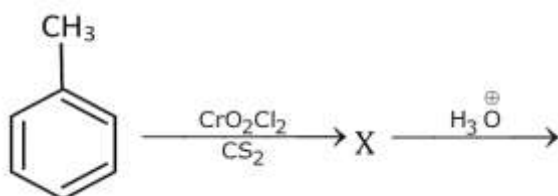
- (a) Isopropyl benzene and acetone
- (b) Cumene peroxide and acetone
- (c) Isopropyl benzene and isopropyl alcohol
- (d) Phenol and acetone

116. The appropriate reagent for the following transformation is



- (a) Zn - Hg/HCl
- (b) H_2N-NH_2 , KOH/ ethylene glycol
- (c) Ni/ H_2
- (d) $NaBH_4$

117. In the following reaction



The compound Z is

- (a) Benzoic acid
- (b) Benzaldehyde
- (c) Acetophenone
- (d) Benzene

118. The reaction of Benzene diazonium chloride with aniline yields yellow dye. The name of the yellow dye is

- (a) p-Hydroxyazobenzene
- (b) p-Aminoazobenzene
- (c) p-Nitroazobenzene
- (d) o-Nitroazobenzene

119. The glycosidic linkage involved in linking the glucose units in amylose part of starch is

- (a) $C_1 - C_4\beta$ -linkage (b) $C_1 - C_6\alpha$ -linkage
(c) $C_1 - C_6\beta$ -linkage (d) $C_1 - C_4\alpha$ -linkage

120. Ziegler-Natta catalyst is used to prepare

- (a) Low-density polythene
(b) Teflon
(c) High density polythene
(d) Nylon-6

Mathematics

121. If $|x + 5| \geq 10$ then

- (a) $x \in (-15, 5]$
(b) $x \in (-5, 5]$
(c) $x \in (-\infty, -15] \cup [5, \infty)$
(d) $x \in [-\infty, -15] \cup [5, \infty)$

122. Everybody in a room shakes hands with everybody else. The total number of handshakes is 45. The total number of persons in the room is

- (a) 9 (b) 10
(c) 5 (d) 15

123. The constant term in the expansion of $\left(x^2 - \frac{1}{x^2}\right)^{16}$ is

- (a) ${}^{16}C_8$ (b) ${}^{16}C_7$
(c) ${}^{16}C_9$ (d) ${}^{16}C_{10}$

124. If $P(n) : "2^{2n} - 1$ is divisible by k for all $n \in \mathbb{N}"$ is true, then the value of ' k ' is

- (a) 6 (b) 3
(c) 7 (d) 2

125. The equation of the line parallel to the line $3x - 4y + 2 = 0$ and passing through $(-2, 3)$ is

- (a) $3x - 4y + 18 = 0$
(b) $3x - 4y - 18 = 0$
(c) $3x + 4y + 18 = 0$
(d) $3x + 4y - 18 = 0$

126. If $\left(\frac{1-i}{1+i}\right)^{96} = a + ib$ then (a, b) is

- (a) (1, 1) (b) (1, 0)
(c) (0, 1) (d) (0, -1)

127. The distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$. Its equation is

- (a) $x^2 - y^2 = 32$ (b) $\frac{x^2}{4} - \frac{y^2}{9} = 1$
(c) $2x^2 - 3y^2 = 7$ (d) $y^2 - x^2 = 32$

128. The number of ways in which 5 girls and 3 boys can be seated in a row so that no two boys are together is

- (a) 14040 (b) 14440
(c) 14000 (d) 14400

129. If a, b, c are three consecutive terms of an AP and x, y, z are three consecutive terms of a GP, then the value of $x^{b-c} \cdot y^{c-a} \cdot z^{a-b}$ is

- (a) 0 (b) xyz
(c) -1 (d) 1

130. The value of $\lim_{x \rightarrow 0} \frac{|x|}{x}$ is

- (a) 1 (b) -1
(c) 0 (d) Does not exist

131. Let $f(x) = x - \frac{1}{x}$ then $f'(-1)$ is

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

132. The negation of the statement " 72 is divisible by 2 and 3 " is

- (a) 72 is not divisible by 2 or 72 is not divisible by 3

- (b) 72 is divisible by 2 or 72 is divisible by 3
 (c) 72 is divisible by 2 and 72 is divisible by 3
 (d) 72 is not divisible by 2 and 3

133. The probability of happening of an event A is 0.5 and that of B is 0.3. If A and B are mutually exclusive events, then the probability of neither A nor B is

- (a) 0.4 (b) 0.5
 (c) 0.2 (d) 0.9

134. In a simultaneous throw of a pair of dice, the probability of getting a total more than 7 is

- (a) $\frac{7}{12}$ (b) $\frac{5}{36}$
 (c) $\frac{5}{12}$ (d) $\frac{7}{36}$

135. If A and B are mutually exclusive events given that $P(A) = \frac{3}{5}$, $P(B) = \frac{1}{5}$, then $P(A \text{ or } B)$ is

- (a) 0.8 (b) 0.6
 (c) 0.4 (d) 0.2

136. Let $f, g: \mathbb{R} \rightarrow \mathbb{R}$ be two functions define as $f(x) = |x| + x$ and $g(x) = |x| - x \forall x \in \mathbb{R}$. Then $(f \circ g)(x)$ for $x < 0$ is

- (a) 0 (b) $4x$
 (c) $-4x$ (d) $2x$

137. A is a set having 6 distinct elements. The number of distinct functions from A to A which are not bijections is

- (a) $6! - 6$ (b) $6^6 - 6$
 (c) $6^6 - 6!$ (d) $6!$

138. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by

$$f(x) = \begin{cases} 2x & ; x > 3 \\ x^2 & ; 1 < x \leq 3 \\ 3x & ; x \leq 1 \end{cases}$$

Then $f(-1) + f(2) + f(4)$ is

- (a) 9 (b) 14
 (c) 5 (d) 10

139. If $\sin^{-1} x + \cos^{-1} y = \frac{2\pi}{5}$, then $\cos^{-1} x + \sin^{-1} y$ is

- (a) $\frac{2\pi}{5}$ (b) $\frac{3\pi}{5}$
 (c) $\frac{4\pi}{5}$ (d) $\frac{3\pi}{10}$

140. The value of the expression $\tan\left(\frac{1}{2}\cos^{-1}\frac{2}{\sqrt{5}}\right)$ is

- (a) $2 - \sqrt{5}$ (b) $\sqrt{5} - 2$
 (c) $\frac{\sqrt{5}-2}{2}$ (d) $5 - \sqrt{2}$

141. If $A = \begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$, then $A^n = 2^k A$, Where $k =$

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

142. If $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$, then the value of x and y respectively are

- (a) $-3, -1$ (b) $1, 3$
 (c) $3, 1$ (d) $-1, 3$

143. If $A = \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$, then $AA' =$

- (a) A (b) Zero matrix
 (c) A' (d) I

144. If $x, y, z \in \mathbb{R}$, then the value of determinant

$$\begin{vmatrix} (5^x + 5^{-x})^2 & (5^x - 5^{-x})^2 & 1 \\ (6^x + 6^{-x})^2 & (6^x - 6^{-x})^2 & 1 \\ (7^x + 7^{-x})^2 & (7^x - 7^{-x})^2 & 1 \end{vmatrix} \text{ is}$$

(a) 10 (b) 12

(c) 1 (d) 0

145. The value of determinant

$$\begin{vmatrix} a-b & b+c & a \\ b-a & c+a & b \\ c-a & a+b & c \end{vmatrix} \text{ is}$$

- (a) $a^3 + b^3 + c^3$ (b) None of these
(c) $a^3 + b^3 + c^3 - 3abc$ (d) $a^3 + b^3 + c^3 + 3abc$

146. If (x_1, y_1) , (x_2, y_2) and (x_3, y_3) are the vertices of a triangle whose area is 'k' Square units, then

$$\begin{vmatrix} x_1 & y_1 & 4 \\ x_2 & y_2 & 4 \\ x_3 & y_3 & 4 \end{vmatrix}^2 \text{ is}$$

- (a) $32k^2$ (b) $16k^2$
(c) $64k^2$ (d) $48k^2$

147. Let A be a square matrix of order 3×3 , then $|5A| =$

- (a) $5|A|$ (b) $125|A|$
(c) $25|A|$ (d) $15|A|$

148. If $f(x) = \begin{cases} \frac{\sqrt{1+kx}-\sqrt{1-kx}}{x} & \text{if } -1 \leq x < 0 \\ \frac{2x+1}{x-1} & \text{if } 0 \leq x \leq 1 \end{cases}$

is continuous at $x = 0$, then the value of k is

- (a) $k = 1$ (b) $k = -1$
(c) $k = 0$ (d) $k = 2$

149. If $\cos y = x \cos(a+y)$ with $\cos a \neq \pm 1$, then $\frac{dy}{dx}$ is equal to

- (a) $\frac{\sin a}{\cos^2(a+y)}$ (b) $\frac{\cos^2(a+y)}{\sin a}$
(c) $\frac{\cos a}{\sin^2(a+y)}$ (d) $\frac{\cos^2(a+y)}{\cos a}$

150. If $f(x) = |\cos x - \sin x|$, then $f\left(\frac{\pi}{6}\right)$ is equal to

- (a) $-\frac{1}{2}(1 + \sqrt{3})$ (b) $\frac{1}{2}(1 + \sqrt{3})$
(c) $-\frac{1}{2}(1 - \sqrt{3})$ (d) $\frac{1}{2}(1 - \sqrt{3})$

151. If $y = \sqrt{x + \sqrt{x + \sqrt{x + \dots}}}$, then $\frac{dy}{dx} =$

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

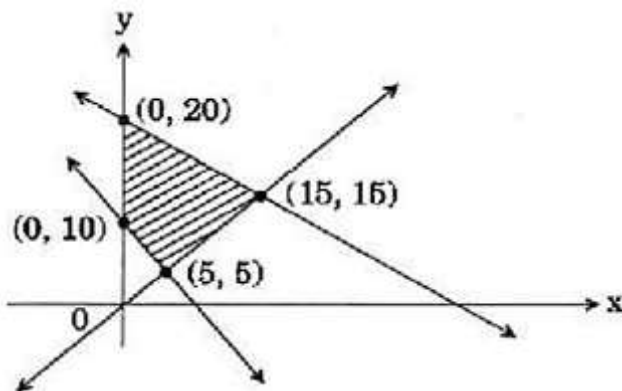
152. If $f(x) = \begin{cases} \frac{\log_e x}{x-1} & ; x \neq 1 \\ k & ; x = 1 \end{cases}$ is

Continuous at $x = 1$, then the value of k is

- (a) e (b) 1
(c) -1 (d) 0

153. Approximate change in the volume V of a cube of side x metres caused by increasing the side by 3% is
 (a) $0.09x^3 \text{ m}^3$ (b) $0.03x^3 \text{ m}^3$
 (c) $0.06x^3 \text{ m}^3$ (d) $0.04x^3 \text{ m}^3$
154. The maximum value of $\left(\frac{1}{x}\right)^x$ is
 (a) e (b) e^e
 (c) $e^{1/e}$ (d) $\left(\frac{1}{e}\right)^{1/e}$
155. $f(x) = x^x$ has stationary point at
 (a) $x = e$ (b) $x = \frac{1}{e}$
 (c) $x = 1$ (d) $x = \sqrt{e}$
156. The maximum area of a rectangle inscribed in the circle $(x + 1)^2 + (y - 3)^2 = 64$ is
 (a) 64 sq. units (b) 72 sq. units
 (c) 128 sq. units (d) 8 sq. units
157. $\int \frac{1}{1+e^x} dx$ is equal to
 (a) $\log_e \left(\frac{e^x+1}{e^x}\right) + c$ (b) $\log_e \left(\frac{e^x-1}{e^x}\right) + c$
 (c) $\log_e \left(\frac{e^x}{e^x+1}\right) + c$ (d) $\log_e \left(\frac{e^x}{e^x-1}\right) + c$
158. $\int \frac{1}{\sqrt{3-6x+9x^2}} dx$ is equal to
 (a) $\sin^{-1} \left(\frac{3x+1}{2}\right) + c$ (b) $\sin^{-1} \left(\frac{3x+1}{6}\right) + c$
 (c) $\frac{1}{3} \sin^{-1} \left(\frac{3x+1}{2}\right) + c$ (d) $\sin^{-1} \left(\frac{2x+1}{3}\right) + c$
159. $\int e^{\sin x} \cdot \left(\frac{\sin x+1}{\sec x}\right) dx$ is equal to
 (a) $\sin x \cdot e^{\sin x} + c$
 (b) $\cos x \cdot e^{\sin x} + c$
 (c) $e^{\sin x} + c$
 (d) $e^{\sin x}(\sin x + 1) + c$
160. $\int_{-2}^2 |x \cos \pi x| dx$ is equal to
 (a) $\frac{8}{\pi}$ (b) $\frac{4}{\pi}$
 (c) $\frac{2}{\pi}$ (d) $\frac{1}{\pi}$
161. $\int_0^1 \frac{dx}{e^x + e^{-x}}$ is equal to
 (a) $\frac{\pi}{4} - \tan^{-1}(e)$ (b) $\tan^{-1}(e) - \frac{\pi}{4}$
 (c) $\tan^{-1}(e) + \frac{\pi}{4}$ (d) $\tan^{-1}(e)$
162. $\int_0^{1/2} \frac{dx}{(1+x^2)\sqrt{1-x^2}}$ is equal to
 (a) $\frac{1}{\sqrt{2}} \tan^{-1} \sqrt{\frac{2}{3}}$ (b) $\frac{2}{\sqrt{2}} \tan^{-1} \left(\frac{3}{\sqrt{2}}\right)$
 (c) $\frac{\sqrt{2}}{2} \tan^{-1} \left(\frac{3}{2}\right)$ (d) $\frac{\sqrt{2}}{2} \tan^{-1} \left(\frac{\sqrt{3}}{2}\right)$
163. The area of the region bounded by the curve $y = \cos x$ between $x = 0$ and $x = \pi$ is
 (a) 1 sq. unit (b) 4 sq. units
 (c) 2 sq. units (d) 3 sq. units
164. The area bounded by the line $y = x$, x -axis and ordinates $x = -1$ and $x = 2$ is
 (a) $\frac{3}{2}$ (b) $\frac{5}{2}$
 (c) 2 (d) 3
165. The degree and the order of the differential equation $\frac{d^2y}{dx^2} = \sqrt[3]{1 + \left(\frac{dy}{dx}\right)^2}$ respectively are
 (a) 2 and 3 (b) 3 and 2
 (c) 2 and 2 (d) 3 and 3

166. The solution of the differential equation $x \frac{dy}{dx} - y = 3$ represents a family of
 (a) straight lines (b) circles
 (c) parabolas (d) ellipses
167. The integrating factor of $\frac{dy}{dx} + y = \frac{1+y}{x}$ is
 (a) xe^x (b) $xe^{1/x}$
 (c) $\frac{e^x}{x}$ (d) $\frac{x}{e^x}$
168. If $|\vec{a} \times \vec{b}|^2 + |\vec{a} \cdot \vec{b}|^2 = 144$ and $|\vec{a}| = 4$, then the value of $|\vec{b}|$ is
 (a) 1 (b) 2
 (c) 3 (d) 4
169. If $\vec{a}$ and $\vec{b}$ are mutually perpendicular unit vectors, then $(3\vec{a} + 2\vec{b}) \cdot (5\vec{a} - 6\vec{b}) =$
 (a) 5 (b) 3
 (c) 6 (d) 12
170. If the vectors $a\hat{i} + \hat{j} + \hat{k}$, $\hat{i} + b\hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + c\hat{k}$ are coplanar ($a \neq b \neq c \neq 1$), then the value of $abc - (a + b + c) =$
 (a) 2 (b) -2
 (c) 0 (d) -1
171. If $\vec{a} = \hat{i} + \lambda\hat{j} + 2\hat{k}$; $\vec{b} = \mu\hat{i} + \hat{j} - \hat{k}$ are orthogonal and $|\vec{a}| = |\vec{b}|$ then $(\lambda, \mu) =$
 (a) $(\frac{1}{4}, \frac{7}{4})$ (b) $(\frac{7}{4}, \frac{1}{4})$
 (c) $(\frac{1}{4}, \frac{9}{4})$ (d) $(\frac{-1}{4}, \frac{9}{4})$
172. The image of the point $(1, 6, 3)$ in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ is
 (a) $(1, 0, 7)$ (b) $(7, 0, 1)$
 (c) $(2, 7, 0)$ (d) $(-1, -6, -3)$
173. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is
 (a) 0° (b) 45°
 (c) 90° (d) 30°
174. The value of k such that the line $\frac{x-4}{1} = \frac{y-2}{1} = \frac{z-k}{2}$ lies on the plane $2x - 4y + z = 7$ is
 (a) -7 (b) 4
 (c) -4 (d) 7
175. The locus represented by $xy + yz = 0$ is
 (a) a pair of perpendicular lines
 (b) a pair of parallel lines
 (c) a pair of parallel planes
 (d) a pair of perpendicular planes
176. The feasible region of an LPP is shown in the figure. If $z = 3x + 9y$, then the minimum value of z occurs at



- (a) (5,5) (b) (0,10)
 (c) (0,20) (d) (15,15)

177. For the LPP; maximize $z = x + 4y$ subject to the constraints $x + 2y \leq 2, x + 2y \geq 8, x, y \geq 0$

- (a) $Z_{\max} = 4$ (b) $Z_{\max} = 18$
(c) $Z_{\max} = 16$ (d) Has no feasible solution

178. For the probability distribution given by

$X = x_i$	0	1	2
P_i	$\frac{25}{36}$	$\frac{5}{18}$	$\frac{1}{36}$

The standard deviation (σ) is

- (a) $\sqrt{\frac{1}{3}}$ (b) $\frac{1}{3}\sqrt{\frac{5}{2}}$
(c) $\sqrt{\frac{5}{36}}$ (d) None of the above

179. A bag contains 17 tickets numbered from 1 to 17. A ticket is drawn at random, then another ticket is drawn without replacing the first one. The probability that both the tickets may show even numbers is

- (a) $\frac{7}{34}$ (b) $\frac{8}{17}$
(c) $\frac{7}{16}$ (d) $\frac{7}{17}$

180. A flashlight has 10 batteries out of which 4 are dead. If 3 batteries are selected without replacement and tested, then the probability that all 3 are dead is

- (a) $\frac{1}{30}$ (b) $\frac{2}{8}$
(c) $\frac{1}{15}$ (d) $\frac{1}{10}$

Biology

181. The correct sequence of taxonomic hierarchy is

- (a) Genus $\rightarrow$ Family $\rightarrow$ Class $\rightarrow$ Order $\rightarrow$ Phylum $\rightarrow$ Kingdom $\rightarrow$ Species
(b) Species $\rightarrow$ Genus $\rightarrow$ Family $\rightarrow$ Order $\rightarrow$ Class $\rightarrow$ Phylum $\rightarrow$ Kingdom
(c) Species $\rightarrow$ Family $\rightarrow$ Genus $\rightarrow$ Kingdom $\rightarrow$ Order $\rightarrow$ Class $\rightarrow$ Phylum
(d) Species $\rightarrow$ Genus $\rightarrow$ Family $\rightarrow$ Class $\rightarrow$ Order $\rightarrow$ Phylum $\rightarrow$ Kingdom

182. Match the animals of Column I with their respective classes in Column II and choose the correct answer.

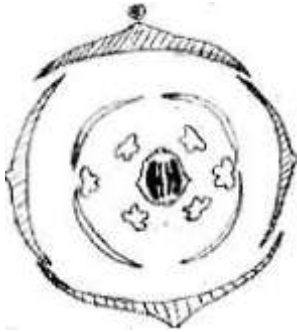
Column-I	Column-II
1. Aptenodytes	I. Aves
2. Hemidactylus	II. Chondrichthyes
3. Carcharodon	III. Mammalia
4. Pteropus	IV. Reptilia
	V. Osteichthyes

Select the code for the correct answer from the options given below:

1 2 3 4

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

183. Choose the correct floral formula of the given floral diagram.



- (a) $\oplus \begin{matrix} \text{♂} \\ \text{♀} \end{matrix} K_{(2+2)} C_4 A_{4+2} G_{(3)}$
(b) $\oplus \begin{matrix} \text{♂} \\ \text{♀} \end{matrix} K_{(3)+2} \overset{\curvearrowright}{C}_4 A_4 G_{(2+1)}$
(c) $\oplus \begin{matrix} \text{♂} \\ \text{♀} \end{matrix} K_{2+2} C_4 A_{2+4} G_{(2)}$
(d) $\oplus \begin{matrix} \text{♂} \\ \text{♀} \end{matrix} K_{2+2} C_4 A_{2+4} G_2$

184. In which type of vascular bundles are Xylem and Phloem present at the same radius?

- (a) Radial (b) Closed
(c) Conjoint (d) Exarch

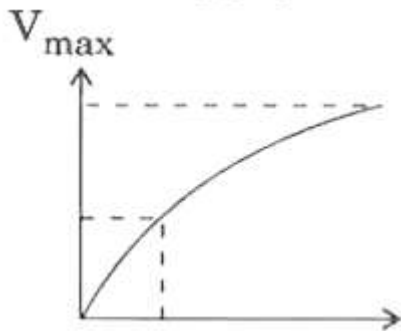
185. Conjunctive tissue is present between (i) and (ii) in (iii).

- (a) (i) Pericycle (ii) Endodermis (iii) Dicot root
(b) (i) Xylem (ii) Phloem (iii) Dicot root
(c) (i) Palisade parenchyma (ii) Spongy parenchyma (iii) Dicot leaf
(d) (i) Xylem (ii) Phloem (iii) Dicot stem

186. Identify the major site of biosynthesis of lipids.

- (a) Golgi apparatus
(b) Mitochondria
(c) Smooth endoplasmic reticulum (SER)
(d) Rough endoplasmic reticulum (RER)

187. The following graph shows concentration of substrate on enzyme activity:



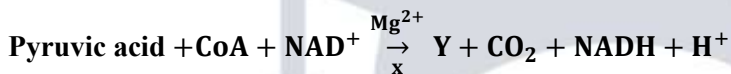
What does the Y-axis represent?

- (a) Temperature (b) Velocity of reaction
(c) pH (d) Pressure

188. In the maize plant, CO₂ fixation occurs in both mesophyll and bundle sheath cells. The enzymes involved in these cells for the process respectively are

- (a) RuBisCO and PEP Kinase
(b) PEP Kinase and Pepsin
(c) RuBisCO and PEP Carboxylase
(d) PEP Carboxylase and RuBisCO

189. In the following reaction, identify X and Y respectively:



- (a) Water, Acetyl CoA
(b) Acetyl CoA, Pyruvate dehydrogenase
(c) Pyruvate dehydrogenase, Acetyl CoA
(d) Pyruvate dehydrogenase, Oxalo-acetic acid

190. Which of the following factors favourable for the formation oxyhaemoglobin in the alveoli human lungs?

- (a) High pCO₂
(b) Lower temperature
(c) High H⁺ concentration
(d) Low pO₂

191. Digestion of both starch and proteins is carried out by enzymes of

- (a) Gastric juice (b) Saliva
(c) Bile juice (d) Pancreatic juice

192. The type of epithelium found in the inner lining of PCT is

- (a) Squamous epithelium
(b) Cuboidal epithelium
(c) Glandular epithelium
(d) Ciliated epithelium

193. Select the correct Rh-blood groups of the parents, whose child is affected with erythroblastosis foetalis.

- (a) Both Father and Mother are Rh + ve
(b) Mother is Rh + ve and Father is Rh – ve

(c) Both Father and Mother are Rh -ve

(d) Father is Rh +ve and Mother is Rh -ve

194. In which of the following groups do the male and female gametophytes have independent, free living existence?

- (a) Bryophytes and Gymnosperms
- (b) Bryophytes and Pteridophytes
- (c) Pteridophytes and Gymnosperms
- (d) Algae and Gymnosperms

195. The hormones of "Fright, Fight and Flight" are

- (a) Thyroxin and Oxytocin
- (b) Thyroxin and Melatonin
- (c) Adrenaline and Nor-adrenaline
- (d) Gastrin and Secretin

196. In the given options, which one cannot propagate by vegetative means?

- (a) A marginal piece of bryophyllum leaf
- (b) A middle piece of sugarcane internode
- (c) A piece of potato tuber with eyes
- (d) A piece of ginger rhizome

197. Among the following statements related to pollens, choose the correct one.

Statement I: In 40% of angiosperms pollen grains are shed at 3 -celled stage.

Statement II: Intine is made of cellulose and pectin and it is discontinuous with germ pores.

- (a) Both I and II are correct
- (b) Both I and II are incorrect
- (c) I is correct and II is incorrect
- (d) I is incorrect and II is correct

198. Match the animals of Column I with the Column II and select the correct options among the following:

Column-I	Column II
1. DNA replication	I. RNA polymerase
2. Translation	II. DNA polymerase
3. Transcription	III. Reverse transcriptase
4. Reverse transcription	IV. Aminoacyl synthetase

Select the code for the correct answer from the options given below:

- (a) **1** **2** **3** **4**
II IV III I
- (b) II IV I III
- (c) II III IV I
- (d) II I IV III

199. When pollen grain is shed at 3-celled stage, name the cells it contains.

- (a) 1 vegetative cell and 2 male gametes
- (b) 2 vegetative cells and 1 male gamete

- (c) 2 generative cells and 1 male gamete
(d) 2 male gametes and 1 generative cell

200. Even in the absence of pollinators, assured seed set will be there in

- (a) Chasmogamous flowers
(b) Geitonogamy
(c) Cleistogamous flowers
(d) Xenogamy

201. The process of conversion of non-motile spermatids into motile spermatozoa is called

- (a) Spermiogenesis (b) Oogenesis
(c) Sporogenesis (d) Spermatogenesis

202. Several mammary ducts join to form a wider structure called

- (a) Lactiferous duct (b) Mammary lobe
(c) Mammary ampulla (d) Mammary tubules

203. The signals for the population process originate from

- (a) Muscles of uterus
(b) Fully developed foetus and placenta
(c) Placenta
(d) Hormones of ovaries and uterus

204. Match the following Column I with Column II :

Column-I	Column-II
1. Surgical methods	I. Condom
2. Barrier methods	II. Pills
3. Natural methods	III. Tubectomy
4. Chemical methods	IV. Lactational amenorrhea

Select the code for the correct answer from the options given below:

- (a) $\begin{matrix} 1 & 2 & 3 & 4 \\ \text{III} & \text{I} & \text{IV} & \text{II} \end{matrix}$
(b) $\begin{matrix} \text{III} & \text{IV} & \text{I} & \text{II} \end{matrix}$
(c) $\begin{matrix} \text{IV} & \text{III} & \text{II} & \text{I} \end{matrix}$
(d) $\begin{matrix} \text{II} & \text{I} & \text{III} & \text{IV} \end{matrix}$

205. The following factors indicate improved reproductive health of the society. Choose the correct option.

- (1) Better detection and cure of disease
(2) Better post-natal care
(3) Medically assisted deliveries
(4) Increased MMR

Select the code for the correct answer from the options given below:

- (a) 2,3 and 4 only (b) 1, 2 and 3 only
(c) 1,3 and 4 only (d) 1, 2 and 4 only

206. ABO blood type in man is an example of

- (1) Pleiotropy (2) Incomplete dominance
(3) Co-dominance (4) Multiple allelism

Select the code for the correct answer from the options given below:

- (a) 1, 2 and 3 only (b) 1, 3 and 4 only
(c) 3 and 4 only (d) 1, 2 and 4 only

207. The codon on mRNA are

CAU - CCU - AAA - CUG

Identify the correct sequence of amino acids.

- (a) His - Pro - Lys - Leu (b) Pro - His - Lys - Leu
(c) His - Pro - Leu - Lys (d) Pro - Leu - Lys - His

208. Choose the possible genotypes responsible for lightest skin colour in human beings.

- (a) AABbCC (b) AaBbCc
(c) aabbcc (d) AABbCc

209. Both male and female have normal vision though their fathers were colour blind, and mothers did not have any gene for colour blindness. The probability of their daughter becoming colour blind is

- (a) 0% (b) 15%
(c) 25% (d) 50%

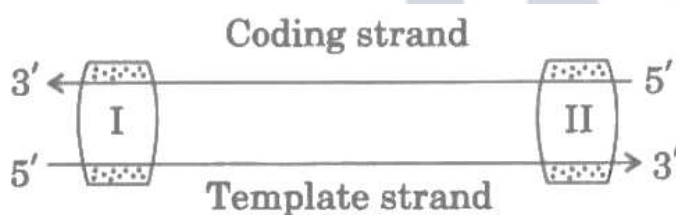
210. Find the nucleotide sequence of the mRNA which codes for the sequence of amino acids 'Met - Leu - Val - Arg - Ala' and choose the correct option from below :

- (a) AUG - GAU - GAA - UAU - UGU
(b) AUG - GAU - GAA - CGU - GCC
(c) AUG - CUA - GUG - UAU - UGU
(d) AUG - CUA - GUG - CGU - GCC

211. Sickle-cell anaemia is due to the following mutant gene:

- (a) CTC - CAC (b) CTC - GAG
(c) CAC - GUG (d) GAG - GUG

212. In the given transcription unit, identify the regions I and II respectively.



- (a) Promoter and Terminator
(b) Rho factor and Sigma factor
(c) Terminator and Promoter
(d) Operator and Inhibitor

213. Which of the following sequences of mRNA are required for translation process but are not translated?

- (a) Stop codons (b) Anticodons
(c) Sense codons (d) UTR

214. Identify the palindromic sequence in the following base sequences:

- (a)
$$\begin{array}{ccccccc} 5' & - & C & G & A & T & A & - & 3' \\ & & | & | & | & | & | & & \\ 3' & - & G & C & T & A & T & - & 5' \end{array}$$
- (b)
$$\begin{array}{ccccccc} 5' & - & G & G & A & T & C & C & - & 3' \\ & & | & | & | & | & | & & \\ 3' & - & C & C & T & A & G & G & - & 5' \end{array}$$
- (c)
$$\begin{array}{ccccccc} 5' & - & C & C & T & G & C & - & 3' \\ & & | & | & | & | & | & & \\ 3' & - & G & G & A & C & G & - & 5' \end{array}$$
- (d)
$$\begin{array}{ccccccc} 5' & - & G & A & A & T & T & G & - & 3' \\ & & | & | & | & | & | & & \\ 3' & - & C & T & T & A & A & C & - & 5' \end{array}$$

215. DNA, present in the nucleus, was named as 'Nuclein' by

- (a) James Watson and Crick
- (b) Friedrich Miescher
- (c) Maurice Wilkins
- (d) Rosalind Franklin

216. When does the lac-operon in *E. coli* become "switched on"?

- (a) Repressor binds to operator
- (b) RNA polymerase binds to operator
- (c) Lactose is present and it binds to the repressor
- (d) Lactose is present and it binds to RNA polymerase

217. The primary gases that were used by Miller in his experiment are

- (a) CH_4, NH_3, H_2O, H_2
- (b) CH_4, CO_2, N_2, SO_2
- (c) CH_4, CO_2, N_2, NH_3
- (d) CH_4, N_2, NH_3, H_2

218. From which of the given plants is the drug whose skeletal structure is given below extracted?



- (a) *Papaver somniferum*
- (b) *Atropa belladonna*
- (c) *Cannabis sativa*
- (d) *Erythroxylum coca*

219. The allele frequency of 'A' and 'a' in a population are 0.6 and 0.4 respectively. The expected frequency of heterozygous individuals is

- (a) 48%
- (b) 36%
- (c) 16%
- (d) 24%

220. Identify the odd one from the following:

- (a) α -Interferon
- (b) Oncogenic virus
- (c) Proto-oncogenes
- (d) UV rays

221. During replication of retrovirus

- (a) Viral protein is introduced into the host cell.
- (b) Viral RNA is introduced into the host cell.

(c) Viral DNA is introduced into the host cell.

(d) Transcriptase enzyme is introduced into the host cell

222. In malignant tumors, the cells divide rapidly and move to distant parts of the body and cause new tumors. This property is called

- (a) Metastasis (b) Metagenesis
(c) Teratogenesis (d) Mitosis

223. The breeding technique that is useful to expose harmful recessive genes is

- (a) Outbreeding (b) Artificial insemination
(c) Inbreeding (d) MOET

224. Germplasm collection refers to

- (a) Collection of all alleles for all genes in a crop.
(b) Collection of all alleles for few genes in a crop.
(c) Collection of different alleles for all genes in different crop plants.
(d) Collection of few alleles for all genes in several crop plants.

225. The microorganisms involved in floc formation during sewage treatment are

- (a) Anaerobic bacteria and fungus
(b) Aerobic bacteria and fungus
(c) Autotrophic bacteria and yeast
(d) Fungus and algae

226. Match the following bacteria of List-I with their commercial products of List-II:

List-I	List-II
1. Lactobacillus	I. Butyric acid
2. Aspergillus niger	II. Acetic acid
3. Acetobacteraceae	III. Lactic acid
4. Clostridium butyricum	IV. Citric acid

Select the code for the correct answer from the options given below:

1 2 3 4

(a) III II IV I (b) I IV III II

(c) III IV II I (d) III IV I II

227. The technique of bombarding plant cells with high velocity microparticle's of gold or tungsten, coated with DNA, is

- (a) Microinjection
(b) Biolistic method
(c) Heat shock method
(d) By disarmed pathogen vector

228. Choose the bacterium which is not a source of REN:

- (a) Haemophilus influenzae
- (b) Escherichia coli
- (c) Agrobacterium tumefaciens
- (d) Bacillus amyloliquefaciens

229. Silencing of a specific mRNA translation could be achieved through

- (a) Antisense RNA
- (b) RNA interference technique
- (c) Both (A) and (B)
- (d) Microinjection

230. In which of the following steps in DNA fingerprinting technique are labelled VNTR probes used?

- (a) During isolation of DNA
- (b) During digestion of DNA by REN
- (c) During electrophoresis
- (d) During hybridization

231. dsRNA is used to develop pest resistant tobacco plant by a technique called

- (a) Polymerase Chain Reaction (PCR)
- (b) RNA interference (RNAi)
- (c) Electrophoresis
- (d) Insertional Activation

232. The interaction between "Cuckoo and Crow" is an example for

- (a) Competition
- (b) Predation
- (c) Brood parasitism
- (d) Mutualism

233. Verhulst-Pearl logistic growth is described by the equation $\frac{dN}{dt} = rN \left[\frac{K-N}{K} \right]$, where 'r' and 'K' represent

- (a) r - intrinsic rate of natural decrease, K - carrying capacity
- (b) r - intrinsic rate of natural increase, K - carrying capacity
- (c) r - extrinsic rate of natural increase, K - productive capacity
- (d) r - extrinsic rate of natural decrease, K - carrying capacity

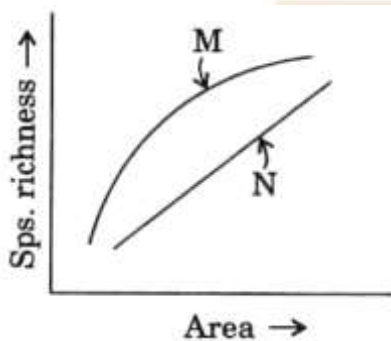
234. Net primary productivity (NPP) in an ecosystem is

- (a) $GPP - R = NPP$
- (b) $GPP + R = NPP$
- (c) $GPP - NPP = R$
- (d) $R - NPP = GPP$

235. Which among the following is not a functional unit of the ecosystem?

- (a) Decomposition
- (b) Nutrient cycling
- (c) Energy flow
- (d) Pollution

236. Match for M and N with species-area relationship shown in the graphic representation below and choose the correct option.



- a. $M \rightarrow S = CA^Z$, $N \rightarrow \log S = \log C + Z \log A$
- b. $M \rightarrow S = CZ^A$, $N \rightarrow \log C = \log S + Z \log A$
- c. $M \rightarrow S = CA^Z$, $N \rightarrow \log S = \log C + A \log Z$
- d. $M \rightarrow S = AZ^C$, $N \rightarrow \log ZA = \log C + \log S$

237. Select the option from the following which is not a major characteristic feature of biodiversity hotspots:

- (a) Large number of species
- (b) Destruction of habitats
- (c) Abundance of endemic species
- (d) Large number of exotic species

238. The biomagnification of which pollutant causes a decline in the bird population?

- (a) Mercury (b) SO_2
- (c) DDT (d) NO_2

239. Snow blindness is caused due to

- (a) Global warming (b) Ozone depletion
- (c) Greenhouse effect (d) Biomagnification

240. Match the items of Column-I with those of Column-II and choose the correct answer.

Column-I	Column-II
1. Hepatitis B vaccine	I. IgA
2. Preformed antibodies	II. Against snake venom
3. Colostrum	III. Neutrophils
4. PMNL	IV. Yeast
	V. Basophils

Select the code for the correct answer from the options given below:

- (a)

1	2	3	4
IV	II	I	III
- (b)

I	II	IV	III
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- (c)

IV	II	I	V
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- (d)

V	II	IV	I
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