Test Booklet Code

E6

KHANA

No. :

This Booklet contains 24 pages.

Do not open this Test Booklet until you are asked to do so.

Important Instructions :

1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on **side-1** and **side-2** carefully with **blue/black** ball point pen only.
2. The test is of **3 hours** duration and Test Booklet contains **180** questions. Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, **one mark** will be deducted from the total scores. The maximum marks are **720**.
3. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. **On completion of the test, the candidate must hand over the Answer Sheet to the invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.**
6. The CODE for this Booklet is **E6**. Make sure that the CODE printed on **Side-2** of the Answer Sheet is the same as that on this Test Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
7. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/ Answer Sheet.
8. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
9. Each candidate must show on demand his/her Admit Card to the Invigilator.
10. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
11. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. **Cases where a candidate has not signed the Attendance Sheet second time will be deemed not to have handed over the Answer Sheet and dealt with as an unfair means case.**
12. Use of Electronic/Manual Calculator is prohibited.
13. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
14. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
15. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

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Candidate's Signature : _____ Invigilator's Signature : _____

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1. A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth ?

(1) 48 N
(2) 32 N
(3) 30 N
(4) 24 N

2. In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly decreased, the beat frequency increases to 7 Hz. If the frequency of A is 530 Hz, the original frequency of B will be :

(1) 523 Hz
(2) 524 Hz
(3) 536 Hz
(4) 537 Hz

3. The capacitance of a parallel plate capacitor with air as medium is 6 μF. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is :

($\epsilon_0 = 8.85 \times 10^{-12}$ C^2 N^{-1} m^{-2})

(1) 0.44×10^{-13} C^2 N^{-1} m^{-2}
(2) 1.77×10^{-12} C^2 N^{-1} m^{-2}
(3) 0.44×10^{-10} C^2 N^{-1} m^{-2}
(4) 5.00 C^2 N^{-1} m^{-2}

4. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.

The pitch of the screw gauge is :

(1) 0.01 mm
(2) 0.25 mm
(3) 0.5 mm
(4) 1.0 mm

5. A short electric dipole has a dipole moment of 16×10^{-9} C m. The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole, situated on a line making an angle of 60° with the dipole axis is :

$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2\right)$

(1) 50 V
(2) 200 V
(3) 400 V
(4) zero

6. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, then the angle of incidence is nearly equal to :

(1) $\frac{A}{2\mu}$
(2) $\frac{2A}{\mu}$
(3) μA
(4) $\frac{\mu A}{2}$

7. A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere ?

$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2\right)$

(1) 1.28×10^4 N/C
(2) 1.28×10^5 N/C
(3) 1.28×10^6 N/C
(4) 1.28×10^7 N/C

8. For transistor action, which of the following statements is **correct** ?

(1) Base, emitter and collector regions should have same doping concentrations.
(2) Base, emitter and collector regions should have same size.
(3) Both emitter junction as well as the collector junction are forward biased.
(4) The base region must be very thin and lightly doped.

9. Dimensions of stress are :

(1) $[ML T^{-2}]$
(2) $[ML^2T^{-2}]$
(3) $[ML^0T^{-2}]$
(4) $[ML^{-1}T^{-2}]$

10. In a certain region of space with volume 0.2 m^3, the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is :

(1) zero
(2) 0.5 N/C
(3) 1 N/C
(4) 5 N/C

11. When a uranium isotope $^{235}_{92}U$ is bombarded with a neutron, it generates $^{89}_{36}Kr$, three neutrons and :

(1) $^{144}_{56}Ba$

(2) $^{91}_{40}Zr$

(3) $^{101}_{36}Kr$

(4) $^{103}_{36}Kr$

12. The increase in the width of the depletion region in a p-n junction diode is due to :

(1) forward bias only

(2) reverse bias only

(3) both forward bias and reverse bias

(4) increase in forward current

13. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is : ($g = 10\ m/s^2$)

(1) 360 m

(2) 340 m

(3) 320 m

(4) 300 m

14. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 ($r_1 = 1.5\ r_2$) through 1 K are in the ratio :

(1) $\frac{27}{8}$

(2) $\frac{9}{4}$

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

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

15. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C.

Its density is : ($R = 8.3\ J\ mol^{-1}\ K^{-1}$)

(1) $0.5\ kg/m^3$

(2) $0.2\ kg/m^3$

(3) $0.1\ kg/m^3$

(4) $0.02\ kg/m^3$

16. For which one of the following, Bohr model is **not** valid ?

(1) Hydrogen atom

(2) Singly ionised helium atom (He^+)

(3) Deuteron atom

(4) Singly ionised neon atom (Ne^+)

17. A wire of length L, area of cross section A is hanging from a fixed support. The length of the wire changes to L_1 when mass M is suspended from its free end. The expression for Young's modulus is :

(1) $\frac{MgL_1}{AL}$

(2) $\frac{Mg(L_1 - L)}{AL}$

(3) $\frac{MgL}{AL_1}$

(4) $\frac{MgL}{A(L_1 - L)}$

18. The solids which have the negative temperature coefficient of resistance are :

(1) metals

(2) insulators only

(3) semiconductors only

(4) insulators and semiconductors

19. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is :

(1) π rad

(2) $\frac{3\pi}{2}$ rad

(3) $\frac{\pi}{2}$ rad

(4) zero

20. Light with an average flux of $20\ W/cm^2$ falls on a non-reflecting surface at normal incidence having surface area $20\ cm^2$. The energy received by the surface during time span of 1 minute is :

(1) $10 \times 10^3\ J$

(2) $12 \times 10^3\ J$

(3) $24 \times 10^3\ J$

(4) $48 \times 10^3\ J$

21. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (c = speed of electromagnetic waves)

(1) c : 1
(2) 1 : 1
(3) 1 : c
(4) $1 : c^2$

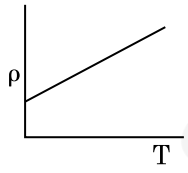
22. In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes :

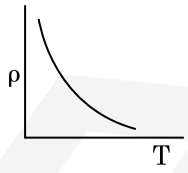
(1) double
(2) half
(3) four times
(4) one-fourth

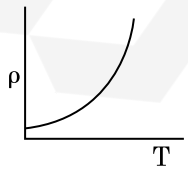
23. An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of the electron is 1.227×10^{-2} nm, the potential difference is :

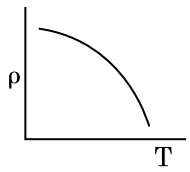
(1) 10 V
(2) 10^2 V
(3) 10^3 V
(4) 10^4 V

24. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper ?

(1) 

(2) 

(3) 

(4) 

25. The average thermal energy for a mono-atomic gas is : (k_B is Boltzmann constant and T, absolute temperature)

(1) $\frac{1}{2} k_B T$
(2) $\frac{3}{2} k_B T$
(3) $\frac{5}{2} k_B T$
(4) $\frac{7}{2} k_B T$

26. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is :

($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) 6.28×10^{-4} T
(2) 3.14×10^{-4} T
(3) 6.28×10^{-5} T
(4) 3.14×10^{-5} T

27. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeability of the material of the rod is :

($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) $2.4\pi \times 10^{-4}$ T m A^{-1}
(2) 8.0×10^{-5} T m A^{-1}
(3) $2.4\pi \times 10^{-5}$ T m A^{-1}
(4) $2.4\pi \times 10^{-7}$ T m A^{-1}

28. Taking into account of the significant figures, what is the value of 9.99 m – 0.0099 m ?

(1) 9.9801 m
(2) 9.98 m
(3) 9.980 m
(4) 9.9 m

29. A charged particle having drift velocity of 7.5×10^{-4} m s^{-1} in an electric field of 3×10^{-10} Vm^{-1}, has a mobility in m^2 V^{-1} s^{-1} of :

(1) 2.25×10^{15}
(2) 2.5×10^{6}
(3) 2.5×10^{-6}
(4) 2.25×10^{-15}

30. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass.
The centre of mass of the system from the 5 kg particle is nearly at a distance of :
(1) 33 cm
(2) 50 cm
(3) 67 cm
(4) 80 cm

31. The mean free path for a gas, with molecular diameter d and number density n can be expressed as :
(1) $\frac{1}{\sqrt{2}\, n\pi d}$
(2) $\frac{1}{\sqrt{2}\, n\pi d^2}$
(3) $\frac{1}{\sqrt{2}\, n^2\pi d^2}$
(4) $\frac{1}{\sqrt{2}\, n^2\pi^2 d^2}$

32. The energy equivalent of 0.5 g of a substance is :
(1) 4.5×10^{16} J
(2) 4.5×10^{13} J
(3) 1.5×10^{13} J
(4) 0.5×10^{13} J

33. A resistance wire connected in the left gap of a metre bridge balances a 10 Ω resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of 1 Ω of the resistance wire is :
(1) 1.0×10^{-2} m
(2) 1.0×10^{-1} m
(3) 1.5×10^{-1} m
(4) 1.5×10^{-2} m

34. The Brewsters angle i_b for an interface should be :
(1) $0° < i_b < 30°$
(2) $30° < i_b < 45°$
(3) $45° < i_b < 90°$
(4) $i_b = 90°$

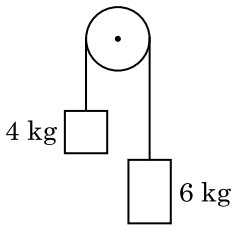
35. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of the water in the capillary is 5 g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is :
(1) 2.5 g
(2) 5.0 g
(3) 10.0 g
(4) 20.0 g

36. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m.
(1) $6\hat{i}$ N m
(2) $6\hat{j}$ N m
(3) $-6\hat{i}$ N m
(4) $6\hat{k}$ N m

37. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\frac{\pi}{3}$. If instead C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$ between current and voltage. The power factor of the circuit is :
(1) zero
(2) 0.5
(3) 1.0
(4) −1.0

38. The energy required to break one bond in DNA is 10^{-20} J. This value in eV is nearly :
(1) 6
(2) 0.6
(3) 0.06
(4) 0.006

39. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is :



(1) g
(2) g/2
(3) g/5
(4) g/10

40. A 40 μF capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly :

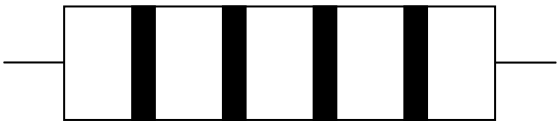
(1) 1.7 A

(2) 2.05 A

(3) 2.5 A

(4) 25.1 A

41. The color code of a resistance is given below :



The values of resistance and tolerance, respectively, are :

(1) 470 kΩ, 5%

(2) 47 kΩ, 10%

(3) 4.7 kΩ, 5%

(4) 470 Ω, 5%

42. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is :

(1) 3.66×10^{-7} rad

(2) 1.83×10^{-7} rad

(3) 7.32×10^{-7} rad

(4) 6.00×10^{-7} rad

43. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is :

(1) isothermal

(2) adiabatic

(3) isochoric

(4) isobaric

44. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled ?

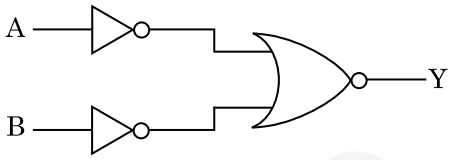
(1) doubled

(2) four times

(3) one-fourth

(4) zero

45. For the logic circuit shown, the truth table is :



(1)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(2)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(3)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(4)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

46. Match the following :

	Oxide		**Nature**
(a)	CO	(i)	Basic
(b)	BaO	(ii)	Neutral
(c)	Al_2O_3	(iii)	Acidic
(d)	Cl_2O_7	(iv)	Amphoteric

Which of the following is **correct** option ?

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iii)	(iv)
(2)	(ii)	(i)	(iv)	(iii)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iv)	(iii)	(ii)	(i)

47. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals.

(1) Iron

(2) Copper

(3) Calcium

(4) Potassium

48. The number of Faradays(F) required to produce 20 g of calcium from molten $CaCl_2$ (Atomic mass of Ca = 40 g mol^{-1}) is :

(1) 1
(2) 2
(3) 3
(4) 4

49. Which of the following alkane cannot be made in good yield by Wurtz reaction ?

(1) n-Hexane
(2) 2,3-Dimethylbutane
(3) n-Heptane
(4) n-Butane

50. The freezing point depression constant (K_f) of benzene is 5.12 K kg mol^{-1}. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is (rounded off upto two decimal places) :

(1) 0.20 K
(2) 0.80 K
(3) 0.40 K
(4) 0.60 K

51. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is :

(a) β-Elimination reaction
(b) Follows Zaitsev rule
(c) Dehydrohalogenation reaction
(d) Dehydration reaction

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

52. Match the following and identify the **correct** option.

(a)	$CO(g) + H_2(g)$	(i)	$Mg(HCO_3)_2 + Ca(HCO_3)_2$
(b)	Temporary hardness of water	(ii)	An electron deficient hydride
(c)	B_2H_6	(iii)	Synthesis gas
(d)	H_2O_2	(iv)	Non-planar structure

	(a)	(b)	(c)	(d)
(1)	(iii)	(i)	(ii)	(iv)
(2)	(iii)	(ii)	(i)	(iv)
(3)	(iii)	(iv)	(ii)	(i)
(4)	(i)	(iii)	(ii)	(iv)

53. Which one of the followings has maximum number of atoms ?

(1) 1 g of Ag(s) [Atomic mass of Ag = 108]
(2) 1 g of Mg(s) [Atomic mass of Mg = 24]
(3) 1 g of O_2(g) [Atomic mass of O = 16]
(4) 1 g of Li(s) [Atomic mass of Li = 7]

54. The rate constant for a first order reaction is 4.606×10^{-3} s^{-1}. The time required to reduce 2.0 g of the reactant to 0.2 g is :

(1) 100 s
(2) 200 s
(3) 500 s
(4) 1000 s

55. Which of the following is the **correct** order of increasing field strength of ligands to form coordination compounds ?

(1) $SCN^- < F^- < C_2O_4^{2-} < CN^-$
(2) $SCN^- < F^- < CN^- < C_2O_4^{2-}$
(3) $F^- < SCN^- < C_2O_4^{2-} < CN^-$
(4) $CN^- < C_2O_4^{2-} < SCN^- < F^-$

56. A mixture of N_2 and Ar gases in a cylinder contains 7 g of N_2 and 8 g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N_2 is :

[Use atomic masses (in g mol^{-1}) : N = 14, Ar = 40]

(1) 9 bar
(2) 12 bar
(3) 15 bar
(4) 18 bar

57. Measuring Zeta potential is useful in determining which property of colloidal solution ?

(1) Viscosity
(2) Solubility
(3) Stability of the colloidal particles
(4) Size of the colloidal particles

58. Sucrose on hydrolysis gives :

(1) β-D-Glucose + α-D-Fructose
(2) α-D-Glucose + β-D-Glucose
(3) α-D-Glucose + β-D-Fructose
(4) α-D-Fructose + β-D-Fructose

59. Find out the solubility of $Ni(OH)_2$ in 0.1 M NaOH. Given that the ionic product of $Ni(OH)_2$ is 2×10^{-15}.

(1) 2×10^{-13} M

(2) 2×10^{-8} M

(3) 1×10^{-13} M

(4) 1×10^{8} M

60. The mixture which shows positive deviation from Raoult's law is :

(1) Ethanol + Acetone

(2) Benzene + Toluene

(3) Acetone + Chloroform

(4) Chloroethane + Bromoethane

61. Identify a molecule which does **not** exist.

(1) He_2

(2) Li_2

(3) C_2

(4) O_2

62. Identify the **incorrect** statement.

(1) $Cr^{2+}(d^4)$ is a stronger reducing agent than $Fe^{2+}(d^6)$ in water.

(2) The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes.

(3) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.

(4) The oxidation states of chromium in CrO_4^{2-} and $Cr_2O_7^{2-}$ are not the same.

63. Which of the following is a basic amino acid ?

(1) Serine

(2) Alanine

(3) Tyrosine

(4) Lysine

64. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is :

(1) $\frac{\sqrt{3}}{4}\times 288$ pm

(2) $\frac{\sqrt{2}}{4}\times 288$ pm

(3) $\frac{4}{\sqrt{3}}\times 288$ pm

(4) $\frac{4}{\sqrt{2}}\times 288$ pm

65. Hydrolysis of sucrose is given by the following reaction.

$$\text{Sucrose} + H_2O \rightleftharpoons \text{Glucose} + \text{Fructose}$$

If the equilibrium constant (K_c) is 2×10^{13} at 300 K, the value of $\Delta_r G^{\ominus}$ at the same temperature will be :

(1) $-8.314\,J\,mol^{-1}K^{-1}\times300\,K\times\ln(2\times10^{13})$

(2) $8.314\,J\,mol^{-1}K^{-1}\times300\,K\times\ln(2\times10^{13})$

(3) $8.314\,J\,mol^{-1}K^{-1}\times300\,K\times\ln(3\times10^{13})$

(4) $-8.314\,J\,mol^{-1}K^{-1}\times300\,K\times\ln(4\times10^{13})$

66. Which of the following is a natural polymer ?

(1) *cis*-1,4-polyisoprene

(2) poly (Butadiene-styrene)

(3) polybutadiene

(4) poly (Butadiene-acrylonitrile)

67. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following ?

(1) $-$I effect of $-CH_3$ groups

(2) $+$R effect of $-CH_3$ groups

(3) $-$R effect of $-CH_3$ groups

(4) Hyperconjugation

68. An increase in the concentration of the reactants of a reaction leads to change in :

(1) activation energy

(2) heat of reaction

(3) threshold energy

(4) collision frequency

69. Which of the following is **not** correct about carbon monoxide ?

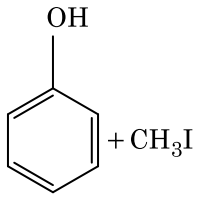
(1) It forms carboxyhaemoglobin.

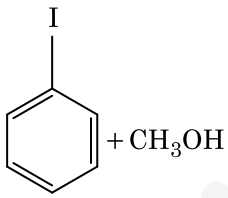
(2) It reduces oxygen carrying ability of blood.

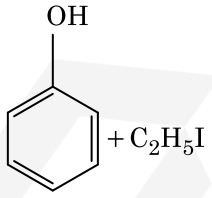
(3) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.

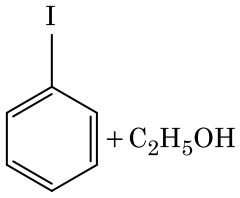
(4) It is produced due to incomplete combustion.

70. Anisole on cleavage with HI gives :

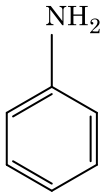
(1) 

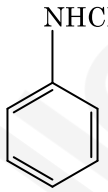
(2) 

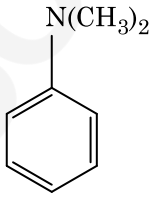
(3) 

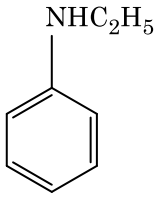
(4) 

71. Which of the following amine will give the carbylamine test ?

(1) 

(2) 

(3) 

(4) 

72. Identify the **incorrect** match.

	Name		**IUPAC Official Name**
(a)	Unnilunium	(i)	Mendelevium
(b)	Unniltrium	(ii)	Lawrencium
(c)	Unnilhexium	(iii)	Seaborgium
(d)	Unununnium	(iv)	Darmstadtium

(1) (a), (i)

(2) (b), (ii)

(3) (c), (iii)

(4) (d), (iv)

73. On electrolysis of dil.sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be :

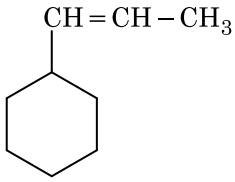
(1) Hydrogen gas

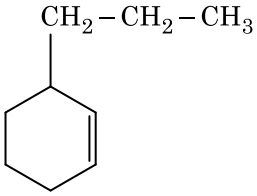
(2) Oxygen gas

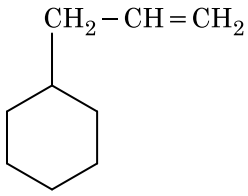
(3) H_2S gas

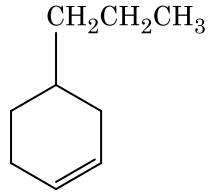
(4) SO_2 gas

74. An alkene on ozonolysis gives methanal as one of the product. Its structure is :

(1) 

(2) 

(3) 

(4) 

75. Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give :

(1) Isopropyl alcohol

(2) Sec. butyl alcohol

(3) Tert. butyl alcohol

(4) Isobutyl alcohol

76. The calculated spin only magnetic moment of Cr^{2+} ion is :

(1) 3.87 BM

(2) 4.90 BM

(3) 5.92 BM

(4) 2.84 BM

77. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as :

(1) Aldol condensation

(2) Cannizzaro's reaction

(3) Cross Cannizzaro's reaction

(4) Cross Aldol condensation

78. Which of the following oxoacid of sulphur has – O – O – linkage ?

(1) H_2SO_3, sulphurous acid

(2) H_2SO_4, sulphuric acid

(3) $H_2S_2O_8$, peroxodisulphuric acid

(4) $H_2S_2O_7$, pyrosulphuric acid

79. Which of the following set of molecules will have zero dipole moment ?

(1) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene

(2) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene

(3) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene

(4) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene

80. The number of protons, neutrons and electrons in $^{175}_{71}Lu$, respectively, are :

(1) 71, 104 and 71

(2) 104, 71 and 71

(3) 71, 71 and 104

(4) 175, 104 and 71

81. Identify the **correct** statements from the following :

(a) $CO_2(g)$ is used as refrigerant for ice-cream and frozen food.

(b) The structure of C_{60} contains twelve six carbon rings and twenty five carbon rings.

(c) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.

(d) CO is colorless and odourless gas.

(1) (a), (b) and (c) only

(2) (a) and (c) only

(3) (b) and (c) only

(4) (c) and (d) only

82. Urea reacts with water to form **A** which will decompose to form **B**. **B** when passed through Cu^{2+} (aq), deep blue colour solution **C** is formed. What is the formula of **C** from the following ?

(1) $CuSO_4$

(2) $[Cu(NH_3)_4]^{2+}$

(3) $Cu(OH)_2$

(4) $CuCO_3 \cdot Cu(OH)_2$

83. Which of the following is a cationic detergent ?

(1) Sodium lauryl sulphate

(2) Sodium stearate

(3) Cetyltrimethyl ammonium bromide

(4) Sodium dodecylbenzene sulphonate

84. For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, the **correct** option is :

(1) $\Delta_r H > 0$ and $\Delta_r S > 0$

(2) $\Delta_r H > 0$ and $\Delta_r S < 0$

(3) $\Delta_r H < 0$ and $\Delta_r S > 0$

(4) $\Delta_r H < 0$ and $\Delta_r S < 0$

85. Identify the **correct** statement from the following :

(1) Wrought iron is impure iron with 4% carbon.

(2) Blister copper has blistered appearance due to evolution of CO_2.

(3) Vapour phase refining is carried out for Nickel by Van Arkel method.

(4) Pig iron can be moulded into a variety of shapes.

86. The correct option for free expansion of an ideal gas under adiabatic condition is :

(1) $q = 0$, $\Delta T = 0$ and $w = 0$

(2) $q = 0$, $\Delta T < 0$ and $w > 0$

(3) $q < 0$, $\Delta T = 0$ and $w = 0$

(4) $q > 0$, $\Delta T > 0$ and $w > 0$

87. HCl was passed through a solution of $CaCl_2$, $MgCl_2$ and NaCl. Which of the following compound(s) crystallise(s) ?

(1) Both $MgCl_2$ and $CaCl_2$

(2) Only NaCl

(3) Only $MgCl_2$

(4) NaCl, $MgCl_2$ and $CaCl_2$

88. What is the change in oxidation number of carbon in the following reaction ?

$$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(l) + 4HCl(g)$$

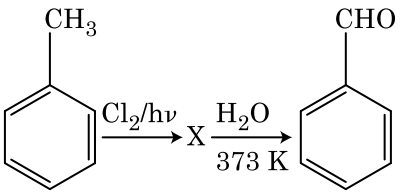
(1) $+4$ to $+4$

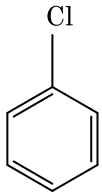
(2) 0 to $+4$

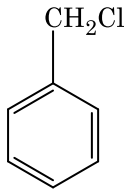
(3) -4 to $+4$

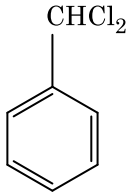
(4) 0 to -4

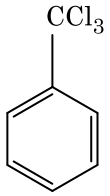
89. Identify compound X in the following sequence of reactions :



(1) 

(2) 

(3) 

(4) 

90. Paper chromatography is an example of :

(1) Adsorption chromatography
(2) Partition chromatography
(3) Thin layer chromatography
(4) Column chromatography

91. Dissolution of the synaptonemal complex occurs during :

(1) Pachytene
(2) Zygotene
(3) Diplotene
(4) Leptotene

92. Select the option including all sexually transmitted diseases.

(1) Gonorrhoea, Syphilis, Genital herpes
(2) Gonorrhoea, Malaria, Genital herpes
(3) AIDS, Malaria, Filaria
(4) Cancer, AIDS, Syphilis

93. Which of the following would help in prevention of diuresis ?

(1) More water reabsorption due to undersecretion of ADH
(2) Reabsorption of Na^+ and water from renal tubules due to aldosterone
(3) Atrial natriuretic factor causes vasoconstriction
(4) Decrease in secretion of renin by JG cells

94. Cuboidal epithelium with brush border of microvilli is found in :

(1) lining of intestine
(2) ducts of salivary glands
(3) proximal convoluted tubule of nephron
(4) eustachian tube

95. Identify the substances having glycosidic bond and peptide bond, respectively in their structure :

(1) Chitin, cholesterol
(2) Glycerol, trypsin
(3) Cellulose, lecithin
(4) Inulin, insulin

96. Bt cotton variety that was developed by the introduction of toxin gene of *Bacillus thuringiensis* (Bt) is resistant to :

(1) Insect pests
(2) Fungal diseases
(3) Plant nematodes
(4) Insect predators

97. The ovary is half inferior in :

(1) Brinjal
(2) Mustard
(3) Sunflower
(4) Plum

98. Identify the **incorrect** statement.

(1) Heart wood does not conduct water but gives mechanical support.

(2) Sapwood is involved in conduction of water and minerals from root to leaf.

(3) Sapwood is the innermost secondary xylem and is lighter in colour.

(4) Due to deposition of tannins, resins, oils etc., heart wood is dark in colour.

99. Select the **correct** events that occur during inspiration.

(a) Contraction of diaphragm

(b) Contraction of external inter-costal muscles

(c) Pulmonary volume decreases

(d) Intra pulmonary pressure increases

(1) (a) and (b)

(2) (c) and (d)

(3) (a), (b) and (d)

(4) only (d)

100. The process responsible for facilitating loss of water in liquid form from the tip of grass blades at night and in early morning is :

(1) Transpiration

(2) Root pressure

(3) Imbibition

(4) Plasmolysis

101. Identify the **wrong** statement with reference to immunity.

(1) When exposed to antigen (living or dead) antibodies are produced in the host's body. It is called "Active immunity".

(2) When ready-made antibodies are directly given, it is called "Passive immunity".

(3) Active immunity is quick and gives full response.

(4) Foetus receives some antibodies from mother, it is an example for passive immunity.

102. Match the following :

(a)	Inhibitor of catalytic activity	(i)	Ricin
(b)	Possess peptide bonds	(ii)	Malonate
(c)	Cell wall material in fungi	(iii)	Chitin
(d)	Secondary metabolite	(iv)	Collagen

Choose the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iv)	(iii)	(i)
(2)	(iii)	(i)	(iv)	(ii)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(ii)	(iii)	(i)	(iv)

103. Identify the **correct** statement with regard to G_1 phase (Gap 1) of interphase.

(1) DNA synthesis or replication takes place.

(2) Reorganisation of all cell components takes place.

(3) Cell is metabolically active, grows but does not replicate its DNA.

(4) Nuclear Division takes place.

104. Experimental verification of the chromosomal theory of inheritance was done by :

(1) Mendel

(2) Sutton

(3) Boveri

(4) Morgan

105. Which of the following hormone levels will cause release of ovum (ovulation) from the graffian follicle ?

(1) High concentration of Estrogen

(2) High concentration of Progesterone

(3) Low concentration of LH

(4) Low concentration of FSH

106. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6×10^9 bp, then the length of the DNA is approximately :

(1) 2.0 meters

(2) 2.5 meters

(3) 2.2 meters

(4) 2.7 meters

107. Which of the following statements are **true** for the phylum-Chordata ?

(a) In Urochordata notochord extends from head to tail and it is present throughout their life.

(b) In Vertebrata notochord is present during the embryonic period only.

(c) Central nervous system is dorsal and hollow.

(d) Chordata is divided into 3 subphyla : Hemichordata, Tunicata and Cephalochordata.

(1) (d) and (c)

(2) (c) and (a)

(3) (a) and (b)

(4) (b) and (c)

108. The specific palindromic sequence which is recognized by EcoRI is :

(1) 5' - GAATTC - 3'
3' - CTTAAG - 5'

(2) 5' - GGAACC - 3'
3' - CCTTGG - 5'

(3) 5' - CTTAAG - 3'
3' - GAATTC - 5'

(4) 5' - GGATCC - 3'
3' - CCTAGG - 5'

109. Ray florets have :

(1) Inferior ovary

(2) Superior ovary

(3) Hypogynous ovary

(4) Half inferior ovary

110. Select the **correct** match.

(1) Haemophilia - Y linked

(2) Phenylketonuria - Autosomal dominant trait

(3) Sickle cell anaemia - Autosomal recessive trait, chromosome-11

(4) Thalassemia - X linked

111. How many true breeding pea plant varieties did Mendel select as pairs, which were similar except in one character with contrasting traits ?

(1) 4

(2) 2

(3) 14

(4) 8

112. In which of the following techniques, the embryos are transferred to assist those females who cannot conceive ?

(1) ZIFT and IUT

(2) GIFT and ZIFT

(3) ICSI and ZIFT

(4) GIFT and ICSI

113. The enzyme enterokinase helps in conversion of :

(1) protein into polypeptides

(2) trypsinogen into trypsin

(3) caseinogen into casein

(4) pepsinogen into pepsin

114. The sequence that controls the copy number of the linked DNA in the vector, is termed :

(1) Selectable marker

(2) Ori site

(3) Palindromic sequence

(4) Recognition site

115. Goblet cells of alimentary canal are modified from :

(1) Squamous epithelial cells

(2) Columnar epithelial cells

(3) Chondrocytes

(4) Compound epithelial cells

116. Which of the following statements about inclusion bodies is **incorrect** ?

(1) They are not bound by any membrane.

(2) These are involved in ingestion of food particles.

(3) They lie free in the cytoplasm.

(4) These represent reserve material in cytoplasm.

117. Which of the following statements is **correct** ?

(1) Adenine pairs with thymine through two H-bonds.

(2) Adenine pairs with thymine through one H-bond.

(3) Adenine pairs with thymine through three H-bonds.

(4) Adenine does not pair with thymine.

118. Identify the **wrong** statement with reference to the gene 'I' that controls ABO blood groups.

(1) The gene (I) has three alleles.

(2) A person will have only two of the three alleles.

(3) When I^A and I^B are present together, they express same type of sugar.

(4) Allele 'i' does not produce any sugar.

119. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Bt cotton	(i)	Gene therapy
(b)	Adenosine deaminase deficiency	(ii)	Cellular defence
(c)	RNAi	(iii)	Detection of HIV infection
(d)	PCR	(iv)	*Bacillus thuringiensis*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(i)	(ii)	(iii)
(2)	(iii)	(ii)	(i)	(iv)
(3)	(ii)	(iii)	(iv)	(i)
(4)	(i)	(ii)	(iii)	(iv)

120. Montreal protocol was signed in 1987 for control of :

(1) Transport of Genetically modified organisms from one country to another

(2) Emission of ozone depleting substances

(3) Release of Green House gases

(4) Disposal of e-wastes

121. Match the following diseases with the causative organism and select the **correct** option.

	Column - I		**Column - II**
(a)	Typhoid	(i)	*Wuchereria*
(b)	Pneumonia	(ii)	*Plasmodium*
(c)	Filariasis	(iii)	*Salmonella*
(d)	Malaria	(iv)	*Haemophilus*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(ii)	(i)	(iii)	(iv)
(4)	(iv)	(i)	(ii)	(iii)

122. Identify the **wrong** statement with regard to Restriction Enzymes.

(1) Each restriction enzyme functions by inspecting the length of a DNA sequence.

(2) They cut the strand of DNA at palindromic sites.

(3) They are useful in genetic engineering.

(4) Sticky ends can be joined by using DNA ligases.

123. The QRS complex in a standard ECG represents :

(1) Repolarisation of auricles

(2) Depolarisation of auricles

(3) Depolarisation of ventricles

(4) Repolarisation of ventricles

124. Which one of the following is the most abundant protein in the animals ?

(1) Haemoglobin

(2) Collagen

(3) Lectin

(4) Insulin

125. In gel electrophoresis, separated DNA fragments can be visualized with the help of :

(1) Acetocarmine in bright blue light

(2) Ethidium bromide in UV radiation

(3) Acetocarmine in UV radiation

(4) Ethidium bromide in infrared radiation

126. Which of the following is **not** an inhibitory substance governing seed dormancy ?

(1) Gibberellic acid

(2) Abscisic acid

(3) Phenolic acid

(4) Para-ascorbic acid

127. In water hyacinth and water lily, pollination takes place by :

(1) insects or wind

(2) water currents only

(3) wind and water

(4) insects and water

128. By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams ?

(1) Out crossing

(2) Mutational breeding

(3) Cross breeding

(4) Inbreeding

129. Presence of which of the following conditions in urine are indicative of Diabetes Mellitus ?

(1) Uremia and Ketonuria

(2) Uremia and Renal Calculi

(3) Ketonuria and Glycosuria

(4) Renal calculi and Hyperglycaemia

130. Which of the following refer to **correct** example(s) of organisms which have evolved due to changes in environment brought about by anthropogenic action ?

(a) Darwin's Finches of Galapagos islands.

(b) Herbicide resistant weeds.

(c) Drug resistant eukaryotes.

(d) Man-created breeds of domesticated animals like dogs.

(1) only (a)

(2) (a) and (c)

(3) (b), (c) and (d)

(4) only (d)

131. Embryological support for evolution was disapproved by :

(1) Karl Ernst von Baer

(2) Alfred Wallace

(3) Charles Darwin

(4) Oparin

132. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Floating Ribs	(i)	Located between second and seventh ribs
(b)	Acromion	(ii)	Head of the Humerus
(c)	Scapula	(iii)	Clavicle
(d)	Glenoid cavity	(iv)	Do not connect with the sternum

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iv)	(i)	(iii)
(2)	(i)	(iii)	(ii)	(iv)
(3)	(iii)	(ii)	(iv)	(i)
(4)	(iv)	(iii)	(i)	(ii)

133. The body of the ovule is fused within the funicle at :

(1) Hilum

(2) Micropyle

(3) Nucellus

(4) Chalaza

134. Which of the following is put into Anaerobic sludge digester for further sewage treatment ?

(1) Primary sludge

(2) Floating debris

(3) Effluents of primary treatment

(4) Activated sludge

135. The product(s) of reaction catalyzed by nitrogenase in root nodules of leguminous plants is/are :

(1) Ammonia alone

(2) Nitrate alone

(3) Ammonia and oxygen

(4) Ammonia and hydrogen

136. Choose the **correct** pair from the following :

(1) Ligases - Join the two DNA molecules

(2) Polymerases - Break the DNA into fragments

(3) Nucleases - Separate the two strands of DNA

(4) Exonucleases - Make cuts at specific positions within DNA

137. Name the plant growth regulator which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane crop.

(1) Cytokinin

(2) Gibberellin

(3) Ethylene

(4) Abscisic acid

138. Match the following columns and select the **correct** option.

	Column - I	**Column - II**
(a)	Gregarious, polyphagous pest	(i) *Asterias*
(b)	Adult with radial symmetry and larva with bilateral symmetry	(ii) Scorpion
(c)	Book lungs	(iii) *Ctenoplana*
(d)	Bioluminescence	(iv) *Locusta*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(iii)	(ii)	(i)	(iv)
(4)	(ii)	(i)	(iii)	(iv)

139. Identify the **wrong** statement with reference to transport of oxygen.

(1) Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2.

(2) Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin.

(3) Higher H^+ conc. in alveoli favours the formation of oxyhaemoglobin.

(4) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin.

140. Match the following concerning essential elements and their functions in plants :

(a)	Iron	(i)	Photolysis of water
(b)	Zinc	(ii)	Pollen germination
(c)	Boron	(iii)	Required for chlorophyll biosynthesis
(d)	Manganese	(iv)	IAA biosynthesis

Select the **correct** option :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(i)	(iv)	(iii)
(2)	(iv)	(iii)	(ii)	(i)
(3)	(iii)	(iv)	(ii)	(i)
(4)	(iv)	(i)	(ii)	(iii)

141. The transverse section of a plant shows following anatomical features :

(a) Large number of scattered vascular bundles surrounded by bundle sheath.

(b) Large conspicuous parenchymatous ground tissue.

(c) Vascular bundles conjoint and closed.

(d) Phloem parenchyma absent.

Identify the category of plant and its part :

(1) Monocotyledonous stem

(2) Monocotyledonous root

(3) Dicotyledonous stem

(4) Dicotyledonous root

142. In light reaction, plastoquinone facilitates the transfer of electrons from :

(1) PS-II to $Cytb_6f$ complex

(2) $Cytb_6f$ complex to PS-I

(3) PS-I to $NADP^+$

(4) PS-I to ATP synthase

143. Which of the following regions of the globe exhibits highest species diversity ?

(1) Western Ghats of India

(2) Madagascar

(3) Himalayas

(4) Amazon forests

144. The first phase of translation is :

(1) Binding of mRNA to ribosome

(2) Recognition of DNA molecule

(3) Aminoacylation of tRNA

(4) Recognition of an anti-codon

145. The infectious stage of *Plasmodium* that enters the human body is :

(1) Trophozoites

(2) Sporozoites

(3) Female gametocytes

(4) Male gametocytes

146. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells ?

(1) Endoplasmic reticulum

(2) Peroxisomes

(3) Golgi bodies

(4) Polysomes

147. Identify the basic amino acid from the following.

(1) Tyrosine

(2) Glutamic Acid

(3) Lysine

(4) Valine

148. The number of substrate level phosphorylations in one turn of citric acid cycle is :

(1) Zero

(2) One

(3) Two

(4) Three

149. From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask :

(1) CH_4, H_2, NH_3 and water vapor at 800°C

(2) CH_3, H_2, NH_4 and water vapor at 800°C

(3) CH_4, H_2, NH_3 and water vapor at 600°C

(4) CH_3, H_2, NH_3 and water vapor at 600°C

150. Strobili or cones are found in :

(1) *Salvinia*

(2) *Pteris*

(3) *Marchantia*

(4) *Equisetum*

151. Name the enzyme that facilitates opening of DNA helix during transcription.

(1) DNA ligase

(2) DNA helicase

(3) DNA polymerase

(4) RNA polymerase

152. The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of :

(1) 2 molecules of 3-C compound

(2) 1 molecule of 3-C compound

(3) 1 molecule of 6-C compound

(4) 1 molecule of 4-C compound and 1 molecule of 2-C compound

153. Floridean starch has structure similar to :

(1) Starch and cellulose

(2) Amylopectin and glycogen

(3) Mannitol and algin

(4) Laminarin and cellulose

154. The process of growth is maximum during :

(1) Log phase

(2) Lag phase

(3) Senescence

(4) Dormancy

155. Which of the following statements is **not correct** ?

(1) In man insulin is synthesised as a proinsulin.

(2) The proinsulin has an extra peptide called C-peptide.

(3) The functional insulin has A and B chains linked together by hydrogen bonds.

(4) Genetically engineered insulin is produced in *E-Coli*.

156. Select the **correct** statement.

(1) Glucocorticoids stimulate gluconeogenesis.

(2) Glucagon is associated with hypoglycemia.

(3) Insulin acts on pancreatic cells and adipocytes.

(4) Insulin is associated with hyperglycemia.

157. Match the following with respect to meiosis :

(a)	Zygotene	(i)	Terminalization
(b)	Pachytene	(ii)	Chiasmata
(c)	Diplotene	(iii)	Crossing over
(d)	Diakinesis	(iv)	Synapsis

Select the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(i)	(ii)
(2)	(iv)	(iii)	(ii)	(i)
(3)	(i)	(ii)	(iv)	(iii)
(4)	(ii)	(iv)	(iii)	(i)

158. If the head of cockroach is removed, it may live for few days because :

(1) the supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen.

(2) the cockroach does not have nervous system.

(3) the head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body.

(4) the head holds a 1/3rd of a nervous system while the rest is situated along the dorsal part of its body.

159. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	6 - 15 pairs of gill slits	(i)	*Trygon*
(b)	Heterocercal caudal fin	(ii)	Cyclostomes
(c)	Air Bladder	(iii)	Chondrichthyes
(d)	Poison sting	(iv)	Osteichthyes

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iii)	(iv)	(i)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(iv)	(ii)	(iii)	(i)
(4)	(i)	(iv)	(iii)	(ii)

160. The roots that originate from the base of the stem are :

(1) Fibrous roots

(2) Primary roots

(3) Prop roots

(4) Lateral roots

161. Identify the **correct** statement with reference to human digestive system.

(1) Ileum opens into small intestine.

(2) Serosa is the innermost layer of the alimentary canal.

(3) Ileum is a highly coiled part.

(4) Vermiform appendix arises from duodenum.

162. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	*Clostridium butylicum*	(i)	Cyclosporin-A
(b)	*Trichoderma polysporum*	(ii)	Butyric Acid
(c)	*Monascus purpureus*	(iii)	Citric Acid
(d)	*Aspergillus niger*	(iv)	Blood cholesterol lowering agent

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(ii)	(i)
(2)	(ii)	(i)	(iv)	(iii)
(3)	(i)	(ii)	(iv)	(iii)
(4)	(iv)	(iii)	(ii)	(i)

163. In relation to Gross primary productivity and Net primary productivity of an ecosystem, which one of the following statements is **correct** ?

(1) Gross primary productivity is always less than net primary productivity.

(2) Gross primary productivity is always more than net primary productivity.

(3) Gross primary productivity and Net primary productivity are one and same.

(4) There is no relationship between Gross primary productivity and Net primary productivity.

164. Match the following columns and select the **correct** option.

	Column - I		Column - II
(a)	Pituitary gland	(i)	Grave's disease
(b)	Thyroid gland	(ii)	Diabetes mellitus
(c)	Adrenal gland	(iii)	Diabetes insipidus
(d)	Pancreas	(iv)	Addison's disease

	(a)	(b)	(c)	(d)
(1)	(iv)	(iii)	(i)	(ii)
(2)	(iii)	(ii)	(i)	(iv)
(3)	(iii)	(i)	(iv)	(ii)
(4)	(ii)	(i)	(iv)	(iii)

165. Match the following columns and select the **correct** option.

	Column - I		Column - II
(a)	Placenta	(i)	Androgens
(b)	Zona pellucida	(ii)	Human Chorionic Gonadotropin (hCG)
(c)	Bulbo-urethral glands	(iii)	Layer of the ovum
(d)	Leydig cells	(iv)	Lubrication of the Penis

	(a)	(b)	(c)	(d)
(1)	(iv)	(iii)	(i)	(ii)
(2)	(i)	(iv)	(ii)	(iii)
(3)	(iii)	(ii)	(iv)	(i)
(4)	(ii)	(iii)	(iv)	(i)

166. Match the following columns and select the **correct** option.

	Column - I		Column - II
(a)	Organ of Corti	(i)	Connects middle ear and pharynx
(b)	Cochlea	(ii)	Coiled part of the labyrinth
(c)	Eustachian tube	(iii)	Attached to the oval window
(d)	Stapes	(iv)	Located on the basilar membrane

	(a)	(b)	(c)	(d)
(1)	(ii)	(iii)	(i)	(iv)
(2)	(iii)	(i)	(iv)	(ii)
(3)	(iv)	(ii)	(i)	(iii)
(4)	(i)	(ii)	(iv)	(iii)

167. Meiotic division of the secondary oocyte is completed :

(1) Prior to ovulation

(2) At the time of copulation

(3) After zygote formation

(4) At the time of fusion of a sperm with an ovum

168. Match the trophic levels with their **correct** species examples in grassland ecosystem.

(a)	Fourth trophic level	(i)	Crow
(b)	Second trophic level	(ii)	Vulture
(c)	First trophic level	(iii)	Rabbit
(d)	Third trophic level	(iv)	Grass

Select the **correct** option :

	(a)	(b)	(c)	(d)
(1)	(ii)	(iii)	(iv)	(i)
(2)	(iii)	(ii)	(i)	(iv)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(i)	(ii)	(iii)	(iv)

169. Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their :

(1) Nutritive value

(2) Growth response

(3) Defence action

(4) Effect on reproduction

170. Snow-blindness in Antarctic region is due to :

(1) Freezing of fluids in the eye by low temperature

(2) Inflammation of cornea due to high dose of UV-B radiation

(3) High reflection of light from snow

(4) Damage to retina caused by infra-red rays

171. Which of the following pairs is of unicellular algae ?

(1) *Laminaria* and *Sargassum*

(2) *Gelidium* and *Gracilaria*

(3) *Anabaena* and *Volvox*

(4) *Chlorella* and *Spirulina*

172. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Eosinophils	(i)	Immune response
(b)	Basophils	(ii)	Phagocytosis
(c)	Neutrophils	(iii)	Release histaminase, destructive enzymes
(d)	Lymphocytes	(iv)	Release granules containing histamine

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(ii)	(i)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(i)	(ii)	(iv)	(iii)
(4)	(ii)	(i)	(iii)	(iv)

173. According to Robert May, the global species diversity is about :

(1) 1.5 million
(2) 20 million
(3) 50 million
(4) 7 million

174. Flippers of Penguins and Dolphins are examples of :

(1) Adaptive radiation
(2) Convergent evolution
(3) Industrial melanism
(4) Natural selection

175. The plant parts which consist of two generations - one within the other :

(a) Pollen grains inside the anther
(b) Germinated pollen grain with two male gametes
(c) Seed inside the fruit
(d) Embryo sac inside the ovule

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

176. Which of the following is **correct** about viroids ?

(1) They have RNA with protein coat.
(2) They have free RNA without protein coat.
(3) They have DNA with protein coat.
(4) They have free DNA without protein coat.

177. Match the organism with its use in biotechnology.

(a)	*Bacillus thuringiensis*	(i)	Cloning vector
(b)	*Thermus aquaticus*	(ii)	Construction of first rDNA molecule
(c)	*Agrobacterium tumefaciens*	(iii)	DNA polymerase
(d)	*Salmonella typhimurium*	(iv)	Cry proteins

Select the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iv)	(iii)	(i)
(2)	(iv)	(iii)	(i)	(ii)
(3)	(iii)	(ii)	(iv)	(i)
(4)	(iii)	(iv)	(i)	(ii)

178. Which of the following is **not** an attribute of a population ?

(1) Sex ratio
(2) Natality
(3) Mortality
(4) Species interaction

179. Some dividing cells exit the cell cycle and enter vegetative inactive stage. This is called quiescent stage (G_0). This process occurs at the end of :

(1) M phase
(2) G_1 phase
(3) S phase
(4) G_2 phase

180. Bilaterally symmetrical and acoelomate animals are exemplified by :

(1) Ctenophora
(2) Platyhelminthes
(3) Aschelminthes
(4) Annelida

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Space For Rough Work

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Space For Rough Work

Test Booklet Code

F6

KHANA

No. :

This Booklet contains 24 pages.

Do not open this Test Booklet until you are asked to do so.

Important Instructions :

1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on **side-1** and **side-2** carefully with **blue/black** ball point pen only.
2. The test is of **3 hours** duration and Test Booklet contains **180** questions. Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, **one mark** will be deducted from the total scores. The maximum marks are **720**.
3. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. **On completion of the test, the candidate must hand over the Answer Sheet to the invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.**
6. The CODE for this Booklet is **F6**. Make sure that the CODE printed on **Side-2** of the Answer Sheet is the same as that on this Test Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
7. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/ Answer Sheet.
8. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
9. Each candidate must show on demand his/her Admit Card to the Invigilator.
10. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
11. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. **Cases where a candidate has not signed the Attendance Sheet second time will be deemed not to have handed over the Answer Sheet and dealt with as an unfair means case.**
12. Use of Electronic/Manual Calculator is prohibited.
13. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
14. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
15. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

Name of the Candidate (in Capitals) : _____

Roll Number : in figures _____

: in words _____

Centre of Examination (in Capitals) : _____

Candidate's Signature : _____ Invigilator's Signature : _____

Facsimile signature stamp of

Centre Superintendent : _____

1. The calculated spin only magnetic moment of Cr^{2+} ion is :

(1) 5.92 BM

(2) 2.84 BM

(3) 3.87 BM

(4) 4.90 BM

2. Which of the following is a cationic detergent ?

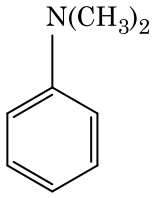
(1) Cetyltrimethyl ammonium bromide

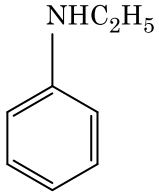
(2) Sodium dodecylbenzene sulphonate

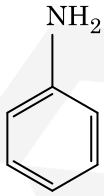
(3) Sodium lauryl sulphate

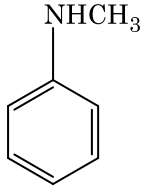
(4) Sodium stearate

3. Which of the following amine will give the carbylamine test ?

(1) 

(2) 

(3) 

(4) 

4. Which of the following set of molecules will have zero dipole moment ?

(1) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene

(2) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene

(3) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene

(4) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene

5. Which of the following is a natural polymer ?

(1) polybutadiene

(2) poly (Butadiene-acrylonitrile)

(3) *cis*-1,4-polyisoprene

(4) poly (Butadiene-styrene)

6. Match the following and identify the **correct** option.

(a)	$CO(g) + H_2(g)$	(i)	$Mg(HCO_3)_2 + Ca(HCO_3)_2$
(b)	Temporary hardness of water	(ii)	An electron deficient hydride
(c)	B_2H_6	(iii)	Synthesis gas
(d)	H_2O_2	(iv)	Non-planar structure

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(ii)	(i)
(2)	(i)	(iii)	(ii)	(iv)
(3)	(iii)	(i)	(ii)	(iv)
(4)	(iii)	(ii)	(i)	(iv)

7. An increase in the concentration of the reactants of a reaction leads to change in :

(1) threshold energy

(2) collision frequency

(3) activation energy

(4) heat of reaction

8. The freezing point depression constant (K_f) of benzene is 5.12 K kg mol^{-1}. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is (rounded off upto two decimal places) :

(1) 0.40 K

(2) 0.60 K

(3) 0.20 K

(4) 0.80 K

9. Identify a molecule which does **not** exist.

(1) C_2

(2) O_2

(3) He_2

(4) Li_2

10. What is the change in oxidation number of carbon in the following reaction ?

$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(l) + 4HCl(g)$

(1) -4 to $+4$

(2) 0 to -4

(3) $+4$ to $+4$

(4) 0 to $+4$

11. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals.

(1) Calcium

(2) Potassium

(3) Iron

(4) Copper

12. Match the following :

	Oxide		**Nature**
(a)	CO	(i)	Basic
(b)	BaO	(ii)	Neutral
(c)	Al_2O_3	(iii)	Acidic
(d)	Cl_2O_7	(iv)	Amphoteric

Which of the following is **correct** option ?

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(i)	(ii)
(2)	(iv)	(iii)	(ii)	(i)
(3)	(i)	(ii)	(iii)	(iv)
(4)	(ii)	(i)	(iv)	(iii)

13. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as :

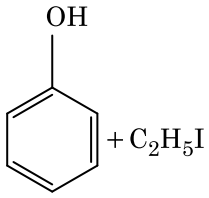
(1) Cross Cannizzaro's reaction

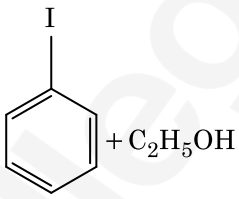
(2) Cross Aldol condensation

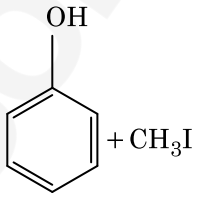
(3) Aldol condensation

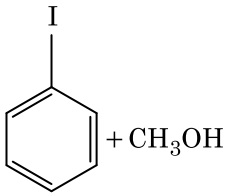
(4) Cannizzaro's reaction

14. Anisole on cleavage with HI gives :

(1) 

(2) 

(3) 

(4) 

15. For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, the **correct** option is :

(1) $\Delta_r H < 0$ and $\Delta_r S > 0$

(2) $\Delta_r H < 0$ and $\Delta_r S < 0$

(3) $\Delta_r H > 0$ and $\Delta_r S > 0$

(4) $\Delta_r H > 0$ and $\Delta_r S < 0$

16. Identify the **correct** statements from the following :

(a) $CO_2(g)$ is used as refrigerant for ice-cream and frozen food.

(b) The structure of C_{60} contains twelve six carbon rings and twenty five carbon rings.

(c) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.

(d) CO is colorless and odourless gas.

(1) (b) and (c) only

(2) (c) and (d) only

(3) (a), (b) and (c) only

(4) (a) and (c) only

17. Which of the following alkane cannot be made in good yield by Wurtz reaction ?

(1) n-Heptane

(2) n-Butane

(3) n-Hexane

(4) 2,3-Dimethylbutane

18. HCl was passed through a solution of $CaCl_2$, $MgCl_2$ and NaCl. Which of the following compound(s) crystallise(s) ?

(1) Only $MgCl_2$

(2) NaCl, $MgCl_2$ and $CaCl_2$

(3) Both $MgCl_2$ and $CaCl_2$

(4) Only NaCl

19. Which one of the followings has maximum number of atoms ?

(1) 1 g of $O_2(g)$ [Atomic mass of O = 16]

(2) 1 g of Li(s) [Atomic mass of Li = 7]

(3) 1 g of Ag(s) [Atomic mass of Ag = 108]

(4) 1 g of Mg(s) [Atomic mass of Mg = 24]

20. A mixture of N_2 and Ar gases in a cylinder contains 7 g of N_2 and 8 g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N_2 is :

[Use atomic masses (in g mol^{-1}) : N = 14, Ar = 40]

(1) 15 bar

(2) 18 bar

(3) 9 bar

(4) 12 bar

21. Identify the **incorrect** statement.

(1) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.

(2) The oxidation states of chromium in CrO_4^{2-} and $Cr_2O_7^{2-}$ are not the same.

(3) Cr^{2+} (d^4) is a stronger reducing agent than Fe^{2+} (d^6) in water.

(4) The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes.

22. The correct option for free expansion of an ideal gas under adiabatic condition is :

(1) $q < 0$, $\Delta T = 0$ and $w = 0$

(2) $q > 0$, $\Delta T > 0$ and $w > 0$

(3) $q = 0$, $\Delta T = 0$ and $w = 0$

(4) $q = 0$, $\Delta T < 0$ and $w > 0$

23. The mixture which shows positive deviation from Raoult's law is :

(1) Acetone + Chloroform

(2) Chloroethane + Bromoethane

(3) Ethanol + Acetone

(4) Benzene + Toluene

24. Which of the following oxoacid of sulphur has $-O-O-$ linkage ?

(1) $H_2S_2O_8$, peroxodisulphuric acid

(2) $H_2S_2O_7$, pyrosulphuric acid

(3) H_2SO_3, sulphurous acid

(4) H_2SO_4, sulphuric acid

25. Sucrose on hydrolysis gives :

(1) α-D-Glucose + β-D-Fructose

(2) α-D-Fructose + β-D-Fructose

(3) β-D-Glucose + α-D-Fructose

(4) α-D-Glucose + β-D-Glucose

26. The number of protons, neutrons and electrons in $^{175}_{71}Lu$, respectively, are :

(1) 71, 71 and 104

(2) 175, 104 and 71

(3) 71, 104 and 71

(4) 104, 71 and 71

27. On electrolysis of dil.sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be :

(1) H_2S gas

(2) SO_2 gas

(3) Hydrogen gas

(4) Oxygen gas

28. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following ?

(1) $-R$ effect of $-CH_3$ groups

(2) Hyperconjugation

(3) $-I$ effect of $-CH_3$ groups

(4) $+R$ effect of $-CH_3$ groups

29. Urea reacts with water to form **A** which will decompose to form **B**. **B** when passed through Cu^{2+} (aq), deep blue colour solution **C** is formed. What is the formula of **C** from the following ?

(1) $Cu(OH)_2$

(2) $CuCO_3 \cdot Cu(OH)_2$

(3) $CuSO_4$

(4) $[Cu(NH_3)_4]^{2+}$

30. Identify the **incorrect** match.

	Name		**IUPAC Official Name**
(a)	Unnilunium	(i)	Mendelevium
(b)	Unniltrium	(ii)	Lawrencium
(c)	Unnilhexium	(iii)	Seaborgium
(d)	Ununnnium	(iv)	Darmstadtium

(1) (c), (iii)

(2) (d), (iv)

(3) (a), (i)

(4) (b), (ii)

31. The rate constant for a first order reaction is $4.606 \times 10^{-3}\ s^{-1}$. The time required to reduce 2.0 g of the reactant to 0.2 g is :

(1) 500 s

(2) 1000 s

(3) 100 s

(4) 200 s

32. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is :

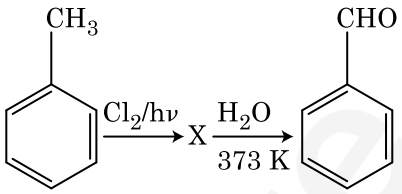
(1) $\frac{4}{\sqrt{3}} \times 288$ pm

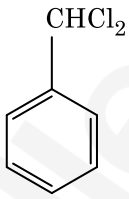
(2) $\frac{4}{\sqrt{2}} \times 288$ pm

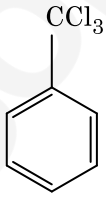
(3) $\frac{\sqrt{3}}{4} \times 288$ pm

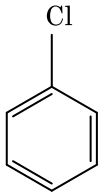
(4) $\frac{\sqrt{2}}{4} \times 288$ pm

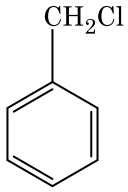
33. Identify compound X in the following sequence of reactions :



(1) 

(2) 

(3) 

(4) 

34. Which of the following is the **correct** order of increasing field strength of ligands to form coordination compounds ?

(1) $F^- < SCN^- < C_2O_4^{2-} < CN^-$

(2) $CN^- < C_2O_4^{2-} < SCN^- < F^-$

(3) $SCN^- < F^- < C_2O_4^{2-} < CN^-$

(4) $SCN^- < F^- < CN^- < C_2O_4^{2-}$

35. Paper chromatography is an example of :

(1) Thin layer chromatography

(2) Column chromatography

(3) Adsorption chromatography

(4) Partition chromatography

36. Identify the **correct** statement from the following :

(1) Vapour phase refining is carried out for Nickel by Van Arkel method.

(2) Pig iron can be moulded into a variety of shapes.

(3) Wrought iron is impure iron with 4% carbon.

(4) Blister copper has blistered appearance due to evolution of CO_2.

37. Hydrolysis of sucrose is given by the following reaction.

$$\text{Sucrose} + H_2O \rightleftharpoons \text{Glucose} + \text{Fructose}$$

If the equilibrium constant (K_c) is 2×10^{13} at 300 K, the value of $\Delta_r G^{\ominus}$ at the same temperature will be :

(1) $8.314\ \text{J mol}^{-1}\text{K}^{-1} \times 300\ \text{K} \times \ln(3 \times 10^{13})$

(2) $-8.314\ \text{J mol}^{-1}\text{K}^{-1} \times 300\ \text{K} \times \ln(4 \times 10^{13})$

(3) $-8.314\ \text{J mol}^{-1}\text{K}^{-1} \times 300\ \text{K} \times \ln(2 \times 10^{13})$

(4) $8.314\ \text{J mol}^{-1}\text{K}^{-1} \times 300\ \text{K} \times \ln(2 \times 10^{13})$

38. The number of Faradays(F) required to produce 20 g of calcium from molten $CaCl_2$ (Atomic mass of Ca = 40 g mol^{-1}) is :

(1) 3

(2) 4

(3) 1

(4) 2

39. Which of the following is a basic amino acid ?

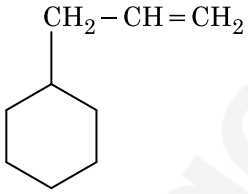
(1) Tyrosine

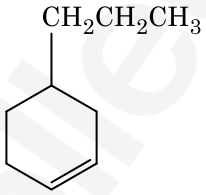
(2) Lysine

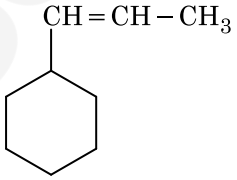
(3) Serine

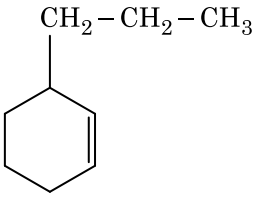
(4) Alanine

40. An alkene on ozonolysis gives methanal as one of the product. Its structure is :

(1) 

(2) 

(3) 

(4) 

41. Measuring Zeta potential is useful in determining which property of colloidal solution ?

(1) Stability of the colloidal particles

(2) Size of the colloidal particles

(3) Viscosity

(4) Solubility

42. Find out the solubility of $Ni(OH)_2$ in 0.1 M NaOH. Given that the ionic product of $Ni(OH)_2$ is 2×10^{-15}.

(1) 1×10^{-13} M

(2) 1×10^{8} M

(3) 2×10^{-13} M

(4) 2×10^{-8} M

43. Which of the following is **not** correct about carbon monoxide ?

(1) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.

(2) It is produced due to incomplete combustion.

(3) It forms carboxyhaemoglobin.

(4) It reduces oxygen carrying ability of blood.

44. Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give :

(1) Tert. butyl alcohol

(2) Isobutyl alcohol

(3) Isopropyl alcohol

(4) Sec. butyl alcohol

45. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is :

(a) β-Elimination reaction

(b) Follows Zaitsev rule

(c) Dehydrohalogenation reaction

(d) Dehydration reaction

(1) (b), (c), (d)

(2) (a), (b), (d)

(3) (a), (b), (c)

(4) (a), (c), (d)

46. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	*Clostridium butylicum*	(i)	Cyclosporin-A
(b)	*Trichoderma polysporum*	(ii)	Butyric Acid
(c)	*Monascus purpureus*	(iii)	Citric Acid
(d)	*Aspergillus niger*	(iv)	Blood cholesterol lowering agent

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iv)	(iii)
(2)	(iv)	(iii)	(ii)	(i)
(3)	(iii)	(iv)	(ii)	(i)
(4)	(ii)	(i)	(iv)	(iii)

47. Match the organism with its use in biotechnology.

(a)	*Bacillus thuringiensis*	(i)	Cloning vector
(b)	*Thermus aquaticus*	(ii)	Construction of first rDNA molecule
(c)	*Agrobacterium tumefaciens*	(iii)	DNA polymerase
(d)	*Salmonella typhimurium*	(iv)	Cry proteins

Select the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(ii)	(iv)	(i)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(ii)	(iv)	(iii)	(i)
(4)	(iv)	(iii)	(i)	(ii)

48. Which of the following would help in prevention of diuresis ?

(1) Atrial natriuretic factor causes vasoconstriction

(2) Decrease in secretion of renin by JG cells

(3) More water reabsorption due to undersecretion of ADH

(4) Reabsorption of Na^+ and water from renal tubules due to aldosterone

49. The enzyme enterokinase helps in conversion of :

(1) caseinogen into casein

(2) pepsinogen into pepsin

(3) protein into polypeptides

(4) trypsinogen into trypsin

50. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Pituitary gland	(i)	Grave's disease
(b)	Thyroid gland	(ii)	Diabetes mellitus
(c)	Adrenal gland	(iii)	Diabetes insipidus
(d)	Pancreas	(iv)	Addison's disease

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(i)	(iv)	(ii)
(2)	(ii)	(i)	(iv)	(iii)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(iii)	(ii)	(i)	(iv)

51. The roots that originate from the base of the stem are :

(1) Prop roots
(2) Lateral roots
(3) Fibrous roots
(4) Primary roots

52. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Floating Ribs	(i)	Located between second and seventh ribs
(b)	Acromion	(ii)	Head of the Humerus
(c)	Scapula	(iii)	Clavicle
(d)	Glenoid cavity	(iv)	Do not connect with the sternum

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(ii)	(iv)	(i)
(2)	(iv)	(iii)	(i)	(ii)
(3)	(ii)	(iv)	(i)	(iii)
(4)	(i)	(iii)	(ii)	(iv)

53. The body of the ovule is fused within the funicle at :

(1) Nucellus
(2) Chalaza
(3) Hilum
(4) Micropyle

54. The infectious stage of *Plasmodium* that enters the human body is :

(1) Female gametocytes
(2) Male gametocytes
(3) Trophozoites
(4) Sporozoites

55. Identify the **wrong** statement with regard to Restriction Enzymes.

(1) They are useful in genetic engineering.
(2) Sticky ends can be joined by using DNA ligases.
(3) Each restriction enzyme functions by inspecting the length of a DNA sequence.
(4) They cut the strand of DNA at palindromic sites.

56. Which of the following statements about inclusion bodies is **incorrect** ?

(1) They lie free in the cytoplasm.
(2) These represent reserve material in cytoplasm.
(3) They are not bound by any membrane.
(4) These are involved in ingestion of food particles.

57. Dissolution of the synaptonemal complex occurs during :

(1) Diplotene
(2) Leptotene
(3) Pachytene
(4) Zygotene

58. Identify the **wrong** statement with reference to the gene 'I' that controls ABO blood groups.

(1) When I^A and I^B are present together, they express same type of sugar.
(2) Allele 'i' does not produce any sugar.
(3) The gene (I) has three alleles.
(4) A person will have only two of the three alleles.

59. Select the option including all sexually transmitted diseases.

(1) AIDS, Malaria, Filaria
(2) Cancer, AIDS, Syphilis
(3) Gonorrhoea, Syphilis, Genital herpes
(4) Gonorrhoea, Malaria, Genital herpes

60. Which of the following is put into Anaerobic sludge digester for further sewage treatment ?

(1) Effluents of primary treatment
(2) Activated sludge
(3) Primary sludge
(4) Floating debris

61. In water hyacinth and water lily, pollination takes place by :

(1) wind and water
(2) insects and water
(3) insects or wind
(4) water currents only

62. Identify the **incorrect** statement.

(1) Sapwood is the innermost secondary xylem and is lighter in colour.

(2) Due to deposition of tannins, resins, oils etc., heart wood is dark in colour.

(3) Heart wood does not conduct water but gives mechanical support.

(4) Sapwood is involved in conduction of water and minerals from root to leaf.

63. Ray florets have :

(1) Hypogynous ovary

(2) Half inferior ovary

(3) Inferior ovary

(4) Superior ovary

64. Identify the **correct** statement with regard to G_1 phase (Gap 1) of interphase.

(1) Cell is metabolically active, grows but does not replicate its DNA.

(2) Nuclear Division takes place.

(3) DNA synthesis or replication takes place.

(4) Reorganisation of all cell components takes place.

65. The specific palindromic sequence which is recognized by EcoRI is :

(1) 5' - CTTAAG - 3'
3' - GAATTC - 5'

(2) 5' - GGATCC - 3'
3' - CCTAGG - 5'

(3) 5' - GAATTC - 3'
3' - CTTAAG - 5'

(4) 5' - GGAACC - 3'
3' - CCTTGG - 5'

66. Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their :

(1) Defence action

(2) Effect on reproduction

(3) Nutritive value

(4) Growth response

67. Which one of the following is the most abundant protein in the animals ?

(1) Lectin

(2) Insulin

(3) Haemoglobin

(4) Collagen

68. The process of growth is maximum during :

(1) Senescence

(2) Dormancy

(3) Log phase

(4) Lag phase

69. According to Robert May, the global species diversity is about :

(1) 50 million

(2) 7 million

(3) 1.5 million

(4) 20 million

70. Goblet cells of alimentary canal are modified from :

(1) Chondrocytes

(2) Compound epithelial cells

(3) Squamous epithelial cells

(4) Columnar epithelial cells

71. Name the plant growth regulator which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane crop.

(1) Ethylene

(2) Abscisic acid

(3) Cytokinin

(4) Gibberellin

72. Which of the following pairs is of unicellular algae ?

(1) *Anabaena* and *Volvox*

(2) *Chlorella* and *Spirulina*

(3) *Laminaria* and *Sargassum*

(4) *Gelidium* and *Gracilaria*

73. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	6 - 15 pairs of gill slits	(i)	*Trygon*
(b)	Heterocercal caudal fin	(ii)	Cyclostomes
(c)	Air Bladder	(iii)	Chondrichthyes
(d)	Poison sting	(iv)	Osteichthyes

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(ii)	(iii)	(i)
(2)	(i)	(iv)	(iii)	(ii)
(3)	(ii)	(iii)	(iv)	(i)
(4)	(iii)	(iv)	(i)	(ii)

74. Bilaterally symmetrical and acoelomate animals are exemplified by :

(1) Aschelminthes

(2) Annelida

(3) Ctenophora

(4) Platyhelminthes

75. The ovary is half inferior in :

(1) Sunflower

(2) Plum

(3) Brinjal

(4) Mustard

76. Which of the following regions of the globe exhibits highest species diversity ?

(1) Himalayas

(2) Amazon forests

(3) Western Ghats of India

(4) Madagascar

77. By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams ?

(1) Cross breeding

(2) Inbreeding

(3) Out crossing

(4) Mutational breeding

78. How many true breeding pea plant varieties did Mendel select as pairs, which were similar except in one character with contrasting traits ?

(1) 14

(2) 8

(3) 4

(4) 2

79. In light reaction, plastoquinone facilitates the transfer of electrons from :

(1) PS-I to $NADP^+$

(2) PS-I to ATP synthase

(3) PS-II to $Cytb_6f$ complex

(4) $Cytb_6f$ complex to PS-I

80. Name the enzyme that facilitates opening of DNA helix during transcription.

(1) DNA polymerase

(2) RNA polymerase

(3) DNA ligase

(4) DNA helicase

81. Match the following concerning essential elements and their functions in plants :

(a)	Iron	(i)	Photolysis of water
(b)	Zinc	(ii)	Pollen germination
(c)	Boron	(iii)	Required for chlorophyll biosynthesis
(d)	Manganese	(iv)	IAA biosynthesis

Select the **correct** option :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(ii)	(i)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(ii)	(i)	(iv)	(iii)
(4)	(iv)	(iii)	(ii)	(i)

82. Which of the following refer to **correct** example(s) of organisms which have evolved due to changes in environment brought about by anthropogenic action ?

(a) Darwin's Finches of Galapagos islands.

(b) Herbicide resistant weeds.

(c) Drug resistant eukaryotes.

(d) Man-created breeds of domesticated animals like dogs.

(1) (b), (c) and (d)

(2) only (d)

(3) only (a)

(4) (a) and (c)

83. The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of :

(1) 1 molecule of 6-C compound

(2) 1 molecule of 4-C compound and 1 molecule of 2-C compound

(3) 2 molecules of 3-C compound

(4) 1 molecule of 3-C compound

84. Snow-blindness in Antarctic region is due to :

(1) High reflection of light from snow

(2) Damage to retina caused by infra-red rays

(3) Freezing of fluids in the eye by low temperature

(4) Inflammation of cornea due to high dose of UV-B radiation

85. Floridean starch has structure similar to :

(1) Mannitol and algin

(2) Laminarin and cellulose

(3) Starch and cellulose

(4) Amylopectin and glycogen

86. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Bt cotton	(i)	Gene therapy
(b)	Adenosine deaminase deficiency	(ii)	Cellular defence
(c)	RNAi	(iii)	Detection of HIV infection
(d)	PCR	(iv)	*Bacillus thuringiensis*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iii)	(iv)	(i)
(2)	(i)	(ii)	(iii)	(iv)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(iii)	(ii)	(i)	(iv)

87. Meiotic division of the secondary oocyte is completed :

(1) After zygote formation

(2) At the time of fusion of a sperm with an ovum

(3) Prior to ovulation

(4) At the time of copulation

88. From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask :

(1) CH_4, H_2, NH_3 and water vapor at 600°C

(2) CH_3, H_2, NH_3 and water vapor at 600°C

(3) CH_4, H_2, NH_3 and water vapor at 800°C

(4) CH_3, H_2, NH_4 and water vapor at 800°C

89. Choose the **correct** pair from the following :

(1) Nucleases - Separate the two strands of DNA

(2) Exonucleases - Make cuts at specific positions within DNA

(3) Ligases - Join the two DNA molecules

(4) Polymerases - Break the DNA into fragments

90. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Placenta	(i)	Androgens
(b)	Zona pellucida	(ii)	Human Chorionic Gonadotropin (hCG)
(c)	Bulbo-urethral glands	(iii)	Layer of the ovum
(d)	Leydig cells	(iv)	Lubrication of the Penis

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(ii)	(iv)	(i)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(i)	(iv)	(ii)	(iii)

91. Which of the following statements are **true** for the phylum-Chordata ?

(a) In Urochordata notochord extends from head to tail and it is present throughout their life.

(b) In Vertebrata notochord is present during the embryonic period only.

(c) Central nervous system is dorsal and hollow.

(d) Chordata is divided into 3 subphyla : Hemichordata, Tunicata and Cephalochordata.

(1) (a) and (b)

(2) (b) and (c)

(3) (d) and (c)

(4) (c) and (a)

92. Identify the **wrong** statement with reference to transport of oxygen.

(1) Higher H^+ conc. in alveoli favours the formation of oxyhaemoglobin.

(2) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin.

(3) Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2.

(4) Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin.

93. Experimental verification of the chromosomal theory of inheritance was done by :

(1) Boveri

(2) Morgan

(3) Mendel

(4) Sutton

94. The sequence that controls the copy number of the linked DNA in the vector, is termed :

(1) Palindromic sequence

(2) Recognition site

(3) Selectable marker

(4) Ori site

95. Select the **correct** statement.

(1) Insulin acts on pancreatic cells and adipocytes.

(2) Insulin is associated with hyperglycemia.

(3) Glucocorticoids stimulate gluconeogenesis.

(4) Glucagon is associated with hypoglycemia.

96. Identify the **wrong** statement with reference to immunity.

(1) Active immunity is quick and gives full response.

(2) Foetus receives some antibodies from mother, it is an example for passive immunity.

(3) When exposed to antigen (living or dead) antibodies are produced in the host's body. It is called "Active immunity".

(4) When ready-made antibodies are directly given, it is called "Passive immunity".

97. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells ?

(1) Golgi bodies

(2) Polysomes

(3) Endoplasmic reticulum

(4) Peroxisomes

98. Match the trophic levels with their **correct** species examples in grassland ecosystem.

(a)	Fourth trophic level	(i)	Crow
(b)	Second trophic level	(ii)	Vulture
(c)	First trophic level	(iii)	Rabbit
(d)	Third trophic level	(iv)	Grass

Select the **correct** option :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(iii)	(ii)	(i)
(2)	(i)	(ii)	(iii)	(iv)
(3)	(ii)	(iii)	(iv)	(i)
(4)	(iii)	(ii)	(i)	(iv)

99. Identify the basic amino acid from the following.

(1) Lysine

(2) Valine

(3) Tyrosine

(4) Glutamic Acid

100. Embryological support for evolution was disapproved by :

(1) Charles Darwin

(2) Oparin

(3) Karl Ernst von Baer

(4) Alfred Wallace

101. The transverse section of a plant shows following anatomical features :

(a) Large number of scattered vascular bundles surrounded by bundle sheath.

(b) Large conspicuous parenchymatous ground tissue.

(c) Vascular bundles conjoint and closed.

(d) Phloem parenchyma absent.

Identify the category of plant and its part :

(1) Dicotyledonous stem

(2) Dicotyledonous root

(3) Monocotyledonous stem

(4) Monocotyledonous root

102. Some dividing cells exit the cell cycle and enter vegetative inactive stage. This is called quiescent stage (G_0). This process occurs at the end of :

(1) S phase

(2) G_2 phase

(3) M phase

(4) G_1 phase

103. The QRS complex in a standard ECG represents :

(1) Depolarisation of ventricles

(2) Repolarisation of ventricles

(3) Repolarisation of auricles

(4) Depolarisation of auricles

104. The number of substrate level phosphorylations in one turn of citric acid cycle is :

(1) Two

(2) Three

(3) Zero

(4) One

105. Strobili or cones are found in :

(1) *Marchantia*

(2) *Equisetum*

(3) *Salvinia*

(4) *Pteris*

106. Presence of which of the following conditions in urine are indicative of Diabetes Mellitus ?

(1) Ketonuria and Glycosuria

(2) Renal calculi and Hyperglycaemia

(3) Uremia and Ketonuria

(4) Uremia and Renal Calculi

107. Flippers of Penguins and Dolphins are examples of :

(1) Industrial melanism

(2) Natural selection

(3) Adaptive radiation

(4) Convergent evolution

108. Which of the following statements is **not correct** ?

(1) The functional insulin has A and B chains linked together by hydrogen bonds.

(2) Genetically engineered insulin is produced in *E-Coli*.

(3) In man insulin is synthesised as a proinsulin.

(4) The proinsulin has an extra peptide called C-peptide.

109. Cuboidal epithelium with brush border of microvilli is found in :

(1) proximal convoluted tubule of nephron

(2) eustachian tube

(3) lining of intestine

(4) ducts of salivary glands

110. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Organ of Corti	(i)	Connects middle ear and pharynx
(b)	Cochlea	(ii)	Coiled part of the labyrinth
(c)	Eustachian tube	(iii)	Attached to the oval window
(d)	Stapes	(iv)	Located on the basilar membrane

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(ii)	(i)	(iii)
(2)	(i)	(ii)	(iv)	(iii)
(3)	(ii)	(iii)	(i)	(iv)
(4)	(iii)	(i)	(iv)	(ii)

111. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Eosinophils	(i)	Immune response
(b)	Basophils	(ii)	Phagocytosis
(c)	Neutrophils	(iii)	Release histaminase, destructive enzymes
(d)	Lymphocytes	(iv)	Release granules containing histamine

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iv)	(iii)
(2)	(ii)	(i)	(iii)	(iv)
(3)	(iii)	(iv)	(ii)	(i)
(4)	(iv)	(i)	(ii)	(iii)

112. In which of the following techniques, the embryos are transferred to assist those females who cannot conceive ?

(1) ICSI and ZIFT
(2) GIFT and ICSI
(3) ZIFT and IUT
(4) GIFT and ZIFT

113. The first phase of translation is :

(1) Aminoacylation of tRNA
(2) Recognition of an anti-codon
(3) Binding of mRNA to ribosome
(4) Recognition of DNA molecule

114. Match the following :

(a)	Inhibitor of catalytic activity	(i)	Ricin
(b)	Possess peptide bonds	(ii)	Malonate
(c)	Cell wall material in fungi	(iii)	Chitin
(d)	Secondary metabolite	(iv)	Collagen

Choose the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(i)	(ii)
(2)	(ii)	(iii)	(i)	(iv)
(3)	(ii)	(iv)	(iii)	(i)
(4)	(iii)	(i)	(iv)	(ii)

115. Which of the following is **not** an inhibitory substance governing seed dormancy ?

(1) Phenolic acid
(2) Para-ascorbic acid
(3) Gibberellic acid
(4) Abscisic acid

116. The plant parts which consist of two generations - one within the other :

(a) Pollen grains inside the anther
(b) Germinated pollen grain with two male gametes
(c) Seed inside the fruit
(d) Embryo sac inside the ovule

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

117. Montreal protocol was signed in 1987 for control of :

(1) Release of Green House gases
(2) Disposal of e-wastes
(3) Transport of Genetically modified organisms from one country to another
(4) Emission of ozone depleting substances

118. Which of the following is **correct** about viroids ?

(1) They have DNA with protein coat.

(2) They have free DNA without protein coat.

(3) They have RNA with protein coat.

(4) They have free RNA without protein coat.

119. Which of the following statements is **correct** ?

(1) Adenine pairs with thymine through three H-bonds.

(2) Adenine does not pair with thymine.

(3) Adenine pairs with thymine through two H-bonds.

(4) Adenine pairs with thymine through one H-bond.

120. In gel electrophoresis, separated DNA fragments can be visualized with the help of :

(1) Acetocarmine in UV radiation

(2) Ethidium bromide in infrared radiation

(3) Acetocarmine in bright blue light

(4) Ethidium bromide in UV radiation

121. Identify the **correct** statement with reference to human digestive system.

(1) Ileum is a highly coiled part.

(2) Vermiform appendix arises from duodenum.

(3) Ileum opens into small intestine.

(4) Serosa is the innermost layer of the alimentary canal.

122. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6×10^9 bp, then the length of the DNA is approximately :

(1) 2.2 meters

(2) 2.7 meters

(3) 2.0 meters

(4) 2.5 meters

123. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Gregarious, polyphagous pest	(i)	*Asterias*
(b)	Adult with radial symmetry and larva with bilateral symmetry	(ii)	Scorpion
(c)	Book lungs	(iii)	*Ctenoplana*
(d)	Bioluminescence	(iv)	*Locusta*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(ii)	(i)	(iv)
(2)	(ii)	(i)	(iii)	(iv)
(3)	(i)	(iii)	(ii)	(iv)
(4)	(iv)	(i)	(ii)	(iii)

124. Select the **correct** match.

(1) Sickle cell anaemia - Autosomal recessive trait, chromosome-11

(2) Thalassemia - X linked

(3) Haemophilia - Y linked

(4) Phenylketonuria - Autosomal dominant trait

125. In relation to Gross primary productivity and Net primary productivity of an ecosystem, which one of the following statements is **correct** ?

(1) Gross primary productivity and Net primary productivity are one and same.

(2) There is no relationship between Gross primary productivity and Net primary productivity.

(3) Gross primary productivity is always less than net primary productivity.

(4) Gross primary productivity is always more than net primary productivity.

126. Bt cotton variety that was developed by the introduction of toxin gene of *Bacillus thuringiensis* (Bt) is resistant to :

(1) Plant nematodes

(2) Insect predators

(3) Insect pests

(4) Fungal diseases

127. Select the **correct** events that occur during inspiration.

(a) Contraction of diaphragm

(b) Contraction of external inter-costal muscles

(c) Pulmonary volume decreases

(d) Intra pulmonary pressure increases

(1) (a), (b) and (d)

(2) only (d)

(3) (a) and (b)

(4) (c) and (d)

128. Which of the following is **not** an attribute of a population ?

(1) Mortality

(2) Species interaction

(3) Sex ratio

(4) Natality

129. The process responsible for facilitating loss of water in liquid form from the tip of grass blades at night and in early morning is :

(1) Imbibition

(2) Plasmolysis

(3) Transpiration

(4) Root pressure

130. Match the following with respect to meiosis :

(a)	Zygotene	(i)	Terminalization
(b)	Pachytene	(ii)	Chiasmata
(c)	Diplotene	(iii)	Crossing over
(d)	Diakinesis	(iv)	Synapsis

Select the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iv)	(iii)
(2)	(ii)	(iv)	(iii)	(i)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iv)	(iii)	(ii)	(i)

131. If the head of cockroach is removed, it may live for few days because :

(1) the head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body.

(2) the head holds a 1/3rd of a nervous system while the rest is situated along the dorsal part of its body.

(3) the supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen.

(4) the cockroach does not have nervous system.

132. Match the following diseases with the causative organism and select the **correct** option.

	Column - I		**Column - II**
(a)	Typhoid	(i)	*Wuchereria*
(b)	Pneumonia	(ii)	*Plasmodium*
(c)	Filariasis	(iii)	*Salmonella*
(d)	Malaria	(iv)	*Haemophilus*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(i)	(iii)	(iv)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(i)	(iii)	(ii)	(iv)
(4)	(iii)	(iv)	(i)	(ii)

133. The product(s) of reaction catalyzed by nitrogenase in root nodules of leguminous plants is/are :

(1) Ammonia and oxygen

(2) Ammonia and hydrogen

(3) Ammonia alone

(4) Nitrate alone

134. Which of the following hormone levels will cause release of ovum (ovulation) from the graffian follicle ?

(1) Low concentration of LH

(2) Low concentration of FSH

(3) High concentration of Estrogen

(4) High concentration of Progesterone

135. Identify the substances having glycosidic bond and peptide bond, respectively in their structure :

(1) Cellulose, lecithin

(2) Inulin, insulin

(3) Chitin, cholesterol

(4) Glycerol, trypsin

136. A charged particle having drift velocity of 7.5×10^{-4} m s^{-1} in an electric field of 3×10^{-10} Vm^{-1}, has a mobility in $m^2\ V^{-1}\ s^{-1}$ of :

(1) 2.5×10^{-6}

(2) 2.25×10^{-15}

(3) 2.25×10^{15}

(4) 2.5×10^{6}

137. The mean free path for a gas, with molecular diameter d and number density n can be expressed as :

(1) $\frac{1}{\sqrt{2}\ n^2\pi d^2}$

(2) $\frac{1}{\sqrt{2}\ n^2\pi^2 d^2}$

(3) $\frac{1}{\sqrt{2}\ n\pi d}$

(4) $\frac{1}{\sqrt{2}\ n\pi d^2}$

138. The energy equivalent of 0.5 g of a substance is :

(1) 1.5×10^{13} J

(2) 0.5×10^{13} J

(3) 4.5×10^{16} J

(4) 4.5×10^{13} J

139. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is :

(1) 7.32×10^{-7} rad

(2) 6.00×10^{-7} rad

(3) 3.66×10^{-7} rad

(4) 1.83×10^{-7} rad

140. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is :

($\mu_0 = 4\pi\times10^{-7}$ T m A^{-1})

(1) 6.28×10^{-5} T

(2) 3.14×10^{-5} T

(3) 6.28×10^{-4} T

(4) 3.14×10^{-4} T

141. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 ($r_1 = 1.5\ r_2$) through 1 K are in the ratio :

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

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

(3) $\frac{27}{8}$

(4) $\frac{9}{4}$

142. The capacitance of a parallel plate capacitor with air as medium is 6 μF. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is :

($\epsilon_0 = 8.85\times10^{-12}\ C^2\ N^{-1}\ m^{-2}$)

(1) $0.44\times10^{-10}\ C^2\ N^{-1}\ m^{-2}$

(2) $5.00\ C^2\ N^{-1}\ m^{-2}$

(3) $0.44\times10^{-13}\ C^2\ N^{-1}\ m^{-2}$

(4) $1.77\times10^{-12}\ C^2\ N^{-1}\ m^{-2}$

143. A short electric dipole has a dipole moment of 16×10^{-9} C m. The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole, situated on a line making an angle of 60° with the dipole axis is :

$\left(\frac{1}{4\pi\epsilon_0} = 9\times10^9\ N\ m^2/C^2\right)$

(1) 400 V

(2) zero

(3) 50 V

(4) 200 V

144. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass.

The centre of mass of the system from the 5 kg particle is nearly at a distance of :

(1) 67 cm

(2) 80 cm

(3) 33 cm

(4) 50 cm

145. The Brewsters angle i_b for an interface should be :

(1) $45° < i_b < 90°$

(2) $i_b = 90°$

(3) $0° < i_b < 30°$

(4) $30° < i_b < 45°$

146. For which one of the following, Bohr model is **not** valid ?

(1) Deuteron atom

(2) Singly ionised neon atom (Ne^+)

(3) Hydrogen atom

(4) Singly ionised helium atom (He^+)

147. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m .

(1) $-6\hat{i}$ N m

(2) $6\hat{k}$ N m

(3) $6\hat{i}$ N m

(4) $6\hat{j}$ N m

148. For transistor action, which of the following statements is **correct** ?

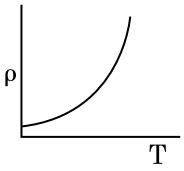
(1) Both emitter junction as well as the collector junction are forward biased.

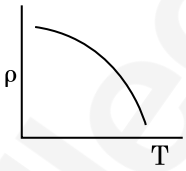
(2) The base region must be very thin and lightly doped.

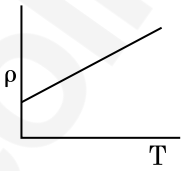
(3) Base, emitter and collector regions should have same doping concentrations.

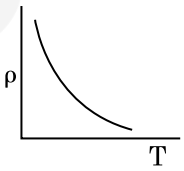
(4) Base, emitter and collector regions should have same size.

149. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper ?

(1) 

(2) 

(3) 

(4) 

150. A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere ?

$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2\right)$

(1) 1.28×10^6 N/C

(2) 1.28×10^7 N/C

(3) 1.28×10^4 N/C

(4) 1.28×10^5 N/C

151. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.

The pitch of the screw gauge is :

(1) 0.5 mm

(2) 1.0 mm

(3) 0.01 mm

(4) 0.25 mm

152. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\frac{\pi}{3}$. If instead C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$ between current and voltage. The power factor of the circuit is :

(1) 1.0
(2) -1.0
(3) zero
(4) 0.5

153. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is : ($g = 10\ m/s^2$)

(1) 320 m
(2) 300 m
(3) 360 m
(4) 340 m

154. A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth ?

(1) 30 N
(2) 24 N
(3) 48 N
(4) 32 N

155. The energy required to break one bond in DNA is 10^{-20} J. This value in eV is nearly :

(1) 0.06
(2) 0.006
(3) 6
(4) 0.6

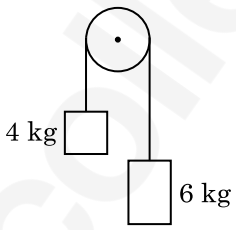
156. A wire of length L, area of cross section A is hanging from a fixed support. The length of the wire changes to L_1 when mass M is suspended from its free end. The expression for Young's modulus is :

(1) $\frac{MgL}{AL_1}$
(2) $\frac{MgL}{A(L_1 - L)}$
(3) $\frac{MgL_1}{AL}$
(4) $\frac{Mg(L_1 - L)}{AL}$

157. An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of the electron is 1.227×10^{-2} nm, the potential difference is :

(1) 10^3 V
(2) 10^4 V
(3) 10 V
(4) 10^2 V

158. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is :



(1) g/5
(2) g/10
(3) g
(4) g/2

159. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled ?

(1) one-fourth
(2) zero
(3) doubled
(4) four times

160. Taking into account of the significant figures, what is the value of 9.99 m – 0.0099 m ?

(1) 9.980 m
(2) 9.9 m
(3) 9.9801 m
(4) 9.98 m

161. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, then the angle of incidence is nearly equal to :

(1) μA
(2) $\frac{\mu A}{2}$
(3) $\frac{A}{2\mu}$
(4) $\frac{2A}{\mu}$

162. The increase in the width of the depletion region in a p-n junction diode is due to :

(1) both forward bias and reverse bias

(2) increase in forward current

(3) forward bias only

(4) reverse bias only

163. In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly decreased, the beat frequency increases to 7 Hz. If the frequency of A is 530 Hz, the original frequency of B will be :

(1) 536 Hz

(2) 537 Hz

(3) 523 Hz

(4) 524 Hz

164. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (c = speed of electromagnetic waves)

(1) 1 : c

(2) $1 : c^2$

(3) c : 1

(4) 1 : 1

165. In a certain region of space with volume 0.2 m^3, the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is :

(1) 1 N/C

(2) 5 N/C

(3) zero

(4) 0.5 N/C

166. In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes :

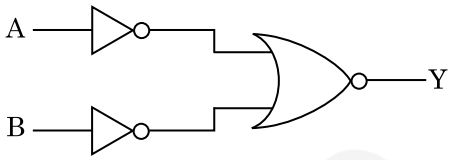
(1) four times

(2) one-fourth

(3) double

(4) half

167. For the logic circuit shown, the truth table is :



(1)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(2)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

(3)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(4)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

168. A resistance wire connected in the left gap of a metre bridge balances a 10 Ω resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of 1 Ω of the resistance wire is :

(1) 1.5×10^{-1} m

(2) 1.5×10^{-2} m

(3) 1.0×10^{-2} m

(4) 1.0×10^{-1} m

169. When a uranium isotope $^{235}_{92}U$ is bombarded with a neutron, it generates $^{89}_{36}Kr$, three neutrons and :

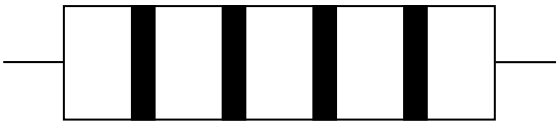
(1) $^{101}_{36}Kr$

(2) $^{103}_{36}Kr$

(3) $^{144}_{56}Ba$

(4) $^{91}_{40}Zr$

170. The color code of a resistance is given below :



The values of resistance and tolerance, respectively, are :

(1) 4.7 kΩ, 5%
(2) 470 Ω, 5%
(3) 470 kΩ, 5%
(4) 47 kΩ, 10%

171. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of the water in the capillary is 5 g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is :

(1) 10.0 g
(2) 20.0 g
(3) 2.5 g
(4) 5.0 g

172. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C.

Its density is : ($R = 8.3\ J\ mol^{-1}\ K^{-1}$)

(1) 0.1 kg/m^3
(2) 0.02 kg/m^3
(3) 0.5 kg/m^3
(4) 0.2 kg/m^3

173. The solids which have the negative temperature coefficient of resistance are :

(1) semiconductors only
(2) insulators and semiconductors
(3) metals
(4) insulators only

174. The average thermal energy for a mono-atomic gas is : (k_B is Boltzmann constant and T, absolute temperature)

(1) $\frac{5}{2}\ k_B T$
(2) $\frac{7}{2}\ k_B T$
(3) $\frac{1}{2}\ k_B T$
(4) $\frac{3}{2}\ k_B T$

175. Light with an average flux of 20 W/cm^2 falls on a non-reflecting surface at normal incidence having surface area 20 cm^2. The energy received by the surface during time span of 1 minute is :

(1) 24×10^3 J
(2) 48×10^3 J
(3) 10×10^3 J
(4) 12×10^3 J

176. Dimensions of stress are :

(1) $[ML^0T^{-2}]$
(2) $[ML^{-1}T^{-2}]$
(3) $[MLT^{-2}]$
(4) $[ML^2T^{-2}]$

177. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is :

(1) isochoric
(2) isobaric
(3) isothermal
(4) adiabatic

178. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeability of the material of the rod is :

($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) $2.4\pi \times 10^{-5}$ T m A^{-1}
(2) $2.4\pi \times 10^{-7}$ T m A^{-1}
(3) $2.4\pi \times 10^{-4}$ T m A^{-1}
(4) 8.0×10^{-5} T m A^{-1}

179. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is :

(1) $\frac{\pi}{2}$ rad
(2) zero
(3) π rad
(4) $\frac{3\pi}{2}$ rad

180. A 40 μF capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly :

(1) 2.5 A
(2) 25.1 A
(3) 1.7 A
(4) 2.05 A

- o 0 o -

Space For Rough Work

Space For Rough Work

Space For Rough Work

Test Booklet Code

G6

KHANA

No. :

This Booklet contains 24 pages.

Do not open this Test Booklet until you are asked to do so.

Important Instructions :

1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on **side-1** and **side-2** carefully with **blue/black** ball point pen only.
2. The test is of **3 hours** duration and Test Booklet contains **180** questions. Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, **one mark** will be deducted from the total scores. The maximum marks are **720**.
3. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. **On completion of the test, the candidate must hand over the Answer Sheet to the invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.**
6. The CODE for this Booklet is **G6**. Make sure that the CODE printed on **Side-2** of the Answer Sheet is the same as that on this Test Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
7. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/ Answer Sheet.
8. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
9. Each candidate must show on demand his/her Admit Card to the Invigilator.
10. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
11. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. **Cases where a candidate has not signed the Attendance Sheet second time will be deemed not to have handed over the Answer Sheet and dealt with as an unfair means case.**
12. Use of Electronic/Manual Calculator is prohibited.
13. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
14. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
15. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

Name of the Candidate (in Capitals) : _____

Roll Number : in figures _____

: in words _____

Centre of Examination (in Capitals) : _____

Candidate's Signature : _____ Invigilator's Signature : _____

Facsimile signature stamp of

Centre Superintendent : _____

1. In water hyacinth and water lily, pollination takes place by :
   (1) water currents only
   (2) wind and water
   (3) insects and water
   (4) insects or wind

2. Choose the **correct** pair from the following :
   (1) Polymerases - Break the DNA into fragments
   (2) Nucleases - Separate the two strands of DNA
   (3) Exonucleases - Make cuts at specific positions within DNA
   (4) Ligases - Join the two DNA molecules

3. Snow-blindness in Antarctic region is due to :
   (1) Inflammation of cornea due to high dose of UV-B radiation
   (2) High reflection of light from snow
   (3) Damage to retina caused by infra-red rays
   (4) Freezing of fluids in the eye by low temperature

4. Meiotic division of the secondary oocyte is completed :
   (1) At the time of copulation
   (2) After zygote formation
   (3) At the time of fusion of a sperm with an ovum
   (4) Prior to ovulation

5. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Floating Ribs	(i)	Located between second and seventh ribs
(b)	Acromion	(ii)	Head of the Humerus
(c)	Scapula	(iii)	Clavicle
(d)	Glenoid cavity	(iv)	Do not connect with the sternum

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iii)	(ii)	(iv)	(i)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(ii)	(iv)	(i)	(iii)

6. Which of the following pairs is of unicellular algae ?
   (1) *Gelidium* and *Gracilaria*
   (2) *Anabaena* and *Volvox*
   (3) *Chlorella* and *Spirulina*
   (4) *Laminaria* and *Sargassum*

7. Dissolution of the synaptonemal complex occurs during :
   (1) Zygotene
   (2) Diplotene
   (3) Leptotene
   (4) Pachytene

8. If the head of cockroach is removed, it may live for few days because :
   (1) the cockroach does not have nervous system.
   (2) the head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body.
   (3) the head holds a $1/3^{rd}$ of a nervous system while the rest is situated along the dorsal part of its body.
   (4) the supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen.

9. Which of the following refer to **correct** example(s) of organisms which have evolved due to changes in environment brought about by anthropogenic action ?
   (a) Darwin's Finches of Galapagos islands.
   (b) Herbicide resistant weeds.
   (c) Drug resistant eukaryotes.
   (d) Man-created breeds of domesticated animals like dogs.
   (1) (a) and (c)
   (2) (b), (c) and (d)
   (3) only (d)
   (4) only (a)

10. Identify the **wrong** statement with reference to transport of oxygen.
    (1) Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin.
    (2) Higher H^+ conc. in alveoli favours the formation of oxyhaemoglobin.
    (3) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin.
    (4) Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2.

11. Montreal protocol was signed in 1987 for control of :

(1) Emission of ozone depleting substances

(2) Release of Green House gases

(3) Disposal of e-wastes

(4) Transport of Genetically modified organisms from one country to another

12. Which of the following is **correct** about viroids ?

(1) They have free RNA without protein coat.

(2) They have DNA with protein coat.

(3) They have free DNA without protein coat.

(4) They have RNA with protein coat.

13. Select the **correct** statement.

(1) Glucagon is associated with hypoglycemia.

(2) Insulin acts on pancreatic cells and adipocytes.

(3) Insulin is associated with hyperglycemia.

(4) Glucocorticoids stimulate gluconeogenesis.

14. Which of the following is **not** an inhibitory substance governing seed dormancy ?

(1) Abscisic acid

(2) Phenolic acid

(3) Para-ascorbic acid

(4) Gibberellic acid

15. The infectious stage of *Plasmodium* that enters the human body is :

(1) Sporozoites

(2) Female gametocytes

(3) Male gametocytes

(4) Trophozoites

16. In which of the following techniques, the embryos are transferred to assist those females who cannot conceive ?

(1) GIFT and ZIFT

(2) ICSI and ZIFT

(3) GIFT and ICSI

(4) ZIFT and IUT

17. Experimental verification of the chromosomal theory of inheritance was done by :

(1) Sutton

(2) Boveri

(3) Morgan

(4) Mendel

18. Identify the **wrong** statement with reference to immunity.

(1) When ready-made antibodies are directly given, it is called "Passive immunity".

(2) Active immunity is quick and gives full response.

(3) Foetus receives some antibodies from mother, it is an example for passive immunity.

(4) When exposed to antigen (living or dead) antibodies are produced in the host's body. It is called "Active immunity".

19. The product(s) of reaction catalyzed by nitrogenase in root nodules of leguminous plants is/are :

(1) Nitrate alone

(2) Ammonia and oxygen

(3) Ammonia and hydrogen

(4) Ammonia alone

20. Match the trophic levels with their **correct** species examples in grassland ecosystem.

(a)	Fourth trophic level	(i)	Crow
(b)	Second trophic level	(ii)	Vulture
(c)	First trophic level	(iii)	Rabbit
(d)	Third trophic level	(iv)	Grass

Select the **correct** option :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(ii)	(i)	(iv)
(2)	(iv)	(iii)	(ii)	(i)
(3)	(i)	(ii)	(iii)	(iv)
(4)	(ii)	(iii)	(iv)	(i)

21. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells ?

(1) Peroxisomes
(2) Golgi bodies
(3) Polysomes
(4) Endoplasmic reticulum

22. The transverse section of a plant shows following anatomical features :

(a) Large number of scattered vascular bundles surrounded by bundle sheath.
(b) Large conspicuous parenchymatous ground tissue.
(c) Vascular bundles conjoint and closed.
(d) Phloem parenchyma absent.

Identify the category of plant and its part :

(1) Monocotyledonous root
(2) Dicotyledonous stem
(3) Dicotyledonous root
(4) Monocotyledonous stem

23. Which of the following is put into Anaerobic sludge digester for further sewage treatment ?

(1) Floating debris
(2) Effluents of primary treatment
(3) Activated sludge
(4) Primary sludge

24. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Eosinophils	(i)	Immune response
(b)	Basophils	(ii)	Phagocytosis
(c)	Neutrophils	(iii)	Release histaminase, destructive enzymes
(d)	Lymphocytes	(iv)	Release granules containing histamine

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(i)	(ii)	(iii)
(2)	(i)	(ii)	(iv)	(iii)
(3)	(ii)	(i)	(iii)	(iv)
(4)	(iii)	(iv)	(ii)	(i)

25. Select the option including all sexually transmitted diseases.

(1) Gonorrhoea, Malaria, Genital herpes
(2) AIDS, Malaria, Filaria
(3) Cancer, AIDS, Syphilis
(4) Gonorrhoea, Syphilis, Genital herpes

26. Name the enzyme that facilitates opening of DNA helix during transcription.

(1) DNA helicase
(2) DNA polymerase
(3) RNA polymerase
(4) DNA ligase

27. Which of the following regions of the globe exhibits highest species diversity ?

(1) Madagascar
(2) Himalayas
(3) Amazon forests
(4) Western Ghats of India

28. In relation to Gross primary productivity and Net primary productivity of an ecosystem, which one of the following statements is **correct** ?

(1) Gross primary productivity is always more than net primary productivity.
(2) Gross primary productivity and Net primary productivity are one and same.
(3) There is no relationship between Gross primary productivity and Net primary productivity.
(4) Gross primary productivity is always less than net primary productivity.

29. Which of the following is **not** an attribute of a population ?

(1) Natality
(2) Mortality
(3) Species interaction
(4) Sex ratio

30. The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of :

(1) 1 molecule of 3-C compound
(2) 1 molecule of 6-C compound
(3) 1 molecule of 4-C compound and 1 molecule of 2-C compound
(4) 2 molecules of 3-C compound

31. Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their :

(1) Growth response

(2) Defence action

(3) Effect on reproduction

(4) Nutritive value

32. Identify the substances having glycosidic bond and peptide bond, respectively in their structure :

(1) Glycerol, trypsin

(2) Cellulose, lecithin

(3) Inulin, insulin

(4) Chitin, cholesterol

33. Identify the **incorrect** statement.

(1) Sapwood is involved in conduction of water and minerals from root to leaf.

(2) Sapwood is the innermost secondary xylem and is lighter in colour.

(3) Due to deposition of tannins, resins, oils etc., heart wood is dark in colour.

(4) Heart wood does not conduct water but gives mechanical support.

34. Identify the **correct** statement with reference to human digestive system.

(1) Serosa is the innermost layer of the alimentary canal.

(2) Ileum is a highly coiled part.

(3) Vermiform appendix arises from duodenum.

(4) Ileum opens into small intestine.

35. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6×10^9 bp, then the length of the DNA is approximately :

(1) 2.5 meters

(2) 2.2 meters

(3) 2.7 meters

(4) 2.0 meters

36. Which of the following statements about inclusion bodies is **incorrect** ?

(1) These are involved in ingestion of food particles.

(2) They lie free in the cytoplasm.

(3) These represent reserve material in cytoplasm.

(4) They are not bound by any membrane.

37. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	6 - 15 pairs of gill slits	(i)	*Trygon*
(b)	Heterocercal caudal fin	(ii)	Cyclostomes
(c)	Air Bladder	(iii)	Chondrichthyes
(d)	Poison sting	(iv)	Osteichthyes

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(i)	(ii)
(2)	(iv)	(ii)	(iii)	(i)
(3)	(i)	(iv)	(iii)	(ii)
(4)	(ii)	(iii)	(iv)	(i)

38. According to Robert May, the global species diversity is about :

(1) 20 million

(2) 50 million

(3) 7 million

(4) 1.5 million

39. Match the following diseases with the causative organism and select the **correct** option.

	Column - I		**Column - II**
(a)	Typhoid	(i)	*Wuchereria*
(b)	Pneumonia	(ii)	*Plasmodium*
(c)	Filariasis	(iii)	*Salmonella*
(d)	Malaria	(iv)	*Haemophilus*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(i)	(ii)
(2)	(ii)	(i)	(iii)	(iv)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(i)	(iii)	(ii)	(iv)

40. The ovary is half inferior in :

(1) Mustard

(2) Sunflower

(3) Plum

(4) Brinjal

41. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Organ of Corti	(i)	Connects middle ear and pharynx
(b)	Cochlea	(ii)	Coiled part of the labyrinth
(c)	Eustachian tube	(iii)	Attached to the oval window
(d)	Stapes	(iv)	Located on the basilar membrane

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(i)	(iv)	(ii)
(2)	(iv)	(ii)	(i)	(iii)
(3)	(i)	(ii)	(iv)	(iii)
(4)	(ii)	(iii)	(i)	(iv)

42. How many true breeding pea plant varieties did Mendel select as pairs, which were similar except in one character with contrasting traits ?

(1) 2

(2) 14

(3) 8

(4) 4

43. Identify the **wrong** statement with reference to the gene 'I' that controls ABO blood groups.

(1) A person will have only two of the three alleles.

(2) When I^A and I^B are present together, they express same type of sugar.

(3) Allele 'i' does not produce any sugar.

(4) The gene (I) has three alleles.

44. From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask :

(1) CH_3, H_2, NH_4 and water vapor at 800°C

(2) CH_4, H_2, NH_3 and water vapor at 600°C

(3) CH_3, H_2, NH_3 and water vapor at 600°C

(4) CH_4, H_2, NH_3 and water vapor at 800°C

45. Identify the **wrong** statement with regard to Restriction Enzymes.

(1) They cut the strand of DNA at palindromic sites.

(2) They are useful in genetic engineering.

(3) Sticky ends can be joined by using DNA ligases.

(4) Each restriction enzyme functions by inspecting the length of a DNA sequence.

46. In gel electrophoresis, separated DNA fragments can be visualized with the help of :

(1) Ethidium bromide in UV radiation

(2) Acetocarmine in UV radiation

(3) Ethidium bromide in infrared radiation

(4) Acetocarmine in bright blue light

47. The plant parts which consist of two generations - one within the other :

(a) Pollen grains inside the anther

(b) Germinated pollen grain with two male gametes

(c) Seed inside the fruit

(d) Embryo sac inside the ovule

(1) (a), (b) and (c)

(2) (c) and (d)

(3) (a) and (d)

(4) (a) only

48. Floridean starch has structure similar to :

(1) Amylopectin and glycogen

(2) Mannitol and algin

(3) Laminarin and cellulose

(4) Starch and cellulose

49. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Pituitary gland	(i)	Grave's disease
(b)	Thyroid gland	(ii)	Diabetes mellitus
(c)	Adrenal gland	(iii)	Diabetes insipidus
(d)	Pancreas	(iv)	Addison's disease

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(ii)	(i)	(iv)
(2)	(iii)	(i)	(iv)	(ii)
(3)	(ii)	(i)	(iv)	(iii)
(4)	(iv)	(iii)	(i)	(ii)

50. Which of the following statements are **true** for the phylum-Chordata ?

(a) In Urochordata notochord extends from head to tail and it is present throughout their life.

(b) In Vertebrata notochord is present during the embryonic period only.

(c) Central nervous system is dorsal and hollow.

(d) Chordata is divided into 3 subphyla : Hemichordata, Tunicata and Cephalochordata.

(1) (c) and (a)

(2) (a) and (b)

(3) (b) and (c)

(4) (d) and (c)

51. Presence of which of the following conditions in urine are indicative of Diabetes Mellitus ?

(1) Uremia and Renal Calculi

(2) Ketonuria and Glycosuria

(3) Renal calculi and Hyperglycaemia

(4) Uremia and Ketonuria

52. The roots that originate from the base of the stem are :

(1) Primary roots

(2) Prop roots

(3) Lateral roots

(4) Fibrous roots

53. Some dividing cells exit the cell cycle and enter vegetative inactive stage. This is called quiescent stage (G_0). This process occurs at the end of :

(1) G_1 phase

(2) S phase

(3) G_2 phase

(4) M phase

54. In light reaction, plastoquinone facilitates the transfer of electrons from :

(1) $Cytb_6f$ complex to PS-I

(2) PS-I to $NADP^+$

(3) PS-I to ATP synthase

(4) PS-II to $Cytb_6f$ complex

55. The specific palindromic sequence which is recognized by EcoRI is :

(1) 5' - GGAACC - 3'
3' - CCTTGG - 5'

(2) 5' - CTTAAG - 3'
3' - GAATTC - 5'

(3) 5' - GGATCC - 3'
3' - CCTAGG - 5'

(4) 5' - GAATTC - 3'
3' - CTTAAG - 5'

56. Identify the basic amino acid from the following.

(1) Glutamic Acid

(2) Lysine

(3) Valine

(4) Tyrosine

57. Bilaterally symmetrical and acoelomate animals are exemplified by :

(1) Platyhelminthes

(2) Aschelminthes

(3) Annelida

(4) Ctenophora

58. The sequence that controls the copy number of the linked DNA in the vector, is termed :

(1) Ori site

(2) Palindromic sequence

(3) Recognition site

(4) Selectable marker

59. Flippers of Penguins and Dolphins are examples of :

(1) Convergent evolution

(2) Industrial melanism

(3) Natural selection

(4) Adaptive radiation

60. The enzyme enterokinase helps in conversion of :

(1) trypsinogen into trypsin

(2) caseinogen into casein

(3) pepsinogen into pepsin

(4) protein into polypeptides

61. The first phase of translation is :

(1) Recognition of DNA molecule

(2) Aminoacylation of tRNA

(3) Recognition of an anti-codon

(4) Binding of mRNA to ribosome

62. Which of the following would help in prevention of diuresis ?

(1) Reabsorption of Na^+ and water from renal tubules due to aldosterone

(2) Atrial natriuretic factor causes vasoconstriction

(3) Decrease in secretion of renin by JG cells

(4) More water reabsorption due to undersecretion of ADH

63. Match the following concerning essential elements and their functions in plants :

(a)	Iron	(i)	Photolysis of water
(b)	Zinc	(ii)	Pollen germination
(c)	Boron	(iii)	Required for chlorophyll biosynthesis
(d)	Manganese	(iv)	IAA biosynthesis

Select the **correct** option :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(iii)	(ii)	(i)
(2)	(iii)	(iv)	(ii)	(i)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(ii)	(i)	(iv)	(iii)

64. Strobili or cones are found in :

(1) *Pteris*

(2) *Marchantia*

(3) *Equisetum*

(4) *Salvinia*

65. Select the **correct** match.

(1)	Phenylketonuria	-	Autosomal dominant trait
(2)	Sickle cell anaemia	-	Autosomal recessive trait, chromosome-11
(3)	Thalassemia	-	X linked
(4)	Haemophilia	-	Y linked

66. Match the following with respect to meiosis :

(a)	Zygotene	(i)	Terminalization
(b)	Pachytene	(ii)	Chiasmata
(c)	Diplotene	(iii)	Crossing over
(d)	Diakinesis	(iv)	Synapsis

Select the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(iii)	(ii)	(i)
(2)	(i)	(ii)	(iv)	(iii)
(3)	(ii)	(iv)	(iii)	(i)
(4)	(iii)	(iv)	(i)	(ii)

67. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	*Clostridium butylicum*	(i)	Cyclosporin-A
(b)	*Trichoderma polysporum*	(ii)	Butyric Acid
(c)	*Monascus purpureus*	(iii)	Citric Acid
(d)	*Aspergillus niger*	(iv)	Blood cholesterol lowering agent

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(i)	(iv)	(iii)
(2)	(i)	(ii)	(iv)	(iii)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(iii)	(iv)	(ii)	(i)

68. Ray florets have :

(1) Superior ovary
(2) Hypogynous ovary
(3) Half inferior ovary
(4) Inferior ovary

69. Identify the **correct** statement with regard to G_1 phase (Gap 1) of interphase.

(1) Reorganisation of all cell components takes place.
(2) Cell is metabolically active, grows but does not replicate its DNA.
(3) Nuclear Division takes place.
(4) DNA synthesis or replication takes place.

70. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Bt cotton	(i)	Gene therapy
(b)	Adenosine deaminase deficiency	(ii)	Cellular defence
(c)	RNAi	(iii)	Detection of HIV infection
(d)	PCR	(iv)	*Bacillus thuringiensis*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(ii)	(i)	(iv)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(i)	(ii)	(iii)	(iv)
(4)	(iv)	(i)	(ii)	(iii)

71. Which of the following statements is **correct** ?

(1) Adenine pairs with thymine through one H-bond.
(2) Adenine pairs with thymine through three H-bonds.
(3) Adenine does not pair with thymine.
(4) Adenine pairs with thymine through two H-bonds.

72. Which one of the following is the most abundant protein in the animals ?

(1) Collagen
(2) Lectin
(3) Insulin
(4) Haemoglobin

73. Name the plant growth regulator which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane crop.

(1) Gibberellin
(2) Ethylene
(3) Abscisic acid
(4) Cytokinin

74. Match the organism with its use in biotechnology.

(a)	*Bacillus thuringiensis*	(i)	Cloning vector
(b)	*Thermus aquaticus*	(ii)	Construction of first rDNA molecule
(c)	*Agrobacterium tumefaciens*	(iii)	DNA polymerase
(d)	*Salmonella typhimurium*	(iv)	Cry proteins

Select the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(iii)	(i)	(ii)
(2)	(iii)	(ii)	(iv)	(i)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(ii)	(iv)	(iii)	(i)

75. The process of growth is maximum during :

(1) Lag phase
(2) Senescence
(3) Dormancy
(4) Log phase

76. By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams ?

(1) Mutational breeding
(2) Cross breeding
(3) Inbreeding
(4) Out crossing

77. The QRS complex in a standard ECG represents :

(1) Depolarisation of auricles
(2) Depolarisation of ventricles
(3) Repolarisation of ventricles
(4) Repolarisation of auricles

78. Goblet cells of alimentary canal are modified from :

(1) Columnar epithelial cells
(2) Chondrocytes
(3) Compound epithelial cells
(4) Squamous epithelial cells

79. Match the following :

(a)	Inhibitor of catalytic activity	(i)	Ricin
(b)	Possess peptide bonds	(ii)	Malonate
(c)	Cell wall material in fungi	(iii)	Chitin
(d)	Secondary metabolite	(iv)	Collagen

Choose the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(i)	(iv)	(ii)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(ii)	(iii)	(i)	(iv)
(4)	(ii)	(iv)	(iii)	(i)

80. Bt cotton variety that was developed by the introduction of toxin gene of *Bacillus thuringiensis* (Bt) is resistant to :

(1) Fungal diseases
(2) Plant nematodes
(3) Insect predators
(4) Insect pests

81. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Placenta	(i)	Androgens
(b)	Zona pellucida	(ii)	Human Chorionic Gonadotropin (hCG)
(c)	Bulbo-urethral glands	(iii)	Layer of the ovum
(d)	Leydig cells	(iv)	Lubrication of the Penis

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(iv)	(ii)	(iii)
(2)	(iii)	(ii)	(iv)	(i)
(3)	(ii)	(iii)	(iv)	(i)
(4)	(iv)	(iii)	(i)	(ii)

82. Select the **correct** events that occur during inspiration.

(a) Contraction of diaphragm
(b) Contraction of external inter-costal muscles
(c) Pulmonary volume decreases
(d) Intra pulmonary pressure increases
(1) (c) and (d)
(2) (a), (b) and (d)
(3) only (d)
(4) (a) and (b)

83. The process responsible for facilitating loss of water in liquid form from the tip of grass blades at night and in early morning is :

(1) Root pressure
(2) Imbibition
(3) Plasmolysis
(4) Transpiration

84. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Gregarious, polyphagous pest	(i)	*Asterias*
(b)	Adult with radial symmetry and larva with bilateral symmetry	(ii)	Scorpion
(c)	Book lungs	(iii)	*Ctenoplana*
(d)	Bioluminescence	(iv)	*Locusta*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(i)	(ii)	(iii)
(2)	(iii)	(ii)	(i)	(iv)
(3)	(ii)	(i)	(iii)	(iv)
(4)	(i)	(iii)	(ii)	(iv)

85. Embryological support for evolution was disapproved by :

(1) Alfred Wallace

(2) Charles Darwin

(3) Oparin

(4) Karl Ernst von Baer

86. Which of the following hormone levels will cause release of ovum (ovulation) from the graffian follicle ?

(1) High concentration of Progesterone

(2) Low concentration of LH

(3) Low concentration of FSH

(4) High concentration of Estrogen

87. The body of the ovule is fused within the funicle at :

(1) Micropyle

(2) Nucellus

(3) Chalaza

(4) Hilum

88. Cuboidal epithelium with brush border of microvilli is found in :

(1) ducts of salivary glands

(2) proximal convoluted tubule of nephron

(3) eustachian tube

(4) lining of intestine

89. Which of the following statements is **not correct** ?

(1) The proinsulin has an extra peptide called C-peptide.

(2) The functional insulin has A and B chains linked together by hydrogen bonds.

(3) Genetically engineered insulin is produced in *E-Coli*.

(4) In man insulin is synthesised as a proinsulin.

90. The number of substrate level phosphorylations in one turn of citric acid cycle is :

(1) One

(2) Two

(3) Three

(4) Zero

91. An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of the electron is 1.227×10^{-2} nm, the potential difference is :

(1) 10^2 V

(2) 10^3 V

(3) 10^4 V

(4) 10 V

92. The capacitance of a parallel plate capacitor with air as medium is 6 μF. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is :

($\epsilon_0 = 8.85 \times 10^{-12}$ C^2 N^{-1} m^{-2})

(1) 1.77×10^{-12} C^2 N^{-1} m^{-2}

(2) 0.44×10^{-10} C^2 N^{-1} m^{-2}

(3) 5.00 C^2 N^{-1} m^{-2}

(4) 0.44×10^{-13} C^2 N^{-1} m^{-2}

93. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 ($r_1 = 1.5\ r_2$) through 1 K are in the ratio :

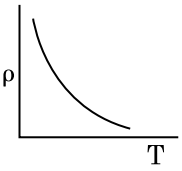
(1) $\frac{9}{4}$

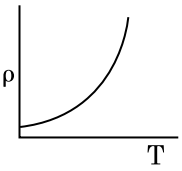
(2) $\frac{3}{2}$

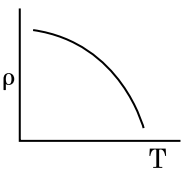
(3) $\frac{5}{3}$

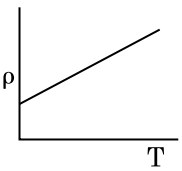
(4) $\frac{27}{8}$

94. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper ?

(1) 

(2) 

(3) 

(4) 

95. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m.

(1) $6\hat{j}$ N m

(2) $-6\hat{i}$ N m

(3) $6\hat{k}$ N m

(4) $6\hat{i}$ N m

96. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled ?

(1) four times

(2) one-fourth

(3) zero

(4) doubled

97. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, then the angle of incidence is nearly equal to :

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

(2) μA

(3) $\frac{\mu A}{2}$

(4) $\frac{A}{2\mu}$

98. The average thermal energy for a mono-atomic gas is : (k_B is Boltzmann constant and T, absolute temperature)

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

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

(3) $\frac{7}{2}k_BT$

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

99. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass.

The centre of mass of the system from the 5 kg particle is nearly at a distance of :

(1) 50 cm

(2) 67 cm

(3) 80 cm

(4) 33 cm

100. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is :

(1) adiabatic

(2) isochoric

(3) isobaric

(4) isothermal

101. In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes :

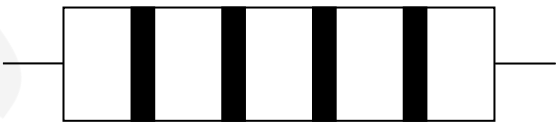
(1) half

(2) four times

(3) one-fourth

(4) double

102. The color code of a resistance is given below :



The values of resistance and tolerance, respectively, are :

(1) 47 kΩ, 10%

(2) 4.7 kΩ, 5%

(3) 470 Ω, 5%

(4) 470 kΩ, 5%

103. In a certain region of space with volume 0.2 m^3, the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is :

(1) 0.5 N/C

(2) 1 N/C

(3) 5 N/C

(4) zero

104. The solids which have the negative temperature coefficient of resistance are :

(1) insulators only

(2) semiconductors only

(3) insulators and semiconductors

(4) metals

105. Light with an average flux of 20 W/cm^2 falls on a non-reflecting surface at normal incidence having surface area 20 cm^2. The energy received by the surface during time span of 1 minute is :

(1) 12×10^3 J

(2) 24×10^3 J

(3) 48×10^3 J

(4) 10×10^3 J

106. A short electric dipole has a dipole moment of 16×10^{-9} C m. The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole, situated on a line making an angle of 60° with the dipole axis is :

$\left(\frac{1}{4\pi\epsilon_0}=9\times10^9\ \text{N m}^2/\text{C}^2\right)$

(1) 200 V

(2) 400 V

(3) zero

(4) 50 V

107. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is :

(1) 1.83×10^{-7} rad

(2) 7.32×10^{-7} rad

(3) 6.00×10^{-7} rad

(4) 3.66×10^{-7} rad

108. A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere ?

$\left(\frac{1}{4\pi\epsilon_0}=9\times10^9\ \text{N m}^2/\text{C}^2\right)$

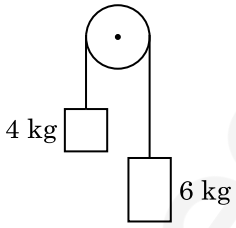
(1) 1.28×10^5 N/C

(2) 1.28×10^6 N/C

(3) 1.28×10^7 N/C

(4) 1.28×10^4 N/C

109. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is :



(1) g/2

(2) g/5

(3) g/10

(4) g

110. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is :

(1) $\frac{3\pi}{2}$ rad

(2) $\frac{\pi}{2}$ rad

(3) zero

(4) π rad

111. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (c = speed of electromagnetic waves)

(1) 1 : 1

(2) 1 : c

(3) 1 : c^2

(4) c : 1

112. In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly decreased, the beat frequency increases to 7 Hz. If the frequency of A is 530 Hz, the original frequency of B will be :

(1) 524 Hz

(2) 536 Hz

(3) 537 Hz

(4) 523 Hz

113. The Brewsters angle i_b for an interface should be :

(1) $30° < i_b < 45°$

(2) $45° < i_b < 90°$

(3) $i_b = 90°$

(4) $0° < i_b < 30°$

114. Taking into account of the significant figures, what is the value of 9.99 m – 0.0099 m ?

(1) 9.98 m

(2) 9.980 m

(3) 9.9 m

(4) 9.9801 m

115. A resistance wire connected in the left gap of a metre bridge balances a 10 Ω resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of 1 Ω of the resistance wire is :

(1) 1.0×10^{-1} m

(2) 1.5×10^{-1} m

(3) 1.5×10^{-2} m

(4) 1.0×10^{-2} m

116. The mean free path for a gas, with molecular diameter d and number density n can be expressed as :

(1) $\frac{1}{\sqrt{2}\, n\pi d^2}$

(2) $\frac{1}{\sqrt{2}\, n^2\pi d^2}$

(3) $\frac{1}{\sqrt{2}\, n^2\pi^2 d^2}$

(4) $\frac{1}{\sqrt{2}\, n\pi d}$

117. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of the water in the capillary is 5 g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is :

(1) 5.0 g

(2) 10.0 g

(3) 20.0 g

(4) 2.5 g

118. For which one of the following, Bohr model is **not** valid ?

(1) Singly ionised helium atom (He^+)

(2) Deuteron atom

(3) Singly ionised neon atom (Ne^+)

(4) Hydrogen atom

119. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.

The pitch of the screw gauge is :

(1) 0.25 mm

(2) 0.5 mm

(3) 1.0 mm

(4) 0.01 mm

120. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is :

($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) 3.14×10^{-4} T

(2) 6.28×10^{-5} T

(3) 3.14×10^{-5} T

(4) 6.28×10^{-4} T

121. A wire of length L, area of cross section A is hanging from a fixed support. The length of the wire changes to L_1 when mass M is suspended from its free end. The expression for Young's modulus is :

(1) $\frac{Mg(L_1 - L)}{AL}$

(2) $\frac{MgL}{AL_1}$

(3) $\frac{MgL}{A(L_1 - L)}$

(4) $\frac{MgL_1}{AL}$

122. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\frac{\pi}{3}$. If instead C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$ between current and voltage. The power factor of the circuit is :

(1) 0.5

(2) 1.0

(3) –1.0

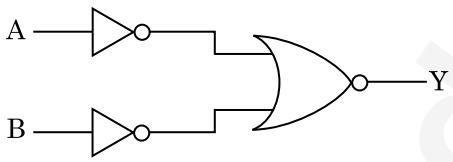
(4) zero

123. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeability of the material of the rod is :
($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})
(1) 8.0×10^{-5} T m A^{-1}
(2) $2.4\pi \times 10^{-5}$ T m A^{-1}
(3) $2.4\pi \times 10^{-7}$ T m A^{-1}
(4) $2.4\pi \times 10^{-4}$ T m A^{-1}

124. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C.
Its density is : (R = 8.3 J mol^{-1} K^{-1})
(1) 0.2 kg/m^3
(2) 0.1 kg/m^3
(3) 0.02 kg/m^3
(4) 0.5 kg/m^3

125. When a uranium isotope $^{235}_{92}U$ is bombarded with a neutron, it generates $^{89}_{36}Kr$, three neutrons and :
(1) $^{91}_{40}Zr$
(2) $^{101}_{36}Kr$
(3) $^{103}_{36}Kr$
(4) $^{144}_{56}Ba$

126. For the logic circuit shown, the truth table is :



(1)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(2)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(3)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

(4)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

127. A charged particle having drift velocity of 7.5×10^{-4} m s^{-1} in an electric field of 3×10^{-10} Vm^{-1}, has a mobility in m^2 V^{-1} s^{-1} of :
(1) 2.5×10^{6}
(2) 2.5×10^{-6}
(3) 2.25×10^{-15}
(4) 2.25×10^{15}

128. The energy required to break one bond in DNA is 10^{-20} J. This value in eV is nearly :
(1) 0.6
(2) 0.06
(3) 0.006
(4) 6

129. The energy equivalent of 0.5 g of a substance is :
(1) 4.5×10^{13} J
(2) 1.5×10^{13} J
(3) 0.5×10^{13} J
(4) 4.5×10^{16} J

130. Dimensions of stress are :
(1) $[ML^2T^{-2}]$
(2) $[ML^0T^{-2}]$
(3) $[ML^{-1}T^{-2}]$
(4) $[MLT^{-2}]$

131. The increase in the width of the depletion region in a p-n junction diode is due to :
(1) reverse bias only
(2) both forward bias and reverse bias
(3) increase in forward current
(4) forward bias only

132. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is : ($g = 10$ m/s^2)
(1) 340 m
(2) 320 m
(3) 300 m
(4) 360 m

133. A 40 μF capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly :

(1) 2.05 A
(2) 2.5 A
(3) 25.1 A
(4) 1.7 A

134. For transistor action, which of the following statements is **correct** ?

(1) Base, emitter and collector regions should have same size.
(2) Both emitter junction as well as the collector junction are forward biased.
(3) The base region must be very thin and lightly doped.
(4) Base, emitter and collector regions should have same doping concentrations.

135. A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth ?

(1) 32 N
(2) 30 N
(3) 24 N
(4) 48 N

136. On electrolysis of dil.sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be :

(1) Oxygen gas
(2) H_2S gas
(3) SO_2 gas
(4) Hydrogen gas

137. The number of Faradays(F) required to produce 20 g of calcium from molten $CaCl_2$ (Atomic mass of Ca = 40 g mol^{-1}) is :

(1) 2
(2) 3
(3) 4
(4) 1

138. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is :

(a) β-Elimination reaction
(b) Follows Zaitsev rule
(c) Dehydrohalogenation reaction
(d) Dehydration reaction

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

139. The rate constant for a first order reaction is 4.606×10^{-3} s^{-1}. The time required to reduce 2.0 g of the reactant to 0.2 g is :

(1) 200 s
(2) 500 s
(3) 1000 s
(4) 100 s

140. Which of the following set of molecules will have zero dipole moment ?

(1) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene
(2) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
(3) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene
(4) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene

141. The mixture which shows positive deviation from Raoult's law is :

(1) Benzene + Toluene
(2) Acetone + Chloroform
(3) Chloroethane + Bromoethane
(4) Ethanol + Acetone

142. Sucrose on hydrolysis gives :

(1) α-D-Glucose + β-D-Glucose
(2) α-D-Glucose + β-D-Fructose
(3) α-D-Fructose + β-D-Fructose
(4) β-D-Glucose + α-D-Fructose

143. Which of the following is a basic amino acid ?

(1) Alanine
(2) Tyrosine
(3) Lysine
(4) Serine

144. Which of the following alkane cannot be made in good yield by Wurtz reaction ?

(1) 2,3-Dimethylbutane

(2) n-Heptane

(3) n-Butane

(4) n-Hexane

145. Which of the following is a cationic detergent ?

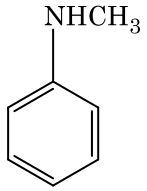
(1) Sodium stearate

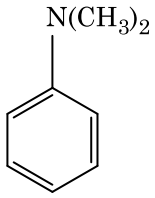
(2) Cetyltrimethyl ammonium bromide

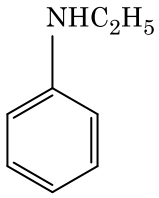
(3) Sodium dodecylbenzene sulphonate

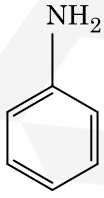
(4) Sodium lauryl sulphate

146. Which of the following amine will give the carbylamine test ?

(1) 

(2) 

(3) 

(4) 

147. Paper chromatography is an example of :

(1) Partition chromatography

(2) Thin layer chromatography

(3) Column chromatography

(4) Adsorption chromatography

148. Find out the solubility of $Ni(OH)_2$ in 0.1 M NaOH. Given that the ionic product of $Ni(OH)_2$ is 2×10^{-15}.

(1) 2×10^{-8} M

(2) 1×10^{-13} M

(3) 1×10^{8} M

(4) 2×10^{-13} M

149. Which one of the followings has maximum number of atoms ?

(1) 1 g of Mg(s) [Atomic mass of Mg = 24]

(2) 1 g of O_2(g) [Atomic mass of O = 16]

(3) 1 g of Li(s) [Atomic mass of Li = 7]

(4) 1 g of Ag(s) [Atomic mass of Ag = 108]

150. For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, the **correct** option is :

(1) $\Delta_r H > 0$ and $\Delta_r S < 0$

(2) $\Delta_r H < 0$ and $\Delta_r S > 0$

(3) $\Delta_r H < 0$ and $\Delta_r S < 0$

(4) $\Delta_r H > 0$ and $\Delta_r S > 0$

151. What is the change in oxidation number of carbon in the following reaction ?

$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(l) + 4HCl(g)$

(1) 0 to +4

(2) −4 to +4

(3) 0 to −4

(4) +4 to +4

152. Which of the following is a natural polymer ?

(1) poly (Butadiene-styrene)

(2) polybutadiene

(3) poly (Butadiene-acrylonitrile)

(4) *cis*-1,4-polyisoprene

153. The calculated spin only magnetic moment of Cr^{2+} ion is :

(1) 4.90 BM

(2) 5.92 BM

(3) 2.84 BM

(4) 3.87 BM

154. Urea reacts with water to form **A** which will decompose to form **B**. **B** when passed through Cu^{2+} (aq), deep blue colour solution **C** is formed. What is the formula of **C** from the following ?

(1) $[Cu(NH_3)_4]^{2+}$

(2) $Cu(OH)_2$

(3) $CuCO_3 \cdot Cu(OH)_2$

(4) $CuSO_4$

155. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals.

(1) Copper

(2) Calcium

(3) Potassium

(4) Iron

156. Hydrolysis of sucrose is given by the following reaction.

$$\text{Sucrose} + H_2O \rightleftharpoons \text{Glucose} + \text{Fructose}$$

If the equilibrium constant (K_c) is 2×10^{13} at 300 K, the value of $\Delta_r G^{\ominus}$ at the same temperature will be :

(1) $8.314\ J\ mol^{-1}K^{-1} \times 300\ K \times \ln(2 \times 10^{13})$

(2) $8.314\ J\ mol^{-1}K^{-1} \times 300\ K \times \ln(3 \times 10^{13})$

(3) $-8.314\ J\ mol^{-1}K^{-1} \times 300\ K \times \ln(4 \times 10^{13})$

(4) $-8.314\ J\ mol^{-1}K^{-1} \times 300\ K \times \ln(2 \times 10^{13})$

157. An increase in the concentration of the reactants of a reaction leads to change in :

(1) heat of reaction

(2) threshold energy

(3) collision frequency

(4) activation energy

158. Measuring Zeta potential is useful in determining which property of colloidal solution ?

(1) Solubility

(2) Stability of the colloidal particles

(3) Size of the colloidal particles

(4) Viscosity

159. Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give :

(1) Sec. butyl alcohol

(2) Tert. butyl alcohol

(3) Isobutyl alcohol

(4) Isopropyl alcohol

160. HCl was passed through a solution of $CaCl_2$, $MgCl_2$ and NaCl. Which of the following compound(s) crystallise(s) ?

(1) Only NaCl

(2) Only $MgCl_2$

(3) NaCl, $MgCl_2$ and $CaCl_2$

(4) Both $MgCl_2$ and $CaCl_2$

161. The number of protons, neutrons and electrons in $^{175}_{71}Lu$, respectively, are :

(1) 104, 71 and 71

(2) 71, 71 and 104

(3) 175, 104 and 71

(4) 71, 104 and 71

162. Match the following :

	Oxide		**Nature**
(a)	CO	(i)	Basic
(b)	BaO	(ii)	Neutral
(c)	Al_2O_3	(iii)	Acidic
(d)	Cl_2O_7	(iv)	Amphoteric

Which of the following is **correct** option ?

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(i)	(iv)	(iii)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(i)	(ii)	(iii)	(iv)

163. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is :

(1) $\frac{\sqrt{2}}{4} \times 288$ pm

(2) $\frac{4}{\sqrt{3}} \times 288$ pm

(3) $\frac{4}{\sqrt{2}} \times 288$ pm

(4) $\frac{\sqrt{3}}{4} \times 288$ pm

164. A mixture of N_2 and Ar gases in a cylinder contains 7 g of N_2 and 8 g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N_2 is :

[Use atomic masses (in g mol^{-1}) : N = 14, Ar = 40]

(1) 12 bar

(2) 15 bar

(3) 18 bar

(4) 9 bar

165. Which of the following is the **correct** order of increasing field strength of ligands to form coordination compounds ?

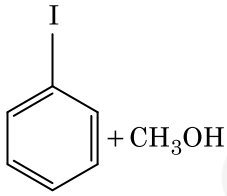
(1) $SCN^- < F^- < CN^- < C_2O_4^{2-}$

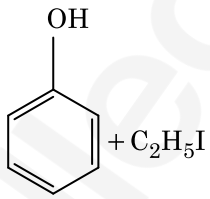
(2) $F^- < SCN^- < C_2O_4^{2-} < CN^-$

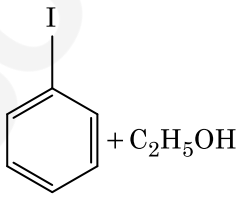
(3) $CN^- < C_2O_4^{2-} < SCN^- < F^-$

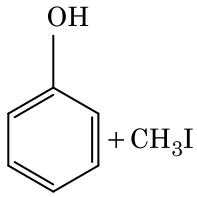
(4) $SCN^- < F^- < C_2O_4^{2-} < CN^-$

166. Anisole on cleavage with HI gives :

(1) 

(2) 

(3) 

(4) 

167. The correct option for free expansion of an ideal gas under adiabatic condition is :

(1) $q = 0, \Delta T < 0$ and $w > 0$

(2) $q < 0, \Delta T = 0$ and $w = 0$

(3) $q > 0, \Delta T > 0$ and $w > 0$

(4) $q = 0, \Delta T = 0$ and $w = 0$

168. Identify the **correct** statement from the following :

(1) Blister copper has blistered appearance due to evolution of CO_2.

(2) Vapour phase refining is carried out for Nickel by Van Arkel method.

(3) Pig iron can be moulded into a variety of shapes.

(4) Wrought iron is impure iron with 4% carbon.

169. Identify the **incorrect** statement.

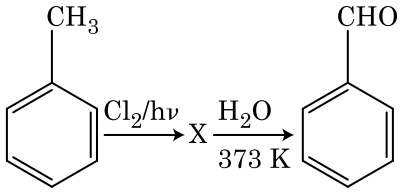
(1) The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes.

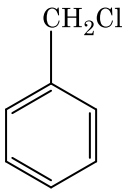
(2) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.

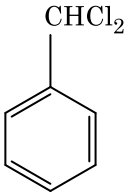
(3) The oxidation states of chromium in CrO_4^{2-} and $Cr_2O_7^{2-}$ are not the same.

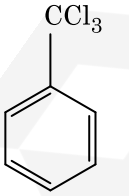
(4) $Cr^{2+}(d^4)$ is a stronger reducing agent than $Fe^{2+}(d^6)$ in water.

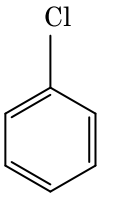
170. Identify compound X in the following sequence of reactions :



(1) 

(2) 

(3) 

(4) 

171. Match the following and identify the **correct** option.

(a)	$CO(g) + H_2(g)$	(i)	$Mg(HCO_3)_2 + Ca(HCO_3)_2$
(b)	Temporary hardness of water	(ii)	An electron deficient hydride
(c)	B_2H_6	(iii)	Synthesis gas
(d)	H_2O_2	(iv)	Non-planar structure

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(ii)	(i)	(iv)
(2)	(iii)	(iv)	(ii)	(i)
(3)	(i)	(iii)	(ii)	(iv)
(4)	(iii)	(i)	(ii)	(iv)

172. The freezing point depression constant (K_f) of benzene is 5.12 K kg mol^{-1}. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is (rounded off upto two decimal places) :

(1) 0.80 K

(2) 0.40 K

(3) 0.60 K

(4) 0.20 K

173. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following ?

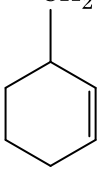
(1) + R effect of $-CH_3$ groups

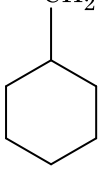
(2) – R effect of $-CH_3$ groups

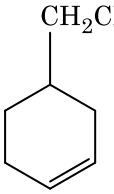
(3) Hyperconjugation

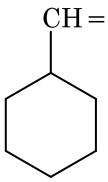
(4) – I effect of $-CH_3$ groups

174. An alkene on ozonolysis gives methanal as one of the product. Its structure is :

(1) $CH_2-CH_2-CH_3$ 

(2) $CH_2-CH=CH_2$ 

(3) $CH_2CH_2CH_3$ 

(4) $CH=CH-CH_3$ 

175. Which of the following is **not** correct about carbon monoxide ?

(1) It reduces oxygen carrying ability of blood.

(2) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.

(3) It is produced due to incomplete combustion.

(4) It forms carboxyhaemoglobin.

176. Identify a molecule which does **not** exist.

(1) Li_2

(2) C_2

(3) O_2

(4) He_2

177. Which of the following oxoacid of sulphur has $-O-O-$ linkage ?

(1) H_2SO_4, sulphuric acid

(2) $H_2S_2O_8$, peroxodisulphuric acid

(3) $H_2S_2O_7$, pyrosulphuric acid

(4) H_2SO_3, sulphurous acid

178. Identify the **correct** statements from the following :

(a) $CO_2(g)$ is used as refrigerant for ice-cream and frozen food.

(b) The structure of C_{60} contains twelve six carbon rings and twenty five carbon rings.

(c) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.

(d) CO is colorless and odourless gas.

(1) (a) and (c) only

(2) (b) and (c) only

(3) (c) and (d) only

(4) (a), (b) and (c) only

179. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as :

(1) Cannizzaro's reaction

(2) Cross Cannizzaro's reaction

(3) Cross Aldol condensation

(4) Aldol condensation

180. Identify the **incorrect** match.

	Name		**IUPAC Official Name**
(a)	Unnilunium	(i)	Mendelevium
(b)	Unniltrium	(ii)	Lawrencium
(c)	Unnilhexium	(iii)	Seaborgium
(d)	Unununnium	(iv)	Darmstadtium

(1) (b), (ii)

(2) (c), (iii)

(3) (d), (iv)

(4) (a), (i)

- o 0 o -

Space For Rough Work

Space For Rough Work

Space For Rough Work

Test Booklet Code

H6

KHANA

No. :

This Booklet contains 24 pages.

Do not open this Test Booklet until you are asked to do so.

Important Instructions :

1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on **side-1** and **side-2** carefully with **blue/black** ball point pen only.
2. The test is of **3 hours** duration and Test Booklet contains **180** questions. Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, **one mark** will be deducted from the total scores. The maximum marks are **720**.
3. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. **On completion of the test, the candidate must hand over the Answer Sheet to the invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.**
6. The CODE for this Booklet is **H6**. Make sure that the CODE printed on **Side-2** of the Answer Sheet is the same as that on this Test Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
7. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/ Answer Sheet.
8. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
9. Each candidate must show on demand his/her Admit Card to the Invigilator.
10. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
11. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. **Cases where a candidate has not signed the Attendance Sheet second time will be deemed not to have handed over the Answer Sheet and dealt with as an unfair means case.**
12. Use of Electronic/Manual Calculator is prohibited.
13. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
14. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
15. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

Name of the Candidate (in Capitals) : _____

Roll Number : in figures _____

: in words _____

Centre of Examination (in Capitals) : _____

Candidate's Signature : _____ Invigilator's Signature : _____

Facsimile signature stamp of

Centre Superintendent : _____

1. Which of the following pairs is of unicellular algae ?
   (1) *Chlorella* and *Spirulina*
   (2) *Laminaria* and *Sargassum*
   (3) *Gelidium* and *Gracilaria*
   (4) *Anabaena* and *Volvox*

2. Goblet cells of alimentary canal are modified from :
   (1) Compound epithelial cells
   (2) Squamous epithelial cells
   (3) Columnar epithelial cells
   (4) Chondrocytes

3. The enzyme enterokinase helps in conversion of :
   (1) pepsinogen into pepsin
   (2) protein into polypeptides
   (3) trypsinogen into trypsin
   (4) caseinogen into casein

4. Which one of the following is the most abundant protein in the animals ?
   (1) Insulin
   (2) Haemoglobin
   (3) Collagen
   (4) Lectin

5. Bt cotton variety that was developed by the introduction of toxin gene of *Bacillus thuringiensis* (Bt) is resistant to :
   (1) Insect predators
   (2) Insect pests
   (3) Fungal diseases
   (4) Plant nematodes

6. How many true breeding pea plant varieties did Mendel select as pairs, which were similar except in one character with contrasting traits ?
   (1) 8
   (2) 4
   (3) 2
   (4) 14

7. The infectious stage of *Plasmodium* that enters the human body is :
   (1) Male gametocytes
   (2) Trophozoites
   (3) Sporozoites
   (4) Female gametocytes

8. Select the **correct** events that occur during inspiration.
   (a) Contraction of diaphragm
   (b) Contraction of external inter-costal muscles
   (c) Pulmonary volume decreases
   (d) Intra pulmonary pressure increases
   (1) only (d)
   (2) (a) and (b)
   (3) (c) and (d)
   (4) (a), (b) and (d)

9. The process of growth is maximum during :
   (1) Dormancy
   (2) Log phase
   (3) Lag phase
   (4) Senescence

10. The sequence that controls the copy number of the linked DNA in the vector, is termed :
    (1) Recognition site
    (2) Selectable marker
    (3) Ori site
    (4) Palindromic sequence

11. The plant parts which consist of two generations - one within the other :
    (a) Pollen grains inside the anther
    (b) Germinated pollen grain with two male gametes
    (c) Seed inside the fruit
    (d) Embryo sac inside the ovule
    (1) (a) and (d)
    (2) (a) only
    (3) (a), (b) and (c)
    (4) (c) and (d)

12. Which of the following statements is **correct** ?

(1) Adenine does not pair with thymine.

(2) Adenine pairs with thymine through two H-bonds.

(3) Adenine pairs with thymine through one H-bond.

(4) Adenine pairs with thymine through three H-bonds.

13. In light reaction, plastoquinone facilitates the transfer of electrons from :

(1) PS-I to ATP synthase

(2) PS-II to $Cytb_6f$ complex

(3) $Cytb_6f$ complex to PS-I

(4) PS-I to $NADP^+$

14. Which of the following statements about inclusion bodies is **incorrect** ?

(1) These represent reserve material in cytoplasm.

(2) They are not bound by any membrane.

(3) These are involved in ingestion of food particles.

(4) They lie free in the cytoplasm.

15. Cuboidal epithelium with brush border of microvilli is found in :

(1) eustachian tube

(2) lining of intestine

(3) ducts of salivary glands

(4) proximal convoluted tubule of nephron

16. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	*Clostridium butylicum*	(i)	Cyclosporin-A
(b)	*Trichoderma polysporum*	(ii)	Butyric Acid
(c)	*Monascus purpureus*	(iii)	Citric Acid
(d)	*Aspergillus niger*	(iv)	Blood cholesterol lowering agent

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(iii)	(ii)	(i)
(2)	(iii)	(iv)	(ii)	(i)
(3)	(ii)	(i)	(iv)	(iii)
(4)	(i)	(ii)	(iv)	(iii)

17. Match the following concerning essential elements and their functions in plants :

(a)	Iron	(i)	Photolysis of water
(b)	Zinc	(ii)	Pollen germination
(c)	Boron	(iii)	Required for chlorophyll biosynthesis
(d)	Manganese	(iv)	IAA biosynthesis

Select the **correct** option :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(i)	(ii)	(iii)
(2)	(ii)	(i)	(iv)	(iii)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(iii)	(iv)	(ii)	(i)

18. Snow-blindness in Antarctic region is due to :

(1) Damage to retina caused by infra-red rays

(2) Freezing of fluids in the eye by low temperature

(3) Inflammation of cornea due to high dose of UV-B radiation

(4) High reflection of light from snow

19. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Pituitary gland	(i)	Grave's disease
(b)	Thyroid gland	(ii)	Diabetes mellitus
(c)	Adrenal gland	(iii)	Diabetes insipidus
(d)	Pancreas	(iv)	Addison's disease

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(i)	(iv)	(iii)
(2)	(iv)	(iii)	(i)	(ii)
(3)	(iii)	(ii)	(i)	(iv)
(4)	(iii)	(i)	(iv)	(ii)

20. Which of the following is **not** an inhibitory substance governing seed dormancy ?

(1) Para-ascorbic acid

(2) Gibberellic acid

(3) Abscisic acid

(4) Phenolic acid

21. Identify the **correct** statement with reference to human digestive system.

(1) Vermiform appendix arises from duodenum.

(2) Ileum opens into small intestine.

(3) Serosa is the innermost layer of the alimentary canal.

(4) Ileum is a highly coiled part.

22. The ovary is half inferior in :

(1) Plum

(2) Brinjal

(3) Mustard

(4) Sunflower

23. The process responsible for facilitating loss of water in liquid form from the tip of grass blades at night and in early morning is :

(1) Plasmolysis

(2) Transpiration

(3) Root pressure

(4) Imbibition

24. Match the following with respect to meiosis :

(a)	Zygotene	(i)	Terminalization
(b)	Pachytene	(ii)	Chiasmata
(c)	Diplotene	(iii)	Crossing over
(d)	Diakinesis	(iv)	Synapsis

Select the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iv)	(iii)	(i)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(i)	(ii)	(iv)	(iii)

25. Identify the basic amino acid from the following.

(1) Valine

(2) Tyrosine

(3) Glutamic Acid

(4) Lysine

26. In gel electrophoresis, separated DNA fragments can be visualized with the help of :

(1) Ethidium bromide in infrared radiation

(2) Acetocarmine in bright blue light

(3) Ethidium bromide in UV radiation

(4) Acetocarmine in UV radiation

27. Identify the substances having glycosidic bond and peptide bond, respectively in their structure :

(1) Inulin, insulin

(2) Chitin, cholesterol

(3) Glycerol, trypsin

(4) Cellulose, lecithin

28. Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their :

(1) Effect on reproduction

(2) Nutritive value

(3) Growth response

(4) Defence action

29. Bilaterally symmetrical and acoelomate animals are exemplified by :

(1) Annelida

(2) Ctenophora

(3) Platyhelminthes

(4) Aschelminthes

30. The product(s) of reaction catalyzed by nitrogenase in root nodules of leguminous plants is/are :

(1) Ammonia and hydrogen

(2) Ammonia alone

(3) Nitrate alone

(4) Ammonia and oxygen

31. Which of the following would help in prevention of diuresis ?

(1) Decrease in secretion of renin by JG cells

(2) More water reabsorption due to undersecretion of ADH

(3) Reabsorption of Na^+ and water from renal tubules due to aldosterone

(4) Atrial natriuretic factor causes vasoconstriction

32. Select the **correct** statement.

(1) Insulin is associated with hyperglycemia.

(2) Glucocorticoids stimulate gluconeogenesis.

(3) Glucagon is associated with hypoglycemia.

(4) Insulin acts on pancreatic cells and adipocytes.

33. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells ?

(1) Polysomes

(2) Endoplasmic reticulum

(3) Peroxisomes

(4) Golgi bodies

34. Name the plant growth regulator which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane crop.

(1) Abscisic acid

(2) Cytokinin

(3) Gibberellin

(4) Ethylene

35. Some dividing cells exit the cell cycle and enter vegetative inactive stage. This is called quiescent stage (G_0). This process occurs at the end of :

(1) G_2 phase

(2) M phase

(3) G_1 phase

(4) S phase

36. Flippers of Penguins and Dolphins are examples of :

(1) Natural selection

(2) Adaptive radiation

(3) Convergent evolution

(4) Industrial melanism

37. The transverse section of a plant shows following anatomical features :

(a) Large number of scattered vascular bundles surrounded by bundle sheath.

(b) Large conspicuous parenchymatous ground tissue.

(c) Vascular bundles conjoint and closed.

(d) Phloem parenchyma absent.

Identify the category of plant and its part :

(1) Dicotyledonous root

(2) Monocotyledonous stem

(3) Monocotyledonous root

(4) Dicotyledonous stem

38. In water hyacinth and water lily, pollination takes place by :

(1) insects and water

(2) insects or wind

(3) water currents only

(4) wind and water

39. Identify the **wrong** statement with reference to immunity.

(1) Foetus receives some antibodies from mother, it is an example for passive immunity.

(2) When exposed to antigen (living or dead) antibodies are produced in the host's body. It is called "Active immunity".

(3) When ready-made antibodies are directly given, it is called "Passive immunity".

(4) Active immunity is quick and gives full response.

40. Which of the following is put into Anaerobic sludge digester for further sewage treatment ?

(1) Activated sludge

(2) Primary sludge

(3) Floating debris

(4) Effluents of primary treatment

41. Match the following :

(a)	Inhibitor of catalytic activity	(i)	Ricin
(b)	Possess peptide bonds	(ii)	Malonate
(c)	Cell wall material in fungi	(iii)	Chitin
(d)	Secondary metabolite	(iv)	Collagen

Choose the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iii)	(i)	(iv)
(2)	(ii)	(iv)	(iii)	(i)
(3)	(iii)	(i)	(iv)	(ii)
(4)	(iii)	(iv)	(i)	(ii)

42. Which of the following hormone levels will cause release of ovum (ovulation) from the graffian follicle ?

(1) Low concentration of FSH
(2) High concentration of Estrogen
(3) High concentration of Progesterone
(4) Low concentration of LH

43. Select the option including all sexually transmitted diseases.

(1) Cancer, AIDS, Syphilis
(2) Gonorrhoea, Syphilis, Genital herpes
(3) Gonorrhoea, Malaria, Genital herpes
(4) AIDS, Malaria, Filaria

44. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Organ of Corti	(i)	Connects middle ear and pharynx
(b)	Cochlea	(ii)	Coiled part of the labyrinth
(c)	Eustachian tube	(iii)	Attached to the oval window
(d)	Stapes	(iv)	Located on the basilar membrane

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iv)	(iii)
(2)	(ii)	(iii)	(i)	(iv)
(3)	(iii)	(i)	(iv)	(ii)
(4)	(iv)	(ii)	(i)	(iii)

45. Identify the **incorrect** statement.

(1) Due to deposition of tannins, resins, oils etc., heart wood is dark in colour.
(2) Heart wood does not conduct water but gives mechanical support.
(3) Sapwood is involved in conduction of water and minerals from root to leaf.
(4) Sapwood is the innermost secondary xylem and is lighter in colour.

46. Identify the **correct** statement with regard to G_1 phase (Gap 1) of interphase.

(1) Nuclear Division takes place.
(2) DNA synthesis or replication takes place.
(3) Reorganisation of all cell components takes place.
(4) Cell is metabolically active, grows but does not replicate its DNA.

47. The number of substrate level phosphorylations in one turn of citric acid cycle is :

(1) Three
(2) Zero
(3) One
(4) Two

48. From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask :

(1) CH_3, H_2, NH_3 and water vapor at 600°C
(2) CH_4, H_2, NH_3 and water vapor at 800°C
(3) CH_3, H_2, NH_4 and water vapor at 800°C
(4) CH_4, H_2, NH_3 and water vapor at 600°C

49. The body of the ovule is fused within the funicle at :

(1) Chalaza
(2) Hilum
(3) Micropyle
(4) Nucellus

50. The QRS complex in a standard ECG represents :

(1) Repolarisation of ventricles
(2) Repolarisation of auricles
(3) Depolarisation of auricles
(4) Depolarisation of ventricles

51. Meiotic division of the secondary oocyte is completed :

(1) At the time of fusion of a sperm with an ovum
(2) Prior to ovulation
(3) At the time of copulation
(4) After zygote formation

52. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Floating Ribs	(i)	Located between second and seventh ribs
(b)	Acromion	(ii)	Head of the Humerus
(c)	Scapula	(iii)	Clavicle
(d)	Glenoid cavity	(iv)	Do not connect with the sternum

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(iii)	(i)	(ii)
(2)	(ii)	(iv)	(i)	(iii)
(3)	(i)	(iii)	(ii)	(iv)
(4)	(iii)	(ii)	(iv)	(i)

53. Match the following diseases with the causative organism and select the **correct** option.

	Column - I		**Column - II**
(a)	Typhoid	(i)	*Wuchereria*
(b)	Pneumonia	(ii)	*Plasmodium*
(c)	Filariasis	(iii)	*Salmonella*
(d)	Malaria	(iv)	*Haemophilus*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(i)	(ii)	(iii)
(2)	(i)	(iii)	(ii)	(iv)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(ii)	(i)	(iii)	(iv)

54. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Gregarious, polyphagous pest	(i)	*Asterias*
(b)	Adult with radial symmetry and larva with bilateral symmetry	(ii)	Scorpion
(c)	Book lungs	(iii)	*Ctenoplana*
(d)	Bioluminescence	(iv)	*Locusta*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(i)	(iii)	(iv)
(2)	(i)	(iii)	(ii)	(iv)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(iii)	(ii)	(i)	(iv)

55. Dissolution of the synaptonemal complex occurs during :

(1) Leptotene
(2) Pachytene
(3) Zygotene
(4) Diplotene

56. Which of the following is **correct** about viroids ?

(1) They have free DNA without protein coat.
(2) They have RNA with protein coat.
(3) They have free RNA without protein coat.
(4) They have DNA with protein coat.

57. Embryological support for evolution was disapproved by :

(1) Oparin
(2) Karl Ernst von Baer
(3) Alfred Wallace
(4) Charles Darwin

58. The specific palindromic sequence which is recognized by EcoRI is :

(1) 5' - GGATCC - 3'
3' - CCTAGG - 5'
(2) 5' - GAATTC - 3'
3' - CTTAAG - 5'
(3) 5' - GGAACC - 3'
3' - CCTTGG - 5'
(4) 5' - CTTAAG - 3'
3' - GAATTC - 5'

59. Match the organism with its use in biotechnology.

(a)	*Bacillus thuringiensis*	(i)	Cloning vector
(b)	*Thermus aquaticus*	(ii)	Construction of first rDNA molecule
(c)	*Agrobacterium tumefaciens*	(iii)	DNA polymerase
(d)	*Salmonella typhimurium*	(iv)	Cry proteins

Select the **correct** option from the following :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iii)	(iv)	(i)	(ii)
(2)	(ii)	(iv)	(iii)	(i)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(iii)	(ii)	(iv)	(i)

60. Which of the following statements are **true** for the phylum-Chordata ?

(a) In Urochordata notochord extends from head to tail and it is present throughout their life.

(b) In Vertebrata notochord is present during the embryonic period only.

(c) Central nervous system is dorsal and hollow.

(d) Chordata is divided into 3 subphyla : Hemichordata, Tunicata and Cephalochordata.

(1) (b) and (c)

(2) (d) and (c)

(3) (c) and (a)

(4) (a) and (b)

61. Montreal protocol was signed in 1987 for control of :

(1) Disposal of e-wastes

(2) Transport of Genetically modified organisms from one country to another

(3) Emission of ozone depleting substances

(4) Release of Green House gases

62. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6×10^9 bp, then the length of the DNA is approximately :

(1) 2.7 meters

(2) 2.0 meters

(3) 2.5 meters

(4) 2.2 meters

63. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Placenta	(i)	Androgens
(b)	Zona pellucida	(ii)	Human Chorionic Gonadotropin (hCG)
(c)	Bulbo-urethral glands	(iii)	Layer of the ovum
(d)	Leydig cells	(iv)	Lubrication of the Penis

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iii)	(iv)	(i)
(2)	(iv)	(iii)	(i)	(ii)
(3)	(i)	(iv)	(ii)	(iii)
(4)	(iii)	(ii)	(iv)	(i)

64. Which of the following regions of the globe exhibits highest species diversity ?

(1) Amazon forests

(2) Western Ghats of India

(3) Madagascar

(4) Himalayas

65. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	6 - 15 pairs of gill slits	(i)	*Trygon*
(b)	Heterocercal caudal fin	(ii)	Cyclostomes
(c)	Air Bladder	(iii)	Chondrichthyes
(d)	Poison sting	(iv)	Osteichthyes

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(iv)	(iii)	(ii)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iv)	(ii)	(iii)	(i)

66. Which of the following is **not** an attribute of a population ?

(1) Species interaction

(2) Sex ratio

(3) Natality

(4) Mortality

67. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Bt cotton	(i)	Gene therapy
(b)	Adenosine deaminase deficiency	(ii)	Cellular defence
(c)	RNAi	(iii)	Detection of HIV infection
(d)	PCR	(iv)	*Bacillus thuringiensis*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iii)	(iv)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(iii)	(ii)	(i)	(iv)
(4)	(ii)	(iii)	(iv)	(i)

68. Which of the following refer to **correct** example(s) of organisms which have evolved due to changes in environment brought about by anthropogenic action ?

(a) Darwin's Finches of Galapagos islands.

(b) Herbicide resistant weeds.

(c) Drug resistant eukaryotes.

(d) Man-created breeds of domesticated animals like dogs.

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

69. In which of the following techniques, the embryos are transferred to assist those females who cannot conceive ?

(1) GIFT and ICSI
(2) ZIFT and IUT
(3) GIFT and ZIFT
(4) ICSI and ZIFT

70. Experimental verification of the chromosomal theory of inheritance was done by :

(1) Morgan
(2) Mendel
(3) Sutton
(4) Boveri

71. The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of :

(1) 1 molecule of 4-C compound and 1 molecule of 2-C compound
(2) 2 molecules of 3-C compound
(3) 1 molecule of 3-C compound
(4) 1 molecule of 6-C compound

72. If the head of cockroach is removed, it may live for few days because :

(1) the head holds a 1/3rd of a nervous system while the rest is situated along the dorsal part of its body.
(2) the supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen.
(3) the cockroach does not have nervous system.
(4) the head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body.

73. Select the **correct** match.

(1) Thalassemia - X linked
(2) Haemophilia - Y linked
(3) Phenylketonuria - Autosomal dominant trait
(4) Sickle cell anaemia - Autosomal recessive trait, chromosome-11

74. Strobili or cones are found in :

(1) *Equisetum*
(2) *Salvinia*
(3) *Pteris*
(4) *Marchantia*

75. Match the following columns and select the **correct** option.

	Column - I		**Column - II**
(a)	Eosinophils	(i)	Immune response
(b)	Basophils	(ii)	Phagocytosis
(c)	Neutrophils	(iii)	Release histaminase, destructive enzymes
(d)	Lymphocytes	(iv)	Release granules containing histamine

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(i)	(iii)	(iv)
(2)	(iii)	(iv)	(ii)	(i)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(i)	(ii)	(iv)	(iii)

76. According to Robert May, the global species diversity is about :

(1) 7 million
(2) 1.5 million
(3) 20 million
(4) 50 million

77. By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams ?

(1) Inbreeding
(2) Out crossing
(3) Mutational breeding
(4) Cross breeding

78. The roots that originate from the base of the stem are :

(1) Lateral roots
(2) Fibrous roots
(3) Primary roots
(4) Prop roots

79. Identify the **wrong** statement with reference to transport of oxygen.

(1) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin.
(2) Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2.
(3) Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin.
(4) Higher H^+ conc. in alveoli favours the formation of oxyhaemoglobin.

80. Presence of which of the following conditions in urine are indicative of Diabetes Mellitus ?

(1) Renal calculi and Hyperglycaemia
(2) Uremia and Ketonuria
(3) Uremia and Renal Calculi
(4) Ketonuria and Glycosuria

81. Ray florets have :

(1) Half inferior ovary
(2) Inferior ovary
(3) Superior ovary
(4) Hypogynous ovary

82. Name the enzyme that facilitates opening of DNA helix during transcription.

(1) RNA polymerase
(2) DNA ligase
(3) DNA helicase
(4) DNA polymerase

83. Identify the **wrong** statement with regard to Restriction Enzymes.

(1) Sticky ends can be joined by using DNA ligases.
(2) Each restriction enzyme functions by inspecting the length of a DNA sequence.
(3) They cut the strand of DNA at palindromic sites.
(4) They are useful in genetic engineering.

84. Match the trophic levels with their **correct** species examples in grassland ecosystem.

(a)	Fourth trophic level	(i)	Crow
(b)	Second trophic level	(ii)	Vulture
(c)	First trophic level	(iii)	Rabbit
(d)	Third trophic level	(iv)	Grass

Select the **correct** option :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iii)	(iv)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(iii)	(ii)	(i)	(iv)
(4)	(iv)	(iii)	(ii)	(i)

85. In relation to Gross primary productivity and Net primary productivity of an ecosystem, which one of the following statements is **correct** ?

(1) There is no relationship between Gross primary productivity and Net primary productivity.
(2) Gross primary productivity is always less than net primary productivity.
(3) Gross primary productivity is always more than net primary productivity.
(4) Gross primary productivity and Net primary productivity are one and same.

86. Floridean starch has structure similar to :

(1) Laminarin and cellulose
(2) Starch and cellulose
(3) Amylopectin and glycogen
(4) Mannitol and algin

87. Choose the **correct** pair from the following :

(1)	Exonucleases	-	Make cuts at specific positions within DNA
(2)	Ligases	-	Join the two DNA molecules
(3)	Polymerases	-	Break the DNA into fragments
(4)	Nucleases	-	Separate the two strands of DNA

88. Identify the **wrong** statement with reference to the gene 'I' that controls ABO blood groups.

(1) Allele 'i' does not produce any sugar.

(2) The gene (I) has three alleles.

(3) A person will have only two of the three alleles.

(4) When I^A and I^B are present together, they express same type of sugar.

89. The first phase of translation is :

(1) Recognition of an anti-codon

(2) Binding of mRNA to ribosome

(3) Recognition of DNA molecule

(4) Aminoacylation of tRNA

90. Which of the following statements is **not correct** ?

(1) Genetically engineered insulin is produced in *E-Coli*.

(2) In man insulin is synthesised as a proinsulin.

(3) The proinsulin has an extra peptide called C-peptide.

(4) The functional insulin has A and B chains linked together by hydrogen bonds.

91. Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give :

(1) Isobutyl alcohol

(2) Isopropyl alcohol

(3) Sec. butyl alcohol

(4) Tert. butyl alcohol

92. Sucrose on hydrolysis gives :

(1) α-D-Fructose + β-D-Fructose

(2) β-D-Glucose + α-D-Fructose

(3) α-D-Glucose + β-D-Glucose

(4) α-D-Glucose + β-D-Fructose

93. A mixture of N_2 and Ar gases in a cylinder contains 7 g of N_2 and 8 g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N_2 is :

[Use atomic masses (in g mol^{-1}) : N = 14, Ar = 40]

(1) 18 bar

(2) 9 bar

(3) 12 bar

(4) 15 bar

94. The number of protons, neutrons and electrons in $^{175}_{71}Lu$, respectively, are :

(1) 175, 104 and 71

(2) 71, 104 and 71

(3) 104, 71 and 71

(4) 71, 71 and 104

95. On electrolysis of dil.sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be :

(1) SO_2 gas

(2) Hydrogen gas

(3) Oxygen gas

(4) H_2S gas

96. Match the following and identify the **correct** option.

(a)	$CO(g) + H_2(g)$	(i)	$Mg(HCO_3)_2 + Ca(HCO_3)_2$
(b)	Temporary hardness of water	(ii)	An electron deficient hydride
(c)	B_2H_6	(iii)	Synthesis gas
(d)	H_2O_2	(iv)	Non-planar structure

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iii)	(i)	(ii)	(iv)
(3)	(iii)	(ii)	(i)	(iv)
(4)	(iii)	(iv)	(ii)	(i)

97. Measuring Zeta potential is useful in determining which property of colloidal solution ?

(1) Size of the colloidal particles

(2) Viscosity

(3) Solubility

(4) Stability of the colloidal particles

98. Hydrolysis of sucrose is given by the following reaction.

$$\text{Sucrose} + H_2O \rightleftharpoons \text{Glucose} + \text{Fructose}$$

If the equilibrium constant (K_c) is 2×10^{13} at 300 K, the value of $\Delta_r G^{\ominus}$ at the same temperature will be :

(1) $-8.314\ \text{J mol}^{-1}\text{K}^{-1} \times 300\ \text{K} \times \ln(4 \times 10^{13})$

(2) $-8.314\ \text{J mol}^{-1}\text{K}^{-1} \times 300\ \text{K} \times \ln(2 \times 10^{13})$

(3) $8.314\ \text{J mol}^{-1}\text{K}^{-1} \times 300\ \text{K} \times \ln(2 \times 10^{13})$

(4) $8.314\ \text{J mol}^{-1}\text{K}^{-1} \times 300\ \text{K} \times \ln(3 \times 10^{13})$

99. The rate constant for a first order reaction is $4.606 \times 10^{-3}\ \text{s}^{-1}$. The time required to reduce 2.0 g of the reactant to 0.2 g is :

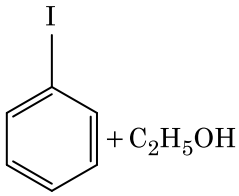
(1) 1000 s

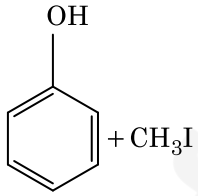
(2) 100 s

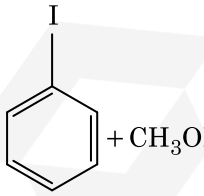
(3) 200 s

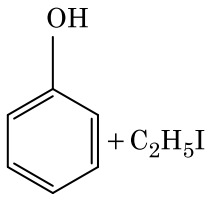
(4) 500 s

100. Anisole on cleavage with HI gives :

(1)  $+ C_2H_5OH$

(2)  $+ CH_3I$

(3)  $+ CH_3OH$

(4)  $+ C_2H_5I$

101. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as :

(1) Cross Aldol condensation

(2) Aldol condensation

(3) Cannizzaro's reaction

(4) Cross Cannizzaro's reaction

102. Which of the following oxoacid of sulphur has $-O-O-$ linkage ?

(1) $H_2S_2O_7$, pyrosulphuric acid

(2) H_2SO_3, sulphurous acid

(3) H_2SO_4, sulphuric acid

(4) $H_2S_2O_8$, peroxodisulphuric acid

103. Urea reacts with water to form **A** which will decompose to form **B**. **B** when passed through Cu^{2+} (aq), deep blue colour solution **C** is formed. What is the formula of **C** from the following ?

(1) $CuCO_3 \cdot Cu(OH)_2$

(2) $CuSO_4$

(3) $[Cu(NH_3)_4]^{2+}$

(4) $Cu(OH)_2$

104. Which of the following is a cationic detergent ?

(1) Sodium dodecylbenzene sulphonate

(2) Sodium lauryl sulphate

(3) Sodium stearate

(4) Cetyltrimethyl ammonium bromide

105. The freezing point depression constant (K_f) of benzene is 5.12 K kg mol^{-1}. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is (rounded off upto two decimal places) :

(1) 0.60 K

(2) 0.20 K

(3) 0.80 K

(4) 0.40 K

106. For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, the **correct** option is :

(1) $\Delta_r H < 0$ and $\Delta_r S < 0$

(2) $\Delta_r H > 0$ and $\Delta_r S > 0$

(3) $\Delta_r H > 0$ and $\Delta_r S < 0$

(4) $\Delta_r H < 0$ and $\Delta_r S > 0$

107. An increase in the concentration of the reactants of a reaction leads to change in :

(1) collision frequency

(2) activation energy

(3) heat of reaction

(4) threshold energy

108. Identify the **correct** statements from the following :

(a) $CO_2(g)$ is used as refrigerant for ice-cream and frozen food.

(b) The structure of C_{60} contains twelve six carbon rings and twenty five carbon rings.

(c) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.

(d) CO is colorless and odourless gas.

(1) (c) and (d) only

(2) (a), (b) and (c) only

(3) (a) and (c) only

(4) (b) and (c) only

109. Which one of the followings has maximum number of atoms ?

(1) 1 g of Li(s) [Atomic mass of Li = 7]

(2) 1 g of Ag(s) [Atomic mass of Ag = 108]

(3) 1 g of Mg(s) [Atomic mass of Mg = 24]

(4) 1 g of $O_2(g)$ [Atomic mass of O = 16]

110. Paper chromatography is an example of :

(1) Column chromatography

(2) Adsorption chromatography

(3) Partition chromatography

(4) Thin layer chromatography

111. The number of Faradays(F) required to produce 20 g of calcium from molten $CaCl_2$ (Atomic mass of Ca = 40 g mol^{-1}) is :

(1) 4

(2) 1

(3) 2

(4) 3

112. Identify the **incorrect** statement.

(1) The oxidation states of chromium in CrO_4^{2-} and $Cr_2O_7^{2-}$ are not the same.

(2) $Cr^{2+}(d^4)$ is a stronger reducing agent than $Fe^{2+}(d^6)$ in water.

(3) The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes.

(4) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.

113. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is :

(1) $\frac{4}{\sqrt{2}} \times 288$ pm

(2) $\frac{\sqrt{3}}{4} \times 288$ pm

(3) $\frac{\sqrt{2}}{4} \times 288$ pm

(4) $\frac{4}{\sqrt{3}} \times 288$ pm

114. Find out the solubility of $Ni(OH)_2$ in 0.1 M NaOH. Given that the ionic product of $Ni(OH)_2$ is 2×10^{-15}.

(1) 1×10^{8} M

(2) 2×10^{-13} M

(3) 2×10^{-8} M

(4) 1×10^{-13} M

115. Identify a molecule which does **not** exist.

(1) O_2

(2) He_2

(3) Li_2

(4) C_2

116. Which of the following is a basic amino acid ?

(1) Lysine

(2) Serine

(3) Alanine

(4) Tyrosine

117. Which of the following is a natural polymer ?

(1) poly (Butadiene-acrylonitrile)

(2) *cis*-1,4-polyisoprene

(3) poly (Butadiene-styrene)

(4) polybutadiene

118. Identify the **correct** statement from the following :

(1) Pig iron can be moulded into a variety of shapes.

(2) Wrought iron is impure iron with 4% carbon.

(3) Blister copper has blistered appearance due to evolution of CO_2.

(4) Vapour phase refining is carried out for Nickel by Van Arkel method.

119. Which of the following is **not** correct about carbon monoxide ?

(1) It is produced due to incomplete combustion.

(2) It forms carboxyhaemoglobin.

(3) It reduces oxygen carrying ability of blood.

(4) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.

120. Match the following :

	Oxide		**Nature**
(a)	CO	(i)	Basic
(b)	BaO	(ii)	Neutral
(c)	Al_2O_3	(iii)	Acidic
(d)	Cl_2O_7	(iv)	Amphoteric

Which of the following is **correct** option ?

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(iii)	(ii)	(i)
(2)	(i)	(ii)	(iii)	(iv)
(3)	(ii)	(i)	(iv)	(iii)
(4)	(iii)	(iv)	(i)	(ii)

121. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals.

(1) Potassium

(2) Iron

(3) Copper

(4) Calcium

122. Which of the following set of molecules will have zero dipole moment ?

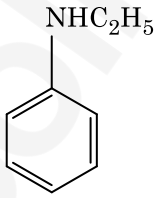
(1) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene

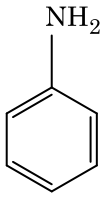
(2) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene

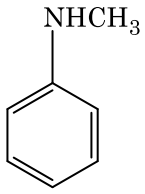
(3) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene

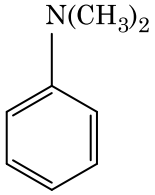
(4) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene

123. Which of the following amine will give the carbylamine test ?

(1) 

(2) 

(3) 

(4) 

124. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following ?

(1) Hyperconjugation

(2) $-I$ effect of $-CH_3$ groups

(3) $+R$ effect of $-CH_3$ groups

(4) $-R$ effect of $-CH_3$ groups

125. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is :

(a) β-Elimination reaction

(b) Follows Zaitsev rule

(c) Dehydrohalogenation reaction

(d) Dehydration reaction

(1) (a), (b), (d)

(2) (a), (b), (c)

(3) (a), (c), (d)

(4) (b), (c), (d)

126. The calculated spin only magnetic moment of Cr^{2+} ion is :

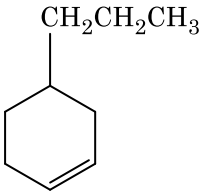
(1) 2.84 BM

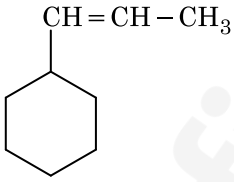
(2) 3.87 BM

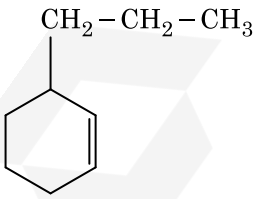
(3) 4.90 BM

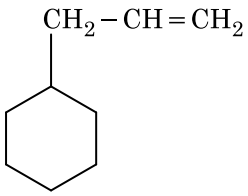
(4) 5.92 BM

127. An alkene on ozonolysis gives methanal as one of the product. Its structure is :

(1) 

(2) 

(3) 

(4) 

128. Which of the following alkane cannot be made in good yield by Wurtz reaction ?

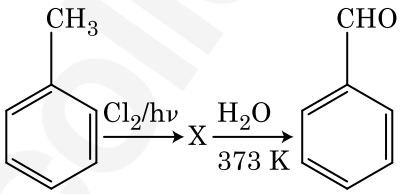
(1) n-Butane

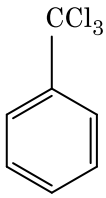
(2) n-Hexane

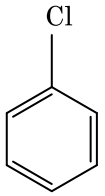
(3) 2,3-Dimethylbutane

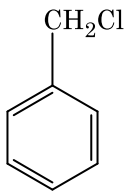
(4) n-Heptane

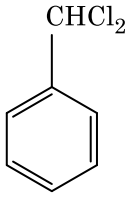
129. Identify compound X in the following sequence of reactions :



(1) 

(2) 

(3) 

(4) 

130. Which of the following is the **correct** order of increasing field strength of ligands to form coordination compounds ?

(1) $CN^- < C_2O_4^{2-} < SCN^- < F^-$

(2) $SCN^- < F^- < C_2O_4^{2-} < CN^-$

(3) $SCN^- < F^- < CN^- < C_2O_4^{2-}$

(4) $F^- < SCN^- < C_2O_4^{2-} < CN^-$

131. The mixture which shows positive deviation from Raoult's law is :

(1) Chloroethane + Bromoethane

(2) Ethanol + Acetone

(3) Benzene + Toluene

(4) Acetone + Chloroform

132. Identify the **incorrect** match.

	Name	**IUPAC Official Name**	
(a)	Unnilunium	(i)	Mendelevium
(b)	Unniltrium	(ii)	Lawrencium
(c)	Unnilhexium	(iii)	Seaborgium
(d)	Unununnium	(iv)	Darmstadtium

(1) (d), (iv)

(2) (a), (i)

(3) (b), (ii)

(4) (c), (iii)

133. The correct option for free expansion of an ideal gas under adiabatic condition is :

(1) $q > 0$, $\Delta T > 0$ and $w > 0$

(2) $q = 0$, $\Delta T = 0$ and $w = 0$

(3) $q = 0$, $\Delta T < 0$ and $w > 0$

(4) $q < 0$, $\Delta T = 0$ and $w = 0$

134. HCl was passed through a solution of $CaCl_2$, $MgCl_2$ and NaCl. Which of the following compound(s) crystallise(s) ?

(1) NaCl, $MgCl_2$ and $CaCl_2$

(2) Both $MgCl_2$ and $CaCl_2$

(3) Only NaCl

(4) Only $MgCl_2$

135. What is the change in oxidation number of carbon in the following reaction ?

$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(l) + 4HCl(g)$

(1) 0 to -4

(2) $+4$ to $+4$

(3) 0 to $+4$

(4) -4 to $+4$

136. A resistance wire connected in the left gap of a metre bridge balances a 10 Ω resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of 1 Ω of the resistance wire is :

(1) 1.5×10^{-2} m

(2) 1.0×10^{-2} m

(3) 1.0×10^{-1} m

(4) 1.5×10^{-1} m

137. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled ?

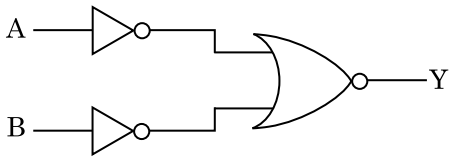
(1) zero

(2) doubled

(3) four times

(4) one-fourth

138. For the logic circuit shown, the truth table is :



(1)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

(2)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

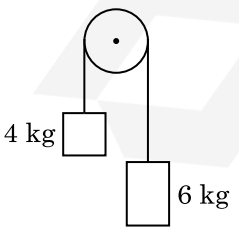
(3)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(4)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

139. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is :



(1) g/10

(2) g

(3) g/2

(4) g/5

140. An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of the electron is 1.227×10^{-2} nm, the potential difference is :

(1) 10^4 V

(2) 10 V

(3) 10^2 V

(4) 10^3 V

141. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is :

(1) 6.00×10^{-7} rad

(2) 3.66×10^{-7} rad

(3) 1.83×10^{-7} rad

(4) 7.32×10^{-7} rad

142. A short electric dipole has a dipole moment of 16×10^{-9} C m. The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole, situated on a line making an angle of 60° with the dipole axis is :

$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2\right)$

(1) zero

(2) 50 V

(3) 200 V

(4) 400 V

143. The increase in the width of the depletion region in a p-n junction diode is due to :

(1) increase in forward current

(2) forward bias only

(3) reverse bias only

(4) both forward bias and reverse bias

144. A 40 μF capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly :

(1) 25.1 A

(2) 1.7 A

(3) 2.05 A

(4) 2.5 A

145. The average thermal energy for a mono-atomic gas is : (k_B is Boltzmann constant and T, absolute temperature)

(1) $\frac{7}{2}\ k_B T$

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

(3) $\frac{3}{2}\ k_B T$

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

146. Taking into account of the significant figures, what is the value of 9.99 m – 0.0099 m ?

(1) 9.9 m

(2) 9.9801 m

(3) 9.98 m

(4) 9.980 m

147. In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly decreased, the beat frequency increases to 7 Hz. If the frequency of A is 530 Hz, the original frequency of B will be :

(1) 537 Hz

(2) 523 Hz

(3) 524 Hz

(4) 536 Hz

148. When a uranium isotope $^{235}_{92}U$ is bombarded with a neutron, it generates $^{89}_{36}Kr$, three neutrons and :

(1) $^{103}_{36}Kr$

(2) $^{144}_{56}Ba$

(3) $^{91}_{40}Zr$

(4) $^{101}_{36}Kr$

149. Dimensions of stress are :

(1) $[ML^{-1}T^{-2}]$

(2) $[MLT^{-2}]$

(3) $[ML^2T^{-2}]$

(4) $[ML^0T^{-2}]$

150. The mean free path for a gas, with molecular diameter d and number density n can be expressed as :

(1) $\frac{1}{\sqrt{2}\ n^2\pi^2 d^2}$

(2) $\frac{1}{\sqrt{2}\ n\pi d}$

(3) $\frac{1}{\sqrt{2}\ n\pi d^2}$

(4) $\frac{1}{\sqrt{2}\ n^2\pi d^2}$

151. Light with an average flux of 20 W/cm^2 falls on a non-reflecting surface at normal incidence having surface area 20 cm^2. The energy received by the surface during time span of 1 minute is :

(1) 48×10^3 J

(2) 10×10^3 J

(3) 12×10^3 J

(4) 24×10^3 J

152. The energy required to break one bond in DNA is 10^{-20} J. This value in eV is nearly :

(1) 0.006

(2) 6

(3) 0.6

(4) 0.06

153. A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere ?

$\left(\frac{1}{4\pi\epsilon_0} = 9\times10^9\ \text{N m}^2/\text{C}^2\right)$

(1) 1.28×10^7 N/C

(2) 1.28×10^4 N/C

(3) 1.28×10^5 N/C

(4) 1.28×10^6 N/C

154. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, then the angle of incidence is nearly equal to :

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

(2) $\frac{A}{2\mu}$

(3) $\frac{2A}{\mu}$

(4) μA

155. The solids which have the negative temperature coefficient of resistance are :

(1) insulators and semiconductors

(2) metals

(3) insulators only

(4) semiconductors only

156. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is :

($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) 3.14×10^{-5} T

(2) 6.28×10^{-4} T

(3) 3.14×10^{-4} T

(4) 6.28×10^{-5} T

157. In a certain region of space with volume 0.2 m^3, the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is :

(1) 5 N/C

(2) zero

(3) 0.5 N/C

(4) 1 N/C

158. The Brewsters angle i_b for an interface should be :

(1) $i_b = 90°$

(2) $0° < i_b < 30°$

(3) $30° < i_b < 45°$

(4) $45° < i_b < 90°$

159. The capacitance of a parallel plate capacitor with air as medium is 6 μF. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is :

($\epsilon_0 = 8.85 \times 10^{-12}$ C^2 N^{-1} m^{-2})

(1) 5.00 C^2 N^{-1} m^{-2}

(2) 0.44×10^{-13} C^2 N^{-1} m^{-2}

(3) 1.77×10^{-12} C^2 N^{-1} m^{-2}

(4) 0.44×10^{-10} C^2 N^{-1} m^{-2}

160. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is :

(1) zero

(2) π rad

(3) $\frac{3\pi}{2}$ rad

(4) $\frac{\pi}{2}$ rad

161. A charged particle having drift velocity of 7.5×10^{-4} m s^{-1} in an electric field of 3×10^{-10} Vm^{-1}, has a mobility in m^2 V^{-1} s^{-1} of :

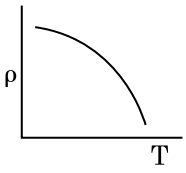
(1) 2.25×10^{-15}

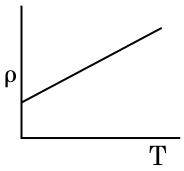
(2) 2.25×10^{15}

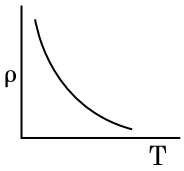
(3) 2.5×10^{6}

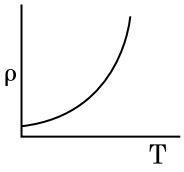
(4) 2.5×10^{-6}

162. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper ?

(1) 

(2) 

(3) 

(4) 

163. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeability of the material of the rod is :

($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) $2.4\pi \times 10^{-7}$ T m A^{-1}

(2) $2.4\pi \times 10^{-4}$ T m A^{-1}

(3) 8.0×10^{-5} T m A^{-1}

(4) $2.4\pi \times 10^{-5}$ T m A^{-1}

164. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass.

The centre of mass of the system from the 5 kg particle is nearly at a distance of :

(1) 80 cm

(2) 33 cm

(3) 50 cm

(4) 67 cm

165. For transistor action, which of the following statements is **correct** ?

(1) The base region must be very thin and lightly doped.

(2) Base, emitter and collector regions should have same doping concentrations.

(3) Base, emitter and collector regions should have same size.

(4) Both emitter junction as well as the collector junction are forward biased.

166. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m.

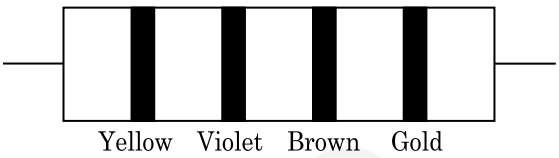
(1) $6\hat{k}$ N m

(2) $6\hat{i}$ N m

(3) $6\hat{j}$ N m

(4) $-6\hat{i}$ N m

167. The color code of a resistance is given below :



The values of resistance and tolerance, respectively, are :

(1) 470 Ω, 5%

(2) 470 kΩ, 5%

(3) 47 kΩ, 10%

(4) 4.7 kΩ, 5%

168. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is : ($g = 10$ m/s^2)

(1) 300 m

(2) 360 m

(3) 340 m

(4) 320 m

169. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of the water in the capillary is 5 g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is :

(1) 20.0 g

(2) 2.5 g

(3) 5.0 g

(4) 10.0 g

170. The energy equivalent of 0.5 g of a substance is :

(1) 0.5×10^{13} J

(2) 4.5×10^{16} J

(3) 4.5×10^{13} J

(4) 1.5×10^{13} J

171. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is :

(1) isobaric

(2) isothermal

(3) adiabatic

(4) isochoric

172. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.

The pitch of the screw gauge is :

(1) 1.0 mm

(2) 0.01 mm

(3) 0.25 mm

(4) 0.5 mm

173. In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes :

(1) one-fourth

(2) double

(3) half

(4) four times

174. A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth ?

(1) 24 N

(2) 48 N

(3) 32 N

(4) 30 N

175. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (c = speed of electromagnetic waves)

(1) $1 : c^2$

(2) $c : 1$

(3) $1 : 1$

(4) $1 : c$

176. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 ($r_1 = 1.5\ r_2$) through 1 K are in the ratio :

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

(2) $\frac{27}{8}$

(3) $\frac{9}{4}$

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

177. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\frac{\pi}{3}$. If instead C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$ between current and voltage. The power factor of the circuit is :

(1) -1.0

(2) zero

(3) 0.5

(4) 1.0

178. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C.

Its density is : ($R = 8.3\ J\ mol^{-1}\ K^{-1}$)

(1) $0.02\ kg/m^3$

(2) $0.5\ kg/m^3$

(3) $0.2\ kg/m^3$

(4) $0.1\ kg/m^3$

179. A wire of length L, area of cross section A is hanging from a fixed support. The length of the wire changes to L_1 when mass M is suspended from its free end. The expression for Young's modulus is :

(1) $\frac{MgL}{A(L_1 - L)}$

(2) $\frac{MgL_1}{AL}$

(3) $\frac{Mg(L_1 - L)}{AL}$

(4) $\frac{MgL}{AL_1}$

180. For which one of the following, Bohr model is **not** valid ?

(1) Singly ionised neon atom (Ne^+)

(2) Hydrogen atom

(3) Singly ionised helium atom (He^+)

(4) Deuteron atom

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Space For Rough Work

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