

Test Booklet Code

KANHA

No. :

G1

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/markings 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 **G1**. 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. 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)  $\frac{MgL_1}{AL}$

2. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature  $27^\circ\text{C}$ .

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

(1)  $0.2 \text{ kg/m}^3$

(2)  $0.1 \text{ kg/m}^3$

(3)  $0.02 \text{ kg/m}^3$

(4)  $0.5 \text{ kg/m}^3$

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

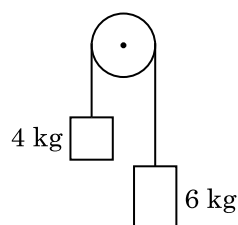
(1)  $12 \times 10^3 \text{ J}$

(2)  $24 \times 10^3 \text{ J}$

(3)  $48 \times 10^3 \text{ J}$

(4)  $10 \times 10^3 \text{ J}$

4. 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)  $g$

5. 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)  $\frac{1}{\sqrt{2} n \pi d}$

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

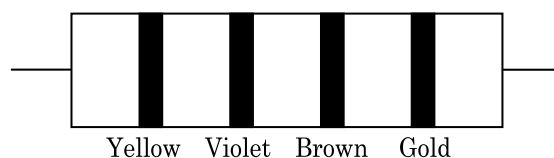
(1) 340 m

(2) 320 m

(3) 300 m

(4) 360 m

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



The values of resistance and tolerance, respectively, are :

(1)  $47 \text{ k}\Omega$ , 10%

(2)  $4.7 \text{ k}\Omega$ , 5%

(3)  $470 \Omega$ , 5%

(4)  $470 \text{ k}\Omega$ , 5%

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

(1)  ${}_{40}^{91}\text{Zr}$

(2)  ${}_{36}^{101}\text{Kr}$

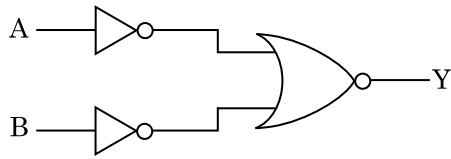
(3)  ${}_{36}^{103}\text{Kr}$

(4)  ${}_{56}^{144}\text{Ba}$

9. A spherical conductor of radius 10 cm has a charge of  $3.2 \times 10^{-7}$  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)  $1.28 \times 10^5$  N/C  
 (2)  $1.28 \times 10^6$  N/C  
 (3)  $1.28 \times 10^7$  N/C  
 (4)  $1.28 \times 10^4$  N/C
10. 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  $\mu$ , then the angle of incidence is nearly equal to :
- (1)  $\frac{2A}{\mu}$   
 (2)  $\mu A$   
 (3)  $\frac{\mu A}{2}$   
 (4)  $\frac{A}{2\mu}$
11. 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
12. An iron rod of susceptibility 599 is subjected to a magnetising field of  $1200 \text{ A m}^{-1}$ . The permeability of the material of the rod is :
- $$(\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1})$$
- (1)  $8.0 \times 10^{-5} \text{ T m A}^{-1}$   
 (2)  $2.4\pi \times 10^{-5} \text{ T m A}^{-1}$   
 (3)  $2.4\pi \times 10^{-7} \text{ T m A}^{-1}$   
 (4)  $2.4\pi \times 10^{-4} \text{ T m A}^{-1}$
13. The energy equivalent of 0.5 g of a substance is :
- (1)  $4.5 \times 10^{13}$  J  
 (2)  $1.5 \times 10^{13}$  J  
 (3)  $0.5 \times 10^{13}$  J  
 (4)  $4.5 \times 10^{16}$  J
14. A  $40 \mu\text{F}$  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
15. 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
16. 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
17. A resistance wire connected in the left gap of a metre bridge balances a  $10 \Omega$  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  $1 \Omega$  of the resistance wire is :
- (1)  $1.0 \times 10^{-1}$  m  
 (2)  $1.5 \times 10^{-1}$  m  
 (3)  $1.5 \times 10^{-2}$  m  
 (4)  $1.0 \times 10^{-2}$  m
18. 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

19. A charged particle having drift velocity of  $7.5 \times 10^{-4} \text{ m s}^{-1}$  in an electric field of  $3 \times 10^{-10} \text{ Vm}^{-1}$ , has a mobility in  $\text{m}^2 \text{V}^{-1} \text{s}^{-1}$  of :
- (1)  $2.5 \times 10^6$
  - (2)  $2.5 \times 10^{-6}$
  - (3)  $2.25 \times 10^{-15}$
  - (4)  $2.25 \times 10^{15}$
20. Dimensions of stress are :
- (1)  $[\text{ML}^2\text{T}^{-2}]$
  - (2)  $[\text{ML}^0\text{T}^{-2}]$
  - (3)  $[\text{ML}^{-1}\text{T}^{-2}]$
  - (4)  $[\text{MLT}^{-2}]$
21. For which one of the following, Bohr model is **not** valid ?
- (1) Singly ionised helium atom ( $\text{He}^+$ )
  - (2) Deuteron atom
  - (3) Singly ionised neon atom ( $\text{Ne}^+$ )
  - (4) Hydrogen atom
22. 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
23. 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
24. 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)  $1.83 \times 10^{-7} \text{ rad}$
  - (2)  $7.32 \times 10^{-7} \text{ rad}$
  - (3)  $6.00 \times 10^{-7} \text{ rad}$
  - (4)  $3.66 \times 10^{-7} \text{ rad}$
25. The solids which have the negative temperature coefficient of resistance are :
- (1) insulators only
  - (2) semiconductors only
  - (3) insulators and semiconductors
  - (4) metals
26. The capacitance of a parallel plate capacitor with air as medium is  $6 \mu\text{F}$ . With the introduction of a dielectric medium, the capacitance becomes  $30 \mu\text{F}$ . The permittivity of the medium is :
- ( $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$ )
- (1)  $1.77 \times 10^{-12} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$
  - (2)  $0.44 \times 10^{-10} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$
  - (3)  $5.00 \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$
  - (4)  $0.44 \times 10^{-13} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$
27. The energy required to break one bond in DNA is  $10^{-20} \text{ J}$ . This value in eV is nearly :
- (1) 0.6
  - (2) 0.06
  - (3) 0.006
  - (4) 6
28. 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
29. 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)  $\frac{27}{8}$

30. 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

31. 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.

32. 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

33. A short electric dipole has a dipole moment of  $16 \times 10^{-9} \text{ C m}$ . 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  $60^\circ$  with the dipole axis is :

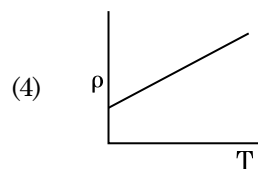
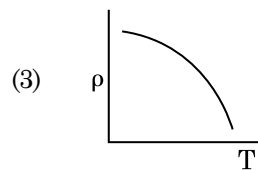
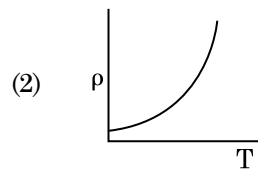
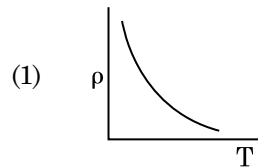
$$\left( \frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2 \right)$$

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

34. 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

35. Which of the following graph represents the variation of resistivity ( $\rho$ ) with temperature (T) for copper ?



36. In a certain region of space with volume  $0.2 \text{ m}^3$ , 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

37. The average thermal energy for a mono-atomic gas is : ( $k_B$  is Boltzmann constant and  $T$ , absolute temperature)
- (1)  $\frac{3}{2} k_B T$
  - (2)  $\frac{5}{2} k_B T$
  - (3)  $\frac{7}{2} k_B T$
  - (4)  $\frac{1}{2} k_B T$
38. 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
39. 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
40. 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 : ( $\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1}$ )
- (1)  $3.14 \times 10^{-4} \text{ T}$
  - (2)  $6.28 \times 10^{-5} \text{ T}$
  - (3)  $3.14 \times 10^{-5} \text{ T}$
  - (4)  $6.28 \times 10^{-4} \text{ T}$
41. The Brewsters angle  $i_b$  for an interface should be :
- (1)  $30^\circ < i_b < 45^\circ$
  - (2)  $45^\circ < i_b < 90^\circ$
  - (3)  $i_b = 90^\circ$
  - (4)  $0^\circ < i_b < 30^\circ$
42. An electron is accelerated from rest through a potential difference of  $V$  volt. If the de Broglie wavelength of the electron is  $1.227 \times 10^{-2} \text{ nm}$ , the potential difference is :
- (1)  $10^2 \text{ V}$
  - (2)  $10^3 \text{ V}$
  - (3)  $10^4 \text{ V}$
  - (4)  $10 \text{ V}$
43. Taking into account of the significant figures, what is the value of  $9.99 \text{ m} - 0.0099 \text{ m}$  ?
- (1)  $9.98 \text{ m}$
  - (2)  $9.980 \text{ m}$
  - (3)  $9.9 \text{ m}$
  - (4)  $9.9801 \text{ m}$
44. 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
45. 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)  $\pi$  rad
46. Match the organism with its use in biotechnology.
- |                                      |  |
|--------------------------------------|--|
| (a) <i>Bacillus thuringiensis</i>    | (i) Cloning vector                       |
| (b) <i>Thermus aquaticus</i>         | (ii) Construction of first rDNA molecule |
| (c) <i>Agrobacterium tumefaciens</i> | (iii) DNA polymerase                     |
| (d) <i>Salmonella typhimurium</i>    | (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)  |

47. 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 :
- |     |            |            |            |            |
|-----|------------|------------|------------|------------|
|     | <b>(a)</b> | <b>(b)</b> | <b>(c)</b> | <b>(d)</b> |
| (1) | (iii)      | (i)        | (iv)       | (ii)       |
| (2) | (iii)      | (iv)       | (i)        | (ii)       |
| (3) | (ii)       | (iii)      | (i)        | (iv)       |
| (4) | (ii)       | (iv)       | (iii)      | (i)        |
48. The plant parts which consist of two generations - one within the other :
- Pollen grains inside the anther
  - Germinated pollen grain with two male gametes
  - Seed inside the fruit
  - Embryo sac inside the ovule
- (a), (b) and (c)
  - (c) and (d)
  - (a) and (d)
  - (a) only
49. The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of :
- 1 molecule of 3-C compound
  - 1 molecule of 6-C compound
  - 1 molecule of 4-C compound and 1 molecule of 2-C compound
  - 2 molecules of 3-C compound
50. In relation to Gross primary productivity and Net primary productivity of an ecosystem, which one of the following statements is **correct** ?
- Gross primary productivity is always more than net primary productivity.
  - Gross primary productivity and Net primary productivity are one and same.
  - There is no relationship between Gross primary productivity and Net primary productivity.
  - Gross primary productivity is always less than net primary productivity.
51. The product(s) of reaction catalyzed by nitrogenase in root nodules of leguminous plants is/are :
- Nitrate alone
  - Ammonia and oxygen
  - Ammonia and hydrogen
  - Ammonia alone
52. Identify the **incorrect** statement.
- Sapwood is involved in conduction of water and minerals from root to leaf.
  - Sapwood is the innermost secondary xylem and is lighter in colour.
  - Due to deposition of tannins, resins, oils etc., heart wood is dark in colour.
  - Heart wood does not conduct water but gives mechanical support.
53. Bt cotton variety that was developed by the introduction of toxin gene of *Bacillus thuringiensis* (Bt) is resistant to :
- Fungal diseases
  - Plant nematodes
  - Insect predators
  - Insect pests
54. Which of the following pairs is of unicellular algae ?
- Gelidium* and *Gracilaria*
  - Anabaena* and *Volvox*
  - Chlorella* and *Spirulina*
  - Laminaria* and *Sargassum*
55. Strobili or cones are found in :
- Pteris*
  - Marchantia*
  - Equisetum*
  - Salvinia*
56. Name the enzyme that facilitates opening of DNA helix during transcription.
- DNA helicase
  - DNA polymerase
  - RNA polymerase
  - DNA ligase

57. Identify the **wrong** statement with reference to transport of oxygen.
- (1) Partial pressure of  $\text{CO}_2$  can interfere with  $\text{O}_2$  binding with haemoglobin.
  - (2) Higher  $\text{H}^+$  conc. in alveoli favours the formation of oxyhaemoglobin.
  - (3) Low  $\text{pCO}_2$  in alveoli favours the formation of oxyhaemoglobin.
  - (4) Binding of oxygen with haemoglobin is mainly related to partial pressure of  $\text{O}_2$ .
58. Identify the **correct** statement with regard to  $\text{G}_1$  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.
59. 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.
60. Match the following diseases with the causative organism and select the **correct** option.
- | Column - I     | Column - II             |
|----------------|-------------------------|
| (a) Typhoid    | (i) <i>Wuchereria</i>   |
| (b) Pneumonia  | (ii) <i>Plasmodium</i>  |
| (c) Filariasis | (iii) <i>Salmonella</i> |
| (d) Malaria    | (iv) <i>Haemophilus</i> |
- | (a)       | (b)   | (c)   | (d)   |
|-----------|-------|-------|-------|
| (1) (iii) | (iv)  | (i)   | (ii)  |
| (2) (ii)  | (i)   | (iii) | (iv)  |
| (3) (iv)  | (i)   | (ii)  | (iii) |
| (4) (i)   | (iii) | (ii)  | (iv)  |
61. 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
62. 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
63. The number of substrate level phosphorylations in one turn of citric acid cycle is :
- (1) One
  - (2) Two
  - (3) Three
  - (4) Zero
64. 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
65. The infectious stage of *Plasmodium* that enters the human body is :
- (1) Sporozoites
  - (2) Female gametocytes
  - (3) Male gametocytes
  - (4) Trophozoites
66. Which of the following is **not** an attribute of a population ?
- (1) Natality
  - (2) Mortality
  - (3) Species interaction
  - (4) Sex ratio



67. Select the **correct** events that occur during inspiration.
- Contraction of diaphragm
  - Contraction of external inter-costal muscles
  - Pulmonary volume decreases
  - Intra pulmonary pressure increases
- (c) and (d)
  - (a), (b) and (d)
  - only (d)
  - (a) and (b)
68. According to Robert May, the global species diversity is about :
- 20 million
  - 50 million
  - 7 million
  - 1.5 million
69. The QRS complex in a standard ECG represents :
- Depolarisation of auricles
  - Depolarisation of ventricles
  - Repolarisation of ventricles
  - Repolarisation of auricles
70. Which of the following statements is **not correct** ?
- The proinsulin has an extra peptide called C-peptide.
  - The functional insulin has A and B chains linked together by hydrogen bonds.
  - Genetically engineered insulin is produced in *E-Coli*.
  - In man insulin is synthesised as a proinsulin.
71. The transverse section of a plant shows following anatomical features :
- Large number of scattered vascular bundles surrounded by bundle sheath.
  - Large conspicuous parenchymatous ground tissue.
  - Vascular bundles conjoint and closed.
  - Phloem parenchyma absent.
- Identify the category of plant and its part :
- Monocotyledonous root
  - Dicotyledonous stem
  - Dicotyledonous root
  - Monocotyledonous stem
72. Select the **correct** statement.
- Glucagon is associated with hypoglycemia.
  - Insulin acts on pancreatic cells and adipocytes.
  - Insulin is associated with hyperglycemia.
  - Glucocorticoids stimulate gluconeogenesis.
73. Montreal protocol was signed in 1987 for control of :
- Emission of ozone depleting substances
  - Release of Green House gases
  - Disposal of e-wastes
  - Transport of Genetically modified organisms from one country to another
74. Match the following columns and select the **correct** option.
- |     | Column - I                 |       | Column - II    |
|-----|----------------------------|-------|----------------|
| (a) | 6 - 15 pairs of gill slits | (i)   | <i>Trygon</i>  |
| (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)  |
75. Identify the **wrong** statement with regard to Restriction Enzymes.
- They cut the strand of DNA at palindromic sites.
  - They are useful in genetic engineering.
  - Sticky ends can be joined by using DNA ligases.
  - Each restriction enzyme functions by inspecting the length of a DNA sequence.

**G1**

76. 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)  |

77. 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

78. 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

79. 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)  | <i>Bacillus thuringiensis</i> |

**(a) (b) (c) (d)**

- |           |       |       |       |
|-----------|-------|-------|-------|
| (1) (iii) | (ii)  | (i)   | (iv)  |
| (2) (ii)  | (iii) | (iv)  | (i)   |
| (3) (i)   | (ii)  | (iii) | (iv)  |
| (4) (iv)  | (i)   | (ii)  | (iii) |

**10**

80. The ovary is half inferior in :

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

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

- (1) Collagen
- (2) Lectin
- (3) Insulin
- (4) Haemoglobin

82. 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  $6.6 \times 10^9$  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

83. 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

84. 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

85. Flippers of Penguins and Dolphins are examples of :

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

86. 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<sup>A</sup> and I<sup>B</sup> are present together, they express same type of sugar.
  - (3) Allele 'i' does not produce any sugar.
  - (4) The gene (I) has three alleles.
87. Select the option including all sexually transmitted diseases.
- (1) Gonorrhoea, Malaria, Genital herpes
  - (2) AIDS, Malaria, Filariasis
  - (3) Cancer, AIDS, Syphilis
  - (4) Gonorrhoea, Syphilis, Genital herpes
88. 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)
89. 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)
90. In light reaction, plastoquinone facilitates the transfer of electrons from :
- (1) Cytb<sub>6</sub>f complex to PS-I
  - (2) PS-I to NADP<sup>+</sup>
  - (3) PS-I to ATP synthase
  - (4) PS-II to Cytb<sub>6</sub>f complex
91. Embryological support for evolution was disapproved by :
- (1) Alfred Wallace
  - (2) Charles Darwin
  - (3) Oparin
  - (4) Karl Ernst von Baer
92. Bilaterally symmetrical and acoelomate animals are exemplified by :
- (1) Platyhelminthes
  - (2) Aschelminthes
  - (3) Annelida
  - (4) Ctenophora
93. Which of the following would help in prevention of diuresis ?
- (1) Reabsorption of Na<sup>+</sup> 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
94. Match the following columns and select the **correct** option.
- | Column - I                        | Column - II                           |
|-----------------------------------|---------------------------------------|
| (a) <i>Clostridium butylicum</i>  | (i) Cyclosporin-A                     |
| (b) <i>Trichoderma polysporum</i> | (ii) Butyric Acid                     |
| (c) <i>Monascus purpureus</i>     | (iii) Citric Acid                     |
| (d) <i>Aspergillus niger</i>      | (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)

95. 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
96. 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
97. 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)
98. 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
99. 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)
100. 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.
101. 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)
102. 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

- 103.** From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask :
- (1)  $\text{CH}_3$ ,  $\text{H}_2$ ,  $\text{NH}_4$  and water vapor at  $800^\circ\text{C}$
  - (2)  $\text{CH}_4$ ,  $\text{H}_2$ ,  $\text{NH}_3$  and water vapor at  $600^\circ\text{C}$
  - (3)  $\text{CH}_3$ ,  $\text{H}_2$ ,  $\text{NH}_3$  and water vapor at  $600^\circ\text{C}$
  - (4)  $\text{CH}_4$ ,  $\text{H}_2$ ,  $\text{NH}_3$  and water vapor at  $800^\circ\text{C}$
- 104.** Experimental verification of the chromosomal theory of inheritance was done by :
- (1) Sutton
  - (2) Boveri
  - (3) Morgan
  - (4) Mendel
- 105.** The body of the ovule is fused within the funicle at :
- (1) Micropyle
  - (2) Nucellus
  - (3) Chalaza
  - (4) Hilum
- 106.** 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.
- 107.** Dissolution of the synaptonemal complex occurs during :
- (1) Zygotene
  - (2) Diplotene
  - (3) Leptotene
  - (4) Pachytene
- 108.** Floridean starch has structure similar to :
- (1) Amylopectin and glycogen
  - (2) Mannitol and algin
  - (3) Laminarin and cellulose
  - (4) Starch and cellulose
- 109.** 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'
- 110.** 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                                 |
- 111.** 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
- 112.** The process of growth is maximum during :
- (1) Lag phase
  - (2) Senescence
  - (3) Dormancy
  - (4) Log phase
- 113.** 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)  |

114. 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
115. 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".
116. 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
117. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells ?
- (1) Peroxisomes
  - (2) Golgi bodies
  - (3) Polysomes
  - (4) Endoplasmic reticulum
118. Which of the following regions of the globe exhibits highest species diversity ?
- (1) Madagascar
  - (2) Himalayas
  - (3) Amazon forests
  - (4) Western Ghats of India
119. Goblet cells of alimentary canal are modified from :
- (1) Columnar epithelial cells
  - (2) Chondrocytes
  - (3) Compound epithelial cells
  - (4) Squamous epithelial cells
120. 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.
121. 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
122. Match the following columns and select the **correct** option.
- |     | <b>Column - I</b>     | <b>Column - II</b>                      |
|-----|-----------------------|---|
| (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           |
- |     | <b>(a)</b> | <b>(b)</b> | <b>(c)</b> | <b>(d)</b> |
|-----|------------|------------|------------|------------|
| (1) | (i)        | (iv)       | (ii)       | (iii)      |
| (2) | (iii)      | (ii)       | (iv)       | (i)        |
| (3) | (ii)       | (iii)      | (iv)       | (i)        |
| (4) | (iv)       | (iii)      | (i)        | (ii)       |
123. Ray florets have :
- (1) Superior ovary
  - (2) Hypogynous ovary
  - (3) Half inferior ovary
  - (4) Inferior ovary
124. 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

125. The enzyme enterokinase helps in conversion of :
- (1) trypsinogen into trypsin
  - (2) caseinogen into casein
  - (3) pepsinogen into pepsin
  - (4) protein into polypeptides

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

	Column - I		Column - II
(a)	Gregarious, polyphagous pest	(i)	<i>Asterias</i>
(b)	Adult with radial symmetry and larva with bilateral symmetry	(ii)	Scorpion
(c)	Book lungs	(iii)	<i>Ctenoplanea</i>
(d)	Bioluminescence	(iv)	<i>Locusta</i>
	<b>(a) (b) (c) (d)</b>		
(1)	(iv) (i) (ii) (iii)		
(2)	(iii) (ii) (i) (iv)		
(3)	(ii) (i) (iii) (iv)		
(4)	(i) (iii) (ii) (iv)		

127. 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

128. 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
	<b>(a) (b) (c) (d)</b>		
(1)	(i) (iii) (ii) (iv)		
(2)	(iii) (ii) (iv) (i)		
(3)	(iv) (iii) (i) (ii)		
(4)	(ii) (iv) (i) (iii)		

129. 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

130. 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<sup>rd</sup> 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.

131. 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)

132. Identify the basic amino acid from the following.

- (1) Glutamic Acid
- (2) Lysine
- (3) Valine
- (4) Tyrosine

133. 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

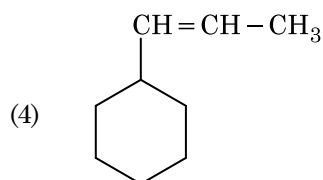
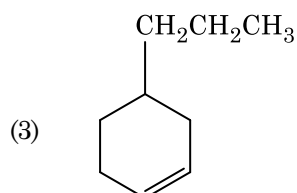
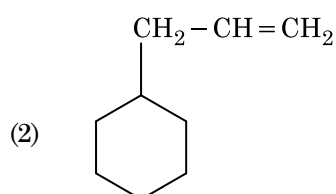
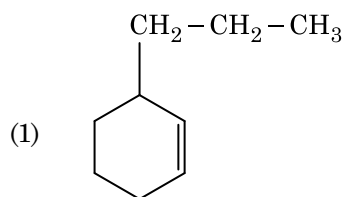
- 134.** The sequence that controls the copy number of the linked DNA in the vector, is termed :
- (1) Ori site
  - (2) Palindromic sequence
  - (3) Recognition site
  - (4) Selectable marker
- 135.** The roots that originate from the base of the stem are :
- (1) Primary roots
  - (2) Prop roots
  - (3) Lateral roots
  - (4) Fibrous roots
- 136.** The calculated spin only magnetic moment of  $\text{Cr}^{2+}$  ion is :
- (1) 4.90 BM
  - (2) 5.92 BM
  - (3) 2.84 BM
  - (4) 3.87 BM
- 137.** Match the following and identify the **correct** option.
- |   |   |
|---|---|
| (a) $\text{CO(g)} + \text{H}_2\text{(g)}$ | (i) $\text{Mg(HCO}_3)_2 + \text{Ca(HCO}_3)_2$ |
| (b) Temporary hardness of water           | (ii) An electron deficient hydride            |
| (c) $\text{B}_2\text{H}_6$                | (iii) Synthesis gas                           |
| (d) $\text{H}_2\text{O}_2$                | (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) |
- 138.** The mixture which shows positive deviation from Raoult's law is :
- (1) Benzene + Toluene
  - (2) Acetone + Chloroform
  - (3) Chloroethane + Bromoethane
  - (4) Ethanol + Acetone
- 139.** Identify the **correct** statement from the following :
- (1) Blister copper has blistered appearance due to evolution of  $\text{CO}_2$ .
  - (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.
- 140.** Urea reacts with water to form **A** which will decompose to form **B**. **B** when passed through  $\text{Cu}^{2+}$  (aq), deep blue colour solution **C** is formed. What is the formula of **C** from the following ?
- (1)  $[\text{Cu}(\text{NH}_3)_4]^{2+}$
  - (2)  $\text{Cu}(\text{OH})_2$
  - (3)  $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
  - (4)  $\text{CuSO}_4$
- 141.** Hydrolysis of sucrose is given by the following reaction.
- $$\text{Sucrose} + \text{H}_2\text{O} \rightleftharpoons \text{Glucose} + \text{Fructose}$$
- If the equilibrium constant ( $K_c$ ) is  $2 \times 10^{13}$  at 300 K, the value of  $\Delta_r G^\ominus$  at the same temperature will be :
- (1)  $8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K} \times \ln(2 \times 10^{13})$
  - (2)  $8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K} \times \ln(3 \times 10^{13})$
  - (3)  $-8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K} \times \ln(4 \times 10^{13})$
  - (4)  $-8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K} \times \ln(2 \times 10^{13})$
- 142.** Identify the **incorrect** match.
- |     | Name        | IUPAC Official Name |
|-----|-------------|---------------------|
| (a) | Unnilunium  | (i) Mendeleevium    |
| (b) | Unniltrium  | (ii) Lawrencium     |
| (c) | Unnilhexium | (iii) Seaborgium    |
| (d) | Unununnium  | (iv) Darmstadtium   |
- (1) (b), (ii)
  - (2) (c), (iii)
  - (3) (d), (iv)
  - (4) (a), (i)
- 143.** Which of the following is a basic amino acid ?
- (1) Alanine
  - (2) Tyrosine
  - (3) Lysine
  - (4) Serine



144. What is the change in oxidation number of carbon in the following reaction ?  
 $\text{CH}_4(\text{g}) + 4\text{Cl}_2(\text{g}) \rightarrow \text{CCl}_4(\text{l}) + 4\text{HCl}(\text{g})$
- (1) 0 to +4
  - (2) -4 to +4
  - (3) 0 to -4
  - (4) +4 to +4
145. Sucrose on hydrolysis gives :
- (1)  $\alpha$ -D-Glucose +  $\beta$ -D-Glucose
  - (2)  $\alpha$ -D-Glucose +  $\beta$ -D-Fructose
  - (3)  $\alpha$ -D-Fructose +  $\beta$ -D-Fructose
  - (4)  $\beta$ -D-Glucose +  $\alpha$ -D-Fructose
146. The number of Faradays(F) required to produce 20 g of calcium from molten  $\text{CaCl}_2$  (Atomic mass of Ca = 40 g mol<sup>-1</sup>) is :
- (1) 2
  - (2) 3
  - (3) 4
  - (4) 1
147. For the reaction,  $2\text{Cl}(\text{g}) \rightarrow \text{Cl}_2(\text{g})$ , 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  $\Delta_r S > 0$
148. 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
149. 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  $\text{CrO}_4^{2-}$  and  $\text{Cr}_2\text{O}_7^{2-}$  are not the same.
  - (4)  $\text{Cr}^{2+}(\text{d}^4)$  is a stronger reducing agent than  $\text{Fe}^{2+}(\text{d}^6)$  in water.
150. 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
151. 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
152. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following ?
- (1) + R effect of -CH<sub>3</sub> groups
  - (2) - R effect of -CH<sub>3</sub> groups
  - (3) Hyperconjugation
  - (4) - I effect of -CH<sub>3</sub> groups
153. Find out the solubility of  $\text{Ni}(\text{OH})_2$  in 0.1 M NaOH. Given that the ionic product of  $\text{Ni}(\text{OH})_2$  is  $2 \times 10^{-15}$ .
- (1)  $2 \times 10^{-8}$  M
  - (2)  $1 \times 10^{-13}$  M
  - (3)  $1 \times 10^8$  M
  - (4)  $2 \times 10^{-13}$  M
154. Identify a molecule which does **not** exist.
- (1) Li<sub>2</sub>
  - (2) C<sub>2</sub>
  - (3) O<sub>2</sub>
  - (4) He<sub>2</sub>
155. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is :
- (a)  $\beta$ -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)

156. 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
157. The number of protons, neutrons and electrons in  ${}_{71}^{175}\text{Lu}$ , respectively, are :
- (1) 104, 71 and 71
  - (2) 71, 71 and 104
  - (3) 175, 104 and 71
  - (4) 71, 104 and 71
158. Identify the **correct** statements from the following :
- (a)  $\text{CO}_2(\text{g})$  is used as refrigerant for ice-cream and frozen food.
  - (b) The structure of  $\text{C}_{60}$  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
159. 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
160. Paper chromatography is an example of :
- (1) Partition chromatography
  - (2) Thin layer chromatography
  - (3) Column chromatography
  - (4) Adsorption chromatography
161. Which of the following oxoacid of sulphur has  $-\text{O}-\text{O}-$  linkage ?
- (1)  $\text{H}_2\text{SO}_4$ , sulphuric acid
  - (2)  $\text{H}_2\text{S}_2\text{O}_8$ , peroxodisulphuric acid
  - (3)  $\text{H}_2\text{S}_2\text{O}_7$ , pyrosulphuric acid
  - (4)  $\text{H}_2\text{SO}_3$ , sulphurous acid
162. 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) 200 s
  - (2) 500 s
  - (3) 1000 s
  - (4) 100 s
163. 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
164. Match the following :
- | Oxide                       | Nature          |
|-----------------------------|-----------------|
| (a) CO                      | (i) Basic       |
| (b) BaO                     | (ii) Neutral    |
| (c) $\text{Al}_2\text{O}_3$ | (iii) Acidic    |
| (d) $\text{Cl}_2\text{O}_7$ | (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)  |
165. A mixture of  $\text{N}_2$  and Ar gases in a cylinder contains 7 g of  $\text{N}_2$  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  $\text{N}_2$  is :
- [Use atomic masses (in  $\text{g mol}^{-1}$ ) : N = 14, Ar = 40]
- (1) 12 bar
  - (2) 15 bar
  - (3) 18 bar
  - (4) 9 bar

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



167. The freezing point depression constant ( $K_f$ ) of benzene is  $5.12 \text{ K kg mol}^{-1}$ . The freezing point depression for the solution of molality  $0.078 \text{ m}$  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

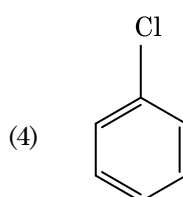
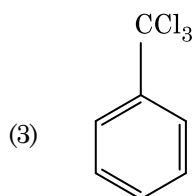
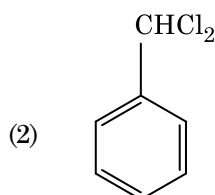
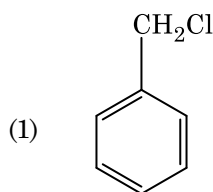
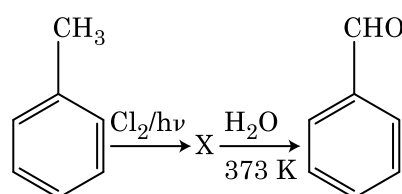
168. The correct option for free expansion of an ideal gas under adiabatic condition is :

- (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  $w = 0$

169. 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  $\text{O}_2$ (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]

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



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

- (1)  $\text{SCN}^- < \text{F}^- < \text{CN}^- < \text{C}_2\text{O}_4^{2-}$
- (2)  $\text{F}^- < \text{SCN}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$
- (3)  $\text{CN}^- < \text{C}_2\text{O}_4^{2-} < \text{SCN}^- < \text{F}^-$
- (4)  $\text{SCN}^- < \text{F}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$

172. Which of the following is a natural polymer ?

- (1) poly (Butadiene-styrene)
- (2) polybutadiene
- (3) poly (Butadiene-acrylonitrile)
- (4) *cis*-1,4-polyisoprene

173. 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

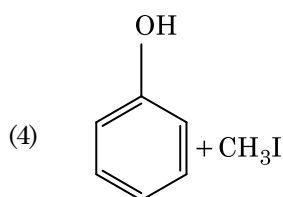
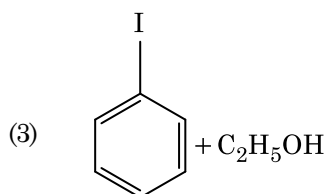
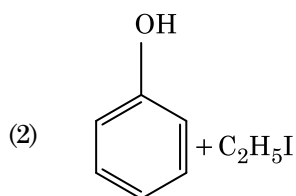
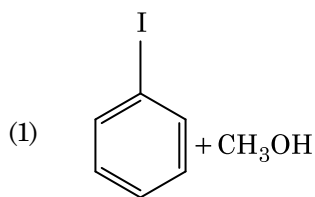
174. HCl was passed through a solution of  $\text{CaCl}_2$ ,  $\text{MgCl}_2$  and NaCl. Which of the following compound(s) crystallise(s) ?

- (1) Only NaCl
- (2) Only  $\text{MgCl}_2$
- (3) NaCl,  $\text{MgCl}_2$  and  $\text{CaCl}_2$
- (4) Both  $\text{MgCl}_2$  and  $\text{CaCl}_2$

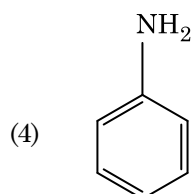
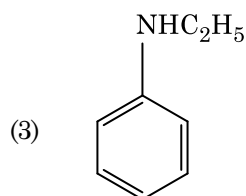
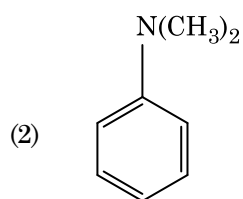
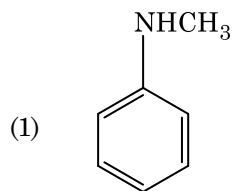
175. Which of the following is **not** correct about carbon monoxide ?

- (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. Anisole on cleavage with HI gives :



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



178. 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

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

- (1) Oxygen gas
- (2) H<sub>2</sub>S gas
- (3) SO<sub>2</sub> gas
- (4) Hydrogen gas

180. Which of the following is a cationic detergent ?

- (1) Sodium stearate
- (2) Cetyltrimethyl ammonium bromide
- (3) Sodium dodecylbenzene sulphonate
- (4) Sodium lauryl sulphate

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