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 score. 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 E3. 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.

In case of any ambiguity in translation of any question, English Version shall be treated as final.

Name of the Candidate (in Capitals):  
Roll Number:  
Centre of Examination (in Capitals):  
Candidate’s Signature:  
Invigilator’s Signature:  
Facsimile signature stamp of Centre Superintendent:  

This Booklet contains 44 pages.
1. Which of the following is a basic amino acid?
   (1) Serine
   (2) Alanine
   (3) Tyrosine
   (4) Lysine

2. 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 \( w > 0 \)

3. 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

4. The calculated spin only magnetic moment of \( \text{Cr}^{2+} \) ion is:
   (1) 3.87 BM
   (2) 4.90 BM
   (3) 5.92 BM
   (4) 2.84 BM

5. 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), (b), (c)
   (2) (a), (c), (d)
   (3) (b), (c), (d)
   (4) (a), (b), (d)

6. On electrolysis of dil.sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be:
   (1) Hydrogen gas
   (2) Oxygen gas
   (3) \( \text{H}_2\text{S} \) gas
   (4) \( \text{SO}_2 \) gas
7. 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.

8. Sucrose on hydrolysis gives:
   (1) \( \beta-D\)-Glucose + \( \alpha-D\)-Fructose
   (2) \( \alpha-D\)-Glucose + \( \beta-D\)-Glucose
   (3) \( \alpha-D\)-Glucose + \( \beta-D\)-Fructose
   (4) \( \alpha-D\)-Fructose + \( \beta-D\)-Fructose

9. Match the following and identify the correct option.
   (a) \( CO(g) + H_2(g) \) (i) \( Mg(HCO_3)_2 + Ca(HCO_3)_2 \)
   (b) \( \beta-D\)-Glucose + \( \alpha-D\)-Fructose
   (c) \( B_2H_6 \)
   (d) \( H_2O_2 \)
   (a) (ii) (i) (ii) (iv)
   (b) (ii) (i) (ii) (iv)
   (c) (iii) (iv) (ii) (i)
   (d) (i) (iii) (ii) (iv)

10. 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

11. Which of the following is a natural polymer?
    (1) cis-1,4-polyisoprene
    (2) poly (Butadiene-styrene)
    (3) polybutadiene
    (4) poly (Butadiene-acrylonitrile)
12. 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) 100 s
(2) 200 s
(3) 500 s
(4) 1000 s

13. Identify the correct statements from the following:

(a) \(\text{CO}_2\) (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), (b) and (c) only
(2) (a) and (c) only
(3) (b) and (c) only
(4) (c) and (d) only

14. A mixture of \(\text{N}_2\) and \(\text{Ar}\) gases in a cylinder contains 7 g of \(\text{N}_2\) and 8 g of \(\text{Ar}\). 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 g mol\(^{-1}\)): \(\text{N} = 14, \text{Ar} = 40\)]

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

15. 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
16. 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 \( \Delta_r G^\circ \) 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) \[8.314 \text{ J mol}^{-1} \text{K}^{-1} \times 300 \text{ K} \times \ln(2 \times 10^{13})\]

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

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

17. Anisole on cleavage with HI gives:

(1) OH + CH₃I

(2) I + CH₃OH

(3) OH + C₂H₅I

(4) I + C₂H₅OH

18. The number of protons, neutrons and electrons in \(^{175}\text{Lu}^{71}\) respectively, are:

(1) 71, 104 and 71

(2) 104, 71 and 71

(3) 71, 71 and 104

(4) 175, 104 and 71
19. Paper chromatography is an example of:
   (1) Adsorption chromatography
   (2) Partition chromatography
   (3) Thin layer chromatography
   (4) Column chromatography

20. Identify the incorrect match.

<table>
<thead>
<tr>
<th>Name</th>
<th>IUPAC Official Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) अनन्तिलोकियम</td>
<td>(i) Mendelevium</td>
</tr>
<tr>
<td>(b) अनन्तिलहारिसियम</td>
<td>(ii) Lawrencium</td>
</tr>
<tr>
<td>(c) अनन्तिलहारिसियम</td>
<td>(iii) Seaborgium</td>
</tr>
<tr>
<td>(d) अनन्तिलहारिसियम</td>
<td>(iv) Darmstadtium</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Substance</th>
<th>Atomic Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag(s)</td>
<td>108</td>
</tr>
<tr>
<td>Mg(s)</td>
<td>24</td>
</tr>
<tr>
<td>O₂(g)</td>
<td>16</td>
</tr>
<tr>
<td>Li(s)</td>
<td>7</td>
</tr>
</tbody>
</table>

   (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 O₂(g) [Atomic mass of O = 16]
   (4) 1 g of Li(s) [Atomic mass of Li = 7]

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

<table>
<thead>
<tr>
<th>Stabilization</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH₃</td>
<td>−I</td>
</tr>
<tr>
<td>CH₃</td>
<td>+R</td>
</tr>
<tr>
<td>CH₃</td>
<td>−R</td>
</tr>
<tr>
<td>CH₃</td>
<td>Hyperconjugation</td>
</tr>
</tbody>
</table>

   (1) −I effect of −CH₃ groups
   (2) +R effect of −CH₃ groups
   (3) −R effect of −CH₃ groups
   (4) Hyperconjugation
23. Which of the following amine will give the carbylamine test?

(1) 

(2) 

(3) 

(4) 

24. 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

25. The mixture which shows positive deviation from Raoult’s law is:

(1) Ethanol + Acetone

(2) Benzene + Toluene

(3) Acetone + Chloroform

(4) Chloroethane + Bromoethane
26. 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

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

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

28. 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

29. 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) $\text{CuSO}_4$
(2) $[\text{Cu(NH}_3)_4]^2^+\text{Cu(OH)}_2$
(3) $\text{Cu(OH)}_2$
(4) $\text{CuCO}_3\cdot\text{Cu(OH)}_2$

30. The number of Faradays(F) required to produce 20 g of calcium from molten $\text{CaCl}_2$ (Atomic mass of Ca = 40 g mol$^{-1}$) is:

(1) 1
(2) 2
(3) 3
(4) 4
32. अभिक्रिया, $2\text{Cl(g)} \rightarrow \text{Cl}_2(g)$, के लिए उचित विकल्प है:

(1) $\Delta_r H > 0$ और $\Delta_r S > 0$
(2) $\Delta_r H > 0$ और $\Delta_r S < 0$
(3) $\Delta_r H < 0$ और $\Delta_r S > 0$
(4) $\Delta_r H < 0$ और $\Delta_r S < 0$

33. Ni(OH)$_2$ की 0.1 M NaOH में विलयन जल कौनसा दिया है कि Ni(OH)$_2$ का आयन गुणांक $2 \times 10^{-15}$ है।

(1) $2 \times 10^{-13}$ M
(2) $2 \times 10^{-8}$ M
(3) $1 \times 10^{-13}$ M
(4) $1 \times 10^8$ M

34. वेज़ीन का हिमांक अवस्था में किस्मत (K$_f$) 5.12 K kg mol$^{-1}$ है। वेज़ीन में एक विशुद्ध-अनपदत्व विलयन बाले 0.078 M मोललता वाले विलयन का हिमांक अवस्था (दो दशमलव स्थानों तक निक्लिट) है:

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

35. गलत कथन को पहचानिए।

(1) जल में, Cr$^{2+}$(d$^4$), Fe$^{2+}$(d$^6$) से अधिक प्रवल अपचारक है।
(2) समक्रमण धातुओं और उनके यौगिक उनकी बहु आक्सीकरण अवस्थाओं को ग्रहण करने की क्षमता के कारण उन्में को सक्रियता और संकुल निर्माण के लिए जाने जाते हैं।
(3) अंतराकाम यौगिक वे होते हैं जो धातुओं के क्रस्ताल जालों के भीतर छोटे आकार वाले परमाणुओं जैसे H, C या N के फलसे (ट्रेप्स) पर बनते हैं।
(4) क्रोमियम की, Cr$^4_2O_7^{2-}$ और Cr$^2_2O_7^{2-}$ में उपचयन अवस्थाएँ समान नहीं हैं।

36. एक तार की 288 pm सेतल कोर वाली दोथ केंद्रित घनीय संरचना है, परमाणु किया है:

(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

32. For the reaction, $2\text{Cl(g)} \rightarrow \text{Cl}_2(g)$, 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 $\Delta_r S < 0$

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

(1) $2 \times 10^{-13}$ M
(2) $2 \times 10^{-8}$ M
(3) $1 \times 10^{-13}$ M
(4) $1 \times 10^8$ M

34. 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

35. 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 Cr$O_4^{2-}$ and Cr$_2O_7^{2-}$ are not the same.

36. 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
37. Identify a molecule which does **not** exist.

(1) He₂
(2) Li₂
(3) C₂
(4) O₂

38. Which of the following oxoacid of sulphur has −O−O− linkage?

(1) H₂SO₃, sulphurous acid
(2) H₂SO₄, sulphuric acid
(3) H₂S₂O₈, peroxodisulphuric acid
(4) H₂S₂O₇, pyrosulphuric acid

39. An alkene on ozonolysis gives methanal as one of the products. Its structure is:

CH = CH − CH₃

(1)

CH₂ − CH₂ − CH₃

(2)

CH₂ − CH = CH₂

(3)

CH₂CH₂CH₃

(4)
40. 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$_2$

41. Match the following:

<table>
<thead>
<tr>
<th>Oxide</th>
<th>Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>(i) Basic</td>
</tr>
<tr>
<td>BaO</td>
<td>(ii) Neutral</td>
</tr>
<tr>
<td>Al$_2$O$_3$</td>
<td>(iii) Acidic</td>
</tr>
<tr>
<td>Cl$_2$O$_7$</td>
<td>(iv) Amphoteric</td>
</tr>
</tbody>
</table>

Which of the following is correct option?

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

42. 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

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

CH$_4$(g) + 4Cl$_2$(g) → CCl$_4$(l) + 4HCl(g)

(1) +4 to +4
(2) 0 to +4
(3) −4 to +4
(4) 0 to −4

44. 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.
45. Identify compound X in the following sequence of reactions:

\[
\text{CH}_3 \text{Cl}_2/\text{hv} \xrightarrow{\text{H}_2\text{O}} 373 \text{ K} \rightarrow \text{CHO} \]

1. Cl
2. CH₂Cl
3. CHCl₂
4. CCl₃

46. Which of the following regions of the globe exhibits highest species diversity?
1. Western Ghats of India
2. Madagascar
3. Himalayas
4. Amazon forests

47. 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
48. The enzyme enterokinase helps in conversion of:
(1) protein into polypeptides
(2) trypsinogen into trypsin
(3) caseinogen into casein
(4) pepsinogen into pepsin

49. 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

50. Experimental verification of the chromosomal theory of inheritance was done by:
(1) Mendel
(2) Sutton
(3) Boveri
(4) Morgan

51. Which of the following is not an attribute of a population?
(1) Sex ratio
(2) Natality
(3) Mortality
(4) Species interaction

52. Goblet cells of alimentary canal are modified from:
(1) Squamous epithelial cells
(2) Columnar epithelial cells
(3) Chondrocytes
(4) Compound epithelial cells

53. Floridean starch has structure similar to:
(1) Starch and cellulose
(2) Amylopectin and glycogen
(3) Mannitol and algin
(4) Laminarin and cellulose
54. 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.

55. 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

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

(1) CH₄, H₂, NH₃ and water vapor at 800°C
(2) CH₃, H₂, NH₄ and water vapor at 800°C
(3) CH₁₄, H₂, NH₃ and water vapor at 600°C
(4) CH₃, H₂, NH₃ and water vapor at 600°C

57. 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.

58. 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
59. 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

60. Embryological support for evolution was disapproved by:
   (1) Karl Ernst von Baer
   (2) Alfred Wallace
   (3) Charles Darwin
   (4) Oparin

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

62. 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

63. 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

64. 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
65. Strobili or cones are found in:
   (1) Salvinia
   (2) Pteris
   (3) Marchantia
   (4) Equisetum

66. The roots that originate from the base of the stem are:
   (1) Fibrous roots
   (2) Primary roots
   (3) Prop roots
   (4) Lateral roots

67. The ovary is half inferior in:
   (1) Brinjal
   (2) Mustard
   (3) Sunflower
   (4) Plum

68. Match the following columns and select the correct option.

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

69. 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.
70. 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

71. 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.

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

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Typhoid</td>
<td>(i) Wuchereria</td>
</tr>
<tr>
<td>(b) Pneumonia</td>
<td>(ii) Plasmodium</td>
</tr>
<tr>
<td>(c) Filariasis</td>
<td>(iii) Salmonella</td>
</tr>
<tr>
<td>(d) Malaria</td>
<td>(iv) Haemophilus</td>
</tr>
</tbody>
</table>

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

73. 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
74. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells?

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

75. 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.

76. 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

77. 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.
78. 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)

79. 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)

80. 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) Fourth trophic level (b) Second trophic level (c) First trophic level (d) Third trophic level
(1) (ii) (iii) (iv) (i)
(2) (iii) (ii) (i) (iv)
(3) (iv) (iii) (ii) (i)
(4) (i) (ii) (iii) (iv)

81. The QRS complex in a standard ECG represents:
(1) Repolarisation of auricles
(2) Depolarisation of auricles
(3) Depolarisation of ventricles
(4) Repolarisation of ventricles
82. 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

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

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

84. 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

85. 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:

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

86. Flippers of Penguins and Dolphins are examples of:

(1) Adaptive radiation
(2) Convergent evolution
(3) Industrial melanism
(4) Natural selection
87. 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) 2.0 meters
(2) 2.5 meters
(3) 2.2 meters
(4) 2.7 meters

88. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Floating Ribs</td>
<td>(i) Located between second and seventh ribs</td>
</tr>
<tr>
<td>(b) Acromion</td>
<td>(ii) Head of the Humerus</td>
</tr>
<tr>
<td>(c) Scapula</td>
<td>(iii) Clavicle</td>
</tr>
<tr>
<td>(d) Glenoid cavity</td>
<td>(iv) Do not connect with the sternum</td>
</tr>
</tbody>
</table>

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

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

89. 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

90. 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
91. 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.

92. Ray florets have:

(1) Inferior ovary
(2) Superior ovary
(3) Hypogynous ovary
(4) Half inferior ovary

93. 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

94. 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

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

(1) Binding of oxygen with haemoglobin is mainly related to partial pressure of O₂.
(2) Partial pressure of CO₂ can interfere with O₂ binding with haemoglobin.
(3) Higher H⁺ conc. in alveoli favours the formation of oxyhaemoglobin.
(4) Low pCO₂ in alveoli favours the formation of oxyhaemoglobin.
96. Bilaterally symmetrical and acelomate animals are exemplified by:
   (1) Ctenophora
   (2) Platyhelminthes
   (3) Aschelminthes
   (4) Annelida

97. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
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</tr>
</thead>
<tbody>
<tr>
<td>(a) Bt cotton</td>
<td>(i) Gene therapy</td>
</tr>
<tr>
<td>(b) Adenosine</td>
<td>(ii) Cellular defence deaminase deficiency</td>
</tr>
<tr>
<td>(c) RNAi</td>
<td>(iii) Detection of HIV infection</td>
</tr>
<tr>
<td>(d) PCR</td>
<td>(iv) Bacillus thuringiensis</td>
</tr>
</tbody>
</table>

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

98. 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

99. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
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</tr>
</thead>
<tbody>
<tr>
<td>(a) Eosinophils</td>
<td>(i) Immune response</td>
</tr>
<tr>
<td>(b) Basophils</td>
<td>(ii) Phagocytosis</td>
</tr>
<tr>
<td>(c) Neutrophils</td>
<td>(iii) Release histaminase, destructive enzymes</td>
</tr>
<tr>
<td>(d) Lymphocytes</td>
<td>(iv) Release granules containing histamine</td>
</tr>
</tbody>
</table>

(a) (b) (c) (d)
(1) (iii) (iv) (ii) (i)
(2) (iv) (i) (ii) (iii)
(3) (i) (ii) (iv) (iii)
(4) (ii) (i) (iii) (iv)
100. 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.

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

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

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

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

103. 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

104. 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*.
105. 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.

106. Match the following with respect to meiosis:

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

Select the correct option from the following:

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

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.

Select the correct option from the following:

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

108. 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.
109. 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'

110. 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

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

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) पीयूष ग्रंथि</td>
<td>(i) ग्रेव्स रोग</td>
</tr>
<tr>
<td>(b) भायरोग्द्र ग्रंथि</td>
<td>(ii) डायबिटीज नेरिटस</td>
</tr>
<tr>
<td>(c) अधिवृक्कु ग्रंथि</td>
<td>(iii) डायबिटीज इस्पिडस</td>
</tr>
<tr>
<td>(d) अन्यायांश</td>
<td>(iv) एडीसन रोग</td>
</tr>
</tbody>
</table>

112. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) क्लोम छिंट्री के 6 - 15 (i) ट्रायगोन</td>
<td>क्यूम</td>
</tr>
<tr>
<td>(b) हेंटरोस्कंकल पुच्छ पक्ष (ii) साइक्लोस्टोम्स</td>
<td>काॅड्राॅटिक्यूज</td>
</tr>
<tr>
<td>(c) वापु कोष (iii) काॅड्राॅटिक्यूज</td>
<td>ओस्टिक्यूज</td>
</tr>
<tr>
<td>(d) विष दंश (iv)</td>
<td></td>
</tr>
</tbody>
</table>
113. यदि तिलचट्टे का सिर हटा दिया जाए तो यह कुछ दिनों तक जीवित रह रहता है क्योंकि:
(1) तिलचट्टे के अभिधारणका पुच्छंदाले उदार के अधर भाग में स्थित होते हैं।
(2) तिलचट्टे में नींदका निजरहता होता।
(3) सिर में तीन का केवल छोटा भाग होता है जबकि शेष शरीर के अधर भाग में स्थित होता है।
(4) सिर में तीन का 1/3 भाग होता है जबकि शेष शरीर के उत्तर भाग में होता है।

114. नदें ने यह रूप से प्रजनन करने वाली मटर के पौधे को कितनी किस्में को हवाम में चुना जो विपरीत विशेषताओं वाले एक लक्षण के अलावा एक समान थी?
(1) 4
(2) 2
(3) 14
(4) 8

115. सूना कुद्रों के बुना बादर वाली अवतार उपकर आपने कितने निकला जाता है?
(1) आंत के आसपास में
(2) लाल ग्रंथी का वाहिका में
(3) चुंकाना की समीपत्ति संविधान नलिका में
(4) यूयेसीकुंद नलिका में

116. एक वेक्टर में सहलनी डी.एन.ए. की प्रति की संख्या को नियंत्रित करने वाले अनुक्रम को क्या कहा जाता है?
(1) चयनकुट मार्कर
(2) ओरी साइट
(3) पैडलाइपिक अनुक्रम
(4) रिकायलिजेषन (फर्मेन) साइट

117. जीव को उनके जैवप्रोजीकोनों में उपयोग के लिए सुमिलित कीए और?
(a) बैक्टीरिया थार्गिनिटिस (i) क्लोनिक वेक्टर
thuringiensis
(b) वर्मस एक्स्टिकास (ii) प्रथम rDNA अणु का प्रयोग
(b) एक्स्टिकास
thuringiensis
(c) एक्स्टिकास (iii) डी.एन.ए. पैलिमरेज
thuringiensis
(d) साल्फोनेला (iv) Cry औऽरीन typhimurium
thuringiensis

निम्नलिखित में से सही विकल्प चुनिए:

118. 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.

119. 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

120. 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

121. 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

122. 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)
In light reaction, plastoquinone facilitates the transfer of electrons from:

1. PS-II to Cytb₆₇ complex
2. Cytb₆₇ complex to PS-I
3. PS-I to NADP⁺
4. PS-I to ATP synthase

The process of growth is maximum during:

1. Log phase
2. Lag phase
3. Senescence
4. Dormancy

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

Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Gregarious, polyphagous (i)</td>
<td>Asterias pest</td>
</tr>
<tr>
<td>(b) Adult with radial symmetry and larva with bilateral symmetry (ii)</td>
<td>Scorpion</td>
</tr>
<tr>
<td>(c) Book lungs (iii)</td>
<td>Ctenoplena</td>
</tr>
<tr>
<td>(d) Bioluminescence (iv)</td>
<td>Locusta</td>
</tr>
</tbody>
</table>

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

1. Haemoglobin
2. Collagen
3. Lectin
4. Insulin
123. निम्न में आम एमीनो अम्ल को पहचानिए।
(1) टायरोसिन
(2) ग्ल्यूटामिन अम्ल
(3) लाइसिन
(4) वैलिन

124. निम्न स्तंभों का मिलान कर सही विकल्प का चयन करें।

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) क्लोस्ट्रिडियम बुटावरिकीकरक</td>
<td>(i) साइक्लोस्ट्रोपोरिन-ए-प्लूसा ह्यूडॉनर विभाजनक अम्ल</td>
</tr>
<tr>
<td>(b) ट्राइकॉपियम पोलीस्ट्रोम</td>
<td>(ii) व्यूटावरिक अम्ल</td>
</tr>
<tr>
<td>(c) मोनॅक्सस पॉयपॉरस</td>
<td>(iii) व्यूटीक अम्ल</td>
</tr>
<tr>
<td>(d) एस्परिजेलस मेडिक्स</td>
<td>(iv) रक्त-कोलोस्टरॉल कम करने वाला कारक</td>
</tr>
</tbody>
</table>

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

125. निम्न के कौन सी फूड पुडक से डांडा का मोचन (अंडोलसर्ग) करेगा?
(1) एप्स्टार्जोन की उच्च सड़कता
(2) प्रोजेस्टरोन की उच्च सड़कता
(3) LH की निम्न सड़कता
(4) FSH की निम्न सड़कता

126. प्रकाशस्रवित में रुबिस्को एंजाइम की ऑक्सीजनीकरण ज्ञात वस्तु का निर्माण कैसे होता है?
(1) 3-सी वौद्धिक के 2 अनु
(2) 3-सी वौद्धिक का 1 अनु
(3) 6-सी वौद्धिक का 1 अनु
(4) 4-सी वौद्धिक का 1 अनु और 2-सी वौद्धिक का 1 अनु

127. यौन संचारक रोगों के सही विकल्प का चयन करें।
(1) स्पिनासियम, सिफिलिस, जनितक परिक्षण
(2) स्पिनासियम, मलेशिया, जनितक परिक्षण
(3) AIDS, मलेशिया, फाइलिया
(4) कैंसर, AIDS, सिफिलिस

128. Identify the basic amino acid from the following.
(1) Tyrosine
(2) Glutamic Acid
(3) Lysine
(4) Valine

129. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Clostridium</td>
<td>(i) Cyclosporin-A butylicum</td>
</tr>
<tr>
<td>(b) Trichoderma</td>
<td>(ii) Butyric Acid polysporum</td>
</tr>
<tr>
<td>(c) Monascus</td>
<td>(iii) Citric Acid purpureus</td>
</tr>
<tr>
<td>(d) Aspergillus</td>
<td>(iv) Blood cholesterol lowering agent</td>
</tr>
</tbody>
</table>

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

130. 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

131. The oxygenation activity of RuBisCo enzyme in phoetospiration 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

132. Select the option including all sexually transmitted diseases.
(1) Gonorrhea, Syphilis, Genital herpes
(2) Gonorrhea, Malaria, Genital herpes
(3) AIDS, Malaria, Filaria
(4) Cancer, AIDS, Syphilis
128. 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

129. The number of substrate level phosphorylations in one turn of citric acid cycle is:
(1) Zero
(2) One
(3) Two
(4) Three

130. Match the following:
(a) Inhibitor of catalytic activity
(b) Possess peptide bonds
(c) Cell wall material in fungi
(d) Secondary metabolite

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)

131. 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 IA and IB are present together, they express same type of sugar.
(4) Allele 'i' does not produce any sugar.
132. 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

133. 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

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

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

135. Match the following columns and select the correct option.

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<td>(ii) Human Chorionic</td>
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<tr>
<td>(c) Bulbo-urethral glands</td>
<td>(iii) Gonadotropin (hCG)</td>
</tr>
<tr>
<td>(d) Leydig cells</td>
<td>(iv) Layer of the ovum</td>
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136. A cylinder contains hydrogen gas at pressure 249 kPa and temperature 27°C. Its density is: (R = 8.3 J mol⁻¹ K⁻¹)

(1) 0.5 kg/m³
(2) 0.2 kg/m³
(3) 0.1 kg/m³
(4) 0.02 kg/m³

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(2) 0.2 kg/m³
(3) 0.1 kg/m³
(4) 0.02 kg/m³
137. When a uranium isotope \(^{235}\text{U}\) is bombarded with a neutron, it generates \(^{89}\text{Kr}\), three neutrons and:

(1) \(^{144}\text{Ba}\)
(2) \(^{91}\text{Zr}\)
(3) \(^{101}\text{Kr}\)
(4) \(^{103}\text{Kr}\)

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

\[\begin{array}{ccc}
A & B & Y \\
0 & 0 & 0 \\
0 & 1 & 1 \\
1 & 0 & 1 \\
1 & 1 & 1 \\
\end{array}\]

139. 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
140. An electron is accelerated from rest through a potential difference of \(V\) volt. If the de Broglie wavelength of the electron is \(1.227 \times 10^{-2}\) nm, the potential difference is:

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

141. 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

142. 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) \(\frac{7}{2} k_B T\)

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

- (1) 
- (2) 
- (3) 
- (4)
144. किसी लघु विद्युत दिप्लोम का दिप्लोम आपूर्ण $16 \times 10^{-9}$ C m है। इस दिप्लोम के सारण, इस दिप्लोम के अंद से 60° का कोण बनाने वाली किसी रेखा पर स्थित 0.6 m दूरी के किसी विन्दु पर, विद्युत विभाग होगा:

$$\left(\frac{1}{4\pi\varepsilon_0}\right) = 9 \times 10^9 \text{ N m}^2/\text{C}^2$$

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

145. 20 cm$^2$ क्षेत्रफल के किसी अपरापत धूप पर $20 \text{ W/cm}^2$ औसत फ्लॉक्स के साथ प्रकाश अभिलम्बवत आपत्ति करता है। 1 मिनट की समयवर्ती में इस पृष्ठ पर प्राप्त की गयी की ज्ञात है:

(1) $10 \times 10^3$ J
(2) $12 \times 10^3$ J
(3) $24 \times 10^3$ J
(4) $48 \times 10^3$ J

146. किसी अन्तरग्रुष्ठ के लिए ब्रूस्टर कोण $i_b$ होना चाहिए:

(1) $0^\circ < i_b < 30^\circ$
(2) $30^\circ < i_b < 45^\circ$
(3) $45^\circ < i_b < 90^\circ$
(4) $i_b = 90^\circ$

147. समान भारिता के दो सिलिंडर A और B एक दूसरे से किसी स्टॉप कांक से होते हुए जुड़े हैं। A में मानक ताप और दब पर कोई आदर्शै गैस भरी है। B भूला; निर्वाचित है। समस्त निकाय कमीयोरोधित है। स्टॉप कांक को अवचांक खोल दिया गया है। यह प्रक्रिया है:

(1) समसापी
(2) स्टॉप्पा
(3) समआवश्यक
(4) समदबी

144. A short electric dipole has a dipole moment of $16 \times 10^{-9}$ 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:

$$\left(\frac{1}{4\pi\varepsilon_0}\right) = 9 \times 10^9 \text{ N m}^2/\text{C}^2$$

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

145. 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) $10 \times 10^3$ J
(2) $12 \times 10^3$ J
(3) $24 \times 10^3$ J
(4) $48 \times 10^3$ J

146. The Brewsters angle $i_b$ for an interface should be:

(1) $0^\circ < i_b < 30^\circ$
(2) $30^\circ < i_b < 45^\circ$
(3) $45^\circ < i_b < 90^\circ$
(4) $i_b = 90^\circ$

147. 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
148. 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) $g/10$

149. 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

150. 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.

151. 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) $3.66 \times 10^{-7}$ rad
(2) $1.83 \times 10^{-7}$ rad
(3) $7.32 \times 10^{-7}$ rad
(4) $6.00 \times 10^{-7}$ rad
152. A resistance wire connected in the left gap of a metre bridge balances a 10 Ohm 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 Ohm of the resistance wire is:

<p>| | |</p>
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</thead>
<tbody>
<tr>
<td>(1)</td>
<td>$1.0 \times 10^{-2}$ m</td>
</tr>
<tr>
<td>(2)</td>
<td>$1.0 \times 10^{-1}$ m</td>
</tr>
<tr>
<td>(3)</td>
<td>$1.5 \times 10^{-1}$ m</td>
</tr>
<tr>
<td>(4)</td>
<td>$1.5 \times 10^{-2}$ m</td>
</tr>
</tbody>
</table>

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

<p>| | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>$4.5 \times 10^{16}$ J</td>
</tr>
<tr>
<td>(2)</td>
<td>$4.5 \times 10^{13}$ J</td>
</tr>
<tr>
<td>(3)</td>
<td>$1.5 \times 10^{13}$ J</td>
</tr>
<tr>
<td>(4)</td>
<td>$0.5 \times 10^{13}$ J</td>
</tr>
</tbody>
</table>

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

<p>| | |</p>
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<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>$\frac{1}{\sqrt{2} \pi nd}$</td>
</tr>
<tr>
<td>(2)</td>
<td>$\frac{1}{\sqrt{2} n^2 d^2}$</td>
</tr>
<tr>
<td>(3)</td>
<td>$\frac{1}{\sqrt{2} n^2 \pi d^2}$</td>
</tr>
<tr>
<td>(4)</td>
<td>$\frac{1}{\sqrt{2} n^2 \pi^2 d^2}$</td>
</tr>
</tbody>
</table>

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

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>(1)</td>
<td>6</td>
</tr>
<tr>
<td>(2)</td>
<td>0.6</td>
</tr>
<tr>
<td>(3)</td>
<td>0.06</td>
</tr>
<tr>
<td>(4)</td>
<td>0.006</td>
</tr>
</tbody>
</table>

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>$6 \hat{i} \text{ N m}$</td>
</tr>
<tr>
<td>(2)</td>
<td>$6 \hat{j} \text{ N m}$</td>
</tr>
<tr>
<td>(3)</td>
<td>$-6 \hat{i} \text{ N m}$</td>
</tr>
<tr>
<td>(4)</td>
<td>$6 \hat{k} \text{ N m}$</td>
</tr>
</tbody>
</table>
157. 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

158. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is: \( c = \text{speed of electromagnetic waves} \)
   (1) \( c : 1 \)
   (2) \( 1 : 1 \)
   (3) \( 1 : c \)
   (4) \( 1 : c^2 \)

159. 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?
   \[
   \left( \frac{1}{4\pi\varepsilon_0} \right) = 9 \times 10^9 \text{ N m}^2/\text{C}^2
   \]
   (1) \( 1.28 \times 10^4 \) N/C
   (2) \( 1.28 \times 10^5 \) N/C
   (3) \( 1.28 \times 10^6 \) N/C
   (4) \( 1.28 \times 10^7 \) N/C

160. Dimensions of stress are:
   (1) \([\text{MLT}^{-2}]\)
   (2) \([\text{ML}^2\text{T}^{-2}]\)
   (3) \([\text{ML}^9\text{T}^{-2}]\)
   (4) \([\text{ML}^{-1}\text{T}^{-2}]\)

161. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is:
   (1) \( \pi \) rad
   (2) \( \frac{3\pi}{2} \) rad
   (3) \( \frac{\pi}{2} \) rad
   (4) zero
162. कोई श्रेणी LCR परिपथ किसी ए,सी. बोल्टमा क्षेत्र से संपीडित है। जब L को हटाया जाता है, तो धारा और बोल्टमा के बीच $\frac{\pi}{3}$ का कलांतर होता है। यदि इसके स्थान पर परिपथ से C को हटाया है, तो भी धारा और बोल्टमा के बीच कलांतर $\frac{\pi}{3}$ हो रहा है। इस परिपथ का शंक्त सूत्र है:

(1) शून्य
(2) 0.5
(3) 1.0
(4) −1.0

163. 40 $\mu$F के किसी संधारित्र को 200 V, 50 Hz की ac आपूर्ति से संपीडित किया गया है। इस परिपथ में धारा का वर्ग माध्य मूल (rms) मान है, लगभग :

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

164. किसी गिटार में समान पदार्थ की वनी दो डॉरियों A और B के ब्लू हल्के से मेल नहीं खा रहे हैं और 6 Hz आवृत्ति के विस्पन्द उत्पन्न कर रहे हैं। जब B में तनाव को कुछ कम कर दिया जाता है, तो विस्पन्द आवृत्ति बढ़कर 7 Hz हो जाती है। यदि A की आवृत्ति 530 Hz है, तो B की मूल आवृत्ति है:

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

165. कोई किरण लघु प्रिज्म कोण (प्रिज्म कोण A) के किसी एक पृष्ठ पर आपत्ति कोण i पर आपत्ति कर के प्रिज्म के विपरीत फलक से अभिलम्बत निर्देश निर्देश होती है। यदि इस प्रिज्म के पदार्थ का अपवर्तनांक $\mu$ है, तो आपत्ति कोण है, लगभग :

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

166. 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

167. A 40 $\mu$F 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

168. 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

169. 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) $\frac{A}{2\mu}$
(2) $\frac{2A}{\mu}$
(3) $\mu A$
(4) $\frac{\mu A}{2}$
166. The color code of a resistance is given below:

![Color Code]

- Yellow
- Violet
- Brown
- Gold

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%

167. 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:

\[ \varepsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2} \]

The values of resistance, respectively, are:
1. 470 kΩ, 5%
2. 47 kΩ, 10%
3. 4.7 kΩ, 5%
4. 470 Ω, 5%

168. 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

169. A charged particle having drift velocity of \( 7.5 \times 10^{-4} \text{ m s}^{-1} \) in an electric field of \( 3 \times 10^{-10} \text{ V m}^{-1} \), has a mobility in \( \text{m}^2 \text{ V}^{-1} \text{ s}^{-1} \) of:

\[ \mu = 2.25 \times 10^{15} \]

1. \( 2.25 \times 10^{15} \)
2. \( 2.5 \times 10^6 \)
3. \( 2.5 \times 10^{-6} \)
4. \( 2.25 \times 10^{-15} \)

170. 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:

\[ \text{Height} = \frac{v_f^2 - v_i^2}{2g} \]

\( v_i = 20 \text{ m/s}, v_f = 80 \text{ m/s}, g = 10 \text{ m/s}^2 \)

1. 360 m
2. 340 m
3. 320 m
4. 300 m
171. The solids which have the negative temperature coefficient of resistance are:
(1) metals
(2) insulators only
(3) semiconductors only
(4) insulators and semiconductors

172. 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

173. 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) \( \frac{5}{3} \)

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

175. 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

176. 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
177. 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\(^+\))

178. 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) \(\frac{\Delta L}{\Delta L_1}\)
(2) \(\frac{\Delta L}{\Delta L_1} - AL\)
(3) \(\frac{\Delta L}{\Delta L_1}\)
(4) \(\frac{\Delta L}{\Delta L_1} - M\)

179. 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) \(6.28 \times 10^{-4} \text{T}\)
(2) \(3.14 \times 10^{-4} \text{T}\)
(3) \(6.28 \times 10^{-5} \text{T}\)
(4) \(3.14 \times 10^{-5} \text{T}\)

180. 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:

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

(1) \(2.4\pi \times 10^{-4} \text{T m A}^{-1}\)
(2) \(8.0 \times 10^{-5} \text{T m A}^{-1}\)
(3) \(2.4\pi \times 10^{-5} \text{T m A}^{-1}\)
(4) \(2.4\pi \times 10^{-7} \text{T m A}^{-1}\)
Space For Rough Work
रफ कार्य के लिए जगह / Space For Rough Work
### हिंदी निर्देशांक

<table>
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<tr>
<th>हिंदी निर्देशांक</th>
<th>English Instructions</th>
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<tbody>
<tr>
<td>1. पूरे जाने पर प्रत्येक परीक्षार्थी, निरीक्षक को अपना प्रवेश-पत्र दिखाएं।</td>
<td>1. Each candidate must show on demand his/her Admit Card to the Invigilator.</td>
</tr>
<tr>
<td>2. अधीश्वर या निरीक्षक की विशेष अनुमति के बिना कोई परीक्षार्थी अपना स्थान न छोड़ें।</td>
<td>2. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.</td>
</tr>
<tr>
<td>3. कार्यरत निरीक्षक को अपना उत्तर पत्र दिए बिना एवं उपस्थिति-पत्रक पर दुबारा हस्ताक्षर किए बिना कोई परीक्षार्थी परीक्षा हॉल नहीं छोड़ें। यदि किसी परीक्षार्थी ने दूसरी बार उपस्थिति-पत्रक पर हस्ताक्षर नहीं किए तो वह माना जाएगा कि उसने उत्तर पत्र नहीं लौटाया है और वह अनुचित साधन का मामला माना जाएगा।</td>
<td>3. 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. <strong>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.</strong></td>
</tr>
<tr>
<td>4. इलेक्ट्रॉनिक/हस्तचालित परिकल्प का उपयोग वांछित है।</td>
<td>4. Use of Electronic/Manual Calculator is prohibited.</td>
</tr>
<tr>
<td>5. परीक्षा-हॉल में आचरण के लिए परीक्षार्थी, परीक्षा के नियमों एवं विनियमों द्वारा नियंत्रित हैं। अनुचित साधन के सभी मामलों का फैसला इस परीक्षा के नियमों एवं विनियमों के अनुसार होगा।</td>
<td>5. 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.</td>
</tr>
<tr>
<td>6. किसी हालत में परीक्षा पुरस्कार और उत्तर पत्र का कोई भाग अलग न करें।</td>
<td>6. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.</td>
</tr>
<tr>
<td>7. परीक्षा पुरस्कार / उत्तर पत्र में दिए गए परीक्षा पुरस्कार संकेत को परीक्षार्थी सही तरीके से उपस्थिति-पत्र में लिखें।</td>
<td>7. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.</td>
</tr>
</tbody>
</table>
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 F3. 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.

In case of any ambiguity in translation of any question, English version shall be treated as final.
1. 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.

2. 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?

   $$\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2$$

   (1) $1.28 \times 10^6 \text{ N/C}$
   (2) $1.28 \times 10^7 \text{ N/C}$
   (3) $1.28 \times 10^4 \text{ N/C}$
   (4) $1.28 \times 10^5 \text{ N/C}$

3. 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) $7.32 \times 10^{-7}$ rad
   (2) $6.00 \times 10^{-7}$ rad
   (3) $3.66 \times 10^{-7}$ rad
   (4) $1.83 \times 10^{-7}$ rad

4. Dimensions of stress are:

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

5. 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
6. 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

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

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

8. 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

9. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C. Its density is:

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

10. 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) $\frac{1}{\sqrt{2} \ n \ pi^2 d^2}$
(3) $\frac{1}{\sqrt{2} \ n \ pi d}$
(4) $\frac{1}{\sqrt{2} \ n \ pi d^2}$
11. 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:

\( g = 10 \text{ m/s}^2 \)

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

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

A → Y

(1) A B Y
    0 0 1
    0 1 1
    1 0 1
    1 1 0

(2) A B Y
    0 0 0
    0 1 0
    1 0 0
    1 1 0

(3) A B Y
    0 0 1
    0 1 1
    1 0 1
    1 1 0

(4) A B Y
    0 0 0
    0 1 1
    1 0 1
    1 1 1

13. 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° with the dipole axis is:

\( \left( \frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2 \right) \)

(1) 400 V
(2) zero
(3) 50 V
(4) 200 V
14. 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

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

16. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is: \((c = \text{speed of electromagnetic waves})\)
(1) 1 : c
(2) 1 : \(c^2\)
(3) c : 1
(4) 1 : 1

17. 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) \(6.28 \times 10^{-5} \text{T}\)
(2) \(3.14 \times 10^{-5} \text{T}\)
(3) \(6.28 \times 10^{-4} \text{T}\)
(4) \(3.14 \times 10^{-4} \text{T}\)
18. Which one of the following is not valid?
(1) Deuteron atom
(2) Singly ionised neon atom (Ne⁺)
(3) Hydrogen atom
(4) Singly ionised helium atom (He⁺)

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

20. 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

21. 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

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) 1.0
(2) $-1.0$
(3) zero
(4) 0.5
23. \( r_1 \) और \( r_2 \) त्रिज्याओं \( (r_1 = 1.5 \, r_2) \) के दो काँप के ठोस गोलों के ताप में 1 K की वृद्धि करने के लिए आवश्यक ऊष्माओं की मात्राओं का अनुपात है:
   (1) 3
   (2) 2
   (3) 5
   (4) \( r_0 = 8.85 \times 10^{-12} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (1) \( 0.44 \times 10^{-10} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (2) \( 5.00 \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (3) \( 0.44 \times 10^{-13} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (4) \( 1.77 \times 10^{-12} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)

24. किसी अत्याधुनिक के लिए बूमर कोण \( i_b \) होना चाहिए:
   (1) 45° < \( i_b \) = 90°
   (2) \( i_b \) = 90°
   (3) 0° < \( i_b \) < 30°
   (4) 30° < \( i_b \) < 45°

25. समान धातिया के दो सिलिंडर A और B एक दूसरे से किसी रेखीय कोण से होते हुए जुड़े हैं। A में मानक ताप और दब बिहार है। B धातु निर्मित है। समस्त निर्माता उच्चतम द्रव्यगत है। रेखीय कोण को अचानक खोल दिया गया है। यह प्रक्रिया है:
   (1) समाचारता
   (2) समचारवी
   (3) समचारपी
   (4) समचारपी

26. 599 धारणार्थक की किसी लोहे की छड़ पर 1200 A m\(^{-1}\) तीव्रता का चुम्बकीय क्षेत्र लगाया गया है। इस छड़ के पदार्थ की पारागतिकता है:
   \( (\mu_0 = 4\pi \times 10^{-7} \, \text{T m A}^{-1}) \)
   (1) \( 2.4\pi \times 10^{-7} \, \text{T m A}^{-1} \)
   (2) \( 2.4\pi \times 10^{-7} \, \text{T m A}^{-1} \)
   (3) \( 2.4\pi \times 10^{-1} \, \text{T m A}^{-1} \)
   (4) \( 8.0 \times 10^{-5} \, \text{T m A}^{-1} \)

27. किसी सामान्य घटक पर परस्पर संगतिता, जिसमें माध्यम के रूप में वायु भरी है, की धातिया 6 \( \mu \text{F} \) है। कोई परवीकृत माध्यम संयुक्त पर इसकी धातिया 30 \( \mu \text{F} \) हो जाती है। इस माध्यम का परवीकृत है:
   \( (\varepsilon_0 = 8.85 \times 10^{-12} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2}) \)
   (1) \( 0.44 \times 10^{-10} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (2) \( 5.00 \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (3) \( 0.44 \times 10^{-13} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (4) \( 1.77 \times 10^{-12} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)

23. 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) 3
   (2) 2
   (3) 5
   (4) \( r_0 = 8.85 \times 10^{-12} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (1) \( 0.44 \times 10^{-10} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (2) \( 5.00 \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (3) \( 0.44 \times 10^{-13} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (4) \( 1.77 \times 10^{-12} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)

24. 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°

25. 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

26. 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:
   \( (\mu_0 = 4\pi \times 10^{-7} \, \text{T m A}^{-1}) \)
   (1) \( 2.4\pi \times 10^{-7} \, \text{T m A}^{-1} \)
   (2) \( 2.4\pi \times 10^{-7} \, \text{T m A}^{-1} \)
   (3) \( 2.4\pi \times 10^{-4} \, \text{T m A}^{-1} \)
   (4) \( 8.0 \times 10^{-5} \, \text{T m A}^{-1} \)

27. 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:
   \( (\varepsilon_0 = 8.85 \times 10^{-12} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2}) \)
   (1) \( 0.44 \times 10^{-10} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (2) \( 5.00 \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (3) \( 0.44 \times 10^{-13} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
   (4) \( 1.77 \times 10^{-12} \, \text{C}^2 \, \text{N}^{-1} \, \text{m}^{-2} \)
28. किसी आवेशित कण, जिसका \(3 \times 10^{-10} \text{Vm}^{-1}\) तीव्रता के विद्युत क्षेत्र में अवस्थित रहने के बिना तेजी से \(7.5 \times 10^{-4} \text{ m s}^{-1}\) है, की मोबाइल्टा है:

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

29. नीचे किसी प्रतिरोध का वर्ण कोड दिया गया है:

[चित्र]

इसके प्रतिरोध और साधन के मान क्रमशः हैं:

(1) \(4.7 \text{k} \Omega, 5\%
(2) \(470 \Omega, 5\%
(3) \(470 \text{k} \Omega, 5\%
(4) \(47 \Omega, 10\%

30. प्रतिरोध के आवरणक मात्र गुणांक वाले दो तोस होते हैं:

(1) केबल अर्थालक
(2) रोधी और अर्थालक
(3) धातुईँ
(4) केबल रोधी

31. पृथ्वी के पूर्ण पर किसी पिण्ड का भार 72 N है। पृथ्वी की त्रिज्या की आधी दूरी के बासर ठेंचाई पर इस पिण्ड पर गुरुत्वाकर्षण बत कितना होगा?

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

32. \(40 \mu \text{F}\) के किसी संधारी को 200 V, 50 Hz की आपूर्ति से संबंधित किया गया है। इस परिपथ में भार का वर्ण माध्य मूल्य (rms) मान है, लगभग:

(1) 2.5 A
(2) 25.1 A
(3) 1.7 A
(4) 2.05 A
33. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is:

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

34. 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) $\frac{3}{2} k_B T$

35. 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

36. 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) $\frac{Mg(L_1 - L)}{AL}$
37. 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) \( \mu A \)
(2) \( \frac{A}{2\mu} \)
(3) \( \frac{2A}{\mu} \)
(4) \( \frac{A}{2\mu} \)

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

(1) \(-6\hat{i} \text{ N m}\)
(2) \(6\hat{k} \text{ N m}\)
(3) \(6\hat{i} \text{ N m}\)
(4) \(6\hat{j} \text{ N m}\)

39. 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

40. The energy required to break one bond in DNA is \( 10^{-20} \text{ J} \). This value in eV is nearly:

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

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

(1) \( _{36}^{101}\text{Kr} \)
(2) \( _{36}^{103}\text{Kr} \)
(3) \( _{36}^{144}\text{Ba} \)
(4) \( _{40}^{91}\text{Zr} \)
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

Light with an average flux of 20 W/cm² falls on a non-reflecting surface at normal incidence having surface area 20 cm². The energy received by the surface during time span of 1 minute is:

(1) $24 \times 10^3$ J
(2) $48 \times 10^3$ J
(3) $10 \times 10^3$ J
(4) $12 \times 10^3$ J

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

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) $1.5 \times 10^{-1}$ m
(2) $1.5 \times 10^{-2}$ m
(3) $1.0 \times 10^{-2}$ m
(4) $1.0 \times 10^{-1}$ m
46. Identify compound X in the following sequence of reactions:

\[
\text{CH}_3\text{Cl}_2/\text{hv} \xrightarrow{X} \text{H}_2\text{O} \xrightarrow{373 \text{ K}} \text{CHO}
\]

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

(1) C\(_2\)  
(2) O\(_2\)  
(3) He\(_2\)  
(4) Li\(_2\)

48. Which of the following is a natural polymer?

(1) polybutadiene  
(2) poly (Butadiene-acrylonitrile)  
(3) cis-1,4-polyisoprene  
(4) poly (Butadiene-styrene)
49. 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

50. Anisole on cleavage with HI gives:

   OH
   (1) \[
   \begin{array}{c}
   \text{C}_6\text{H}_5\text{I} + \text{C}_2\text{H}_5\text{I} \\
   \end{array}
   \]

   I
   (2) \[
   \begin{array}{c}
   \text{C}_6\text{H}_5\text{I} + \text{C}_2\text{H}_5\text{OH} \\
   \end{array}
   \]

   OH
   (3) \[
   \begin{array}{c}
   \text{C}_6\text{H}_5\text{I} + \text{CH}_3\text{I} \\
   \end{array}
   \]

   I
   (4) \[
   \begin{array}{c}
   \text{C}_6\text{H}_5\text{I} + \text{CH}_3\text{OH} \\
   \end{array}
   \]

51. The number of protons, neutrons and electrons in \(^{175}_{71}\text{Lu}\), respectively, are:

   (1) 71, 71 and 104
   (2) 175, 104 and 71
   (3) 71, 104 and 71
   (4) 104, 71 and 71
52. 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

53. Match the following:

<table>
<thead>
<tr>
<th>Oxide</th>
<th>Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>Basic</td>
</tr>
<tr>
<td>BaO</td>
<td>Neutral</td>
</tr>
<tr>
<td>Al$_2$O$_3$</td>
<td>Acidity</td>
</tr>
<tr>
<td>Cl$_2$O$_7$</td>
<td>Amphoteric</td>
</tr>
</tbody>
</table>

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)

54. 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$_3$·Cu(OH)$_2$  
(3) CuSO$_4$  
(4) [Cu(NH$_3$)$_4$]$_2$^2+

55. Match the following and identify the correct option.

<table>
<thead>
<tr>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO(g) + H$_2$(g)</td>
<td>Mg(HCO$_3$)$_2$ + Ca(HCO$_3$)$_2$</td>
<td>Temporary hardness of water</td>
<td>B$_2$H$_6$</td>
</tr>
<tr>
<td>(i)</td>
<td>(ii)</td>
<td>(iii)</td>
<td>(iv)</td>
</tr>
<tr>
<td>Jalti ke asamanei</td>
<td>Ek eklectrin nuw</td>
<td>Synthesis gas</td>
<td>H$_2$O</td>
</tr>
<tr>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
</tr>
<tr>
<td>H$_2$O$_2$</td>
<td>Asamatali sarrchana</td>
<td>An electron deficient hydride</td>
<td>Non-planar structure</td>
</tr>
<tr>
<td>(i)</td>
<td>(ii)</td>
<td>(iii)</td>
<td>(iv)</td>
</tr>
</tbody>
</table>
56. The mixture which shows positive deviation from Raoult’s law is:
(1) Acetone + Chloroform
(2) Chloroethane + Bromoethane
(3) Ethanol + Acetone
(4) Benzene + Toluene

57. 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 up to two decimal places):
(1) 0.40 K
(2) 0.60 K
(3) 0.20 K
(4) 0.80 K

58. 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

59. 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

60. Find out the solubility of Ni(OH)\(_2\) in 0.1 M NaOH. Given that the ionic product of Ni(OH)\(_2\) is \( 2 \times 10^{-15} \).
(1) 1 \times 10^{-13} M
(2) 1 \times 10^8 M
(3) 2 \times 10^{-13} M
(4) 2 \times 10^{-8} M
61. 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

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

(1) 
(2) 
(3) 
(4)
63. An alkene on ozonolysis gives methanal as one of the products. Its structure is:

- (1) \( \text{CH}_2\text{CH}=\text{CH}_2 \)
- (2) \( \text{CH}_2\text{CH}_2\text{CH}_3 \)
- (3) \( \text{CH}=\text{CH} \text{-CH}_3 \)
- (4) \( \text{CH}_2\text{-CH}_2 \text{-CH}_3 \)

64. A mixture of \( \text{N}_2 \) and \( \text{Ar} \) gases in a cylinder contains 7 g of \( \text{N}_2 \) and 8 g of \( \text{Ar} \). If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of \( \text{N}_2 \) is:

- (1) 15 bar
- (2) 18 bar
- (3) 9 bar
- (4) 12 bar
65. 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) $SCN^- < F^- < CN^- < C_2O_4^{2-}$

66. Paper chromatography is an example of:

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

67. Sucrose on hydrolysis gives:

(1) $\alpha$-D-Glucose $+$ $\beta$-D-Fructose
(2) $\alpha$-D-Fructose $+$ $\beta$-D-Fructose
(3) $\beta$-D-Glucose $+$ $\alpha$-D-Fructose
(4) $\alpha$-D-Glucose $+$ $\beta$-D-Glucose

68. 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) 500 s
(2) 1000 s
(3) 100 s
(4) 200 s

69. 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

70. 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.
71. 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 \(\Delta_r G^\circ\) 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) \(8.314 \text{ J mol}^{-1}\text{K}^{-1} \times 300 \text{ K} \times \ln(2 \times 10^{13})\)

---

72. 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

---

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

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

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

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

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

---

74. Which of the following oxoacid of sulphur has \(-\text{O}—\text{O}—\) linkage?

(1) \(\text{H}_2\text{S}_2\text{O}_8\), peroxodisulphuric acid

(2) \(\text{H}_2\text{S}_2\text{O}_7\), pyrosulphuric acid

(3) \(\text{H}_2\text{SO}_3\), sulphurous acid

(4) \(\text{H}_2\text{SO}_4\), sulphuric acid
75. गलत कथन को पहचानिए।
(1) अंतःस्थलीय यौगिक बे जोड़े हैं जो धातुओं के क्रिस्टल जालों के भीतर छोटे आकार वाले परमाणुओं जैसे H, C या N के फंसने (ट्रैप) पर बनते हैं।
(2) क्रोमियम की, CrO$_4^{2-}$ और Cr$_2$O$_7^{2-}$ में उच्चतम अवस्थाएँ समान नहीं हैं।
(3) जल में, Cr$^{2+}$(d$^4$), Fe$^{2+}$(d$^6$) से अधिक प्रबल अपचायक हैं।
(4) संक्रमण धातुएँ और उनके यौगिक उनकी बड़ी ऑक्सीडेंस अवस्थाओं को प्राप्त करने की क्षमता के कारण उद्धरकी संक्रिया और संकुल निर्माण के लिए जाने जाते हैं।

76. निम्नलिखित में से कौन–सा धातुवीण अपचारजक है?
(1) सील्ट्रिल्मेथिल अमीनोजियरम ब्रोमाइड
(2) सील्ट्रिल्मेथिलबेनजीन सल्फोनेट
(3) सील्ट्रिल्मेथिल सल्फेट
(4) सील्ट्रिल्मेथिल सिट्रेट

77. किसी आर्द्र गैस के रद्दोप परिस्थिति में मुक्त प्रसरण के लिए उचित विकल्प हैं:
(1) q < 0, $\Delta T = 0$ और $w = 0$
(2) q > 0, $\Delta T > 0$ और $w > 0$
(3) q = 0, $\Delta T = 0$ और $w = 0$
(4) q = 0, $\Delta T < 0$ और $w > 0$

78. प्लेटिनम (Pt) इलेक्ट्रोड का उपयोग करते हुए तनसल्फूरिक अम्ल के बैंकुल अपषन पर, ऐल्ट क्लोर प ब्रांक प्राप्त होगा:
(1) H$_2$S गैस
(2) SO$_2$ गैस
(3) हाइड्रोजन गैस
(4) ऑक्सीजन गैस

79. निम्नलिखित में से सही कथन पहचानिए:
(1) निकेल के लिए राज्य प्रावस्था उपचार वेन आर्केल विभि द्वारा किया जाता है।
(2) कच्चे लोहे की विभिन्न आकारों में बनावट जा सकता है।
(3) फिटया लोहा 4% कान्ध वाला अवशेष लोहा होता है।
(4) फेनोललोर तंबा, CO$_2$ के निकास के कारण फेनोललोर लगता है।

75. 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$_2$O$_7^{2-}$ 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.

76. Which of the following is a cationic detergent?
(1) Cetyltrimethyl ammonium bromide
(2) Sodium dodecylbenzene sulphonate
(3) Sodium lauryl sulphate
(4) Sodium stearate

77. 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 $w > 0$

78. On electrolysis of dil.sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be:
(1) H$_2$S gas
(2) SO$_2$ gas
(3) Hydrogen gas
(4) Oxygen gas

79. 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$_2$. 
80. Which of the following is a basic amino acid?
(1) Tyrosine
(2) Lysine
(3) Serine
(4) Alanine

81. Identify the incorrect match.

<table>
<thead>
<tr>
<th>Name</th>
<th>IUPAC Official Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Unnilunium</td>
<td>(i) Mendelevium</td>
</tr>
<tr>
<td>(b) Unniltrium</td>
<td>(ii) Lawrencium</td>
</tr>
<tr>
<td>(c) Unnilhexium</td>
<td>(iii) Seaborgium</td>
</tr>
<tr>
<td>(d) Unununnium</td>
<td>(iv) Darmstadtium</td>
</tr>
</tbody>
</table>

82. 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

83. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is:
(1) β-Elimination reaction
(2) Follows Zaitsev rule
(3) Dehydrohalogenation reaction
(4) Dehydration reaction

84. The number of Faradays (F) required to produce 20 g of calcium from molten CaCl₂ (Atomic mass of Ca = 40 g mol⁻¹) is:
(1) 3
(2) 4
(3) 1
(4) 2
85. Which one of the followings has maximum number of atoms?

(1) 1 g of O\(_2\) [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]

86. For the reaction, 2Cl(g) → Cl\(_2\)(g), the correct option is:

(1) \(\Delta H < 0\) and \(\Delta S > 0\)

(2) \(\Delta H < 0\) and \(\Delta S < 0\)

(3) \(\Delta H > 0\) and \(\Delta S > 0\)

(4) \(\Delta H > 0\) and \(\Delta S < 0\)

87. 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

88. 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

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

\[\text{CH}_4(g) + 4\text{Cl}_2(g) \rightarrow \text{CCl}_4(l) + 4\text{HCl}(g)\]

(1) -4 to +4

(2) 0 to -4

(3) +4 to +4

(4) 0 to +4
90. निम्नलिखित धातु आयन अनेक एंजाइमों को संक्रमित करता है, जिसके कारण ATP के उत्पादन में और Na के साथ सिंह संकेतों के संचार के लिए उत्तरदायी हैं:
(1) कैल्शियम
(2) पोटाशियम
(3) आयन
(4) लांबा (कॉपर)

91. निमं में मुख्यी कोणसी अवस्था डायबिटीज मेलिटस की ओर संकेत करती है?
(1) कोटोनुरिया एवं ग्लाइकोनुरिया
(2) रीनल कैल्क्यूलस एवं हाइपरग्लाइसिमिया
(3) यूरिया एवं कोटोनुरिया
(4) यूरिया एवं रीनल कैल्क्यूलस

92. निम्न स्तंभों का मिलान कर सही विकल्प का चयन करो।

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) अपा</td>
<td>(i) एंड्रोजन</td>
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<td>(b) जीना पेय्मुडरा</td>
<td>(ii) मानव जरायु गोनेटोस्ट्रोपिन</td>
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<tr>
<td>(c) बल्बो-यूरिया ग्राहिया</td>
<td>(iii) अंड्रानु की परत</td>
</tr>
<tr>
<td>(d) लॉडिङ कोशिकाएँ</td>
<td>(iv) विशेष का स्नेहन</td>
</tr>
</tbody>
</table>

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

93. निम्न स्तंभों का मिलान कर सही विकल्प का चयन करो।

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंब - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) बीटी कपास</td>
<td>(i) जीन परिकल्पन</td>
</tr>
<tr>
<td>(b) एडोनेसिस डियोमेनेज</td>
<td>(ii) कोशिकाय सुरक्षा की कर्मी</td>
</tr>
<tr>
<td>(c) आर.एन.ए.आई</td>
<td>(iii) HIV संक्रमण का पता लगाना</td>
</tr>
<tr>
<td>(d) पी.सी.आर.</td>
<td>(iv) वीरियल गृहिज्ञानिसिस</td>
</tr>
</tbody>
</table>

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

90. निम्नलिखित धातु आयन अनेक एंजाइमों को संक्रमित करता है, जिसके कारण ATP के उत्पादन में और Na के साथ सिंह संकेतों के संचार के लिए उत्तरदायी हैं:
(1) कैल्शियम
(2) पोटाशियम
(3) आयन
(4) लांबा (कॉपर)

91. 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

92. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Placenta</td>
<td>(i) Androgens</td>
</tr>
<tr>
<td>(b) Zona pellucida</td>
<td>(ii) Human Chorionic Gonadotropin</td>
</tr>
<tr>
<td>(c) Bulbo-urethral glands</td>
<td>(iii) Layer of the ovum glands</td>
</tr>
<tr>
<td>(d) Leydig cells</td>
<td>(iv) Lubrication of the Penis</td>
</tr>
</tbody>
</table>

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

93. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Bt cotton</td>
<td>(i) Gene therapy</td>
</tr>
<tr>
<td>(b) Adenosine</td>
<td>(ii) Cellular defence deficiency</td>
</tr>
<tr>
<td>(c) RNAi</td>
<td>(iii) Detection of HIV infection</td>
</tr>
<tr>
<td>(d) PCR</td>
<td>(iv) Bacillus thuringiensis</td>
</tr>
</tbody>
</table>

(a) (b) (c) (d)
(1) (ii) (iii) (iv) (i)
(2) (i) (ii) (iii) (iv)
(3) (iv) (i) (ii) (iii)
(4) (iii) (ii) (i) (iv)
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. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) 6 - 15 pairs of (i) Trygon gill slits</td>
<td></td>
</tr>
<tr>
<td>(b) Heterocercal (ii) Cyclostomes caudal fin</td>
<td></td>
</tr>
<tr>
<td>(c) Air Bladder (iii) Chondrichthyes</td>
<td></td>
</tr>
<tr>
<td>(d) Poison sting (iv) Osteichthyes</td>
<td></td>
</tr>
</tbody>
</table>

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

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

96. 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

97. 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)

98. The QRS complex in a standard ECG represents:

(1) Depolarisation of ventricles
(2) Repolarisation of ventricles
(3) Repolarisation of auricles
(4) Depolarisation of auricles
99. The enzyme enterokinase helps in conversion of:
   (1) caseinogen into casein
   (2) pepsinogen into pepsin
   (3) protein into polypeptides
   (4) trypsinogen into trypsin

100. 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.

101. Ray florets have:
   (1) Hypogynous ovary
   (2) Half inferior ovary
   (3) Inferior ovary
   (4) Superior ovary

102. 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

103. The number of substrate level phosphorylations in one turn of citric acid cycle is:
   (1) Two
   (2) Three
   (3) Zero
   (4) One

104. Identify the correct statement with regard to G1 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.
105. निम्नलिखित में से कौन सा ग्रंथ एक कोशिकाय शैवालों का है?

(1) अनाबेना और वोल्वोक्स
(2) कॉलोरा और स्पिरुलिना
(3) वैश्वीनंदिया और सारागांसम
(4) वैशिन्दिया और ग्रास्तिहिंदिया

106. प्रतिक्रिया के संदर्भ में गलत कथन को पहचानिए।

(1) स्वास्थ य प्रतिक्रिया जलदी होती है और पूर्ण प्रतिक्रिया देती है।
(2) भूषण माता दे से कुछ प्रतिक्रिया प्राप्त करता है, यह निक्रिय प्रतिक्रिया का उदाहरण है।
(3) जब परमाणुओं की शरीर (जीवित अथवा मृत) प्रतिक्रिया के संपर्क में आता है और उसके शरीर में प्रतिक्रिया उत्पन्न होते हैं, इसे ‘‘स्वास्थ य प्रतिक्रिया’’ कहते हैं।
(4) जब वे बना गए प्रतिक्रिया प्रतिक्रिया के संपर्क से दिए जाते हैं, इसे ‘‘निक्रिय प्रतिक्रिया’’ कहते हैं।

107. निम्न स्तंभों का मिलान कर महत्वपूर्ण अतिक्रम का चयन करो।

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) प्लाजी पसलियाँ</td>
<td>(i) दूसरी एवं सातवीं पसली के बीच स्थित होती हैं।</td>
</tr>
<tr>
<td>(b) एक्सोकोमन</td>
<td>(ii) ह्यूमरस का शीर्ष</td>
</tr>
<tr>
<td>(c) स्कैपुला</td>
<td>(iii) क्लेविकल</td>
</tr>
<tr>
<td>(d) ग्लीनॉसिद गृह</td>
<td>(iv) उग्रीय से नहीं जुड़ती</td>
</tr>
</tbody>
</table>

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

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

108. निम्न में कार्यात्मक एमीनो अम्ल को पहचानिए।

(1) लाइसिन
(2) वैलीन
(3) ट्रायटिसिन
(4) ग्लुटामाइक अम्ल

105. 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*

106. Identify the wrong statement with reference to immunity.

(1) Active immunity is quick and gives full response.
(2) Foetus receives some antibodies from the 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”.

107. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Floating Ribs</td>
<td>(i) Located between second and seventh ribs</td>
</tr>
<tr>
<td>(b) Acromion</td>
<td>(ii) Head of the Humerus</td>
</tr>
<tr>
<td>(c) Scapula</td>
<td>(iii) Clavicle</td>
</tr>
<tr>
<td>(d) Glenoid cavity</td>
<td>(iv) Do not connect with the sternum</td>
</tr>
</tbody>
</table>

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

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

108. Identify the basic amino acid from the following.

(1) Lysine
(2) Valine
(3) Tyrosine
(4) Glutamic Acid
109. पादप का वह भाग कौन-सा है जिसमें दो पीढ़ियों - एक पीढ़ियों दूसरे के अंदर होता है?
(a) पराग्रंथ के अंदर पराग्रंथ
(b) जानवर युग्मकों वाली अंकुरित पराग्रंथ
(c) फल के अंदर बीज
(d) बोतल के अंदर धूप-कोप
(1) (c) और (d)
(2) (a) और (d)
(3) केवल (a)
(4) (a), (b) और (c)

110. ऑक्सीजन के परिवहन के संदर्भ में गलत कथन को पहचानो।
(1) वायु कृपिका में H+ को ऊज संदर्भ ऑक्सीहेमोग्लोबिन बनाने में सहायक होता है।
(2) वायु कृपिका में कम pCO2 ऑक्सीहेमोग्लोबिन बनाने में सहायक होता है।
(3) ऑक्सीजन की हीमोग्लोबिन से बंधता मुख्तः O2 के आशिक दब से संबंधित है।
(4) CO2 का आशिक दब हीमोग्लोबिन से बंधन बाली O2 में बाधा डाल सकता है।

111. निम्न संबंधों का मिलान कर उचित विकल्प का चयन करो।

<table>
<thead>
<tr>
<th>संबंध - I</th>
<th>संबंध - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) आर्गन ऑफ कार्टी</td>
<td>(i) मध्य कार्टी और पेयरिक्स को जोड़ती है</td>
</tr>
<tr>
<td>(b) कोकिलध</td>
<td>(ii) लेवरिंग का गुणवाद भाग</td>
</tr>
<tr>
<td>(c) यूस्टेकोपन नलिका</td>
<td>(iii) अंडाकार खिड़कियों से जुड़ी होती है</td>
</tr>
<tr>
<td>(d) स्टेपिज</td>
<td>(iv) बेसिपल खिड़की में स्थित होती है</td>
</tr>
</tbody>
</table>

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

112. कृषि पदार्थक का नाम बताइए जिसे गन्ने को फसल पर खिड़कने से उसके तेंद की लम्बाई में बढ़ोतरी होती है, तथा गन्ने के फसल की पैदावार की बढ़ती है।
(a) एथिलीन
(b) एंथ्रोपिक अम्ल
(c) साइटोकाइन
(d) विज्ञरलीन

110. 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)

110. Identify the wrong statement with reference to transport of oxygen.
(1) Higher H+ conc. in alveoli favours the formation of oxyhaemoglobin.
(2) Low pCO2 in alveoli favours the formation of oxyhaemoglobin.
(3) Binding of oxygen with haemoglobin is mainly related to partial pressure of O2.
(4) Partial pressure of CO2 can interfere with O2 binding with haemoglobin.

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

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

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

112. Name the plant growth regulator which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane crop.
(a) Ethylene
(b) Abscisic acid
(c) Cytokinin
(d) Gibberellin
113. The roots that originate from the base of the stem are:
(1) Prop roots
(2) Lateral roots
(3) Fibrous roots
(4) Primary roots

114. 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 $\frac{1}{3}$rd 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.

115. Strobili or cones are found in:
(1) Marchantia
(2) Equisetum
(3) Salvinia
(4) Pteris

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

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

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Typhoid</td>
<td>(i) Wuchereria</td>
</tr>
<tr>
<td>(b) Pneumonia</td>
<td>(ii) Plasmodium</td>
</tr>
<tr>
<td>(c) Filariasis</td>
<td>(iii) Salmonella</td>
</tr>
<tr>
<td>(d) Malaria</td>
<td>(iv) Haemophilus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(ii)</td>
<td>(i)</td>
<td>(iii)</td>
</tr>
<tr>
<td>(2)</td>
<td>(iv)</td>
<td>(i)</td>
<td>(ii)</td>
</tr>
<tr>
<td>(3)</td>
<td>(i)</td>
<td>(iii)</td>
<td>(ii)</td>
</tr>
<tr>
<td>(4)</td>
<td>(iii)</td>
<td>(iv)</td>
<td>(i)</td>
</tr>
</tbody>
</table>
118. ट्रांसलेशन (अनुवाद/स्थानांतरण) की प्रथम अवस्था कौन सी होती है?
(1) tRNA का ऐमानोएमालेशन
(2) एक अंदी-कोडिंग की पहचान
(3) राइबोसोमसे mRNA का बनना
(4) डी.एच.ए., अनु की पहचान

119. निम्न स्तंभों का मिलान कर सही विकल्प का चयन करो।

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंब - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) क्लोस्ट्रिडियम</td>
<td>(i) साइलोस्पोरिन-ए. व्यथापलकम</td>
</tr>
<tr>
<td>(b) ट्रिचोडर्मा पोलीस्पोरम</td>
<td>(ii) व्युदिरिक अम्ल</td>
</tr>
<tr>
<td>(c) मोनासक्स परन्दूरीअस</td>
<td>(iii) सिस्टैक अम्ल</td>
</tr>
<tr>
<td>(d) एस्फ्रोजलस गाइडर</td>
<td>(iv) रक्त-कोडलेक्ट्रल कम करने वाला कारक</td>
</tr>
</tbody>
</table>

120. प्रकाशसंशेष में RuBisCo एंजाइम की ऑक्सीजनीकरण द्वारा से किसका निर्माण होता है?
(1) 6-C यौगिक का 1 अणु
(2) 4-C यौगिक का 1 अणु और 2-C यौगिक का 1 अणु
(3) 3-C यौगिक के 2 अणु
(4) 3-C यौगिक का 1 अणु

121. अनिवार्य तत्त्वों और पदार्थों में उनके कार्यों के विषय में निम्नलिखित को सुमेलित किये जाएँ:
(a) लोहा (i) जल का प्रकाश अपवर्तन
(b) जंक (ii) पराम का अंकुरण
(c) बोरोन (iii) क्लोरोफिल के जैव संशोधन के लिए आवश्यक
(d) मीनगीज (iv) इआईए, जैव संशोधन

सही विकल्प चुनिए:
(a) (b) (c) (d)
(1) (iii) (iv) (ii) (i)
(2) (iv) (i) (ii) (iii)
(3) (ii) (i) (iv) (iii)
(4) (iv) (iii) (ii) (i)

118. 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

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

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Clostridium butylicum</td>
<td>(i) Cyclosporin-A</td>
</tr>
<tr>
<td>(b) Trichoderma polysporum</td>
<td>(ii) Butyric Acid</td>
</tr>
<tr>
<td>(c) Monascus purpureus</td>
<td>(iii) Citric Acid</td>
</tr>
<tr>
<td>(d) Aspergillus niger</td>
<td>(iv) Blood cholesterol lowering agent</td>
</tr>
</tbody>
</table>

120. 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

121. 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)
122. अनुलेखन के समय डी.एन.ए. की कुंडली को खोलने में कोणसा एंजाइम मदद करता है?
(1) डी.एन.ए. पैलिम्युर्ज
(2) अर.एन.ए. पैलिम्युर्ज
(3) डी.एन.ए. लाइम्युर्ज
(4) डी.एन.ए. हैलिम्युर्ज

123. एम.एल. मिलर ने अपने प्रयोग में एक बंद फ्लास्क में किसका मिश्रण कर ऐमिनो अमाल उत्पन्न किये?
(1) 600°C पर CH₄, H₂, NH₃ और जल वाष्प
(2) 600°C पर CH₃, H₂, NH₃ और जल वाष्प
(3) 800°C पर CH₄, H₂, NH₃ और जल वाष्प
(4) 800°C पर CH₃, H₂, NH₄ और जल वाष्प

124. आहार नाला की गोडलेट कोशिकाएँ रूपांतरित होती हैं?
(1) उपस्थित कोशिकाओं से
(2) संयुक्त उपकला कोशिकाओं से
(3) लघु कोशिका कोशिकाओं से
(4) स्तंभाकार उपकला कोशिकाओं से

125. सूक्ष्मकोरों के बुझ बाईं वाली बनाकर उपकला पायी जाती है?
(1) बुझकायु की समीपस्थ संवेणित नलिका में
(2) युजस्कोपय नलिका में
(3) आंत्र के आस्तर में
(4) लाल ग्राघ की वालिका में

126. प्रकाश अभिविक्षा में, इलेक्ट्रोग्राफों के स्थानांतरण को प्लास्टोडिओसिन कहां से सुरु करता है?
(1) PS-I से NADP⁺
(2) PS-I से ATP सिन्युर्ज
(3) PS-II से Cytb₆f सिम्मश्र
(4) Cytb₆f सिम्मश्र से PS-I

127. यदि दो लगातार श्वसन के बीच की दूरी 0.34 nm है और एक सनातन जीविका की DNA की द्विकुंडली में श्वसन की कुल संख्या 6.6 x 10⁹ bp है, तब DNA की लम्बाई होगी लगभग?
(1) 2.2 मीटर
(2) 2.7 मीटर
(3) 2.0 मीटर
(4) 2.5 मीटर

128. Name the enzyme that facilitates opening of DNA helix during transcription.
(1) DNA polymerase
(2) RNA polymerase
(3) DNA ligase
(4) DNA helicase

129. From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask:
(1) CH₄, H₂, NH₃ and water vapor at 600°C
(2) CH₃, H₂, NH₃ and water vapor at 600°C
(3) CH₄, H₂, NH₃ and water vapor at 800°C
(4) CH₃, H₂, NH₄ and water vapor at 800°C

130. Goblet cells of alimentary canal are modified from:
(1) Chondrocytes
(2) Compound epithelial cells
(3) Squamous epithelial cells
(4) Columnar epithelial cells

131. 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

132. 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 Cytb₆f complex
(4) Cytb₆f complex to PS-I

133. 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 x 10⁹ 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
128. सुके-त्रकी की उंगलियों में ग्लाइकोप्रोटीन और ग्लाइकोलिपाइड के निर्माण का मुख्य स्थल कौन सा है?
(1) गलती काय
(2) पालीसोम
(3) अंतरिक्षी जालिका
(4) पेरोसोम

129. निम्न में कौनसा क्रस्त सही नहीं है?
(1) कार्यान्वक इंसूलिन में A एवं B शृंखलाएं होती हैं जो हाइड्रोजन बंधे द्वारा जुड़ी होती हैं।
(2) आमतौर पर, इंसूलिन की इंसूलिन ई-कोल्लाइन द्वारा उत्पादित होता है।
(3) मनुष्य में इंसूलिन प्राक-इंसूलिन से संयुक्त होता है।
(4) प्राक-इंसूलिन में एक अतिरिक्त पेप्टाइड, जिसे "सी-पेप्टाइड" कहते हैं, होता है।

130. गलत क्रस्त को चुनए।
(1) रसदार कुछ स्थलों में द्वितीय दान होता है और यह अपेक्षाकृत हल्के रंग की होती है।
(2) तैनिंग, दिनिंग, तेल आदि के ज्ञान होने के कारण अंतःशाला गहरी रंग की होती है।
(3) अंतःशाला जल का धारण नहीं करती, वरन यथेष्ट सहायताप्रदान करती है।
(4) रसदार बाहेर से पती तक जल के चालन में और खनिजों के चालन में सहायता होती है।

131. प्लोरिडोन मॉड की संरचना किसके समान होती है?
(1) मैनीटोल और एथिलन
(2) लीम्युनिन और सेल्युलोज
(3) मॊड और सेल्युलोज
(4) एम्ब्रॉयडेन और ग्लाइकोजन

132. अर्द्धसूत्रीय विभाजन के संदर्भ में निर्माणित को सम्मिलित क्रस्त कौनसे?
(a) गुनमुक्त अवस्था (i) उपस्थितिभवन
(b) स्थूलमुक्त अवस्था (ii) काइएमेटा
(c) द्वितीय अवस्था (iii) जीन विनिमय
(d) पारागेमेम (iv) सुप्रमुक्त (डाइएक्साइनिस)

निर्माणित में से सही विकल्प चुनिए:
(a) (b) (c) (d)
(1) (i) (ii) (iv) (iii)
(2) (ii) (iv) (iii) (i)
(3) (iii) (iv) (i) (ii)
(4) (iv) (iii) (ii) (i)

128. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells?
(1) Golgi bodies
(2) Polysomes
(3) Endoplasmic reticulum
(4) Peroxisomes

129. 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.

130. 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.

131. Floridean starch has structure similar to:
(1) Mannitol and algin
(2) Laminarin and cellulose
(3) Starch and cellulose
(4) Amylopectin and glycogen

132. 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)
133. निम्न सत्त्वों का मिलान कर उचित विकल्प का चयन करें।

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) इंसुलिनोफिल</td>
<td>(i) प्रतिरक्षा प्रतिक्रिया</td>
</tr>
<tr>
<td>(b) बेसोफिल</td>
<td>(ii) भक्षण करना</td>
</tr>
<tr>
<td>(c) लिफ्ट्रॉफिल</td>
<td>(iii) हिस्टामिनज, बीनाशककी एंजाइमों का मोचन</td>
</tr>
<tr>
<td>(d) लिफ्टोसाइट</td>
<td>(iv) कण जिनमें हिस्टामिन होते हैं का मोचन करना</td>
</tr>
</tbody>
</table>

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

134. वृद्धि की प्रक्रिया अधिकतम किस दैर्घ्य होती है?
(1) जीवपति
(2) प्रसुप्ति
(3) लांग प्रायस्था
(4) परसुता प्रायस्था

135. निम्नलिखित को सुमेलित कीजिए:

| (a) उद्घोर्षक क्रिया का निरोधक | (i) रिसिन |
| (b) पेंटाइड्रॉ क्रिया भार | (ii) मेलोनेट |
| (c) त्वचाओं में कोशिका भिंतिः | (iii) काउटाइन पदार्थ |
| (d) द्वितीय उपाध्यय | (iv) कोलेजन |

निम्नलिखित में से सही विकल्प चुनिए:

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

136. कुछ विभाजित हो रही कोशिकाओं कोशिका चक्र से बाहर निकल जाती हैं और काफी निक्रिया अवस्था में प्रवेश कर जाती है। इसे शान्त अवस्था (G₀) कहा जाता है। यह प्रक्रिया किसके अन्त में होती है?
(1) S अवस्था
(2) G₂ अवस्था
(3) M अवस्था
(4) G₁ अवस्था
137. निम्न में कौन मूलकोशिका को रोकने में सहायता करेगा?
   (1) एट्रियल नेय्रोपरिटिक कारक द्वारा वाहिकाओं का संक्रमण नहीं होना।
   (2) JG कोशिकाओं द्वारा रेनिन का स्वाभाविक कम होना।
   (3) ADH के अल्पसमय से अधिक जल का पुनरावशोषण।
   (4) एड्वार्डरेन द्वारा कारण कुछ नलिका से Na⁺ एवं जल का पुनरावशोषण।

138. बायराइड्डों के विषय में, निम्नलिखित में से कौन सा कथन सही है?
   (1) उनमें प्रोटीन आवरण के साथ डी.एन.ए. होता है।
   (2) उनमें प्रोटीन आवरण के बिना स्वतंत्र डी.एन.ए. होता है।
   (3) उनमें आए एन.ए. के साथ प्रोटीन आवरण होता है।
   (4) उनमें प्रोटीन आवरण के बिना स्वतंत्र आए,एन.ए. होता है।

139. एड्ज़मोडियम की संक्रमक अवस्था जो मानव शरीर में प्रवेश करती है, है:
   (1) मादा युग्मजनक।
   (2) नर युग्मजनक।
   (3) पोषण।
   (4) जीवायुज्जवल।

140. निम्नलिखित में से कौन सा कथन सही है?
   (1) एडिनीन तीन H-बंधों के द्वारा धार्मिक के साथ गुरुत्व बनाता है।
   (2) एडिनीन, धार्मिक के साथ गुरुत्व नहीं बनाता।
   (3) एडिनीन दो H-बंधों के द्वारा धार्मिक के साथ गुरुत्व बनाता है।
   (4) एडिनीन एक H-बंध के द्वारा धार्मिक के साथ गुरुत्व बनाता है।

141. प्यालन एवं डॉल्फिन के पक्ष उदाहरण है:
   (1) औषधिक मैलेनिम्स का।
   (2) प्राकृतिक वरण का।
   (3) अनुकूलित विकिरण का।
   (4) अधिसतत्व विकास का।

137. 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.

138. 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.

139. The infectious stage of Plasmodium that enters the human body is:
   (1) Female gametocytes.
   (2) Male gametocytes.
   (3) Trophozoites.
   (4) Sporozoites.

140. 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.

141. Flippers of Penguins and Dolphins are examples of:
   (1) Industrial melanism.
   (2) Natural selection.
   (3) Adaptive radiation.
   (4) Convergent evolution.
142. [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

143. [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

144. [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

145. [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)

146. [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
147. एक परिस्थिति में सकल प्राथमिक उपयोगक्ता और नेट प्राथमिक उपयोगक्ता के संबन्ध में, निम्नलिखित में से कौन सा कथन सही है?

(1) सकल प्राथमिक उपयोगक्ता और नेट प्राथमिक उपयोगक्ता एक ही है और अभिज्ञ है।
(2) सकल प्राथमिक उपयोगक्ता और नेट प्राथमिक उपयोगक्ता के बीच कोई सम्बन्ध नहीं है।
(3) सकल प्राथमिक उपयोगक्ता स्थिर नेट प्राथमिक उपयोगक्ता से कम होती है।
(4) सकल प्राथमिक उपयोगक्ता स्थिर नेट प्राथमिक उपयोगक्ता से अधिक होती है।

148. जीन 'I' जो ABO रक्त वर्ग का नियंत्रण करता है उसके संदर्भ में गलत कथन को पहचानें।

(1) जब I^A एवं I^B दोनों इकट्ठे होते हैं, तो एक प्रकार का शरक्का अभिज्ञ होता है।
(2) 'i' ऐंटीज कोई भी शरक्का उत्पन्न नहीं करता।
(3) जीन (I) के तीन ऐंटीज होते हैं।
(4) एक व्यक्ति में तीन में से केवल दो ऐंटीज होंगे।

149. निम्न संख्याओं का मिलान कर सही बिल्कुल का चयन करो।

<table>
<thead>
<tr>
<th>संख्या I</th>
<th>संख्या II</th>
</tr>
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<tbody>
<tr>
<td>पीपूर्ण प्राथंक</td>
<td>प्रेसस रोग</td>
</tr>
<tr>
<td>थायिड्विज प्राथंक</td>
<td>डायबिटीज मेलिटेज</td>
</tr>
<tr>
<td>अधिकाक्ष प्राथंक</td>
<td>डायबिटीज इसिडिपाइटर</td>
</tr>
<tr>
<td>अग्निकाय</td>
<td>एडिसन रोग</td>
</tr>
</tbody>
</table>

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

150. राष्ट्र में के अनुसार, विश्व में जाति विविधता लगभग कितनी है?

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

147. 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.

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

(1) When IA and IB 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.

149. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>वल्लभ - I</th>
<th>वल्लभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>पीपूर्ण प्राथंक</td>
<td>प्रेसस रोग</td>
</tr>
<tr>
<td>थायिड्विज प्राथंक</td>
<td>डायबिटीज मेलिटेज</td>
</tr>
<tr>
<td>अधिकाक्ष प्राथंक</td>
<td>डायबिटीज इसिडिपाइटर</td>
</tr>
<tr>
<td>अग्निकाय</td>
<td>एडिसन रोग</td>
</tr>
</tbody>
</table>

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

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

(1) 50 million
(2) 7 million
(3) 1.5 million
(4) 20 million
151. बीजांड का पिंड, बीजांड चूंते से कहाँ पर संलग्न होता है?
(1) नुकेलस
(2) चालाजा
(3) हिलम
(4) मिक्रोपाइल

152. निम्न स्तंभों का मिलान कर सही विकल्प का चयन करो।

स्तंभ - I                      स्तंभ - II
(a) यूथ, बहुलारी पौधक (i) एस्टरियस
(b) व्यस्त में अतीय सममिति एवं (ii) बिच्छु
लवण में द्विपाक्य सममिति
(c) पुष्ट फुप्तस (iii) टीमोथ्याना
(d) जीवंतीफ़िट (iv) लोकस्टा

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

153. क्रांतिव उद्भव के लिए पृथ्वीय प्राणी को किसने अस्वीकार किया था?
(1) चालास डाविन
(2) ओपरिन
(3) कार्ल एर्टन वॉन बार
(4) अल्फ्रेड वॉल्स

154. जीव को उनके जीवप्राप्तिकों में उपयोग के लिए सुप्रभावित कीजिए।

(a) वैसिलस यूरिजिनिसस (i) क्लोनिंग वेक्टर
(b) धर्मस एक्स्प्रेसिस (ii) प्रथम rDNA अणु का निर्माण
(c) एग्रोबैक्टरियाम (iii) डी.एन.ए. पैल्मरेज
cटुमुफेसियाएंस
(d) साल्मोनेला (iv) Cry प्रोटीन
tीफिम्यूरियम

निर्दिष्टम ने से सही विकल्प चुनिए :

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

151. The body of the ovule is fused within the funicle at:
(1) Nucellus
(2) Chalaza
(3) Hilum
(4) Micropyle

152. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Gregarious, polyphagous (i)</td>
<td>Asterias pest</td>
</tr>
<tr>
<td>(b) Adult with radial symmetry and larva with bilateral symmetry (ii)</td>
<td>Scorpion</td>
</tr>
<tr>
<td>(c) Book lungs (iii)</td>
<td>Ctenoplasma</td>
</tr>
<tr>
<td>(d) Bioluminescence (iv)</td>
<td>Locusta</td>
</tr>
</tbody>
</table>

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

153. Embryological support for evolution was disapproved by:
(1) Charles Darwin
(2) Oparin
(3) Karl Ernst von Baer
(4) Alfred Wallace

154. 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) (i) (iv) (iii) (i)
(4) (iv) (iii) (i) (ii)
155. निम्नलिखित में से कौन एक बीज प्रसुप्ति निर्यात करने वाला निरोधक पदार्थ नहीं है?
(1) फिनीलिक अम्ल
(2) पेय-ऐसीकर्षिक अम्ल
(3) जिबरिलिक अम्ल
(4) एच्यूसिक अम्ल

156. अंतर्विंद कार्यों के विषय में निम्नलिखित में से कौन सा कथन गलत है?
(1) ये कोशिकाध्रव्य में स्वतंत्र रूप में होते हैं।
(2) ये कोशिकाध्रव्य में निचबंध पदार्थ को व्यक्त करते हैं।
(3) ये किसी छिल्ली से पिघल नहीं होते।
(4) ये खाद्य कणों के अंतर्गत में शामिल होते हैं।

157. अंद्रं अध्यक्षों अंदरशाय किसमें पाया जाता है?
(1) सूरजमुखी
(2) आलजुबारा
(3) बैंगन
(4) सरसों

158. शास्त्रीय पारितत्त्व में पोषण स्तरों के साथ जातियों के सही उदाहरण को सुमारित कीजिए।
(a) चतुर्थ पोषण स्तर (i) कौन
(b) द्वितीय पोषण स्तर (ii) गिप्पू
(c) प्रथम पोषण स्तर (iii) खाँगौश
(d) तृतीय पोषण स्तर (iv) शास
सही विकल्प चुनिए:

<table>
<thead>
<tr>
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<td>(4)</td>
<td>(iii)</td>
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<td>(ii)</td>
<td>(iv)</td>
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159. रात्रि में या पूर्ण प्रत:काल में शास की पानी के पांचों से जल के द्रव अवस्था में किन्तु सी कुमार बनने में कौन सी प्रक्रिया उत्तरदायी होती है?
(1) अंतस्तिकरण
(2) जीवतद्वनुस्तत्तत
(3) बाप्पोस्तितन
(4) मूलवीय दब

155. 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

156. 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.

157. The ovary is half inferior in:
(1) Sunflower
(2) Plum
(3) Brinjal
(4) Mustard

158. 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:

<table>
<thead>
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<th>(d)</th>
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<td>(4)</td>
<td>(iii)</td>
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<td>(ii)</td>
<td>(iv)</td>
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159. 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
160. निम्नलिखित में से सही युग्म को चुनिए :
(1) न्यूक्लिसेज - डी.एन.ए. के दो रचनें को विभक्त करता है।
(2) एक्सोन्यूक्लिसेज - डी.एन.ए. में विभिन्न स्थानों पर कट कर लगाता है।
(3) लाइमेज - डी.एन.ए. के अनुसार को जोड़ता है।
(4) पॉलिमरेज - डी.एन.ए. को खण्डों में तोड़ता है।

161. एक पादप का अनुसूचक काट में निम्नलिखित शारीरिक लक्षण दर्शाये गये हैं:
(a) अधिक संख्या में विच्छेद हुए संवहन बंदल जो पूलाचाद से निकलते हैं।
(b) स्पष्ट बनहु मृतकों की भरण उत्तरक।
(c) संकुचन और अवधि संवहन बंदल।
(d) पोषणात्मक मृत्तिका का अभाव।
इस पादप का शेपणी और उसके भाग को पहचानिए:
(1) हिंदीजाती ताना
(2) हिंदीजाती जड़
(3) एकबीजाती ताना
(4) एकबीजाती जड़।

162. वैज्ञानिक के गुणसूत्र सिद्धान्त का प्रायोगिक प्रमाणण किसने किया था?
(1) बोजेरी
(2) मैनन
(3) मैंडल
(4) सटन

163. बीटी कपास की किसम जिसे बैक्टीरियोलॉजिसिस के विष जीन को समापित करके बनाई गयी है, प्रतिरोधी है:
(1) पादप सुरक्षित से
(2) कौट पर्याप्त से
(3) कौट पीड़ित से
(4) कौट की रोग से

164. सही कथन का चयन करो।
(1) इंसुलिन अन्य शरीरी कोशिकाओं एवं एडीपोलाईटों पर कार्य करता है।
(2) इंसुलिन हाइपरलाइसिमिया से संबंधित है।
(3) ग्ल्यूकोजीयोटिकोहाइड्रेट ग्ल्यूकोनियोजिनेसिस को प्रेरित करते हैं।
(4) ग्ल्यूकोजीयोजिनेसिस से संबंधित है।

160. 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

161. 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

162. Experimental verification of the chromosomal theory of inheritance was done by:
(1) Boveri
(2) Morgan
(3) Mendel
(4) Sutton

163. 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

164. 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.
165. The specific palindromic sequence which is recognized by EcoRI is:

(1) 5' - CTTAAG - 3'
    3' - GAATTCC - 5'
(2) 5' - GGATCC - 3'
    3' - CCTAGG - 5'
(3) 5' - GAATTC - 3'
    3' - CTTAAG - 5'
(4) 5' - GGAACC - 3'
    3' - CCTTGG - 5'

166. 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

167. 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

168. 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

169. 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.
170. Bilaterally symmetrical and acoelomate animals are exemplified by:
(1) Aschelminthes
(2) Annelida
(3) Ctenophora
(4) Platyhelminthes

171. Which of the following regions of the globe exhibits highest species diversity?
(1) Himalayas
(2) Amazon forests
(3) Western Ghats of India
(4) Madagascar

172. 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

173. Which one of the following is the most abundant protein in the animals?
(1) Lectin
(2) Insulin
(3) Haemoglobin
(4) Collagen

174. 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

175. 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
176. 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

177. 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

178. 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

179. Which of the following is not an attribute of a population?
(1) Mortality
(2) Species interaction
(3) Sex ratio
(4) Natality

180. 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

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रफ कार्य के लिए जगह / Space For Rough Work
Space For Rough Work
<table>
<thead>
<tr>
<th>हिंदी-अंग्रेजी निर्देश ध्यान से पढ़ें :</th>
<th>निम्नलिखित निर्देश ध्यान से पढ़ें :</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. पूरे जाने पर प्रत्येक परीक्षार्थी, निरीक्षक को अपना प्रवेश-पत्र दिखाएं।</td>
<td>1. Each candidate must show on demand his/her Admit Card to the Invigilator.</td>
</tr>
<tr>
<td>2. अंतर्गत निरीक्षक को अपने उत्तर पत्र स्वीकार करते हुए बिना कोई विशेष अनुमति के बिना कोई परीक्षार्थी अपना स्थान न छोड़े।</td>
<td>2. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.</td>
</tr>
<tr>
<td>3. कार्यकर्ता निरीक्षक को अपने उत्तर पत्र स्वीकार करते हुए बिना कोई विशेष अनुमति-पत्र द्वारा हस्ताक्षर किए बिना कोई परीक्षार्थी परीक्षा हॉल नहीं छोड़ें। यदि किसी परीक्षार्थी ने दूसरी बार उपस्थिति-पत्र द्वारा हस्ताक्षर नहीं किए तो यह माना जाएगा कि उसने उत्तर पत्र नहीं लौटाया है और यह अनुचित साधन का मामला माना जाएगा।</td>
<td>3. 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.</td>
</tr>
<tr>
<td>4. इलेक्ट्रॉनिक/हास्यचालित परिक्लिक का उपयोग बाधित है।</td>
<td>4. Use of Electronic/Manual Calculator is prohibited.</td>
</tr>
<tr>
<td>5. परीक्षा-हॉल में आचरण के लिए परीक्षार्थी, परीक्षा के नियमों एवं विनियमों द्वारा नियोजित है। अनुचित साधन के सभी मामलों का फैलस्ता इस परीक्षा के नियमों एवं विनियमों के अनुसार होगा।</td>
<td>5. 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.</td>
</tr>
<tr>
<td>6. किसी हालत में परीक्षा पुस्तिका और उत्तर पत्र का कोई भाग अलग न करें।</td>
<td>6. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.</td>
</tr>
<tr>
<td>7. परीक्षा पुस्तिका / उत्तर पत्र में दिए गए परीक्षा पुस्तिका संकेत को परीक्षार्थी सही तरीके से उपस्थिति-पत्र में लिखें।</td>
<td>7. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.</td>
</tr>
</tbody>
</table>
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 G3. 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.

In case of any ambiguity in translation of any question, English version shall be treated as final.
1. Identify the wrong statement with reference to transport of oxygen.

1. CO₂ can interfere with O₂ binding with haemoglobin.
2. Higher H⁺ conc. in alveoli favours the formation of oxyhaemoglobin.
3. Low pCO₂ in alveoli favours the formation of oxyhaemoglobin.
4. Binding of oxygen with haemoglobin is mainly related to partial pressure of O₂.

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

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

3. 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

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

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Typhoid</td>
<td>(i) Wuchereria</td>
</tr>
<tr>
<td>(b) Pneumonia</td>
<td>(ii) Plasmodium</td>
</tr>
<tr>
<td>(c) Filariasis</td>
<td>(iii) Salmonella</td>
</tr>
<tr>
<td>(d) Malaria</td>
<td>(iv) Haemophilus</td>
</tr>
</tbody>
</table>

(a) (iii) (iv) (i) (ii)
(b) (ii) (i) (iii) (iv)
(c) (iv) (i) (ii) (iii)
(d) (i) (iii) (ii) (iv)
5. 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)

6. 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

7. In light reaction, plastoquinone facilitates the transfer of electrons from:
   (1) Cytb$_6$ complex to PS-I
   (2) PS-I to NADP$^+$
   (3) PS-I to ATP synthase
   (4) PS-II to Cytb$_6$ complex

8. 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

9. The QRS complex in a standard ECG represents:
   (1) Depolarisation of auricles
   (2) Depolarisation of ventricles
   (3) Repolarisation of ventricles
   (4) Repolarisation of auricles
10. 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

11. The infectious stage of *Plasmodium* that enters the human body is:
   (1) Sporozoites
   (2) Female gametocytes
   (3) Male gametocytes
   (4) Trophozoites

12. 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.

13. Flippers of Penguins and Dolphins are examples of:
   (1) Convergent evolution
   (2) Industrial melanism
   (3) Natural selection
   (4) Adaptive radiation

14. 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.
15. 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)

16. 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

17. 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

18. Ray florets have:

(1) Superior ovary
(2) Hypogynous ovary
(3) Half inferior ovary
(4) Inferior ovary

19. The process of growth is maximum during:

(1) Lag phase
(2) Senescence
(3) Dormancy
(4) Log phase
20. The roots that originate from the base of the stem are:
   (1) Primary roots
   (2) Prop roots
   (3) Lateral roots
   (4) Fibrous roots

21. 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

22. 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

23. Bilaterally symmetrical and acoelomate animals are exemplified by:
   (1) Platyhelminthes
   (2) Aschelminthes
   (3) Annelida
   (4) Ctenophora

24. Identify the basic amino acid from the following.
   (1) Glutamic Acid
   (2) Lysine
   (3) Valine
   (4) Tyrosine

25. 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
26. 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.

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

(1) Sutton
(2) Boveri
(3) Morgan
(4) Mendel

28. 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

29. 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.

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

(1) Peroxisomes
(2) Golgi bodies
(3) Polysomes
(4) Endoplasmic reticulum
31. Match the following columns and select the **correct** option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Clostridium butylicum</td>
<td>(i) Cyclosporin-A</td>
</tr>
<tr>
<td>(b) Trichoderma polysporum</td>
<td>(ii) Butyric Acid</td>
</tr>
<tr>
<td>(c) Monascus purpureus</td>
<td>(iii) Citric Acid</td>
</tr>
<tr>
<td>(d) Aspergillus niger</td>
<td>(iv) Blood cholesterol</td>
</tr>
<tr>
<td></td>
<td>Lowering agent</td>
</tr>
</tbody>
</table>

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

32. Embryological support for evolution was disapproved by:

(1) Alfred Wallace  
(2) Charles Darwin  
(3) Oparin  
(4) Karl Ernst von Baer

33. 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

34. 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.

35. 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
36. The number of substrate level phosphorylations in one turn of citric acid cycle is:
   (1) One
   (2) Two
   (3) Three
   (4) Zero

37. Which of the following hormone levels will cause release of ovum (ovulation) from the Graafian follicle?
   (1) High concentration of Progesterone
   (2) Low concentration of LH
   (3) Low concentration of FSH
   (4) High concentration of Estrogen

38. 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

39. 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

40. 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

41. 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
42. 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

43. 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

44. Floridean starch has structure similar to:

(1) Amylopectin and glycogen
(2) Mannitol and algin
(3) Laminarin and cellulose
(4) Starch and cellulose

45. Identify the correct statement with regard to G₁ 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.

46. 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
47. 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”.

48. 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'

49. 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

50. 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 1/3rd 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.
51. 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)

52. The enzyme enterokinase helps in conversion of:

(1) trypsinogen into trypsin
(2) caseinogen into casein
(3) pepsinogen into pepsin
(4) protein into polypeptides

53. 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.

54. 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

55. 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.
56. 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)

57. Goblet cells of alimentary canal are modified from:
(1) Columnar epithelial cells
(2) Chondrocytes
(3) Compound epithelial cells
(4) Squamous epithelial cells

58. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) 6 - 15 pairs of gill slits</td>
<td>(i) Trygon</td>
</tr>
<tr>
<td>(b) Heterocercal caudal fin</td>
<td>(ii) Cyclostomes</td>
</tr>
<tr>
<td>(c) Air Bladder</td>
<td>(iii) Chondrichthyes</td>
</tr>
<tr>
<td>(d) Poison sting</td>
<td>(iv) Osteichthyes</td>
</tr>
</tbody>
</table>

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

60. Name the enzyme that facilitates opening of DNA helix during transcription.
(1) DNA helicase
(2) DNA polymerase
(3) RNA polymerase
(4) DNA ligase
61. 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.

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

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

63. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Pituitary gland</td>
<td>(i) Grave’s disease</td>
</tr>
<tr>
<td>(b) Thyroid gland</td>
<td>(ii) Diabetes mellitus</td>
</tr>
<tr>
<td>(c) Adrenal gland</td>
<td>(iii) Diabetes insipidus</td>
</tr>
<tr>
<td>(d) Pancreas</td>
<td>(iv) Addison’s disease</td>
</tr>
</tbody>
</table>

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

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

64. 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
65. आवश्यक तत्वों और पादपों में उनके कार्यों के विषय में निम्नलिखित को सुमारित कीजिएः
(a) लोह (i) जल का प्रकाशण अपघातन
(b) जिंक (ii) पराग का अंकुरण
(c) बोर (iii) क्लोरोफिल के जैव संस्थापन के लिए आवश्यक
(d) मैंगनीज (iv) आईआएस औय, पैक के जैव संस्थापन

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

66. निम्न में कौन मूर्ति को रोकने में सहायता करेगा?
(1) एल्डोस्ट्रोन के कारण वृद्धि नलिका से Na+ एवं जल का पुनरावशेषण
(2) एडिमेंट नेट्रियुस्टिक कारक द्वारा वाहिकाओं का संक्रमण होगा
(3) JG व्यक्तित्वों द्वारा रेनिन का वापस करना होगा
(4) ADH के अल्पस्वरूप से अधिक जल का पुनरावशेषण

67. द्वितीय अंक का अर्थ गूढ़ता विभाजन पूर्ण होता हैः
(1) संभोग के समय
(2) पुर्णज करने के बाद
(3) सूक्ष्म एवं अंडां के संयोजन के समय
(4) अंडलस्य से पहले

68. निम्न स्तंभों का मिलान कर सही विकल्प का चयन करो।

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) युथ, बहुलारी दोऊक (i) एस्टरियस</td>
<td></td>
</tr>
<tr>
<td>(b) व्यक्तियों में आर्गर रमणीय एवं (ii) बिंदुल लावों में द्विपाक समस्तति</td>
<td></td>
</tr>
<tr>
<td>(c) पुलत फुस्फुस (iii) टीनोलागोना</td>
<td></td>
</tr>
<tr>
<td>(d) जीवसंटोलिन (iv) लोकस्टा</td>
<td></td>
</tr>
</tbody>
</table>

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

65. 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)

66. 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

67. 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

68. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Gregarious, polyphagous (i) Asterias pest</td>
<td></td>
</tr>
<tr>
<td>(b) Adult with radial symmetry and larva with bilateral symmetry</td>
<td></td>
</tr>
<tr>
<td>(c) Book lungs (iii) Ctenoplana</td>
<td></td>
</tr>
<tr>
<td>(d) Bioluminescence (iv) Locusta</td>
<td></td>
</tr>
</tbody>
</table>

(a) (b) (c) (d)
(1) (iv) (i) (ii) (iii)
(2) (iii) (ii) (i) (iv)
(3) (ii) (i) (iii) (iv)
(4) (i) (iii) (ii) (iv)
69. निम्न स्तंभों का मिलान कर सही विकल्प का चयन करो।

स्तंभ - I | स्तंभ - II
--- | ---
(a) प्लागी पसलियाँ | (i) दूसरी एवं सातवीं पसली के बीच स्थित होती हैं
(b) एफ्रोमिनन | (ii) हुमरस का शीर्ष
(c) स्कैपुला | (iii) कल्कलक
(d) ग्लेयोयड ग्लास | (iv) उपोष्ठ से नहीं जुड़ती

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

70. द्वितीयक उपायवत, जैसे कि निकोटीन, स्ट्रिंक्सन और कैपोन को पीने के द्वारा अपने लिए क्यों उपयोगित होता है?

(1) वृद्धि पर प्रभाव
(2) रक्षा पर असर
(3) प्रजनन पर प्रभाव
(4) पोषण में उपयोग

71. निम्न स्तंभों का मिलान कर सही विकल्प का चयन करो।

स्तंभ - I | स्तंभ - II
--- | ---
(a) बीटी कपास | (i) चीन चिकित्सा
(b) एडोनोमोन डिक्सियनैज | (ii) कॉरिकीय सुरक्षा को कमी
(c) आरएनएआई | (iii) HIV संक्रमण का पता लगाना
(d) पी.सी.आर. | (iv) वैसिलस शुरुआतिङ्गितक

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

72. एस.एल. मिलर ने अपने प्रयोग में एक बंद फ्लास्क में किसका मिश्रण कर ऐसा उत्पन्न किये?

(1) 800°C पर CH₃, H₂, NH₄ और जल वायु
(2) 600°C पर CH₄, H₂, NH₃ और जल वायु
(3) 600°C पर CH₃, H₂, NH₃ और जल वायु
(4) 800°C पर CH₄, H₂, NH₃ और जल वायु

70. सेक्टरी संततिक सूचक, जैसे कि निकोटीन, स्ट्रिंक्सन और कैपोन को पीने के द्वारा अपने क्यों उपयोगित होता है?

(1) वृद्धि पर प्रभाव
(2) रक्षा पर असर
(3) प्रजनन पर प्रभाव
(4) पोषण में उपयोग

71. निम्न स्तंभों का मिलान कर सही विकल्प का चयन करो।

स्तंभ - I | स्तंभ - II
--- | ---
(a) बीटी कपास | (i) चीन चिकित्सा
(b) एडोनोमोन डिक्सियनैज | (ii) कॉरिकीय सुरक्षा को कमी
(c) आरएनएआई | (iii) HIV संक्रमण का पता लगाना
(d) पी.सी.आर. | (iv) वैसिलस शुरुआतिङ्गितक

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

72. एस.एल. मिलर ने अपने प्रयोग में एक बंद फ्लास्क में किसका मिश्रण कर ऐसा उत्पन्न किये?

(1) 800°C पर CH₃, H₂, NH₄ और जल वायु
(2) 600°C पर CH₄, H₂, NH₃ और जल वायु
(3) 600°C पर CH₃, H₂, NH₃ और जल वायु
(4) 800°C पर CH₄, H₂, NH₃ और जल वायु

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

(1) CH₃, H₂, NH₄ and water vapor at 800°C
(2) CH₄, H₂, NH₃ and water vapor at 800°C
(3) CH₃, H₂, NH₃ and water vapor at 600°C
(4) CH₄, H₂, NH₃ and water vapor at 800°C
73. 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)

74. 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

75. 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

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

(1) Micropyle
(2) Nucellus
(3) Chalaza
(4) Hilum
77. Strobili or cones are found in:
(1) *Pteris*
(2) *Marchantia*
(3) *Equisetum*
(4) *Salvinia*

78. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Eosinophils</td>
<td>(i) Immune response</td>
</tr>
<tr>
<td>(b) Basophils</td>
<td>(ii) Phagocytosis</td>
</tr>
<tr>
<td>(c) Neutrophils</td>
<td>(iii) Release histaminase, destructive enzymes</td>
</tr>
<tr>
<td>(d) Lymphocytes</td>
<td>(iv) Release granules containing histamine</td>
</tr>
</tbody>
</table>

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

79. 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

80. 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.
81. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Placenta</td>
<td>(i) Androgens</td>
</tr>
<tr>
<td>(b) Zona pellucida</td>
<td>(ii) Human Chorionic Gonadotropin (hCG)</td>
</tr>
<tr>
<td>(c) Bulbo-urethral glands</td>
<td>(iii) Layer of the ovum</td>
</tr>
<tr>
<td>(d) Leydig cells</td>
<td>(iv) Lubrication of the Penis</td>
</tr>
</tbody>
</table>

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

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

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

83. Match the following columns and select the correct option.

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

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

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

(1) Collagen
(2) Lectin
(3) Insulin
(4) Haemoglobin
85. 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)

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

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

87. The ovary is half inferior in:

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

88. 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.

89. 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
90. 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

91. 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

92. 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:
(1) $3.14 \times 10^{-4}$ T
(2) $6.28 \times 10^{-5}$ T
(3) $3.14 \times 10^{-5}$ T
(4) $6.28 \times 10^{-4}$ T

93. 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

94. 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) $c : 1$
95. 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

96. 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) $\frac{1}{2} k_B T$

97. 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

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

99. 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
100. 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

101. 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

102. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C. Its density is:

- (1) 0.2 kg/m³
- (2) 0.1 kg/m³
- (3) 0.02 kg/m³
- (4) 0.5 kg/m³

103. 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) $^{103}_{36}$Kr
- (3) $^{103}_{36}$Kr
- (4) $^{144}_{56}$Ba

104. A charged particle having drift velocity of $7.5 \times 10^{-4}$ m s⁻¹ in an electric field of $3 \times 10^{-10}$ Vm⁻¹, has a mobility in m² V⁻¹ s⁻¹ of:

- (1) $2.5 \times 10^6$
- (2) $2.5 \times 10^{-6}$
- (3) $2.25 \times 10^{-15}$
- (4) $2.25 \times 10^{15}$

105. 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
106. 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) $8.0 \times 10^{-5}\ T\ m\ A^{-1}$
(2) $2.4\pi \times 10^{-5}\ T\ m\ A^{-1}$
(3) $2.4\pi \times 10^{-7}\ T\ m\ A^{-1}$
(4) $2.4\pi \times 10^{-4}\ T\ m\ A^{-1}$

107. 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?

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

(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) $1.28 \times 10^4\ N/C$

108. 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 $\frac{3}{2}\pi$. If instead C is removed from the circuit, the phase difference is again $\frac{3}{2}\pi$ between current and voltage. The power factor of the circuit is:

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

109. 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

110. 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
111. For the logic circuit shown, the truth table is:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

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

- Yellow
- Violet
- Brown
- Gold

The values of resistance and tolerance, respectively, are:

<table>
<thead>
<tr>
<th></th>
<th>Resistance</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>47 kΩ, 10%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4.7 kΩ, 5%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>470 Ω, 5%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>470 kΩ, 5%</td>
<td></td>
</tr>
</tbody>
</table>
114. 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/s²)
   (1) 340 m
   (2) 320 m
   (3) 300 m
   (4) 360 m

115. 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

116. 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

117. 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

118. 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

119. 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
120. 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

121. Light with an average flux of 20 W/cm² falls on a non-reflecting surface at normal incidence having surface area 20 cm². The energy received by the surface during time span of 1 minute is:

- (1) 12 × 10³ J
- (2) 24 × 10³ J
- (3) 48 × 10³ J
- (4) 10 × 10³ J

122. 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) $\frac{A}{2\mu}$

123. 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

124. Dimensions of stress are:

- (1) [ML²T⁻²]
- (2) [ML⁹T⁻²]
- (3) [ML⁻¹T⁻²]
- (4) [MLT⁻²]

125. 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°
126. 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:

\begin{align*}
(1) & \quad \frac{Mg(L_1 - L)}{AL} \\
(2) & \quad \frac{MgL}{AL_1} \\
(3) & \quad \frac{MgL}{A(L_1 - L)} \\
(4) & \quad \frac{MgL_1}{AL}
\end{align*}

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

\begin{align*}
\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2
\end{align*}

\begin{align*}
(1) & \quad 200 \text{ V} \\
(2) & \quad 400 \text{ V} \\
(3) & \quad 50 \text{ V} \\
(4) & \quad 500 \text{ V}
\end{align*}

128. 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:

\begin{align*}
(1) & \quad 524 \text{ Hz} \\
(2) & \quad 536 \text{ Hz} \\
(3) & \quad 537 \text{ Hz} \\
(4) & \quad 523 \text{ Hz}
\end{align*}

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

\begin{align*}
(1) & \quad 10^2 \text{ V} \\
(2) & \quad 10^3 \text{ V} \\
(3) & \quad 10^4 \text{ V} \\
(4) & \quad 10 \text{ V}
\end{align*}
130. The solids which have the negative temperature coefficient of resistance are:
(1) insulators only
(2) semiconductors only
(3) insulators and semiconductors
(4) metals

131. 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

132. The quantities of heat required to raise the temperature of two solid copper spheres of radii \(r_1\) and \(r_2\) (where \(r_1 = 1.5\) \(r_2\)) through 1 K are in the ratio:
(1) \(\frac{9}{4}\)
(2) \(\frac{3}{2}\)
(3) \(\frac{5}{3}\)
(4) \(\frac{27}{8}\)

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

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

\[
\text{CH}_4(g) + 4\text{Cl}_2(g) \rightarrow \text{CCl}_4(l) + 4\text{HCl}(g)
\]

(1) 0 to +4
(2) −4 to +4
(3) 0 to −4
(4) +4 to +4

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

(1) Oxygen gas
(2) \(\text{H}_2\text{S}\) gas
(3) \(\text{SO}_2\) gas
(4) Hydrogen gas

138. 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
139. 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

140. 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

141. Which of the following is a natural polymer?
(1) poly (Butadiene-styrene)
(2) polybutadiene
(3) poly (Butadiene-acrylonitrile)
(4) cis-1,4-polyisoprene

142. A mixture of N\textsubscript{2} and Ar gases in a cylinder contains 7 g of N\textsubscript{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\textsubscript{2} is:

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

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

143. Match the following and identify the correct option.

(a) CO(g) + H\textsubscript{2}(g) (i) Mg(HCO\textsubscript{3})\textsubscript{2} + Ca(HCO\textsubscript{3})\textsubscript{2}
(b) \text{Temporary hardness of water} (ii) An electron deficient hydride
(c) B\textsubscript{2}H\textsubscript{6} (iii) Synthesis gas
(d) H\textsubscript{2}O\textsubscript{2} (iv) Non-planar structure

(a) (b) (c) (d)
144. For the reaction, \(2\text{Cl}(g) \rightarrow \text{Cl}_2(g)\), the correct option is:

1. \(\Delta_rH > 0\) and \(\Delta_rS < 0\)
2. \(\Delta_rH < 0\) and \(\Delta_rS > 0\)
3. \(\Delta_rH < 0\) and \(\Delta_rS < 0\)
4. \(\Delta_rH > 0\) and \(\Delta_rS > 0\)

145. 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

146. 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. \([\text{Cu(NH}_3]_4\text{]}^{2+}\)
2. Cu(OH)_2
3. CuCO_3\cdot Cu(OH)_2
4. CuSO_4

147. 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

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. 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

150. 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

151. Identify a molecule which does not exist.

(1) Li$_2$
(2) C$_2$
(3) O$_2$
(4) He$_2$

152. Identify the incorrect match.

<table>
<thead>
<tr>
<th>Name</th>
<th>IUPAC Official Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Unnilnilinum</td>
<td>(i) Mendelevium</td>
</tr>
<tr>
<td>(b) Unniltrium</td>
<td>(ii) Lawrencium</td>
</tr>
<tr>
<td>(c) Unnilhexium</td>
<td>(iii) Seaborgium</td>
</tr>
<tr>
<td>(d) Unununnium</td>
<td>(iv) Darmstadtium</td>
</tr>
<tr>
<td>(1) (b), (ii)</td>
<td></td>
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<tr>
<td>(2) (c), (iii)</td>
<td></td>
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<tr>
<td>(3) (d), (iv)</td>
<td></td>
</tr>
<tr>
<td>(4) (a), (i)</td>
<td></td>
</tr>
</tbody>
</table>

153. 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) 200 s
(2) 500 s
(3) 1000 s
(4) 10 s
154. 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.

155. 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

156. 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

157. 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)
158. Identify the correct statements from the following:
(a) \( \text{CO}_2(g) \) 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 alkene on ozonolysis gives methanal as one of the product. Its structure is:

\[ \text{CH}_2 = \text{CH} = \text{CH}_2 \]  
\[ \text{CH}_2 = \text{CH} = \text{CH}=\text{CH}_3 \]  
\[ \text{CH}_2 = \text{CH} = \text{CH} \]  
\[ \text{CH}=\text{CH} \]
160. कागज वर्णलेखक की, उदाहरण हैं:
(1) विपातन वर्णलेखक का
(2) पत्ती पत्र वर्णलेखक का
(3) स्तंभ वर्णलेखक का
(4) अधिशोधण वर्णलेखक का

161. निम्नलिखित को सुमेलित कीजिए:

<table>
<thead>
<tr>
<th>ऑक्साइड</th>
<th>प्रकृति</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) CO</td>
<td>(i) शारीय</td>
</tr>
<tr>
<td>(b) BaO</td>
<td>(ii) उदासीन</td>
</tr>
<tr>
<td>(c) Al₂O₃</td>
<td>(iii) अम्लीय</td>
</tr>
<tr>
<td>(d) Cl₂O₇</td>
<td>(iv) उम्बरधामी</td>
</tr>
</tbody>
</table>

निम्नलिखित में से कौन-सा सबसे विकृति है?
(a) (b) (c) (d)
(1) (ii) (i) (iv) (iii)
(2) (iii) (iv) (i) (ii)
(3) (iv) (iii) (ii) (i)
(4) (i) (ii) (iii) (iv)

162. निम्नलिखित में से किसमें परमाणुओं की संख्या अधिकतम होगी?
(1) Mg(s) का 1 g [Atomic mass of Mg = 24]
(2) O₂(g) का 1 g [Atomic mass of O = 16]
(3) Li(s) का 1 g [Atomic mass of Li = 7]
(4) Ag(s) का 1 g [Atomic mass of Ag = 108]

163. निम्नलिखित में से कौन-सा एक क्षारीय ऐमीनो अम्ल है?
(1) ऐलानिन
(2) ट्याइरोसिन
(3) लाइसिन
(4) सरीन

164. Cr²⁺ के लिए, केवल प्रवक्षण चुंबकीय आपूर्ण का परिकलित मान है:
(1) 4.90 BM
(2) 5.92 BM
(3) 2.84 BM
(4) 3.87 BM
165. Sucrose on hydrolysis gives:
(1) $\alpha$-D-Glucose + $\beta$-D-Glucose
(2) $\alpha$-D-Glucose + $\beta$-D-Fructose
(3) $\alpha$-D-Fructose + $\beta$-D-Glucose
(4) $\beta$-D-Glucose + $\alpha$-D-Fructose

166. The mixture which shows positive deviation from Raoult’s law is:
(1) Benzene + Toluene
(2) Acetone + Chloroform
(3) Chloroethane + Bromoethane
(4) Ethanol + Acetone

167. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following?
(1) $+$R effect of $-\text{CH}_3$ groups
(2) $-$R effect of $-\text{CH}_3$ groups
(3) Hyperconjugation
(4) $-$I effect of $-\text{CH}_3$ groups

168. Find out the solubility of Ni(OH)$_2$ in 0.1 M NaOH. Given that the ionic product of Ni(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

169. Which of the following is a cationic detergent?
(1) Sodium stearate
(2) Cetyltrimethyl ammonium bromide
(3) Sodium dodecylbenzene sulphonate
(4) Sodium lauryl sulphate

170. 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
171. 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. $\text{Cr}^{2+}(d^4)$ is a stronger reducing agent than $\text{Fe}^{2+}(d^6)$ in water.

172. 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.

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

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

If the equilibrium constant ($K_c$) is $2 \times 10^{13}$ at 300 K, the value of $\Delta_r G^\circ$ 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. $-8.314 \text{ J mol}^{-1}\text{K}^{-1} \times 300 \text{ K} \times \ln(2 \times 10^{13})$

174. 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. $\text{SCN}^- < \text{F}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$
175. Identify compound X in the following sequence of reactions:

\[
\begin{align*}
(1) \quad & \text{CH}_3Cl_2/\text{hv} \xrightarrow{X} \text{CH}_2\text{Cl} \\
(2) \quad & \text{CHCl}_2 \\
(3) \quad & \text{CCl}_3 \\
(4) \quad & \text{Cl}
\end{align*}
\]

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

\[
\begin{align*}
(1) \quad & q = 0, \Delta T < 0 \text{ and } w > 0 \\
(2) \quad & q < 0, \Delta T = 0 \text{ and } w = 0 \\
(3) \quad & q > 0, \Delta T > 0 \text{ and } w > 0 \\
(4) \quad & q = 0, \Delta T = 0 \text{ and } w = 0
\end{align*}
\]
177. The number of Faradays (F) required to produce 20 g of calcium from molten \( \text{CaCl}_2 \) (Atomic mass of Ca = 40 g mol\(^{-1}\)) is:

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

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

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

179. Anisole on cleavage with HI gives:

(1) \( + \text{CH}_3\text{OH} \)
(2) \( + \text{C}_2\text{H}_5\text{I} \)
(3) \( + \text{C}_2\text{H}_5\text{OH} \)
(4) \( + \text{CH}_3\text{I} \)
180. Which of the following amine will give the carbylamine test?

(1) \( \text{NHCH}_3 \)

(2) \( \text{N(CH}_3\text{)}_2 \)

(3) \( \text{NHC}_2\text{H}_5 \)

(4) \( \text{NH}_2 \)
Space For Rough Work
रफ कार्य के लिए जगह / Space For Rough Work
Read carefully the following instructions:

1. Each candidate must show on demand his/her Admit Card to the Invigilator.

2. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.

3. 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.

4. Use of Electronic/Manual Calculator is prohibited.

5. 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.

6. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.

7. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
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 H3. 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.

In case of any ambiguity in translation of any question, English version shall be treated as final.
1. The color code of a resistance is given below:

Yellow Violet Brown Gold

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%

2. Find the torque about the origin when a force of 3 j N acts on a particle whose position vector is 2 k m.

(1) 6 k N m
(2) 6 i N m
(3) 6 j N m
(4) −6 i N m

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

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

(1) 0.02 kg/m³
(2) 0.5 kg/m³
(3) 0.2 kg/m³
(4) 0.1 kg/m³

4. 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
5. 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

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 $\mu$, then the angle of incidence is nearly equal to:
   (1) $\frac{A}{\mu}$
   (2) $\frac{A}{2\mu}$
   (3) $2A\mu$
   (4) $\mu A$

7. 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

8. 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:
   (1) $2.4\pi \times 10^{-7}$ T m A$^{-1}$
   (2) $2.4\pi \times 10^{-8}$ T m A$^{-1}$
   (3) $8.0 \times 10^{-9}$ T m A$^{-1}$
   (4) $2.4\pi \times 10^{-5}$ T m A$^{-1}$

9. 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.
10. 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) \(48 \times 10^3\) J
(2) \(10 \times 10^3\) J
(3) \(12 \times 10^3\) J
(4) \(24 \times 10^3\) J

11. A short electric dipole has a dipole moment of \(16 \times 10^{-9}\) 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:

\[
\left(\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9\ \text{N m}^2/\text{C}^2\right)
\]

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

12. 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:

\(g = 10\ \text{m/s}^2\)

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

13. 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) \(1.5 \times 10^{-2}\) m
(2) \(1.0 \times 10^{-2}\) m
(3) \(1.0 \times 10^{-1}\) m
(4) \(1.5 \times 10^{-1}\) m
14. When a uranium isotope $^{235}\text{U}_92$ is bombarded with a neutron, it generates $^{89}\text{Kr}_{36}$, three neutrons and:

(1) $^{103}\text{Kr}_{36}$
(2) $^{114}\text{Ba}_{56}$
(3) $^{91}\text{Zr}_{40}$
(4) $^{101}\text{Kr}_{36}$

15. 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:

(1) $3.14 \times 10^{-5}$ T
(2) $6.28 \times 10^{-4}$ T
(3) $3.14 \times 10^{-4}$ T
(4) $6.28 \times 10^{-5}$ T

16. 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) $\frac{5}{2} k_B T$

17. 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
18. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is: \(c = \text{speed of electromagnetic waves}\)

\[
\begin{align*}
(1) & : c^2 \\
(2) & : 1 \\
(3) & : 1 \\
(4) & : c
\end{align*}
\]

19. 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:

\[
\begin{align*}
(1) & : 6.00 \times 10^{-7} \text{ rad} \\
(2) & : 3.66 \times 10^{-7} \text{ rad} \\
(3) & : 1.83 \times 10^{-7} \text{ rad} \\
(4) & : 7.32 \times 10^{-7} \text{ rad}
\end{align*}
\]

20. 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:

\[
\begin{align*}
(1) & : \frac{MgL}{A(L - L)} \\
(2) & : \frac{MgL_1}{AL} \\
(3) & : \frac{Mg(L_1 - L)}{AL} \\
(4) & : \frac{MgL_1}{AL_1}
\end{align*}
\]

21. 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:

\[
\begin{align*}
(1) & : 5 \text{ N/C} \\
(2) & : \text{zero} \\
(3) & : 0.5 \text{ N/C} \\
(4) & : 1 \text{ N/C}
\end{align*}
\]

22. The energy required to break one bond in DNA is \(10^{-20} \text{ J}\). This value in eV is nearly:

\[
\begin{align*}
(1) & : 0.006 \\
(2) & : 6 \\
(3) & : 0.6 \\
(4) & : 0.06
\end{align*}
\]
23. The mean free path for a gas, with molecular diameter \( d \) and number density \( n \) can be expressed as:

\[
\frac{1}{\sqrt{2} \ n^{\frac{3}{2}} d^{2}}
\]

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

\[
\begin{align*}
(1) & \quad 10^4 V \\
(2) & \quad 10 V \\
(3) & \quad 10^2 V \\
(4) & \quad 10^3 V
\end{align*}
\]

25. 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:

\[
\begin{align*}
(1) & \quad 537 Hz \\
(2) & \quad 523 Hz \\
(3) & \quad 524 Hz \\
(4) & \quad 536 Hz
\end{align*}
\]

26. A 40 \( \mu F \) capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly:

\[
\begin{align*}
(1) & \quad 25.1 A \\
(2) & \quad 1.7 A \\
(3) & \quad 2.05 A \\
(4) & \quad 2.5 A
\end{align*}
\]

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

\[
\begin{align*}
(1) & \quad \text{increase in forward current} \\
(2) & \quad \text{forward bias only} \\
(3) & \quad \text{reverse bias only} \\
(4) & \quad \text{both forward bias and reverse bias}
\end{align*}
\]
28. The Brewster’s angle $i_b$ for an interface should be:
   (1) $i_b = 90^\circ$
   (2) $0^\circ < i_b < 30^\circ$
   (3) $30^\circ < i_b < 45^\circ$
   (4) $45^\circ < i_b < 90^\circ$

29. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is:
   (1) zero
   (2) $\pi$ rad
   (3) $\frac{3\pi}{2}$ rad
   (4) $\frac{\pi}{2}$ rad

30. 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) $1.28 \times 10^7 \text{ N/C}$
   (2) $1.28 \times 10^4 \text{ N/C}$
   (3) $1.28 \times 10^5 \text{ N/C}$
   (4) $1.28 \times 10^6 \text{ N/C}$

31. 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) $5.00 \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$
   (2) $0.44 \times 10^{-13} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$
   (3) $1.77 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$
   (4) $0.44 \times 10^{-10} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$

32. Taking into account of the significant figures, what is the value of $9.99 \text{ m} - 0.0099 \text{ m}$?
   (1) 9.9 m
   (2) 9.9801 m
   (3) 9.98 m
   (4) 9.980 m
33. 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

34. Dimensions of stress are:
   (1) \([ML^{-1}T^{-2}]\)
   (2) \([MLT^{-2}]\)
   (3) \([ML^2T^{-2}]\)
   (4) \([ML^0T^{-2}]\)

35. 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

36. The solids which have the negative temperature coefficient of resistance are:
   (1) insulators and semiconductors
   (2) metals
   (3) insulators only
   (4) semiconductors only

37. 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) \( 2.25 \times 10^{-15} \)
   (2) \( 2.25 \times 10^{15} \)
   (3) \( 2.5 \times 10^6 \)
   (4) \( 2.5 \times 10^{-6} \)
38. Which of the following graph represents the variation of resistivity ($\rho$) with temperature ($T$) for copper?

(1) ![Graph 1]
(2) ![Graph 2]
(3) ![Graph 3]
(4) ![Graph 4]

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

40. 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
41. 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

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

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

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

44. 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
45. The quantities of heat required to raise the temperature of two solid copper spheres of radii \( r_1 \) and \( r_2 \) (\( r_1 = 1.5 r_2 \)) to a temperature \( 1 \) \( K \) are in the ratio:

- (1) \( \frac{5}{3} \)
- (2) \( \frac{27}{8} \)
- (3) \( \frac{9}{4} \)
- (4) \( \frac{3}{2} \)

46. 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

47. 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

48. Which of the following statements is not correct?

- (1) Genetically engineered insulin is produced in \( E. \text{Coli} \).
- (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.
49. Embryological support for evolution was disapproved by:
(1) Oparin
(2) Karl Ernst von Baer
(3) Alfred Wallace
(4) Charles Darwin

50. Goblet cells of alimentary canal are modified from:
(1) Compound epithelial cells
(2) Squamous epithelial cells
(3) Columnar epithelial cells
(4) Chondrocytes

51. The QRS complex in a standard ECG represents:
(1) Repolarisation of ventricles
(2) Repolarisation of auricles
(3) Depolarisation of auricles
(4) Depolarisation of ventricles

52. In light reaction, plastoquinone facilitates the transfer of electrons from:
(1) PS-I to ATP synthase
(2) PS-II to Cytb$_6$ complex
(3) Cytb$_6$ complex to PS-I
(4) PS-I to NADP$^+$

53. 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

54. Match the following with respect to meiosis:
(a) Zygote (i) Terminalization
(b) Pachytene (ii) Chiasmata
(c) Diplotene (iii) Crossing over
(d) Diakinesis (iv) Synapsis
Select the correct option from the following:

<table>
<thead>
<tr>
<th></th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(i)</td>
<td>(iv)</td>
<td>(iii)</td>
<td>(i)</td>
</tr>
<tr>
<td>2</td>
<td>(ii)</td>
<td>(iv)</td>
<td>(i)</td>
<td>(i)</td>
</tr>
<tr>
<td>3</td>
<td>(iv)</td>
<td>(iii)</td>
<td>(i)</td>
<td>(i)</td>
</tr>
<tr>
<td>4</td>
<td>(i)</td>
<td>(ii)</td>
<td>(iv)</td>
<td>(iii)</td>
</tr>
</tbody>
</table>
55. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) 6 - 15 pairs of gill slits</td>
<td>(i) <em>Trygon</em></td>
</tr>
<tr>
<td>(b) Heterocercal caudal fin</td>
<td>(ii) <em>Cyclostomes</em></td>
</tr>
<tr>
<td>(c) Air Bladder</td>
<td>(iii) <em>Chondrichthyes</em></td>
</tr>
<tr>
<td>(d) Poison sting</td>
<td>(iv) <em>Osteichthyes</em></td>
</tr>
</tbody>
</table>

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

1. Polysomes
2. Endoplasmic reticulum
3. Peroxisomes
4. Golgi bodies

57. 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 |

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

1. Morgan
2. Mendel
3. Sutton
4. Boveri
59. 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)

60. Bilaterally symmetrical and acoelomate animals are exemplified by:
(1) Annelida
(2) Ctenophora
(3) Platyhelminthes
(4) Aschelminthes

61. Floridean starch has structure similar to:
(1) Laminarin and cellulose
(2) Starch and cellulose
(3) Amylopectin and glycogen
(4) Mannitol and algin

62. Identify the correct statement with regard to G1 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.

63. 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.
64. The enzyme enterokinase helps in conversion of:
(1) pepsinogen into pepsin
(2) protein into polypeptides
(3) trypsinogen into trypsin
(4) caseinogen into casein

65. Match the following columns and select the correct option.

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

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

66. Identify the wrong statement with reference to transport of oxygen.
(1) Low pCO₂ in alveoli favours the formation of oxyhaemoglobin.
(2) Binding of oxygen with haemoglobin is mainly related to partial pressure of O₂.
(3) Partial pressure of CO₂ can interfere with O₂ binding with haemoglobin.
(4) Higher H⁺ conc. in alveoli favours the formation of oxyhaemoglobin.

67. 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

68. 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
69. **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.

70. **Identify the basic amino acid from the following.**

1. Valine
2. Tyrosine
3. Glutamic Acid
4. Lysine

71. **Flippers of Penguins and Dolphins are examples of:**

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

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

1. CH₃, H₂, NH₃ and water vapor at 600°C
2. CH₄, H₂, NH₃ and water vapor at 800°C
3. CH₃, H₂, NH₄ and water vapor at 800°C
4. CH₄, H₂, NH₃ and water vapor at 600°C

73. **The specific palindromic sequence which is recognized by EcoRI is:**

1. 5'- GGATCC - 3'
2. 3' - CCTAGG - 5'
3. 5' - GAATTC - 3'
4. 3' - CTTAAG - 5'
5. 5' - GGAACC - 3'
6. 3' - CCTTGG - 5'
7. 5' - CTTAAG - 3'
8. 3' - GAATTC - 5'

74. **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
75. 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

76. 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)

77. 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

78. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Clostridium</td>
<td>(i) Cyclosporin-A</td>
</tr>
<tr>
<td>(b) Trichoderma</td>
<td>(ii) Butyric Acid</td>
</tr>
<tr>
<td>(c) Monascus</td>
<td>(iii) Citric Acid</td>
</tr>
<tr>
<td>(d) Aspergillus</td>
<td>(iv) Blood cholesterol</td>
</tr>
</tbody>
</table>

   (a) (iv) (iii) (ii) (i)
   (2) (iii) (iv) (ii) (i)
   (3) (ii) (i) (iv) (iii)
   (4) (i) (ii) (iv) (iii)
79. 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.

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

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

81. 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

82. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Eosinophils</td>
<td>(i) Immune response</td>
</tr>
<tr>
<td>(b) Basophils</td>
<td>(ii) Phagocytosis</td>
</tr>
<tr>
<td>(c) Neutrophils</td>
<td>(iii) Release histaminase, destructive enzymes</td>
</tr>
<tr>
<td>(d) Lymphocytes</td>
<td>(iv) Release granules containing histamine</td>
</tr>
</tbody>
</table>

83. 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
84. अंतःखंड के दौरान होने वाली सही पटनाओं का चयन करो।
(a) डायफ्लैगम का संकुचन
(b) बाहरी अंतर्गुण मैपिंग का संकुचन
(c) फुफ़ुल का आवळन कम होना
(d) अंतःफुफ़ुल का बढ़ना
(1) केवल (d)
(2) (a) एवं (b)
(3) (c) एवं (d)
(4) (a), (b) एवं (d)

85. निम्न में किस तकनीक की सहायता से ऐसी रिक्रियाओं जो गर्भधारण नहीं कर सकती, में धूर्ण को स्थानांतरित किया जाता है?
(1) GIFT एवं ICSI
(2) ZIFT एवं IUI
(3) GIFT एवं ZIFT
(4) ICSI एवं ZIFT

86. प्ले-न्द्रोडाम की संक्रमक अवस्था जो मानव शरीर में प्रवेश करती है, है:
(1) त्वचा दण्डनक
(2) औषधियों
(3) त्वचा आकाशीय
(4) त्वचा दण्डनक

87. निम्न रमिंग का मिलान कर सही विकल्प का चयन करो।

<table>
<thead>
<tr>
<th>स्थान - I</th>
<th>स्थान - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) आफ्पा</td>
<td>(i) एंड्रोजन</td>
</tr>
<tr>
<td>(b) जोना पेल्युसिडा</td>
<td>(ii) मानव जरारु गोनेटोड्रोपिन</td>
</tr>
<tr>
<td>(c) बल्डो-गुर्खल ग्राहियाँ</td>
<td>(iii) अंडारु की परत</td>
</tr>
<tr>
<td>(d) लीड-मॉर्फिकाँ</td>
<td>(iv) रस्ता का रेसहन</td>
</tr>
</tbody>
</table>

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

88. सही मिलान का चयन करो।

| (1) खेलेसीमिया | X संलग्न |
| (2) होमोफ़ैलिया | Y संलग्न |
| (3) फेनिलकोटोपैलिया | अलिंग क्रॉमोसोम प्रभावी लक्षण |
| (4) दात्र कोशिका अरकता | अलिंग क्रॉमोसोम अपभ्रंशी लक्षण, क्रॉमोसोम-11 |

84. 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)

85. In which of the following techniques, the embryos are transferred to assist those females who cannot conceive?
(1) GIFT and ICSI
(2) ZIFT and IUI
(3) GIFT and ZIFT
(4) ICSI and ZIFT

86. The infectious stage of Plasmodium that enters the human body is:
(1) Male gametocytes
(2) Trophozoites
(3) Sporozoites
(4) Female gametocytes

87. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>आयत 1</th>
<th>आयत 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Placenta</td>
<td>(i) Androgens</td>
</tr>
<tr>
<td>(b) Zona pellucida</td>
<td>(ii) Human Chorionic Gonadotropin (hCG)</td>
</tr>
<tr>
<td>(c) Bulbo-urethral glands</td>
<td>(iii) Layer of the ovum</td>
</tr>
<tr>
<td>(d) Leydig cells</td>
<td>(iv) Lubrication of the Penis</td>
</tr>
</tbody>
</table>

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

88. 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
89. 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.

90. Which one of the following is the most abundant protein in the animals?
(1) Insulin
(2) Haemoglobin
(3) Collagen
(4) Lectin

91. 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

92. 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)

93. 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.
94. 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

95. Some dividing cells exit the cell cycle and enter vegetative inactive stage. This is called quiescent stage (G₀). This process occurs at the end of:
   (1) G₂ phase
   (2) M phase
   (3) G₁ phase
   (4) S phase

96. 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.

97. 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)
98. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>संबंध - I</th>
<th>संबंध - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) पीतीय गृंथि</td>
<td>(i) ग्रेव्स रोग</td>
</tr>
<tr>
<td>(b) धार्मिक गृंथि</td>
<td>(ii) डायबिटीज मेलिटस</td>
</tr>
<tr>
<td>(c) अधिकृत गृंथि</td>
<td>(iii) डायबिटीज इंसीपिडस</td>
</tr>
<tr>
<td>(d) अर्थाय था</td>
<td>(iv) एडिसन रोग</td>
</tr>
</tbody>
</table>

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

99. निम्न संबंधों का मिलान कर सही विकल्प का चयन करो।

1. कैंसर, AIDS, सिकिलिस
2. ग्याजक, सिकिलिस, जननिक परिपथ
3. ग्याजक, मलेशिया, जननिक परिपथ
4. AIDS, मलेशिया, फाइलिया

100. सिस्ट्रिक अभ्य चक्र के एक घुमाव में कार्यवान स्तर फाल्सेफोर्लेसन को संख्या क्या होता है?

1. तीन
2. चार
3. एक
4. दो

101. मॉन्ट्रेल प्रोटोकॉल किस पर नियंत्रण के लिए हस्ताक्षरित किया गया था?

1. e-वेबस (e-कृंडा करकट) का निपटन
2. एक देश से दूसरे देश में आनुपातिक: स्थापित जीवों के परिवर्तन के लिए
3. ओजोन को क्षति पहुँचाने वाले पदार्थों का उत्सर्जन
4. हरि पृथ्वी गैसों का छोड़ना

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
102. 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)

103. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Gregarious, polyphagous (i)</td>
<td>Asterias (i)</td>
</tr>
<tr>
<td>(b) Adult with radial symmetry and larva with bilateral symmetry (ii)</td>
<td>Scorpion (ii)</td>
</tr>
<tr>
<td>(c) Book lungs (iii)</td>
<td>Ctenoplana (iii)</td>
</tr>
<tr>
<td>(d) Bioluminescence (iv)</td>
<td>Locusta (iv)</td>
</tr>
</tbody>
</table>

Select the correct option:

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

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

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

105. Ray florets have:

- (1) Half inferior ovary
- (2) Inferior ovary
- (3) Superior ovary
- (4) Hypogynous ovary
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 $6.6 \times 10^9$ 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

107. Match the following columns and select the correct option.

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Bt cotton</td>
<td>(i) Gene therapy</td>
</tr>
<tr>
<td>(b) Adenosine deaminase deficiency</td>
<td>(ii) Cellular defence</td>
</tr>
<tr>
<td>(c) RNAi</td>
<td>(iii) Detection of HIV infection</td>
</tr>
<tr>
<td>(d) PCR</td>
<td>(iv) <em>Bacillus thuringiensis</em></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Fourth trophic level</td>
<td>(i) Crow</td>
</tr>
<tr>
<td>(b) Second trophic level</td>
<td>(ii) Vulture</td>
</tr>
<tr>
<td>(c) First trophic level</td>
<td>(iii) Rabbit</td>
</tr>
<tr>
<td>(d) Third trophic level</td>
<td>(iv) Grass</td>
</tr>
</tbody>
</table>

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)
109. निम्न रोगों को उनके पैदा करने वाले जीवों के साथ मिलान कर सही विकल्प का चयन करो।

<table>
<thead>
<tr>
<th>स्तंभ - I</th>
<th>स्तंभ - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>टाइफोइड</td>
</tr>
<tr>
<td>(b)</td>
<td>शूरोगिया</td>
</tr>
<tr>
<td>(c)</td>
<td>फाल्किएडरसस</td>
</tr>
<tr>
<td>(d)</td>
<td>मलेशिया</td>
</tr>
<tr>
<td>(i)</td>
<td>वुचेरेया</td>
</tr>
<tr>
<td>(ii)</td>
<td>प्लामोडियम</td>
</tr>
<tr>
<td>(iii)</td>
<td>सल्मोनेला</td>
</tr>
<tr>
<td>(iv)</td>
<td>हैमोफिलस</td>
</tr>
</tbody>
</table>

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

110. तन के आधार से उत्पन्न होने वाली जड़ें को क्या कहा जाता है?
(1) पार्वती जड़ें
(2) झंडा जड़ें
(3) प्राथमिक जड़ें
(4) अवर्तमान जड़ें

111. द्वितीयक अंडक का अर्थपूर्वी विभाजन पूर्ण होता है?
(1) शूरक्दुए एवं अंडापु के सतंबर के समय
(2) अंडोंपल ने पहले
(3) संप्रेषण के समय
(4) युग्मनत्र बनने के बाद

112. प्रतिबंधन एंजाइम के विषय में गलत कथन को पहचानिए।
(1) चिपचिपे सिरे डी.एन.ए. लाइनोज द्वारा जोड़े जा सकते हैं।
(2) प्रत्येक प्रतिक्रिया एंजाइम डी.एन.ए. क्रम की लम्बाई का निरीक्षण करके कार्य करते हैं।
(3) ये ठीक में पैलिंड्रोमिक स्थलों पर कार्य करते हैं।
(4) ये अनुक्रमिक इंजीनियरिंग में उपयोगी हैं।

113. एक पारितिप में सकल प्राथमिक उत्पादकता और नेट प्राथमिक उत्पादकता के संबंध में, निम्नलिखित में से कौन सा कथन सही है?
(1) सकल प्राथमिक उत्पादकता और नेट प्राथमिक उत्पादकता के बीच कोई सम्बन्ध नहीं है।
(2) सकल प्राथमिक उत्पादकता सटेड नेट प्राथमिक उत्पादकता से कम होती है।
(3) सकल प्राथमिक उत्पादकता सटेड नेट प्राथमिक उत्पादकता से अधिक होती है।
(4) सकल प्राथमिक उत्पादकता और नेट प्राथमिक उत्पादकता एक ही है और अभिन्न है।

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

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Typhoid</td>
</tr>
<tr>
<td>(b)</td>
<td>Pneumonia</td>
</tr>
<tr>
<td>(c)</td>
<td>Filariasis</td>
</tr>
<tr>
<td>(d)</td>
<td>Malaria</td>
</tr>
<tr>
<td>(i)</td>
<td>Wuchereria</td>
</tr>
<tr>
<td>(ii)</td>
<td>Plasmodium</td>
</tr>
<tr>
<td>(iii)</td>
<td>Salmonella</td>
</tr>
<tr>
<td>(iv)</td>
<td>Haemophilus</td>
</tr>
</tbody>
</table>

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

110. The roots that originate from the base of the stem are:
(1) Lateral roots
(2) Fibrous roots
(3) Primary roots
(4) Prop roots

111. 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

112. 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.

113. 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.
114. The process of growth is maximum during:
   (1) Dormancy
   (2) Log phase
   (3) Lag phase
   (4) Senescence

115. 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

116. Name the enzyme that facilitates opening of DNA helix during transcription.
   (1) RNA polymerase
   (2) DNA ligase
   (3) DNA helicase
   (4) DNA polymerase

117. 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

118. Strobili or cones are found in:
   (1) *Equisetum*
   (2) *Salvinia*
   (3) *Pteris*
   (4) *Marchantia*

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

<table>
<thead>
<tr>
<th>Column - I</th>
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</thead>
<tbody>
<tr>
<td>(a)</td>
<td>(i)</td>
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<tr>
<td>(b)</td>
<td>(ii)</td>
</tr>
<tr>
<td>(c)</td>
<td>(iii)</td>
</tr>
<tr>
<td>(d)</td>
<td>(iv)</td>
</tr>
</tbody>
</table>

(a) Floating Ribs
(b) Acromion
(c) Scapula
(d) Glenoid cavity

(a) Located between second and seventh ribs
(b) Head of the Humerus
(c) Clavicle
(d) Do not connect with the sternum
120. 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

121. 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.

122. The ovary is half inferior in:
(1) Plum
(2) Brinjal
(3) Mustard
(4) Sunflower

123. 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

124. 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

125. Dissolution of the synaptonemal complex occurs during:
(1) Leptotene
(2) Pachytene
(3) Zygotene
(4) Diplotene
126. 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

127. 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) Cytokin
   (3) Gibberellin
   (4) Ethylene

128. 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.

129. Which of the following regions of the globe exhibits highest species diversity?
   (1) Amazon forests
   (2) Western Ghats of India
   (3) Madagascar
   (4) Himalayas

130. 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
131. 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.

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

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

133. 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

134. 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

135. 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
136. Match the following and identify the correct option.

(a) CO(g) + H₂(g)  (i) Mg(HCO₃)₂ + Ca(HCO₃)₂
(b) कल की अस्थायी (ii) एक इलेक्ट्रॉन न्यून जीयना
(c) B₂H₆ (iii) संश्लेषण गैस
(d) H₂O₂ (iv) असमतली संरचना

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

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

(1) Hyperconjugation
(2) −I effect of −CH₃ groups
(3) +R effect of −CH₃ groups
(4) −R effect of −CH₃ groups

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

CH₄(g) + 4Cl₂(g) → CCl₄(l) + 4HCl(g)

(1) 0 to −4
(2) +4 to +4
(3) 0 to +4
(4) −4 to +4

139. 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

140. The calculated spin only magnetic moment of Cr²⁺ ion is:

(1) 2.84 BM
(2) 3.87 BM
(3) 4.90 BM
(4) 5.92 BM
141. Identify a molecule which does not exist.
(1) $O_2$
(2) $He_2$
(3) $Li_2$
(4) $C_2$

142. 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

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

144. 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

145. 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

146. Which of the following is a cationic detergent?
(1) Sodium dodecylbenzene sulphonate
(2) Sodium lauryl sulphate
(3) Sodium stearate
(4) Cetyltrimethyl ammonium bromide
147. गलत कथन को पहचानें।
(1) क्रोमियम की, \( \text{CrO}_4^{2-} \) और \( \text{Cr}_2\text{O}_7^{2-} \) में उपचयन अवस्थाएँ समान नहीं हैं।
(2) जल में, \( \text{Cr}^{3+}(d^4) \) और \( \text{Fe}^{2+}(d^6) \) से अधिक प्रभाव अपनाया है।
(3) संक्रमण घाटा और उनके यौगिक उनकी बहु ऑक्सीजनरण अवस्थाओं को प्रदान करने की क्षमता के कारण उन्हें भारी संक्रमण और संक्षिप्त निर्माण के लिए जाने जाते हैं।
(4) अंतराकार यौगिक बे होते हैं जो धातुओं के क्रक्स्टल जलायें के बीतर छोटे आकार बाले परमाणुओं जैसे H, C या N के फंसने (ट्रैप) पर बनते हैं।

148. निम्नलिखित में से कौन-सा ऐल्केन वर्तुः अभिक्रिया द्वारा अच्छी लाभ में नहीं बनाई जा सकती?
(1) n-Butane
(2) n-Hexane
(3) 2,3-Dimethylbutane
(4) n-Heptane

149. यूरिया जल के साथ अभिक्रिया द्वारा \( \Delta \) बनता है जो विषाक्त होकर B बनता है। जब B की \( \text{Cu}^{2+} \) (जलीय) से गुजराता जाता है, तब C का गहरे नीले रंग का विलयन प्राप्त होता है। निम्नलिखित में से C का सूत्र क्या है?
(1) \( \text{CuCO}_3\text{Cu(OH)}_2 \)
(2) \( \text{CuSO}_4 \)
(3) \( [\text{Cu(NH}_3)_4]^2^+ \)
(4) \( \text{Cu(OH)}_2 \)

150. बेजून का हिमांक अवनमन रियांक (Kp) 5.12 K kg mol\(^{-1}\) है। बेजून में एक विद्युत-अनपट्ट विलयन बाले 0.078 m मोललता बाले विलयन का हिमांक अवनमन (दो दशमलव स्थानों तक निकालिए), है:
(1) 0.60 K
(2) 0.20 K
(3) 0.80 K
(4) 0.40 K

151. \(^{175}\text{Lu}\) में प्रोटॉन, न्यूट्रॉन और इलेक्ट्रॉनों की संख्याएँ, क्रमशः हैं:
(1) 175, 104 और 71
(2) 71, 104 और 71
(3) 104, 71 और 71
(4) 71, 71 और 104

147. Identify the incorrect statement.
(1) The oxidation states of chromium in \( \text{CrO}_4^{2-} \) and \( \text{Cr}_2\text{O}_7^{2-} \) are not the same.
(2) \( \text{Cr}^{2+}(d^4) \) is a stronger reducing agent than \( \text{Fe}^{2+}(d^6) \) 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.

148. 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

149. 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) \( \text{CuCO}_3\text{Cu(OH)}_2 \)
(2) \( \text{CuSO}_4 \)
(3) \( [\text{Cu(NH}_3)_4]^2^+ \)
(4) \( \text{Cu(OH)}_2 \)

150. The freezing point depression constant (Kf) 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 to two decimal places):
(1) 0.60 K
(2) 0.20 K
(3) 0.80 K
(4) 0.40 K

151. The number of protons, neutrons and electrons in \(^{175}\text{Lu}\), respectively, are:
(1) 175, 104 and 71
(2) 71, 104 and 71
(3) 104, 71 and 71
(4) 71, 71 and 104
152. Identify compound X in the following sequence of reactions:

\[
\text{CH}_3\text{Cl} _{2/\text{hv}} \xrightarrow{X} \text{X} \xrightarrow{\text{H}_2\text{O}} \text{CHO}
\]

\[
\text{Cl}_2 / \text{hv} \xrightarrow{X} \text{X} \xrightarrow{\text{H}_2\text{O}} \text{CHO}
\]

153. 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\textsubscript{2}.

(4) Vapour phase refining is carried out for Nickel by Van Arkel method.
154. निम्नलिखित में से अनुपात के किस समुच्चय का शून्य दिशुर आपूर्ति होता है?
(1) बोर डाइफ्लूॅराइड, बेरिलियम डाइफ्लूॅराइड, कार्बन डाइऑक्साइड, 1,4-डाइक्लोरोबिजीन
(2) अमीनिया, बेरिलियम डाइफ्लूॅराइड, जल, 1,4-डाइक्लोरोबिजीन
(3) बोर डाइफ्लूॅराइड, हाइड्रोजन फ्लूॅराइड, कार्बन डाइऑक्साइड, 1,3-डाइक्लोरोबिजीन
(4) नाइट्रोजन डाइफ्लूॅराइड, बेरिलियम डाइफ्लूॅराइड, जल, 1,3-डाइक्लोरोबिजीन

155. कागज वर्गोलिखिकी की, उदाहरण हैं:
(1) स्तंभ वर्गोलिखिकी का
(2) अधिशोषण वर्गोलिखिकी का
(3) विपातन वर्गोलिखिकी का
(4) पतली पत्र वर्गोलिखिकी का

156. अनुसूचित समूह को पहचानिए।

<table>
<thead>
<tr>
<th>नाम</th>
<th>आई.एन.ए.ए. सी. अधिकृत नाम</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) अन्नलिंगिनियम</td>
<td>(i) मैंडलिंवियम</td>
</tr>
<tr>
<td>(b) अन्नलिंट्राइडियम</td>
<td>(ii) लॉरेंसियम</td>
</tr>
<tr>
<td>(c) अन्नलिंहेक्सियम</td>
<td>(iii) सीबोगियम</td>
</tr>
<tr>
<td>(d) अन्नजूनियम</td>
<td>(iv) डार्मस्टैटियम</td>
</tr>
</tbody>
</table>

157. Ni(OH)₂ की 0.1 M NaOH में विलेखत जल बूझाए।
दिखाया है कि Ni(OH)₂ का अपनी पुनस्वल्प 2×10⁻¹⁵ है।
(1) 1×10⁻⁸ M
(2) 2×10⁻¹³ M
(3) 2×10⁻⁸ M
(4) 1×10⁻¹³ M

158. निम्नलिखित में से कौन-सा एक प्राकृतिक बहुतक है?
(1) पालित (ब्रूटाडाइन-प्रैक्सिलोतॉनाइड्रा)
(2) सियार 1,4-पालितआइड्रोन
(3) पालित (ब्रूटाडाइन-एच्ड्रोन)
(4) पालितब्रूटाडाइन

159. बैन्जील्डराइड और एसीलोत्राइडराइड की टन NaOH की उपस्थिति में अभिक्रिया इस प्रकार जानी जाती हैं:
(1) क्रौस ऐल्डोल संशोधन
(2) ऐल्डोल संशोधन
(3) कैनिज्जरो अभिक्रिया
(4) क्रौस कैनिज्जरो अभिक्रिया

154. 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

155. Paper chromatography is an example of:
(1) Column chromatography
(2) Adsorption chromatography
(3) Partition chromatography
(4) Thin layer chromatography

156. Identify the incorrect match.
<table>
<thead>
<tr>
<th>Name</th>
<th>IUPAC Official Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Unnilunium</td>
<td>(i) Mendelevium</td>
</tr>
<tr>
<td>(b) Unniltrium</td>
<td>(ii) Lawrencium</td>
</tr>
<tr>
<td>(c) Unnilhexium</td>
<td>(iii) Seaborgium</td>
</tr>
<tr>
<td>(d) Unununnium</td>
<td>(iv) Darmstadtium</td>
</tr>
</tbody>
</table>

157. 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

158. Which of the following is a natural polymer?
(1) poly (Butadiene-acrylonitrile)
(2) cis-1,4-polyisoprene
(3) poly (Butadiene-styrene)
(4) polybutadiene

159. Reaction between benzaldehyde and acetoephone in presence of dilute NaOH is known as:
(1) Cross Aldol condensation
(2) Aldol condensation
(3) Cannizzaro’s reaction
(4) Cross Cannizzaro’s reaction
160. The mixture which shows positive deviation from Raoult’s law is:
(1) Chloroethane + Bromoethane
(2) Ethanol + Acetone
(3) Benzene + Toluene
(4) Acetone + Chloroform

161. 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) 1000 s
(2) 100 s
(3) 200 s
(4) 500 s

162. 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$_2$

163. 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 $w = 0$

164. 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
165. 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 \( \Delta_r G^\circ \) at the same temperature will be:

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

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

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

(4) \(8.314 \text{ J mol}^{-1} \times 300 \text{ K} \times \ln(3 \times 10^{13})\)

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

- (1) \( \text{NHC}_2\text{H}_5 \)
- (2) \( \text{NH}_2 \)
- (3) \( \text{NHCH}_3 \)
- (4) \( \text{N(CH}_3)_2 \)
167. An alkene on ozonolysis gives methanal as one of the product. Its structure is:

- (1) \( \text{CH}_2\text{CH}_2\text{CH}_3 \)
- (2) \( \text{CH} = \text{CH} - \text{CH}_3 \)
- (3) \( \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \)
- (4) \( \text{CH}_2 - \text{CH} = \text{CH}_2 \)

168. Anisole on cleavage with HI gives:

- (1) \( \text{I} + \text{C}_2\text{H}_5\text{OH} \)
- (2) \( \text{I} + \text{CH}_3\text{I} \)
- (3) \( \text{I} + \text{CH}_3\text{OH} \)
- (4) \( \text{I} + \text{C}_2\text{H}_5\text{I} \)
169. 2-ब्रोमो-पेंटेन से पेंट-2-ेन बनने की विलोपन अभिक्रिया :
(a) β-बिलोपन अभिक्रिया है
(b) जेटीफ नियम का पालन करती है
(c) विहार्डीहेलियोजीकरण अभिक्रिया है
(d) नाइजेलीकरण अभिक्रिया है
(1) (a), (b), (d)
(2) (a), (b), (c)
(3) (a), (c), (d)
(4) (b), (c), (d)

170. किसी अभिक्रिया के अभिक्रायों की सांद्रता में वृद्धि से परिवर्तन होगा :
(1) संघटण आवृति में
(2) अभिक्रिया की ऊष्मा में
(3) अभिक्रिया की ऊष्मा में
(4) देहली ऊष्मा में

171. निम्नलिखित में से कौन-सा एक शरीरीय ऐमीनो अम्ल है?
(1) लाइसीन
(2) चॅर्सीन
(3) एलाइनिन
(4) टाइरोसीन

172. निम्नलिखित धातु आयन अनेक एंजाइम्स को सक्रिय बनाता है, रस्प्लेसेंस के अस्थायी से ATP के उत्पादन में और Na के साथ सिया संক्षिप्त के संचार के लिए उत्तरदायी है : 
(1) पोटेडियम
(2) आयरन
(3) लोबा (कॉपर)
(4) कैल्शियम

173. अभिक्रिया, 2Cl(g) → Cl₂(g), के लिए उचित विकल्प है : 
(1) Δ_H < 0 और Δ_S < 0
(2) Δ_H > 0 और Δ_S > 0
(3) Δ_H > 0 और Δ_S < 0
(4) Δ_H < 0 और Δ_S > 0

169. 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)

170. 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

171. Which of the following is a basic amino acid ?
(1) Lysine
(2) Serine
(3) Alanine
(4) Tyrosine

172. 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

173. For the reaction, 2Cl(g) → Cl₂(g), the correct option is :
(1) Δ_H < 0 and Δ_S < 0
(2) Δ_H > 0 and Δ_S > 0
(3) Δ_H > 0 and Δ_S < 0
(4) Δ_H < 0 and Δ_S > 0
174. निम्नलिखित को सोम्मेलित कीजिए :

<table>
<thead>
<tr>
<th>ऑक्साइड</th>
<th>प्रकृति</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) CO</td>
<td>(i) आमीर</td>
</tr>
<tr>
<td>(b) BaO</td>
<td>(ii) उदासीन</td>
</tr>
<tr>
<td>(c) Al₂O₃</td>
<td>(iii) अस्फील</td>
</tr>
<tr>
<td>(d) Cl₂O₇</td>
<td>(iv) उपवस्तुभर्मी</td>
</tr>
</tbody>
</table>

निम्नलिखित में से कौन-सा सही विकल्प है?

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

175. जीटा विभूति का मापन कोलोइडिक विलयन के किस गुणधर्म के निर्धारण में उपयोगी होता है?

1. कोलोइड कणों का आयाम
2. स्पर्शता
3. बिलायता
4. कोलोइड कणों की बिलायता

176. एक सिलिंडर में N₂ और Ar गैसों के एक मिश्रण में N₂ के 7 g और Ar के 8 g हैं। यदि सिलिंडर में गैसों के मिश्रण का कुल दबाव 27 bar हो, तो N₂ का आयाम दबाव है,

\[\text{परमाणु द्राप्तर्व (g mol}^{-1}\text{)} : N = 14, \text{Ar} = 40 \text{ उपयोग कीजिए} \]

1. 18 bar
2. 9 bar
3. 12 bar
4. 15 bar

177. निम्नलिखित में से कौन-सा कार्बन मोनोक्साइड के लिए सही नहीं है?

1. यह अपूर्ण दहन के कारण उत्पन्न होती है।
2. यह कार्बोक्सीहीमोग्लोबिन बनाती है।
3. यह रक्त को ऑक्सीजन बांधन घोटाला को घटा देती है।
4. कार्बोक्सीहीमोग्लोबिन (CO से बृद्धित हीमोग्लोबिन), ऑक्सीहीमोग्लोबिन से अस्थायी होता है।

174.  

<table>
<thead>
<tr>
<th>Oxide</th>
<th>Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) CO</td>
<td>(i) Basic</td>
</tr>
<tr>
<td>(b) BaO</td>
<td>(ii) Neutral</td>
</tr>
<tr>
<td>(c) Al₂O₃</td>
<td>(iii) Acidic</td>
</tr>
<tr>
<td>(d) Cl₂O₇</td>
<td>(iv) Amphoteric</td>
</tr>
</tbody>
</table>

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)

175. 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

176. A mixture of N₂ and Ar gases in a cylinder contains 7 g of N₂ 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 N₂ is : 

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

1. 18 bar
2. 9 bar
3. 12 bar
4. 15 bar

177. 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.
178. 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

179. 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]

180. 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$_2$S gas
Space For Rough Work
रफ कार्य के लिए जगह / Space For Rough Work
**निम्नलिखित निर्देश ध्यान से पढ़ें:**

<table>
<thead>
<tr>
<th>हिंदी</th>
<th>English</th>
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</thead>
<tbody>
<tr>
<td>1. पूरे जाने पर प्रत्येक परीक्षार्थी, निरीक्षक को अपना प्रवेश-पत्र दिखाए।</td>
<td>1. Each candidate must show on demand his/her Admit Card to the Invigilator.</td>
</tr>
<tr>
<td>2. अधीक्षक या निरीक्षक को विशेष अनुमति के बिना कोई परीक्षार्थी अपना स्थान न छोड़े।</td>
<td>2. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.</td>
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<tr>
<td>3. कार्यस्थल निरीक्षक को अपना उत्तर पत्र दिए बिना एवं उपस्थिति-पत्रक पर दुबारा हस्ताक्षर किए बिना कोई परीक्षार्थी परीक्षा हॉल नहीं छोड़ें। यदि किसी परीक्षार्थी ने दूसरी बार उपस्थिति-पत्रक पर हस्ताक्षर नहीं किए तो वह माना जाएगा कि उसने उत्तर पत्र नहीं लौटाया है और वह अनुचित साधन का मामला माना जाएगा।</td>
<td>3. 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. <strong>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.</strong></td>
</tr>
<tr>
<td>4. इलेक्ट्रॉनिक/हस्तचालित परिकल्प का उपयोग बंद रखिए।</td>
<td>4. Use of Electronic/Manual Calculator is prohibited.</td>
</tr>
<tr>
<td>5. परीक्षा-हॉल में आचरण के लिए परीक्षार्थी, परीक्षा के नियमों एवं विनियमों द्वारा नियमित हैं। अनुचित साधन के सभी मामलों का फैसला इस परीक्षा के नियमों एवं विनियमों के अनुसार होगा।</td>
<td>5. 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.</td>
</tr>
<tr>
<td>6. किसी हालत में परीक्षा पुरस्का और उत्तर पत्र का कोई भाग अलग न बनाएं।</td>
<td>6. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.</td>
</tr>
<tr>
<td>7. परीक्षा पुरस्का / उत्तर पत्र में दिए गए परीक्षा पुरस्का संकेत को परीक्षार्थी सही तरीके से उपस्थिति-पत्र में लिखें।</td>
<td>7. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.</td>
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