14/04/2023

Phase-1
CODE-B

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FINAL TEST SERIES for NEET-2023

MM : 720 **Test-8** **Time : 3 Hrs. 20 Mins.**

Topics covered :

Physics : Dual Nature of Radiation and Matter, Atoms, Nuclei, Semiconductor Devices

Chemistry : Amines, Biomolecules, Polymers, Chemistry in Everyday Life

Botany : Ecosystem, Biodiversity and Conservation, The Environmental Issues

Zoology : Biotechnology: Principles and Processes, Biotechnology and Its Applications

Instructions for Paper (ΣXIVIVT8β) :

(i) There are two sections in each subject, i.e., Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
(ii) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.
(iii) Use blue/black ballpoint pen only to darken the appropriate circle.
(iv) Mark should be dark and completely fill the circle.
(v) Dark only one circle for each entry.
(vi) Dark the circle in the space provided only.
(vii) Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet. (ΣXIVIVT8β)

PHYSICS

Choose the correct answer :

SECTION - A

1. The energy of a photon possessing wavelength 6200 Å is nearly

(1) 22 eV (2) 16 eV
(3) 1 eV (4) 2 eV

2. The maximum velocity of electrons emitted from a metal surface is v. If the frequency of the incident light is increased to six times the initial frequency, then the maximum velocity of the emitted photo electron will be

(1) Greater than $2v$
(2) Less than v
(3) Less than $2v$
(4) Equal to $2v$

3. The angular momentum of an electron in Bohr's H-atom whose kinetic energy is 3.4 eV, will be

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

4. For the n-type semiconductors (symbols have their usual meanings)

(1) $n_e = n_h$
(2) $n_e > n_h$
(3) $n_e < n_h$
(4) $n_e^2 < n_h^3$

5. Which of the following statements is correct about photons?

(1) Momentum of the photon is $\frac{h}{2\lambda}$

(2) Rest mass of the photon is zero

(3) Photon exert no pressure

(4) Energy of the photon is zero

6. The speed of electrons in second orbit of Be^{+3} ion will be

(1) $\frac{c}{137}$ (2) $\frac{4c}{137}$

(3) $\frac{c}{274}$ (4) $\frac{2c}{137}$

7. If R is Rydberg constant for hydrogen, then the wave number of the first line in the Lyman series is

(1) $\frac{3R}{4}$ (2) $\frac{R}{2}$

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

8. An atom emits a spectral line of wavelength λ when an electron makes a transition between levels of energy E_1 and E_2. The correct relation among the following is

(1) $\lambda = \frac{hc}{E_1 - E_2}$ (2) $\lambda = \frac{hc}{E_1 + E_2}$

(3) $\lambda = \frac{2hc}{E_1 - E_2}$ (4) $\lambda = \frac{2hc}{E_1 + E_2}$

9. When an electron jumps from $n = 2$ to $n = 1$, the momentum of recoiled hydrogen atom will be

(1) 5.45×10^{-27} kg m s^{-1} (2) 6.5×10^{-27} kg m s^{-1}

(3) 4.2×10^{-26} kg m s^{-1} (4) 2.1×10^{-27} kg m s^{-1}

10. The ratio of maximum to minimum possible radiation energy in Bohr's hypothetical hydrogen atom is equal to

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

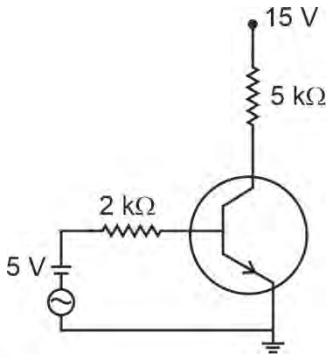
(3) $\frac{3}{2}$ (4) 2

11. For bipolar junction transistor, if $\frac{I_C}{I_E} = x$, $\frac{I_C}{I_B} = y$ and $\frac{I_E}{I_B} = z$, then correct relation among them is

(1) $z = y + 1$ (2) $\frac{1}{x} = \frac{1}{y} + 1$

(3) $y = 1 - \frac{1}{z}$ (4) Both (1) and (2)

12. If the current gain of *CE* amplifier shown below is β, then transconductance of the amplifier is



(1) $\beta\ \Omega^{-1}$ (2) $\frac{\beta}{2}\ \Omega^{-1}$

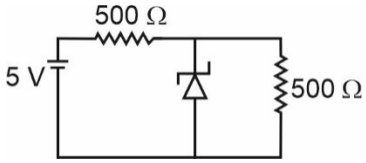
(3) $\frac{\beta}{2} \times 10^{-3}\ \Omega^{-1}$ (4) $\beta \times 10^{-3}\ \Omega^{-1}$

13. A p-n photodiode is manufactured from a semiconductor with E_g = 2.4 eV. Which among the following wavelengths can be detected by it?

(1) 5000 Å (2) 5000 nm

(3) 5500 Å (4) Both (1) and (3)

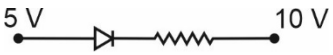
14. A zener diode of breakdown voltage V_Z = 10 V is used in voltage regulator circuit as shown in the figure. The current through the diode will be

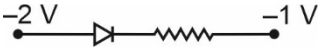


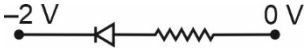
(1) 5 mA (2) 2.5 mA

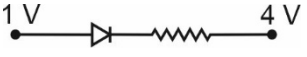
(3) 20 mA (4) Zero

15. Among the following, which diode is forward biased?

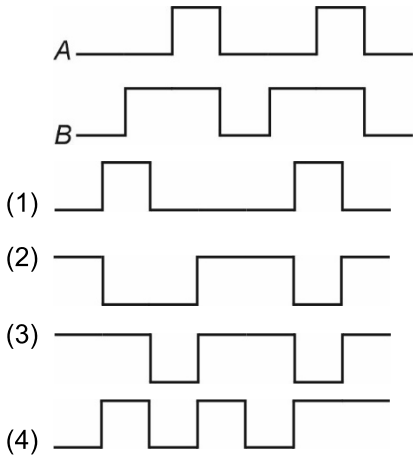
(1) 

(2) 

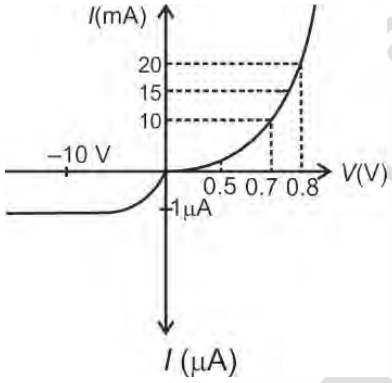
(3) 

(4) 

16. The input waveforms are shown below which are applied at the input of NAND gate. The correct output waveform will be



17. The *V-I* characteristics of a silicon diode is as shown in the figure. The ratio of resistance at I_D = 15 mA to resistance at V_D = –10 V is nearly



(1) 10^6 (2) 10^{-6}

(3) 10 (4) 0.1

18. The input signal given to a CE amplifier having a voltage gain of 100 is $V_i = 4\sin\left(100\pi t + \frac{\pi}{4}\right)$. The corresponding output signal will be

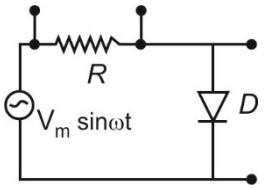
(1) $400\sin\left(100\pi t + \frac{\pi}{4}\right)$

(2) $400\sin\left(100\pi t + \frac{5\pi}{4}\right)$

(3) $0.04\sin\left(100\pi t + \frac{\pi}{4}\right)$

(4) $0.04\sin\left(100\pi t + \frac{3\pi}{4}\right)$

19. A half wave rectifier is shown in the figure. Choose the correct statement(s)



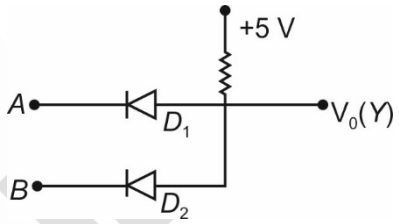
(1) The output across diode will be zero all time

(2) Output across diode *D* will be like a half wave rectifier with negative cycle in output

(3) Output across resistance *R* will be like a half wave rectifier with positive cycle in output

(4) Both (2) and (3)

20. The truth table for the circuit shown in the figure will be



(1)

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

(2)

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

(3)

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

(4)

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

21. The ratio of angular speed to the tangential speed of electron in n^{th} orbit of hydrogen atom is

(1) Directly proportional to n^2

(2) Directly proportional to n^4

(3) Inversely proportional to n^2

(4) Independent of *n*

22. A deuteron strikes $_8O^{16}$ nucleus with the subsequent emission of an α particle. The atomic number and mass number of element produced will be respectively

(1) 7, 16 (2) 7, 15

(3) 7, 14 (4) 8, 15

23. The half life of a radioactive isotope X is 100 years. It decays to another element Y which is stable. The two elements X and Y were found to be in the ratio 1 : 31 in a sample of a given rock. The age of rock was estimated to be

(1) 200 years (2) 400 years

(3) 1000 years (4) 500 years

24. In a radioactive material the activity at time $t_1 = \frac{1}{2\lambda}$ is A_1 and at later time $t_2 = \frac{1}{\lambda}$, is A_2 where λ is decay constant of the material. The relation between A_1 and A_2 is

(1) $A_2 = A_1 e^{1/2}$ (2) $A_2 = A_1 e^{-1/2}$

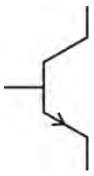
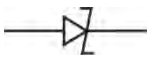
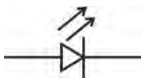
(3) $A_2 = A_1 e^{-3/2}$ (4) $A_2 = A_1 e^{3/2}$

25. The radius of a nuclide X is measured to be twice the radius of $^{9}_{4}Be$. The number of nucleons in nuclide X are

(1) 18 (2) 36

(3) 72 (4) 54

26. Column I contains symbols of semiconductor devices and column II contains their names. Match the column I with column II and choose the correct option.

	Column I		Column II
a.		(i)	Zener diode
b.		(ii)	*n*-*p*-*n* transistor
c.		(iii)	*p*-*n*-*p* transistor
d.		(iv)	Light emitting diode

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

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

27. The $_{92}U^{238}$ nucleus, hypothetically undergoes successively 9α and $8\beta^-$ decays. The resulting nucleus will be

(1) $_{82}Pb^{202}$ (2) $_{82}Pb^{220}$

(3) $_{94}Pu^{238}$ (4) $_{93}Np^{232}$

28. In one mean life

(1) Half of the initial nuclei will decay

(2) More than half of the initial nuclei will decay

(3) Less than half of the initial nuclei will decay

(4) All the active nuclei will decay

29. A radioactive sample has 1.6×10^{18} radioactive nuclei at a certain instant. After three half lives the number of nuclei that will remain undecayed is

(1) 2×10^{18} (2) 5×10^{18}

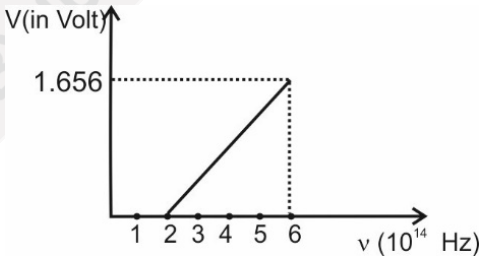
(3) 2×10^{17} (4) 4×10^{17}

30. If R is the radius of a nucleus and A is mass number, then the plot of $\ln(R/R_0)$ versus $\ln(A)$ will be

(1) An ellipse (2) A straight line

(3) A parabola (4) A hyperbola

31. The plot of stopping potential (V) and frequency (ν) of the light incident in an experiment on photoelectric effect is shown in the figure. The ratio (h/e) will come out



(1) 4.14×10^{-15} V s (2) 2.07×10^{-15} V s

(3) 8.28×10^{-15} V s (4) 2.58×10^{-14} V s

32. If the momentum of an electron is changed by Δp, then the de-Broglie wavelength associated with it changes by 0.2%. The initial momentum of the electron will be

(1) $500\Delta p$ (2) $200\Delta p$

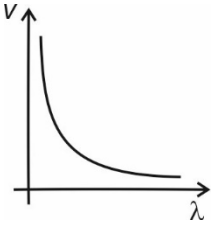
(3) $\frac{\Delta p}{500}$ (4) $\frac{\Delta p}{200}$

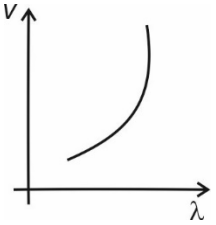
33. Better material for solar cells is

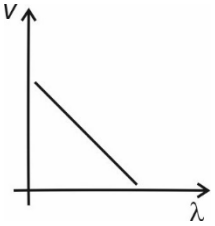
(1) Si (2) GaAs

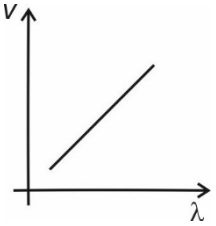
(3) CdSe (4) PbS

34. Which of the following graph represent the variation of speed of proton and the associated de-Broglie wavelength?

(1) 

(2) 

(3) 

(4) 

35. A very heavy nucleus having mass number $A = 240$ is having

(1) Lower binding energy as compared to that of a nucleus with $A = 120$

(2) Lower binding energy per nucleon as compared to that of a nucleus with $A = 120$

(3) Same binding energy per nucleon as compared to that of a nucleus with $A = 120$

(4) Both (1) and (3) are correct.

SECTION - B

36. Among the following, for which transition of a hydrogen atom, photon of lowest wavelength are emitted?

(1) $n = 2$ to $n = 1$ (2) $n = 4$ to $n = 3$

(3) $n = 3$ to $n = 1$ (4) $n = 4$ to $n = 1$

37. The velocity of an electron revolving in n^{th} orbit of a hydrogen atom is given by $\frac{cn^p}{K}$, where c is speed of light, then value of K and p is

(1) $K = 137, p = 1$ (2) $K = 137, p = -1$

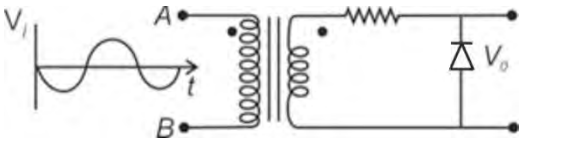
(3) $K = 274, p = 2$ (4) $K = 274, p = -1$

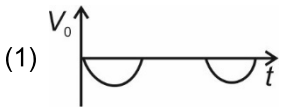
38. M_x and M_y denote the atomic masses of the parent and daughter nuclei respectively in radioactive decay. The Q value for β^+ decay is Q_0. If m_e denotes the mass of an electron, then value of Q_0 is

(1) $\left(M_x - M_y\right)c^2$ (2) $\left(M_x - M_y - 2m_e\right)c^2$

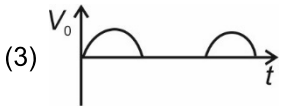
(3) $\left(M_x - M_y + m_e\right)c^2$ (4) $\left(M_x - M_y + 2m_e\right)c^2$

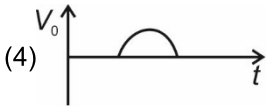
39. A 220 V ac supply is connected between the two points A and B as shown in the figure. The output waveform (qualitative) across the diode is



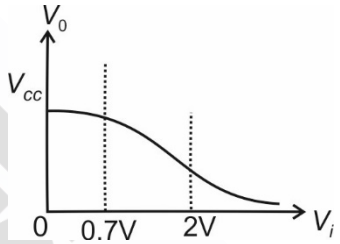
(1) 

(2) 

(3) 

(4) 

40. Figure below shows the transfer characteristics of a CE amplifier. Choose the false statement.



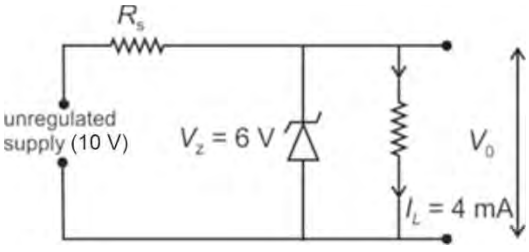
(1) At $V_i = 0.5$ V, transistor is in cut off (switch off) mode

(2) At $V_i = 1$ V, it can be used as an amplifier

(3) At $V_i = 2.5$ V transistor is in cut off mode

(4) At $V_i = 2.2$ V, transistor is in saturation (switch ON) mode

41. In a Zener regulated power supply, a Zener diode with $V_z = 6.0$ V, $I_z = 5I_L$ is used for regulation. The load current is to be 4.0 mA and the unregulated input is 10 V, as shown in the figure. The value of series resistance R_s required will be approximately



(1) 167 Ω

(2) 200 Ω

(3) 267 Ω

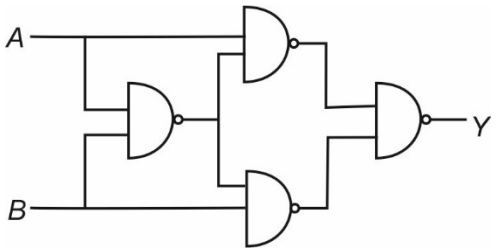
(4) 367 Ω

42. Hydrogen atom from excited state comes to the ground state by emitting a photon of wavelength λ. If R is Rydberg constant, the principal quantum number n of the excited state is

(1) $\sqrt{\frac{\lambda}{\lambda R-1}}$ (2) $\sqrt{\frac{\lambda R}{\lambda R-1}}$

(3) $\sqrt{\frac{\lambda R-1}{\lambda R}}$ (4) $\sqrt{\frac{\lambda R}{R-1}}$

43. The output (Y) of the logic circuit shown in the figure will be.



(1) $AB + A\bar{B}$ (2) $\bar{A}B + A\bar{B}$

(3) $AB + \bar{A}\bar{B}$ (4) $A + B$

44. A radio transmitter operates at a frequency 990 kHz and power of 10 kW. The number of photons emitted per second is

(1) 1.53×10^{31} (2) 6.6×10^{34}

(3) 1.53×10^{-31} (4) 8.8×10^{30}

45. Zener diode can be used

(1) As voltage regulator (2) As amplifier

(3) As oscillator (4) All of these

46. Given below are two statements one is labelled as assertion (A) and other is labelled as reason (R).

Assertion (A): The conductivity of a pure semiconductor increases on doping.

Reason (R): The conductivity of a pure semiconductor decreases on increasing the temperature.

In light of the above statements, choose the most appropriate answer from the options given below.

(1) Both (A) and (R) are correct and (R) is correct explanation of (A).

(2) Both (A) and (R) are correct and (R) is not the correct explanation of (A).

(3) (A) is correct but (R) is incorrect.

(4) (A) is incorrect but (R) is correct.

47. When a hydrogen atom is raised from first excited state to 2nd excited state, then

(1) Both *KE* and *PE* increases

(2) Both *KE* and *PE* decreases

(3) *PE* increases and *KE* decreases

(4) *KE* increases and *PE* decreases

48. Ionisation energy for hydrogen atom in the ground state is E. The ionisation energy of Li^{++} atom in the 2nd excited state is

(1) E (2) $3E$

(3) $6E$ (4) $9E$

49. Choose the incorrect statement.

(1) In forward biased p-n junction, barrier potential decreases

(2) In *CE* amplifier, input and output signals are out of phase

(3) For sustained oscillation, $A\beta = 1$, where A is open loop gain and β is feedback ratio

(4) Depletion width of p-n junction increases with increase in doping concentration

50. If E_1, E_2, E_3 and E_4 are energy of first, second, third and fourth orbit of H-atom respectively, then correct order of energy difference is

(1) $E_2 - E_1 < E_3 - E_2 < E_4 - E_3$

(2) $E_4 - E_3 < E_3 - E_2 < E_2 - E_1$

(3) $E_2 - E_1 = E_3 - E_2 = E_4 - E_3$

(4) $E_3 - E_2 < E_4 - E_3 < E_2 - E_1$

CHEMISTRY

SECTION - A

51. Correct order of basic strength of the given amines in aqueous medium is

(1) $CH_3NH_2 > (CH_3)_3N > (CH_3)_2NH$

(2) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

(3) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$

(4) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$

52. Number of chiral carbon atoms in α-D-(+)-glucopyranose is

(1) 4 (2) 5

(3) 6 (4) 3

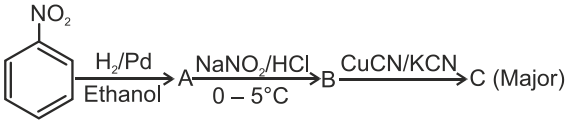
53. Monomer of orlon is

(1) Isoprene (2) Acrylonitrile

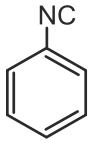
(3) Vinyl chloride (4) Tetrafluoroethene

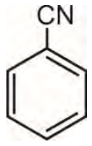
54. Pernicious anaemia is caused by the deficiency of
(1) Thiamine (2) Riboflavin
(3) Cyanocobalamine (4) Pyridoxine

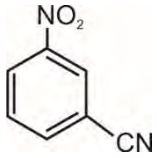
55. Consider the following reaction sequence:

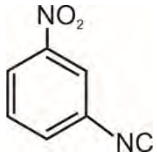


Major product C is

(1) 

(2) 

(3) 

(4) 

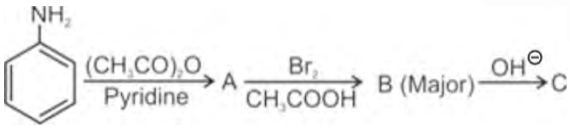
56. Which among the following is not an essential amino acid ?
(1) Lysine (2) Tryptophan
(3) Serine (4) Arginine

57. Caprolactam is the monomer of
(1) Terylene (2) Nylon-6,6
(3) Nylon-6 (4) Teflon

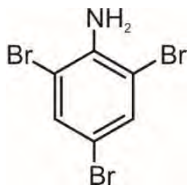
58. Sweetest compound among the following is
(1) Aspartame (2) Sucrose
(3) Sucralose (4) Alitame

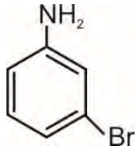
59. Cimetidine is used as an
(1) Antacid (2) Antihistamine
(3) Analgesic (4) Antibiotic

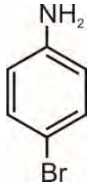
60. Consider the following reaction sequence

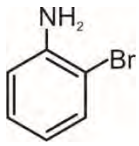


Product (C) is

(1) 

(2) 

(3) 

(4) 

61. Antifertility drug among the following is
(1) Novestrol
(2) Chloramphenicol
(3) Salvarsan
(4) Phenelzine

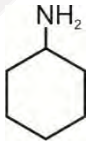
62. Which among the following is a purine base?
(1) Adenine (2) Cytosine
(3) Thymine (4) Uracil

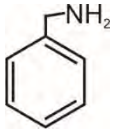
63. Which of the following statements is incorrect?
(1) Formalin is used to preserve biological specimens
(2) Paracetamol is a narcotic analgesic
(3) Barbiturates are hypnotic
(4) Aspirin has anti blood clotting action

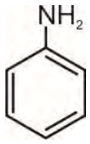
64. Which polymer is formed by heating novolac with formaldehyde?
(1) Bakelite (2) Glyptal
(3) PVC (4) Polystyrene

65. When benzamide is treated with Br_2/NaOH then the product obtained is
(1) Benzylamine (2) Aniline
(3) Benzyl alcohol (4) Benzaldehyde

66. Which among the following is not obtained by Gabriel phthalimide synthesis?

(1) 

(2) 

(3) 

(4) 

67. The incorrect statement among the following is
(1) Ethylmethylamine and Isopropylamine can be chemically distinguished by Hinsberg's reagent
(2) Benzenediazonium chloride forms benzene on reaction with ethanol
(3) Arenediazonium salt is more stable than alkyl diazonium salt
(4) Benzenediazonium chloride is water insoluble

68. Heating of primary aliphatic amine with chloroform and alcoholic potash results in the formation of

(1) Isocyanide (2) Nitroalkane

(3) Haloalkane (4) Nitrile

69. Glucose does not react with which of the following reagents?

(1) Tollen's reagent (2) NH_2OH

(3) $NaHSO_3$ (4) Br_2/Water

70. Nitrobenzene on reaction with zinc in presence of NaOH forms

(1) Azobenzene (2) Hydrazobenzene

(3) Aniline (4) Azoxybenzene

71. Consider the following statements:

Statement I : Direct nitration of aniline yields only meta-nitroaniline as the major product.

Statement II : In strongly acidic medium, aniline is protonated to form anilinium ion which is meta directing.

In the light of above statements, choose the correct option.

(1) Both the statements I and II are correct

(2) Statement I is correct and statement II is incorrect

(3) Statement I is incorrect and statement II is correct

(4) Both the statements I and II are incorrect

72. Consider the following polymers

(i) Nylon-2-nylon-6

(ii) PHBV

(iii) Buna-S

Which of the above polymers is/are biodegradable?

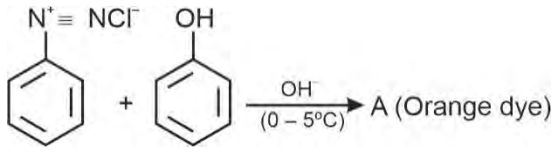
(1) Only (ii)

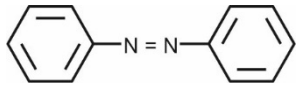
(2) Only (i) and (iii)

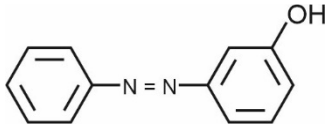
(3) Only (i) and (ii)

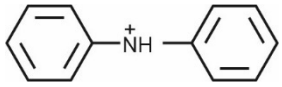
(4) (i), (ii) and (iiii)

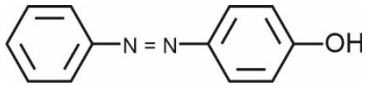
73. In the following reaction, the product 'A' is



(1) 

(2) 

(3) 

(4) 

74. Iodobenzene can be prepared by the reaction of benzene diazonium chloride with

(1) Cu/HI (2) Cu_2I_2/HI

(3) KI (4) H_3O^+/I_2

75. Structure of proteins which gets destroyed during denaturation is/are

(1) Primary and secondary structures

(2) Secondary and tertiary structures

(3) Tertiary structure only

(4) Primary, secondary and tertiary structures

76. All of the following are polysaccharides, except

(1) Starch (2) Cellulose

(3) Galactose (4) Glycogen

77. An example of optically inactive amino acid is

(1) Alanine (2) Glycine

(3) Valine (4) Leucine

78. Among the following broad-spectrum antibiotic(s) is/are

(1) Ampicillin and Amoxycillin

(2) Penicillin G and Ampicillin

(3) Amoxycillin and Penicillin G

(4) Penicillin G

79. Which of the following will react to produce non-ionic detergent?

(1) Stearic acid and alkali

(2) Dodecyl benzene sulphonic acid and alkali

(3) Lauryl alcohol and sulphonic acid

(4) Stearic acid and polyethylene glycol

80. An example of antihistamine is

(1) Bithional (2) Seldane

(3) Prontosil (4) Norethindrone

81. One phosphodiester linkage joins

(1) 2-amino acids (2) 2-nucleosides

(3) 2-nucleotides (4) 2-monosaccharides

82. Which of the following is not an elastomer?

(1) Buna-S (2) Polystyrene

(3) Buna-N (4) Neoprene

83. Consider the following statements:

Statement I: Drug binding to receptor site and inhibits its natural action is called agonist.

Statement II: Drug that mimic the natural messenger by switching on the receptor is called antagonist.

In the light of above statements, choose the correct option.

(1) Both the statements I and II are correct

(2) Both the statements I and II are incorrect

(3) Statement I is correct and statement II is incorrect

(4) Statement I is incorrect and statement II is correct

84. Choose the incorrect match.

(1) Keratin – Fibrous protein

(2) Insulin – Globular protein

(3) Albumin – Fibrous protein

(4) Myosin – Fibrous protein

85. Condensation polymer among the following is/are

(1) Polythene and Polystyrene

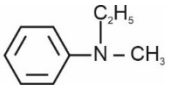
(2) Nylon-6, 6 and Teflon

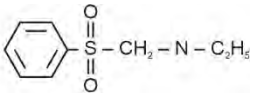
(3) Nylon-6, 6 only

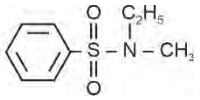
(4) Orlon only

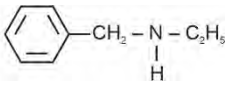
SECTION - B

86. An amine 'X' with the molecular formula C_3H_9N reacts with benzene sulphonyl chloride to form a white precipitate. The white precipitate 'Y' is insoluble in aqueous alkali. Identify the amine X and the chemical formula of insoluble precipitate Y.

(1) $X = CH_3CH_2CH_2NH_2$; $Y \Rightarrow$ 

(2) $X = CH_3-CH_2-NH-CH_3$; $Y \Rightarrow$ 

(3) $X = CH_3CH_2NHCH_3$; $Y \Rightarrow$ 

(4) $X = (CH_3)_3N$; $Y \Rightarrow$ 

87. **Assertion:** Amines are basic in nature while amides are neutral.

Reason: $R-\overset{\overset{O}{\|}}{C}-$ group in amides is electron withdrawing while alkyl group in amines is electron releasing.

(1) Both assertion and reason are correct and reason is the correct explanation of assertion

(2) Both assertion and reason are correct but reason is not the correct explanation of assertion

(3) Assertion is correct but reason is incorrect

(4) Both assertion and reason are incorrect

88. Choose the incorrect statements from the following.

(1) Product of sulphonation of aniline can exists as a zwitter ion

(2) Aniline does not undergo Friedel craft reaction

(3) Tertiary amines do not undergo acylation

(4) Carbon-nitrogen bond length in aromatic amines is more than that in aliphatic amines

89. Cross linked polymer among the following is

(1) Melamine formaldehyde polymer

(2) Polyvinyl chloride

(3) Low density polythene

(4) Polyesters

90. The compound which will not reduce Fehling's solution is

(1) D-Glucose (2) D-Fructose

(3) (+) Lactose (4) (+) Sucrose

91. Incorrect statement among the following is

(1) Glycogen is known as animal starch

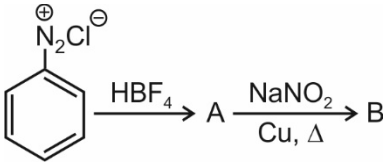
(2) Cellulose is composed of only β-D-glucose units

(3) Amylopectin is insoluble in water

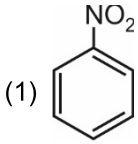
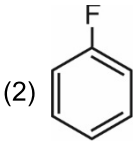
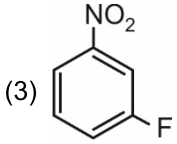
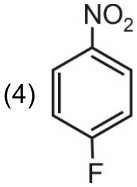
(4) Amylose is branched chain polymer of α-D-glucose units

92. An example of condensation polymer is
(1) Teflon (2) Polyacrylonitrile
(3) Dacron (4) Polythene

93. Consider the following reactions



Product B is

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

94. Which among the following is a water-soluble vitamin?
(1) Vitamin A
(2) Vitamin E
(3) Vitamin C
(4) Vitamin D

95. Incorrect statement among the following is
(1) Sugar component of DNA is β-D-2-deoxyribose
(2) Guanine is absent in DNA
(3) In DNA molecule, adenine forms hydrogen bond with thymine
(4) Nucleoside does not contain phosphate group

96. Match the following columns and choose the correct option.

	Column I	Column II
a.	Iproniazid	(i) Artificial sweetener
b.	Sorbic acid	(ii) Tranquilizer
c.	Aspartame	(iii) Antioxidant
d.	BHT	(iv) Food preservative

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

97. Natural rubber is
(1) cis -1, 4-polychloroprene
(2) 2 - Methyl - 1, 3-polybutadiene
(3) 2-chloro-1, 3-polybutadiene
(4) cis-1, 4-polyisoprene

98. The monomers of glyptal are
(1) Ethylene glycol and benzoic acid
(2) Glycerol and formaldehyde
(3) Formaldehyde and phthalic acid
(4) Ethylene glycol and phthalic acid

99. A mixture of terpineol and chloroxylenol acts as
(1) Analgesic (2) Antiseptic
(3) Antibiotic (4) Antipyretic

100. Which of the following hormones is iodinated derivative of tyrosine?
(1) Insulin
(2) Thyroxin
(3) Epinephrine
(4) Adrenaline

BOTANY

SECTION - A

101. Sedimentary nutrient cycle is
(1) Nitrogen cycle
(2) Carbon cycle
(3) Sulphur cycle
(4) Oxygen cycle

102. In terrestrial ecosystems, much larger fraction of energy flows through (i) than through (ii) .
Select the **correct** option for (i) and (ii).

	(i)	(ii)
(1)	Predator food chain	Saprophytic food chain
(2)	Detritus food chain	Grazing food chain
(3)	Parasitic food chain	Auxillary food chain
(4)	Detritus food chain	Saprophytic food chain

103. Plants capture
(1) 50% of incident solar radiation
(2) 60 % of photosynthetically active radiation
(3) 2 – 10% of PAR
(4) 10 – 20% of incident solar radiation

104. 'EcoSan' toilets
(1) Are working majorly in Delhi and Kerala
(2) Use a lot of water and are hygienic
(3) Are dry composting toilets working in many areas of Sri Lanka
(4) Increases the usage of chemical fertilizers

105. Pioneer community in xerarch succession are
(1) Phytoplanktons (2) Lichens
(3) Zooplanktons (4) Shrubs

106. Ozone which is harmful for human is formed in
(1) Upper atmosphere (2) Stratosphere
(3) Exosphere (4) Troposphere

107. Select the statements which are **not** true w.r.t. ecological succession.
(a) Composition and structure of communities change in response to change in environmental conditions.
(b) Degree of diversity decreases during ecological succession.
(c) Primary succession occurs in areas, like cut forests.
(d) Vegetational changes does not affect food and shelter of various types of animals.
(1) (a) and (b) (2) (a), (c) and (d)
(3) (b), (c) and (d) (4) (b) and (d) only

108. Select the correct sequence of various greenhouse gases in descending order w.r.t. contribution in total global warming.
(1) $N_2O > CFCs > CH_4 > CO_2$
(2) $CO_2 > CH_4 > CFC > N_2O$
(3) $CH_4 > CFCs > CO_2 > N_2O$
(4) $CFC > CH_4 > CO_2 > N_2O$

109. Select the **incorrect** match from the following.
(1) Scavenger – Vulture
(2) Detritivore – Termite
(3) Parasite – Mosquito
(4) Saprotroph – Fungi

110. The 'rivet popper hypothesis' explains
(1) Important causes of species extinction
(2) Conservation of threatened species
(3) Utilitarian services provided by ecosystem
(4) Importance of species diversity in an ecosystem

111. Since the origin and diversification of life on earth, there were how many episodes of mass extinction of species?
(1) Five (2) Three
(3) Four (4) Six

112. Enumeration of prokaryotic species are difficult due to all of the following reasons, **except**
(1) Microbial species are not culturable under laboratory conditions
(2) They play a very insignificant role in ecosystem
(3) If we follow molecular criteria to determine the species, then their diversity alone becomes in billions
(4) Conventional taxonomic methods are not suitable for identifying the microbial species

113. If we consider the different animal like birds (B), reptiles (R), fishes (F) and mammals (M), the **correct** order for their number of species in Amazonian rain forest will be
(1) F > M > R > B (2) B > M > F > R
(3) B > F > M > R (4) F > B > M > R

114. Which among the following is not a key criteria for determining a hot spot?
(1) High species richness
(2) High degree of endemism
(3) High level of economical development
(4) High degree of threat

115. Species-Area relationship was described by
(1) Paul Ehrlich
(2) Robert May
(3) Alexander von Humboldt
(4) Edward Wilson

116. The tribal people are mainly residing and showing activities in which zone of the Biosphere reserve?
(1) Natural zone (2) Core zone
(3) Buffer zone (4) Transition zone

117. To conserve the biodiversity, on-site conservation strategies are used. It includes
(1) Home gardens (2) Seed bank
(3) Cryopreservation (4) Biosphere reserve

118. What percentage of the mammal species are facing the worldwide threat of extinction?
(1) 12% (2) 23%
(3) 32% (4) 31%

119. Match the column I with column II and choose the correct option.

	Column I		Column II
a.	Quagga	(i)	Extinct species of Russia
b.	Dodo	(ii)	Extinct species of Africa
c.	Steller's sea cow	(iii)	Extinct species of Mauritius
d.	Thylacine	(iv)	Extinct species of Australia

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

120. Which of the following features is **not** associated with humus?
(1) Reservoir of nutrients
(2) Easily decomposed by microbial action
(3) Amorphous and slightly acidic
(4) Colloidal and dark coloured

121. The scrubbers installed in industries to remove SO_2 pollutant from the exhaust gases involves use of
(1) $CaCO_3$ (2) $MgSO_4$
(3) SiO_2 (4) $CaSO_4$

122. Which of the following statements is **correct** w.r.t. decomposition of detritus?
(1) It is an anaerobic process
(2) Fragmentation and leaching of detritus occur simultaneously
(3) Rate of decomposition is enhanced in excessive moisture
(4) Chemical nature of detritus does not affect decomposition process

123. To safeguard our Water resources, the Government of India has passed the Water (Prevention and Control of Pollution) Act in
(1) 1974 (2) 1980
(3) 1954 (4) 2000

124. (a) Trophic level represents a/an (A) , not a species as such.
(b) Most limiting nutrient of marine ecosystem is (B) .
Select correct option for 'A' and 'B'.

	(A)	(B)
(1)	Organism	Carbon
(2)	Functional level	Nitrogen
(3)	Stratification	Phosphorus
(4)	Population	Oxygen

125. Mark the **correctly** matched option.

(1)	Excessive growth of planktonic algae	–	Pure water body	– High BOD
(2)	Low BOD	–	Lake with low organic matter	– BOD is less than 1500 mg/L
(3)	Particulates with 2.5 micrometer size	–	Least harmful for human health	– Are easily settleable particulate matter
(4)	DDT and aldrin	–	Major role in eutrophication	– Can lead to mutations

126. Major conduit of energy flow in a river is
(1) Grazing food chain
(2) Detritus food chain
(3) Parasitic food chain
(4) Auxiliary food chain

127. Select the **odd one** w.r.t. persons related with conservation of forest.
(1) Amrita Devi
(2) Chandi Prasad Bhatt
(3) Ahmed Khan
(4) Sundar Lal Bahuguna

128. Below given are characteristic features of
a. High productivity and lack of self regulatory mechanism.
b. Simple food chain.
c. Low biodiversity and little cycling of nutrients.
(1) Forests (2) Ocean
(3) Crop fields (4) Grassland

129. Read the given statements and select the option for **correct** ones.
(A) Value of NPP is considerably higher than GPP.
(B) Desert and deep sea are the most productive ecosystems.
(C) Primary productivity in the ecosystem is expressed in terms of weight as (g m^{-2}) yr^{-1}
(D) Annual NPP of whole biosphere is approximately 170 billion tons of fresh weight of organic matter.
(E) The major site of decomposition is bottom of water bodies in aquatic ecosystem.
(1) (A) and (B) (2) (B), (C) and (D)
(3) (C) and (E) (4) (C) and (D)

130. Mark the option stating the **incorrect** statements.
(i) Decomposers replenish the soil naturally with minerals that are essential for growth.
(ii) The carnivores which are not eaten by others are top carnivores.
(iii) Third order consumers are key industry animals.
(iv) Transducers convert solar energy into chemical energy.
(1) (ii) only
(2) (i) and (ii)
(3) (iii) only
(4) (iii) and (iv)

131. Select the **odd** one out w.r.t. hydrarch succession.
(1) Annual grass stage
(2) Scrub stage
(3) Reed-swamp stage
(4) Phytoplankton

132. Out of the total biodiversity hot spots in the world, three cover our country. One among those three is
(1) Aravali hills (2) Western ghats
(3) Eastern ghats (4) Jaintia hills

133. Which one of the following shows maximum genetic diversity in India?
(1) Rice in tropical and sub-tropical regions
(2) Mango in tropical region
(3) *Rauwolfia* in desert
(4) Maize in desert

134. Exploring molecular, genetic and species level diversity for products of economic importance is called
(1) Biofortification (2) Bioprospecting
(3) Biopiracy (4) Bioremediation

135. Read the given statements and mark the options stating **incorrect** one(s).
a. More seasonal and unpredictable environment accounts for greater biological diversity in tropics.
b. Co-extinction can be seen for host fish and its unique assemblage of parasites.
c. The whole ecosystem and its biodiversity at all levels can be protected by establishing a wildlife safari.
d. World ozone day is celebrated on 16th september.
(1) Only a (2) Only b
(3) All except c (4) Both a and c

SECTION - B

136. The process in which part of water-soluble substances present in decomposing detritus go down into the soil horizon by percolating water is called
(1) Humification (2) Fragmentation
(3) Catabolism (4) Leaching

137. Read the following statements and select the correct option.
(A) Nitrogen is in relatively inactive form when present in atmosphere.
(B) Water vapour can also contribute towards greenhouse effect.
(1) Only (A) is correct
(2) Only (B) is correct
(3) Both (A) and (B) are correct
(4) Both (A) and (B) are incorrect

138. Which element constitutes maximum percent of dry weight of organisms next to water and is majorly found in oceans?
(1) Carbon (2) Nitrogen
(3) Calcium (4) Phosphorus

139. In the following statements, statements of assertion (A) is followed by a statement of reason (R). Read them carefully and select the **correct** option.
(A) Ecosystem can support only a limited number of trophic levels.
(R) Dead biomass serves as an energy source for decomposers.
(1) Only (A) is correct
(2) Only (R) is correct
(3) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(4) Both (A) and (R) are correct and (R) is correct explanation of (A)

140. Loss of biodiversity in a region leads to
(1) High productivity
(2) High resistance to drought
(3) Decline in plant production
(4) Decreased variability of ecosystem processes

141. Mark the following statements as true **(T)** or false **(F)** and choose the **correct** option.
a. 10% law of Lindeman justify upright shape of pyramid of number.
b. Pyramid of biomass is upright in grassland ecosystem and a tree ecosystem.
(1) a(F), b(F) (2) a(T), b(F)
(3) a(F), b(T) (4) a(T), b(T)

142. Slope of regression (z) for frugivorous birds and mammals in the tropical forests of different continents is
(1) 0.6 (2) 0.1
(3) 1.15 (4) 0.2

143. Which of the following ecosystems is not operated by the energy of sun?
(1) Grassland ecosystem
(2) Pond ecosystem
(3) Desert
(4) Deep sea hydrothermal ecosystem

144. Degree of biodiversity decreases from
(1) Poles to equator
(2) Tropics to temperate areas
(3) High latitude to low latitude
(4) High altitude to low altitude

145. Mark the **incorrect** statement.
(1) Initially nuclear energy is considered as a polluting way for generating electricity
(2) IPCC periodically monitors atmospheric concentration of greenhouse gases
(3) FOAM is a group of citizens in Arcata responsible for integrated waste water treatment
(4) Bharat Stage II mass emission standards are no more applicable in any cities of India

146. Select the **incorrect** match.
(1) CNG – Cheaper than petrol and diesel
(2) Electrostatic precipitator – Uses $CaCO_3$ and electrode wires to remove pollutants
(3) Catalytic converters – Inactivated by leaded petrol
(4) Euro III-norms – Aimed to reduce sulphur to 50 ppm in petrol

147. All of the following are methods to reduce noise pollution **except**
(1) Delimitation of horn free zones around hospitals
(2) Use of sound absorbent materials
(3) Allowing 120 dB sound level of crackers
(4) Application of green muffler scheme

148. Thinning of egg shell and their premature breaking in hawks is due to
(1) Nutrient enrichment with nitrogen and phosphorus
(2) Low environmental temperature
(3) Higher concentration of DDT in the tissues at higher trophic levels
(4) Reduced BOD of water

149. Secondary air pollutants play role in
(1) Leaching of essential mineral
(2) Stone leprosy
(3) Photochemical smog
(4) Acid rain

150. It is very difficult for the pioneer community to get established in
(1) Abandoned farm lands
(2) Flooded land
(3) Cooled volcanic lava
(4) Cut forest

ZOOLOGY

SECTION - A

151. Elution is a process in RDT that involves
(1) Dyeing the DNA fragments with ethidium bromide
(2) Exposure of DNA fragments to UV radiation
(3) Extraction of separated fragments of DNA from agarose gel
(4) Separation of DNA fragments

152. The first recombinant DNA was synthesised using the native plasmid of
(1) *Pneumococcus pneumoniae*
(2) *Salmonella typhimurium*
(3) *Agrobacterium tumefaciens*
(4) *Escherichia coli*

153. The DNA fragments generated after restriction digestion can be separated by forcing them to move towards __A__ under an electric field through a matrix called __B__ as the DNA fragments are __C__ charged.

Select the option which correctly identifies A, B and C respectively.
(1) Agarose, anode, negatively
(2) Cathode, sea weeds, positively
(3) Cathode, agarose, positively
(4) Anode, agarose, negatively

154. PCR directly finds its application in the detection of all of the following, **except**
(1) Muscular dystrophy
(2) Pregnancy
(3) Cancer
(4) AIDS

155. Choose the **correct** match w.r.t. genes and restriction sites present in them in pBR322.
(1) amp^R – *Pst* I, *Pvu* II
(2) tet^R – *Bam* HI, *Sal* I
(3) *rop* – *Pvu* I
(4) *ori* – *Hind* III

156. Select the mismatch from the following.
(1) DNA ligase - Joins DNA fragments
(2) Exonuclease - Removes nucleotides from the ends of DNA
(3) Lysozyme - Breaks the cell wall of plants
(4) *Taq* DNA polymerase - Extends primers using nucleotides provided in PCR

157. A cation usually used to make the host cell competent is
(1) Ca^{2+} (2) Na^{+}
(3) Zn^{2+} (4) Mn^{2+}

158. A retrovirus **cannot**
(1) Be used as vector to transfer genes in humans
(2) Contain RNA as genetic material
(3) Transform cancerous cells into normal cells
(4) Be disarmed and is always pathogenic

159. Which of the following is used for amplification of nucleic acids?
(1) Gel electrophoresis (2) Bioreactor
(3) PCR (4) ELISA

160. A precursor of vitamin A can be obtained from
(1) Flavr Savr tomato
(2) Bt tomato
(3) Golden rice
(4) Bt rice

161. Downstream processing takes place
(1) During biosynthetic stage
(2) So that the product can be marketed
(3) To facilitate increased production of desired protein
(4) To ensure sterile conditions during manufacturing of desired product

162. If a gene of interest is inserted at *Sal*I site of pBR322 vector, then the host possessing this vector is
(1) Resistant to ampicillin
(2) Sensitive to ampicillin
(3) Resistant to tetracycline
(4) Sensitive to both ampicillin and tetracycline

163. The ultimate aim of RDT is to
(1) Cause genetic modification in the vector only
(2) Obtain a desirable protein in large quantities
(3) Cut off a protein coding gene from donor
(4) Produce large biomass of non-recombinants in a bioreactor

164. During cloning or multiplication of any alien piece of DNA in an organism, its replication is initiated at
(1) MCS
(2) *ori*
(3) Selectable marker
(4) Antibiotic resistance gene

165. A simple stirred tank bio-reactor comprises all of the following components, **except**
(1) Motor
(2) Flat bladed impeller
(3) Sparger
(4) Foam breaker

166. A palindrome in DNA is a sequence of base pairs that reads same on the two strands when orientation of reading is from
(1) 5′ → 3′ in one strand and 3′ → 5′ in other strand
(2) Only 5′ → 3′ in both the strands
(3) 3′ → 5′ in one strand and 5′ → 3′ in other strand
(4) 5′ → 3′ or 3′ → 5′ in both the strands

167. How many fragments will be generated if a linear dsDNA, possessing 3 restriction sites of *Hind* II, is cut by *Hind* II?
(1) Zero (2) One
(3) Three (4) Four

168. Sequence 'C' of the cloning vector is a sequence from where replication starts and any piece of DNA when linked to it can be made to replicate within the host cells.
Select the correct feature of sequence 'C'.
(1) It helps in identifying and eliminating non-transformants and selectively permitting the growth of transformants
(2) A cloning vector needs to have very few sequence 'C'
(3) It helps in making the bacterial cells competent to take up DNA
(4) It is responsible for controlling the copy number of linked DNA

169. Choose the **odd** one w.r.t type of ends produced after restriction enzyme digestion.
(1) *Sma* I (2) *Hind* III
(3) *Bam* HI (4) *Sal* I

170. A thermostable enzyme used in PCR is obtained from which of the following bacteria?
(1) *E. coli*
(2) *Thermus aquaticus*
(3) *Salmonella typhimurium*
(4) *Haemophilus influenzae*

171. The activated Bt toxin causes death of insect by
(1) Cell swelling and lysis
(2) Blocking oxygen transport
(3) Disrupting protein formation
(4) Neuronal breakdown

172. Commercially grown Bt cotton is resistant to
(1) Nematode infestation
(2) Insects
(3) Fungus infection
(4) Viruses

173. In 1983, Eli Lilly company prepared two DNA sequences corresponding to A and B chain of human insulin and introduced them in plasmids of

(1) *E.coli*

(2) *Thermus aquaticus*

(3) *Meloidogyne incognita*

(4) *Bacillus thuringiensis*

174. Which of the following proteins was obtained from the milk of Rosie?

(1) Human β - lactalbumin

(2) Human α - 1 - antitrypsin

(3) Human α - lactalbumin

(4) Human β - 1 - antitrypsin

175. The documented varieties of Basmati rice grown in India are

(1) 2,00,000 (2) 27,000

(3) 700 (4) 27

176. A probe is allowed to hybridise its complementary DNA in a clone of cells followed by detection using autoradiography. Which gene will appear on photographic film?

(1) Normal gene (2) Mutated gene

(3) Oncogene (4) Viral oncogene

177. Animals that have had their DNA manipulated to possess and express a foreign gene can be used for

a. Study of disease

b. Testing vaccine safety

c. Treatment of autoimmune diseases

d. Obtaining useful biological products

Select the option with **correct** set.

(1) a and b only (2) b and d only

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

178. A procedure used to produce pest resistant plants by using RNAi involves silencing of genes by the use of

(1) ds DNA (2) ss DNA

(3) ss RNA (4) ds RNA

179. Bt cotton is prepared to kill all of the following organisms, **except**

(1) Armyworms (2) Cotton bollworms

(3) Beetles (4) Roundworms

180. A permanent cure for a patient suffering from SCID could be

(1) Gene therapy in early embryonic stages

(2) Immunotherapy after attaining puberty

(3) Radiotherapy in fetal life

(4) Surgical intervention during infancy

181. The consequence of RNAi in tobacco plant is that

(1) Tumour occur in plant

(2) The nematode cannot survive in transgenic plants

(3) Parasite causes killing of host cells by secreting toxins

(4) Parasite cannot survive in a transgenic host expressing specific interfering DNA

182. Select the term used to refer to the use of bio-resources by multinational companies and other organisations without proper authorisation from the countries and people concerned without compensatory payment.

(1) Biopatenting (2) Bioethics

(3) Biopiracy (4) Bioweapon

183. Early diagnosis of presence of antigen or antibodies synthesised against the pathogen can be detected by

(1) Gel electrophoresis (2) ELISA

(3) Urine analysis (4) Autoradiography

184. Which of the following vectors is used to introduce nematode-specific genes into the host plant?

(1) Retrovirus

(2) pBR322

(3) *Agrobacterium*

(4) *Bacillus thuringiensis*

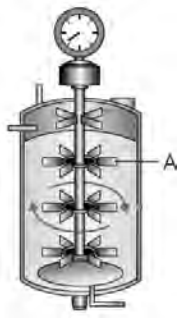
185. An organisation of Indian Government which take decisions regarding validity of GM research is

(1) EFB (2) GEAC

(3) ICMR (4) CSIR

SECTION - B

186. Study the following figure.



In the above figure, the part labelled as 'A' facilitates

(1) Maintenance of optimum temperature
(2) Foam control
(3) Addition of fresh substrate
(4) Oxygen availability throughout the reactor

187. Today we know more than ____ restriction enzymes that have been isolated from over _____ strains of bacteria.

Choose the correct option to fill the blanks respectively.

(1) 200, 930 (2) 230, 900
(3) 900, 230 (4) 700, 930

188. Cohen and Boyer in 1972 isolated a gene by cutting out a piece of DNA from a plasmid. This gene was responsible for providing

(1) Insect resistance
(2) Antibiotic resistance
(3) Pest resistance
(4) Nematode resistance

189. In a method of transformation called gene gun, the DNA is coated over by which of the following micro-particles?

(1) Gold or tungsten
(2) Diamond or tungsten
(3) Gold or diamond
(4) Steel or gold

190. Choose the **incorrect** statement w.r.t. ELISA.

(1) It is based on principle of antigen-antibody interaction
(2) It serves the purpose of early diagnosis
(3) It can detect the presence of antigens as well as antibodies synthesised against pathogen
(4) It primarily makes use of enzymes, DNA and RNA polymerases

191. Read the given statements and select the **correct** option.

Statement A: Several attempts have been made to patent uses, products and processes based on Indian traditional herbal medicines.

Statement B: The Indian parliament has recently cleared the second amendment of the Indian Patents Bill.

(1) Both statements are incorrect
(2) Both statements are correct
(3) Only statement A is correct
(4) Only statement B is correct

192. An **incorrect** statement w.r.t PCR is that

(1) *Taq* polymerase eliminated the need to add fresh DNA polymerase during every PCR cycle
(2) A small amount such as 10 nanograms of DNA can serve as initial template
(3) Deoxyribonucleotides serve as substrates for DNA polymerase
(4) It only helps to detect the pathogen when the concentration of pathogen is high in the body

193. At what temperature heat shock is given that enables the bacteria to take up rDNA?

(1) 72°C (2) 42°C
(3) 92°C (4) 62°C

194. A protein encoding gene, if expressed in a heterologous host, is called

(1) Recombinant protein (2) Recombinant DNA
(3) Plasmid (4) Vector

195. Gel electrophoresis causes separation of DNA fragments which can then be viewed by staining with __A__ followed by exposure to __B__ .

Choose the option that fills the blanks A and B **correctly**.

	A	**B**
(1)	Ethidium bromide	X-rays
(2)	Bromophenol	UV rays
(3)	Ethidium bromide	UV rays
(4)	Bromophenol	X-rays

196. Select the **incorrect** statement.

(1) The normal *E.coli* do not carry resistance against any antibiotics

(2) Each restriction enzymes functions by inspecting the length of a DNA sequence

(3) Methylase is used to isolate genetic material from algae

(4) In order to cut the DNA with restriction enzymes, it needs to be in pure form

197. Read the following statements.

Statement A : Enzyme replacement therapy involves intravenous delivery of functional enzyme to the patient.

Statement B : The enzyme replacement therapy is an effective and permanent cure for enzyme deficiency in all patients.

Choose the **correct** options.

(1) Only statement A is correct

(2) Only statement B is correct

(3) Both statements A and B are incorrect

(4) Both statements A and B are correct

198. Select the **incorrect** statement w.r.t. transgenic animals.

(1) 95 percent of all existing transgenic animals are mice

(2) The milk produced by Rosie contained 2.4 g/L of human protein

(3) Human protein (α-1-antitrypsin) obtained from transgenic animal was used to treat cystic fibrosis

(4) Transgenic animals are made more sensitive to toxic substances than non-transgenic animals

199. Plasmid DNA is/does **not**

(1) Capable of independent replication

(2) Circular

(3) Rich in introns

(4) Lack histone proteins

200. Select the correct match w.r.t. Bt toxins.

(1) *crylAc* - Corn borer

(2) *crylAb* - Armyworm

(3) *crylIAb* - Corn borer

(4) *crylAc* - Cotton bollworm

❑ ❑ ❑

14/04/2023

Phase-1
CODE-B

Corporate Office: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

FINAL TEST SERIES for NEET-2023

MM : 720 **Test-8** **Time : 3 Hrs. 20 Mins.**

Answers

1. (4)	41. (1)	81. (3)	121. (1)	161. (2)
2. (1)	42. (2)	82. (2)	122. (2)	162. (1)
3. (2)	43. (2)	83. (2)	123. (1)	163. (2)
4. (2)	44. (1)	84. (3)	124. (2)	164. (2)
5. (2)	45. (1)	85. (3)	125. (2)	165. (3)
6. (4)	46. (3)	86. (3)	126. (1)	166. (4)
7. (1)	47. (3)	87. (1)	127. (3)	167. (4)
8. (1)	48. (1)	88. (4)	128. (3)	168. (4)
9. (1)	49. (4)	89. (1)	129. (3)	169. (1)
10. (2)	50. (2)	90. (4)	130. (3)	170. (2)
11. (4)	51. (2)	91. (4)	131. (1)	171. (1)
12. (3)	52. (2)	92. (3)	132. (2)	172. (2)
13. (1)	53. (2)	93. (1)	133. (1)	173. (1)
14. (4)	54. (3)	94. (3)	134. (2)	174. (3)
15. (3)	55. (2)	95. (2)	135. (4)	175. (4)
16. (3)	56. (3)	96. (2)	136. (4)	176. (1)
17. (2)	57. (3)	97. (4)	137. (3)	177. (3)
18. (2)	58. (4)	98. (4)	138. (1)	178. (4)
19. (4)	59. (1)	99. (2)	139. (3)	179. (4)
20. (1)	60. (3)	100. (2)	140. (3)	180. (1)
21. (3)	61. (1)	101. (3)	141. (3)	181. (2)
22. (3)	62. (1)	102. (2)	142. (3)	182. (3)
23. (4)	63. (2)	103. (3)	143. (4)	183. (2)
24. (2)	64. (1)	104. (3)	144. (2)	184. (3)
25. (3)	65. (2)	105. (2)	145. (1)	185. (2)
26. (1)	66. (3)	106. (4)	146. (2)*	186. (4)
27. (1)	67. (4)	107. (3)	147. (3)	187. (3)
28. (2)	68. (1)	108. (2)	148. (3)	188. (2)
29. (3)	69. (3)	109. (3)	149. (3)	189. (1)
30. (2)	70. (2)	110. (4)	150. (3)	190. (4)
31. (1)	71. (3)	111. (1)	151. (3)	191. (2)
32. (1)	72. (3)	112. (2)	152. (2)	192. (4)
33. (2)	73. (4)	113. (4)	153. (4)	193. (2)
34. (1)	74. (3)	114. (3)	154. (2)	194. (1)
35. (2)	75. (2)	115. (3)	155. (2)	195. (3)
36. (4)	76. (3)	116. (4)	156. (3)	196. (3)
37. (2)	77. (2)	117. (4)	157. (1)	197. (1)
38. (2)	78. (1)	118. (2)	158. (3)	198. (3)
39. (4)	79. (4)	119. (4)	159. (3)	199. (3)
40. (3)	80. (2)	120. (2)	160. (3)	200. (4)

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Answers and Solutions

PHYSICS

SECTION - A

1. Answer (4)

$$E_{Ph} = \frac{hc}{\lambda} \simeq \frac{12400}{\lambda(\text{Å})}\text{eV}$$

$$\Rightarrow E_{Ph} = \frac{12400}{6200} = 2\,\text{eV}$$

2. Answer (1)

$$h\nu - \phi = \frac{1}{2}mv_1^2$$

$$h(6\nu) - \phi = \frac{1}{2}mv_2^2$$

$$6(h\nu - \phi) + 5\phi = \frac{1}{2}mv_2^2$$

$$\frac{v_2^2}{v_1^2} = \frac{6(h\nu - \phi) + 5\phi}{(h\nu - \phi)}$$

$$v_2 > \sqrt{6}\,v_1$$

3. Answer (2)

$$KE = \frac{13.6\text{ eV}}{n^2}$$

$$n^2 = \frac{13.6\text{ eV}}{3.4\text{ eV}} = 4$$

$$\Rightarrow \quad n = 2$$

Now $L = \frac{nh}{2\pi} = \frac{2h}{2\pi} = \frac{h}{\pi}$

4. Answer (2)

For *n*-type semiconductors $n_e > n_h$.

5. Answer (2)

$E_{Ph} = h\nu$

$$p_{Ph} = \frac{E_{Ph}}{c} = \frac{h}{\lambda}$$

and rest mass of photon is zero.

6. Answer (4)

$$v = \frac{Z}{n}\left(\frac{c}{137}\right) = \frac{4}{2}\left(\frac{c}{137}\right)$$

$$= \frac{2c}{137}$$

7. Answer (1)

$$\frac{1}{\lambda} = R\left[\frac{1}{n_f^2} - \frac{1}{n_i^2}\right]$$

$$\frac{1}{\lambda} = R\left[\frac{1}{1} - \frac{1}{4}\right] = \frac{3R}{4}$$

8. Answer (1)

$$\frac{hc}{\lambda} = E_1 - E_2$$

$$= \lambda = \frac{hc}{E_1 - E_2}$$

9. Answer (1)

Momentum of recoiled hydrogen atom = momentum of photon emitted

$$= \frac{hc}{\lambda c} = \frac{h}{\lambda} = hR\left[\frac{1}{n_f^2} - \frac{1}{n_i^2}\right]$$

$$= 6.6 \times 10^{-34} \times 1.097 \times 10^7 \times \frac{3}{4}$$

$$= 5.45 \times 10^{-27}\text{ kg m s}^{-1}$$

10. Answer (2)

E_{max} = 13.6 eV

$$E_{min} = 13.6\left[1-\frac{1}{4}\right]$$

$$= 13.6\times\frac{3}{4}\text{eV}$$

$$\frac{E_{max}}{E_{min}} = \frac{4}{3}$$

11. Answer (4)

Since $I_C + I_B = I_E$

$$\frac{I_E}{I_B} = \frac{I_C}{I_B} + \frac{I_B}{I_B} \Rightarrow z = y + 1$$

i.e., $y = z - 1$

Also $\frac{I_E}{I_C} = \frac{I_C}{I_C} + \frac{I_B}{I_C}$

$$= \frac{1}{x} = 1 + \frac{1}{y}$$

12. Answer (3)

Transconductance $g_m = \frac{I_0}{V_i}$

$$g_m = \frac{I_0}{I_i R_i} = \frac{\beta}{R_i}$$

$$g_m = \frac{\beta}{2\times10^3}\Omega^{-1}$$

$$= \frac{\beta}{2}\times10^{-3}\,\Omega^{-1}$$

13. Answer (1)

$$E_g \le \frac{hc}{\lambda}$$

$$2.4\text{ eV} \le \frac{12400(\text{eV Å})}{\lambda(\text{Å})}$$

$$\lambda \le \left(\frac{12400}{2.4}\right)\text{Å}$$

$$\lambda \le 5166.67\text{ Å}$$

14. Answer (4)

Here $V_{Applied} < V_z$

$\Rightarrow$ Zener diode will not be ON and $I_Z \simeq 0$ and

$$I_{500\,\Omega} = \frac{5}{1000} = 5\text{ mA}$$

15. Answer (3)

If *p* side is at higher potential than *n* side, then diode is forward biased.

16. Answer (3)

$Y = \overline{A\cdot B}$ i.e.

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

17. Answer (2)

From the curve, forward bias resistance

$$r_{fb} = \frac{\Delta V}{\Delta I} = \frac{0.8-0.7}{(20-10)\times10^{-3}} = 10\ \Omega$$

and reverse bias resistance $r_{fb} = \frac{-10\text{ V}}{-1\,\mu\text{A}} = 10^7\ \Omega$

The required ratio $\frac{r_{fb}}{r_{rb}} = \frac{10}{10^7} = 10^{-6}$

18. Answer (2)

The phase difference between input and output signal in CE amplifier is π

Also, $V_0 = V_i A_v = 100\times4\sin\left(100\pi t + \frac{\pi}{4} + \pi\right)$

$$V_0 = 400\sin\left(100\pi t + \frac{5\pi}{4}\right)$$

19. Answer (4)

In positive half cycle $\Rightarrow$ D $\Rightarrow$ on $\Rightarrow$ $(V_0)_D = 0$ and $(V_0)_R = V_i$

In negative half cycle $\Rightarrow$ D = off $\Rightarrow$ $(V_0)_D = V_i$ and $(V_0)_R = 0$

20. Answer (1)

When both inputs *A* and *B* are high diodes D_1 and D_2 both will be off and output *Y* will be high. If any one or both input are low, then corresponding diode(s) will be on and output *Y* will be low i.e. corresponding truth table will be

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

21. Answer (3)

Ratio $\frac{\omega_n}{v_n} = \frac{\omega_n}{R_n\omega_n} = \frac{1}{R_n}$

Since $R_n \propto n^2$

$\Rightarrow \frac{\omega_n}{v_n} \propto \frac{1}{n^2}$

22. Answer (3)

$^{2}_{1}H + {}^{16}_{8}O \longrightarrow {}^{14}_{7}N + {}^{4}_{2}He$

Hence atomic number and mass number of product are $Z = 7$, $A = 14$

23. Answer (4)

$\left(\frac{N}{N_0}\right) = \left(\frac{1}{2}\right)^{\frac{t}{T_{1/2}}}$

$\frac{1}{32} = \left(\frac{1}{2}\right)^{\frac{t}{T_{1/2}}}$

$t = 5\ T_{1/2} = 500$ years

24. Answer (2)

Since $A = A_0e^{-\lambda t}$

$A_1 = A_0e^{-\lambda\left(\frac{1}{2\lambda}\right)} = A_0e^{-\frac{1}{2}}$

$A_2 = A_0e^{-\lambda\left(\frac{1}{\lambda}\right)} = A_0e^{-1}$

$\frac{A_2}{A_1} = \frac{A_0e^{-1}}{A_0e^{-1/2}}$

$A_2 = A_1e^{-\frac{1}{2}}$

25. Answer (3)

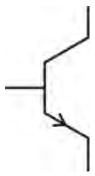
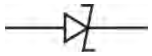
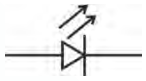
$R = R_0A^{1/3}$

$\frac{R_1}{R_2} = \left(\frac{A_1}{A_2}\right)^{1/3}$

$A_2 = \left(\frac{R_2}{R_1}\right)^3 A_1 = 2^3 \times 9$

$\Rightarrow$ $A_2 = 72$

26. Answer (1)

Device symbol	Device name
	n-p-n transistor
	p-n-p transistor
	Zener diode
	Light emitting diode

27. Answer (1)

Mass number change only by α particle and atomic number by both α and β emission.

Since $^{A}_{Z}X \longrightarrow {}^{A-4}_{Z-2}Y + {}^{4}_{2}He$

and $^{A}_{Z}X \longrightarrow {}^{A}_{Z+1}Y + {}_{-1}e^{0}$

Hence $_{92}U^{238} \xrightarrow{9\alpha \text{ and } 8\beta^-} {}_{82}Pb^{202}$

28. Answer (2)

In one half life, half the nuclei decay and mean life $\simeq 1.44$ (half-life)

Hence in one mean life, more than half the nuclei will decay.

29. Answer (3)

$\frac{N}{N_0} = \left(\frac{1}{2}\right)^n$

$N = N_0 \times \left(\frac{1}{2}\right)^3$

$N = 1.6 \times 10^{18} \times \frac{1}{8}$

$N = 2 \times 10^{17}$

30. Answer (2)

$R = R_0.A^{1/3}$

$\ln\left(\frac{R}{R_0}\right) = \frac{1}{3}\ln(A)$

31. Answer (1)

From the graph, equation of stopping potential will be

$$V-0=\frac{1.656}{(6-2)\times10^{14}}\left[\nu-2\times10^{14}\right]$$

$$V=\frac{1.656}{4\times10^{14}}\left[\nu-2\times10^{14}\right]$$

By comparing with standard equation

$$V=\frac{h}{e}\left(\nu-\nu_0\right)$$

$$\frac{h}{e}=\frac{1.656}{4\times10^{14}}\text{ V s}$$

$$=4.14\times10^{-15}\text{ V s}$$

32. Answer (1)

$$p=\frac{h}{\lambda}$$

$$\frac{\Delta p}{p}=\frac{\Delta\lambda}{\lambda}$$

$$\frac{\Delta p}{p_i}=0.0020$$

$$p_i=\frac{\Delta p}{0.0020}=500\Delta p$$

33. Answer (2)

GaAs (E_g nearer to 1.5 eV) is better material for solar cell fabrication.

34. Answer (1)

$$\lambda=\frac{h}{p}=\frac{h}{mv}$$

$$\lambda v=\frac{h}{m}\Rightarrow\text{ Constant}$$

35. Answer (2)

Binding energy per nucleon is higher for $A = 120$.

SECTION - B

36. Answer (4)

$$\frac{1}{\lambda}=R\left(\frac{1}{n_1^2}-\frac{1}{n_2^2}\right)$$

37. Answer (2)

In nth orbit $v_n=\frac{Zv_0}{n}$

For H-atom $v_n=\frac{c}{137n}=\frac{c\left(n^{-1}\right)}{137}$

on comparing $p=-1$ and $K=137$

38. Answer (2)

β^+ decay is represented as

$${}_zX^A\rightarrow{}_{z-1}Y^A+{}_1e^{\circ}+\nu+Q_0$$

$$Q_0=\left[m_n\left({}_zX^A\right)-m_n\left({}_{z-1}Y^A\right)-m_e\right]c^2$$

$$Q_0=\left[m_n\left({}_zX^A\right)+zm_e-m_n\left({}_{z-1}Y^A\right)-(z-1)m_e-2m_e\right]c^2$$

$$Q_0=\left(M_x-M_y-2m_e\right)c^2$$

39. Answer (4)

For 1st half cycle of input, $v_i < 0 \Rightarrow$ diode is ON and $v_0 = 0$

For 2nd half cycle of input, $v_i > 0 \Rightarrow$ diode is OFF $\Rightarrow v_0 = v_i$

For 3rd half cycle of input, $v_i < 0 \Rightarrow$ diode is OFF $\Rightarrow v_0 = 0$

40. Answer (3)

From the given transfer characteristics of a CE amplifier

For $v_i = 0.5$ V, $I_B = 0 \Rightarrow I_C = 0 \Rightarrow$ transistor is in cut off mode and it can be used as switch off.

For $v_i = 1$V, transistor will be used as an amplifier

For $v_i > 2.0$ V, transistor will be in saturation mode and corrector current will be maximum.

41. Answer (1)

$I_L = 4$ mA

$I_z = 5I_L = 20$ mA

$I = I_z + I_L = 24$ mA

Now $R_s=\frac{10-6}{24\times10^{-3}}=\frac{4000}{24}=166.66\ \Omega$

$R_s \simeq 167\ \Omega$

42. Answer (2)

$$\frac{1}{\lambda}=R\left[\frac{1}{1}-\frac{1}{n^2}\right]$$

$$1=\lambda R-\frac{\lambda R}{n^2}$$

$$\frac{\lambda R}{n^2}=\lambda R-1$$

$$n=\sqrt{\frac{\lambda R}{\lambda R-1}}$$

43. Answer (2)

$$Y = \overline{A.\overline{AB}} \,.\, \overline{B.\overline{AB}}$$

$$= \overline{A.\overline{AB}} + \overline{B.\overline{AB}}$$

$$= A.\overline{AB} + B.\overline{AB}$$

$$= A.(\overline{A} + \overline{B}) + B.(\overline{A} + \overline{B})$$

$$= A\overline{B} + A\overline{A} + B\overline{A} + B\overline{B}$$

$$= A\overline{B} + \overline{A}B$$

44. Answer (1)

$$P = \frac{n}{t}(h\nu)$$

$$\frac{n}{t} = \frac{P}{h\nu} = \frac{10000}{6.6\times10^{-34}\times990\times10^{3}}$$

$$= \frac{10^{33}}{6.6\times9.9}$$

$$= 1.53\times10^{31} \text{ photons/s}$$

45. Answer (1)

Zener diode can be used as voltage regulator.

46. Answer (3)

On increasing temperature or on doping, the conductivity of pure semiconductor increases.

47. Answer (3)

$$v = \frac{v_0}{n} \Rightarrow \text{speed decreases}$$

$\Rightarrow$ KE decreases

$$\text{P.E} = -2\left[\frac{13.6}{n^2}\right] \Rightarrow \text{P.E increases}$$

With increase in n.

48. Answer (1)

$$E \propto \frac{Z^2}{n^2}$$

$$\frac{E_H}{E_{Li^{++}}} = \frac{\frac{1^2}{1^2}}{\frac{3^2}{3^2}} = 1$$

$$E_{Li^{++}} = E_H = E$$

49. Answer (4)

Depletion width of p-n junction decrease with increase in doping concentration.

50. Answer (2)

$$E_n = \frac{-13.6}{n^2}$$

i.e. $E_n - E_{n-1} = 13.6\left[\frac{1}{(n-1)^2} - \frac{1}{n^2}\right]$

CHEMISTRY

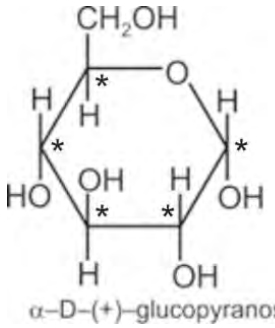
SECTION - A

51. Answer (2)

Due to the subtle interplay of the inductive effect, solvation effect and steric hindrance the order of basic strength of methyl substituted amines is

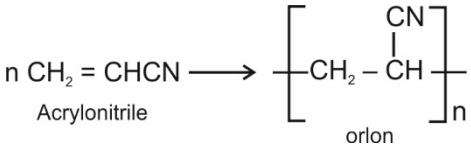
$(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

52. Answer (2)



α–D–(+)–glucopyranose

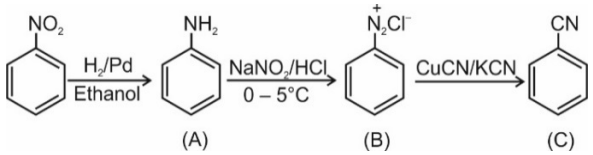
53. Answer (2)



54. Answer (3)

Vitamin B-12 is known as cyanocobalamin and its deficiency causes pernicious anaemia.

55. Answer (2)

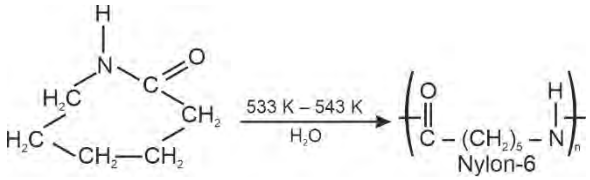


56. Answer (3)

9 essential amino acids are Phenylalanine, Valine, Threonine, Tryptophan, Isoleucine, Methionine, Histidine, Arginine Leucine and Lysine.

57. Answer (3)

On heating caprolactam with water at high temperature Nylon-6 is prepared.



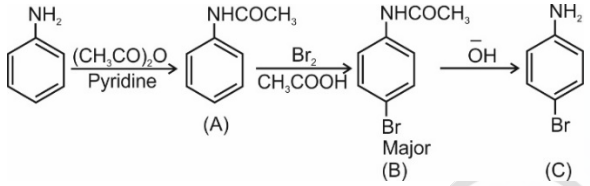
58. Answer (4)

Alitame is 2000 times sweeter than cane sugar.

59. Answer (1)

Cimetidine is an antacid.

60. Answer (3)



61. Answer (1)

Novestrol – Antifertility

Chloramphenicol – Antibiotic

Salvarsan – Antibiotic

Phenelzine – Antidepressant

62. Answer (1)

Purine Bases in nucleic acids are Adenine and Guanine.

63. Answer (2)

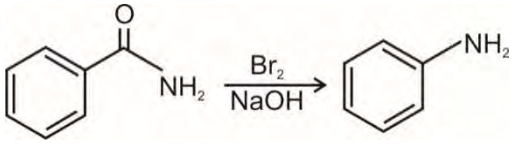
Paracetamol non-narcotic analgesic.

64. Answer (1)

Novolac on heating with formaldehyde undergoes crosslinking to form Bakelite.

65. Answer (2)

Hoffmann bromamide degradation reaction



66. Answer (3)

Aniline cannot be synthesized by Gabriel phthalimide synthesis because Ph–Br cannot undergo S_N2 reaction, which is required in Gabriel phthalimide synthesis.

67. Answer (4)

$Ph-N_2^+Cl^-$ is soluble in water.

68. Answer (1)

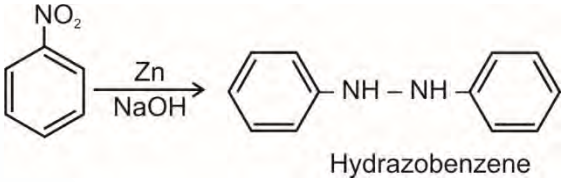
In carbylamine reaction, primary amine forms isocyanide

$$CH_3NH_2 + CHCl_3 + 3KOH(alc) \xrightarrow{\Delta} CH_3NC + 3KCl + 3H_2O$$

69. Answer (3)

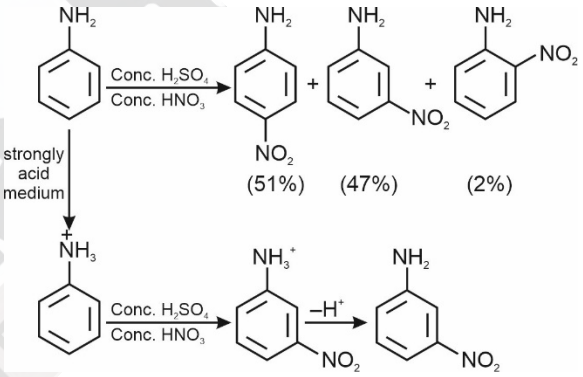
Glucose does not react with $NaHSO_3$ due to its cyclic structure.

70. Answer (2)



71. Answer (3)

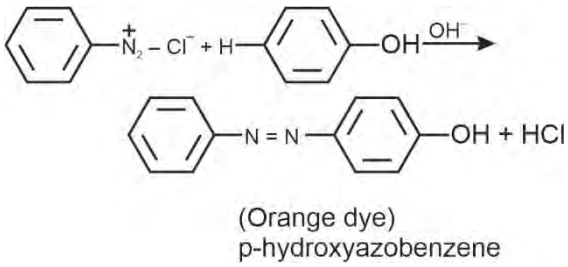
Direct nitration of aniline yields a mixture of para (51%), meta (47%) and ortho (2%) nitro derivative so, meta nitroaniline is not the major product.



72. Answer (3)

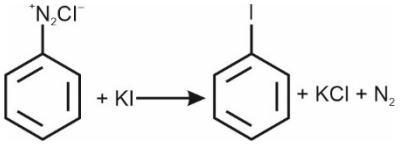
Nylon-2-nylon-6 and PHBV both are man-made biodegradable polymers.

73. Answer (4)



74. Answer (3)

Iodine is not easily introduced in benzene ring but reaction of benzene diazonium salt solution with KI forms iodobenzene



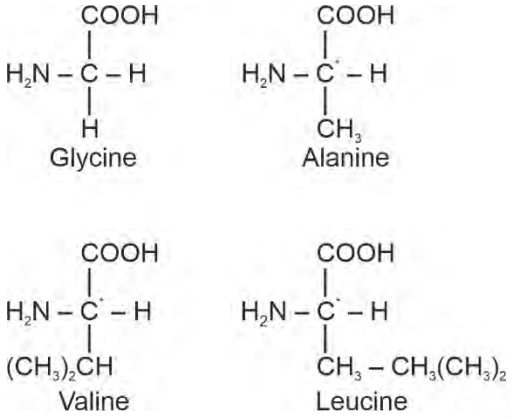
75. Answer (2)

During denaturation of protein primary structure remains intact while secondary and tertiary structures get destroyed.

76. Answer (3)

Galactose is an oligosaccharide.

77. Answer (2)

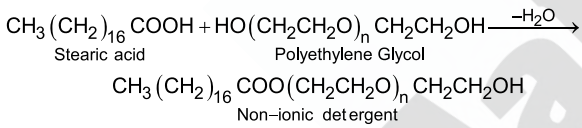


Glycine does not have chiral carbon.

78. Answer (1)

Penicillin G is narrow spectrum antibiotic while ampicillin and amoxycillin are broad spectrum antibiotics.

79. Answer (4)



80. Answer (2)

Seldane is an antihistamine

Prontosil – Antibiotic

Norethindrone – Antifertility drug

Bithional – Antiseptic

81. Answer (3)

In nucleic acid, nucleotides are joined together by phosphodiester linkage between 5′ and 3′ carbon atoms of pentose sugar.

82. Answer (2)

Polystyrene is a thermoplastic not an elastomer.

83. Answer (2)

Agonists – Drug that mimic the natural messenger by switching on receptor.

Antagonists – Drug binding to receptor site and inhibits its natural action.

84. Answer (3)

Albumin and insulin are globular proteins while keratin and myosin are fibrous protein.

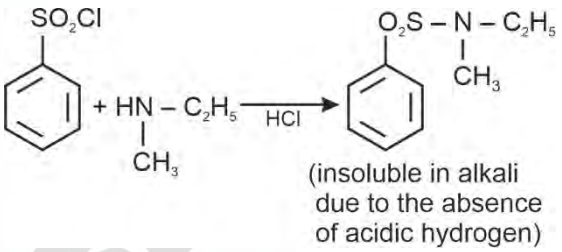
85. Answer (3)

Nylon-6, 6 is condensation polymer of hexamethylene diamine and adipic acid while polythene, polystyrene, Teflon and orlon (Polyacrylonitrile) are addition polymers.

SECTION - B

86. Answer (3)

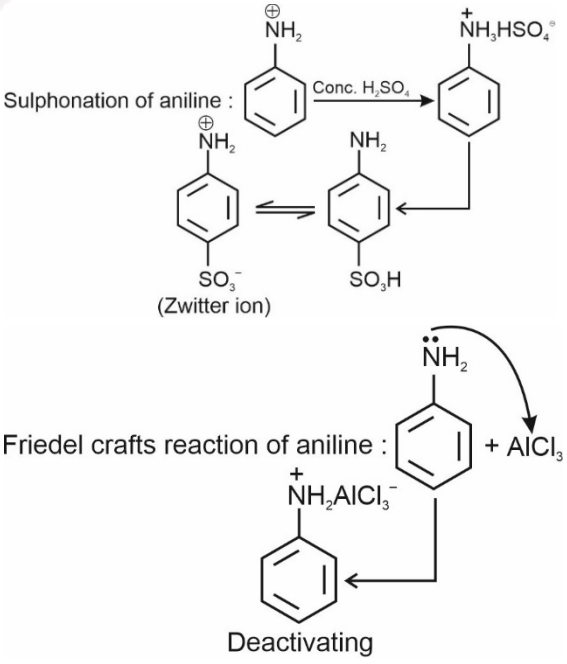
As X reacts with benzene sulphonyl chloride to form precipitate Y which is insoluble in alkali it means amine X is a secondary amine $\left(\begin{array}{c} CH_3-NH \\ | \\ C_2H_5 \end{array}\right)$.



87. Answer (1)

In amines, alkyl group is electron releasing which increases electron density on nitrogen atom and makes it basic. While $R-\overset{\overset{O}{\|}}{C}-$ group being electron withdrawing involves lone pair of electron of $-NH_2$ group in delocalisation and makes amide a neutral compound.

88. Answer (4)



Due to absence of –H on nitrogen atom of amine tertiary amine does not undergo acylation.

Due to +R effect of $–NH_2$ group, C – N bond in aromatic amines have double bond character which leads to reduction in bond length.

So, C – N bond length in aromatic amine is less than that of aliphatic amines.

89. Answer (1)

Example of cross-linked polymers is melamine-formaldehyde polymer and bakelite.

PVC and polyesters and linear polymers while low density polythene is branched chain polymer.

90. Answer (4)

Sucrose is non-reducing sugar hence does not reduce Fehling solution.

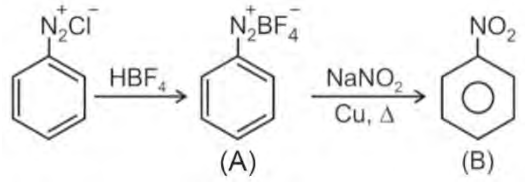
91. Answer (4)

Amylose is unbranched long chain with 200 – 1000 α-D-(+)-glucose units.

92. Answer (3)

Dacron (terylene) is a condensation polymer of ethylene glycol and terephthalic acid while teflon, polyacrylonitrile and polythene are addition polymers.

93. Answer (1)



94. Answer (3)

Vitamin B and C are water soluble.

95. Answer (2)

Guanine is a nitrogenous base present in DNA

96. Answer (2)

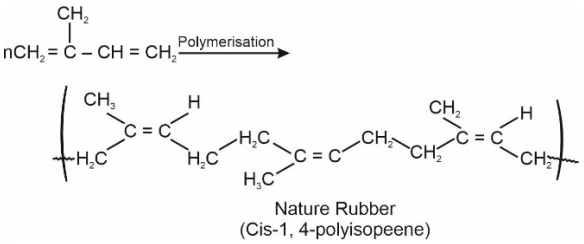
a. Iproniazid – Tranquilizer

b. Sorbic acid – Food preservative

c. Aspartame – Artificial sweetener

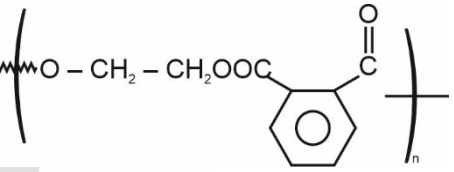
d. BHT – Antioxidant

97. Answer (4)

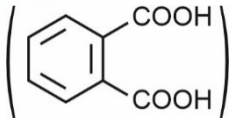


Polymerisation of isoprene forms cis-1, 4-polyisoprene which is natural rubber.

98. Answer (4)

Glyptal 

is a polymer of ethylene glycol ($HOCH_2 – CH_2OH$)

and phthalic acid 

99. Answer (2)

Dettol is a well known antiseptic which is a mixture of chloroxylenol and terpineol.

100. Answer (2)

Thyroxine produced in the thyroid gland is an iodinated derivative of amino acid tyrosine.

BOTANY

SECTION - A

101. Answer (3)

Nitrogen and carbon biogeochemical cycles are of gaseous cycles.

102. Answer (2)

In terrestrial ecosystems, a much larger fraction of energy flows through the DFC than through the GFC.

103. Answer (3)

Plants capture only 2 – 10 % of PAR and convert it into biomass.

104. Answer (3)

'Ecosan' toilets working in many parts of Kerala and Sri Lanka are dry composting toilets.

105. Answer (2)

Primary succession on rocks is xerarch. Pioneer community growing on such habitat is lichen.

106. Answer (4)

Bad ozone is formed in the troposphere.

107. Answer (3)

Degree of diversity increases during ecological succession.

Primary succession occurs where no living organisms ever existed.

Vegetational changes in turn affect food and shelter for various types of animals.

108. Answer (2)

The relative contribution of various greenhouse gases to total global warming is as follows:

$CO_2(60\%) > CH_4(20\%) > CFCs(14\%) > N_2O(6\%)$

109. Answer (3)

Female mosquito needs our blood for its reproduction. It is not considered as parasite because it never spends even a short duration as other parasites do.

110. Answer (4)

The 'rivet popper hypothesis' explains the importance of every single species in the ecosystem and was explained by Paul Ehrlich.

111. Answer (1)

Since the origin and diversification of life on earth, there were five episodes of mass extinction of species.

112. Answer (2)

Biologists are not sure about number of prokaryotic species because conventional taxonomic methods are not suitable for identifying microbial species.

113. Answer (4)

Taxa	**Number of species**
Birds	1300
Reptiles	378
Fishes	3000
Mammals	427

114. Answer (3)

Key criteria for determining hot spots are high species richness, high degree of endemism and high degree of threat.

115. Answer (3)

Species area relationship was described by Alexander von Humboldt.

116. Answer (4)

The transition zone, the outermost part of the Biosphere Reserve, is an area of active cooperation between reserve management and the local people wherein activities like settlements, cropping, forestry, recreation and other economic uses continue in harmony with conservation goals.

117. Answer (4)

Biosphere reserve is an on-site or *in-situ* conservation strategy while rest all are *ex-situ* conservation strategies.

118. Answer (2)

23% of all mammal species world-wide are facing the threat of extinction.

119. Answer (4)

Below given are extinct species of the respective countries.

Quagga	–	Africa
Dodo	–	Mauritius
Steller's sea cow	–	Russia
Thylacine	–	Australia

120. Answer (2)

Humus is highly resistant to microbial action.

121. Answer (1)

The calcium in limestone combines chemically with SO_2 to produce $CaSO_4$.

122. Answer (2)

Fragmentation, leaching and catabolism in decomposition operates simultaneously on the detritus.

Decomposition is largely an oxygen requiring process. Excessive moisture also impedes decomposition. Decomposition of detritus is slow if it contains lignin, chitin, tannins and cellulose. It is rapid if detritus possesses more of nitrogenous compounds and water-soluble reserve carbohydrates.

123. Answer (1)

Water (Prevention and Control of Pollution) Act was passed in 1974.

124. Answer (2)

Trophic level represents a functional level, not a species as such. Most limiting nutrient of marine ecosystem is nitrogen.

125. Answer (2)

Lake with low organic matter has low BOD and thus is least polluted.

126. Answer (1)

Major conduit of energy flow in an aquatic ecosystem is grazing food chain.

127. Answer (3)

Ahmed Khan is famous for making polyblend out of waste plastic.

128. Answer (3)

Anthropogenic ecosystem such as agriculture show high productivity and less species diversity.

129. Answer (3)

NPP = GPP – R (Respiratory losses)

Desert and deep sea are the least productive ecosystems. Annual NPP of whole biosphere is approximately. 170 billion tons (dry weight) of organic matter.

130. Answer (3)

Primary consumers or herbivores are called key industry animals. They are first order consumers.

131. Answer (1)

Annual grass stage is a transitional community of xerarch succession but scrub and reed-swamp stage are seral communities of hydrarch succession. Phytoplankton is the pioneer community of hydrarch succession.

132. Answer (2)

Biodiversity hotspots in India are Western ghats and Sri Lanka, Indo-Burma and Himalaya.

133. Answer (1)

Rice shows maximum genetic diversity in India. There are more than 50,000 genetically different strains of rice and 1000 varieties of mango in India.

134. Answer (2)

Exploration of molecular, genetic and species level diversity for products of economic importance is known as bioprospecting.

135. Answer (4)

The whole ecosystem and its biodiversity at all levels is protected by *in situ* conservation. Wildlife safari is an *ex-situ* conservation strategy. Less seasonal and more predictable environment accounts for greater biological diversity in tropics.

SECTION - B

136. Answer (4)

During leaching, water-soluble substances present in detritus go down into the soil horizon and get precipitated as unavailable salts.

137. Answer (3)

Atmosphere is the reservoir pool for nitrogen where it is present in inactive form. Water vapour also contributes in green house effect.

138. Answer (1)

Carbon constitute 49% of dry weight of organisms.

139. Answer (3)

Due to 10% low, the residual energy decreases drastically within 2-3 trophic levels. As a result an ecosystem can support only a limited number of trophic levels hardly, 3-5. Dead biomass serves as an energy source for decomposers.

140. Answer (3)

Loss of biodiversity in a region may lead to decline in plant production, reduced resistance to environment perturbations, and increased variability of ecosystem processes.

141. Answer (3)

10% law of Lindeman justify upright shape of pyramid of energy.

142. Answer (3)

Slope of regression for frugivorous birds and mammals in tropical forests is 1.15.

143. Answer (4)

Deep sea hydrothermal ecosystem is not-operated by energy of sun.

144. Answer (2)

Tropics are localized at low latitudes and low altitude areas having high degree of biodiversity.

145. Answer (1)

Use of nuclear energy for generating electricity also causes pollution.

146. Answer (2 Or 4)* **Both are correct**

In scrubbing mechanism, effluents containing SO_2 are passed through the scrubber having $CaCO_3$ and can be removed easily.

147. Answer (3)

Any value more than 80 dB causes noise pollution. Noise becomes unbearable at 140 dB.

148. Answer (3)

Biomagnification of chemicals, such as DDT is the major cause of thinning of egg shell in hawks.

149. Answer (3)

Secondary pollutants play role in photochemical smog. It has no role in leaching of essential minerals of soil, stone leprosy and acid rain.

150. Answer (3)

Primary succession starts at a barren area, never having vegetation of any type *e.g.* cooled volcanic lava. It is very difficult for the pioneer community to get established in these areas.

ZOOLOGY

SECTION - A

151. Answer (3)

The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This process is called elution.

152. Answer (2)

Cohen and Boyer synthesised the first rDNA using the plasmid of *Salmonella typhimurium*.

153. Answer (4)

Since DNA fragments are negatively charged molecules they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. Nowadays the most commonly used matrix is agarose which is a natural polymer extracted from sea weeds.

154. Answer (2)

PCR can be used to detect the presence of a specific mutation that is responsible for causing a particular genetic disease. Pregnancy can be detected by using ELISA.

155. Answer (2)

amp^R – *Pst* I, *Pvu* I

rop – *Pvu* II

156. Answer (3)

Lysozyme breaks the bacterial cell wall to break the cell open.

157. Answer (1)

Treatment with divalent cation increases the efficiency with which DNA enters the bacterium through pores in its cell wall.

158. Answer (3)

Retrovirus can transform normal cells to cancerous cells.

159. Answer (3)

In PCR, multiple copies of gene of interest is synthesised *in vitro* and gene of interest can be amplified.

160. Answer (3)

Golden rice has been used to treat vitamin A deficiency as it accumulates more β-carotene.

161. Answer (2)

Downstream processing includes separation and purification *etc.* so that product can be made ready for marketing as a finished product.

162. Answer (1)

The recombinant plasmids contain gene of interest at *tet*^{R} region, so due to insertional inactivation, these plasmids become sensitive to tetracycline but remain resistant to ampicillin.

163. Answer (2)

For the production of desirable protein in large quantities, expression of gene is enhanced by using inducers that can increase the production.

164. Answer (2)

An alien DNA linked with *ori* can replicate and multiply itself in host organism.

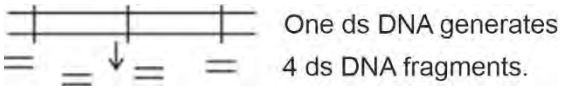
165. Answer (3)

Sparger is a component of sparged stirred tank bioreactor.

166. Answer (4)

The palindrome in DNA is a sequence of base pairs that reads same on the two strands when orientation of reading is kept the same. For example, the following sequences reads the same on the two strands in 5' → 3' direction. This is also true if read in the 3' → 5' direction.

167. Answer (4)



168. Answer (4)

Origin of replication (*ori*) : This is a sequence from where replication starts and any piece of DNA when linked to this sequence can be made to replicate within the host cells. This sequence is also responsible for controlling the copy number of the linked DNA.

169. Answer (1)

Sma I produces blunt ends upon digestion whereas other given enzymes produce sticky ends.

170. Answer (2)

Repeated amplification is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, *Thermus aquaticus*), which remain active during the high temperature induced denaturation of double stranded DNA.

171. Answer (1)

The activated toxin binds to the surface of midgut epithelial cells and create pores that cause cell swelling and lysis and eventually causes death of insect.

172. Answer (2)

Bt crops are insect resistant.

173. Answer (1)

In 1983, Eli Lilly an American company prepared two DNA sequences corresponding to A and B, chains of human insulin and introduced them in plasmids of *E. coli* to produce insulin chains.

174. Answer (3)

In 1997, the first transgenic cow, Rosie, produced human protein-enriched milk (2.4 grams per litre). The milk contained the human alpha-lactalbumin and was nutritionally a more balanced product for human babies than natural cow-milk.

175. Answer (4)

Basmati rice is distinct for its unique aroma and flavour and 27 documented varieties of Basmati are grown in India.

176. Answer (1)

A probe is made complementary to the normal gene so that it will appear on photographic film. The clone having the mutated gene will hence not appear on the photographic film, because the probe will not have complementarity with the mutated gene.

177. Answer (3)

Transgenic organisms can be used to investigate new treatment for autoimmune diseases.

178. Answer (4)

RNAi takes place in all eukaryotic organisms as a method of cellular defense. This method involves silencing of a specific mRNA due to a complementary dsRNA molecule that binds to and prevents translation of the mRNA (silencing).

179. Answer (4)

Roundworms belong to the phylum Aschelminthes. Rest of all are insects which can be killed by Bt cotton.

180. Answer (1)

If the gene isolated from marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure.

181. Answer (2)

The transgenic plant got itself protected from the parasite as the parasite did not survive in a transgenic host expressing specific interfering RNA.

182. Answer (3)

Biopiracy is the term used to refer to the use of bio-resources by multinational companies and other organisations without proper authorisation from the countries and people concerned without compensatory payment.

183. Answer (2)

RDT, ELISA, PCR are some of the techniques that serve the purpose of early diagnosis.

184. Answer (3)

Using *Agrobacterium* vectors, nematode-specific genes were introduced into the host plant.

185. Answer (2)

GEAC is Genetic Engineering Approval Committee and it validates the introduction of GM organisms for public services.

SECTION - B

186. Answer (4)

Part labelled as 'A' is the stirrer which facilitates even mixing and oxygen availability throughout the bioreactor.

187. Answer (3)

We know about 900 restriction enzymes isolated from over 230 strains of bacteria.

188. Answer (2)

The construction of first recombinant DNA by Cohen and Boyer involved the linking of a gene encoding antibiotic resistance with a native plasmid of *Salmonella typhimurium*.

189. Answer (1)

In a method, suitable for plants, cells are bombarded with high velocity micro-particles of gold or tungsten coated with DNA in a method known as biolistics or gene gun.

190. Answer (4)

The enzymes frequently used in ELISA include peroxidase and alkaline phosphatase.

191. Answer (2)

Several attempts have been made to patent uses, products and processes based on Indian traditional herbal medicines. *e.g.*, turmeric, neem.

192. Answer (4)

Very low concentration of a bacteria or virus can be detected by amplification of their nucleic acid by PCR.

193. Answer (2)

Heat shock is given at 42°C and then putting the cells back on ice. This enables the bacteria to take up rDNA.

194. Answer (1)

If any protein encoding gene is expressed in a heterologous host, it is called a recombinant protein.

195. Answer (3)

Pure DNA fragments cannot be seen in visible light without staining.

196. Answer (3)

Methylase adds methyl groups to DNA.

197. Answer (1)

ERT is not a permanent cure as the enzyme is not being formed in the body.

198. Answer (3)

Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α-1-antitrypsin) used to treat emphysema.

199. Answer (3)

Plasmid DNA is double stranded, circular, naked, lacks introns and does not carry any vital gene necessary for the cell.

200. Answer (4)

The proteins encoded by the genes *cryIAc* and *cryIIAb* control the cotton bollworms, that of *cryIAb* controls corn borer.

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