Test Series (2023)

Mock Test –03

NEET

DURATION : 200 Minutes | **19-03-2023** | **M. MARKS : 720**

Topics Covered

Physics :	Full Syllabus (Class 11 & 12)
Chemistry :	Full Syllabus (Class 11 & 12)
Biology :	**(Botany) :** Full Syllabus (Class 11 & 12)
	(Zoology) : Full Syllabus (Class 11 & 12)

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hour 20 minute** duration.
3. The test booklet consists of **200** questions. The maximum marks are **720**.
4. There are four Section in the Question Paper, Section I, II, III & IV consisting of Section-I **(Physics)**, Section-II **(Chemistry)**, Section-III **(Botany)** & Section IV **(Zoology)** and having **50 Questions** in each part.
5. There is only one correct response for each questions.
6. Each correct answer will give 4 marks while 1 Mark will be deducted for a wrong MCQ response.
7. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
8. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pens.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

SECTION-I (PHYSICS)

SECTION: A

1. The time dependence of a physical quantity P is given by $P = P_0 e^{-\alpha t^2}$, where α is a constant and t is time. Then constant α is/has

(1) Dimensionless (2) Dimension of T^{-2}

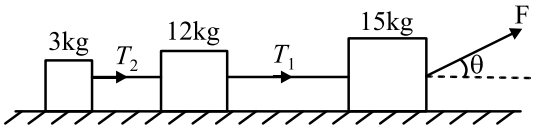
(3) Dimension of P (4) Dimension of T^{+2}

2. A balloonist releases a bag from a balloon which is rising constantly at $40 ms^{-1}$ at a time when the balloon is 100m above the ground. If $g = 10 ms^{-2}$, then the bag reaches the ground in:

(1) 16s (2) 18s

(3) 10s (4) 20s

3. In figure if the surfaces are frictionless the ratio of $T_1 : T_2$ is-



(1) $\sqrt{3}:2$ (2) $1:\sqrt{3}$

(3) 1 : 5 (4) 5 : 1

4. Under the action of a force a 2kg body moves such that its position x (in meters) is a function of time t is given by $x = \frac{t^4}{4} + 3$. Then work done by the force in first two seconds is

(1) 6 J (2) 10 J

(3) 7 J (4) 64 J

5. The angular velocity of a particle rotating in a circular orbit 210 times per minute is:

(1) π rad/s (2) 2π rad/s

(3) 22 rad/s (4) 44 rad/s

6. In free space, a shell moving with velocity 60m/s along the positive x-axis. When it passes through origin, it explodes into two pieces of mass ratio 1 : 2. After the explosion, the velocity of the centre of mass is:

(1) 20 m/s (2) 60 m/s

(3) 90 m/s (4) zero

7. The radius of gyration (K) of a rigid body changes with change of:

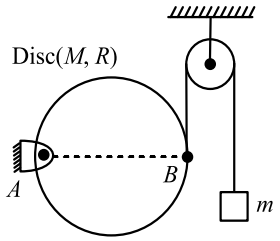
(1) Angular speed

(2) Axis of rotation

(3) Both (1) & (2)

(4) Never changes

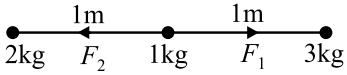
8. Find the value of mass m to keep the disc horizontal. (Given string is attached at point B on disc.)



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

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

9. For a given system, find out the net gravitational force on 1 kg mass.



(1) 6.67×10^{-10} N (2) 6.67×10^{-11} N

(3) 13.34×10^{-10} N (4) 13.34×10^{-11} N

10. The acceleration due to gravity at a height 1 km above the earth is the same as at a depth d below the surface of earth. Then:

(1) d = 1km (2) $d = \frac{3}{2}$ km

(3) $d = 2$ km (4) $d = \frac{1}{2}$ km

11. The bulk modulus of rubber is 9.8×10^8 N/m^2. To what depth a rubber ball a taken in a lake so that its volume is decreased by 0.1%.

(1) 1 km (2) 25 m

(3) 100 m (4) 200 m

12. Two temperature scales A and B are related by:

$$\frac{A-42}{110} = \frac{B-72}{220}$$

At which temperature two scales have the same reading?

(1) –42° (2) –72°

(3) 12° (4) –40°

13. In which of the following process convection does not take place primarily?

(1) Sea and land breeze

(2) Trade wind

(3) Boiling of water

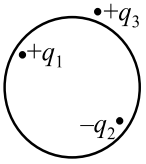
(4) Warming of glass of bulb due to filament

14. For any type of oscillatory or vibratory motion which force is necessary:
(1) Damping force (2) Restoring force
(3) External force (4) Any force

15. The transverse displacement of a stretched string which is connected between two rigid supports is given by $y = 0.06\sin\left(\frac{2\pi x}{5} - 80\pi t\right)$ where x and y are in metre and t in sec. Length of string is 1.5m and its mass is 3×10^{-2} kg. Then tension in string will be:
(1) 600N (2) 400N
(3) 800N (4) 200N

16. Point charges $+4q$, $-q$, $+4q$ are kept on the x-axis at points $x = 0$, $x = a$ and $x = 2a$ respectively, for displacement along x-axis:
(1) only $-q$ is in stable equilibrium
(2) none of the charges are in equilibrium
(3) all the charges are in unstable equilibrium
(4) all the charges are in stable equilibrium

17. The adjoining figure shows a spherical Gaussian surface and a charge distribution. When calculating the flux of electric field through the Gaussian surface, the electric field will be due to:



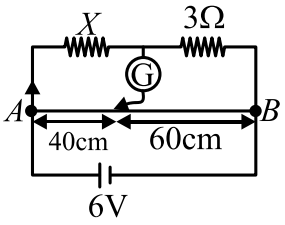
(1) $+q_3$ only
(2) $+q_1$ and q_3
(3) $+q_1$, $+q_3$ and $-q_2$
(4) $+q_1$ and $-q_2$

18. A parallel plate capacitor is connected to a 5V battery and charged. The battery is then disconnected and a glass slab is introduced between the plates. Then, the quantities that decrease are
(1) charge and potential differences
(2) charge and capacitance
(3) capacitance and potential difference
(4) energy stored and potential difference

19. The current in a wire varies with time according to the equation $i = 4 + 2t$, where i is in ampere and t is in second. The quantity of charge which passes through a cross-section of the wire during the time $t = 2$s to $t = 6$s is:
(1) 40 C (2) 48 C
(3) 38 C (4) 43 C

20. For measurement of potential difference, potentiometer is preferred in comparison to voltmeter because:
(1) Potentiometer is more sensitive than voltmeter
(2) The resistance of potentiometer is less than voltmeter
(3) Potentiometer is cheaper than voltmeter
(4) Potentiometer does not take current from the circuit

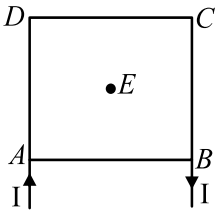
21. In figure a meter-bridge is shown in its balance position. If the resistance of the wire of meter-bridge is 1.0 ohm/cm then find the value of unknown resistance X:



(1) 4.5Ω (2) 2Ω
(3) 6Ω (4) 9Ω

22. The path difference between two interfering waves at a point on screen in 171.5 times the wavelength. If the path difference is 0.01372 cm. Find the wavelength?
(1) 4000 Å (2) 6000 Å
(3) 7000 Å (4) 8000 Å

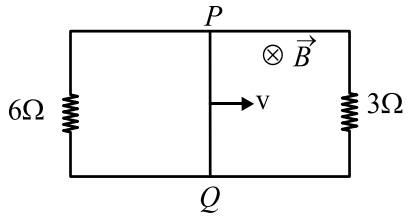
23. Current I enters at A in a square loop of uniform resistance and leaves at B. The ratio of magnetic field at E, the center of square, due to segment AB to that due to DC is: (Each side have equal resistance)



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

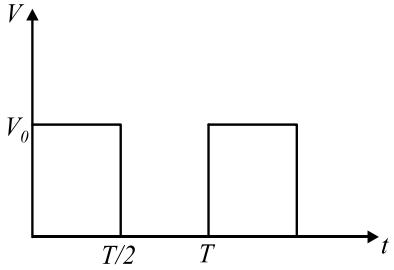
24. A 2MeV proton is moving perpendicular to uniform magnetic field of 2.5T. The magnetic force on the proton:
(1) 8×10^{-12}N
(2) 4×10^{-12} N
(3) 2×10^{-12} N
(4) 2×10^{-12} N

25. A rectangular loop with a sliding connector PQ of length ℓ = 1.0 m is situated in a uniform magnetic field B = 2T perpendicular to the plane of loop. Resistance of connector is r = 2Ω. Two resistance of 6Ω and 3Ω are connected as shown in figure. The external force required to keep the connector moving with a constant velocity v = 2m/s is:



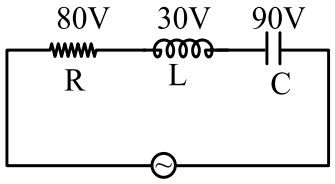
(1) 6 N (2) 4 N
(3) 2 N (4) 1 N

26. The *r.m.s* value of potential difference V shown in the figure is:-



(1) $\frac{V_0}{\sqrt{3}}$ (2) V_0
(3) $\frac{V_0}{\sqrt{2}}$ (4) $\frac{V_0}{2}$

27. In the circuit shown the potential differences across R, L and C are as given, then the voltage of the A.C. source will be: -



(1) 260V
(2) 20V
(3) 100V
(4) 140V

28. Arrange the following electromagnetic radiations per quantum in the order of increasing energy:
(A) Blue light (B) Yellow light
(C) X-ray (D) Radio wave
(1) D, B, A, C
(2) A, B, D, C
(3) C, A, B, D
(4) B, A, D, C

29. The images of clouds and tree in water always less bright than in reality–
(1) Because water is forming the image dirty
(2) Because there is an optical illusion due to which the image appears to be less bright
(3) Because only a portion of the incident light is reflected and quite a large portion goes mid water
(4) Because air above the surface of water contains a lot of moisture

30. An achromatic convergent system of focal length +20 cm is made of the two lenses in contact of materials having dispersive powers in the ratio of 1: 2, Their focal length must be respectively
(1) 10 cm, –20 cm (2) 20 cm, 10 cm
(3) –10 cm, –20 cm (4) 20 cm, –10 cm

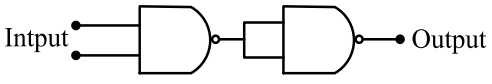
31. The stopping potential of anode relative to cathode that must be applied to stop the fastest photons emitted by surface having work function 5.01 eV, when UV light of wavelength 200 nm falls on it, must be: -
(1) 1.2 V (2) 2.4 V
(3) – 1.2 V (4) –2.4 V

32. Ratio of de-Broglie wavelength of proton and deuteron is 1 : 4 Then ratio of their KE will be: -
(1) 32 : 1 (2) 8 : 1
(3) 64 : 1 (4) 16 : 1

33. In a radioactive substance at t = 0, the number of atoms is 8×10^4. Its half life period is 3 years. The number of atoms 1×10^4 will remain after interval:
(1) 9 years (2) 8 years
(3) 6 years (4) 24 years

34. Regarding a semiconductor which one of the following statements is wrong?
(1) There are no free electrons at room temperature
(2) There are no free electrons at 0K
(3) The number of free electrons increases with increase in temperature
(4) The charge carriers are electrons and holes

35. The circuit given below represents which of logic operations: -



(1) AND (2) NOT
(3) OR (4) NOR

SECTION-B

This section will have 15 Question. Candidate can attempt any 10 question out of these 15 questions. In case if candidate attempts more than 10 more question, first 10 attempted question will be considered for marking.

36. A body moves in a plane so that the displacement along x and y axes are given by $x = 3t^3$ and $y = 4t^3$. The magnitude of velocity of the body is : -

(1) $9t$ (2) $15t$

(3) $15t^2$ (4) $25t^2$

37. The position x(in m) of a particle of mass 1 kg moving along x-axis varies with time t(in sec) as $t = \sqrt{x} + 3$ under the action of a force. The work done by the force from $t = 1$ to $t = 5$ sec. : -

(1) Zero

(2) 4J

(3) 6J

(4) 10J

38. A solid sphere slides down a smooth inclined plane of inclination θ with acceleration a_1. A disc rolls down a rough inclined plane of inclination θ with acceleration a_2. value of $\frac{a_1}{a_2}$ is :

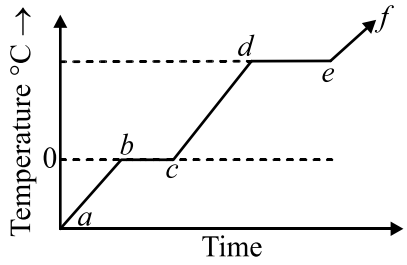
(1) $\frac{3}{2}$

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

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

(4) 2

39. The following figure represents the temperature versus time plot for a given amount of a substance when heat energy is supplied to it at a fixed rate and a constant pressure.



Which part of the above plot represent a phase change?

(1) a to b and e to f

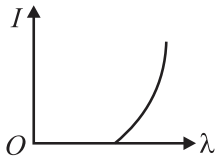
(2) b to c and c to d

(3) d to e and e to f

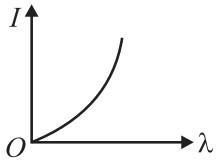
(4) b to c and d to e

40. The anode voltage of a photocell is kept fixed. The wavelength λ of the light falling on the cathode is gradually changed. The plate current I of the photocell varies as follows

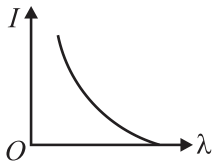
(1)



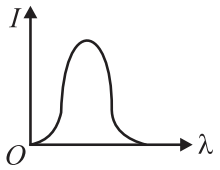
(2)



(3)



(4)

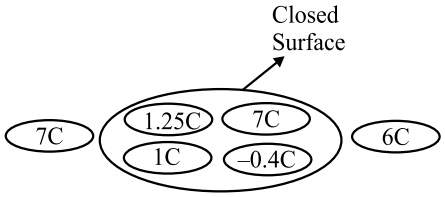


41. The period of oscillation of a mass M suspended from a spring of negligible mass is T. If along with it another mass M is also suspended, the period of oscillation will now be :-

(1) $\sqrt{2}T$ (2) T

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

42. What is the electric flux linked with closed surface?



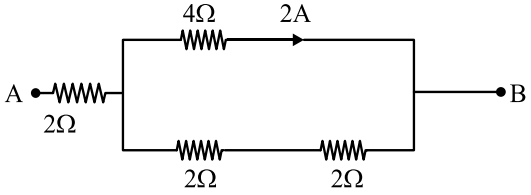
(1) 10^{11} N–m^2/C

(2) 10^{12} N–m^2/C

(3) 10^{10} N–m^2/C

(4) 8.86×10^{13} N–m^2/C

43. If current through 4Ω is 2A then calculate potential difference across A–B : -



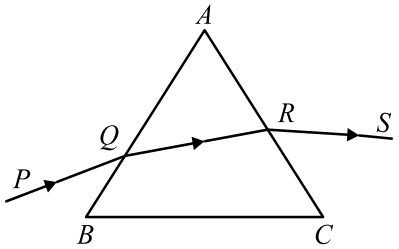
(1) 8V (2) 16V

(3) 4V (4) None

44. A uniform magnetic field acts at right angles to the direction of motion of electrons. As result, the electron moves in a circular path of radius 2 cm. If the speed of the electrons is doubled, the radius of the circular path will be :-

(1) 2.0 cm
(2) 0.5 cm
(3) 4.0 cm
(4) 1.0 cm

45. A ray of light is incident on an equilateral glass prism. For minimum deviation which of the following is true:-



(1) PQ || BC (2) RS || BC
(3) QR || BC (4) None

46. **Statement I :** The units of some physical quantities can be expressed as combination of the base units.
Statement II : We need only a limited number of units for expressing the derived physical quantities.

(1) Both Statement-I and Statement-II are correct.
(2) Both Statement-I and Statement-II are incorrect.
(3) Statement-I is correct and Statement-II is correct.
(4) Statement-I is incorrect and Statement-II is correct.

47. **Statement I :** The nuclear force is independent of the charge on the nucleons.
Statement II : The same nuclear force exists between proton-proton, proton-neutron and neutron-neutron.

(1) Both Statement-I and Statement-II are correct.
(2) Both Statement-I and Statement-II are incorrect
(3) Statement-I is correct and Statement-II is incorrect.
(4) Statement-I is incorrect and Statement-II is correct

48. **Assertion:** If the temperature of a semiconductor is increased then its resistance decreases.
Reason: The energy gap between conduction band and valence band is small in semiconductor .

(1) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(2) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(3) If the Assertion is correct but Reason is incorrect.
(4) If both the Assertion and Reason are incorrect.

49. **Assertion:** In process of photoelectric emission, all emitted electrons do not have same kinetic energy.
Reason: If radiation falling on photosensitive surface of a metal consists of different wavelength then energy acquired by electrons absorbing photons of different wavelengths shall be different.

(1) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(2) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(3) If the Assertion is correct but Reason is incorrect.
(4) If both the Assertion and Reason are incorrect.

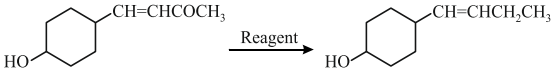
50. **Assertion:** No interference pattern is detected when two coherent sources are infinitely close to each other.
Reason: The fringe width is inversely proportional to the distance between the two sources.

(1) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(2) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(3) If the Assertion is correct but Reason is incorrect.
(4) If both the Assertion and Reason are incorrect.

SECTION-II (CHEMISTRY)

SECTION-A

51. In the given transformation, which of the following is the most appropriate reagent?



(1) Zn(Hg)-HCl (2) Na, liq. NH_3
(3) $NaBH_4$ (4) NH_2NH_2, OH^-

52. How many benzene rings are present in indigo?
(1) Zero (2) One
(3) Two (4) Three

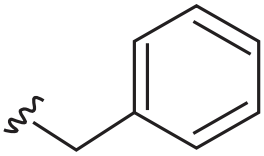
53. What is chemical name of the R-group present in tryptophan?
(1) Hydrogen (2) Indole
(3) Phenyl (4) Methyl

54. Which of the following contains secondary amino group?
(1) Leucine (2) Glycine
(3) Proline (4) None of these

55. Which of the following functional group is present in apple to give it a pleasant smell?
(1) Alcohol (2) Ether
(3) Ester (4) Aldehyde

56. Which of the following is not considered carboxylic oxidation level functional group?
(1) Nitrile
(2) Amide
(3) Ketone
(4) Acyl chloride

57. What is the trivial name given to the following fragment?



(1) Aryl
(2) Benzyl
(3) Phenyl
(4) Vinyl

58. What is the relationship between benzyl acetate and phenyl acetate?
(1) Isomers
(2) Rotamers
(3) Metamers
(4) None of these

59. Match List-I with List-II, and choose the correct option.

List I		List II	
A.	Valium	i.	Antifertility drug
B.	Morphine	ii.	Pernicious anaemia
C.	Norethindrone	iii.	Analgesic
D.	Vitamin B_{12}	iv.	Tranquiliser

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

60. Name the functional groups present in DMF and THF.
(1) Amide and ester
(2) Ether and amide
(3) Amide and ether
(4) Ester and alcohol

61. How many pi electrons are present in pentacene?
(1) 20 (2) 22
(3) 24 (4) 26

62. **Assertion:** In methane, ammonia and water, the respective central atoms are sp^3 hybridised.
Reason: All the three are having same bond angle.
(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion
(3) Assertion is correct, reason is incorrect
(4) Assertion is incorrect, reason is correct

63. Many towns and streets are lit at night by X vapour lamps, which emit an intense, pure yellow-orange glow. Inside these lights is X metal. The same colour as the light you get when you put a small amount of a X compound on a spatula and place it in a Bunsen flame. Identify X
(1) Iron
(2) Lithium
(3) Sodium
(4) Calcium

64. Which of the following is incorrect?
(1) The allowed vibrations of an electron in 3D space is known as orbitals.
(2) All s-orbitals are spherical.
(3) All p-orbitals have 2 nodes.
(4) All p-orbitals are directional.

65. Which of the following is paramagnetic?
(1) $Cr(CO)_6$ (2) $Fe(CO)_5$
(3) $Ni(CO)_4$ (4) $V(CO)_6$

66. The compound with zero dipole moment
(1) Cis-2-butene (2) Trans-2-butene
(3) But-1-ene (4) 2-methyl-1-propene

67. The bond dissociation energies (ΔH) of three alkyl halides is as follows:
CH_3Cl $\Delta H = 84$ kcal/mol
$CH_2 = CHCl$ $\Delta H = 207$ kcal/mol
$C_6H_5CH_2Cl$ $\Delta H = 166$ kcal/mol
The cleavage of C–Cl bond in the halide with least ΔH produces
(1) Two free radicals
(2) Two cations
(3) Two anions
(4) One cation and one anion

68. The electrophilic centre in the following molecule is
$CH_2 = CH - CO - CH_3$
(1) C_2 (2) C_2 and C_4
(3) C_3 (4) C_1

69. The boiling point of three isomeric pentanes A, B and C is 9.5°C, 28°C and 36°C respectively What are A, B and C?
(1) n-pentane, isopentane, neopentane
(2) Isopentane, neopentane, n-pentane
(3) n-pentane, neopentane, isopentane
(4) Neopentane, isopentane, n-pentane

70. Which one on the following pairs of species will have identical ground state electronic configuration?
(1) Li^+ and He^-
(2) Cl^- and Ar
(3) Na and K
(4) F^+ and Ne

71. The number of sigma and pi bonds between two carbon atoms in CaC_2 is
(1) 3σ and 0π
(2) 2π and 1σ
(3) 2σ and 1π
(4) 1π and 1σ

72. Chlorine gas reacts with aqueous solution of KOH to give certain products. The reaction is an example of
(1) Neutralization reaction
(2) Substitution reaction
(3) Disproportionation reaction
(4) Double displacement reaction

73. In case of neutralization reaction of weak acid and weak base, the enthalpy of neutralization is low because
(1) The reaction is slow
(2) The electrolytes are partially ionized
(3) A part of energy evolved is utilized in the dissociation of electrolytes.
(4) The ions are solvated and hence more energy is required for solvation

74. Cesium chloride on heating to 760 K changes into
(1) CsCI(g)
(2) NaCI structure
(3) Antifluorite structure
(4) ZnS structure

75. Consider the following statements. An increase in the rate of reaction for a rise in temperature is due to
I. The increase in the number of collisions
II. The shortening of mean free path
III. The increase in the number of activated molecules
IV. The increase in the pressure of the system
Choose the correct option regarding the correct statement.
(1) I and II
(2) II and III
(3) I and III
(4) I, III and IV

76. Consider the following statements. The role of a catalyst is to
I. Reduce the activation energy
II. Increase the activation energy
III. Increase the rate of attainment of equilibrium
IV. Decrease the rate of attainment of equilibrium
Which of the given statements are correct?
(1) II and IV
(2) I and IV
(3) I and III
(4) II and III

77. In view of the signs of $\Delta_r G^o < 0$ for the following reactions:
$PbO_2 + Pb \rightarrow 2PbO,\ \Delta_r G^o < 0;$
$SnO_2 + Sn \rightarrow 2SnO, \Delta_r G^o > 0$
Which oxidation states are more characteristics for lead and tin?
(1) For lead +2, for tin +2
(2) For lead +4, for tin +4
(3) For lead +2. for tin +4
(4) For lead +4, for tin +2

78. **Assertion:** Sols are positively or negatively charged

Reason: It is due to preferential adsorption of certain ion around the sol particle.

(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion
(3) Assertion is correct, reason is incorrect
(4) Assertion is incorrect, reason is correct

79. A piston filled with 0.04 mol of an ideal gas expands reversibly from 50.0 mL to 375 mL at a constant temperature of 37.0°C. As it does so, it absorbs 208 J of heat. The values of q and w for the process will be:

(R = 8.314 J/mol K) (In 7.5 = 2.01)

(1) q = +208 J. w = – 208 J
(2) q = –208 J. w = – 208 J
(3) q = –208 J, w = + 208 J
(4) q = +208 J, w = + 208 J

80. pOH of H_2O is 7 at 298 K. If water is heated to 350 K, which of the following statement should be true?

(1) pOH will decrease
(2) pH will increase
(3) pOH will remain 7.
(4) Both (1) and (2).

81. In the process of corrosion, at cathode, one mole of oxygen absorbs how many electrons

(1) 2 (2) 4
(3) 6 (4) 8

82. If 1.5 moles of oxygen combine with Al to form Al_2O_3, the weight of Al used in the reaction is:

(1) 27 g (2) 40.5 g
(3) 54 g (4) 81 g

83. The density of a solution prepared by dissolving 120 g of urea (mol. mass = 60 u) in 1000 g of water is 1.15 g/mL. The molarity of this solution is:

(1) 0.50M (2) 1.78 M
(3) 1.02 M (4) 2.05 M

84. The limiting molar conductivities of potassium ion is more than that of sodium ion. This is due to

(1) Bigger size of potassium
(2) Smaller size of potassium
(3) Less hydration of potassium ion as it is bigger in size
(4) More hydration of potassium ion as it is bigger in size

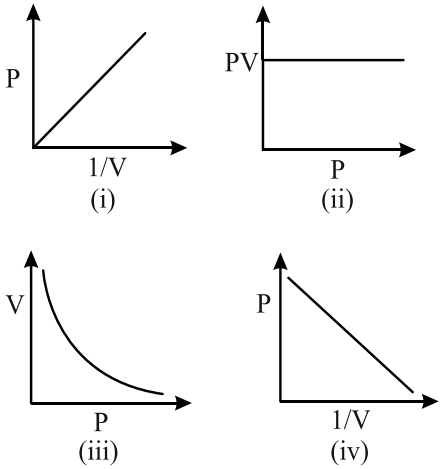
85. The correct order of following 3d metal oxides, according to their oxidation number is:

(a) CrO_3 (b) Fe_2O_3
(c) MnO_2 (d) V_2O_5
(e) Cu_2O

(1) (a) > (d) > (c) > (b) > (e)
(2) (d) > (a) > (b) > (c) > (e)
(3) (a) > (c) > (d) > (b) > (e)
(4) (c) > (a) > (d) > (e) > (d)

SECTION B

86. Which of the following graph represents the correct Boyle's law:



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

87. $Cu(OH)_2$ has Ksp = 1.6×10^{-19}. What is the maximum $[Cu^{2+}]$ concentration possible in a neutral solution (pH = 7)?

(1) 3.2×10^{-5} M
(2) 4.8×10^{-6} M
(3) 0.8×10^{-6} M
(4) 1.6×10^{-5} M

88. Azeotropes are binary mixtures having _____composition in _____ and _____ phase and boil at constant temperature.

(1) Same, liquid, vapour
(2) Same, liquid, solid
(3) Different, liquid, vapour
(4) Different, liquid, solid

89. Which of the following is an ideal solution?

(1) n-hexane and n-heptane
(2) Bromoethane and chloroethane
(3) Benzene and toluene
(4) All of the above

90. For the reaction given, $2NO_2(g) \rightleftarrows 2NO(g) + O_2(g)$, $K_C = 1.8 \times 10^{-6}$ at 184° C and R = 0.08311 kJ mol^{-1} K^{-1}. When K_P and K_C are compared at 184°C, it is found that:

(1) Whether K_P is greater than, less than or equal to K_C depends upon the total gas pressure

(2) $K_P = K_C$

(3) K_P is less than K_C

(4) K_P is greater than K_C

91. **Assertion:** In the addition of Grignard reagent to the carbonyl compound, the R group of RMgX attacks the carbonyl carbon.

Reason: The C-Mg bond of the Grignard reagent is highly polar, carbon being highly negative in comparison to magnesium.

(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.

(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion

(3) Assertion is correct, reason is incorrect

(4) Assertion is incorrect, reason is correct

92. Match the following Column:

Column I		Column II	
A.	Oppenauer oxidation	1.	Peracids
B.	Baeyer-Villiger oxidation	2.	Chromyl chloride
C.	Etard reaction	3.	Red P + Bromine
D.	HVZ reaction	4.	Zn/Hg, HCl
		5.	Acetone/Al-isopropoxide

	A	B	C	D
(1)	5	1	2	3
(2)	2	3	4	1
(3)	5	3	2	1
(4)	2	1	4	3

93. The de-Broglie wavelength for a He atom travelling at 1000 m/s at room temperature is

(1) 99.7×10^{-12} m (2) 199.4×10^{-12} m

(3) 199.4×10^{-18} m (4) 99×10^{-6} m

94. During the day at 27°C a cylinder with a sliding top contains 20.0 L of air. At night it only holds 19 L. What is the temperature at night in °C?

(1) 285 (2) 21

(3) 12 (4) 288

95. In a crystalline solid, having formula AB_2O_4, oxide ions are arranged in cubic close packed lattice while cations X are present in tetrahedral voids and cations Y are present in octahedral voids. The percentage of tetrahedral voids occupied by X is:

(1) 50% (2) 12.5%

(3) 58% (4) 75%

96. Band theory predicts that magnesium is an insulator. However, in practice it acts as a conductor due to

(1) Presence of filled 3s orbital

(2) Overlap of filled 2p and filled 3s orbital

(3) Overlap of filled 3s and empty 3p orbital

(4) Presence of unfilled 3p orbital

97. An alkali metal hydride (NaH) reacts with diborane in 'A' to give a tetrahedral compound 'B' which is extensively used as reducing agent in organic synthesis. The compounds 'A' and 'B' respectively are:

(1) CH_3COCH_3 and $B_3N_3H_6$

(2) $(C_2H_5)_2O$ and $NaBH_4$

(3) C_2H_6 and C_2H_5Na

(4) C_6H_6 and $NaBH_4$

98. Among the following, the isoelectronic and isostructural pair is

(1) CO_2 and SO_2

(2) SO_3 and SeO_3

(3) NO_2^+ and TeO_2

(4) SiO_4^{4-} and PO_4^{3-}

99. Match Column-I with Column-II and select the correct answer with respect to hybridisation using the codes given below:

Column I (Complex)		Column II (Hybridisation)	
(I)	$[AuF_4]^-$	(p)	dsp^2 hybridisation
(II)	$[Cu(CN)_4]^{3-}$	(q)	sp^3 hybridisation
(III)	$[Co(C_2O_4)_3]^{3-}$	(r)	Sp^3d^2 hybridisation
(IV)	$[Fe(H_2O)_5NO]^{2+}$	(s)	d^2sp^3 hybridisation

Codes :

	(I)	(II)	(III)	(IV)
(A)	q	p	r	s
(B)	p	q	s	r
(C)	p	q	r	s
(D)	q	p	s	r

100. The reaction of solid XeF_2 with AsF_5 in 1 : 1 ratio affords

(1) XeF_4 and AsF_3

(2) XeF_6 and AsF_3

(3) $[XeF]^+$ and $[AsF_6]^-$

(4) $[Xe_2F_3]^+$ and $[AsF_6]$

SECTION-III (BOTANY)

SECTION-A

101. Haplo-diplontic life cycles are exhibited by which of the following plant groups?
(1) Ferns (2) Kelps
(3) Liverworts (4) All of these

102. Read the following statements.
(a) Male or female cones may be borne on the same tree in *Pinus*.
(b) Megaspore mother cell divides mitotically to form four megaspores.
(c) Meiosis in zygote results in haploid spore formation.
(d) Male and female gametophytes have independent free-living existence in gymnosperms.
(e) Haplontic life cycle is observed in *fucus*.
Select the correct statements:
(1) a, b and e (2) a, b, d and e
(3) b, c, d and e (4) a, c and e

103. Species of *Eudorina* produces what kind of gametes
(1) Anisogamous (2) Isogamous
(3) Oogamous (4) Both (2) and (3)

104. *Adiantum* represents which of the following class of pteridophytes?
(1) Psilopsida (2) Pteropsida
(3) Lycopsida (4) Sphenopsida

105. Identify the correct statement from the following
(1) *Porphyra* species possess 2-equal flagella to coordinate its movement
(2) Members of phaeophyceae store food in the form of Floridean starch.
(3) Asexual reproduction takes place by flagellated zoospores in green algae.
(4) Major pigments found in *Fucus* in chlorophyll a and d.

106. Whittaker placed unicellular nucleated organisms in
(1) Protista (2) Fungi
(3) Plantae (4) Monera

107. Consider the following statements and choose the incorrect statement?
(1) Mycelium is aseptate and coenocytic in *Albugo* and *Mucor*.
(2) No sexual reproduction is known in *Trichoderma* species.
(3) Asexual spores are more commonly found in species causing wheat rust.
(4) Puff balls, Bracket fungi are known forms of basidiomycetes.

108. Identify the correct sequence of taxonomic categories.
(1) Genus – species – order – family – class
(2) Genus – species – family – order – class
(3) Species – genus – family – order – class
(4) Species – genus – order – family – class

109. Mark the odd one in the following:
(1) Plantae (2) Chordata
(3) Clubmosses (4) Tracheophyta

110. Match the term in column A with their respective examples in column B:

Column-A		Column-B	
1.	Mad cow disease	i.	Phytoplankton
2.	Heterocysts	ii.	*Trypanosoma*
3.	Diatoms	iii.	Prions
4.	Sleeping sickness	iv.	*Anabena*
5.	Leaf curling	v.	Virus

Select the correct option:

	1	2	3	4	5
(1)	iii	iv	i	ii	v
(2)	v	iv	i	ii	iii
(3)	v	i	iv	iii	ii
(4)	ii	iii	v	iv	i

111. The flora formula of tobacco plant is:
(1) $\oplus ♂ k_5 \overset{\frown}{C_{(5)} A_{(5)}} \underline{G}_{(2)}$
(2) $\oplus ♂ k_{(5)} \overset{\frown}{C_{(5)} A_5} \underline{G}_{(2)}$
(3) $\oplus ♂ {}_{2+2}\, C_4 A_5 G_{(2)}$
(4) $\% ♂ k_{(5)} C_{1+2+(2)} A_{(9)+1} \underline{G}_{(1)}$

112. Ovary becomes two chambered due to the formation of false septum in
(1) Primrose (2) China rose
(3) Mustard (4) Marigold

113. Which of the following is wrongly matched?
(1) Epiphyllous – Lily
(2) Drupe – Coconut
(3) Polyadelphous – *Citrus*
(4) Asymmetric flower – Bean

114. **Statement I:** In conjoint vascular bundles xylem and phloem are present separately.
Statement II: Vascular bundles are arranged in a ring, each bundle in open, conjoint in dicot stem.
(1) Both statements are correct
(2) Both statements are incorrect
(3) Only statement I is correct
(4) Only statement II is correct

115. A bundle in which phloem sandwiches xylem on both the sides is called
(1) Bicollateral (2) Radial
(3) Concentric (4) Collateral

116. In dicot stem newly formed cells of secondary phloem are found:
(1) Inside the pericycle
(2) Inside the hypodermic
(3) Outside the vascular cambium
(4) Inside the vascular cambium

117. Glycosylation of protein occurs in which cell organelle?
(1) Golgi bodies
(2) Chloroplast
(3) Ribosomes
(4) Mitochondrial matrix

118. Which of the following statement is wrong?
(1) Proteins can move within lipid bilayer
(2) Proteins can undergo flip-flop movements in lipid bilayer
(3) Phospholipid molecule can't change their position within the same layer
(4) Arrangement of lipids within the membrane is such that the head lies towards the outer side and hydrophobic tail towards the inner side.

119. Mitochondria and chloroplasts are called semi-autonomous organelles because
(1) They are involved in energy transformation
(2) They are formed by division of pre-existing organelles and do not have protein synthesizing machinery
(3) They are involved in vital processes like photosynthesis, respiration
(4) They have their own DNA and protein synthesising machinery

120. Chromosome decondense and lose their individuality in
(1) Anaphase
(2) Telophase
(3) Prophase
(4) Metaphase

121. Syncytium is formed when
(1) Karyokinesis not followed by cytokinesis
(2) Karyokinesis is followed by cytokinesis
(3) Karyokinesis do not occur at regular interval
(4) Both (2) and (3)

122. Crossing over is an enzyme-mediated process, the enzyme involved in it is
(1) Polymerase (2) Ligase
(3) Endonuclease (4) Recombinase

123. Which element performs important function in splitting of water to liberate oxygen during photosynthesis?
(1) Manganese (2) Molybdenum
(3) Copper (4) Zinc

124. Which element is needed in synthesis of auxin?
(1) Copper (2) Chlorine
(3) Zinc (4) Magnesium

125. **Assertion:** C_3 plants are more efficient than C_4 plants due to absence of photorespiration.
Reason: In C_4 plants, respiration does not occur in dark.
(1) Both assertion and reason are correct and reason is correct explanation of assertion
(2) Both assertion and reason are correct and reason is not correct explanation of assertion
(3) Only assertion is true but reason is false
(4) Both assertion and reason are false

126. In the lac operon system, permease is coded by
(1) y-gene (2) a-gene
(3) i-gene (4) z-gene

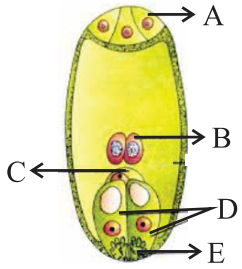
127. The purposeful manipulation of plant species in order to create desired plant types that are better suited for cultivation, give better yields and are disease resistant is called:
(1) Breeding (2) Genetic farming
(3) Phytoremediation (4) rDNA technology

128. The primary acceptor of CO_2 in C_4 plants is
(1) RuBP (2) Acetyl CoA
(3) PEP (4) PGA

129. In chloroplasts and mitochondria, chemiosmotic theory of ATP synthesis is based on
(1) Accumulation of Na ions
(2) Proton gradient
(3) Membrane potential
(4) Both (2) and (3)

130. Water potential of a cell is affected by
(1) Solute potential
(2) Pressure potential
(3) Matrix potential
(4) All of these

131. In the given diagram, label the parts A, B, C, D, E.



(1) Synergids, Central cell, Egg cell, Antipodals, Polar nuclei
(2) Antipodals, Polar nuclei, Egg cell, Synergids, Filiform appratus
(3) Polar nuclei, Antipodals, Egg cell, Synergids, Filiform appratus
(4) Antipodals, Central cell, Egg cell, Synergids, Filiform appratus

132. **Statement I:** In cleistogamous flower, self pollination takes places.
Statement II: In *Oxalis*, generally xenogamy takes places by various means.
(1) Both statements are correct
(2) Both statements are incorrect
(3) Only statement I is correct
(4) Only statement II is correct

133. Vegetative propagation in banana takes places by
(1) Rhizome (2) Stolon
(3) Suckers (4) Tuber

134. Match the structure/process in column I with the examples in column II and choose the correct answer:

Column I		Column II	
A.	Non-endospermic seed	i.	Sunflower
B.	Scutellum	ii.	Angiosperms
C.	Capitulum	iii.	Beet
D.	Double fertilisation	iv.	Maize
E.	Perisperm	v.	Groundnut

	A	B	C	D	E
(1)	iii	i	iv	ii	v
(2)	v	iv	i	ii	iii
(3)	iv	i	iii	ii	v
(4)	i	ii	iii	v	iv

135. When tall plant with yellow seeds (TtYy) are crossed with tall plant with green seed (Ttyy), the expected proportions of tall and green phenotype in the offspring is
(1) 3
(2) 4
(3) 2
(4) 1

SECTION – B

136. Man become sterile due to presence of additional copy of X-chromosome. This chromosomal disorder is
(1) Turner syndrome
(2) Klinefelter syndrome
(3) Down syndrome
(4) Polyploidy

137. Pioneer community in Xerarch succession is
(1) Lichen (2) Herb
(3) Scrub stage (4) Forest stage

138. Which of the following statements regarding species interdependence are true?
(a) An interspecific association where one is harmed and other remains unaffected is ammensalism
(b) An interspecific association in which one is benefitted and other gets harmed is commensalism
(c) An interspecific association in which both the partners are benefitted from each other is symbiosis
(d) An interspecific association in which both partners gets harmed is predation
(1) a, b and c (2) a and c
(3) a, c and d (4) All are true

139. In a DNA molecule, distance between a base pair in a helix is approximately
(1) 0.34 nm
(2) 3.4 nm
(3) 4.5 nm
(4) 0.2 nm

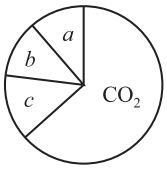
140. Identify the correct sequence produced as a result of transcription of the DNA sequence GCTACAGATC?
(1) 5'CGUUGUCUUG3'
(2) 5'CGUAGUCUAG3'
(3) 5'CGUAGUCUUG3'
(4) 5'CGAUGUCUAG3'

141. **Assertion:** Senescence takes place in all non-meristematic cells.
Reason: Meristematic cells are potentially immortal.
(1) Both assertion and reason are correct and reason is correct explanation of assertion
(2) Both assertion and reason are correct and reason is not correct explanation of assertion
(3) Only assertion is true but reason is false
(4) Both assertion and reason are false

142. In transcription in eukaryotes, rRNA is transcribed by?

(1) RNA polymerase II
(2) RNA polymerase III
(3) RNA polymerase I
(4) Both (2) and (3)

143. The given figure shows relative contribution of various green-house gases to the total global warming.



Name the gases *a, b, c*

(1) N_2O, CH_4, CFC_S (2) CH_4, N_2O, CFC_S
(3) N_2O, CFC_S, CH_4 (4) N_2O_2, CH_4, CFC_S

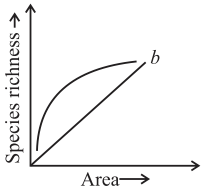
144. Identify the correct pair

(1) Scrubber – Remove O_2
(2) Arsenic – Black foot disease
(3) Green muffler – Air pollution
(4) Ozone hole – CO_2

145. Which of the following is not *In-situ* conservation?

(1) Wildlife safari
(2) National parks
(3) Biosphere reserve
(4) Biodiversity hotspots

146. The given graph shows species areas relationship. Choose the correct equation of the curve *b*?



(1) Log S = Log A + Z log C
(2) Log S = Log C + A log Z
(3) Log C = Log S + Z log A
(4) Log S = Log C + Z log A

147. Which enzymes are used in detergents and fruit juices are clarified by which enzymes respectively?

(1) Lipases, proteases
(2) Proteases, lipases
(3) Hydrolases, lipases
(4) Proteases, carboxylases

148. **Assertion:** In most eukaryotic cell, the net gain of ATP per glucose molecule oxidized is 38 ATP.
Reason: Only three molecules of ATP are synthesised during glycolysis.

(1) Both assertion and reason are correct and reason is correct explanation of assertion
(2) Both assertion and reason are correct and reason is not correct explanation of assertion
(3) Only assertion is true but reason is false
(4) Both assertion and reason are false

149. The crossing of F_1, hybrid with either of the parents is called

(1) Back cross
(2) Test cross
(3) Breeding
(4) Hybridization

150. Identify the correct statements:

(a) One of objective of plant breeding is to develop diseases, pest resistant varieties
(b) Most important breeding method is inbreeding
(c) Hybrid vigour increases by continuous breeding
(d) Apis mellifera is high yielding variety of honey bees
(e) Pure line represents the progeny of homozygous plant

(1) Only a, b, e is correct
(2) Only a, c, d, e is correct
(3) Only a, d, e is correct
(4) All are correct

SECTION-IV (ZOOLOGY)

SECTION – A

151. Choanocytes are also known as :
(1) Collar cells (2) Cnidoblasts
(3) Flame cells (4) Lasso cells

152. Which of the following phylum shows polymorphism?
(1) Porifera (2) Coelenterata
(3) Ctenophora (4) Platyhelminthes

153. The notochord is formed on which side of the body during embryonic development ?
(1) Lateral (2) Ventral
(3) Dorsal (4) Bilateral

154. Tentacles of ctenophore contain
(1) Cnidoblasts (2) Colloblasts
(3) Comb plate (4) Statocysts

155. Hydra is
(1) Fresh water form, radially symmetrical and diploblastic
(2) Marine, radially symmetrical and diploblastic
(3) Fresh water form, bilaterally symmetrical and diploblastic
(4) Marine, radially symmetrical and triploblastic

156. The junction that help to stop substances from leaking is
(1) Tight junction
(2) Gap junction
(3) Adhering junction
(4) All of these

157. Endothelium lining of blood vessel is formed of
(1) Ciliated epithelium
(2) Columnar epithelium
(3) Cuboidal epithelium
(4) Simple squamous epithelium

158. Stratified non-keratinised squamous epithelium covers
(1) Moist surface
(2) Dry surface
(3) Rough surface
(4) Dead surface

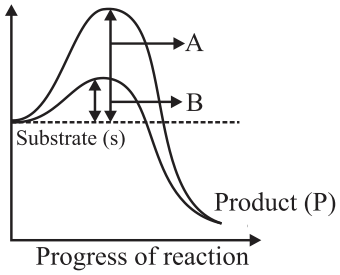
159. Goblet cells are found in
(1) Rectum
(2) Anus
(3) Stomach
(4) Buccal cavity

160. **Assertion (A):** Goblet cells are unicellular glands.
Reason (R): Pancreas is compound gland.
(1) (A) is correct but (R) is not correct.
(2) (A) is not correct but (R) is correct.
(3) Both (A) and (R) are correct and (R) is the correct explanation of (A).
(4) Both (A) & (R) are correct but (R) is not the correct explanation of A.

161. Which of the following are drugs?
(1) Abrin, ricin
(2) Morphine, codeine
(3) Vinblastine, curcumin
(4) Rubber, gums

162. Biomolecule which cannot be considered as a polymer is
(1) RuBisCO (2) Gingely oil
(3) Glycogen (4) Cellulose

163. The graph given below is showing the concept of activation energy, Identify A and B in the options given below



	(A)	(B)
(1)	Transition state	Potential energy
(2)	Potential energy	Transition state
(3)	Activation energy without enzyme	Activation energy with enzyme
(4)	Activation energy with enzyme	Activation energy without enzyme

164. 'Crypts of lieberkuhn' are found in
(1) Stomach (2) Intestine
(3) Liver (4) Gall Bladder

165. Achlorohydria is
(1) Non-secretion of urine
(2) Non-secretion of HCl
(3) Non-secretion of H_2SO_4
(4) Non-secretion of HNO_3

166. Pantothenic acid is vitamin
(1) B_6 (2) B_7
(3) B_5 (4) B_9

167. Diffusion membrane is made up of
(1) Thin squamous epithelium of alveoli
(2) Endothelial lining of alveolar capillaries that surround it
(3) Basement substance
(4) All of these

168. Factors that affect rate of diffusion is/are:
(1) Solubility of gases
(2) Partial pressure of gases
(3) Thickness of membrane
(4) All of these

169. For conversion of prothrombin into thrombin, which of the following is required?
(1) Fibrinogen (2) Vitamin K
(3) Proconvertin (4) Thrombokinase

170. Atrial systole
(1) Increase the flow of blood into the ventrides by 70 percent.
(2) Is due to generation of action potential in AVN only
(3) Increase the flow of blood into ventricles by 30%
(4) Coincides with ventricular systole

171. All of the following are excreted through sebum except:
(1) Sterols (2) Hydrocarbons
(3) Waxes (4) NaCl

172. Contraction of which of the following smooth muscles results in release of urine out from urinary bladder?
(1) Dartos muscles
(2) Detrusor muscles
(3) Deltoidius muscles
(4) Depressor muscles

173. Anaerobic work becomes painful due to accumulation of
(1) Ca^{2+} ions (2) Calcium carbonate
(3) Lactic acid (4) Creatine phosphate

174. Contractile unit of muscles is a part of myofibril between
(1) Z-line and I band
(2) Z-line and Z-line
(3) Z-line and A-band
(4) A-band and I-band

175. Somatic neural system relays impulses from
(1) CNS to involuntary organs
(2) Involuntary organs to CNS
(3) CNS to skeletal muscles
(4) Skeletal muscles to CNS

176. Which of the following is not under control of human parasympathetic nervous system?
(1) Constriction of pupil
(2) Contraction of bladder
(3) Increase in salivation
(4) Increased sweating

177. Which part of brain is responsible for thermoregulation?
(1) Cerebrum
(2) Hypothalamus
(3) Corpus callosum
(4) Medulla oblongata

178. Removal of parathyroid glands can result in
(1) Goitre (2) Tetany
(3) Diabetes (4) Gigantism

179. **Statement 1:** Prolactin is lactotroph.
Statement 2: FSH is gonadotroph.
Choose the correct statement
(1) Statement I is correct but statement II is incorrect.
(2) Statement I is incorrect but statement II is correct.
(3) Both statements I and II are correct.
(4) Both statements I and II are incorrect.

180. If over secretion of growth hormone occurs after puberty, then individual suffers from :
(1) Gigantism
(2) Acromegaly
(3) Pitutary dwarfism
(4) All of these

181. **Assertion (A):** Development of embryo from the zygote is known as embryogenesis.
Reason (R): Embryogenesis involves cell division and cell differentiation.
(1) Both (A) and (R) are true and (R) is the correct explanation of (A).
(2) Both (A) and (R) are true but (R) is the incorrect explanation of (A).
(3) Both (A) and (R) are false.
(4) Both (A) and (R) are true.

182. In humans, at the end of the first meiotic divisions, the male germ cells form :
(1) Spermatogonia
(2) Primary spermatocyte
(3) Secondary spermatocyte
(4) Spermatid

183. The middle piece of sperm contains
(1) Proteins (2) Mitochondria
(3) Centriole (4) Nucleus

184. Hormone releasing IUDs is
(1) LNG-20 (2) Progestasert
(3) Cortisone (4) Both (1) and (2)

185. MTPs are relatively safe upto
(1) 12 weeks of pregnancy
(2) 20 weeks of pregnancy
(3) 24 weeks of pregnancy
(4) Secondary trimester of pregnancy

SECTION – B

186. Life originated in:
(1) Air
(2) Water
(3) Sun
(4) Soil

187. All of the following theories were given for the origin of life, except:
(1) The Big Bang theory
(2) Theory of panspermia
(3) Theory of spontaneous generation
(4) Theory of chemical evolution

188. **Statement I:** First mammals on earth were like shrews.
Statement II: *Dryopithecus* were more ape-like and *Ramapithecus* were more man-like primate.
Choose the correct option:
(1) Statement I is correct but statement II is incorrect
(2) Statement I is incorrect but statement II is correct
(3) Both statement I and II are correct
(4) Both statement I and II are incorrect

189. Common cold is
(1) Caused by gram-negative bacterium
(2) Not an infectious disease
(3) Caused by a virus
(4) Caused by a gram-positive bacterium

190. **Assertion (A):** The antibodies produced against allergens are IgE type.
Region (R): Edward Jenner is regarded 'Father of immunology'
(1) (A) is correct but (R) is not correct.
(2) (A) is not correct but (R) is correct.
(3) Both (A) and (R) are correct and (R) is the correct explanation of (A).
(4) Both (A) and (R) are correct but (R) is not the correct explanation of (A).

191. Autoimmunity is caused due to the
(a) Ability of immune cells to discriminate between self-cells from non-self-cells.
(b) Inability of immune cells in damaging self-cells representing foreign antigens.
(c) Inability of immune cells in distinguishing self-cells from non-self-cells.
(d) Ability of immune cells to damage self-cells.
(1) (a) and (b) only (2) (b) and (c) only
(3) (c) and (d) only (4) (a) and (d) only

192. How much is the contribution of India and China to world's farm produce?
(1) 5% (2) 10%
(3) 15% (4) 25%

193. Which of the following disease is caused by virus?
(1) Anthrax
(2) Rinderpest
(3) Tick fever
(4) Coccidiosis

194. Ranikhet disease is connected with
(1) Honey bees
(2) Hens
(3) Fishes
(4) Pigs

195. Which of the following enzymes has been incorrectly matched with their function?
(1) Ligase - Molecular glue
(2) Endonuclease - Chemical scalpel
(3) DNA polymerase - Joins nucleoside
(4) RNA polymerase - Joins nucleotides

196. Which of the following represents the correct palindromic sequence recognised by EcoRI ?
(1) 5'-G↓AATTC-3'
5'-CTTAA↑G-3'
(2) 5'-CCC↓GGG-3'
3'-GGG↑CCC-5'
(3) 5'-G↓AATTC-3'
3'-CTTAA↑G-5'
(4) 5'-ATGCC↓G-3'
3'-TACGG↑C-5'

197. Which of the following is the most important factor that would leads to increased milk yield in cattle ?
(1) Selection of good breeds
(2) Resistance to diseases
(3) Stringent cleanliness and hygiene
(4) Provision of ideal environmental conditions to cattle

198. Crystalline protein synthesised by *Bacillus thuringiensis* is activated by
(1) Acidic condition of bacterial food vacuole
(2) Alkaline pH of bacterial food vacuole
(3) Alkaline pH in insect foregut
(4) Alkaline pH in insect mid-gut

199. Methods of producing microbe and pest resistant plants include
(1) RNAi (2) Use of Bt toxin
(3) Gene therapy (4) Both (1) and (2)

200. Production of pest resistant plants could
(1) Increase the amount of pesticide used
(2) Increase the amount of weedicide used
(3) Decrease the amount of pesticide used
(4) Both (1) and (2)

Test Series (2023)

Mock Test - 03

NEET

DURATION : 200 Minutes | **19/03/2023** | **M. MARKS : 720**

ANSWER KEY

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

SECTION – I (PHYSICS)

1. **(2)**

Given $\boxed{P = P_0 e^{-\alpha t^2}}$,

αt^2 must be dimension less in $e^{-\alpha t^2}$,

$\Rightarrow \quad \dim(\alpha t^2) = M^0 L^0 T^0$

$\Rightarrow \quad \dim(\alpha) = \dfrac{M^0 L^0 T^0}{t^2}$

$\Rightarrow \quad \dim(\alpha) = M^0 L^0 T^{-2}$

$= \boxed{M^0 L^0 T^{-2}}$

2. **(3)**

$S = ut + \dfrac{1}{2}at^2$

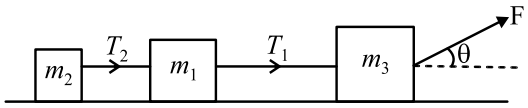
$-100 = 40t + \dfrac{1}{2}(-10)t^2$

$5t^2 - 40t - 100 = 0$

$t^2 - 8t - 20 = 0$

by solving above equation $t = 10$ sec

3. **(4)**



$T_2 = m_2 a$

$T_1 = (m_1 + m_2)a$

$T_1 : T_2 = (m_1 + m_2)a : m_2 a$

$= (12 + 3)a : 3a = 15a : 3a = 5 : 1$

4. **(4)**

$x = \dfrac{t^4}{4} + 3$

$\dfrac{dx}{dt} = \dfrac{4t^3}{4} + 0$

$V = t^3$

Using work energy theorem

$w = \Delta k = \dfrac{1}{2}m\left(v_f^2 - v_i^2\right)$

$\dfrac{1}{2}(2)\left[\left(2^3\right)^2 - 0\right] = 64\text{J}$

5. **(3)**

rounds = 210, time = 60s

$\theta = 2\pi n$

$\omega = \dfrac{\theta}{t} = \dfrac{2\pi(210)}{60}$

$\omega = 7\pi$ rad/s

$\omega = 22$ rad/s

6. **(2)**

As $F_{ext} = 0$ so v_{cm} = constant

$\therefore\ v_{cm} = 60$ m/s

7. **(2)**

Radius of gyration (K) depends on axis of rotation and mass distribution of body. If does not depends on mass of body and angular qualities (angular displacement, angular velocity etc.)

8. **(2)**

To keep the disc horizontal

Net torque = 0 (about point A)

$Mg(R) - T(2R) = 0$

$MgR - mg(2R) = 0$ ($T = mg$)

$m = \dfrac{M}{2}$

9. **(2)**

$F_{net} = F_1 - F_2 = \dfrac{G(3)(1)}{(1)^2} - \dfrac{G(2)(1)}{(1)^2}$

$= G = 6.67 \times 10^{-11}$ N

10. **(3)**

$\dfrac{\Delta g}{g} = \dfrac{2h}{R}, \dfrac{\Delta g}{g} = \dfrac{d}{R}$

So $\dfrac{2h}{R} = \dfrac{d}{R} \Rightarrow d = 2h \Rightarrow d = (1)$

$d = 2$km

11. **(3)**

$B = \dfrac{\Delta P}{-\Delta V / V}$

$\Delta P = B(\Delta V/V)$

$h\rho g = B(-\Delta V/V)$

$h \times 10^3 \times 9.8 = (9.8 \times 10^8) \times (0.1 \times 10^{-2})$

$h = 100$m

12. **(3)**

Let at temperature T both the scales A and B have the same reading.

$\dfrac{T - 42}{110} = \dfrac{T - 72}{220}$ or $2T - 84 = T - 72$

Or $T = 12°$

13. **(4)**

In convection process heat is transferred by the actual motion of the heated particles. It is not so is case of warming of glass bulb due to filament heating effect, warming of glass bulb is due to radiation.

14. (2)

Restoring force is necessary for SHM.

15. (3)

$$V = \sqrt{\frac{T}{\mu}} = \frac{\omega}{k}$$

$$T = \frac{\mu\omega^2}{k^2} = \left(\frac{m}{L}\right)\left(\frac{\omega}{k}\right)^2$$

$$T = \left(\frac{3\times10^{-2}}{1.5}\right)\left(\frac{80\pi}{2\pi/5}\right)^2$$

$T = (2 \times 10^{-2})\ (200)^2 = 800\text{N}$

16. (4)

Force on the charge $-q$ will be due to the other two charges $4q$ and $4q$

$$F = \frac{kq_1q_2}{r^2}$$

$$\Rightarrow F = \frac{k4q(-q)}{a^2} - \left(\frac{k4q(-q)}{a^2}\right)$$

$\therefore F = 0$

Force on the charge $4q$ at $x = 0$ will be due to the other two charges $-q$ and $4q$

$$F = \frac{kq_1q_2}{r^2}$$

$$\Rightarrow F = \left|\frac{k4q(-q)}{a^2}\right| - \left|\left(\frac{k4q(4q)}{(2a)^2}\right)\right|$$

$$\Rightarrow F = \frac{k4q(q)}{a^2} - \frac{k4q(q)}{a^2}$$

$\therefore F = 0$

Force on the charge $4q$ at $x = 2a$ will be due to the other two charges $-q$ and $4q$

$$F = \frac{kq_1q_2}{r^2}$$

$$\Rightarrow F = \left|\frac{k4q(-q)}{a^2}\right| - \left|\left(\frac{k4q(4q)}{(2a)^2}\right)\right|$$

$$\Rightarrow F = \frac{k4q(q)}{a^2} - \frac{k4q(q)}{a^2}$$

$\therefore F = 0$

17. (4)

Electric field will be due to $+q_1$ and $-q_2$

18. (4)

The quantities energy stored and potential difference decreases, because $U = \frac{1}{2}\frac{q^2}{KC}$ and $V = \frac{q}{KC}$ decreases. On inserting a dielectric, the capacitance increases (KC_0), where C_0 is the capacitance when no glass slab is present and K is dielectric constant, As 'C' increase, U and V both decreases as they are inversely related to C. q is constant here.

19. (2)

$$dq = \int i\,dt = \int (4+2t)dt$$

$$\Rightarrow q = \int_2^6 (4+2t)\,dt = \left[4t + t^2\right]_2^6$$

$= 4 \times 6 + 6^2 - (4 \times 2 + 2^2) = 60 - 12 = 48\text{C}$

20. (4)

For measurement of potential difference, potentiometer is preferred in comparison to voltmeter because Potentiometer does not take current from the circuit.

21. (2)

$$\frac{X}{3} = \frac{40}{60} \Rightarrow X = 2\Omega$$

22. (4)

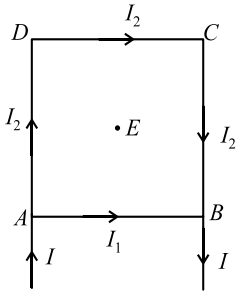
$$\Delta x_d = 171.5\lambda = \frac{343}{2}\lambda = 0.01372$$

$$\lambda = \frac{0.01372\times2}{343} = 8\times10^{-5}\text{ cm}$$

$\lambda = 8000$ Å

23. (3)

Let current in AB I_1 and in DC, I_2. Then



$\frac{I_1}{I_2} = \frac{3}{I}$ It is because resistance of AB will be one-third of that of $ADCB$.

Now, $\frac{B_1}{B_2} = \frac{I_1}{I_2} = 3$

24. (1)

$F = \text{qvB}$, $E = \frac{1}{2}\text{mv}^2$

$$F = \text{qB}\sqrt{\frac{2E}{m}}$$

$$= 1.6\times10^{-19}\times2.5\times\sqrt{\frac{2\times2\times10^6\times1.6\times10^{-19}}{1.67\times10^{-27}}}$$

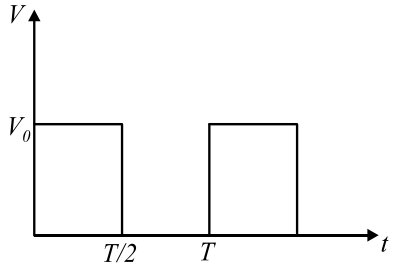
$F = 8 \times 10^{-12}$ N

25. **(3)**

$$F_{ext} = \frac{B^2 \ell^2 v}{R_{total}}$$

$$F_{ext.} = \frac{4 \times 1 \times 2}{4} = 2N$$

26. **(3)**

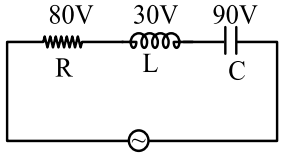


$$V_{rms} = \sqrt{V_{avg}^2}$$

$$V_{rms} = \sqrt{\frac{\int_0^T V^2 dt}{\int_0^T dt}} = \sqrt{\frac{\int_0^{T/2} V_0^2 dt + \int_{T/2}^{T} 0\, dt}{T}}$$

$$V_{rms} = \sqrt{\frac{V_0^2 (T/2)}{T}} = \frac{V_0}{\sqrt{2}}$$

27. **(3)**



$$V_s = \sqrt{V_R^2 + (V_L - V_C)^2}$$

$$= \sqrt{80^2 + (30-90)^2}$$

$$= \sqrt{80^2 + 60^2}$$

$$= \sqrt{6400 + 3600}$$

$$= \sqrt{10000}$$

= 100 *V*

28. **(1)**

$\boxed{E = h\nu}$

where ν is the frequency

Given waves in increasing order of frequency are:

$\boxed{\text{Radiowaves} < \text{Yellow} < \text{Blue} < \text{X-rays}}$

$\boxed{D, B, A, C}$

29. **(3)**

Fact based

30. **(1)**

$$\frac{\omega_1}{f_1} + \frac{\omega_2}{f_2} = 0 \Rightarrow \frac{\omega}{f_1} + \frac{2\omega}{f_2} = 0 \qquad f_2 = -2f_1$$

$$\frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{f} \Rightarrow \frac{1}{f_1} - \frac{1}{2f_1} = \frac{1}{20}$$

$$\frac{1}{2f_1} = \frac{1}{20} \Rightarrow f_1 = 10 \text{ cm}, f_2 = -20 \text{ cm}$$

31. **(3)**

$\phi = 5.01$; $\lambda = 200$ nm

$E = \frac{hc}{\lambda} = \frac{1240 eV}{\lambda}$, where λ in nm

$\therefore E = \frac{1240}{200} = 6.2$ eV

From,

$\therefore K_{max} = E - \phi = 6.2 - 5.01$

$eV_0 \approx 1.2$ eV

$\therefore V_{AC} = -1.2$ volts

32. **(1)**

$$\lambda = \frac{h}{\sqrt{2mE}}$$

$$\Rightarrow \quad \frac{1}{4} = \frac{\sqrt{m_D K_D}}{\sqrt{m_P K_P}} \Rightarrow \frac{1}{16} = \frac{2m_P}{m_P} \cdot \frac{K_D}{K_P}$$

$$\Rightarrow \frac{K_P}{K_D} = \frac{32}{1}$$

33. **(1)**

By formula, $N = N_0 \left(\frac{1}{2}\right)^{t/T}$

or $10^4 = 8 \times 10^4 \left(\frac{1}{4}\right)^{t/T}$

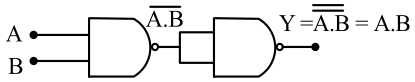
or $\left(\frac{1}{8}\right) = \left(\frac{1}{2}\right)^{t/T}$ or $\left(\frac{1}{2}\right)^3 = \left(\frac{1}{2}\right)^{t/3}$

$\Rightarrow \quad 3 = \frac{t}{3}$, $t = 9$ year's

34. **(1)**

Fact Based

35. **(1)**



36. **(3)**

$$v_x = \frac{dx}{dt} = 9t^2$$

$$v_y = \frac{dy}{dt} = 12t^2$$

$$\therefore V = \sqrt{v_x^2 + v_y^2} = \sqrt{\left(9t^2\right)^2 + \left(12t^2\right)^2} = 15t^2$$

37. **(1)**

$t = \sqrt{x} + 3$

$x = (t - 3)^2$

$x = t^2 - 6t + 9$

$v = \frac{dx}{dt} = 2t - 6$

at t = 1 sec, v = 2(1) – 6 $\Rightarrow$ – 4 m/s

at t = 5 sec, v = 2(5) – 6 $\Rightarrow$ – 4 m/s

W = $\Delta KE = \frac{1}{2}m\left(v_f^2 - v_i^2\right)$

W = $\frac{1}{2}(1)((-4)^2 - (-4)^2)$

W = $\frac{1}{2}(1)(16-16)$

W = 0

38. **(1)**

$a_1 = g \sin\theta$

$a_2 = \frac{g\sin\theta}{1+\frac{K^2}{R^2}} = \frac{2g\sin\theta}{3}$

39. **(4)**

In phase change temperature remain constant.

40. **(3)**

As λ is increased, there will be a value of λ above which photo-electron will be cease to came out, so photo-current will be becomes zero.

41. **(1)**

$T = 2\pi\sqrt{\frac{M}{k}}$

after adding another mass M with M

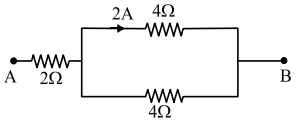
Time period,

$T' = 2\pi\sqrt{\frac{2M}{k}} = \sqrt{2} \times T$

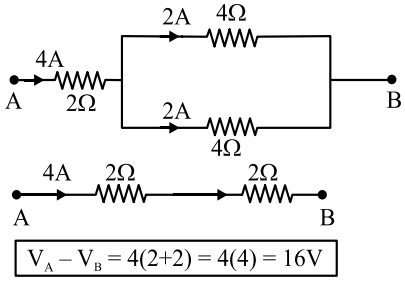
42. **(2)**

$\phi = \frac{q_{in}}{\epsilon_0} = \frac{8.85}{8.85\times10^{-12}} = 10^{12}\text{N} - \text{m}^2/\text{C}$

43. **(2)**



Since both resistance of 4Ω are in parallel, then Current in other 4Ω would be 2A.



$V_A - V_B = 4(2+2) = 4(4) = 16V$

44. **(3)**

$r = \frac{mv}{qB}$ or $r \propto v$

As v is doubled, the radius also becomes doubled. Hence radius = 2×2 = 4 cm.

45. **(3)**

In an equilateral prism for minimum deviation light ray inside the prism will be parallel to base

46. **(1)**

Fact Based

47. **(1)**

Fact Based

48. **(1)**

In semiconductors the energy gap between conduction band and valence band is small (1 ev). Due to temperature rise, electron in the valence band gain thermal energy and may jumpy across the small energy gap, (to the conduction band). Thus, conductivity increases and hence resistance decreases.

49. **(2)**

Both statement I and II are true; but even it radiation of single wavelength in incident on photosensitive surface, electrons of different KE be emitted.

50. **(1)**

Fact Based

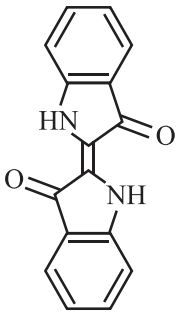
SECTION – II (CHEMISTRY)

51. (4)

Here OH and double bond in reactant should be untouched in product.

Hence wolf kishner reduction reaction will proceed.

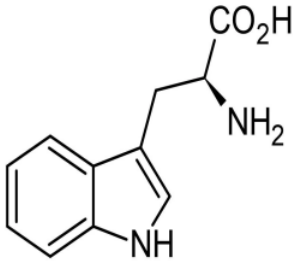
52. (3)



indigo

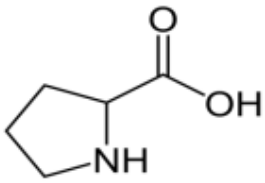
53. (2)

Tryptophan has an indole ring.



54. (3)

Proline contains a secondary amino group.



55. (3)

Isopentyl valerate is present in apples.

56. (3)

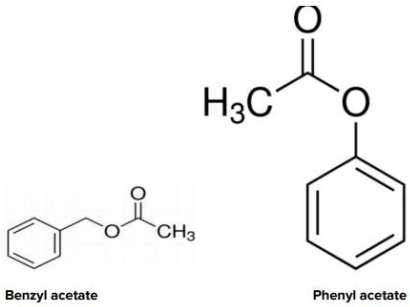
Ketone groups can not be converted to carboxylic acid on oxidation..

57. (2)

The given fragment is benzyl

58. (4)

Structure of benzyl acetate and phenyl acetate is as follows.



Benzyl acetate

Phenyl acetate

There is no relation between benzyl acetate and phenyl acetate.

59. (4)

Norethindrone is an antifertility drug

Vitamin B_{12} is used for pernicious anemia

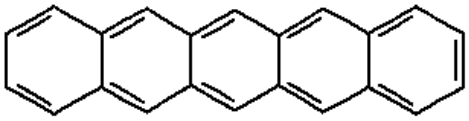
Morphine used as analgesic

60. (3)

DMF means dimethyl formamide and THF means tetrahydrofuran.

61. (2)

Structure of pentacene will be as



62. (3)

methane, ammonia and water, the respective central atoms are sp^3 hybridised, but they have different bond angles.

63. (3)

X will be sodium.

64. (3)

All p-orbitals have 2 nodes is an incorrect statement, because the number of total nodes will depend upon the n-1 value, so, for n = 2,3,4 etc. number of nodes will be different.

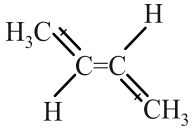
65. (4)

According to EAN rule:

$\left[V(CO)_6\right]: 23+6\times2=35e^-$, so paramagnetic

66. (2)

Trans-2-butene has zero dipole moment.

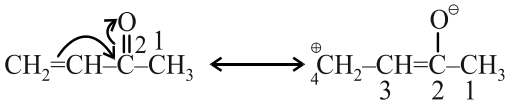


67. (1)

The least ΔH is for CH_3Cl. So, in this case cation is not so stable. So, it will follow homolytic cleavage. So, two free radicals will form.

68. (2)

C_2 and C_4 will be electrophilic.



69. (4)

Boiling point directly proportional to surface area. As branching increases surface area decreases so boiling point decreases.

70. (2)

Cl^- and Ar both have same 18 electrons, so both will have ground state electronic configuration.

71. (2)

The structure of CaC_2 is as

$$Ca^{2+}\left[:C\equiv C:\right]^{2-}$$

So, carbon atoms have triple bond, so it has 2$\boldsymbol{\pi}$ and 1$\boldsymbol{\sigma}$ bond.

72. (3)

Reaction: $3Cl_2 + 6KOH(aq) \rightarrow 5KCl + KClO_3 + 3H_2O$.

This reaction is a type of disproportionation reaction.

73. (3)

In case of strong acid and alkali, complete ionization is possible so 57.3 kJ/mol of energy is released. But weak acid or base will not ionize completely in water. Some remain as undissociated molecules in water. Some amount of heat of neutralization is used to ionize undissociated molecules. As some amount of energy is consumed, energy release is less in case of weak acid or alkali.

74. (2)

On increasing the temperature, the coordination number of CsCI will decrease and it becomes 6. NaCI structure has 6 coordination number.

75. (3)

As temperature increases, then the kinetic energy of the molecule will increase, so the number of collisions will increase and the number of activated molecules also increase. So, I and III are correct statements.

76. (3)

The role of a catalyst is to reduce the activation energy and Increase the rate of attainment of equilibrium.

77. (3)

For 1st reaction, $\Delta rG^o < 0$ that means the process is spontaneous and reaction is feasible, so, for lead more characteristic oxidation state will be +2. For IInd reaction, $\Delta rG^o > 0$, that means the process is non-spontaneous and reaction is not feasible, so, for tin more characteristic oxidation state will be +4.

78. (1)

Both assertion and reason are correct statements and reason is correct explanation of the assertion . Sols are positively or negatively charged it depends upon the preferential adsorption of certain ion around the sol particle.

79. (1)

Process is reversible isothermal,

So ΔU will be zero. So, according to first law of thermodynamics ΔU = q + W So, q = –W Since 208 J of heat is absorbed, q will be +208 J. So,

W will be –208 J.

80. (1)

As the temperature increases pH and pOH both will decrease.

81. (2)

The reaction of oxygen at cathode will take place as, $O_2(g) + 4H^+(g) + 4e^- \rightarrow 2H_2O(\ell)$

82. (3)

Reaction of oxygen with Al will be as

$$4Al(s) + 3O_2(g) \rightarrow 2Al_2O_3(s)$$

According to stoichiometry coefficient, 4 mole of Al react with = 3 mole of O_2.

So, 1.5 mole of O_2 react with= $1.5 \times \frac{4}{3}$ mole of Al

So, mole of Al = 0.5 × 4 =2 mole

Molar mass of Al = 27 g/mol

So, mass of Al = 2 × 27 = 54 g

83. (4)

Solution: Density of solution is 1.15 g/mL.

Mass of solution = 120 + 1000 = 1120 g

So, volume of solution = [Mass of solution] / [density of solution] = 1120/1.15 = 973.9 mL

Number of moles of urea = 120/60 = 2

By using the formula of molarity, it will be 2.05 M

84. **(3)**

Smaller cation, larger hydration thus smaller limiting molar conductivity and vice-versa .

85. **(1)**

Finding the oxidation number

Oxidation number of Cr in CrO_3 +6 ,

Oxidation number of Fe in Fe_2O_3 +3,

Oxidation number of Mn in MnO_2 + 4,

Oxidation number of V in V_2O_5 +5,

Oxidation number of Cu in Cu_2O +1 ,

So order of oxidation state

a) > (d) > (c) > (b) > (e)

86. **(1)**

According to Boyle's law for fixed temperature, Pressure is inversely proportional to Volume.

This means If P increases, 1/V increases or

P= k/V + c which is following a linear gas equation which means option

(i) follows. With increase in pressure, Volume is decreasing in (iii) following a hyperbolic curve so option (iii) is also correct. PV = K so option (ii) is also correct

87. **(4)**

Here, $Cu(OH)_2 \rightleftharpoons Cu^{2+} + 2OH^-$

Since, its a neutral solution, $[H^+] = [OH^-]$

$=10^{-7}$ M; $K_{sp} = [Cu^{2+}]\,[OH^-]^2$;

$[Cu^{2+}] = 1.6 \times 10^{-19}/10^{(-14)} = 1.6 \times 10^{-5}$ M

88. **(1)**

Azeotropes are binary mixtures having the same composition in liquid and vapour phase and boil at a constant temperature

89. **(4)**

An ideal solution obeys Raoult's law at all temperatures and pressures. The solute-solute and the solvent-solvent interactions are almost similar to solute-solvent interactions. All options are examples of ideal solutions.

90. **(4)**

$K_p/K_c = (RT)^{\Delta ng} = (0.0831$ kJ/mol x 457 K)

$\Delta n_g = 3–2 = 1$

$K_p = K_c$ (8.314 × 457) which implies $K_p > K_c$

91. **(1)**

Assertion is correct, reason is correct; reason is a correct explanation for assertion.

92. **(1)**

Oppenauer Oxidation takes place in the presence of $[Al(i\text{-}Pro)_3]$ in excess of acetone. Baeyer-Villiger Oxidation takes place in the presence of peracid. Etard reaction takes place in presence of chromyl chloride. HVZ reaction is takes place in the presence of Red P + Bromine

93. **(1)**

Using the formula

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

94. **(3)**

Charles' law ;

$T_1/V_1 = T_2/V_2$

300 K / 20 L = T_2 / 19 L

(300 K x 19L)/20 L = T_2

T_2 = 285 K or 12°C

.

95. **(1)**

Calculating the percentage of tetrahedral voids occupied in a ccp lattice.

Percentage of tetrahedral voids occupied by

A = 1/8×100=12.5%

96. **(3)**

The electronic configuration of Mg is $1s^2\ 2s^2\ 2p^6\ 3s^2$.

3s - orbital is completely filed and 3p-orbital is empty. There is a very small energy difference between 3s and 3p - orbitals. Thus, they overlap and make the Mg a conductor**.**

97. **(2)**

When an alkali metal hydride (NaH) react with diborane (B_2H_6) in the presence of ether ($(C_2H_5)_2O$), a tetrahedral compound

(Metal borohydride) is formed which act as a reducing agent in organic synthesis.

$2NaH + B_2H_6$ (in the presence of $(C_2H_5)_2O$) ⟶ $2\ NaBH_4$.

98. **(4)**

Isoelectronic and isostructural species have the same number of valence electrons (as well as total number of electrons) and identical shapes /geometries.

99. **(2)**

By using crystal field theory

100. **(3)**

XeF_2 (Xenon difluoride) acts as a fluoride donor and thus, forms complex when mixed with covalent pentafluoride like AsF_5.

$$XeF_2 + AsF_5 \rightarrow [XeF]^+ [AsF_6]^-$$

SECTION – III (BOTANY)

101. **(4)**
Bryophytes, Pteridophytes exhibit an intermediate condition (Haplo-diplontic). Some algae are also haplo-diplontic. It involves alternation of generation between a haploid gametophyte and a diploid sporophyte.

102. **(4)**
Megaspore mother cell divides meiotically to form four megaspores.
In gymnosperms, male and female gametophytes do not have an independent free-living existence. They remain within the sporangia retained on the sporophytes.

103. **(1)**
Eudorina produces anisogamous gametes i.e., Fusion of two gametes dissimilar is size.

104. **(2)**
Adiantum is an example of pteropsida. Pteropsida are a group of vascular plants.

105. **(3)**
Porphyra is red algae, it do not possess any flagella phaeophyceae (Brown algae) stores food in the form of Laminarin and mannitol.
Fucus is brown algae which contain pigment chlorophyll a, c and fucoxanthin.

106. **(1)**
Whittaker proposed five kingdom classification in which he placed all single celled i.e., unicellular nucleated organisms in kingdom Protista.

107. **(3)**
Rust is caused by *Puccinia* species which belong to basidiomycetes. In *Puccinia* asexual spores are generally not found. Vegetative propagation by fragmentation occurs in basidiomycetes. Sex organs are absent.

108. **(3)**
Kingdom
↑
Phylum/Division
↑
Class
↑
Order
↑
Family
↑
Genus
↑
Species

Heirarchial arrangement in ascending order of various taxonomical categories.

109. **(2)**
Chordata is a phylum of animal kingdom while plantae, tracheophyta and clubmoss all belongs to plant kingdom.

110. **(1)**

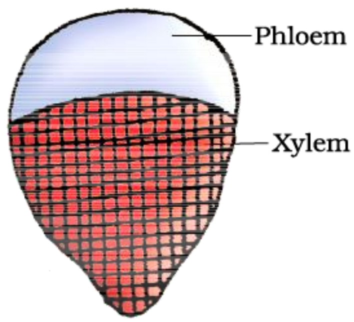
(a)	Mad cow disease	–	Prions
(b)	Heterocysts	–	*Anabena*
(c)	Diatoms	–	Phytoplankton
(d)	Sleeping sickness	–	*Trypanosoma*
(e)	Leaf curing	–	Virus

111. **(2)**
Tobacco belongs to solanaceae family and its floral formula is
$\oplus ⚥\ k_{(5)}C_{(5)}\ A_5\ \underline{G}_{(2)}$

112. **(3)**
Ovary is usually one –chambered but it becomes two chambered due to formation of a false septum. It comes under parietal placentation and can be seen in argemone, mustard etc.

113. **(4)**
Flowers of bean are zygomorphic i.e., bilateral symmetric, flowers can be divided into two similar halves only in one particular vertical plane.

114. **(4)**
In conjoint vascular bundles, xylem and phloem are jointly situated along the same radius of vascular bundles.



Conjoint closed vascular bundle

115. **(1)**
Bicollateral vascular bundles are a type of conjoint vascular bundles in which xylem is present in between two phloem strands. It occurs in stem of cucurbits, potato family, etc.

116. (3)

The secondary phloem tissue is found outside the vascular cambium in dicot stem.

117. (1)

Glycosylation of protein occurs in Golgi bodies and ER. It plays critical role in determining protein structure, function and stability.

118. (3)

Phospholipid molecule can change their position within the same layer.

119. (4)

Mitochondria and chloroplasts have their own DNA and protein synthesising machinery. They can replicate independently and synthesise their proteins with ribosomes.

120. (2)

At beginning of final stage of Karyokinesis i.e., Telophase,, chromosomes after they reached their respective poles decondense and lose their individuality. The individual chromosomes can no longer be seen and each set of chromatin material tends to collect each of two poles.

121. (1)

When Karyokinesis is not followed by cytokinesis, a multinucleate condition arise which lead to formation of syncytium e.g. liquid endosperm in coconut.

122. (4)

Crossing over occurs in Pachytene stage of meiosis I i.e., exchange of genetic material between two homologous chromosomes. Enzyme involved in it is recombinase.

123. (1)

Manganese performs vital function in splitting of water to liberate O_2 during photosynthesis. It is absorbed in the form of manganous ions (Mn^{2+}).

124. (3)

Zinc is needed in Auxin synthesis. Auxin is a plant hormone which play important role in regulation of plant growth.

125. (4)

Photorespiration is a type of respiration that occurs in C_3 plants. It occurs in the presence of sunlight. It occurs in Calvin cycle during plant metabolism. During this RuBisCo enzyme reacts with oxygen rather than CO_2. Photorespiration do not occur in C_4 plants as they have a special mechanism which increases CO_2 concentration at enzyme site.

126. (1)

y-gene codes for permease enzyme which transport lactose into cells via proton gradient.

127. (1)

Plant breeding is an application of genetic principles to produce plants that are more useful to humans. This is accomplished by selecting plants that are found to be economically or aesthetically desirable, first by controlling the mating of selected individuals, and then by selecting certain individual among the progeny.

128. (3)

PEP (Phosphoenolpyruvate) is primary acceptor of CO_2 in C_4 plants.

129. (2)

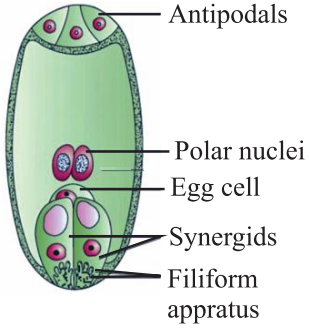
In chloroplasts and mitochondria, chemiosmotic hypothesis of ATP synthesis is linked to development of a proton gradient across a membrane. These are membrane of thylakoid.

130. (4)

Water potential of a cell is affected by all i.e., pressure, solute, matrix potential.

$\psi_W = \psi_S + \psi_P$

131. (2)



The given diagram is of a mature embryo sac which is 7 celled, 8 nucleate.

132. (3)

Oxalis species produces two types of flowers, chasmogamous (with exposed anthers and stigma) and cliestogamous (that do not open at all). *Oxalis* undergo autogamy i.e., self-pollination.

133. (1)

Banana can be vegetatively propagated by rhizome which is a reduced underground stem bears several buds.

134. (2)

Non-endospermic seed	–	Groundnut
Scutellum	–	Maize
Capitulum	–	Sunflower
Double fertilization	–	Angiosperms
Perisperm	–	Beet

135. (1)

Parents — Tall yellow seed plant (T t Y y) × Tall green seed plant (T t y y)

Gametes — TY Ty tY ty | Ty ty

	Ty	tY
TY	TTYy Tall yellow	TtYY Tall yellow
Ty	TTyy Tall green	TtYy Tall yellow
tY	TtYy Tall yellow	ttYY dwarf yellow
ty	Ttyy Tall green	ttYy dwarf green

So, phenotype of tall and green seed plant is 3.

136. (2)

In klinefelter syndrome, additional copy of x-chromosome is present forming XXY condition in males. Such males become sterile

137. (1)

Species that invade a bare rock called pioneer species. In dry (Xerarch) succession.

Lichens (Association of algae and fungi) are pioneer species.

138. (2)

In commensalism, one organism is benefitted and other neither harmed nor benefitted. e.g., Barnacles growing on whale back or epiphytes growing on a mango plant. In predation, one organism benefited other is harmed.

139. (1)

In a DNA molecule, distance between a base pair in a helix is approximately 0.34 nm.

140. (4)

DNA $\rightarrow$ 5'GCTACAGATC3'

RNA $\rightarrow$ 5'CGAUGUCUAG3'

RNA formed after transcription

141. (1)

Senescence takes place in all non-meristematic cells as meristematic cells are potentially immortal, they divide throughout their life & located in specific regions of plant.

142. (3)

RNA polymerase I transcribes rRNA.

143. (3)

CO_2	–	60%
CH_4	–	20%
CFC_S	–	14%
N_2o	–	6%

Percentage of various green house gases contributing to total global warming.

144. (2)

Scrubber remove gases like CO_2 in electrostatic precipitator.

Green muffler is related to noise pollution ozone hole is caused by CFC_S.

145. (1)

Wildlife safari is ex-situ conservation.

146. (4)

On a log scale, relationship between species richness and area is a straight line $\boxed{S = CA^z}$

log S = log C + Z log A

S = species richness

C = Y-intercept

Z = slope of line

A = Area

147. (1)

Lipases are used in detergents formulation and are helpful in removing oily stains from laundry. Proteases and pectinases are used to clarify bottled juices.

148. (3)

Two moleules of ATP are synthesised during glycolysis and total 38 ATP are synthesised by complete oxidation of glucose molecule in eukaryotes.

149. (1)

Back cross is crossing of hybrid with one of its parent. It is useful in genetics.

150. (3)

Hybrid vigoees do not increases by continuous inbreeding. Continuous inbreeding leads to inbreeding depression. It causes reduction in growth, survival rate. Inbreeding is not most important breeding method.

SECTION – IV (ZOOLOGY)

151. (1)
Choanocytes are also known as collar cells. Choanocytes are characteristic cells of phylum porifera responsible for ingestion of food.

152. (2)
Phylum coelentrata shows Polymorphism. Polymorphism mean occurrence of same species in more than one type of individual.
Ex. *Physalia* and *Obelia*.

153. (3)
Notochord is formed on dorsal side of body during embryonic development. Notochord is a rod like structure derived from mesoderm.

154. (2)
Tentacles of ctenophore contains colloblasts used to capture prey.

155. (1)
Hydra is fresh water form, cylindrical, radially symmetrical and tribloblastic.

156. (1)
Tight junctions help to stop substances from leaking across tissues.

157. (4)
Endothelial lining of blood vessel is formed of simple squamous epithelium.

158. (1)
Stratified non-keratinised squamous epithelium covers moist surface like buccal cavity, pharynx and oesophagus.

159. (3)
Goblet cells are found in stomach and secrete mucous.

160. (4)
Goblet cells are made up of single cells, hence unicellular glands. Pancreas is compound gland and it has both exocrine and endocrine portions.

161. (3)
Vinblastine and curcumin are drugs.
Abrin and ricin are toxins.
Rubber and gums are polymeric substance.
Morphine and codeine are alkaloids.

162. (2)
Gingelly oil cannot be considered as polymer. Cellulose, RuBisCO and glycogen are polymers.

163. (3)
A = Activation energy without enzyme.
B = Activation energy with enzyme.

164. (2)
'Crypts of lieberkuhn' are found in small intestine.

165. (2)
'Achlorohydria' is non-secretion of HCl.

166. (3)
Vitamin B_5 is pantothenic acid.
Vitamin B_6 = Pyridoxin.
Vitamin B_7 = Biotin.
Vitamin B_9 = Folic acid.

167. (4)
Diffusion membrane is made up of thin squamous epithelium of alveoli, endothelial lining of alveolar capillaries surrounding it and basement substance between them.

168. (4)
Factors that affect rate of diffusion are solubility of gases, partial pressure of gases and thickness of diffusion membrane.

169. (4)
For conversion of prothrombin into thrombin thrombokinase is necessary.

170. (3)
Atrial systole increases the flow of blood into ventricles by 30%.

171. (4)
Sterols, waxes and hydrocarbons are secreted by sebum; NaCl is not excreted through sebum.

172. (2)
Detrusor muscles contraction results in release of urine out of urinary bladder.

173. (3)
Anaerobic work become painful due to accumulation of lactic acid.

174. (2)
Contractile unit of muscle is a part of myofibril between z-line and z-line.

175. (3)
Somatic neural system relays impulse from CNS to skeletal muscles.

176. (4)
Increased sweating is not under the control of parasympathetic neural system.

177. (2)
Hypothalamus is the part of brain that is responsible for thermoregulation.

178. (2)
Removal of parathyroid glands can result in tetany due to low calcium level in blood.

179. (3)
Prolactin is lactotroph and FSH is a gonadotroph.

180. (2)
If over secretion of growth hormone occur after puberty than individual suffers from acromegaly.

181. (2)
Development of embryo from the zygote is known as embryogenesis, embryogenesis involve cell divisions and cell differentiation.

182. (3)
In humans, at the end of 1^{st} meiotic division male germ cells form secondary spermatocyte.

183. (2)
The middle piece of sperm contains mitochondria.

184. (4)
Progestasert and LNG-20 are hormone releasing IUDs.

185. (1)
MTPs are relatively safe upto 12-weeks of pregnancy.

186. (2)
Life originated in water.

187. (1)
The origin of life was not given by the Big Bang theory.

188. (3)
First mammals on earth were like shrews. *Dryopithecus* were more ape-like and *Ramapithecus* were more man like primate.

189. (3)
Common cold is caused by virus.

190. (4)
The antibodies produced against allergy are IgE type. Edward-Jenner is regarded as 'Father of Immunology'.

191. (3)
Autoimmunity is caused due to the Inability of immune cells in distinguishing between self-cells non-self and ability of self-cells to damage self-cells.

192. (4)
Contribution of India and China to world's farm produce is only 25%.

193. (2)
Rinderpest is a disease caused by virus. Rinderpest is also known as 'Cattle plague'.

194. (2)
Ranikhet disease is connected with hens.

195. (3)
Ligase = molecular glue
Endonuclease = Chemical scalpel
RNA polymerase = Joins nucleotide

196. (3)
Palindromic sequence recognised by EcoRI is
5'-G↓AATTC-3'
3'-CTTAA↑G-5'

197. (1)
The most important factor that would leads to increased milk yield in cattle is selection of good breeds.

198. (4)
Crystalline proteins synthesised by *Bacillus thuringiensis* is activated by alkaline pH in insect midgut.

199. (4)
RNAi and use of Bt-toxin are methods of producing microbes and pest resistant plants.

200. (3)
Production of pest resistant plants could decrease the amount of pesticide use.