Dated : 03-05-2023

M.L. Syal's Helix Institute

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Test Booklet Code **A**

MM : 720

Test Series [Option-1] for NEET-2023

Time : 3 hrs. 20 min.

Mock Test

PHYSICS : SECTION-A

All questions are compulsory in section A

1. A system is given 200 calories of heat and it does 500 joules of work. Change in internal energy of system in this process is

   (J = 4.18 joule/cal)

   (1) 300 joule
   (2) 336 joule
   (3) – 300 joule
   (4) 524 joule

2. Momentum of a photon of wavelength λ is

   (1) $\frac{h}{\lambda}$
   (2) Zero
   (3) $\frac{h\lambda}{c^2}$
   (4) $\frac{h\lambda}{c}$

3. A ball of mass 'm' is dropped from height 'h' and strikes the ground with the kinetic energy $\frac{3}{4}$mgh. The work done by air resistance is

   (1) $-\frac{1}{4}$ mgh
   (2) –mgh
   (3) $-\frac{3}{4}$ mgh
   (4) zero

4. Sensitivity of potentiometer can be increased by
   (1) increasing the e.m.f. of the cell
   (2) increasing the length of the potentiometer wire
   (3) decreasing the length of the potentiometer wire
   (4) none of the above

5. A satellite is moving very close to a planet of density ρ, the time period of the satellite is

   (1) $\sqrt{\frac{3\pi}{\rho G}}$
   (2) $\left(\frac{3\pi}{\rho G}\right)^{3/2}$
   (3) $\sqrt{\frac{3\pi}{2\rho G}}$
   (4) $\left(\frac{3\pi}{2\rho G}\right)^{3/2}$

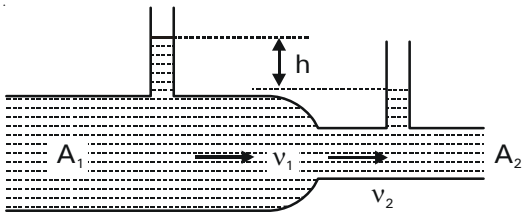
6. In magnetic maps "Isogonic lines" are the lines
   (1) joining same inclination places
   (2) joining same declination places
   (3) joining zero declination places
   (4) joining zero inclination places

7. A car is moving along a circular road at a speed of 20 m/s. The radius of the circular road is 10 m. If the speed is increased at the rate of 30 m/s^2, what is the resultant acceleration?
   (1) 10 m/s^2
   (2) 80 m/s^2
   (3) 70 m/s^2
   (4) 50 m/s^2

8. If frequency of incident radiations exceeds the threshold frequency, the photoelectric emission starts in a time of the order of
   (1) $\leq 10^{-6}$ s
   (2) $\leq 10^{-9}$ s
   (3) $\leq 10^{-7}$ s
   (4) $\leq 10^{-2}$ s

9. Beta rays emitted by a radioactive material are
   (1) electromagnetic radiations
   (2) electrons orbiting around the nucleus
   (3) charged particles emitted by the nucleus
   (4) neutral particles

10.



An ideal liquid flows through a horizontal tube. The velocities of the liquid in the two sections, which have areas of cross-section A_1 and A_2, are v_1 and v_2 respectively. The difference in the levels of the liquid in the two vertical tubes is h. Which of the following is wrong?

(1) The volume of the liquid flowing through the tube in unit time is A_1v_1

(2) $v_2 - v_1 = \sqrt{2gh}$

(3) $v_2^2 - v_1^2 = 2gh$

(4) The energy per unit mass of the liquid is the same in both sections of the tube

11. EM wave is travelling towards x-direction. The component of field which is always zero is

(1) E_x

(2) E_y

(3) E_z

(4) None of these

12. In the context of significant figures in expressing results of experiment, which of the following is/are correct

a. Out of the two measurements 50.14 cm and 0.00025 ampere, the first one has greater number of significant figures

b. If one travels 478 km by rail and 397 m. by road, the total distance travelled is 478 km.

(1) a only
(2) b only
(3) Both a & b
(4) neither a nor b

13. A freezer has coefficient of performance 6. When 4.2×10^6 J work is done on the freezer, mass of water at 0°C converted into ice cubes at 0°C is

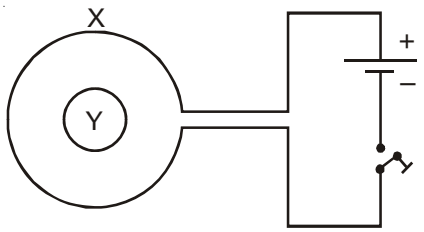
(1) 50 kg

(2) 36 kg

(3) 60 kg

(4) 75 kg

14.



If in figure, key K is switched on, then the induced current in coil Y will

(1) be zero
(2) continue to flow in clockwise direction
(3) continue to flow in anticlockwise direction
(4) flow clockwise for a short time and then become zero

15. A car is going with velocity at $(40\hat{i} + 30\hat{j})$ km/h and the train is going at $(30\hat{i} - 40\hat{j})$ km/h. What is the velocity of car as seen by a passenger in the train?

(1) $(70\hat{i} + 10\hat{j})$ km/h

(2) $(10\hat{i} + 70\hat{j})$ km/h

(3) $(10\hat{i} + 10\hat{j})$ km/h

(4) zero

16. An object of mass 'm' starts to fall from a height equal to radius of earth (R). Its speed when it reaches surface of earth is [M is mass of earth]

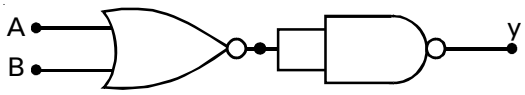
(1) $\sqrt{\frac{2GM}{R}}$

(2) $\sqrt{\frac{GM}{R}}$

(3) $\sqrt{\frac{GM}{2R}}$

(4) $\sqrt{\frac{GM}{4R}}$

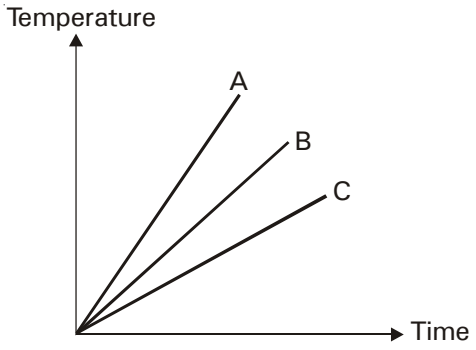
17.



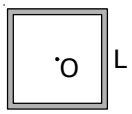
Identify the gate represented by the above block diagram.

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

18. Let the equation of motion of a particle be
$x = t^2 - t^3$
Then the particle is moving with
(1) uniform velocity
(2) uniform acceleration
(3) variable acceleration
(4) uniform retardation

19.


Heat is supplied to equal amount of three substances at the same rate and above graph is obtained. Substance with maximum specific heat is
(1) A
(2) B
(3) C
(4) all have equal specific heat

20.


Four thin rods of same mass M and same length L, form a square as shown in figure. Moment of inertia of this system about an axis through centre O and perpendicular to its plane is

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

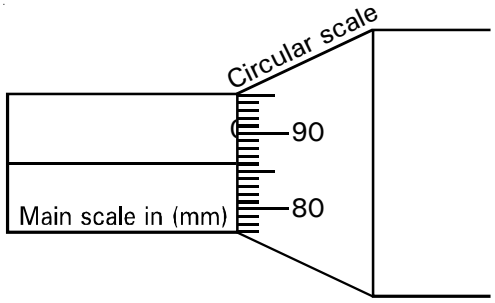
(2) $\frac{1}{3}ML^2$

(3) $\frac{1}{6}ML^2$

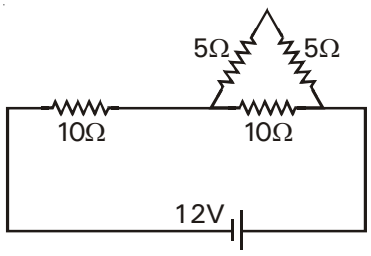
(4) $\frac{2}{3}ML^2$

21. If the earth were to suddenly contract to $1/n^{th}$ of its present size without any change in its mass, the duration of the new day will be
(1) 24/n
(2) 24n
(3) $24/n^2$
(4) $24n^2$

22. A calcite crystal is placed over a dot on a piece of paper and rotated. On seeing through the calcite, one will be see
(1) one dot
(2) two stationary dots
(3) two rotating dots
(4) one dot rotating about the other

23.


In the above instrument, there are 100 divisions on the circular scale. Zero error of the instrument is
(1) 0.14 mm
(2) –0.14 mm
(3) 0.86 mm
(4) –0.86 mm

24.


The potential drop across the $5\,\Omega$ resistor is
(1) 3 V
(2) 0.5 V
(3) 2 V
(4) 1.5 V

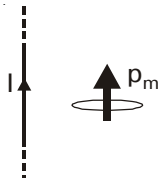
25. The mass and diameter of a planet have twice the value of the corresponding parameters of earth. Acceleration due to gravity on the surface of the planet is
(1) $9.8\ m/s^2$
(2) $4.9\ m/s^2$
(3) $980\ m/s^2$
(4) $19.6\ m/s^2$

26. When the plate separation in a parallel plate capacitor is made three times and the space between the plates is filled with a dielectric slab, the capacitance becomes 9 times. The dielectric constant of the slab is
(1) 9
(2) 24
(3) 27
(4) 3

27. According to Bohr's quantum condition, an electron can revolve only in those orbits in which
(1) its energy is an integral multiple of $h/2\pi$
(2) its linear momentum is an integral multiple of $h/2\pi$
(3) its angular momentum is an integral multiple of $h/2\pi$
(4) none of these

28. A body is projected at an angle θ to the horizontal with kinetic energy E_K. What is the kinetic energy at the highest point?
(1) E_K
(2) $E_K \cos^2\theta$
(3) $E_K \sin^2\theta$
(4) $E_K \tan^2\theta$

29.



For the magnetic dipole $\vec{p}_m$, placed parallel to an infinitely long current carrying straight wire,
(1) the potential energy of the dipole is zero
(2) torque acting on the dipole is zero
(3) both (1) and (2)
(4) neither (1) nor (2)

30. When a tunning fork of frequency 100 Hz is sounded with an unknown fork, then 2 beats per second are produced. On loading the unknown fork with wax, 1 beat per second is produced. The frequency of unknown fork is
(1) 101 Hz
(2) 102 Hz
(3) 98 Hz
(4) 99 Hz

31. A body is moving in a straight line such that its linear momentum varies with time as $p = 6 + 5t^2$. The net force acting on the body is proportional to
(1) t^2
(2) t
(3) $\frac{1}{t}$
(4) t^3

32. The ratio of thermal conductivity of two rods of same area of cross-section but of different material is 1 : 2. The two rods have same thermal resistance. Their lengths are in the ratio
(1) 1 : 4
(2) 1 : 8
(3) 1 : 1
(4) 1 : 2

33. A tube closed at one end and containing air is excited. It produces the fundamental note of frequency 512 Hz. If the same tube is open at both the ends the fundamental frequency that can be produced is
(1) 1024 Hz
(2) 512 Hz
(3) 256 Hz
(4) 128 Hz

34. **Statement-I** : Given a point source of light, a convex mirror can produce a parallel beam of light.

Statement-II : If a plane glass slab is kept over various coloured letters, the red letter appears least raised.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

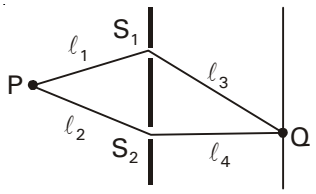
35. A force of $3x^2\,\hat{i}$ N acts on a body and displaces it from $x = 0$ to $x = 2$m. The work done by this force is
(1) 4 J
(2) 9 J
(3) 8 J
(4) 12 J

PHYSICS : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

36. A pure semiconductor at absolute zero of temperature behaves like a/an
(1) insulator
(2) superconductor
(3) semiconductor
(4) metallic conductor

37. A rod of length L, whose lower end is resting along the horizontal plane, starts to topple from the vertical position. The velocity of the upper end when it hits the ground, assuming that its lower end does not slip, is
(1) $\sqrt{gL}$
(2) $\sqrt{5gL}$
(3) $\sqrt{3gL}$
(4) $3\sqrt{gL}$

38. 

Two identical narrow slits S_1 and S_2 are illuminated by light of wavelength λ from a point source P as shown in the diagram. Light is then allowed to fall on a screen. If 'n' is a positive integer, the condition for destructive interference at Q is

(1) $(\ell_1 - \ell_2) = (2n + 1)\lambda/2$
(2) $(\ell_3 - \ell_4) = (2n + 1)\lambda/2$
(3) $(\ell_1 + \ell_2) - (\ell_2 + \ell_4) = n\lambda$
(4) $(\ell_1 + \ell_3) - (\ell_2 + \ell_4) = (2n + 1)\lambda/2$

39. If the resistance of a conductor is $5\,\Omega$ at 50°C and $6\,\Omega$ at 100°C, then the mean temperature coefficient of resistance of the material is

(1) 0.008/°C
(2) 0.006/°C
(3) 0.004/°C
(4) 0.001/°C

40. Match the Bohr's postulates in column I with their description in column II

Column I	**Column II**
a. First	p. Electron makes a transition from one of its specified non-radiating orbits to another of lower energy
b. Second	q. Electron in an atom could revolve in certain stable orbits without emission of radiant energy
c. Third	r. Electron revolves only in orbits for which angular momentum is some integral multiple of $h/2\pi$

(1) a-q, b-r, c-p
(2) a-q, b-p, c-r
(3) a-p, b-q, c-r
(4) a-r, b-p, c-q

41. A river is flowing due east with a speed of 3 m/s. A swimmer can swim in still water at a speed of 4 m/s. If swimmer starts swimming due north, then his resultant velocity will be

(1) 7 m/s at 37° to north
(2) 5 m/s at 37° to north
(3) 5 m/s at 53° to north
(4) 5 m/s at 60° to east

42. A resonant ac circuit contains a capacitor of capacitance 10^{-6} F and an inductor of 10^{-4} H. The frequency of electrical oscillations will be

(1) 10^5 Hz
(2) 10 Hz
(3) $\frac{10^5}{2\pi}$ Hz
(4) $\frac{10}{2\pi}$ Hz

43. Two particles are executing SHM with time period T and amplitude A. What is the phase difference between them if they cross each other at A/2?

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

44. A spherical raindrop reaching the ground with terminal velocity has kinetic energy K. Another drop of twice the radius, also reaching the ground with terminal velocity, will have kinetic energy

(1) 16 K
(2) 64 K
(3) 128 K
(4) 256 K

45. Which is incorrect w.r.t. isothermal process?

(1) Pressure of a given mass of a gas varies directly as its volume
(2) There is no change in the internal energy of an ideal gas
(3) In an isothermal expansion, the gas absorbs heat and does work
(4) In isothermal compression, work is done on the gas by environment and heat is released

46. A ray of light is incident at angle 'i' on a surface of a prism of small angle A and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, then $i \approx$

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

47. **Assertion** : When gravel is dropped on a moving belt, force is required to maintain its speed.

Reason : Force is required to accelerate the gravel in the above case.

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

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

(3) Assertion is true statement but Reason is false

(4) Assertion is false

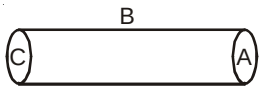
48. If two streams of protons move parallel to each other in the same direction, then they

(1) do not exert any force on each other

(2) repel each other

(3) attract each other

(4) get rotated to be perpendicular to each other

49. 

A hollow cylinder has a charge 'q' coulomb at its center. If ϕ is electric flux in units of volt meter associated with curved surface B, the flux linked with the plane surface A in units of volt meter will be

(1) $\frac{q}{\varepsilon_0} - \phi$

(2) $\frac{1}{2}\left(\frac{q}{\varepsilon_0} - \phi\right)$

(3) $\frac{q}{2\varepsilon_0}$

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

50. The tension of a stretched string of length L is increased by 44%. In order to keep its fundamental frequency same, its length must be changed to

(1) 0.8 L

(2) 0.56 L

(3) 1.44 L

(4) 1.2 L

CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. Which solution will show the maximum vapour pressure at 300 K?

(1) 1 M $C_{12}H_{12}O_{11}$

(2) 1 M CH_3COOH

(3) 1 M $MgCl_2$

(4) 1 M NaCl

52. Which of the following is not a macromolecular colloids?

(1) starch

(2) egg albumin

(3) cellulose

(4) gold sol

53. Which equilibrium in gaseous phase would be unaffected by an increase in pressure

(1) $N_2O_4 \rightleftharpoons 2NO_2$

(2) $N_2 + O_2 \rightleftharpoons 2NO$

(3) $N_2 + 3H_2 \rightleftharpoons 2NH_3$

(4) $CO + \frac{1}{2} O_2 \rightleftharpoons CO_2$

54. The half life period of a reaction, becomes 8 times when reactant concentration is halved. The order of reaction is

(1) 3

(2) 5

(3) 4

(4) 2

55. The pri., sec. and tert. amines can be distinguished by

(1) Hinsberg's reagent

(2) Grignard reagent

(3) Fehling's solution

(4) Tollen's reagent

56. In a chemical reaction ΔH = 150 kJ and $\Delta S = 100\ JK^{-1}$ at 300 K. Therefore ΔG will be

(1) zero

(2) 300 kJ

(3) 330 kJ

(4) 120 kJ

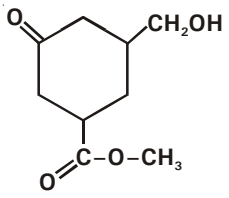
57. The sharp melting point of crystalline solids is due to _____.

(1) a regular arrangement of constituent particles observed over a short distance in the crystal lattice.

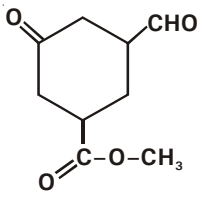
(2) a regular arrangement of constituent particles observed over a long distance in the crystal lattice.

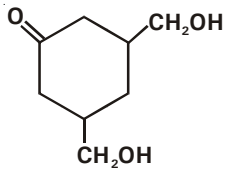
(3) same arrangement of constituent particles in different directions.

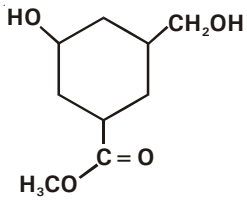
(4) different arrangement of constituent particles in different directions.

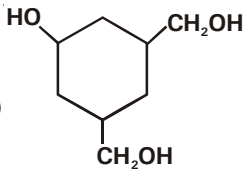
58. 

when reduced with $NaBH_4$ forms

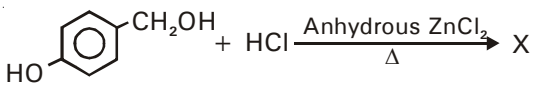
(1) 

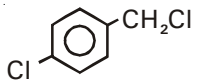
(2) 

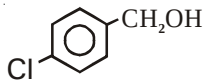
(3) 

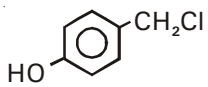
(4) 

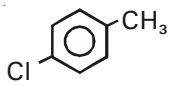
59. The product X in the given reaction will be,



(1) 

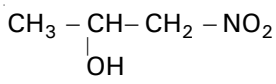
(2) 

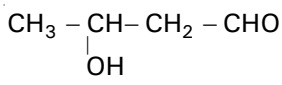
(3) 

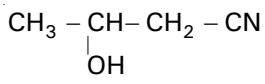
(4) 

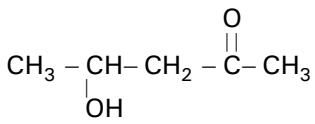
60. If phenyl magnesium bromide & acetaldehyde are reactants,product formed after hydrolysis would be
(1) benzyl alcohol
(2) 1-Phenylethanol
(3) 2-Phenylethanol
(4) Acetone

61. Which alcohol contains the most acidic hydrogen?

(1) 

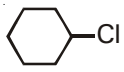
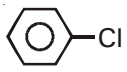
(2) 

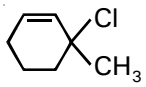
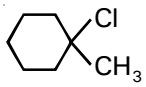
(3) 

(4) 

62. Rubidium imparts red violet colour to bunsen flame. This is mainly due to
(1) high hydration energy
(2) low ionisation energy
(3) small size
(4) strong metallic bonds

63. Which among the following is most reactive for S_N1 reaction?

(1)  (2) 

(3)  (4) 

64. Which of the following oxyacids of phosphorous commonly exist as trimer?
(1) Hypophosphorous acid
(2) Pyrophosphorous acid
(3) Hypophosphoric acid
(4) Metaphosphoric acid

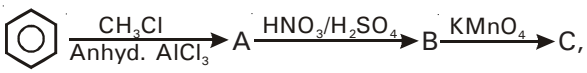
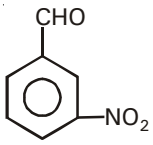
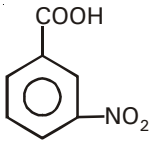
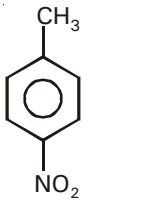
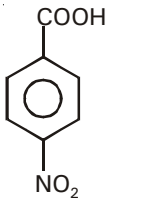
65. **Assertion** : The distribution of speeds of gases is broader at a higher temperature than at lower temperature.
Reason : Most probable speed of a gas decreases with increase in temperature.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

66. Hydrolysis of ClF_5 produces
(1) HF & $HClO_3$
(2) HF & $HClO_2$
(3) HF & $HClO_4$
(4) HF & HCl

67. Which of the following will not give dinitrogen gas with nitrous acid?
(1) Propanamine
(2) Ethanamine
(3) Trimethylamine
(4) Isopropylamine

68. Which of the following is used as blood-thinner to save the heart attack?
(1) Valium
(2) Lansopyrazole
(3) Aspirin
(4) Salvarsan

69. CFSE for high spin d^4 octahedral complexes is
(1) $-1.8\ \Delta_0$
(2) $-1.6\Delta_0 + P$
(3) $-1.2\Delta_0$
(4) $-0.6\Delta_0$

70. 
C is
(1) 
(2) 
(3) 
(4) 

71. Consider the isoelectronic species, Na^+, Mg^{2+}, F^- and O^{2-}. The correct order of their radii is
(1) $F^- < O^{2-} < Mg^{2+} < Na^+$
(2) $Mg^{2+} < Na^+ < F^- < O^{2-}$
(3) $O^{2-} < F^- < Na^+ < Mg^{2+}$
(4) $O^{2-} < F^- < Mg^{2+} < Na^+$

72. Acidic character of boron halides is due to their tendency to
(1) donate H^+ in aq. solution
(2) accept a pair of electrons
(3) donate a pair of electrons
(4) release proton

73. Which of the following pair of orbitals have same energy for hydrogen atom?
(1) 3s; 3d
(2) 2p; 3p
(3) 4f; 5s
(4) 3s; 4d

74. Which of the following is the correct oxidation number of phosphorus in $Mg_2P_2O_7$?
(1) – 3
(2) + 2
(3) + 5
(4) + 3

75. Which is NOT correct statement regarding Green house effect?
(1) It is due to high conc. of CO_2 in atmosphere
(2) It is influenced by gases like CH_4, O_3, chlorofluorocarbons
(3) It would result in the warming up of the earth
(4) It would result in lowering the level of oceans due to high evaporation

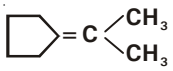
76. $2A + 2B \rightarrow 3C + 4D$
The above gaseous reaction is taking place at STP. What volume of D will be formed if 1mole of A participates in the reaction?
(1) 22.4 L
(2) 11.2 L
(3) 44.8 L
(4) 56.0 L

77. Match species with corresponding conjugate acid

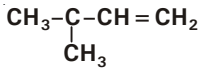
	Species		**Conjugate acid**
i.	NH_3	a.	H_2CO_3
ii.	HCO_3^-	b.	NH_4^+
iii.	H_2O	c.	H_3O^+
iv.	HSO_4^-	d.	H_2SO_4

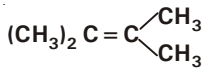
(1) i-b, ii-a, iii-c, iv-d
(2) i-a, ii-d, iii-b, iv-c
(3) i-d, ii-b, iii-a, iv-c
(4) i-c, ii-b, iii-d, iv-a

78. Which of the following alkenes on ozonolysis give a mixture of ketones only?

a. 

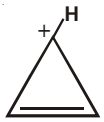
b. $CH_3-CH=CH-CH_3$

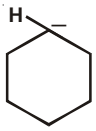
c. 

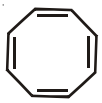
d. 

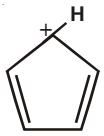
(1) both a & d
(2) both b & d
(3) both c & d
(4) both a & c

79. Which of the following compounds is aromatic?

(1) 

(2) 

(3) 

(4) 

80. Which of these is a natural polymer?
a. Proteins ; b. Starch ; c. Nucleic acid
(1) a & b only
(2) a & c only
(3) a, b & c
(4) b & c only

81. **Statement-I** : Glucose pentacetate can react with hydroxyl amine.
Statement-II : Glucose can react with hydroxyl amine.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

82. When 1 mol $CrCl_3.6H_2O$ is treated with excess of $AgNO_3$, 3 mol of AgCl are obtained. The formula of the complex is :
(1) $[CrCl_3(H_2O)_3].3H_2O$
(2) $[CrCl_2(H_2O)_4]Cl.2H_2O$
(3) $[CrCl(H_2O)_5]Cl_2.H_2O$
(4) $[Cr(H_2O)_6]Cl_3$

83. The number of lone pairs on A in pyramidal AX_3 is/are
(1) 1
(2) 2
(3) zero
(4) 3

84. Two electrolytic cells, one containing ferrous sulphate and other containing ferric sulphate are connected in series. The ratio of iron deposited at cathodes in the two cells will be respectively
(1) 2 : 1
(2) 2 : 3
(3) 1 : 1
(4) 3 : 2

85. Which of the following statement is NOT correct about an inert electrode in a cell?
(1) It does not participate in the cell reaction
(2) It provides surface either for oxidation or for reduction reaction
(3) It provides surface for conduction of electrons
(4) It provides surface for redox reaction

CHEMISTRY : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

86. Number of π-bonds in $XeOF_4$, XeO_2F_2 and XeO_3 molecules are respectively
(1) 1,1, and 1
(2) 2,2 and 1
(3) 1,2 and 3
(4) 1,2 and 1

87. In an adiabatic process, no transfer of heat takes place between system and surroundings. Choose the correct option for free expansion of an ideal gas under adiabatic condition from the following
(1) $q=0,\ \Delta T\neq 0,\ w=0$
(2) $q\neq 0,\ \Delta T=0,\ w=0$
(3) $q=0,\ \Delta T=0,\ w=0$
(4) $q=0,\ \Delta T<0,\ w\neq 0$

88. Arrange the following conjugate bases in the decreasing order of their stability
(1) $ClO_4^- > ClO_3^- > ClO_2^- > ClO^-$
(2) $ClO_3^- > ClO_4^- > ClO_2^- > ClO^-$
(3) $ClO_2^- > ClO_3^- > ClO_4^- > ClO^-$
(4) $ClO^- > ClO_2^- > ClO_3^- > ClO_4^-$

89. **Assertion** : $CH_3-CH_2-\ddot{\underset{\cdot\cdot}{\ddot{O}}}:$ is less stable than $O_2N-CH_2-CH_2-\ddot{O}:^-$.

Reason : NO_2 group exerts –I effect .

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

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

(3) Assertion is true statement but Reason is false

(4) Assertion is false

90. The difference in the wavelength of the 1st line of Lyman series and 2nd line of Balmer series in a hydrogen atom is

(1) $\frac{9}{2R}$

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

(3) $\frac{88}{15R}$

(4) $\frac{22R}{36}$

91. Match the species given in column-I with properties given in column-II

Column-I	Column-II
i. Diborane	a. Used as a flux for soldering metals
ii. Gallium	b. Crystalline form of silica
iii. Borax	c. Banana bonds
iv. Quartz	d. Low melting, high boiling, useful for measuring high temp.

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

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

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

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

92. The correct balanced equation for the reaction $MnO_4^- + SO_3^{2-} + H^+ \rightarrow Mn^{2+} + SO_4^{2-} + H_2O$ is

(1) $5MnO_4^- + 2SO_3^{2-} + 6H^+ \rightarrow 5Mn^{2+} + 2SO_4^{2-} + 3H_2O$

(2) $2MnO_4^- + 5SO_3^{2-} + 6H^+ \rightarrow 2Mn^{2+} + 5SO_4^{2-} + 3H_2O$

(3) $2MnO_4^- + 5SO_3^{2-} + 2H^+ \rightarrow 2Mn^{2+} + 5SO_4^{2-} + H_2O$

(4) $MnO_4^- + 5SO_3^{2-} + 6H^+ \rightarrow Mn^{2+} + 5SO_4^{2-} + 3H_2O$

93. During Fehling's test, a reddish brown ppt is obtained mainly due to the formation of

(1) $CuSO_4$

(2) Cu_2O

(3) CuO

(4) Cu

94. In SF_2 the % p–character in hybrid orbital of S is

(1) 25

(2) 33.3

(3) 66.6

(4) 75

95. The solubility product of AX_2, $K_{sp} = 4 \times 10^{-6}$. The solubility of AX_2 in pure water, assuming that neither kind of ion reacts with water is

(1) 1.1×10^{-1} mol/L

(2) 1×10^{-6} mol/L

(3) 1×10^{-2} mol/L

(4) 1×10^{-3} mol/L

96. **Statement-I** : Enthalpy, entropy and free energy of a system are state functions as well as intensive properties.

Statement-II : Enthalpy, entropy and free energy of formation of elementary substances in standard state are takes as zero.

(1) Both statement-I and statement-II are correct

(2) Both statement-I and statement-II are incorrect

(3) Statement-I is correct but statement-II is incorrect

(4) Statement-I is incorrect but statement-II is correct

97. Kolbe's synthesis of sodium salt of butanoic acid gives.

(1) n-hexane

(2) isobutane

(3) n-butane

(4) propane

98. Cerium (Z = 58) is an important member of the lanthanide. Which of the following statements about Ce is incorrect?

(1) The common oxidation state of cerium are +3 and +4

(2) The +3 oxidation state of cerium is more stable than +4 oxidation state

(3) The +4 oxidation state of cerium is not known is solution

(4) Cerium (IV) acts as an oxidizing agent

99. Which of the following shall yield a trans alkene?

(1) $R-C\equiv C-R' + H_2 \xrightarrow{Pd/C}$

(2) $CH\equiv CH + H_2 \xrightarrow{Pd/C}$

(3) $R-C\equiv C-R' + H_2 \xrightarrow{Na,liq,NH_3}$

(4) $R-C\equiv C-H + H_2 \xrightarrow{Na,liq,NH_3}$

100. For binary hydrides of formula MX_n, the value of n can be fractional for
(1) salt like hydrides
(2) interstitial hydrides
(3) covalent hydrides
(4) polymeric hydrides

ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. Which stage of meiotic prophase shows terminalisation of chiasmata as its distinctive feature?
(1) Leptotene
(2) Zygotene
(3) Diakinesis
(4) Pachytene

102. The contraceptive measures which have similar mechanism of action are
(1) Saheli, Vaults
(2) Lippe's loop, condom
(3) Condom, diaphragms
(4) Cervical caps, Pills

103. A special case of Rh incompatibility has been observed between the _____ blood of a pregnant mother with _____blood of the foetus.
(1) Rh + ve, Rh – ve
(2) Rh + ve, Rh + ve
(3) Rh – ve, Rh + ve
(4) Rh – ve, Rh – ve

104. Which of the following factors do not disturb Hardy-Weinberg equilibrium ?
(1) Genetic drift
(2) Natural selection
(3) Random mating
(4) Gene migration

105. Which of the following statements are true for the phylum-Chordata?
(a) In Urochordata notochord extends from head to tail and it is present throughout their life
(b) In Vertebrata notochord is present during the embryonic period
(c) Central nervous system is dorsal and hollow
(d) Chordata is divided into 3 subphyla: Hemichordata, Tunicata and Cephalochordata
(1) (c) and (a)
(2) (a) and (b)
(3) (b) and (c)
(4) (d) and (c)

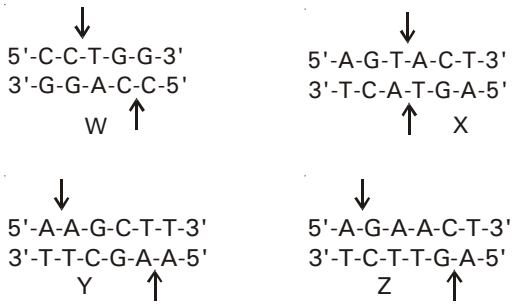
106. How many statements are incorrect?
a. Probes are double stranded DNA or RNA tagged with radio isotopes
b. ELISA is based on principle of electrophoresis
c. DNA vaccines are obtained from transgenic mice
d. Very low concentration of microbes can be detected by amplification of their proteins by PCR
(1) Two
(2) Three
(3) One
(4) four

107. Which is incorrect difference between Kwashiorkar and Marasmus?

	Kwashiorkar	Marasmus
(1)	Skin & hair colour change.	No change in skin and hair color.
(2)	Oedema is present	Oedema is absent
(3)	Deficiency of proteins is the cause	Deficiency of vitamins & minerals is the cause
(4)	Thinner muscles but subcutaneous fat is preserved	Extreme emaciation of body, prominent ribs

108. A projecting ridge called macula is present in
(1) Saccule
(2) Semicircular canal
(3) Utricle
(4) Both (1) & (3)

109. Recognition sites of enzymes w, x, y or z are given below. Which of these can be used for genetic engineering

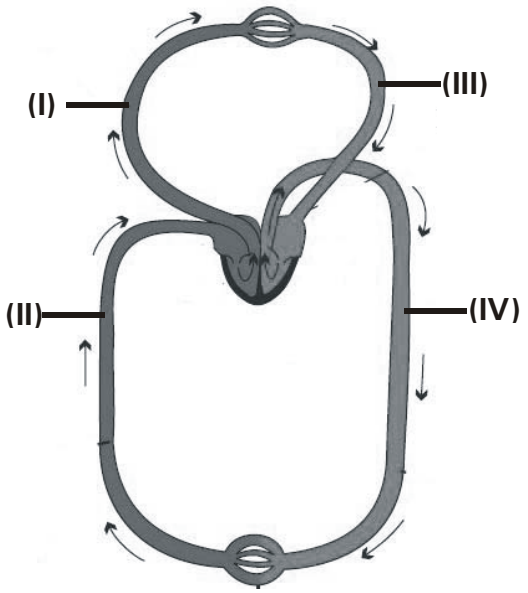


(1) W & X
(2) X & Y
(3) Y & Z
(4) W & Z

110. Which of the following is correct for the disease whose symptoms include internal bleeding, muscular pain, fever, anemia and blockage of the intestinal passage ?
(1) *Wuchereria*, the filarial worm, is responsible for the given symptoms.
(2) *Ascaris,* an intestinal platyhelminth parasite causes Ascariasis.
(3) Larvae of the parasite are excreted along with the faeces of infected persons which contaminate soil, water, plants, etc.
(4) A healthy person acquires this infection through contaminated water, vegetables, fruits.

111. Transgenic plant are the ones
(1) generated by introducing foreign DNA into a cell and regenerating a plant from that cell
(2) produced after protoplast fusion in artificial medium
(3) grown in artificial medium after hybridisation in the field
(4) produced by a somatic embryo in artifical medium

112. Identify the correct statement



(1) I-Pulmonary artery –oxygenated blood from right ventricle pumped into it
(2) II-Vena cava – empties blood into right atrium
(3) III- Pulmonary vein– carries deoxygenated blood
(4) IV- Aorta-oxygenated blood from left atrium enters into it

113. Choose the incorrect match
(1) heart failure - congestion of lungs
(2) cardiac arrest - stopping of heart beat
(3) heart attack - sudden damage of heart muscles
(4) angina pectoris-oedema

114. Bottle juices are clearer as compared to those made at home due to use of
(1) Lipases and proteases
(2) Proteases and pectinases
(3) Amylases and lipases
(4) Pectinase and nucleases

115. Choose the incorrect option w.r.t homologous organs
(1) Divergent evolution
(2) Common ancestory
(3) Similar anatomical structure
(4) Flippers of Penguins & Dolphins

116. Which one of the following statements is correct, with reference to enzymes?
(1) Apoenzyme = Holoenzyme + Coenzyme
(2) Holoenzyme = Apoenzyme + Coenzyme
(3) Coenzyme = Apoenzyme + Holoenzyme
(4) Holoenzyme = Coenzyme + Cofactor

117. Which of the following statements are incorrect?
(a) Ribosomes are surrounded by unit membrane and contain ribonucleic acid & proteins.
(b) Cytoskeleton of cell are involved in mechanical support, motility etc.
(c) Centrosome consists of centrioles which lie perpendicular to each other
(d) Lysosomes are membrane bound structures containing hydrolytic enzymes which work at alkaline pH.
(1) b & d
(2) b & c
(3) a & c
(4) a & d

118. Enzymes included in restriction modification system are
a. EcoRI
b. Methyl group
c. Methylases
d. Terminal transferase
(1) a & b
(2) a & c
(3) a, b & c
(4) a, c & d

119. Floating debris in sewage is removed by
(1) Biological treatment
(2) Sequential filtration
(3) Anaerobic sludge digester
(4) Chemical treatment

120. What causes membrane permeability to change in photoreceptor cells?
(1) Light induced dissociation of retinal from opsin
(2) Light induced association of retinal with opsin
(3) Generation of potential difference in bipolar neurons
(4) Passage of light through layers of retinal cells

121. Which of the following can not be included in female accessory ducts?

(1) Oviduct (2) Urethera

(3) Uterus (4) Vagina

122. Which of the following is responsible for causing cancer, used in diagnosis as well as in treatment ?

(1) Biopsy
(2) X-rays
(3) α -interferon
(4) UV-radiations

123. Consider following features

(a) Organ system level of organisation

(b) Bilateral symmetry

(c) True coelomates with segmentation of body

Select the correct option of animal groups which possess all the above characteristics

(1) Annelida, Arthropoda and Chordata

(2) Annelida, Arthropoda and Mollusca

(3) Arthropoda, Mollusca and Chordata

(4) Annelida, Mollusca and Chordata

124. Which of the following is CORRECT?

	Part of brain	Features	Exception
(1)	Cerebellar hemisphere	Corpus callosum, major part of brain, superficial cleft	Superficial cleft
(2)	Association area	Responsible for intersensory association, cardio vascular reflexes, communication	Cardio vascular reflexes
(3)	Hypothalamus	Controls body temperature, urge for eating and drinking, emotional reaction	Emotional reaction
(4)	Midbrain	Corpora quadrigemina, crura cerebri, cerebral aqueduct	Cerebral aqueduct

125. Which one of the following statements is wrong?

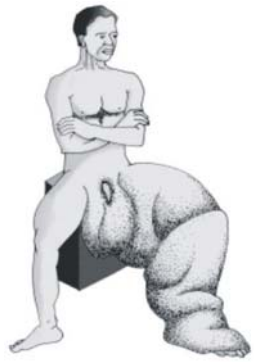
(1) Glycine is a sulphur containing amino acid

(2) Sucrose is a disaccharide

(3) Cellulose is a polysaccharide

(4) Uracil is a pyrimidine

126. Name the disease and causal organism?



(1) Elephantiasis, *Ascaris*

(2) Elephantiasis, *Wuchereria*

(3) Ameobiasis, *Entamoeba*

(4) Ringworm, *Trichophyton*

127. Which of these are all hormones of pars distalis?

(1) GH, PRL, ADH, ACTH, TSH
(2) GH, LH, FSH, ADH, ACTH
(3) GH, FSH, PRL, LH, ADH
(4) GH, LH, FSH, ACTH, PRL

128. Find the correct statement for secondary lymphoidal tissues

(1) These are located within the lining of the major tracts (respiratory, digestive and urogenital tracts) called mucosalassociated lymphoid tissue (MALT).

(2) It constitutes about 20 percent of the lymphoid tissue in human body.

(3) All blood cells produce and mature in them

(4) All of these

129. When cell has stalled DNA replication fork, which checkpoint should be predominantly activated?

(1) G_1/S

(2) G_2 /M

(3) M

(4) Both G_2 /M and M

130. Match the items given in Column I with those in Column II and select the correct option given below:

	Column I		Column II
	Type		**pO_2 in mm of Hg**
a.	Tissues	i.	116
b.	Alveolar air	ii.	40
c.	Oxygenated blood	iii.	104
d.	Expired air	iv.	95

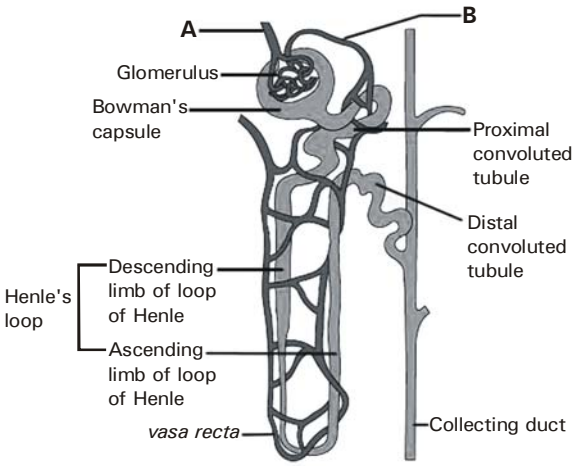
(1) a-iii;b- ii;c-i;d-iv

(2) a-iii;b- i;c-iv;d-ii

(3) a-ii;b-iii;c-iv;d-i

(4) a-i;b-iv;c-ii;d-iii

131. **Assertion :** Normal inspiration in humans is an active process while expiration is passive.
Reason: Contraction of diaphragm and external intercostal muscles causes inspiration while their relaxation causes expiration.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

132.


From the above figure what do labels A and B represent?
(1) A–afferent arteriole, B–efferent arteriole
(2) A–glomerulus, B–efferent arteriole
(3) A–afferent arteriole, B–renal vein
(4) A–vasa recta, B–efferent arteriole

133. Match the column-I with column-II and select the correct option from the codes given below

	Column-I	Column-II
a.	PCT	i. Maintains high osmolarity in interstitium
b.	DCT	ii. Filtration of blood
c.	Loop of Henle	iii. Major site for active secretion
d.	Renal corpuscle	iv. Extends from cortex deep into the medulla
e.	Collecting duct	v. Conditional reabsorption of Na + and water

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

134. Choose the incorrect statement with respect to cilia & flagella.
(1) Cilia work like oars causing movement of either cells or surrounding fluid.
(2) Prokaryotic cilia are structurally different from eukaryotic cilia.
(3) Their axoneme have nine pairs of triplets of radially arranged peripheral microtubules.
(4) 9 radial spokes are present.

135. **Statement- I** : Joints are points of contact between bones or between bones and cartilages.
Statement-II : Synovial fluid act as a grease in the joints of elbow, ankle, wrist, hip, knee..
(1) Statement- I is correct but statement -II is incorrect
(2) Both statement- I and statement- II are correct
(3) Both statement- I and statement- II are incorrect
(4) Statement- I is incorrect but statement- II is correct

ZOOLOGY : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

136. Which one is the most abundant protein in the animal world ?
(1) Insulin (2) Trypsin
(3) Haemoglobin (4) Collagen

137. **Statement-I :** Tubular reabsorption is a very important step in the process of urine formation.
Statement-II : The glomerular filtrate contains important nutrients and electrolytes.
(1) Both statement-I and statement-II are incorrect
(2) Statement-I is correct but statement-II is incorrect
(3) Both statement-I and statement-II are correct
(4) Statement-I is incorrect but statement-II is correct

138. Purkinje's fibres are special types of
(1) muscle fibres located in heart
(2) nerve fibres located in cerebrum
(3) connective tissue fibres joining one bone to another bone
(4) sensory fibres extending from retina into optic nerve

139. Cell in G_0 phase
(1) terminate the cell cycle
(2) exit the cell cycle
(3) enter the cell cycle
(4) suspend the cell cycle

140. Which of the following options does correctly represent the characteristic features of phylum Annelida?

(1) Triploblastic, segmented body and bilaterally symmetrical.

(2) Triploblastic, flattened body and acoelomate condition.

(3) Diploblastic, mostly marine and radially symmetrical.

(4) Triploblastic, unsegmented body and bilaterally symmetrical.

141. Which of the following is correct regarding digestive disorders?

a. There is reduction in absorption of nutrients in diarrhoea.

b. Anxiety, intake of spicy food & inadequate secretion of enzymes cause jaundice

c. Faeces are retained in colon, as the bowel movements occur irregularly in constipation

d. Cardiac sphincter relaxes during vomiting

(1) a & c

(2) a, c & d

(3) b, c & d

(4) a, b, c & d

142. What could be the minimum & the maximum number of eggs produced by a woman who gives birth to two boys & two girls?

(1) 2 & 4 respectively
(2) 1 & 4 respectively
(3) 4 in both case
(4) cannot be said

143. The method of directly injecting a sperm into ovum in assisted reproductive technology is called:

(1) GIFT
(2) ZIFT
(3) ICSI
(4) ET

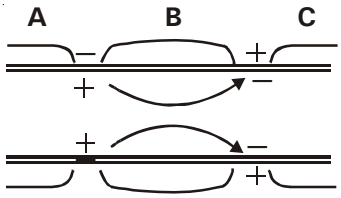
144. What does 'competent mean' in competent host?

(1) Ability of foreign DNA to express in host cell
(2) Ability of the host to pick up the foreign DNA

(3) Selection of recombinant host cells

(4) Ability of host cell to express the recombinant gene and the proteins

145. In the following diagram showing propagation of nerve impulse in a myelinated nerve fibre, if segment A is repolarised and C is polarised, nerve impulse will propagate from



(1) B to A
(2) B to C
(3) either B to A or B to C
(4) cannot be said

146. Bt toxin gene has been cloned from _____ & expessed in _____

(1) plants ; animals
(2) bacteria ; plants
(3) animals ; bacteria
(4) bacteria ; animals

147. Branching descent & natural selection are key concepts of theory of

(1) Darwin
(2) Lamarck
(3) Hugo de Vries
(4) Both (1) & (3)

148. Given below is an incomplete table about certain hormones, their source glands and one major effect of each on the body in humans. Identify the correct option for the three blanks A, B and C

Glands	Secretion	Effect on body
A	Oestrogen	Maintenance of secondary sexual character
Alpha cells of islets of Langerhans	B	Raises blood sugar level
Anterior pituitary	C	Over secretion leads to gigantism

	A	B	C
(1)	Ovary	Glucagon	Calcitonin
(2)	Ovary	Glucagon	growth hormone
(3)	Leydig's cells	Insulin	Vasopressin
(4)	Ovary	insulin	Calcitonin

149. **Assertion** : Myasthenia gravis is an autoimmune disorder.

Reason : Neuromuscular junction is affected leading to paralysis of skeletal muscles.

(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

150. An important characteristic that Hemichordates share with Chordates is
(1) Absence of notochord
(2) Ventral tubular nerve cord
(3) Pharynx with gill slits
(4) Pharynx without gill slits

BOTANY : SECTION-A

All questions are compulsory in section A

151. Which of the following is incorrect?
(1) Bacteria are the sole members of the kingdom monera.
(2) Compared to many other organisms, bacteria as a group show the most extensive metabolic diversity.
(3) Archaebacteria differ from other bacteria in having a different cell wall structure and this feature is responsible for their survival in extreme conditions.
(4) Bacteria are unicellular eukaryotes

152. Which of the following statement is correct?
(1) In carboxylation step, one ATP is required in C_3 cycle
(2) RUBP is 5-carbon ketose sugar
(3) C_3 plant shows kranz anatomy
(4) In cyclic photophosphorylation, two NADPH molecules are formed

153. Which of the following disease is an analogous variant of BSE and is caused in humans by prions ?
(1) Swine flu
(2) AIDS
(3) Cr-Jacob disease (CJD)
(4) Covid-19

154. In transcription
(1) all DNA and both the strands are copied into RNA
(2) only a segment of DNA and only one of the strands is copied into RNA
(3) all RNA and both the strands are copied into DNA
(4) only a segment of RNA and only one of the strands is copied into DNA

155. Identify the incorrect statement
(1) The rRNA act as a catalyst for the formation of peptide bond
(2) The UTR's are present at both 5'-end (before start codon) and at 3'end (after stop codon)
(3) At the end of translation, a release factor binds to the stop codon
(4) When the larger subunit encounters an mRNA, the process of translation of the mRNA to protein begins

156. **Statement- I** : Root pressure is result of passive absorption of water by root.

Statement- II : Every plant species has its own adaptation to enhance water absorption.
(1) Both statement -I and statement- II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement- II is correct

157. What is not true about sclereids?
(1) These are sclerenchyma with thickened lignified walls
(2) These are commonly found in the fruit wall of nuts and in the pulp of guava, pear, etc.
(3) These are elongated and flexible with tapered ends
(4) These are dead mechanical tissue

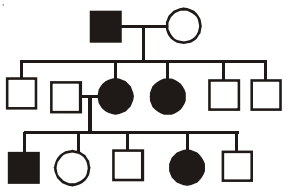
158. Who argued that the pairing and separation of a pair of chromosomes would lead to the segregation of a pair of factors they carried ?
(1) Sutton and Boveri
(2) Morgan
(3) Bateson and punnet
(4) Sturtevant

159. Golden algae is a
(1) Cyanobacteria
(2) Euglenoid
(3) Saprophytic algae
(4) Desmids

160. Which is false w.r.t. viability period of pollen grains?
(1) It is highly variable
(2) To some extent it depends on the prevailing temperature and humidity
(3) In some cereals such as rice & wheat, pollen grains lose viability within 30 hrs of release
(4) In some members of Rosaceae, Leguminoseae & Solanaceae, they maintain viability for months

161. Which type of ovary is present in *Papaver*?
(1) Multicarpellary, syncarpous
(2) Multicarpellary, apocarpous
(3) Monocarpellary, syncarpous
(4) Monocarpellary, apocarpous

162. Given below is a pedigree chart showing the inheritance of a certain sex-linked trait in humans



The trait traced in the above pedigree chart is
(1) dominant X-linked (2) recessive X-linked
(3) dominant Y-linked (4) recessive Y-linked

163. Which of the following statement is correct?
(1) The gametophyte of *Pteris* is more developed than that of *Polytrichum*
(2) In *Ginkgo*, the female gametophyte is retained on the parent sporophyte
(3) Sexual reproduction in *Fucus* is anisogamous
(4) The spores of slime molds lack cell wall

164. Which of the following statement is incorrect?
(1) The promoter region allow binding of DNA polymerase to it
(2) DNA acts as a template for synthesis of both DNA and RNA
(3) Ori site is a definite region in DNA where replication starts
(4) DNA polymerase is DNA dependent DNA polymerase

165. Match the entries in column I with column II

	Column I		**Column II**
a.	*Solanum nigrum*	(i)	pulvinate leaf
b.	Sweet pea	(ii)	cymose inflorescence
c.	*Asparagus*	(iii)	parietal placentation
d.	Mustard	(iv)	perianth

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

166. Pick the correct match of function of essential elements
(1) Mn – Component of chlorophyll
(2) Zn – Photolysis of water
(3) Cu – Component of Urease
(4) Ca – Component of middle lamella

167. Select the incorrect statement w.r.t. sequence annotation methodology of HGP
(1) Commonly used hosts were bacteria and yeast
(2) Only those genes were identified which express as RNA
(3) Fragments were sequenced using automated DNA sequencers
(4) Specalised computer based programmes were developed for joining up the sequences

168. Gymnosperms
a. are cormophytes
b. bear tap roots
c. always produce dioecious sporophyte
d. bear multicellular female gametophyte
(1) b and d only (2) a, b and d
(3) c and d (4) a, b, c and d

169. What percentage of progeny can be colour blind when there is marriage between colour blind father's normal son and colour blind mother's daughter?
(1) 25% (2) 0%
(3) 50% (4) 75%

170. **Statement- I** : 0.1% sewage impurities make domestic sewage unfit for human use.
Statement- II : Dissolved salts such as nitrates, phosphates & toxic metal ions are most difficult to remove from sewage.
(1) Both statement-I and statement-II are correct
(2) Both statement- I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

171. Function of synergids is to
(1) attract pollen tube and bear its shock
(2) fuse with extra male gametes and form endosperm
(3) produce additional embryo
(4) protect egg from pathogens

172. Which of the following statements is incorrect about sieve tube elements?
(1) They are long, tube-like structures, arranged longitudinally and are associated with the companion cells
(2) Their end walls are perforated in a sieve-like manner to form the sieve plates
(3) Mature sieve element posseses a peripheral cytoplasm and a small vacuole
(4) The functions of sieve tubes are controlled by the nucleus of companion cells

173. Biofortified crop of maize is rich in
(1) lipids
(2) vitamin C
(3) lysine
(4) iron and calcium

174. How many of the following statements are correct?
a. All the biodiversity hot spots put together cover less than 2 percent of earth's land area
b. Norman Myers developed the concept of hot spots.
c. India has 25 biodiversity hot spots
(1) a, b (2) b, c
(3) only c (4) a, b, c

175. **Assertion** : Monarch butterfly is highly distasteful to its predator, a bird.

Reason : Butterfly has a chemical in its body acquired by feeding on poisonous weed during caterpillar stage.

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

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

(3) Assertion is true statement but Reason is false

(4) Assertion is false

176. An allele is dominant if it is expressed in

(1) pure condition

(2) heterozygous combination

(3) F_2 generation

(4) both homozygous and heterozygous conditions

177. If gynoecium is situated in the centre and other parts of flowers are located on the rim of thalamus almost at the same level, it is called

(1) hypogynous

(2) perigynous

(3) epigynous

(4) syncarpous

178. Transverse section of a tree stem shows 10 rings of autumn wood and 10 rings of spring wood. Age of the tree is approximately

(1) 20 years

(2) 10 years

(3) 30 years

(4) cannot be predicted

179. Match the following correctly

	Column-I		**Column-II**
a.	FOAM	i.	Integrated organic farming
b.	Ahmed Khan	ii.	Integrated waste water management
c.	Ramesh Chandra Dagar	iii.	Protecting trees
d.	Amrita Devi	iv.	Polyblend

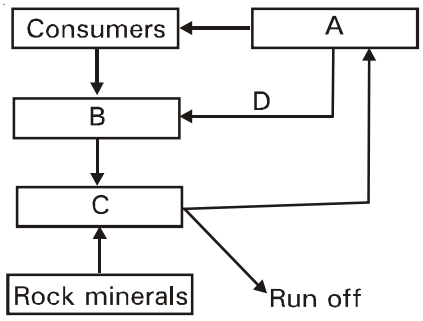
(1) a-i, b-ii, c-iv, d-iii

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

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

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

180. A flow chart is given below to represent the phosphorus cycle in a terrestrial ecosystem. Find out A, B, C & D



(1) A–Soil solution, B–Littter fall,C–Producers, D–Detritus,

(2) A–Detritus,B–Soil solution,C–Littter fall, D–Producers

(3) A–Producers,B–Detritus, C–Soil solution, D–Litter fall

(4) A–Litter fall,B–Soil solution,C–Detritus, D–Producers

181. Select the correct statement w.r.t. Phenylketonuria

(1) It is single gene mutation, caused due to lack of enzyme phenyl alanine hydroxylase

(2) Caused due to lack of enzyme tyrosinase

(3) It is single gene mutation, caused due to excessive formation of enzyme phenyl alanine hydroxylase

(4) Organism infected with this disease becomes resistant to malaria

182. Choose the correct match

	Species A	**Species B**	**Name of interaction**
(1)	+	+	Competition
(2)	–	–	Predation
(3)	+	0	Commensalism
(4)	+	–	Amensalism

183. Identify the incorrect match

	Type of cell	**Number of base pairs**	**Length of DNA**
(1)	Skin cell of human	6.6×10^9bp	2.2 m
(2)	*E.coli*	4.6×10^6bp	1.56 mm
(3)	Haploid content of human DNA	3.3×10^9bp	1.1 m
(4)	$\phi \times 174$	5386 bp	1.8×10^{-6}m

184. In which of the following, both pairs have correct combination ?
(1) *In situ* conservation – Seed banks
Ex situ conservation – National parks
(2) Hot spots in India – Western ghats
World Summit – Johannesberg, Africa
(3) Sacred lake of India– Dal Lake of Kashmir
Sacred grove of India– Himalayas
(4) First National park of India – Keoladeo
First Biosphere reserve in India –Nilgiri

185. Ecological sanitation is
a. sustainable system for handling human excreta
b. using dry compositing toilets
c. a practical, hygienic efficient and cost effective solution to human waste disposal
d. working in many areas of Kerala and Sri Lanka
(1) a & b only
(2) b, c & d only
(3) a & c only
(4) a, b, c & d

BOTANY : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

186. Find the incorrect statement
(1) The number of ovules in an ovary may be one as in wheat, paddy and mango
(2) Many ovules are present in the ovary of papaya, watermelon and orchids
(3) The ovarian cavity is called carpel
(4) The protective envelopes called integuments encircle the ovule except at the tip, where a small opening called the micropyle is organised

187. Which method is used to remove particulate pollutants from the chimney smoke?
(1) Combustion system
(2) Dry system
(3) Electrostatic precipitator
(4) Wet system

188. What will be the number of purines in four turns of double helical DNA molecule?
(1) 10
(2) 20
(3) 30
(4) 40

189. Reproduction is synonymous with growth, in
(1) Bacteria
(2) *Hydra*
(3) *Planaria*
(4) *Rhizopus*

190. **Statement-I** : Offspring formed due to sexual reproduction have better chances of survival.
Statement-II : Sexual reproduction introduces genetic variation.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

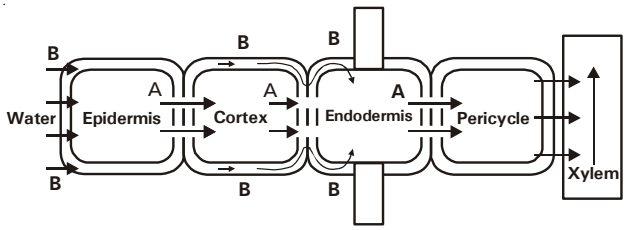
191. Legume root nodules contain leghaemoglobin. Its function is to
(1) help in expression of 'nod' gene
(2) deactivate dinitrogenase enzyme
(3) help in scavanging of oxygen
(4) help in growth of nodule

192. How many of the following statements are incorrect?
a. Polyblend and bitumen when used to lay roads, water repellent properties of bitumen's were enhanced.
b. At high doses, nuclear radiations are lethal
c. Green house gases absorb short wave radiations from the earth and emit it again towards the earth
d. Bad ozone formed in the lower atmosphere harms plants and animals
e. Ozone hole over Antarctica develops each year between late August and early October
(1) 1
(2) 2
(3) 3
(4) 4

193. In monocots, plumule is enclosed in a sheath, called
(1) aleurone layer
(2) scutellum
(3) coleorhiza
(4) coleoptile

194. **Assertion :** RQ of fatty compounds is less than one.
Reason : Fats are poor in oxygen content.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

195. In the given diagram, A and B defines the movement of water inside the plant cell. Identify A & B.



(1) A–Apoplast movement, B–Symplast movement
(2) A–Apoplast movement, B–Symport movement
(3) A–Symplast movement, B–Apoplast movement
(4) A–Antiport movement, B–Symport movement

196. Which of the following is correct w.r.t. law of dominance?

(1) Characters are controlled by descrete units called factors
(2) Factors occurs in pairs
(3) In a dissimilar pair of factors one member of the pair dominates the other
(4) All of these

197. Match the fungus in column I with effects in column II.

Column I		**Column II**	
a.	Parasitic	p.	disease in plants & animals
b.	Yeast	q.	white spots on mustard leaf
c.	*Albugo*	r.	source of antibiotics
d.	*Penicillium*	s.	used to make bread and beer

(1) a-s, b-q, c-p, d-r
(2) a-q, b-r, c-s, d-p
(3) a-p, b-s, c-q, d-r
(4) a-r, b-s, c-q, d-p

198. $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$

Identify N, r & K in the equation

(1) N = carrying capacity, r = population, K = density
(2) N = population density, r = carrying capacity, K = natural log
(3) N = population size, r = natural logarithms, K = carrying capacity
(4) N = population density at time t, r = intrinsic rate of natural increase, K = carrying capacity

199. The cyanobacteria are also called as

(1) Golden algae
(2) Golden brown algae
(3) Blue green algae
(4) Brown algae

200. Ethylene is used to initiate flowering and for synchronising fruit set in

(1) cotton
(2) pineapples
(3) tomatoes
(4) walnut

Space for rough work

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