Dated : 30-04-2023

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Test Series HMC-8 [Option -2]

Test - 09(Rev.)

MM : 720 Time : 3 hrs. 20 min.

Physics	:	Electrostatics, Current Electricity, Magnetic Effects of Current, Magnetism, EMI, AC, Ray Optics, Wave Optics,Dual nature of radiation & matter, Atoms and Nuclei, Semiconductor devices, EM Waves
Chemistry	:	GOC (I/C Nomenclature & isomerism), Hydrocarbons, Purification, Alkyl & Aryl halides, Alchohol, Phenols & ethers, Aldehydes, Ketones & Carboxylic Acids, Amines, Biomolecules, Polymers, d & f block elements, Coordination compunds, Chemical kinetics, Solid state, Surface chemistry
Zoology	:	Evolution, Human repdorduction, Reproductive health, Human health & disease,Immune system, Strategies of enhancement in food production, Biotechnology & Microbes in human welfare
Botany	:	Genetics (Principle of inheritance and variations, Molecular basis of inheritance), Reproduction in Flowering Plants, Reproduction in Organism, Morphology of Flowering Plants, Ecology

PHYSICS : SECTION-A

All questions are compulsory in section A

1. If the width of one slit in YDSE is slightly increased, it will be observed experimentally that
   (1) bright fringes become dimmer
   (2) bright fringes become brighter
   (3) the intensity of minima is strictly zero
   (4) the fringes become more distinct

2. The alloys constantan and manganin are used to make standard resistance because they have
   (1) Low resistivity
   (2) High resistivity
   (3) Low temperature coefficient of resistance
   (4) Both (2) and (3)

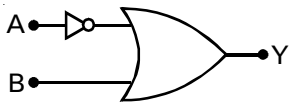
3. An astronomical telescope has a large aperture to
   (1) reduce spherical aberration
   (2) have high resolution
   (3) increase span of observation
   (4) have low dispersion

4. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. If the frequency is halved and the intensity is doubled, the photoelectric current becomes
   (1) four times
   (2) double
   (3) half
   (4) zero

5. Two positive point charges of $10\,\mu C$ and $8\,\mu C$ are 10 cm apart. Potential energy of system is
   (1) 4.8 J
   (2) 5 J
   (3) 10 J
   (4) 7.2 J

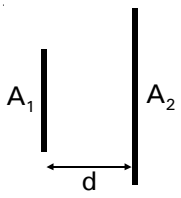
6. Nuclear forces are
   (1) Charge dependent
   (2) Spin independent
   (3) Charge independent
   (4) Long-range

7. A achromatic combination is made with a lens of focal length *f* and dispersive power ω with a lens having dispersive power of 2ω. The focal length of second will be
   (1) 2 f
   (2) *f/2*
   (3) $-f/2$
   (4) $-$ 2 f

8. 

   What is the Boolean equation for the logic gate shown?
   (1) $Y = A + \overline{B}$
   (2) $Y = \overline{A + B}$
   (3) $Y = \overline{A} + B$
   (4) $Y = \overline{A} + \overline{B}$

9.



The capacitance of a capacitor of plate area A_1 and A_2 ($A_1 < A_2$) at a distance d is

(1) $\frac{A_1 \varepsilon_0}{d}$

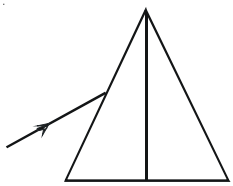
(2) $\frac{A_2 \varepsilon_0}{d}$

(3) $\frac{\varepsilon_0 (A_1 + A_2)}{2d}$

(4) $\frac{\varepsilon_0 \sqrt{A_1 A_2}}{d}$

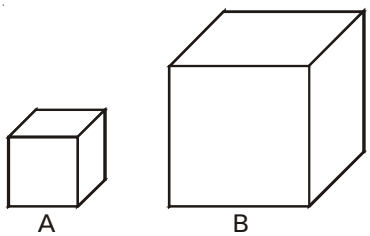
10. In the hysteresis cycle, the value of H needed to make the intensity of magnetisation zero is called
(1) Retentivity
(2) Coercive force
(3) Lorentz force
(4) none of the above

11. A light ray is incident upon a prism in minimum deviation position and suffers a deviation of 34°. If the second half of the prism is knocked off, the ray will



(1) suffer a deviation of 34°
(2) suffer a deviation of 68°
(3) suffer a deviation of 17°
(4) not come out of the prism

12.



A and B are two aluminium cubes but the volume of B is eight times the volume of A. If the resistance of A between two opposite faces is 10 Ω, that of B is

(1) 10 Ω
(2) 5 Ω
(3) 20 Ω
(4) 2.5 Ω

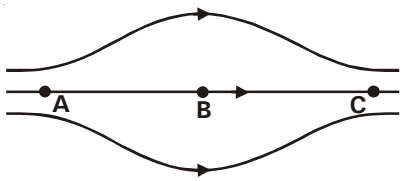
13. In a torroidal solenoid carrying current the magnetic field exists
(1) only inside the torroid
(2) inside the torroid as well as in the space bounded by the torroid
(3) inside the torroid as well as in the space beyond the torroid
(4) no where

14. $^{22}Ne_{10}$ nucleus, after absorbing energy, decays into two α-particles and an unknown nucleus. The unknown nucleus is
(1) nitrogen
(2) carbon
(3) boron
(4) oxygen

15. A coil of 100 turns carries a current 5 A and creates a magnetic flux 10^{-5} weber per turn. The value of its inductance will be
(1) 0.05 mH
(2) 0.1 mH
(3) 0.15 mH
(4) 0.2 mH

16. The ratio of number of turns in the secondary to that in primary of an ideal transformer is 2 : 1. If the power input be 100 W, then the output power is
(1) 200 W
(2) 50 W
(3) 100 W
(4) 150 W

17. Figure shows some of the electric field lines corresponding to an electric field. Then



(1) $E_A > E_B > E_C$
(2) $E_A = E_B = E_C$
(3) $E_A = E_C > E_B$
(4) $E_A = E_C < E_B$

18. An aeroplane with wing span 50 m is flying horizontally with a speed of 360 km/hr over a place where the vertical component of the earth's magnetic field is 2×10^{-4} Wb/m². The potential difference between the tips of the wings would be
(1) 0.1 V
(2) 1 V
(3) 0.2 V
(4) 0.01 V

19. **Assertion** : In YDSE, the fringewidth increases when a glass slab is placed in front of one of the slits .

Reason : The glass slab introduces additional optical path in the ray passing through it.

(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

20. A 2 volt battery, a $15\,\Omega$ resistor and a potentiometer of 100 cm length, all are connected in series. If the resistance of potentiometer wire is $5\,\Omega$, then the potential gradient of the potentiometer wire is

(1) 0.005 V/cm

(2) 0.05 V/cm

(3) 0.02 V/cm

(4) 0.2 V/cm

21. According to Maxwell, a time changing electric field in a region generates

(1) an e.m.f.

(2) an electric field

(3) a magnetic field

(4) an electric current

22. A convex lens forms a real image of an object for its two different positions on a screen. If height of the image in both the cases be 8 cm and 2 cm, then height of the object is

(1) 16 cm

(2) 8 cm

(3) 4 cm

(4) 2 cm

23. As the temperature of a metallic resistor is increased the product of its resistivity and conductivity

(1) increases

(2) decreases

(3) remains constant

(4) may increase or decrease

24. Ratio of area enclosed by first orbit of hydrogen atom to that enclosed by second orbit of He^+ is

(1) 1 : 2

(2) 1 : 4

(3) 1 : 1

(4) 1 : 8

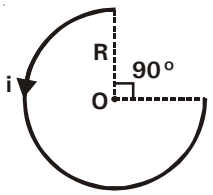
25. Condition of observable diffraction pattern is

(1) $\frac{a}{\lambda} \approx 1$

(2) $\frac{a}{\lambda} >> 1$

(3) $\frac{a}{\lambda} << 1$

(4) None of these

26. 

A current i ampere flows in a circular arc of wire whose radius is R, which subtends an angle $3\pi/2$ radian at its centre. The magnetic induction B at the centre is

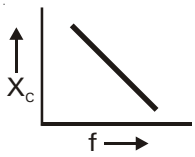
(1) $\frac{\mu_0 i}{R}$

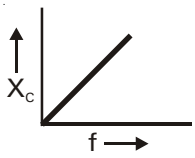
(2) $\frac{\mu_0 i}{2R}$

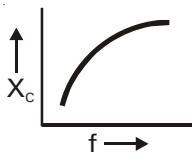
(3) $\frac{2\mu_0 i}{R}$

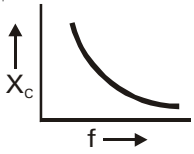
(4) $\frac{3\mu_0 i}{8R}$

27. The reactance of a capacitor X_C in an ac circuit varies with frequency f of the source voltage. Which one of the following represents this variation correctly?

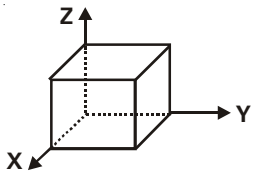
(1) 

(2) 

(3) 

(4) 

28. A cube of sides 0.2 m is placed with one corner at origin. A uniform electric field 2.5 N/C exists along x-axis. Electric flux through entire cube is

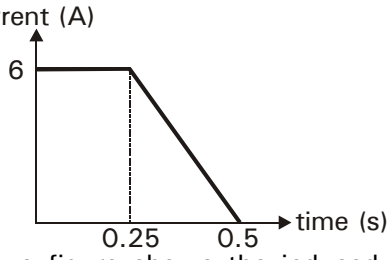


(1) 5 volt-metre

(2) 8.4 volt-metre

(3) 6.7 volt-metre

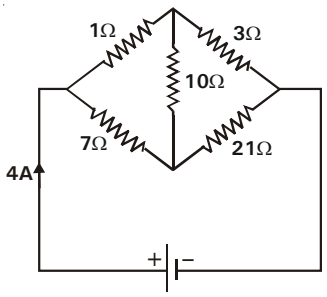
(4) zero

29. 

The above figure shows the induced current flowing through a circuit with resistance $20\,\Omega$. The change in flux responsible for this current is
(1) 72 Wb
(2) 18 Wb
(3) 36 Wb
(4) 45 Wb

30. A diver at a depth of 12m in water ($\mu = 4/3$) sees the sky in a cone of semi-vertical angle
(1) $\sin^{-1}(4/3)$
(2) $\tan^{-1}(4/3)$
(3) $\sin^{-1}(3/4)$
(4) 90°

31. In the circuit shown in figure, the current drawn from the battery is 4A. If 10Ω resistor is replaced by 20Ω resistor, the current drawn by it from the circuit will be



(1) 1A
(2) 2A
(3) 3A
(4) zero

32. If a star can convert all the Helium nuclei completely into oxygen nuclei. The energy released per oxygen nuclei is [Mass of the He nucleus is 4.0026 amu and mass of oxygen nucleus is 15.9994]
(1) 7.5 MeV
(2) 56.12 MeV
(3) 10.24 MeV
(4) 23.4 MeV

33. **Statement-I** : There is no change in the kinetic energy of a charged particle moving in a magnetic field although a magnetic force may be acting on it.
Statement-II : In a cyclotron electric field increases K.E.while magnetic field changes direction of moving charge particle.
(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

34. In a CE amplifier, using output resistance of $5000\,\Omega$ and input resistance of $2000\,\Omega$, the value of β is 50. If the peak value of signal voltage is 10 mV, then the peak value of output voltage is
(1) 5×10^{-6} V
(2) 2.5×10^{-4} V
(3) 1.25 V
(4) 125 V

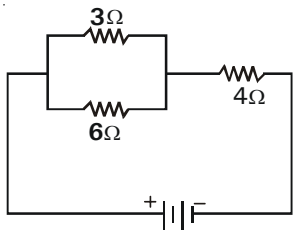
35. Rutherford's experiments on scattering of α-particle by thin foils established that
a. most of the mass of an atom is located in its nucleus
b. the nucleus of an atom has a positive charge
c. the nucleus of an atom contains protons and neutrons
d. the electrons revolve around the nucleus of an atom
(1) a & b
(2) a, b, c & d
(3) a, b & d
(4) a only

PHYSICS : SECTION-B

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

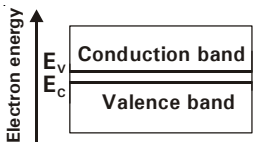
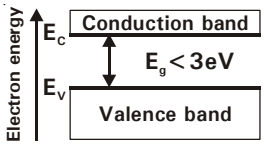
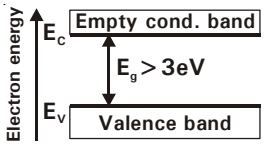
36. The total energy of an electron in the first excited state of the hydrogen atom is about –3.4 eV. What is the ratio of kinetic energy to the potential energy of the electron in this state?
(1) $-\frac{1}{2}$
(2) $\frac{1}{2}$
(3) 2
(4) –2

37. If a magnet is dropped down an infinitely long vertical copper tube, magnet moves with continuously
(1) increasing velocity and ultimately acquires a constant terminal velocity
(2) decreasing velocity & ultimately comes to rest
(3) increasing velocity but constant acceleration
(4) increasing velocity & non-uniform acceleration

38. 

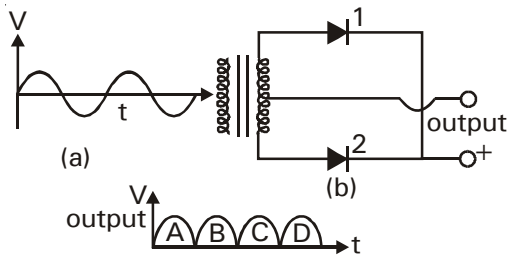
In figure,current through 3Ω resistor is 0.8 ampere, then potential drop through $4\,\Omega$ resistor is
(1) 9.6 V
(2) 2.6 V
(3) 4.8 V
(4) 1.2 V

39. Match the types of solids in column-I with their energy band differences in column-II

Column-I		Column-II
a. Semi-conductor	p.	
b. Insulator	q.	
c. Metal	r.	

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

40. A full-wave rectifier circuit along with the output is shown in the figure below. The contribution(s) from the diode 1 is (are)



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

41. A convex mirror is used to form the image of an object. Then which of the following statements is wrong?

(1) Image lies between the pole and the focus
(2) Image is diminished in size
(3) Image is erect
(4) Image is real

42. Electromagnetic waves are transverse in nature is evident by

(1) Polarization
(2) Interference
(3) Reflection
(4) Diffraction

43. A particle of mass 'm' and charge 'q' is placed at rest in a uniform electric field E. Speed attained by the particle after moving a distance y is

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

44. An ac circuit consists of an inductor of inductance 0.5 H and a capacitor of capacitance 8 μF in series. The current in the circuit is maximum when the angular frequency of ac source is

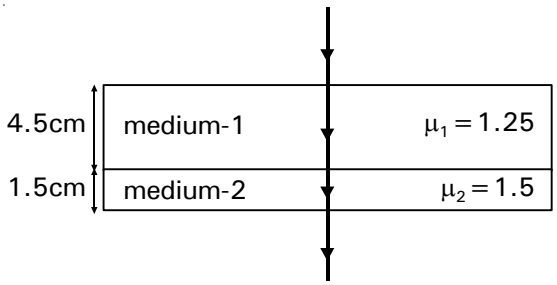
(1) 500 rad/s
(2) 2000 rad/s
(3) 4000 rad/s
(4) 5000 rad/s

45. In a mean life of a radioactive sample

(1) about 1/3 of the substance disintegrates
(2) about 90% of the substance disintegrates
(3) about 2/3 of the substance disintegrates
(4) almost all the substance disintegrates

46. A proton and an α-particle enter a uniform magnetic field perpendicularly with the same speed. If proton takes 5 μs to make 10 revolutions, then the time period for α-particle would be

(1) 1 μs
(2) 2 μs
(3) 5 μs
(4) 0.5 μs

47. 

A ray of light is incident normally on a pair of media 1 and 2 as shown above. The ratio of optical path in medium 1 to that in medium 2 is

(1) 5 : 1
(2) 3 : 2
(3) 2 : 1
(4) 5 : 2

48. A particle of mass 'm' and charge Q is accelerated through V. Then the de Broglie wavelength associated with it, is

(1) $\frac{h}{\sqrt{mV}}$

(2) $\frac{h}{\sqrt{2mQ}}$

(3) $\frac{h}{\sqrt{2mQV}}$

(4) $\frac{h}{\sqrt{2mV}}$

49. In a hypothetical atom, a transition from n = 4 to n = 3 produces visible light. Then the possible transition to obtain infrared radiation is

(1) n = 5 to n = 3
(2) n = 4 to n = 2
(3) n = 3 to n = 1
(4) none of these

50. A condenser of capacity 100 μF is charged so that the electrostatic energy stored in it is 600 μJ. It is now connected to another uncharged condenser of capacity 200 μF in parallel. The energy dissipated in the process is

(1) 400 μJ
(2) 300 μJ
(3) 200 μJ
(4) 150 μJ

CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. Arrange the following hydrogen halides in order of their decreasing reactivity with propene

(1) HCl > HBr > HI
(2) HBr > HI > HCl
(3) HI > HBr > HCl
(4) HCl > HI > HBr

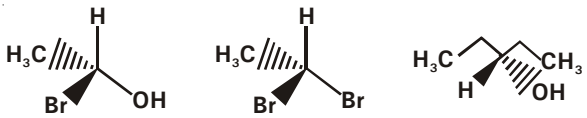
52. In which of the following reaction a new carbon-carbon bond is not formed

(1) Gattermann Koch reaction
(2) Kolbe's electrolysis
(3) Friedel crafts reaction
(4) Cannizarro's reaction

53. **Statement-I** : Cyclohex-3-en-1-ol gives Cyclohex-3-en-1-one with PCC.
Statement-II : The same reaction can be carried out with catalytic hydrogenation (H_2, Ni).

(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

54. Which one of the following is/are chiral molecules?



(I) (II) (III)

(1) I & II
(2) II & III
(3) I & III
(4) I only

55. Anisole reacts with a excess amount of HI at 373K to give

(1) phenol & methanol
(2) Iodobenzene & methanol
(3) Iodomethane & anisol
(4) phenol & iodomethane

56. $C_6H_5COC_6H_5 \xrightarrow[H^+/H_2O]{C_2H_5MgBr} P \xrightarrow[\Delta]{H_3PO_4} Q$

identify Q

(1) $C_6H_5-\underset{\underset{CH-CH_3}{\|}}{C}-C_6H_5$

(2) $C_6H_5-\underset{\underset{CH_2}{\|}}{C}-C_6H_5$

(3) $C_6H_5-\underset{\underset{C_2H_5}{|}}{\overset{\overset{OH}{|}}{C}}-C_6H_5$

(4) $C_6H_5-\underset{\underset{CH=CH_2}{|}}{\overset{\overset{OH}{|}}{C}}-C_6H_5$

57. Identify the mismatch

(1) Tetracarbonyl nickel : tetrahedral
(2) Decacarbonyldimanganese : Square bipyramidal
(3) Pentacarbonyl iron : trigonal bipyramidal
(4) Hexacarbonyl chromium : octahedral

58. Which of the following is not electrophile?

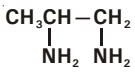
(1) H_2O
(2) BF_3
(3) NO_2^+
(4) $AlCl_3$

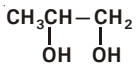
59. Which of the following pair of oxides are amphoteric?

(1) V_2O_5, Cr_2O_3
(2) Mn_2O_7, CrO_3
(3) V_2O_5, CrO
(4) V_2O_5, Mn_2O_7

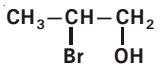
60. $CH_3CH=CH_2 \xrightarrow{Br_2} A \xrightarrow[(ii)\ NaNH_2]{(i)\ KOH(alc.)} B$

Identify B

(1) 

(2) 

(3) $CH_3-C\equiv CH$

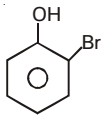
(4) 

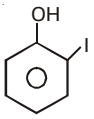
61. Which of the following carbohydrates are branched polymer of glucose?

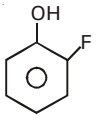
a. Amylose
b. Amylopectin
c. Cellulose
d. Glycogen

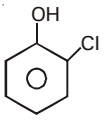
(1) a & b
(2) b & c
(3) b & d
(4) a & d

62. pKa is more for

(1) 

(2) 

(3) 

(4) 

63. **Statement-I** : Increase in temperature decreases half life period of the given reaction.

Statement-II : The fraction of molecules crossing the energy barrier increases with increase in temperature.

(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

64. Which of the following is a biodegradable polymer?

(1) Nylon 2-nylon 6
(2) Nylon-6
(3) Nylon-66
(4) Dacron

65. Which S_N2 reaction will occur most rapidly?(Assume the concentration and temperature are all the same)

(1) $CH_3O^- + CH_3CH_2F \rightarrow$

(2) $CH_3O^- + CH_3CH_2I \rightarrow$

(3) $CH_3O^- + CH_3CH_2Cl \rightarrow$

(4) $CH_3O^- + CH_3CH_2Br \rightarrow$

66. Half life of a certain radioactive element is such that 7/8 of a given quantity decays in 12 days. What fraction decays in 32 days?

(1) 0
(2) 1/128
(3) 1/256
(4) 255/256

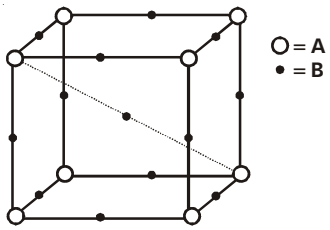
67. Which one of the following is not applicable generally to the phenomenon of adsorption?

(1) $\Delta H>0$
(2) $\Delta G<0$
(3) $\Delta S<0$
(4) $\Delta H<0$

68. On acetylation, glucose gives an _____ derivative

(1) penta-acetyl
(2) octa-acetyl
(3) hexa-acetyl
(4) deca-acetyl

69. A compound has a unit cell of the type shown in the figure. The formula of the compound is



(1) A_2B_3
(2) AB_3
(3) A_3B
(4) AB_4

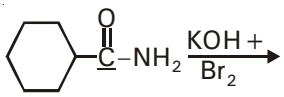
70. Which of the following will show Tyndall effect?

(1) Aqueous solution of soap below critical micelle concentration.
(2) Aqueous solution of soap above critical micelle concentration.
(3) Aqueous solution of sodium chloride.
(4) Aqueous solution of sugar.

71. Which one of the following is anisotropic & covalent solid?

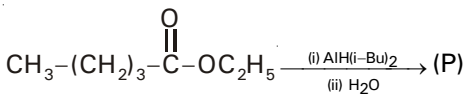
(1) NaCl
(2) Graphite
(3) Cu
(4) Sn

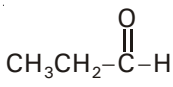
72. Oxidation state of the underlined carbon in the final product of the given reaction is



(1) +2
(2) +4
(3) –4
(4) +3

73. Co-ordination compounds have great importance in biological systems. In this context, which statement is incorrect?
(1) Carboxypeptidase - A is an enzyme and contains zinc
(2) Haemoglobin is the red pigment of blood and contains iron
(3) Cyanocobalmin is B_{12} and contains cobalt
(4) Chlorophylls are green pigments in plants and contain calcium

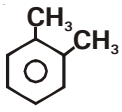
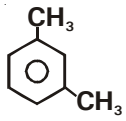
74. 

The product 'P' is
(1) $CH_3(CH_2)_3-CH_2OH$
(2) 
(3) $CH_3(CH_2)_3-CHO$
(4) $CH_3-(CH_2)_3-COOH$

75. Which one of the following is a combination of both vacancy and interstitial defect?
(1) Frenkel defect
(2) Schottky defect
(3) Electronic defect
(4) Impurity defect

76. Which of the following colloids cannot be coagulated easily?
a. Lyophobic colloids.
b. Irreversible colloids.
c. Reversible colloids.
d. Lyophilic colloids.
(1) a & b
(2) c & d
(3) b & c
(4) a & d

77. Match the following

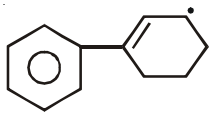
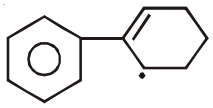
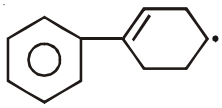
Column-I	Column-II
a. $CH_3CH_2CH_2CH_3$ and $CH_3CH(CH_3)CH_3$	i. position isomers
b. $CH_3CH_2OCH_2CH_3$ and $CH_3OCH_2CH_2CH_3$	ii. ring chain isomers
c.  & 	iii. chain isomers
d. $CH_3CH=CH_2$ & 	iv. metamers

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

78. Oxygen is available in plenty in air yet fuels do not burn by themselves at room temperature. This is because
(1) fuels are thermodynamically stable
(2) fuels are kinetically stable
(3) high activation energy is required
(4) both (2) and (3)

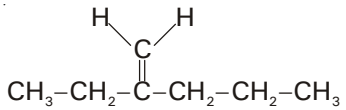
79. Which of the following will not be coloured in aqueous solution?
(1) Co^{2+}
(2) Sc^{+3}
(3) Mn^{+2}
(4) V^{3+}

80. Arrange the following radical in their decreasing order of stability

i. 
ii. 
iii. 

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

81. IUPAC nomenclature for the following compound is ?



(1) 3-methylenehexane
(2) 2-propyl but-1-ene
(3) 4-ethyl pent-4-ene
(4) 2-ethyl pent-1-ene

82. Low spin complex of d^6 cation in an octahedral field will have the following energy
(P = pairing energy)

(1) $-\frac{12}{5}\Delta_0 + P$

(2) $-\frac{12}{5}\Delta_0 + 3P$

(3) $-\frac{2}{5}\Delta_0 + 2P$

(4) $-\frac{2}{5}\Delta_0 + P$

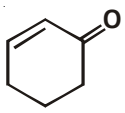
83. A sample of 0.50 g of an organic compound was treated according to Kjeldahl's method. The ammonia evolved was absorbed in 50 ml of 0.5 M H_2SO_4. The residual acid required 60 mL of 0.5 M solution of NaOH for neutralisation. The percentage composition of nitrogen in the compound.

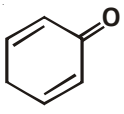
(1) 7%
(2) 28%
(3) 56%
(4) 14%

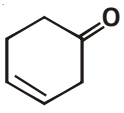
84. In alkaline medium $KMnO_4$ oxidizes I^- to

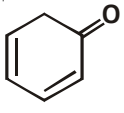
(1) I_2
(2) I_3^-
(3) IO_3^-
(4) I_2O_7

85. In which case [C–O] bond length is minimum

(1) 

(2) 

(3) 

(4) 

CHEMISTRY : SECTION-B

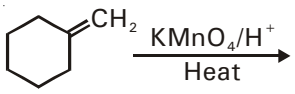
This section has 15 questions, attempt any 10 questions of them.

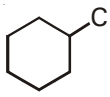
86. Match the complex (in List I) with the type of isomerism (in List II)

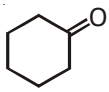
	List I		List II
a.	$[Pt(NH_3)_2Cl_2]$	i.	Optical
b.	$cis[Co(en)_2Cl_2)]$	ii.	Ionisation
c.	$trans[Co(en)_2(NO_2)Cl]SCN$	iii.	Coordination
d.	$[Co(NH_3)_6][Cr(CN)_6]$	iv.	Geometrical

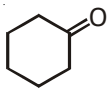
(1) a-ii, b-iv, c-iii, d-i (2) a-iii, b-iv, c-ii, d-i
(3) a-iv, b-i, c-ii, d-iii (4) a-ii, b-i, c-iii, d-iv

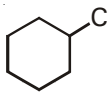
87. The major products of the following reaction are



(1)  , CH_2O

(2)  , CH_2O

(3)  , CO_2, H_2O

(4)  , HCOOH

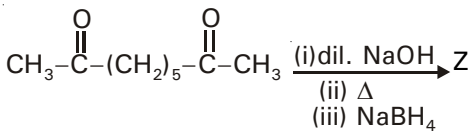
88. Phenol when it first reacts with conc. H_2SO_4 and then with Conc.HNO_3 gives

(1) nitrobenzene
(2) 2,4,6-trinitrophenol
(3) ortho-nitrophenol
(4) para-nitrophenol

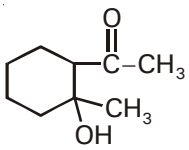
89. H_2 gas is adsorbed on activated charcoal to a very little extent in comparison to easily liquefiable gases due to _____.

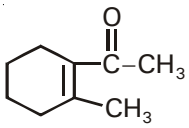
a. very strong van der Waal's interaction.
b. very weak van der Waals forces.
c. very low critical temperature.
d. very high critical temperature.

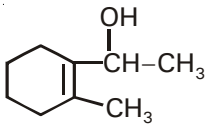
(1) a & b
(2) a & c
(3) b & c
(4) a & d

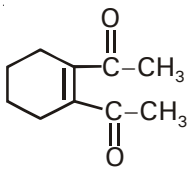
90. 

The final product Z will be

(1) 

(2) 

(3) 

(4) 

91. Select the rate law that corresponds to data shown for reaction : $A + B \rightarrow$ Products

Exp.	[A]	[B]	initial rate
1	0.012	0.035	0.1
2	0.024	0.070	0.8
3	0.024	0.035	0.1
4	0.012	0.070	0.8

(1) rate = k $[B]^3$ (2) rate = k $[B]^4$

(3) rate = k [A] $[B]^3$ (4) rate = k $[A]^2$ $[B]^2$

92. Two solids which have different solubilites in a solvent and which do not undergo reaction when dissolved in it are separated / purified by

(1) fractional distillation

(2) distillation under reduced pressure

(3) steam distillation

(4) crystallisation

93. Which of the following is not a thermoplastic polymer?

(1) Polythene

(2) Polysterane

(3) Bakelite

(4) Polyvinyl chloride

94. Which carboxylic acid will show HVZ reaction?

(1) Propionic acid

(2) Trichloro ethanoic acid

(3) Triphenyl acetic acid

(4) 2,2-dimethyl propanoic acid

95. **Assertion** : Carboxylic acids like aldehyde and ketones show nucleophilic addition reactions.

Reason : All these compounds have polar C = O group.

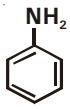
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

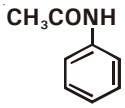
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

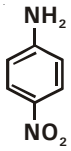
(3) Assertion is true statement but Reason is false

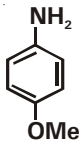
(4) Assertion is false

96. The correct order of increasing ease of protonation is

i. 

ii. 

iii. 

iv. 

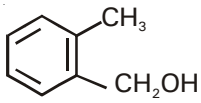
(1) ii < iii < iv < i

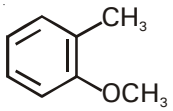
(2) ii < iv < iii < i

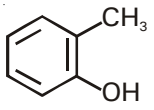
(3) ii < iii < i < iv

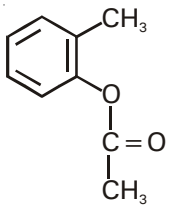
(4) ii < i < iii < iv

97. Which one of the following is most reactive towards electrophilic reagent?

(1) 

(2) 

(3) 

(4) 

98. The rate expression for a chemical reaction, $2NO_2Br \rightarrow 2NO_2 + Br_2$ is given as : Rate = k $[NO_2Br]$. Rate determining step is
(1) $2NO_2Br \rightarrow 2NO_2 + Br_2$
(2) $NO_2Br + Br \rightarrow NO_2 + Br_2$.
(3) $NO_2Br \rightarrow NO_2 + Br$.
(4) $NO_2 + Br \rightarrow NO_2Br_2$.

99. Which of the following halides is not a suitable substrate for the Gabriel synthesis of amines?
(1) $C_6H_5CH_2X$
(2) $CH_2 = CHCH_2X$
(3) $(CH_3)_3CX$
(4) Both (1) and (2)

100. **Assertion** : The packing efficiency is maximum for the fcc or hcp structure.
Reason : The cordination number is 12 in fcc and 6 in hcp structures.
(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

ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. According to neo-Darwinism, natural selection operates through
(1) survival of the fittest
(2) struggle for existence
(3) inheritance of useful variation
(4) differential reproduction

102. Which of the following are carcinogens?
(1) Ionizing radiations like X-rays & gamma rays
(2) Non-ionizing radiations like UV-rays
(3) Benzopyrene, soot
(4) all of these

103. Sertoli cells and Leydig cells are regulated respectively by hormones
(1) ICSH and FSH
(2) FSH and GnRH
(3) FSH and ICSH
(4) GH and ICSH

104. Site of the completion of second meiotic division of the secondary oocyte is
(1) Stroma of ovary
(2) Abdominal cavity
(3) Ampulla of fallopian tubule
(4) Uterus

105. Evolution by anthropogenic action is depicted by
(1) Darwin finches
(2) development of marsupials in Australia
(3) development of drug resistance by bacteria
(4) homologous organs

106. Identify the group of sexually transmitted diseases which are not completely curable
(1) HIV, genital warts, syphilis
(2) HIV, genital herpes, gonorrhoea
(3) genital herpes, hepatitis B, HIV
(4) Trichomoniasis HIV, chlamydiasis

107. The sites of formation of 8-celled embryo, secondary oocyte and blastocyst are respectively.
(1) Ovary, fallopian tube, oviduct
(2) Fallopian tube, ovary, uterus
(3) Ovary, fallopian tube, uterus
(4) Oviduct, uterus, fallopian tube

108. Identify the correctly matched pair concerning foetal growth in case of humans
(1) End of first trimester - external genital organs developed
(2) end of 2nd month of pregnancy - body is covered with fine hair
(3) 3rd month of pregnancy - foetal movement observed
(4) 1st month of pregnancy - hair appear on head

109. Branching descent and natural selection are two key concepts of
(1) Lamarckian theory of use and disuse
(2) Darwinian theory of evolution
(3) De Vries theory of mutation
(4) Neo-Darwinism

110. **Statement-I** : *Ascaris*, the common round worm and *Wuchereria*, the filarial worm, are some of the helminths which are known to be pathogenic to man.
Statement-II : Symptoms of Ascariasis include external bleeding, muscular pain, fever, anemia and blockage of the intestinal passage.
(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

111. Colostrum provides immunity to infants by
(1) lactalbumin
(2) Lactose
(3) IgA
(4) All of these

112. What is true w.r.t. Ganga Action Plan?
(1) It was launched with initiation of Late PM Rajiv Gandhi to clean water of Ganga
(2) It was meant for saving the major rivers like Ganga from pollution
(3) It is proposed to build a large number of STPs so that only treated water be discharged in the river.
(4) All are true

113. The immune system of a person is suppressed. In the ELISA test, he was found positive to a pathogen. From the given options, identify the disease, causative organism and the cells of body which are affected.
(1) AIDS, HIV, T_C cells
(2) Typhoid, *Salmonella*, intestinal cells
(3) Malaria, *Plasmodium*, liver cells
(4) AIDS, HIV, T_H-cells

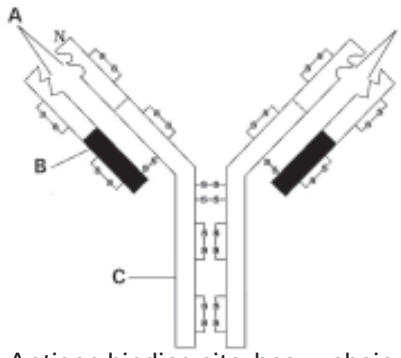
114. Which of the following statement is incorrect?
(1) *Aspergillus niger* bacteria is good producer of citric acid.
(2) Bottled fruit juices bought from the market are clearer as compared to those made at home due to use of pectinases and proteases.
(3) The technology of biogas production was developed in India mainly due to efforts of IARI and KVIC.
(4) *Saccharomyces cerevsiae* used to prepared bread is cultured on molasses

115. The concept of chemical evolution is based on
(1) formation of inorganic molecules from complex organic molecules
(2) effect of solar radiation on chemicals
(3) on the fact that formation of biomolecules preceded the appearance of first cellular forms
(4) interaction of water, air and clay under intense heat

116. Cancer specific antigens can be detected by
(1) monoclonal antibodies
(2) mammography
(3) CT scan
(4) none of these

117. The end product obtained in Miller and Urey experiment was
(1) amino acid
(2) sugars
(3) N–bases
(4) pigments

118. From the given structure of antibody, identify A, B & C respectively

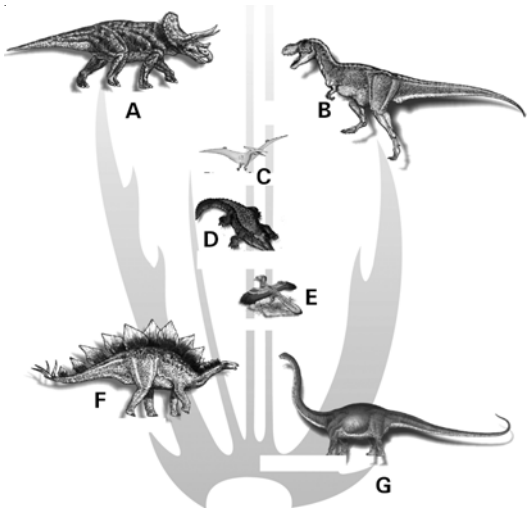


(1) Antigen binding site, heavy chain, light chain
(2) Antigen binding site, light chain, heavy chain
(3) Heavy chain, light chain, antigen binding site
(4) Light chain, heavy chain, antigen binding site

119. **Assertion** : The primary effluent is passed into large aeration tanks where it is constantly agitated mechanically and air is pumped into it.
Reason : Aeration allows vigorous growth of useful aerobic microbes into flocs which consume the major part of the inorganic matter in effluent .
(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

120. A person was diagnosed with a positive ELISA test he might show all of the following symptoms; which amongst these symptoms is most unlikely to be present in him
(1) Bouts of fever, diarrhoea and weight loss
(2) Suppressed immune response in the body
(3) Increased susceptibility to infections
(4) Inflammation and deformities of extremities

121. Select the correct statement about the various forms (A - G) given below



(1) B became extinct around 250 mya
(2) E is a missing link between reptiles and mammals
(3) sauropsids can be considered as ancestral forms of D
(4) G was 20 feet high with fearsome, dagger like teeth

122. What is true for *cry* genes?
a. *cry* IAc and *cry* IAb control cotton bollworms.
b. *cry* IIAb control the cotton bollworms as well as corn borer.
c. *cry* IAc and *cry*IIAb control cotton bollworms.
d. *cry* IAb controls corn borer.
(1) a, b, c, d (2) c, d
(3) b, c, d (4) only d

123. Choose the correct pair

(1) MOET – reduces rate of production of hybrids

(2) *Apis* – uneconomical insect

(3) Prawn – aquatic edible animal

(4) Jersey – Indian cattle breed

124. Identify the group of drugs that depress the functioning of CNS.

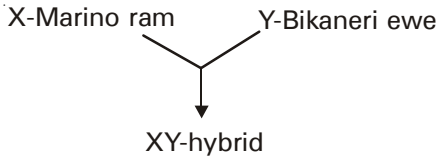
(1) Morphine, cocaine, heroin

(2) Morphine, amphetamines, cocaine

(3) Morphine, heroin, codein

(4) Amphetamines, cocaine, LSD

125. XY produced in this cross represents



(1) outcross

(2) cross breed

(3) inbred

(4) interspecific hybrid

126. Classify the following statements as true or false and choose the correct option

a. survival in the struggle for existence is always random

b. the concept of branching descent opposes Darwinism

c. the unequal ability of individuals to survive and reproduce will lead to appearance of new forms after several generations

d. evolution is a stochastic process

(1) a–T, b–F, c–T, d–T

(2) a–F, b–F, c–T, d–T

(3) a–F, b–F, c–T, d–F

(4) a–T, b–F, c–T, d–F

127. Plasmids containing an antibiotic resistant gene & one coding for an enzyme are preferred over plasmids with two antibiotic resistance genes because

(1) it is difficult to make a plasmid with two antibiotic resistance genes

(2) 2 antibiotic resistance gene will cancel the effect of one another

(3) use of the former plasmid involves plating once of the microbes for selection

(4) use of the latter plasmid does not give accurate result

128. Choose the right option

	Category	Examples	Exception
(1)	Infectious diseases	Polio, tetanus cancer, AIDS	AIDS
(2)	Diseases which can be prevented by spraying of insecticides in ditches	Chikungunya, filariasis, Taeniasis, malaria	Taeniasis
(3)	Bacterial diseases	Plague, pneumonia, dengue, diphtheria	Plague
(4)	Bacterial diseases controlled by vaccination	Tetanus, polio, diphtheria, pneumonia	Diphtheria

129. Artificial selection to obtain cows yielding higher milk output represents

(1) Stabilizing selection as it stabilizes this character in the population

(2) Directional as it pushes the mean of the character in one direction

(3) Disruptive as it splits the population into two one yielding higher output and the other lower output

(4) Stabilizing followed by disruptive as it stabilizes the population to produce higher yielding cows

130. The process of RNA interference

(1) involves the silencing of specific tRNA

(2) utilises a complementary dsRNA which prevents translation of mRNA of tobacco

(3) it is a method of cellular defence in some of the eukaryotes

(4) utilises a complementary dsRNA which prevents translation of mRNA of nematode

131. Palindrome in DNA is a sequence of base pairs that reads same on the two strands

(1) when orientation of reading is kept opposite

(2) when orientation of reading is kept same

(3) of one is read from 5-3 and other is from 3-5

(4) both (1) and (3)

132. In DNA of which of the following organisms, recognition sites of REs are present

a. *Agrobacterium*

b. *Haemophilus*

c. pBR 322

d. eukaryotes

(1) a & b only

(2) b & c only

(3) a, b & d

(4) a, b, c, d

133. Match the hominids with their correct brain size :

(a)	*Homo habilis*	(i)	900 cc
(b)	*Homo neanderthalensis*	(ii)	1350 cc
(c)	*Homo erectus*	(iii)	650-800 cc
(d)	*Homo sapiens*	(iv)	1400 cc

Select the correct option.

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

134. Which of these is least likely to be treated surgically?
(1) Leukaemia
(2) Prostate cancer
(3) Breast cancer
(4) Colon cancer

135. What is true for sewage treatment process ?
(1) Treatment of waste water in sewage treatment plant is done by autotrophic microbes naturally present in the sewage.
(2) Floating debris is removed by sequential filteration and soil and pebbles are removed by sedimentation.
(3) BOD of waste water is inversely propotional to polluting potential of the water.
(4) All of these

ZOOLOGY : SECTION-B

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

136. 1.5 mya fossil discovered in 1891 revealed the following stage
(1) *Ramapithecus*
(2) *Australopithecus*
(3) Java man
(4) *Dryopithecus*

137. Oxytocin of posterior pituitary stimulates uterine contraction during child birth. What will be the effect of further increase in uterine contraction on the secretion of this hormone
(1) more oxytocin is released
(2) less oxytocin is released
(3) uterine contraction decreases
(4) both (1) & (3)

138. Tuataras, snakes and thecodonts diverged from the evolutionary line along which lizards developed. The correct sequence of divergence is
(1) Thecodonts–Tuataras–Snakes
(2) Thecodonts–Snakes–Tuataras
(3) Snakes–Thecodonts–Tuataras
(4) Tuataras–Snakes–Thecodonts

139. **Assertion** : Placenta is the structural and functional unit between the foetus and maternal body.
Reason : Placenta supplies nutrients to the developing embryo but does not play any role in the elimination of the wastes produced by embryo.
(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

140. What is true about the plant shown in the picture?

(1) It has hallucinogenic properties
(2) Its effects are similar to those products which are extracted from the poppy plant
(3) Its extract stimulate the nervous system, increase alertness and activity mainly
(4) Its product is used mainly as analgesic and anti anxiety drugs.

141. **Statement-I** : Life appeared 500 million years after the formation of earth.
Statement-II : Panspermia suggest the origin of life from decaying and rotting matter like straw, mud etc.
(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

142. Which of the following group contain hormone based contraceptive measures?
(1) Progestasert, Cervical caps, Foams, Condoms
(2) LNG-20, Implant, Pills, Injections
(3) Cu7, Multiload 375, LNG-20 pills
(4) Injections, Implants, Lippes Loop, Progestasert

143. **Statement-I** : Spleen, lymph nodes and peyer's patches are secondary lymphoid organs.
Statement-II : Spleen is the main lymphoid organ where all blood cells including lymphocytes are produced.
(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

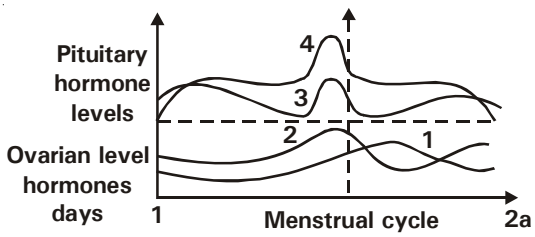
144. If the given scheme represents introduction of desirable gene in a host to prevent infection in its roots using RNAi, what could be X, Y and Z ?

'X' Gene + 'Y' Vector ⟶ 'Z' Host

(1) Arthropod specific genes, cosmid, cotton plant
(2) Nematode specific genes, *Agrobacterium*, tobacco plant
(3) Insect specific genes, bacteriophage, cotton plant
(4) Nematode specific genes, pBR322, tomato plant

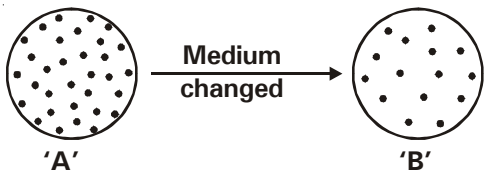
145. Identify the correct statement on 'inhibin'
(1) Is produced by nurse cells in testes and inhibits the secretion of LH
(2) Inhibits the secretion of LH,FSH and prolactin
(3) Is produced by granulose cells in ovary and inhibits the secretion of FSH
(4) Is produced by granulose cells in ovary and inhibits the secretion of LH

146.



In the diagram shown above, 1, 2, 3 and 4 are respectively.
(1) Estrogen, LH, FSH, Estrogen
(2) Progesterone, Estrogen, FSH, LH
(3) Progesterone, Estrogen, LH, FSH
(4) LH, FSH, Progesterone, Estrogen

147. Shown below is a bacterial colony (A) growing on a given medium, on changing medium only some part of population (say B), survived ; what can be inferred from this?



(1) Population 'B' is more fit as compared to 'A'
(2) Population 'A' had some advantageous mutations which led to its elimination
(3) Population 'B' would over a period of time lead to speciation
(4) Both (1) & (3)

148. Match the items in Column 'A' and Column 'B' and choose correct answer.

Column-A		Column-B	
(i)	Lady bird	(a)	Methano bacterium
(ii)	Mycorrhiza	(b)	*Trichoderma*
(iii)	Biological control	(c)	Aphids
(iv)	Biogas	(d)	*Glomus*

The correct answer is:
(1) i b, ii d, iii c, iv a
(2) i c, ii d, iii b, iv a
(3) i d, ii a, iii b, iv c
(4) i c, ii b, iii a, iv d

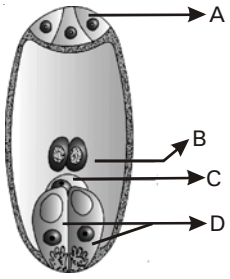
149. The bones of forelimbs of whale, bat, cheetah and man are similar in structure, because
(1) they have different anatomical structure
(2) all are adapted for locomotion
(3) they have similar anatomical structure
(4) the have biochemical similarities

150. Inbreeding increases _____ and it is necessary if we want to evolve a _____ in any animal
(1) Homozygosity, pureline
(2) Heterozygosity, pureline
(3) Heterozygosity, mixed line
(4) Homozygosity, mixed line

BOTANY : SECTION-A

All questions are compulsory in section A

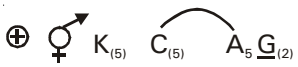
151.



A, B, C & D marked in the above figure of the mature embryo sac are respectively
(1) Egg apparatus, polar nuclei, egg, antipodal cell
(2) Antipodals, central cell, egg, synergids
(3) Central cell, polar nuclei, egg, synergids
(4) Egg, antipodal cell, central cell, polar nuclei

152. How many pollen grains are required for formation of 30 embryos, if each pollen grain contains 2 male gametes?
(1) 30
(2) 60
(3) 120
(4) 240

153. What is true about the family having floral formula given below ?



a. It is commonly called potato family

b. It is a monocotyledonous family

c. It has marginal placentation

(1) a only
(2) b & c
(3) a & c
(4) a, b & c

154. For crop breeding programmes and pollen banks it is possible to store pollen grains of a large number of species for years in liquid nitrogen at
(1) (–206°C)
(2) (–196°C)
(3) (–175°C)
(4) (–186°C)

155. Which of the following is incorrect regarding HGP?
(1) The estimated cost of HGP was 9 billion US $
(2) HGP was completed in 1990.
(3) YAC and BAC were used as Vectors.
(4) HGP was closely associated with development of a new science called Bioinformatics

156. Genetic mechanism which prevents self-pollen from fertilising the ovule by inhibiting pollen germination is
(1) self potency
(2) self incompatibility
(3) inbreeding depression
(4) pollen pistil interaction

157. Match the organisms in column-I with their parent body in column-II

Column-I		**Column-II**	
a.	Pteridophyte	p.	Haploid
b.	Fungi	q.	Diploid
c.	Human being		
d.	Bryophyte		

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

158. Which of the following plants produce chasmogamous as well as cleistogamous flowers?
(1) Oxalis, common pansy and *Commelina*
(2) *Vallisneria* and *Hydrilla*
(3) Maize and common grass
(4) *Viola, Pisum* and *Amorphophallus*

159. Floral formula of pea family does not show
(1) position of ovary
(2) type of placentation
(3) number of floral whorls
(4) bisexual condition of flower

160. Select the incorrect statement
(1) Polymorphism (variation at genetic level) arises due to mutations
(2) If more than one variant (allele) at a locus occurs in human population with a frequency less than 0.01, means inheritable mutation is observed in population at high frequency
(3) Mutations in noncoding DNA regions keep on accumulating generations after generations forming basis of variability/polymorphism
(4) DNA from every tissue from an individual show the same degree of polymorphism

161. Which of the following is not a feature of 'lily family'?
(1) Bisexual, actinomorphic flower
(2) endospermous seed
(3) tricarpellary, syncarpous ovary
(4) parietal placentation

162. How many of the following statements are incorrect?

a. Sacred groves are the last refuges for the large number of rare and threatened plants

b. The earth summit was held in Rio de Janerio in 1992

c. Endemism is when species confined to that region and not found anywhere else

(1) a, b
(2) b, c
(3) a, b, c
(4) none of the above

163. How many of the following statement are correct
a. Cleistogamous flowers are invariably autogamous
b. Only a small proportion of plants use abiotic agents for pollination
c. Water is a regular mode of transport for male gametes in the lower plants
d. Date palm produce hermaphrodite flowers
(1) 4
(2) 2
(3) 3
(4) 1

164. How many different phenotypes and genotypes (respectively) are obtained in F_2 generation of dihybrid test cross?
(1) 4, 9
(2) 4, 4
(3) 2, 2
(4) 2, 3

165. Choose the incorrect pair
(1) Tt – Heterozygous
(2) 3:1 – Phenotypic ratio of monohybrid cross
(3) 9:3:3:1 – Phenotypic ratio of dihybrid cross
(4) 1:2:1 – Genotypic ratio of dihybrid cross

166. When the distributional range of a species is greatly increased because of the removal of competitively superior species, it is known as
(1) competitive exclusion principle
(2) competitive release
(3) competitive co-existence
(4) resource partitioning

167. Kangaroo rat living in North American desert
(1) uses metabolic water to meet water needs
(2) produce dilute urine
(3) can constrict its nostrils during sandy environment
(4) can drink upto 80 litres of water in 10 min

168. Multiple alleles of a gene can be found when
(1) large number of individuals of different species are studied
(2) large number of individuals of same species are studied
(3) population studies are made
(4) both (2) and (3)

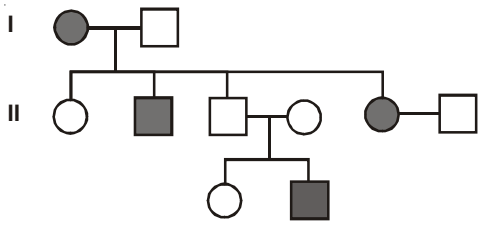
169. Identify the levels of bio-diversity represented by the following
a. 50,000 strains of rice in India
b. Presence of deserts, mangroves and coral reef in India.
(1) Ecological and community
(2) Genetic and ecological
(3) Species and genetic
(4) Species and ecological

170. Morgan in his experiments on *Drosophila* crossed white eyed female with red eyed male. The results were
(1) all flies red eyed
(2) all flies white eyed
(3) 50% of the male flies red eyed and 50% of the female flies white eyed
(4) All females red eyed and all males white eyed.

171. Small standing crop of phytoplankton supporting large standing crop of zooplankton will lead to which type of ecological pyramid?
(1) upright pyramid of number
(2) inverted pyramid of biomass
(3) upright pyramid of biomass
(4) inverted pyramid of energy

172. A man with certain disease marries a normal woman. They have 8 children (2 boys and 6girls) ; all of the girls have their father's disease, but none of boys do. What inheritance is suggested ?
(1) Autosomal recessive
(2) Autosomal dominant
(3) Y-linked
(4) X-linked

173. Study the pedigree chart of a certain family given below and select the correct conclusion which can be drawn for the character the

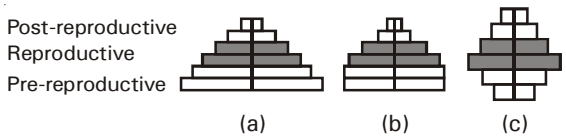


(1) female parent (generation-I) is heterozygous
(2) trait is sex-linked recessive
(3) male parent is homozygous dominant
(4) trait under study could be phenylketonuria

174. Stem tendrils and thorns
(1) are under ground stems
(2) arises from axillary buds
(3) act as organ of perennation
(4) protect plants from browsing animals

175. Robert May places the global species diversity at about
(1) 20–50 million
(2) 1.7 million
(3) 7 million
(4) 10 million

176. Which bond will not be present in uridine monophosphate ?
(1) N-Glycosidic bond
(2) Phosphodiester bond
(3) Phosphoester bond
(4) None

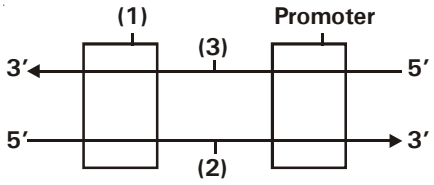
177. 

Which age pyramid for human population represents a stable population?
(1) a
(2) b
(3) c
(4) a, b

178. Which of the following is autosomal recessive Mendelian disorder?
(1) Muscular dystrophy
(2) Protanopia
(3) Christmas disease
(4) Cystic fibrosis

179. How many of the following statements are true?
a. Uneqivocal proof that DNA is the hereditary material came in 1869
b. The diameter of double helix is 2 nm
c. Uracil is the purine found in both RNA and DNA
d. E.coli has 3.3 billion basepairs
(1) four
(2) three
(3) two
(4) one

180. In the following diagram the two DNA strands represented are ready for transcription



In the which of the following option the part is correctly labelled ?
(1) 3– template strand
(2) 2–template strand
(3) 1–operator gene
(4) 1–structural gene

181. Semi-conservative replication of DNA involves
(1) the use of original dsDNA molecule as a template, without unwinding
(2) only one of the original strand acting as a template for a new strand
(3) each of the original strand acting as a template for a new strand
(4) complete separation of the original strands

182. **Assertion** : Histones are basic proteins, rich in lysine and arginine and are found associated with eukaryotic DNA.
Reason : The DNA helix coils approximately two times (1.75 turns) over histone octamer made up of H2A, H2B, H3 & H4 histones.
(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

183. Genetic code is unambiguous. It means that
(1) one codon codes for one amino acid
(2) one amino acid is coded by one codon only
(3) one amino acid is coded by more than one codon
(4) all of these

184. During transcription, opening of DNA helix is facilitated by
(1) helicase
(2) RNA polymerase
(3) RNA ligase
(4) sigma factor

185. Pneumatophores are
(1) stilt roots
(2) prop roots
(3) adventitious roots
(4) modified tap roots

BOTANY : SECTION-B

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

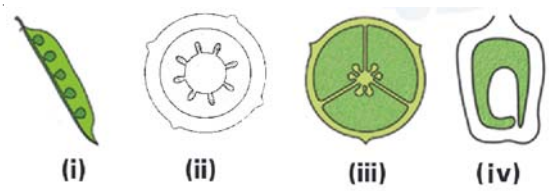
186. In mango and coconut, the fruit is known as a _____. Edible portion of mango and coconut is respectively
(1) Berry ; epicarp, mesocarp
(2) Drupe, ; Mesocarp, endosperm
(3) parthenocarpic ; exocarp, seed
(4) pome; thalamus, cotyledon

187. **Statement-I** : Pollen tablets are used as food supplement .
Statement-II : Generative cell grows as pollen tube before pollination.
(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

188. During ecological succession
(1) the gradual and unpredictable change in species composition occurs in a given area
(2) change is orderly and sequential
(3) the first community to appear is climax community
(4) vegetational changes occur but number and type of animals and decomposers remain constant

189. Choose the incorrect statement
(1) Levels of thermal tolerance of different species determines their geographical distribution to a large extent
(2) Productivity and distribution of plants is dependent on size of producers
(3) All living organisms are dependent on solar energy directly or indirectly
(4) Salt concentration of inland waters is less than 5ppt

190. What is the total number of hydrogen bonds present in DNA of coliphage $\phi \times 174$?
(1) 5386
(2) 48502
(3) 10772
(4) none of the above

191. 

Identify the type of placentation in *Dianthus*, lily, *pea*, marigold respectively from the above diagram and choose the correct option
(1) i, ii, iii & iv
(2) iii, iv, i & ii
(3) ii, iii, iv & i
(4) ii, iii, i & iv

192. What is common to plants *Nepenthes*, *Psilotum*, *Rauwolfia* and *Aconitum*?
(1) All are ornamental plants
(2) All are exclusively present in the Eastern himalayas
(3) All are prone to over exploitation
(4) All are insectivorous plants

193. Given below is a list of organisms. Count the number of organisms showing male heterogamety.
Peacock, grasshoppers, fruitfly, human being, reptiles, fish,
(1) 6
(2) 8
(3) 3
(4) 7

194. **Assertion** : Seeds offer many advantages to angiosperms.
Reason : Seeds have better adaptive strategies for dispersal to new habitats help the species to colonise in other areas.
(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. X-linked traits do not
(1) appear in males when recessive
(2) affect females at all
(3) show criss –cross inheritance
(4) arise due to abnormal meiosis

196. If modifed allele produces no or non-functional enzyme then it is known as
(1) Dominant allele
(2) partially dominant allele
(3) recessive allele
(4) co-dominant allele

197. In Cactus,
(1) Leaves are modified to perform photosynthesis
(2) Leaves are modified into tendril
(3) leaves are small short lived
(4) leaves are modified into spine

198. When heterozygous tall plants are inter crossed, approximately what fraction of the tall progeny are expected to be homozygous?
(1) 3/4
(2) 2/3
(3) 1/2
(4) 1/3

199. Probability of genotype TTrr in F_2 generation of a dihybrid test cross is
(1) $\frac{1}{16}$
(2) $\frac{3}{16}$
(3) $\frac{9}{16}$
(4) zero

200. The hollow foliar structure protecting the plumule is
a. seen in embryo of *Capsella*
b. seen in embryo of Maize
c. called coleoptile
d. called coleorrhiza
(1) a and c are correct
(2) b and c are correct
(3) a and d are correct
(4) b and d are correct

Space for rough work

Space for rough work

Space for rough work