

HFT/9/19

Test Code

720

Max. Marks

3 hrs.

Time Allowed

Important Instructions:

1. This booklet carries 180 multiple choice questions; 45 in Physics, 45 in Chemistry and 90 in Biology.
2. The test is of 3 hours duration. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores.
3. Each question is followed by four alternatives as suggested answers. Mark the most appropriate alternative as your answer in the space provided in the OMR sheet.
4. Only one alternative is to be selected. Any cutting, overwriting, multiple responses will be treated as an incorrect response and will be awarded one negative mark.
5. Read the instructions on the OMR sheet carefully before filling up the responses.
6. Any indiscipline / use of unfair means in the Examination Hall will lead to disqualification of the candidate.
7. Use of white fluid for correction and use of electronic/manual calculator is prohibited.
8. The candidates are allowed to take away this test-booklet with them but must submit the OMR sheet before leaving the Examination Hall.
9. Use Blue/Black Ball Point Pen only for writing particulars on this page/markings responses.

Test Syllabus

Physics	:	XII Full SYllabus
Chemistry	:	XII Full Syllabus
Botany	:	XII Full Syllabus
Zoology	:	XII Full Syllabus

Name of the Candidate (in Capitals) : _____

Roll Number (In figures) : _____

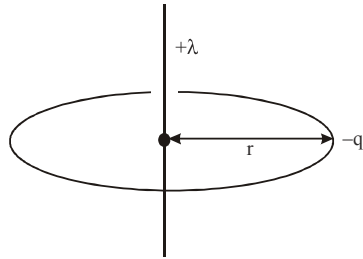
Centre of Examination (in Capitals) : _____

Date of Examination : _____

Candidate's Signatgure : _____ Invigilator's Signature : _____

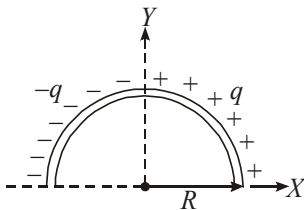
1. A particle of charge $-q$ and mass m moves in a circle of radius r around an infinitely long line charge on linear charge density $+\lambda$. Then time period will be –

[where $k = \frac{1}{4\pi\epsilon_0}$]



1. $T = 2\pi r \sqrt{\frac{m}{2k\lambda q}}$ 2. $T^2 = \frac{4\pi^2 m}{2k\lambda q} r^3$
 3. $T = \frac{1}{2\pi r} \sqrt{\frac{2k\lambda q}{m}}$ 4. $T = \frac{1}{2\pi r} \sqrt{\frac{m}{2k\lambda q}}$

2. The dipole moment of the given charge distribution is :

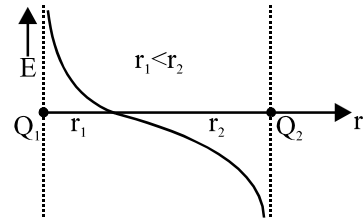


1. $-\frac{4Rq}{\pi} \hat{i}$ 2. $\frac{4Rq}{\pi} \hat{i}$
 3. $-\frac{2Rq}{\pi} \hat{i}$ 4. $\frac{2Rq}{\pi} \hat{i}$

3. In a region of space the electric field is given by $\vec{E} = 8\hat{i} + 4\hat{j} + 3\hat{k}$. The electric flux through a surface of area of 100 units in x-y plane is :

1. 800 units 2. 300 units
 3. 400 units 4. 1500 units

4. The variation of electric field between two point charges along the line joining the charges is given in figure. Then which is/are correct ?



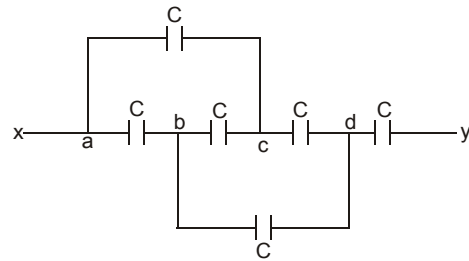
1. Q_1 is +ve and Q_2 is -ve
 2. Q_1 is +ve and Q_2 is +ve
 3. $|Q_1| < |Q_2|$
 4. $|Q_1| > |Q_2|$

5. Two concentric, thin metallic spheres of radii R_1 and R_2 ($R_1 > R_2$) bear charges Q_1 and Q_2 respectively. Then the potential at distance r

between R_1 and R_2 will be ($k = \frac{1}{4\pi\epsilon_0}$)

1. $k \left(\frac{Q_1 + Q_2}{r} \right)$ 2. $k \left(\frac{Q_1}{r} + \frac{Q_2}{R_2} \right)$
 3. $k \left(\frac{Q_2}{r} + \frac{Q_1}{R_1} \right)$ 4. $k \left(\frac{Q_1}{r} + \frac{Q_1}{R_2} \right) s$

6. Find equivalent capacitance between X and Y if each capacitor is $4 \mu F$.



1. $4 \mu F$ 2. $8 \mu F$
 3. $12 \mu F$ 4. $1 \mu F$

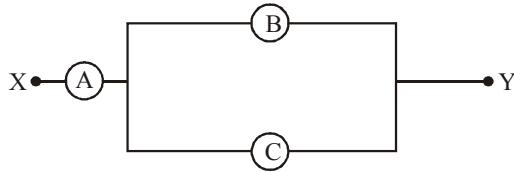
7. Maximum charge stored on a metal sphere of radius 15 cm may be $7.5 \mu C$. The potential energy of the sphere in this case is.

1. 9.67 J 2. 0.25 J
 3. 3.25 J 4. 1.69 J

8. Temperature of a resistance at temperature $t^\circ c$ is $R = R_0(1 + at + bt^2)$. Here R_0 is the temperature at $0^\circ C$. the temperature coefficient of resistance at temperature t is –

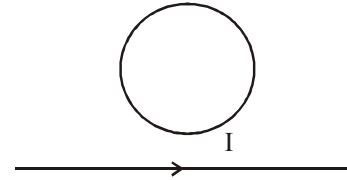
1. $\frac{a + 2bt}{1 + at + bt^2}$ 2. $(a + 2bt)$
 3. $\frac{1 + at + bt^2}{a + 2bt}$ 4. constant

9. Three voltmeters A, B and C having resistances R, 1.5 R and 3R, respectively, are connected as shown. When some potential difference is applied between X and Y, the voltmeter readings are V_A , V_B and V_C respectively. Then –

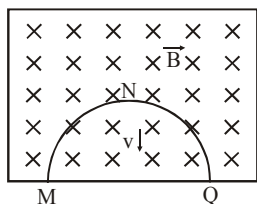


1. $V_A \neq V_B = V_C$ 2. $V_A = V_B \neq V_C$
 3. $V_A \neq V_B = V_C$ 4. $V_A = V_B = V_C$
10. An electric bulb rated for 500W at 100V is used in a circuit having a 200V supply. The resistance R that must be put in series with the bulb, so that the bulb draws 500W is –
1. 100 Ω 2. 50 Ω
 3. 20 Ω 4. 10 Ω
11. The length of a potentiometer wire is l . A cell of emf E is balanced at a length $l/3$ from the positive end of the wire. If the length of the wire is increased by $l/2$. At what distance will be the same cell give a balance point.
1. $2l/3$ 2. $l/2$
 3. $l/6$ 4. $4l/3$
12. The materials suitable for making electromagnets should have-
1. low retentivity and high coercivity
 2. low retentivity and low coercivity
 3. high retentivity and low corecivity
 4. high retentivity and high coercivity
13. A magnet of moment M is lying in a magnetic field of induction B. W_1 is the work done in turning it from 0° to 60° and W_2 is the work done in turning it from 30° to 90° . Then –
1. $W_2 = W_1$ 2. $W_2 = W_1/2$
 3. $W_2 = 2W_1$ 4. $W_2 = \sqrt{3} W_1$

14. The period of oscillation of a freely suspended bar magnet is 4 second. If it is cut into two equal parts length wise then the time period of each part will be
1. 4 sec 2. 2 sec
 3. 0.5 sec 4. 0.25 sec
15. The mutual inductance of a pair of coils is 2H. IF the current in of the coils changes from 10A to zero in 0.1s, the emf induced in the other coil is –
1. 2V 2. 20V
 3. 0.2 V 4. 200 V
16. A current-carrying wire is placed below a coil in its plane, with current flowing as shown. If the current increases –



1. no current will be induced in the coil
 2. an anticlockwise current will be induced in the coil
 3. a clockwise current will be induced in the coil
 4. the current induced in the coil will be first anticlockwise and then clockwise
17. A small magnet is along the axis of a coil and its distance from the coil is 80 cm. In this position the flux linked with the coil are 4×10^{-5} weber turns. If the coil is displaced 40 cm towards the magnet in 0.08 second, then the induced emf produced in the coil will be-
1. 0.5 mV 2. 1 mV
 3. 7 mV 4. 3.5 mV
18. A thin semi-circular conducting ring of radius R is falling with its plane vertical in a horizontal magnetic induction \vec{B} (see figure). At the position MNQ the speed of the ring is v and the potential difference developed across the ring is

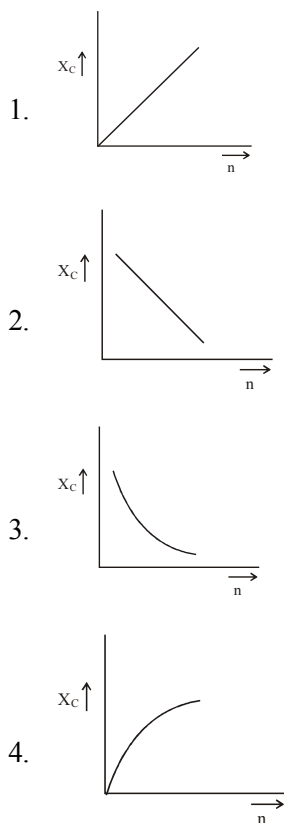


1. zero
2. $Bv \pi R^2 / 2$ and M is at higher potential
3. πRBv and Q is at higher potential
4. $2RBv$ and Q is at higher potential.

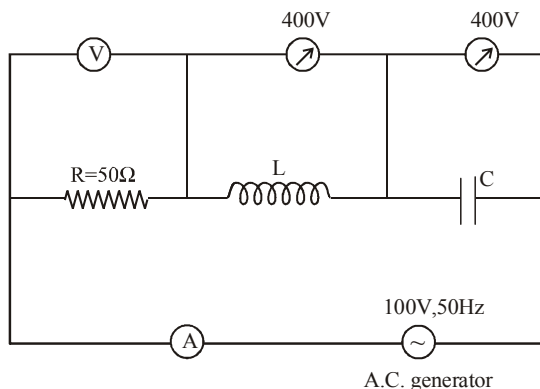
19. Current in an ac circuit is given by $i = 3 \sin \omega t + 4 \cos \omega t$ then –

1. rms value of current is 5 A
2. mean value of this current in one half period will be $6/\pi$
3. if voltage applied is $V = V_m \sin \omega t$ then the circuit must be containing resistance and capacitance.
4. if voltage applied is $V = V_m \sin \omega t$, the circuit may contain resistance and inductance.

20. Which of the following curves correctly the variation of capacitive reactance (X_c) with frequency n –



21. In the LCR series circuit, the voltmeter and ammeter readings are –



1. $E = 100$ volts, $I = 2$ amp
2. $E = 100$ volts, $I = 5$ amp
3. $E = 300$ volts, $I = 2$ amp
4. $E = 300$ volts, $I = 5$ amp

22. Which of the following is the correct statement for the refractive index μ :

1. $\mu = v_{\text{medium}} / v_{\text{vacuum}}$
2. $\mu = \sin i / \sin r$
3. $\mu = 1 / \sqrt{\epsilon_r \mu_r}$
4. $\mu = v_{\text{vacuum}} / v_{\text{medium}}$

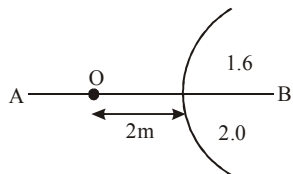
23. What is the magnitude of momentum that is contained in a unit volume for an electromagnetic wave :

1. $\vec{E} \times \vec{B}$
2. $\epsilon_0 (\vec{E} \times \vec{B})$
3. $\mu_0 (\vec{E} \times \vec{B})$
4. $\sqrt{\mu_0 \epsilon_0} (\vec{E} \times \vec{B})$

24. Which of the following are not electromagnetic waves ?

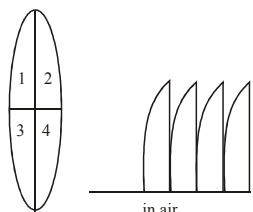
1. Cosmic-rays
2. γ -rays
3. β -rays
4. X-ray

25. In the figure shown a point object O is placed in air. A spherical boundary separates two media. AB is principal axis. The refractive index above AB is 1.6 and below AB is 2.0. The separation between the images formed due to refraction at spherical surface is –



- 1. 12m
- 2. 20m
- 3. 14m
- 4. 10m

26. The given lens is broken into four parts and rearranged as shown. If the initial focal length is f then after rearrangement the equivalent focal length is –

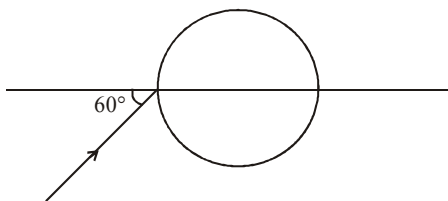


- 1. f
- 2. $f/2$
- 3. $f/4$
- 4. $4f$

27. When light is passed through a prism, the colour which deviates least is –

- 1. Red
- 2. Violet
- 3. Blue
- 4. Green

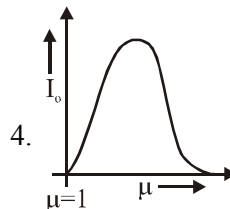
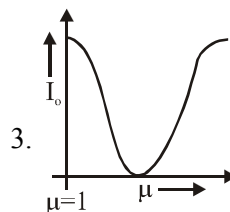
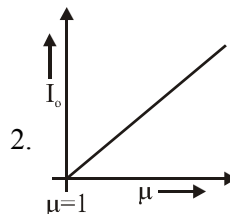
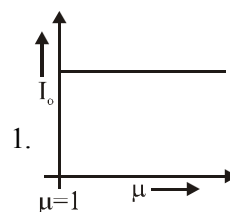
28. A ray of light falls on a transparent as shown in the figure. If the final ray emerges from the sphere parallel to the horizontal diameter, then calculate the refractive index of the sphere. Consider that the sphere is kept in air –



- 1. $\sqrt{2}$
- 2. $\sqrt{3}$
- 3. $\sqrt{3/2}$
- 4. $\sqrt{4/3}$

29. In a YDSE experiment if a slab whose refraction index can be varied is placed in front of one of the slits then the variation of resultant intensity at mid-point of screen with ' μ ' will be best represented by ($\mu \geq 1$). [Assume slits of equal width and there is no absorption by slab;

mid point of screen is the point where waves interfere with zero phase difference in absence of slab]



30. In Young's double slit experiment the two slits are illuminated by light of wavelength 5890 \AA and the distance between the fringes obtained on the screen is 0.2° . If the whole apparatus is immersed in water then the angular fringe width will be, if the refractive index of water is $4/3$.

- 1. 0.30°
- 2. 0.15°
- 3. 15°
- 4. 30°

31. The equation of two light waves are $y_1 = 6 \cos \omega t$, $y_2 = 8 \cos (\omega t + \phi)$. The ratio of maximum to minimum intensities produced by the superposition of these waves will be –

- 1. 49 : 1
- 2. 1 : 49
- 3. 1 : 7
- 4. 7 : 1

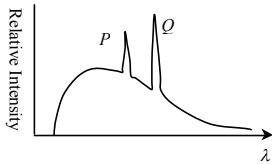
32. The wavelength of K_{α} X-rays produced by an X-ray tube is 0.76 \AA . Find the atomic number of the anode material of the tube ?

1. 40
2. 30
3. 20
4. 10

33. The stopping potential applied between a photo cathode and respective anode is such that the fastest electron can fly only one half of the distance L between cathode and anode . For the same stopping potential , the distance between cathode and anode is reduced to $L/2$. The fastest electron can :

1. reach the anode
2. fly a distance greater than $L/4$
3. fly a distance less than $L/4$
4. fly a distance $L/4$

34. If a characteristic X-Rays spectra of some atom is superimposed on continuous X-Rays spectra.



1. P represents K_{α} line
2. Q represent K_{β} line
3. P and Q represents K_{α} and K_{β} line respectively
4. Positions of K_{α} and K_{β} depend on the particular atom.

35. If the stationary proton and α -particle are accelerated through same potential difference, the ratio of de Broglie's wavelength will be

1. 2
2. 1
3. $2\sqrt{2}$
4. none of these.

36. A hydrogen atom is in an excited state of principal quantum number (n), it emits a photon of wavelength (λ), when it returns to the ground state. The value of n is

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

37. In a hydrogen atom, the electron is in nth excited state. It may come down to second excited state by emitting ten different wavelengths. What is the value of n ?

1. 6
2. 7
3. 8
4. 5

38. The maximum wavelength of spectral line in Lyman series in terms of Rydberg constant R is :

1. R
2. $4/3R$
3. Rc
4. $1/R$

39. $A \xrightarrow{\lambda} B \xrightarrow{2\lambda} C$

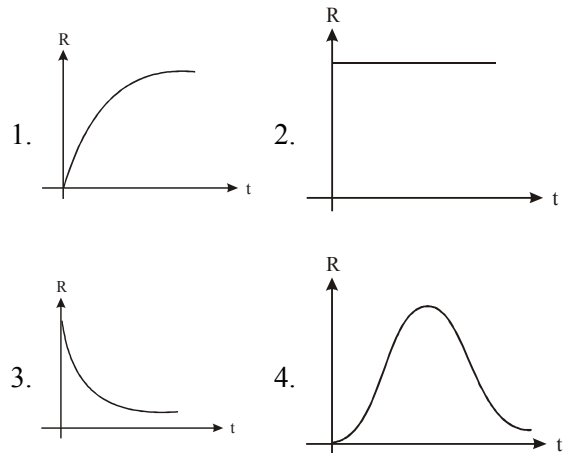
$$t=0 \quad N_0 \quad 0 \quad 0$$

$$t \quad N_1 \quad N_2 \quad N_3$$

The ratio of N_1 to N_2 when N_2 is maximum is –

1. at no time this is possible
2. 2
3. $1/2$
4. $\frac{\ln 2}{2}$

40. A radioactive nucleus X decays to a stable nucleus 'Y'. Then the graph of rate of formation of 'Y' against time 't' will be –



41. An npn transistor is biased to work as an amplifier. Which of the following statements is not correct –

1. The electrons go from base region to collector region
2. The electrons go from emitter region to base region
3. The electrons go from the collector region to base region
4. The holes go from base region to emitter region

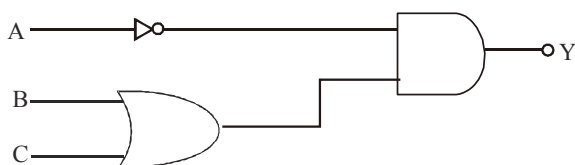
42. Zener diode work on –

1. zero bias
2. reverse bias
3. forward bias
4. infinite bias

43. The value of β for a transistor, for which $\alpha = 0.95$, will be -

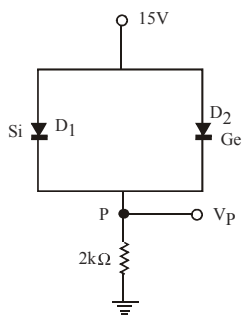
1. 19
2. 91
3. 1.9
4. 0.19

44. The Boolean equation for the circuit given in figure is



1. $Y = \bar{A}.B + C$
2. $Y = \bar{A}.(\bar{B} + \bar{C})$
3. $Y = \bar{A}.(B + \bar{C})$
4. $Y = \bar{A}.(B + C)$

45. What is the voltage across $2k\Omega$ shown in figure.



1. 14.7V
2. 12.7V
3. 21.2V
4. 4.8V

46. The correct order of M – C bond energy is

1. $[V(CO)_6]^- < [Cr(CO)_6] < [Mn(CO)_6]^+ < [Ti(CO)_6]^{2-}$
2. $[Ti(CO)_6]^{2-} < [V(CO)_6]^- < [Cr(CO)_6] < [Mn(CO)_6]^+$
3. $[Mn(CO)_6]^+ < [Cr(CO)_6] < [V(CO)_6]^- < [Ti(CO)_6]^{2-}$
4. $[Mn(CO)_6]^+ < [V(CO)_6]^- < [Cr(CO)_6] < [Ti(CO)_6]^{2-}$

47. A 6% glucose solution and 2% solution of X show same osmotic pressure. Assuming X to be a non-electrolyte, the molecular weight of X is

1. 30 g/mole
2. 60 g/mole
3. 90 g/mole
4. 180 g/mole

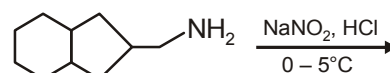
48. Correct pair of aqueous solutions with equal osmotic pressures at same temperature

1. 0.1 M urea, 0.2 M sucrose
2. 0.1 M NaCl, 0.1 M glucose
3. 0.1 M Na_2SO_4 , 0.1 M KCl
4. 0.2 M urea, 0.1 M NaCl

49. A crystal has the lattice parameter $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$. The crystal system is

1. Tetrahedral
2. Monoclinic
3. Cubic
4. Orthorhombic

50. The major product formed in the reaction given below is



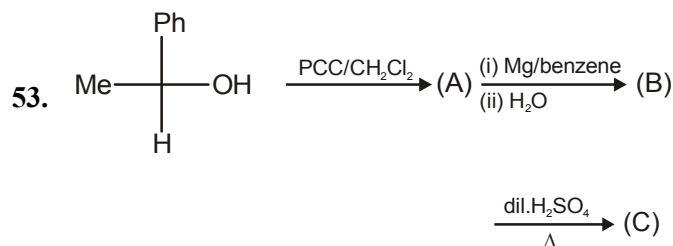
- 1.
- 2.
- 3.
- 4.

51. Chlorobenzene condenses with chloral in the presence of conc. H_2SO_4 to produce D.D.T. Which mechanism does this reaction follow?

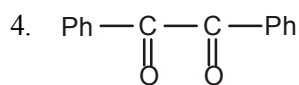
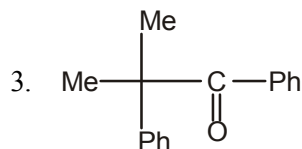
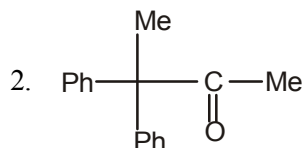
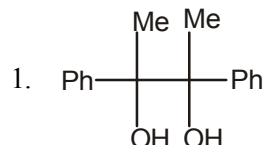
1. Electrophilic addition reaction
2. Nucleophilic substitution reaction
3. Electrophilic substitution reaction
4. Free radical substitution reaction

52. One mole of glycerol can react with a maximum of 'x' moles of HI and 'y' moles of HCl separately. So, (x/y) is

1. 1 : 1
2. 3 : 5
3. 5 : 3
4. 2 : 1



Hence, the product (C) is



54. In neutral or faintly alkaline medium, thiosulphate is quantitatively oxidised by KMnO_4 to

1. SO_3^{2-}
2. SO_4^{2-}
3. $\text{S}_2\text{O}_6^{2-}$
4. SO_5^{2-}

55. The spin only magnetic moment value of $\text{Cr}(\text{CO})_6$ as per VBT is

1. Zero
2. 2.84
3. 4.90
4. 5.92

56. The reason for the stability of Gd^{3+} ion is

1. Half-filled 4f subshell
2. Completely filled 4f-subshell
3. Possesses the electronic configuration of inert gases
4. Empty 4f shell

57. The complex showing a spin only magnetic moment of 2.82 BM is

1. $\text{Ni}(\text{CO})_4$
2. $[\text{NiCl}_4]^{2-}$
3. $\text{Ni}(\text{PPh}_3)_4$
4. $[\text{Ni}(\text{CN})_4]^{2-}$

58. Which of the following can act as ligand but does not have any lone or unshared pair of electrons?

1. C_2H_4
2. NH_3
3. H_2O
4. Cl^-

59. Metal-ligand bonds in metal carbonyl possess

1. Only sigma bond
2. Only Pi(π) bond
3. Both sigma (σ) and Pi (π) bond
4. None of these

60. pH of a 10^{-4} M aqueous monobasic weak acid is 5. What will be the elevation in boiling point of the solution? (Given K_b for water is 0.52 k/m) (assume molality = molarity)

1. 5.72×10^{-5}
2. 5.72×10^{-2}
3. 5.72×10^{-4}
4. 0.572

61. What is the percentage by mass of Ti in Rutile, a mineral that contains Ti and O if structure can be described as a closest packed array of oxide ion with Ti ions in one half of the octahedral voids? (At. mass of Ti = 48, O = 16)

1. 40%
2. 50%
3. 60%
4. 70%

62. Dry air was successively passed through a solution of 5 g solute in 80 g water and then through pure water. The loss in weight of solution was 2.5 g and that of pure water was 0.04 g. What is the molecular weight of solute?

1. 24
2. 35.51
3. 35.15
4. 70.31

63. 0.01 molar aqueous solution of α -chloroacetic acid has K_a value 1.6×10^{-3} . What is the value of van't Hoff's factor?

1. 1
2. 2
3. 1.4
4. 1.6

64. At 300 K the half-life of a sample of a gaseous compound initially at 1 atm is 100 s. When the pressure is 0.5 atm the half-life is 50 s. The order of reaction is
1. 0
 2. 1
 3. 2
 4. 3
65. An aqueous solution of Na_3PO_4 freezes at -0.186°C . Given that $K_b(\text{H}_2\text{O}) = 0.512 \text{ K kg mol}^{-1}$ and $K_f(\text{H}_2\text{O}) = 1.86 \text{ K kg mol}^{-1}$, the elevation in boiling point of this solution is
1. 0.0585 K
 2. 0.0512 K
 3. 1.864 K
 4. 0.0265 K
66. Which among the following statements is false?
1. Increase of pressure increases the amount of adsorption and reaches maximum at constant temperature
 2. Increase of temperature may decrease the amount of adsorption
 3. Adsorption may be monolayered or multi layered
 4. Particle size of the adsorbent will not affect the amount of adsorption
67. Which of the following have spinel structure?
1. Mg_2AlO_2
 2. MgAl_2O_4
 3. $\text{Mg}_3\text{Al}_2\text{O}_6$
 4. $\text{Mg}_4\text{Al}_2\text{O}$
68. In a cubic unit cell, seven of the eight corners are occupied by atoms A and centres of faces are occupied by atoms B. The general formula of the compound is
1. A_7B_6
 2. A_7B_{12}
 3. A_7B_{24}
 4. A_{24}B_7
69. The correct order of equivalent conductivity at infinite dilution of LiCl , NaCl and KCl is
1. $\text{NaCl} > \text{KCl} > \text{LiCl}$
 2. $\text{KCl} > \text{NaCl} > \text{LiCl}$
 3. $\text{NaCl} > \text{LiCl} > \text{KCl}$
 4. $\text{LiCl} > \text{KCl} > \text{NaCl}$
70. What is the flux used in blast furnace?
1. $\text{Ca}(\text{OH})_2$
 2. CaCO_3
 3. CaO
 4. SiO_2
71. Xe and F_2 are present in 1 : 20 mole ratio and in proper condition which of the following xeron flouride will be formed?
1. XeF_2
 2. XeF_4
 3. XeF_6
 4. XeF_5^-
72. Two faraday of electricity is passed through a solution of CuSO_4 . The mass of copper deposited at the cathode is (at. mass of Cu = 63.5 amu)
1. 0
 2. 63.5 g
 3. 2 g
 4. 127 g
73. The color of KMnO_4 is due to
1. $\text{M} \rightarrow \text{L}$ charge transfer transition
 2. d - d transition
 3. $\text{L} \rightarrow \text{M}$ charge transfer transition
 4. $\sigma - \sigma^*$ transition
74. Which polymer is used in manufacture of paints and lacquers?
1. Bakelite
 2. Glyptal
 3. Polypropene
 4. Poly vinyl chloride
75. The standard electrode potentials ($E_{\text{M}^+/\text{M}}^0$) of four metals A, B, C and D are -1.2 V , 0.6 V , 0.85 V and -0.76 V , respectively. The sequence of deposition of metals on applying potential is:
1. A, C, B, D
 2. B, D, C, A
 3. C, B, D, A
 4. D, A, B, C
76. The correct statement about the magnetic properties of $[\text{Fe}(\text{CN})_6]^{3-}$ and $[\text{FeF}_6]^{3-}$ is ($Z = 26$):
1. both are paramagnetic.
 2. both are diamagnetic.
 3. $[\text{Fe}(\text{CN})_6]^{3-}$ is diamagnetic, $[\text{FeF}_6]^{3-}$ is paramagnetic.
 4. $[\text{Fe}(\text{CN})_6]^{3-}$ is paramagnetic, $[\text{FeF}_6]^{3-}$ is diamagnetic.
77. Which of the following compounds is metallic and ferromagnetic ?
1. CrO_2
 2. VO_2
 3. MnO_2
 4. TiO_2

78. The volume of atoms present in a face centred cubic unit cell of a metal is:

1. $\frac{24}{3}\pi r^3$
2. $\frac{12}{3}\pi r^3$
3. $\frac{16}{3}\pi r^3$
4. $\frac{20}{3}\pi r^3$

79. A crystalline solid has a cubic structure in which tungsten (W) atoms are located at the cubic corners of the unit cell, oxygen (O) atoms at the cube edges and sodium (Na) atom at the centre of the cube. The molecular formula of the compound is:

1. Na_2WO_4
2. NaWO_4
3. NaWO_3
4. NaWO_2

80. Which of the following will have highest measure of any colligative property?

1. 1% sucrose solution
2. 1% glucose solution
3. 1% glycerol solution
4. 1% urea solution

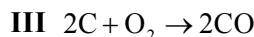
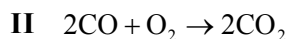
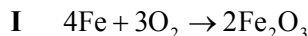
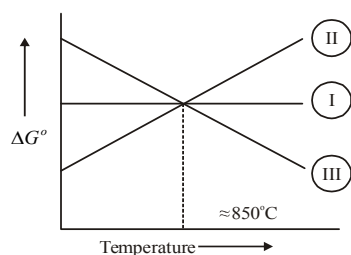
81. If the rate law of a reaction is $r = k[A][B]^2$, what would be the new rate in comparison to the original one when the volume of the vessel is reduced to half of the original?

1. 2
2. 1/8
3. 8
4. none of these

82. The rate of a reaction doubles when its temperature changes from 300K to 310K. Activation energy of a such a reaction will be: ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ and $\log 2 = 0.301$)

1. 53.6 kJ mol^{-1}
2. 48.6 kJ mol^{-1}
3. 58.5 kJ mol^{-1}
4. 60.5 kJ mol^{-1}

83. From the adjacent graphs of oxide formation:



Which statement is correct?

1. Fe_2O_3 can be reduced to Fe by CO below 850°C
2. Fe_2O_3 can be reduced to Fe by C above 850°C
3. Both (1) and (2) are correct
4. Both (1) and (2) are wrong

84. Which of the following is not oxidised by O_3 gas?

1. KI
2. FeSO_4
3. KMnO_4
4. K_2MnO_4

85. In which of the following coordination compounds, does the central metal atom obeys the EAN rule?

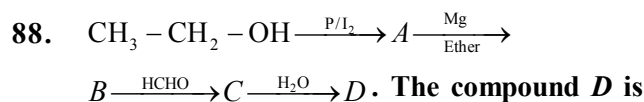
1. $\text{K}_3[\text{Fe}(\text{CN})_6]$
2. $\text{K}_4[\text{Fe}(\text{CN})_6]$
3. $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$
4. All of these

86. Gemoetrical shape of the complexes formed by the reaction of Ni^{2+} with Cl^- , CN^- and H_2O are respectively:

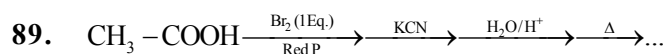
1. octahedral, tetrahedral, square planar
2. tetrahedral, square planar, octahedral
3. square planar, tetrahedral, octahedral
4. octahedral, square planar, tetrahedral

87. Which of the following is hydrolysed most easily?

- 1.
- 2.
- 3.
- 4.

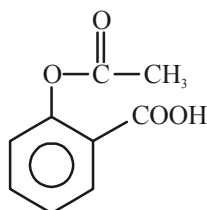


1. propanal
2. butanal
3. *n*-butyl alcohol
4. *n*-propyl alcohol



The final product is:

1. $\text{CH}_2 \begin{cases} \text{COOH} \\ \text{COOH} \end{cases}$
2. $\text{H}_3\text{C} - \overset{\text{O}}{\parallel} \text{C} - \text{COOH}$
3. CH_3COOH
4. CH_4



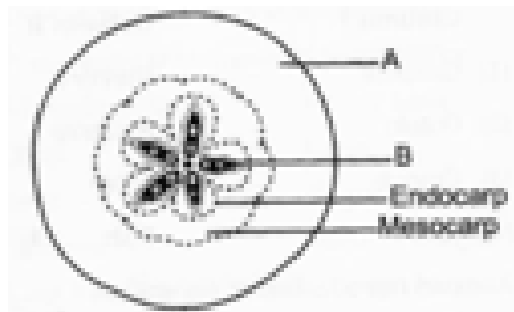
90. The compound

1. antiseptic
2. antibiotic
3. analgesic
4. pesticide

91. A plant breeder employ technique of emasculation

1. To cover the flower with a bag
2. To prevent self-pollination
3. To prevent stamen from being contaminated
4. To produce female plant

92. Look at the diagram given below and answer appropriately



(i) Since ___A___ is associated with fruit, it is called as ___(i)___ .

(ii) Since ___B___ is present, fruit cannot be called as ___(ii)___ .

1. A - Pericarp, (i) - True fruits
2. B - Seed, (ii) - Ex-albuminous
3. A - Thalamus, (i) - True fruit
4. B - Seed, (ii) - Parthenocarpic

93. A typical anther shows

- a. Two lobes with two theca each
- b. Each lobe as dithecous
- c. All cells in a given microsporangium as potential PMC
- d. Thousands of microspores per microsporangium

Out of these statements :

1. b is incorrect
2. a and b are correct
3. c and d are incorrect
4. a, b, c and d are correct

94. Find correct match

Column I

Column II

- | | |
|--|------------------|
| a. Thick and swollen cotyledons | (i) Castor |
| b. Unused endosperm in mature seed | (ii) Legumes |
| c. Unused nucleus in seed | (iii) Cashew nut |
| d. Thalamus contributes to fruit formation | (iv) Beet |
1. a(iii), b(iv), c(ii), d(i)
 2. a(i), b(iii), c(iv), d(iii)
 3. a(ii), b(i), c(iii), d(iv)
 4. a(ii), b(i), c(iv), d(iii)

95. In wheat, stem sawfly unable to cause destruction of crop due to

1. Low nitrogen and sugar content
2. Hollow stem
3. Solid stem
4. Nectarless flowers

- 96. Read the following statement and select the right choice**
- Semi-dwarf varieties, Jaya and Ratna were developed in IRRI, Phillipines
 - Classical plant breeding involves crossing or hybridization of pure lines
 - Saccharum barberi* was originally growth in South India
 - Genetic variability is the root of any breeding programme
- Only a is correct
 - b and d are correct
 - a, b and c are correct
 - b, c and d are correct
- 97. In nature, a given habitat has enough resources to support a maximum possible number, beyond which no further growth is possible. The limit is known as**
- Environmental resistance
 - Intrinsic rate of natural increase
 - Carrying capacity
 - Exponentially growth
- 98. Tropical environments, unlike temperate ones, are less seasonal, relatively more constant and predictable. Such constant environment promote**
- Deforestation
 - Mass extinctions
 - Over-exploitation
 - Niche specialization
- 99. In general, loss of biodiversity in a region may lead to**
- Increase in plant production
 - Decreased variability in certain ecosystem processes such as plant productivity
 - Increase in species richness
 - Lowered resistance to environmental perturbations such as drought
- 100. Exploring molecular, genetic and species - level diversity for products of economic importance is known as**
- Endemism
 - Bioinformatics
 - Tissue culture
 - Bioprospecting
- 101. It has been recommended that storage of nuclear waste, after sufficient pre-treatment, should be done in suitably shielded containers buried within rocks about _____ deep below the earth's surface.**
- 100 m
 - 50 m
 - 500 m
 - 200 m
- 102. Find the correct match w.r.t. crop variety for their disease resistant**
- | Column I | Column II |
|---------------------------|---------------------------|
| (a) <i>Pusa Komal</i> | (i) Tobaccor mosaic virus |
| (b) <i>Pusa Sadabahar</i> | (ii) Black rot |
| (c) <i>Pusa Shubhra</i> | (iii) White rust |
| (d) <i>Pusa Swarnim</i> | (iv) Bacterial Blight |
- a(iv), b(i), c(ii), d(iii)
 - a(iv), b(i), c(iii), d(ii)
 - a(i), b(iv), c(ii), d(iii)
 - a(ii), b(iii), c(iv), d(i)
- 103. Rate of increase in biomass by heterotrophs or consumers per unit time and area is known as**
- Gross primary productivity
 - Net primary productivity
 - Secondary productivity
 - Community productivity
- 104. The concept of Joint Forest Management was introduced by the Government of India in**
- 1974
 - 1980
 - 1987
 - 1990
- 105. Which one of the following statement is false in respect of flowering plants?**
- Parthenocarpy can be induced through the application of growth hormones
 - Integuments encircle the ovule except at the tip where a small opening called the germ pore is organized
 - Endosperm development precedes embryo development
 - Apomicts have several advantages in horticulture and agriculture

106. Find incorrect statement about reproduction :-

1. Type of reproduction depends upon habitat and internal physiology of organisms also
2. Enables continuity of species generation after generation
3. May be monoparental or biparental
4. Asexual reproduction never involves gametes formation

107. Which group of plants show clear cut vegetative, reproductive and senescent phases in their life cycle?

1. Mustard, Radish, Mango
2. Peepal, Mango, Banyan
3. Wheat, Rice, Cabbage
4. Peepal, *Bryophyllum*, Rice

108. In a 7 celled and 8 nucleate embryo sac :

- (A) The polar nuclei are situated below the egg apparatus in central cell
 (B) Egg apparatus has two synergids and one egg cell at micropylar end
 (C) Filiform apparatus in synergid direct the pollen tube to enter the ovule
 (D) Antipodal cells are haploid but have different genetic composition to that of egg cell

How many of above statements are true for statement given in the question ?

1. Two
2. Three
3. One
4. Four

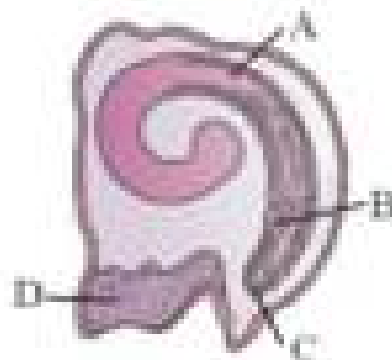
109. To form four fully developed *Polygonum* type of embryosacs in angiosperms total number of meiosis and mitosis divisions generations required are :-

1. 4, 12
2. 1, 3
3. 4, 4
4. 1, 12

110. Choose unrelated for embryo development in flowering plants :-

1. Develops at micropyle end of ovule
2. Early stages of embryo development differs in monocots and dicots
3. In most cases zygotes divide first by transverse division
4. Most zygote divide only after certain amount of endosperm is formed

111. How many of the structures (A to D) in the following diagram are diploid ?



1. Four
2. Two
3. Three
4. One

112. A: All organisms have to reach a certain stage of growth and maturity in their life, before they can reproduce sexually.

B: Male and female gametes must be physically brought together to facilitate syngamy :

1. A - correct B – incorrect
2. Both A and B are correct
3. Both A and B are incorrect
4. A - incorrect B - correct

113. Which one of the following plant does not show dioecious condition :-

1. *Marchantia*
2. Papaya
3. Date palm
4. Coconut

114. Read the following statements :-

(A) Desert lizard lack physiological ability that mammals have to deal with high temperature of their habitat.

(B) Kangaroo rat has the ability to concentrate its urine.

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

115. In how many population interactions only one species get harmed ?

Predation, Mutualism, Commensalism, Parasitism, competition, Amensalism, Protocooperation

1. Three
2. Five
3. Seven
4. Four

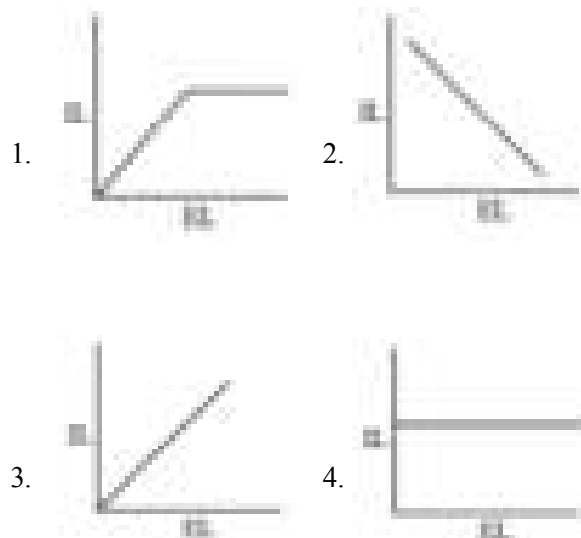
116. How many statements are correct about decomposition ?

- (A) Oxygen independent process
 (B) Faster if detritus is rich in lignin and chitin
 (C) Light is most important climatic factor for decomposition
 (D) Warm and moist environment favour decomposition

1. One
2. Two
3. Three
4. Four

117. Identify the correct option for diagrammatic representation of organismic response in overwhelming majority (99%) animals :-

(EL = External level) (IL = Internal level)



118. Which one of the following belongs to more than one trophic level ?

1. Grasshopper
2. Insectivorous plant
3. Cow
4. Lion

119. Which one of the following is wrong about primary succession ?

1. Lichen is pioneer community in lithosere
2. Formation of soil does not take place
3. The establishment of new biotic community is generally slow
4. With time water body is converted into land

120. According to Robert Constanza, the most expensive ecological service is :-

1. Purification of air
2. Soil formation
3. Nutrient cycling
4. Climate regulation

121. In 1981 the r-value for human population in India was

1. 0.015
2. 0.12
3. 0.205
4. 0.0205

122. Find odd one out about levels of biological organisation :-

1. Biome
2. Community
3. Species
4. Population

123. Which of the following alcoholic drinks are produced by distillation of the fermented broth:

1. Beer and wine
2. Whisky, brandy, rum
3. Beer and rum
4. Wine and brandy

124. Which of the following bioactive molecule is used as a blood cholesterol lowering agent :

1. Cyclosporin-A
2. Streptokinase
3. Statins
4. All the above

125. In mycorrhiza association the fungal symbiont helpful in :

1. Phosphorus nutrition
2. Resistance to root borne pathogen
3. Tolerance to salinity and drought
4. All the above

126. A major component of gobar gas is :

1. Butane
2. Ammonia
3. Methane
4. Ethane

127. Which of the following is not used as a biofertilizers :

1. Rhizobium
2. Fungi-Glomus
3. Cyano bacteria
4. Yeast

128. Virus free plants can be obtained by :-

1. Only apical meristem
2. Only axillary meristem
3. Apical and axillary meristem
4. Embryo culture

129. Which of the following is not the objective of bio fortification :-

1. Improvement of protein content and quality.
2. Increase oil content & quality
3. Reduction in micro nutrient and mineral content.
4. Improvement of vitamin content.

130. Atlas 66 is a variety of :-

1. Wheat
2. Bhindi
3. Rice
4. Sugar cane

131. Practical, hygienic, efficient and cost effective solution to human waste disposal is :-

1. Natural toilets
2. Eco-friendly toilets
3. Eco-san toilets
4. Biological sanitation

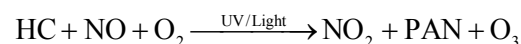
132. In which device the exhaust is passed through a spray of water or lime for removal of gases as well as particles ?

1. ESP
2. Scrubber
3. Catalytic converter
4. Both (1) and (2)

133. Select the correct match w.r.t. pollutants :-

- | I | II |
|-----------------------------------|------------------|
| 1. Itai-Itai | i. Cd |
| 2. Methaemoglobinemia | ii. Hg |
| 3. Acid Rain | iii. CFC |
| 4. Most effective green house gas | iv. Stone cancer |

134. Which phenomenon is indicated by above reaction:-



1. Acid rain
2. Photochemical smog
3. Ozone depletion
4. Sulphur smog

135. Which is not an example of insitu conservation:-

1. National park, wild life sanctuaries
2. Biosphere reserve
3. Sacred groves
4. Botanical gardens

136. A molecular technique in which DNA sequences between two oligonucleotide primers can be amplified is known as

1. southern blotting
2. northern blotting
3. polymerase chain reaction
4. DNA replication

137. Agrobacterium tumefaciens is

1. a disease in humans that causes loss of sight
2. a bacterium that can be used to introduce DNA into plants
3. a fungi that is used to produce antibiotics in large amounts
4. a disease in humans that causes loss of weight

138. Vectors are

1. molecules that degrade nucleic acids
2. molecules that help in replication
3. molecules that are able to covalently bond to and carry foreign DNA into cells
4. molecules that protect host cells from invasion by foreign DNA

139. Bacterial cells protect their own DNA from degradation by restriction endonucleases by

1. methylating the DNA at the sites that the enzyme recognizes
2. deleting all recognition sites from the genome
3. not producing any restriction endonucleases
4. having anti restriction endonucleases

140. Which of the following enzyme is used to covalently bond foreign DNA to a vector plasmid?

1. DNA polymerase
2. Restriction endonuclease
3. DNA ligase
4. DNA helicase

141. The piece of equipment, that introduces DNA into cells via DNA-coated microprojectiles is known as

1. laser
2. DNA probe
3. gene gun
4. inoculating needle

142. How is human insulin synthesized using recombinant DNA technology?

1. By using chemically synthesized DNA sequences for the two chains separately
2. By isolating DNA from the islets of Langerhans of pancreas
3. By using cDNA for insulin
4. By using chemically synthesized DNA sequences for the complete insulin protein

- 143. The mammary glands are modified**
1. endocrine glands
 2. sebaceous glands
 3. vascular plexuses
 4. sweat glands
- 144. Menstrual bleeding is the result of**
1. low levels of ovarian hormones
 2. high levels of ovarian hormones
 3. high levels of LH
 4. high levels of FSH
- 145. The oral steroid contraceptive "the Pill" works by directly preventing**
1. ovulation
 2. menstruation
 3. fertilization
 4. implantation
- 146. Amenorrhea**
1. will cause overdevelopment of the secondary sex characteristics
 2. is never normal
 3. is rare in women athletes due to their good physical conditioning
 4. is the absence of menstruation
- 147. Which of the following is the correct sequence for the development and regression of an ovarian follicle?**
1. primordial follicle, mature vesicular ovarian follicle, corpus albicans, and corpus luteum
 2. primordial follicle, mature vesicular ovarian follicle, corpus luteum, and corpus albicans
 3. primordial follicle, corpus luteum, corpus albicans, and mature vesicular ovarian follicle
 4. primordial follicle, corpus luteum, mature vesicular ovarian follicle, and corpus albicans
- 148. Which of the following represents the form of Plasmodium that is released from the erythrocyte by lysis?**
1. Trophozoite
 2. Schizont
 3. Merozoite
 4. Macrogametocyte
- 149. Dysarthria on consumption of alcohol is due to the fact that alcohol affects:**
1. Cerebrum
 2. Cerebellum
 3. Hypothalamus
 4. Medulla oblongata
- 150. Which disease has been completely eradicated?**
1. Smallpox
 2. Chickenpox
 3. Polio
 4. Mumps
- 151. Influenza viruses are classified into groups based on the _____ antigens of their protein coats.**
1. A
 2. B
 3. C
 4. N
- 152. Infection with HIV will result in a depletion of**
1. CD1+ cells.
 2. CD2+ cells.
 3. CD3+ cells.
 4. CD4+ cells.
- 153. Prion diseases share important clinical, neuropathological, and cell biological features with:**
1. Kuru
 2. Creutzfeldt-Jakob disease
 3. Typhoid
 4. Alzheimer's disease
- 154. Electroporation is:**
1. the process of separating charged molecules through a gel maintained in an electric field
 2. the process of combining foreign DNA to an electrically charged vector molecule
 3. the process of introducing DNA into cells by the application of high voltage pulses
 4. the process of introducing DNA into plant cells by the application of PEG
- 155. At the time early life first formed on Earth, the atmosphere could best be described as:**
1. oxidizing.
 2. reducing.
 3. rich in oxygen.
 4. low in hydrogen gas.
- 156. Which of the following was presented as evidence in favor of "the RNA world" hypothesis?**
1. The fact that DNA can encode genetic information
 2. The fact that enzymes, made of protein, can catalyze biological reactions
 3. The discovery that some enzymes are composed of RNA rather than protein
 4. The discovery of new life forms that encode their genetic information in RNA rather than DNA
- 157. Which of the following statements is TRUE?**
1. Prokaryotes evolved before eukaryotes.
 2. Eukaryotes evolved before prokaryotes.
 3. Prokaryotes and eukaryotes evolved at approximately the same time.
 4. It is unclear whether prokaryotes or eukaryotes evolved first.

- 158. Reproductive isolation in sympatric speciation develops without a:**
1. Geographic barrier
 2. Barrier to gene flow
 3. Change in chromosome number
 4. Barrier to mating
- 159. Distantly related organisms with similar traits have experienced:**
1. Coevolution
 2. Convergent evolution
 3. Divergent evolution
 4. Parallel evolution
- 160. Natural selection acts on an organism's:**
1. Dominant alleles
 2. Recessive alleles
 3. Phenotype
 4. Combined genotype
- 161. Disruptive selection favors:**
1. Both extreme forms of a trait
 2. Intermediate forms of a trait
 3. One of the extremes of a trait
 4. Environmental differences
- 162. A deleterious allele decreases more rapidly in frequency if it is:**
1. Recently mutated
 2. Rare
 3. Dominant
 4. Recessive
- 163. The wobble effect is the:**
1. Lack of precision with regard to the third base in the codon and anticodon
 2. Instability of the DNA molecule when unwound
 3. Instability of pairing when a purine pairs with another purine
 4. Undulating movements of mRNA
- 164. About how much of the DNA in a eukaryotic cell is expressed at any one time?**
1. 1 %
 2. 20 %
 3. 50 %
 4. 80 %
- 165. In general, bacterial genes are regulated at the time of:**
1. Transcription
 2. Post transcription
 3. Translation
 4. Post translation
- 166. An operon is a:**
1. Protein that suppresses gene expression
 2. Protein that accelerates gene expression
 3. Genes that switch other genes on or off
 4. Cluster of structural genes with related functions
- 167. The activity of a repressor depends on whether:**
1. The repressor is positioned next to the operon
 2. The repressor is positioned next to the promoter
 3. A key substance in the metabolic pathway is present
 4. There is enough RNA polymerase present
- 168. A gene carried by recombinant DNA is cloned when:**
1. The host bacterium divides by binary fission
 2. It is transcribed
 3. It is fragmented by restriction enzymes
 4. It is hybridized
- 169. A piece of nucleic acid used to find a gene, by forming a hybrid with it, is called a:**
1. Probe
 2. Vector
 3. Restriction sequence
 4. Retrovirus
- 170. Restriction enzymes are synthesized by:**
1. Bacteria only
 2. Yeast and Bacteria only
 3. Eukaryotic cells only
 4. All kinds of cells
- 171. Bacterial resistance to antibiotics is a genetic trait carried in the bacterial:**
1. Intron
 2. Chromosome
 3. Plasmid
 4. Centromere
- 172. In oogenesis, when a diploid cell undergoes meiosis, how many ova result?**
1. 1
 2. 2
 3. 3
 4. 4
- 173. An organism with two different alleles is:**
1. Homozygous for that trait
 2. Homologous for the allele
 3. Heterozygous for the trait
 4. Heterologous for the allele
- 174. How many different kinds of gametes can an organism with genotype A/a; B/B; C/c produce?**
1. 4
 2. 8
 3. 9
 4. 16

175. The extinct reptile group from which mammals directly evolved is:

1. Sauropsids
2. Pelycosaur
3. Thecodonts
4. Therapsids

176. Which one of the following would cause the Hardy-Weinberg principle to be inaccurate?

1. The size of the population is very large.
2. Individuals mate with one another at random.
3. Natural selection is present.
4. There is no source of new copies of alleles from outside the population.

177. Which of the following ideas was developed by Thomas Malthus?

1. Peppered moths living near English industrial cities provide a good example of evolution.
2. The diversity of Galápagos finch species is the result of natural selection.
3. Living things often produce far more offspring than are needed to maintain their numbers.
4. Reproductive isolation is pre-condition for speciation

178. Which of the following is not a vector borne disease?

1. African sleeping sickness
2. Dengue
3. Filariasis
4. Diptheria

179. Adaptive immunity depends on:

1. traits common to groups of pathogens.
2. pathogen-specific recognition.
3. maternal provision of antibodies to offspring.
4. having exhausted all options for innate immunity responses.

180. A patient who can produce antibodies against some bacterial pathogens, but not against viral infections, probably has a disorder in his

1. B cells.
2. plasma cells.
3. natural killer cells.
4. T cells.

HFT-9 Answer key

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