CUMULATIVE TEST (JANUARY)

Time: 3hours ***Marks:720 marks***

PHYSICS

1.**A sample of an ideal gas is slowly compressed to one-half its original volume with no change in temperature. What happens to the average speed of the molecules in the sample?**

a. It does not change b. It becomes 4 times as great
c. It becomes 2 times as great d. It becomes ½ as great

2. Which one of the following is a wrong statement in kinetic theory of gases?

a. The gas molecules are in random motion
b. The gas molecules are perfect elastic spheres
c. The volume occupied by the molecules of a gas is negligible
d. The collision between molecules is inelastic

3. If the rms velocity of oxygen molecule at certain temperature is 0.5 km/s, the rms velocity for hydrogen molecule at the same temperature will be

a. 2 km/s b. 4 km/s c. 9 km/s d. 16 km/s

4. A sample of an ideal gas is slowly compressed to one-half its original volume with no change in pressure. If the original root-mean-square speed (thermal speed) of the gas molecules was V, the new speed is

a. V b. 2V c. $\sqrt{2}$ V d. V/$\sqrt{2}$

5. If we double the root-mean-square speed (thermal speed) of the molecules of a gas, then

a. its temperature must increase by a factor of 4 b. its temperature must increase by a factor of 2
c. its temperature must increase by a factor of $\sqrt{2}$ d. its pressure must increase by a factor of 2

6. An ideal gas is kept in a rigid container that expands negligibly when heated. The gas starts at a temperature of 20.0°C, and heat is added to increase its temperature. At what temperature will its root-mean-square speed (thermal speed) be double its value at 20.0°C?

a. 40.0°C b. 141°C c. 313°C d. 899°C

7. The root-mean-square speed (thermal speed) of the molecules of a gas is 200m/s at a temperature 23.0°C. What is the mass of the individual molecules? The Boltzmann constant is 1.38 x 10^{-23} J/K.

a. 2.13 x 10^{-25} kg b. 2.45 x 10^{-25} kg c. 5.66 x 10^{-25} kg d. 3.11 x 10^{-25} kg

8. In thermal equilibrium, the average velocity of gas molecules is

a. Proportional to $\sqrt{T}$ b. Proportional to T^2 c. Proportional to T^3 d. Zero

9. According to the kinetic theory of gases the r.m.s. velocity of gas molecules is directly proportional to

a. T b. $\sqrt{T}$ c. T^2 d. $\frac{1}{\sqrt{T}}$

10. **To what temperature should the hydrogen at 327°C be cooled at constant pressure, so that the root mean square velocity of its molecules become half of its previous value**

a. -123°C b. 23°C c. -100°C d. 0^0C

11**. At a pressure of 24 x 10^5 dyne/cm^2, the volume of O_2 is 10 litre and mass is 20gm. The r.m.s. velocity will be**

a. 800 m/sec. b. 400 m/sec. c. 600 m/sec. d. 200 m/sec.

12**. The root mean square speed of hydrogen molecules of an ideal hydrogen gas kept in a gas chamber at 0°C is 3180 meters/second. The pressure on the hydrogen gas is (Density of hydrogen gas is 8.99 x 10^{-2} kg/m^3, 1 atmosphere = 1.01 x 10^5 N/m^2)**

a. 1.0 atm b. 1.5 atm c.2.0 atm d. 3.0 atm

13. **What is the average translational kinetic energy per molecule of an ideal gas at a temperature of 300K? The Boltzmann constant is 1.38 x 10^{-23} J/K**

a. 1.7 x 10^{-21} J b. 8.3 x 10^{-21} J c. 6.2 x 10^{-21} J d.2.1 x 10^{-21} J

14. **At 50.0°C, the average translational kinetic energy of a gas molecule is K. If the temperature is now increased to 100.0°C, the average translational kinetic energy of a molecule will be closest to**

a. 1.07 K b. 1.15 K c. 1.41 K d. 2.00 K

15**. A monoatomic gas molecule has**

a. Three degrees of freedom b. Four degrees of freedom c. Five degrees of freedom
d. Six degrees of freedom

16. A particle performing SHM with a frequency of 5 Hz and amplitude 2cm is initially in the positive extreme position. What is the equation for its displacement?

a. x= 0.02 cos $10\pi t$ b. x= 0.02 cos $5\pi t$ c. x= 0.02 cos $15\pi t$ d. x= 0.02 cos $20\pi t$

17**. Two simple harmonic oscillators with amplitudes in the ratio 1:2 are having the same total energy. The ratio of their frequencies is**

a. 1:4 b. 1:2 c. 2:1 d. 4:1

18**. A particle is vibrating in SHM with an amplitude of 4cm. At what displacement from the equilibrium position it has half potential and half kinetic**

a. 1 cm b. 2 cm c. $\sqrt{2}cm$ d. $2\sqrt{2}cm$

19**. At what displacement is the KE of a particle performing SHM of amplitude 10cm, three times its PE?**

a. 10 cm b. 5 cm c. 15 cm d. 20 cm

20. **Two springs of force constants 1000 N/m and 2000 N/m are stretched by same force. The ratio of their respective potential energies is**

a. 2:1 b. 1:2 c. 4:1 d. 1:4

21. **A second's pendulum is taken from the surface of the earth to that of the moon. In order to maintain the period constant**

a. Length of the pendulum has to be decreased b. Length of the pendulum has to be increased
c. Amplitude of the pendulum has to be increased
d. Amplitude of the pendulum has to be decreased

22. **The period of a simple pendulum suspended from the ceiling of a car is T when the car is at rest. If the car moves with a constant acceleration the period of the pendulum**

a. Unaltered b. Decreases c. Increases d. None

23**. The time period of a pendulum in stationary lift is 'T', if lift starts accelerating in the downward direction, the time period will**

a. Increase b. Decrease c. No change d. Nothing certain

24. **The periods of a pendulum on two planets are in the ratio 3:4. The acceleration due to gravity on them are in the ratio**

a. 9:16 b. 3:4 c. 4:3 d. 16:9

25. **The mass and diameter of a planet are twice that of the earth. What will be the time period of oscillation of a pendulum on this planet, if it is a second's pendulum on earth.**

a) $\sqrt{2}sec$ b) 2 sec c) $\frac{1}{\sqrt{2}}sec$ d) $2\sqrt{2}sec$

26**. The period of a simple pendulum measured inside a stationary lift is 'T'. If the lift starts moving upwards with a acceleration g/3. What will be the time period?**

a. T/3 b. 3 T c. $\frac{\sqrt{3}T}{2}$ d. $\sqrt{\frac{3}{2}T}$

27**. Two pendulums of length 121 cm and 100 cm start vibrating in phase. At some instant, the two are at their mean position in the same phase. The minimum number of vibrations of the shorter pendulum after which the two are again in phase at the mean position is:**

a. 9 b. 10 c. 8 d.11

28**. A body is executing simple harmonic motion with frequency 'n', the frequency of its potential energy is**

a. 3n b. 2n c. n d. 2n

29. **A spring is stretched by 5 cm by a force 10 N. The time period of the oscillations when a mass of 2kg is suspended by it is**

a. 3.14 s b.0.628 s c. 0.0628 s d. 6.28 s

30. **The phase difference between displacement and acceleration of a particle in a simple harmonic motion is:**

a. Zero b. π rad c. $\frac{3\pi}{2}rad$ d. $\frac{\pi}{2}rad$

31. water waves produced by a motor boat sailing in water are

a. neither longitudinal nor transvers
b. both longitudinal and transvers
c. only longitudinal
d. only transvers

32. Sound waves of wavelength λ travelling in a medium with a speed of v ms^{-1} enter into another medium where its speed is 2v ms^{-1}. Wavelength of sound waves in the second medium is

a. λ
b. $\frac{\lambda}{2}$
c. 2 λ
d. 4 λ

33. Speed of sound wave in air

a. Is independent of temperature
b. Increase with pressure
c. Increase with increase in humidity
d. decrease with increase in humidity

34. Change in temperature of the medium changes

a. Frequency of sound waves
b. Amplitude of sound waves
c. Wavelength of sound waves
d. Loudness of sound waves

35. With propagation of longitudinal waves through a medium, the quantity transmitted is

a. Matter
b. Energy
c. Energy and matter
d. Energy, matter and momentum

36. Which of the following statement is true for waves motion?

a. Mechanical transvers waves can propagate through all mediums
b. Longitudinal waves can propagate through solids only
c. Mechanical transvers waves can propagate through solids only
d. Longitudinal waves can propagate through vacuum

37. **A sound wave is passing through air column in the form of compressions and rarefaction. In consecutive compression and rarefactions**.

a. Density remains constant
b. Boyle's law obeyed
c. Bulk modulus of air oscillates
d. There is no transfer of heat

38. Equation of a plane progressive wave is given by y=0.6 sin $2\pi\left(t-\frac{x}{2}\right)$. On reflection from a denser medium its amplitude become $\frac{2}{3}$ of the amplitude of the incident wave. The equation of the reflected wave is

a. y=0.6 sin $2\pi\left(t+\frac{x}{2}\right)$
b. y=-0.4 sin $2\pi\left(t+\frac{x}{2}\right)$
c. y=0.4 sin $2\pi\left(t+\frac{x}{2}\right)$
d. y=-0.4 sin $2\pi\left(t-\frac{x}{2}\right)$

39. A string of mass 2.5 kg is under a tension of 200 N. The length of the stretched string is 20 m. If the transvers jerk is struck at one end of the string, the disturbance will reach the other end in

a. One second
b. 0.5 second
c. 2 second
d. Data given is insufficient

40. Which of the following equation represents a wave travelling along y – axis?

a. X= A sin (ky – wt)
b. Y = A sin (kx – wt)
c. Y = A sin ky cos wt
d. Y = A cos ky sin wt

41. Which of the following is a mechanical wave?

a. Radio wave
b. X- rays
c. Light waves
d. Sound waves

42. Velocity of sound in air is 332 m s^{-1}. Its velocity in vacuum will be
a. > 332 m s^{-1}
b. = 332 m s^{-1}
c. < 332 m s^{-1}
d. Meaningless

43. Two waves represented by y = a sin (wt – kx) and y = a cos (wt – kx) are superposed. The resultant wave will have an amplitude
a. a
b. $\sqrt{2}$a
c. $2a$
d. 0

44. Two sine waves travel in the same direction in a medium. The amplitude of each wave is A and the phase difference between the two waves is 120°. The resultant amplitude will be
a. A
b. 2A
c. 4A
d. $\sqrt{2}$A

45. The fundamental frequency of a string is proportional to
a. Inverse of its length
b. The diameter
c. The tension
d. The density

CHEMISTRY

46. **Assertion(A)**: Alkyl halides are polar in nature, but they are almost insoluble in water
Reason(R): They can neither form Hydrogen bond nor they can break the hydrogen bond between water molecules.
a. Both A and R are true, and R is correct explanation to A
b. Both A and R are true, and R is not the correct explanation to A
c. A is true and R is false.
d. A is false and R is true.

47. Following major compound is formed when ethyl chloride reacts with silver nitrite
a. Nitro ethane b. Ethyl nitrite c. Ethyl nitrite d. Acetaldehyde

48. The IUPAC name of $(CH_3)_2CHCH_2Br$ is
a. 1-bromo-2-methylpropane
b. 2-bromo-2-methylpropane
c. 1-bromo-1-methylpropane
d. 2-bromo-1-methylpropane

49. Isomerism shown by 2,3-dichlorobutane is
a. dia stereo isomerism
b. optical isomerism
c. geometrical isomerism
d. structural isomerism

50. What is the molecular formula of the product formed when benzene is treated with ethylchloride in presence of anhydrous aluminium chloride?
a. C_8H_{10} b. C_6H_6 c. C_8H_8 d. C_6H_5Cl

51. The organic chloro compound, which shows complete stereochemical inversion during a SN^2 reaction, is
a. $(C_2H_5)_2CHCl$ b. $(CH_3)_3CCl$ c. $(CH_3)_2CHCl$ d. CH_3Cl

52. Fluorobenzene (C_6H_5F) can be synthesized in the laboratory

a. by direct fluorination of benzene with F_2 gas
b. by reacting bromobenzene with NaF solution
c. by heating phenol with HF and KF
d. from aniline by diazotisation followed by heating the diazonium salt with HBF_4

53. A set of compounds in which the reactivity of halogen atom in the ascending order is

a. chlorobenzene, vinyl chloride, chloroethane
b. chloroethane, chlorobenzene, vinyl chloride
c. vinyl chloride, chlorobenzene, chloroethane
d. vinyl chloride, chloroethane, chlorobenzene

54. Possible major product formed in the reaction of neopentyl alcohol with HCl is

a. 2 -chloro-2-methylbutane
b. 2, 2 -dimethyl 1-chloropropane
c. 2 -chloro -3-methylbutane
d. 3, chloro -3-methylbutane

55. **Which one of the following is not an allylic halide**?

a. 4-Bromopent-2-ene
b. 3-Bromo-2-methylbut-1-ene
c. 1-Bromobut-2-ene
d. 4-Bromobut-1-ene

56. **Consider the reactions.**$(i)(CH_3)_2CHCH_2Br \xrightarrow{C_2H_5OH} (CH_3)_2CHCH_2OC_2H_5 + HBr$

$(ii)(CH_3)_2CHCH_2Br \xrightarrow{C_2H_5O^-} (CH_3)_2CHCH_2OC_2H_5 + Br^-$

The mechanism of reactions (i) and (ii) are respectively.

a. S_N1 and S_N2
b. S_N2 and S_N1
c. S_N1 and S_N1
d. S_N2 and S_N2

57. Match the columns

Column-1	**Column-II**
(A) $C_2H_6 \xrightarrow{Cl_2/hv} C_2H_5Cl$	(p) Finkelstein reaction
(B) $C_6H_5NH_2 \xrightarrow{NaNO_2+HCl/CuCl} C_6H_5Cl$	(q) Free radical substitution
(C) $CH_3Cl + NaI \xrightarrow{Acetone} CH_3I + NaCl$	(r) Swarts reactions
(D) $CH_3Br + AgF \rightarrow CH_3F + AgBr$	(s) Sandmeyer's reaction

a. A – (q), B – (s), C – (p), D – (r)
b. A – (q), B – (r), C – (p), D – (s)
c. A – (r), B – (p), C – (s), D – (q)
d. A – (s), B – (r), C – (p), D – (q)

58. Which of the following reagent produces pure alkyl halides when heated with alcohols?

a. PCl_5
b. PCl_3
c. $SOCl_2$
d. dry HCl

59. Freon (dichlorodifluoromethane) is used

a. as local anaesthetic
b. for dissolving impurities in metallurgical process
c. in refrigerator
d. in printing industry

60. Which of the following possesses highest melting point?
a. Chlorobenzene b. m-dichlorobenzene
c. o-dichlorobenzene d. p-dichlorobenzene

61. Chlorobenzene is prepared commercially by
a. Raschig process b. Wurtz -Fittig reaction
c. Friedel-Craft's reaction d. Grignard reaction

62. The work done during the expansion of a gas from a volume of 4 dm3 to 6 dm3 against aconstant external pressure of 3 atm is (1 L atm = 101.32 J)
a. – 6 J b. – 608 J c. + 304 J d. – 304 J

63. The q is … when heat is transferred from the surroundings to the system and q is When heat is transferred from system to the surroundings.
a. +ve, -ve b. -ve,+ve c. high, low d. low, high

64. For the reaction C_3H_8 (g) + 5O_2 (g) □ 3CO_2 (g) + 4H_2O(l) at constant temperature, then ΔH-ΔE is
a. – RT b. + RT c. – 3 RT d. + 3 RT

65. On the basis of thermochemical equations (i), (ii) and (iii), find out which of the algebraicrelationships given in options (a) to (d) is correct.
(i) C (graphite) + O_2(g) □ CO_2(g); $\Delta_r H$ = x kJ mol^{-1}
(ii) C(graphite) + ½ O_2(g) □ CO (g); $\Delta_r H$ = y kJ mol^{-1}
(iii) CO (g) + ½ O_2 (g) □ CO_2 (g); $\Delta_r H$ = z kJ mol^{-1}

a. z = x + y b. x = y – z c. x = y + z d. y = 2z – x

66. Bond dissociation enthalpy of H_2, Cl_2 and HCl are 434, 242 and 431 kJ mol^{-1} respectively. Enthalpy of formation of HCl is:
a. 93 kJ mol^{-1} b. – 245 kJmol^{-1} c. – 93 kJmol^{-1} d. 245 kJmol^{-1}

67. Hess's law is used to calculate:
a. enthalpy of reaction b. entropy of reaction
c. work done in reaction d. All of the above

68. In which of the following entropy decreases?
a. Crystallization of sucrose solution b. Rusting of iron
c. Melting of ice d. Vaporization of camphor

69. Among the following, the intensive properties are
(i) molar conductivity (ii) electromotive force (iii) resistance (iv) heat capacity
a. (ii) and (iii) b. (i), (ii) and (iii) c. (i) and (iv) d. (i) only

70. The molar heat capacity of water at constant pressure is 75 JK^{-1} mol^{-1}. When 1kJ of heat issupplied to 100 g of water, which is free to expand, the increase in temperature of water is
a. 6.6 K b. 1.2 K c. 2.4 K d. 4.8 K

71. Consider the reaction: N_2 +3H_2 □ 2NH_3 carried out at constant temperature and pressure. If

ΔH and ΔU are the enthalpy and internal energy changes for the reaction, which of the following expressions is true?

a. $\Delta H > \Delta U$ b. $\Delta H < \Delta U$ c. $\Delta H = \Delta U$ d. $\Delta H = 0$

72. For most of the ionic compounds, ΔH_{Sol} is …… and the dissociation process is…….

a. positive, exothermic b. negative, exothermic
c. positive, endothermic d. negative, endothermic

73. A spontaneous reaction is impossible if

a. both Δ H and Δ S are negative b. both ΔH and Δ S are positive
c. Δ H is negative and Δ S is positive d. ΔH is positive and ΔS is negative

74. According to the first law of thermodynamics, ΔU = q + W.
In special cases the statement can be expressed in different ways. Which of the following is not a correct expression?

a. At constant temperature q = –W b. When no work is done ΔU = q
c. In gaseous system ΔU = q + P ΔV d. When work is done by the system: ΔU = q + W

75. What is the internal energy (kJ) change occurs when 36g of $H_2O(l)$ converted to $H_2O(g)$?
Given $\Delta H°$(vaporisation) = 40.79kJ/mol

a. 75.38 b. 80.98 c. 70.98 d. 45.89

76. For an isothermal reversible expansion process, the value of q can be calculated by the expression

a. $q = 2.303nRT \log (V_2 / V_1)$ b. $q = -2.303nRT \log (V_2 / V_1)$
c. $q = -P_{exp}\, nRT \log (V_1 / V_2)$ d. None of these

77. Choose the reaction with negative ΔS value.

a. $2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$ b. $Cl_2(g) \rightarrow 2Cl(g)$
c. $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$ d. $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$

78. Benzene can be obtained by heating either benzoic acid with X or phenol with Y. X and Y are respectively.

a. Zinc dust and soda lime b. Soda lime and zinc dust
c. Zinc dust and sodium hydroxide d. Soda lime and copper

79. Identify the alkyne in the following sequence of reactions.

$$Alkyne \xrightarrow{H_2/Lindlar\ catalyst} A \xrightarrow{Ozonolysis} B\ only \xleftarrow{Wacker\ process} CH_2 = CH_2$$

a. $CH_3 - C \equiv C - CH_3$ b. $CH_3 - CH_2 - C \equiv CH$
c. $CH_2 = CH - C \equiv CH$ d. $HC \equiv C - CH_2 - C \equiv CH$

80. Which one of these is not compatible with arenes?

a. Greater stability b. Delocalisation of -electrons
c. Electrophilic additions d. Resonance

81. The disappearance of the characteristic purple colour of $KMnO_4$ in its reaction with an alkene is

the test for unsaturation. It is known as
a. Markovnikov test b. Baeyer test c. Wurtz test d. Grignard test

82. During the nitration of benzene. In the process of generation of nitronium ion sulphuric acid behaves as a/an_____and nitric acid behave as a/an_____.
a. base, acid b. acid, base c. strong acid, weak acid d.weak acid, strong acid

83. When acetylene is passed through dil. H_2SO_4 in presence of $HgSO_4$, the compound formed is
a. ether b. acetaldehyde c. acetic acid d. ketone

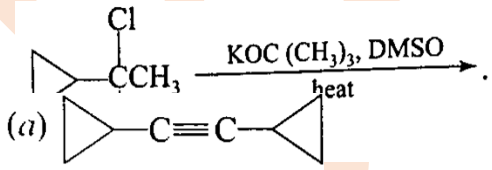
84. One mole of a symmetrical alkene on ozonolysis gives two moles of an aldehyde having a molecular mass of 44 u. The alkene is
a. propene b. 1-butene c. 2-butene d. ethane

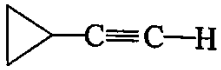
85. Reaction of HBr with propene in the presence of peroxide gives
a. isopropyl bromide b. 3-bromo propane
c. allyl bromide d. n-propyl bromide

86. Acetylenic hydrocarbons are acidic because
a. Sigma electron density of C-H bond in acetylene is nearer a carbon which has 50% s-character
b. Acetylene has only one hydrogen atom at each carbon atom
c. Acetylene contains least number of hydrogen atoms among the possible
d. Acetylene belongs to the class of alkynes with formula C_nH_{2n-2}

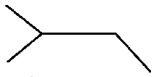
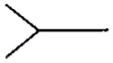
87. Ethylene dibromide on treating with alcoholic KOH gives
a. C_2H_6 b. CH_4 c. C_2H_4 d. C_2H_2

88. Benzene on ozonolysis followed by hydrolysis gives
a. 3 moles of $CH_2 = CH_2$ b. 3 moles of C_2H_2
c. 3 moles of CHO-CHO d. None of these89.



(a)
(c) 
(b) H—C≡C—H
(d) 

90. **Which of the following alkane is synthesised by single alkyl halide by Wurtz reaction**

(a) 
(b) 
(c) 
(d) 

BIOLOGY

91. The correct sequence of ecological and biological organization is

a. Populations- communities- organization – biome

b. Organisms- populations- communities- biome

c. biome - communities- Populations- organization

d. communities -Populations- - organization – biome

92. Major biomes in India are

a. Tropical rain forest, deciduous forest, desert and sea coast

b. Tropical rain forest, coniferous forest, deciduous forest and sea coast

c. Tropical rain forest, evergreen forest, deciduous forest and desert

d. Tropical rain forest, permafrost forest, deciduous forest and sea coast

93. The equation $N_t = N_0 e^{rt}$ represents which of the following?

a. Logarithmic form of logistic growth

b. Integral form of exponential growth

c. Logarithmic form of exponential growth

d. Integral form of logistic growth.

94. Mac Arthur, experimentally proved the behavioral difference in

a. Predation

b. Parasitism

c. Competition

d. mutualism

95. The historic convention on biological diversity held in Rio de Janeiro in 1992 is known as

a. CITES convention

b. The Earth Summit

c. The World Summit

d. MAB programme

96. Choose the *wrongly* matched pair from the following?

a. Lungs of the planet -- Amazon rain forest

b. Endemism – Species confined to one region and also found widely in other regions

c. Hot spots- - Regions with species richness

d. Alien species – *Clarias garipinus*

97. Total number of identified biodiversity hotspots in the world is

a. 29

b. 24

c. 34

d. 40

98. **Which one is not the 'evil quartet'?**

a. Alien species invasions

b. Habitat loss

c. Co- evolution

d. Over exploitation

99. select the correct statement

a. There are 2000 species of ants, 300000 species of beetles and 2800 species of fishes and 2100000 species of orchids all over the world

b. *Rauwolfia vomitoria* is the microbe which causes omitting symptoms in humans

c. IUCN stated that the total number of plant and animal species described so far is slightly more than 1.5 million

d. Many taxonomic species are there in temperate regions than tropics

100. Select the correct group/set of Australian Marsupials exhibiting adaptive radiation.

a. Numbat, spotted cuscus, Flying phalanger

b. Mole, Flying squirrel, Tasmanian tiger cat

c. Lemur, Anteater, Wolf

d. Tasmanian wolf, Bobcat, Marsupial mole

101. Identify the fossil of a man who showed the following characterstics.

A. Brain capacity of 1400cc

B. Used hides to protect the body

C. Buried their dead ones

In the light of above statements, chose the correct answer from the options given below

a. Homo erectus

b. Neanderthal man

c. Homo habilis

d. Australopithecus

102. Which of the following are most suitable indications of SO_2 pollution in the environment?

a. Ants

b. Algae

c. Fungi

d. Litchens

103. In a population of 100 individuals, 360 belongs to the genotype AA, 480 to Aa, and the remaining 160 to aa. Based on this data, what is the frequency of allele A in the population?

a. 0.2

b. 0.5

c. 0.4

d. 0.6

104. Which of the following are analogous structures?

a. Gills of prawn and lungs of cow

b. Wings of pigeons and wings of bat

c. Flippers of dolphin and legs of rabbit

d. Thorns of bougainvillea and tendrils of Cucurbita

105. Hershey and Chase's experiment was based on the principle

a. Transformation

b. Translation

c. Transduction

d. Transcription

106. Histones are

a. Positively charged and basic amino acids
c. Negatively charged and basic proteins
b. Positively charged and acidic proteins
d. Absent in bacteria

107. The correct option regarding the lac operon in E.coli from the following is

a. Lac operon is switched on in the absence of lactose

b. Lac repressor binds to the lac promoter

c. β-galactosidase is the only enzyme produced in large quantities when lac operon is turned on

d. lac operon messenger RNA is a polycistronic mRNA

108. Which of the following is not a feature of the genetic code?

a. Triplet
c. Non – overlapping
b. Degenerate
d. Ambiguous

109. The technique called Gamete Intra Fallopian Transfer (GIFT) is recommended for those females

a. who cannot produce an ovum

b. who cannot retain the foetus inside uterus

c. who cannot provide suitable environment for fertilization

d. all of these

110. Increased IMR and decreased MMR in a population will

a. cause rapid increase in growth rate

b. result in decline in growth rate

c. not cause significant change in growth rate

d. result in an explosive population.

111. Statutory ban on amniocentesis in India was necessary because

a. It is very expensive

b. It can tell about chromosomal aberrations

c. It is an invasive procedure and carry high risk of abortions

d. It can be used for pre-natal sex determination to be foetus leading to female foeticides.

112. Which of the following factors is not responsible for the population explosion in India?

a. Traditional belief
c. Desire for male child
b. Mortality rate
d. Control in birth rate

113. Which of the following groups is formed only of the hermaphrodite organisms?

a. Earthworm, tapeworm, housefly, frog

b. Earthworm, tapeworm, sea horse, housefly

c. Earthworm, leech, sponge, roundworm

d. Earthworm, tapeworm, leech, sponge

114. Ovulation in the human female normally takes place during the menstrual cycle

a. at the mind secretory phase
b. just before the end of the secretory phase
c. at the end of the proliferative phase.
d. at the beginning of the proliferative phase

115. Mature Graafian follicle is generally present in the ovary of a healthy human female around

a. 5-8 day of menstrual cycle
b. 11-17 day of menstrual cycle
c. 18-23 day of menstrual cycle
d. 24-28 day of menstrual cycle.

116. Even in absence of pollinating agents seed-setting is assured in

a. Commelina
b. Zostera
c. Salvia
d. Fig

117. Feathery stigma occurs in

a. pea
b. wheat
c. Datura
d. Caesalpinia

118. The correct sequence of cell stage in spermatogenesis is

a. Spermatocytes – Spermatids – Spermatogonia – Spermatozoa
b. Spermatogonia – Spermatids – Spermatocytes – Spermatozoa
c. Spermatocytes – Spermatogonia – Spermatids – Spermatozoa
d. Spermatogonia – Spermatocytes – Spermatids – Spermatozoa

119. This happens during spermatogenesis

a. Meiosis
b. Mitosis
c. Meiosis and mitosis
d. None of these

120. When one CO_2 molecule is fixed as one molecule of triose phosphate, which of the following photochemically made, high energy chemical intermediates are used in the reduction phase?

a. 2 ATP + 2 NADPH
b. 1ATP+1NADPH
c. 1ATP+2NADPH
d. 2 ATP + 1 NADPH

121. Which of the following is an in-situ conservation method?

a. Seed banks
b. Botanical gardens
c. National parks
d. Wildlife sanctuaries

122. Which of the following is an example of an ex-situ conservation method?

a. Wildlife sanctuary
b. National Park
c. Zoo
d. Biosphere reserve

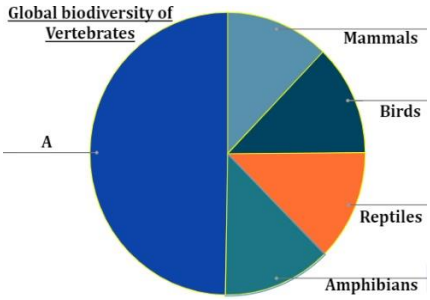
123. Biodiversity is the term popularised by the sociobiologist

a. Karl Marx
b. Edward Wilson

c. Herbert Spencer

d. Robert E. Park

124. In the global biodiversity pie chart of vertebrates given below, 'A' is covered by



a. Insects

c. Angiosperms

b. Fishes

d. None of the above

125. On a logarithmic scale, the relationship is a straight line described by the equation

a. log S = log C + Z log A

c. log C = log S + Z log A

b. log S = log A + Z log C

d. log Z = log S + C log A

126. Read the following statements

(1) India has a greater ecosystem diversity than Norway

(2) According to the IUCN (2004), the total number of plant and animal species described so far is slightly more than 15 million.

a. Both (1) and (2) are correct

c. Both (1) and (2) are incorrect

b. Only (2) is correct

d. Only (1) is correct

127. Conventional taxonomic methods are not suitable for identifying

a. Amphibian species

c. Microbial species

b. Insect species

d. Gymnospermic species

128. India has % of the world's land area. Its share of the global species diversity is an impressive%

a. 8.1, 2.4

c. 12, 22

b. 22, 12

d. 2.4, 8.1

129. How many different kinds of proteins can you find in a single ribosome?

a. 40

c. 80

b. 60

d. 100

130. What is the term for the repressor-mediated control of a lac operon?

a. Positive regulation,

c. Neutral Regulation,

b. Mixed regulation,

d. Negative Regulation

131. Which of the following is not a component of a ribozyme?

a. Nitrogenous base

c. Ribose sugar

b. Phosphate group

d. Deoxyribose sugar

132. The process of DNA replication is semi-conservative because:

a. The two resulting DNA molecules are identical

b. Each resulting DNA molecule contains one strand from the original DNA molecule

c. The process involves the creation of new DNA strands from scratch

d. None of the above

133. The genetic code is degenerate, meaning:

a. Each amino acid has only one codon.

b. Each codon codes for multiple amino acids.

c. Multiple codons can code for the same amino acid.

d. The genetic code is constantly changing.

134. Which contraceptive method provides protection against both unwanted pregnancies and sexually transmitted infections?

a. Oral contraceptive pill

b. Barrier methods (e.g., condom)

c. Intrauterine device (IUD)

d. Sterilization

135. Which of the following is not the role of Reproductive and Child Health Care (RCH) programs?

a. Awareness about reproductive health

b. Providing facilities to build a reproductively healthy society

c. Providing support to reproductively sick people

d. Promote abortion

136. Which cells in the testis of a human male produce testosterone?

a. Germinal cells

b. Interstitial cells

c. Sertoli cells

d. Both (1) and (3)

137. Which of the following hormones are involved in the process of oogenesis?

a. Estrogen

b. Oxytocin

c. Follicle-stimulating hormones (FSH)

d. Both (A) and (C)

138. The larger basal cells in dicots are called the _____ cells.

a. suspensor

b. basal

c. hypophytic

d. micropylar

139. How do the 3 cells of the egg apparatus communicate?

a. Plasmodesmata

b. Nucellus

c. Cytokine

d. Vacuole

140. The maximum number of spermatozoa are stored in the:

a. Epididymis
c. Vas deferens
b. Seminal vesicles
d. Prostate gland

141. 1st polar body is formed at which stage of oogenesis?

a. 1st meiosis b. 2nd mitosis c. 1st mitosis d. Differentiation

142. Pick the mismatched pair

a. Cycas – Dioecious
c. Salvinia – Heterosporous
b. Equisetum – Homosporous
d. Pinus – Dioecious

143. Agar is commercially obtained from

a. Blue-green algae
c. Brown algae
b. Red algae
d. Green algae

144. Isogamous condition with non-flagellated gametes is found in

a. *Chlamydomonas*
c. *Spirogyra*
b. *Volvox*
d. *Fucus*

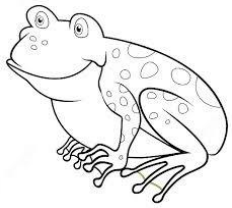
145. Which of the following characteristic is shared by both birds and mammals?

a. Pigmented skin
c. Viviparity
b. Pneumatic bones
d. Warm-blooded body

146. Which one of these animals is not a homeotherm?

a. Camelus
c. Macropus
b. Chelone
d. Psittacula

147. Choose the incorrect option for the following animal.



a. Cloaca present
c. Body divisible into head and trunk
b. Dioecious, external fertilization, oviparous, direct development
d. Eyes are without eyelids.

148. Assertion: Bats and whales are classified as mammals.

Reason: Bats and whales have four chambered heart.

a. Both Assertion and Reason are true and Reason is correct explanation of Assertion.

b. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

c. Assertion is true, but Reason is false.

d. Assertion is false, but Reason is true

149. Assertion: All vertebrates are chordates.

Reason: Vertebrates possess notochord only during embryonic period.

a. Both Assertion and Reason are true and Reason is correct explanation of Assertion.

b. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

c. Assertion is true, but Reason is false.

d. Assertion is false, but Reason is true.

150. Match the following columns.

Column-I	**Column-II**
a. Squamous epithelium	(1) Stomach and intestine
b. Cuboidal epithelium	(2) Lungs and blood vessels
c. Columnar epithelium	(3) Tubular parts of nephrons

Select the correct option

	A	B	C
A)	3	1	2
B)	1	2	3
C)	2	3	1
D)	3	2	1

151. All the listed glands pour their secretions into ducts except

a. salivary gland

b. digestive glands

c. pineal gland

d. mammary glands

152. Phallomere in cockroaches

a. helps to store spermatophores

b. is chitinous external genitalia

c. is accessory reproductive gland

d. represents ejaculatory duct

153. Select the incorrect statement regarding cockroach:

a. Cockroaches possess open circulating system.

b. Blood vessels are highly developed and open into heart.

c. Visceral organs found in hemocoel are bathed in hemolymph.

d. Alary muscles associated with heart are contractile muscles.

154. **The conducting part of the respiratory system has functions.**

a. Filter, warm and moisten the air

b. Gaseous exchange

c. Filtering the air only

d. Warm the air

155. Arrange the following in order of increasing volume

1. Tidal volume 2. Residual volume 3. Expiratory reserve volume 4. Vital capacity

a. 1 < 2 < 3 < 4

b. 1 < 4 < 3 < 2

c. 1 < 3 < 2 < 4

d. 1 < 4 < 2 < 3

156. Which of the following factors favour the formation of oxyhaemoglobin in lungs?

a. pO2 ↓, pCO2↑, H+↑, Temperature↑

b. pO2 ↑, pCO2↑, H+↓, Temperature↑

c. pO2 ↑, pCO2↓, H+↓, Temperature↓

d. pO2 ↓, pCO2↑, pH↑, Temperature↓

157. **Find the correct descending order of percentage proportion of leucocytes in human blood**.

a. Neutrophils → Basophils →L Lymphocytes → Acidophils (Eosinophils) → Monocytes

b. Neutrophils → Monocytes →Lymphocytes→ Acidophils (Eosinophils) → Basophils

c. Neutrophils →Lymphocytes→ Monocytes → Acidophils (Eosinophils) → Basophils

d. Neutrophils → Acidophils (Eosinophils) → Basophils → Lymphocytes → Monocytes

158. It is often referred as atherosclerosis, affects the blood vessels that supply blood to the heart muscles. It is caused by deposition of Ca, fat, cholesterol and fibrous tissues making the lumen of arteries narrow – The above facts are related to

a. CAD

b. SCIO

c. Blue baby

d. Heart arrest

159. First cardiac sound (lub) is associated with

a. Closure of tricuspid and bicuspid valves

b. Opening of tricuspid and bicuspid valves

c. Closure of semilunar valves

d. Opening of semi lunar valves

160. In uremia, artificial kidney is used for removing accumulated waste products like urea by the process called-

a. Micturition

b. Haemolysis

c. Ureotelism

d. Hemodialysis

161. Which of the following is true about Atrial Natriuretic factor (ANF)?

a. An increase in blood volume and B. P. stimulates cardiac atria to release ANF

b. ANF promotes vasoconstriction and thereby decrease B.P.

c. ANF acts as a check on RAAS

d. A and C

162. Which of the following statements about the striated muscles is false?

I. In the centre of each I-band is an elastic fibre (Z-line) which bisects it

II. Thin filaments are firmly attached to the Z-line

III. M-line is a fibrous membrane in the middle of A-bands

IV. A sarcomere comprises one full Abands and 2 half I-bands

a. All
b. IV
c. I and II
d. None

163. Put the following phrases in proper order to describe what occurs at the neuromuscular junction to trigger muscle contraction.

I. Receptor sites on sarcolemma.
II. Nerve impulse.
III. Release of Ca+2 from sarcoplasmic reticulum
IV. The neurotransmitter acetylcholine is released
V. Sarcomere shorten
VI. Synaptic cleft
VII. Spread of impulses over sarcolemma on T-tubules

a. II, IV, I, VI, VII, III, V
b. II, IV, VI, I, VII, III, V
c. I, II, III, IV, V, VI, VII
d. VII, VI, V, IV, III, II, I

164. Match the following columns.

Column-I	Column-II
(A) Neurotransmitters	(1) Ribosomal granules
(B) Nissl's granules	(2) Short and branched
(C) Dendrites	(3) Contained in synaptic knob
(D) Axon	(4) Carry impulse away from cell body

Select the correct option.

	A	B	C	D
a.	1	3	2	4
b.	3	1	4	2
c.	3	1	2	4
d.	1	3	4	2

165. During an action potential

(1) impulse is conducted along the axons
(2) Na+ ions move outwards
(3) permeability of membrane to K+ ions decreases

Select the most appropriate option.

a. 1, 2, 3 are correct.
b. 1 and 2 are correct.
c. 1 and 3 are correct.

d. Only 1 is correct.

166. Select the incorrect statement.

a. Brain is protected by the skull.

b. Human brain can regulate thermoregulation and circadian rhythm of body.

c. Inside the skull, humans possess two cranial meninges.

d. Processing of vision and speech occur in human brain.

167. Which of the following structure or region is incorrectly paired with its function?

a. Medulla oblongata: Controls respiration and cardiovascular reflexes.

b. Limbic system: Consists of fibre tracts that interconnect different regions of brain; controls movement.

c. Hypothalamus: Production of releasing hormones and regulation of temperature, hunger and thirst.

d. Corpus callosum: Band of fibres connecting left and right cerebral hemispheres.

168. The hormones produced by hypothalamic nuclei

a. regulate the functions of the anterior pituitary.

b. regulate the functions of the posterior pituitary.

c. regulate the functions of both anterior and posterior pituitaries.

d. inhibit the secretion of posterior pituitary hormones.

169. Which of the following sets of physiological functions correctly describes the role of cortisol in the human body?

a. Anti-inflammatory response and suppression of the immune response

b. Breakdown of RBCs in spleen

c. Upregulation of uptake of amino acids

d. Reabsorption of Na+ from kidneys

170. Assertion: **Receptors for steroid hormones are present at the cell surface**.

Reason: **Receptors for protein hormones are present in the nucleus.**

a. Both Assertion and Reason are true and Reason is correct explanation of Assertion.

b. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

c. Both assertion and reason are false

d. Assertion is false, but Reason is true.

171. The nuclear envelope is a derivative of

a. Membrane of Golgi complex

b. Smooth endoplasmic reticulum

c. Rough endoplasmic reticulum

d. Microtubules

172. Which one of the following does not differ in E.coli and Chlamydomonas?

a. Cell membrane
c. Chromosomal organization
b. Cell wall
d. Ribosomes

173. Which among the following is incorrect about the major discoveries in the history of cell?

a. Robert brown made the most major contribution to the history of cell by discovering nucleus
b. Cell theory was developed by Schleiden and Schwann
c. Virchow introduced the concept that genetic material is present inside the nucleus
d. Robert Hooke discovered cell in 1665

174. Which of the following is not a product of the light reaction of photosynthesis?

a. Oxygen
c. NADPH
b. NADH
d. ATP

175. PGA as the first CO_2 fixation product was discovered in the photosynthesis of

a. Alga
c. Bryophyte
b. Angiosperm
d. Gymnosperm

176. Photosystem II occurs in

a. Cytochrome
c. Stroma
b. Grana
d. Mitochondrial surface

177. What does the name RuBisCO suggest?

a. Its active site can bind to oxygen and carbon dioxide.
b. It causes the synthesis of carbon dioxide and oxygen.
c. In order to break down sugar, it utilizes carbon and oxygen.
d. It decomposes RuBP using carbon and oxygen.

178. Which of the following terminal cytochromes is responsible for donating electrons to oxygen?

a. Cyt a_3
c. Cyt c
b. Cyt b
d. Cyt a_1

179. In which part of the cell, oxidative phosphorylation takes place?

a. Inner mitochondrial membrane
c. Grana of chloroplast
b. Outer mitochondrial membrane
d. Stroma of chloroplast

180. Which of the following is not formed during the Krebs cycle?

a. Lactate
c. Succinate
b. Isocitrate
d. Both (a) and (b)