Model Test Paper-4

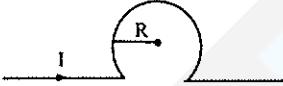*Time :* 3½ *hours.*   *Maximum Marks :* 200

PHYSICS

1. In Huygen's wave theory, the focus of all points in the same state of vibration called
   - (a) wave front
   - (b) a half-period zone
   - (c) vibrator
   - (d) a ray

2. A spring has been kept fixed with immovable wall and a force of 1 newton has been applied on it. The spring extends upto a length l. Now if 2 newton force is applied on it, it will extend
   - (a) 2/3 l
   - (b) 3/2 l
   - (c) 2l
   - (d) l^2

3. Refractive index is greater for
   - (a) light of greater wavelength
   - (b) light of shorter wavelength
   - (c) light of low frequency
   - (d) all of these

4. A thin circular copper plate, a sphere and a cube of same mass and material are heated to 100°C temperature. Now if they are allowed to cool, which of the three will cool first ?
   - (a) sphere
   - (b) copper plate
   - (c) cube
   - (d) all at same time

5. If we bring N-pole of a magnet towards the coil. The face of the coil acquires
   - (a) zero-polarity
   - (b) north polarity
   - (c) south polarity
   - (d) none of these

6. In a closed and organ pipe which of the following notes is not present if fundamental note is 50?
   - (a) 100
   - (b) 250
   - (c) 150
   - (d) none of these

7. In a semiconductor diode P-side is earthed and N-side is applied a potential of 2 volt, the diode shall
   - (a) breakdown
   - (b) not conduct
   - (c) conduct
   - (d) conduct partially

8. The sensitivity of galvanometer depends on
   - (a) moment of inertia of coil
   - (b) angle of deflection
   - (c) earth's magnetic field
   - (d) none of these

9. If v_c be the escape velocity and v_o be the orbital velocity, then v_c/v_o is equal to
   - (a) $2\sqrt{2}$
   - (b) $\sqrt{2}$
   - (c) $\dfrac{1}{\sqrt{2}}$
   - (d) 2

10. A pendulum of time period T is kept suspended in a train accelerating uniformly, then its time period
    - (a) decreases
    - (b) increases
    - (c) remains unchanged
    - (d) none of these

11. The difference in the acceleration due to gravity at the pole and equator is given by
    - (a) $R\omega^2$
    - (b) $\Omega \cos\theta^2$
    - (c) $R\omega^2 \cos^2\theta$
    - (d) $\dfrac{R\omega^2\theta}{g^2}$

12. If two bulbs one of 60 W and other of 100 W are connected in parallel, then which one of the following will glow more ?
    - (a) 60 W bulb
    - (b) 100 W bulb
    - (c) both equally
    - (d) none of these

13. The number of electrons ejected from photoelectric surface depends upon
    - (a) the wavelength of light
    - (b) the frequency of light
    - (c) the intensity of incident light
    - (d) none of these

14. An *n*-type semiconductor is formed
   (a) only from germanium
   (b) when germanium is doped with impurity containing 3*d* valence electrons
   (c) when germanium is doped with impurity containing 5-valence electrons
   (d) only from pure silicon

15. Which one of the following is essential feature of SHM ?
   (a) acceleration is directly proportional to displacement from mean position and is directed towards it
   (b) restoring force is inversely proportional to displacement from mean position
   (c) acceleration and amplitude
   (d) constant amplitude

16. Which of the following wavelengths will suffer maximum deviation while passing through a prism?
   (a) orange   (b) green
   (c) violet   (d) red

17. A spectrum which contains all wavelengths without any break is called
   (a) continuous emission spectrum
   (b) line spectrum
   (c) emission spectrum
   (d) all of these

18. Seebeck emf depends on
   (a) neutral temperature
   (b) temperature of cold junction
   (c) temperature of hot junction
   (d) none of these

19. A hollow cylinder and a solid cylinder having same mass and same diameter are released from rest simultaneously from top of an inclined plane which one will reach bottom first ?
   (a) solid   (b) hollow
   (c) both equally
   (d) one with greator density

20. A hollow charged metal sphere has radius *r*. If the potential difference between its surface and a point at a distance of 3*r* from the centre is *V*,

then electric field intensity at a distance of 3*r* from centre is

   (a) $\dfrac{V}{2}r$ (b) $\dfrac{V}{4}r$

   (c) $-\dfrac{V}{3r}$ (d) $\dfrac{V}{6}r$

21. In an A.C. circuit *V* and *I* is given by
   $V = 100$ sine (1000 *t*) volt
   $I = 1000$ sin (1000 *t* + π/3) mA The power dissipated in the circuit is
   (a) 10 W   (b) 25 W
   (c) 10^4 W   (d) 250 W

22. A series LCR circuit is tuned to resonance. The angular frequency of the applied AC voltage is ω. If resistance of the circuit is *R*, the impedance of circuit will be

   (a) $R^2 + \left(\omega L + \dfrac{1}{\omega C}\right)^2$ (b) $R + \omega L + \left(\dfrac{1}{\omega C}\right)$

   (c) R (d) $\sqrt{R + \left(\omega L - \dfrac{1}{\omega C}\right)}$

23. Choose the correct answer
   Heat in metals is produced due to
   (a) collision of conduction electrons with protons
   (b) collision of conduction electrons with atoms
   (c) collision of electrons with electrons
   (d) in all these ways as mentioned in above options

24. A proton enters a magnetic field parallel to the direction of field, then the path following by it is
   (a) straight line   (b) hyperbola
   (c) circular   (d) helical

25. The negative sign in the equation $e = \dfrac{-d\phi}{dt}$ indicates
   (a) induced emf opposes the cause producing it
   (b) current density is negative
   (c) emf is always taken negative
   (d) none of the above

26. Fission reaction was discovered by
(a) Seaborg
(b) Otto Han and Strassman
(c) Einstein   (d) S. Hawking

27. If 200 MeV energy is released in a fission of a single nucleus of $_{92}U^{235}$. How many fissions must occur per second to produce a power of kW ?
(a) 3.125×10^{13} (b) 3.12×10^{12}
(c) 0.312×10^{13} (d) none of these

28. Some water drops of radius r each coalesec to form a big drop of radius R. Then rise in temperature is given by
(a) $\left(\dfrac{3T}{J}\right)\left(\dfrac{1}{r}-\dfrac{1}{R}\right)$ (b) $\dfrac{3T}{J.r}$

(c) $\dfrac{rT}{J}$ (d) $\dfrac{3T}{J}\left(\dfrac{1}{r}+\dfrac{1}{R}\right)$

29. A long straight conductor is bent into shape as shown. If it carries I ampere

and its radius is R, then magnetic field $(\vec{B})$ at the centre of circular coil is

(a) $\dfrac{\mu_0 I(\pi+1)}{2\pi R}$ (b) Zero

(c) ∞ (d) $\dfrac{\mu_0 I(\pi-1)}{2\pi R}$

30. An engineer claims to have made an engine delivering 10 kW power with fuel consumption of 1g sec⁻¹. The calorific value of fuel is 2k cal/gm. His claim is
(a) depends on engine
(b) valid   (c) non-valid
(d) depends on load

31. If two drops of same radius are falling through air with a velocity of 5 cm sec⁻¹. If the two drops coalesec to form one drop, the terminal velocity of the drop is
(a) $5\sqrt{2}$ cm/sec   (b) 10 cm/sec
(c) 2.5 cm/sec   (d) $5 \times 4^{1/3}$ cm/sec

32. The frequency of open organ pipe is f. If half part of the organ pipe is dipped in water, then frequency is
(a) $3f/4$ (b) $f/2$
(c) f (d) zero

33. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of particle. The motion of the particle takes place in a horizontal plane. It follows
(a) it moves in a circular path
(b) velocity is constant
(c) linear momentum is constant
(d) none of these

34. The number of turns in the coil are doubled, the emf will get
(a) quadrupled   (b) halved
(c) doubled   (d) none of these

35. Nucleus contains
(a) protons, electrons and neutrons
(b) electrons and neutrons
(c) protons and electrons
(d) protons and neutrons

36. Diamond shines due to
(a) total internal reflection
(b) refraction   (c) reflection
(d) none of these

37. The frequency of sonometer wire is n. If its tension is increased four times and length is doubled, the new frequency will be
(a) n (b) $2n$
(c) $n/2$ (d) $4n$

38. Which of the following combination would give maximum emf ?
(a) Sb and Bi   (b) Fe and Bi
(c) Ni and Cr   (d) Cu and Fe

39. According to Bohr's theory, the radius of electron in an orbit described by principal quantum number n and atomic number Z is proportional to

(a) $\dfrac{n^2}{Z^2}$ (b) $\dfrac{n^2}{Z}$

(c) $Z^2 n^2$ (d) $\dfrac{Z^2}{n}$

40. $\dfrac{kg.m^2}{s^2}$ is the unit of
   (a) Momentum   (b) Power
   (c) Energy   (d) Impulse

Instructions for Q. No. 41 to 60

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) *If both assertion and reason are true and the reason is a correct explanation of the assertion*

(b) *If both assertion and reason are true but the reason is not a correct explanation of the assertion*

(c) *If the assertion is true, but the reason is false*

(d) *If both assertion and reason are falses*

41. *Assertion (A) :* A dip needle becomes vertical at magnetic equator of the earth.
   Reason (R) : The magnetic field due to the earth at the magnetic equator is vertical.

42. *Assertion (A) :* When two electrons are brought close to each other, the electrical potential energy increases.
   Reason (R) : Work must be done against electrical force of repulsion.

43. *Assertion (A) :* If Young's double slit experiment is performed in water, the fringe with width will decrease
   Reason (R) : Wavelength of light in water is smaller than in air.

44. *Assertion (A) :* Interference pattern is obtained on a screen due to two identical coherent sources of monochromatic light. The intensity at the central part of the screen becomes one half if one of the sources is blocked.
   Reason (R) : The resultant density is the sum of the densities due to two sources; if one is blocked the intensity obviously reduces to one-half.

45. *Assertion (A) :* Insulators do not allow flow of current through them.
   Reason (R) : They have no free charge carriers.

46. *Assertion (A) :* The shape of an automobile is so designed that its front resembles the streamline pattern of the fluid through which it moves.
   Reason (R) : the resistance offered by the fluid is maximum.

47. *Assertion (A) :* Two satellites of mass m_1 and m_2 $(m_1 > m_2)$ are going around the earth in orbits of radii r_1 and r_2 $(r_1 > r_2)$.
   Reason (R) : They will have same velocity.

48. *Assertion (A) :* In Thomson's experiment all the positive ions with the same value of specific charge are focussed on the same parabola irrespective of their velocities.
   Reason (R) : The ions of same velocities arrive at different points on the same parabola.

49. *Assertion (A) :* In the process of nuclear fission the fragments emit two or three neutrons as soon as they are formed and subsequently emit particles.
   Reason (R) : As the fragments contain an excess of neutrons over protons emission of neutrons and particles bring their neutron/proton ratio to stable values.

50. *Assertion (A) :* While passing round the corners of an obstacle the light spreads out to some extent into the region of the geometrical shadow.
   Reason (R) : The bending is greater for light of longer wavelengths and less for shorter wavelengths.

51. *Assertion (A) :* An e.m.f. is induced in a circuit whenever there is a change in the magnetic flux linked with the circuit and the magnitude of the induced e.m.f. is equal to the negative rate of change of flux.
   Reason (R) : The direction of the induced e.m.f. is such that it opposes the very cause to which it is due.

52. *Assertion (A) :* If a heavy nucleus is split into two medium sized parts, each of the new nuclei will have more binding energy per-nucleon than the original nucleus.
   Reason (R) : Combining two light nuclei to form a single relatively heavy nucleus means more binding energy per nucleon in the new nucleus.

53. *Assertion (A)* : When two vibrating tuning forks having frequencies 256Hz and 512Hz are held near each other, beats can not be heard.
Reason (R) : The principle of superposition is valid only if the frequencies of the oscillators are nearly equal.

54. *Assertion (A)* : In the absence of space charge, the potential gradient between cathode and the anode will be uniform.
Reason (R) : The space charge reduces the potential in the cathode and anode region non-uniformly.

55. *Assertion (A)* : A thin aluminium disc, spinning freely about a central pivot, is quickly brought to rest when placed between the poles of strong U-shaped magnet.
Reason (R) : Current induced in the disc rotating in a magnetic field produces a force which opposes the motion of the disc.

56. *Assertion (A)* : When white light is incident on a thin oil film on the surface of water, colours are seen.
Reason (R) : White light is composed of several colours.

57. *Assertion (A)* : The work done in bringing a body from the top to the base along a frictionless inclined plane is the same as the work done in bringing it down along the vertical side.
Reason (R) : The gravitational force on the body along the inclined plane is the same as that along the vertical side.

58. *Assertion (A)* : A vibrating tuning fork sounds louder when its stem is put against a desk top.
Reason (R) : When a wave reaches another denser medium, a part of the wave is reflected.

59. *Assertion (A)* : Isotopes of an element can be separated by using a mass spectrometer.
Reason (R) : Separation of isotopes is possible because of the difference in electron numbers of isotopes.

60. *Assertion (A)* : A large soap bubble expands while a small bubble shrinks, when they are connected to each other by a capillary tube.
Reason (R) : The excess pressure inside bubble (or a drop) is inversely proportional to its radius

CHEMISTRY

61. Consider the following reaction occurring in an automobile
$$2C_8H_{18(g)} + 25O_{2(g)} \rightarrow 16CO_{2(g)} + 18H_2O_{(g)}$$
The sign ΔH, ΔS and ΔG would be
(a) $-, +, +$ (b) $-, +, -$
(c) $+, -, +$ (d) $+, +, -$

62. Equivalent conductance of NaCl, HCl and CH_3COONa at infinite dilution are 126.45, 426.16 and 91 ohm^{-1} cm^2 respectively. The equivalent conductance of CH_3COOH at infinite dilution would be
(a) 390.71 ohm^{-1} cm^2 (b) 253.71 ohm^{-1} cm^2
(c) 101.38 ohm^{-1} cm^2 (d) 678.90 ohm^{-1} cm^2

63. Which does not exist ?
(a) $[CCl_6]^{2-}$ (b) $[GeF_6]^{2-}$
(c) $[SiCl_6]^{2-}$ (d) $[GeF_6]^{2-}$

64. The type of hybridisation of boron in diborane is
(a) sp^3 (b) sp^2
(c) sp^2 (d) sp^3d^2

65. Boron compounds behave as Lewis acids because of their
(a) electron deficient character
(b) covalent nature
(c) acidic nature
(d) ionising property

66. All the following substances react with water. The pair that yields the same gaseous product is
(a) Ca and CaH_2 (b) Na and Na_2O_2
(c) K and KO_2 (d) Ba and BaO_2

67. Epsom salt is
(a) $2CaSO_4.H_2O$ (b) $MgSO_4.2H_2O$
(c) $MgSO_4.7H_2O$ (d) $BaSO_4.2H_2O$

68. Squashes are stored by adding
(a) Na_2SO_3 (b) KCl
(c) Citric acid
(d) Sod. metabisulphite

69. In Goldschmidt aluminothermic process, reducing agent used is
(a) Na   (b) Al powder
(c) Coke   (d) Al_2O_3

70. Which one of the following pairs of substances on reaction will not evolve H_2 gas ?
   (a) iron and H_2SO_4 (aq)
   (b) iron and steam
   (c) copper and HCl (aq)
   (d) sodium and ethanol

71. The oxide that gives hydrogen peroxide on treatment with dil acid is
   (a) MnO_2 (b) Na_2O_2
   (c) PbO_2 (d) TiO_2

72. The energy required to remove an electron of a gaseous atom from its ground state is called
   (a) electrode potential
   (b) ionisation energy
   (c) potential energy
   (d) activation energy

73. Chloride of an element A gives neutral solution in water. In the periodic table, the element A belongs to
   (a) fifth group
   (b) third group
   (c) first group
   (d) first transition series

74. If the valency shell electronic configuration of an element is $ns^2 np^5$, this element belongs to the group of
   (a) noble gases   (b) inert metals
   (c) alkali metals   (d) halogens

75. Main product of reaction
   $CH_3CONH_2 + HNO_2 \rightarrow$? is
   (a) CH_3NH_2 (b) $CH_3CH_2NH_2$
   (c) CH_3COOH (d) CH_3NO_2

76. Paraldehyde is
   (a) a hexamer of formaldehyde
   (b) a trimer of acetaldehyde
   (c) a trimer of formaldehyde
   (d) a hexamer of acetaldehyde

77. An aldehyde when treated with an alkali gives an acid and an alcohol. Such reaction is named as
   (a) cannizzaro reaction
   (b) hydrolysis reaction
   (c) aldol condensation
   (d) claisen condensation

78. Reaction $\underbrace{CO + H_2}_{} + H_2 \xrightarrow[Cr_2O_3\text{-}ZnO]{673 \text{ K, } 300 \text{ atm}}$ may be used for the manufacture of
   (a) HCHO   (b) HCOOH
   (c) CH_3OH (d) CH_3COOH

79. An organic compound A reacts with sodium metal and forms B. On heating with conc. H_2SO_4, A gives diethyl ether. A and B are respectively
   (a) CH_3OH, CH_3ONa
   (b) C_3H_7OH, C_3H_7ONa
   (c) C_2H_5OH, C_2H_5ONa
   (d) C_4H_9OH, C_4H_9ONa

80. Glucose molecule reacts with 'X' number of phenyl hydrazine molecules to yield osazone. The value of 'X' is
   (a) 3   (b) 2
   (c) 1   (d) 4

81. The sugar present in fruits is
   (a) sucrose   (b) glucose
   (c) fructose   (d) galactose

82. To become a carbohydrate a compound must contain at least
   (a) 4 carbons   (b) 3 carbons
   (c) 2 carbons   (d) 6 carbons

83. Vitamin D is also known as
   (a) reporductive vitamin
   (b) ascorbic acid
   (c) growth vitamin
   (d) sunshine vitamin

84. Zwitter ion is formed by
   (a) benzoic acid   (b) acetanilide
   (c) aniline   (d) lysine

85. Aspirin is an acetylation product of
   (a) m-hydroxybenzoic acid
   (b) o-dihydroxy benzene
   (c) o-hydroxybenzoic acid
   (d) p-dihydroxy benzene

86. The olefin which on ozonolysis gives CH_3CH_2CHO and CH_3CHO is
   (a) 1-pentene   (b) 2-butene
   (c) 1-butene   (d) 2-pentene

87. An isomer of ethanol is
   (a) diethyl ether   (b) dimethyl ether
   (c) methanol   (d) ethylene glycol

88. IUPAC name of

$$CH_3-\underset{\underset{C_2H_5}{|}}{\overset{\overset{H}{|}}{C}}-\underset{\underset{CH_3}{|}}{\overset{\overset{C_2H_9}{|}}{C}}-CH_3 \text{ is}$$
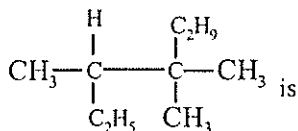
   (a) 3, 4, 4-trimethyl heptane
   (b) 2-ethyl-3, 3-dimethyl heptane
   (c) 2-butyl-2-methyl-3 ethyl butane
   (d) 3, 4, 4-trimethyl octane

89. The most-suitable method of separation of 1 : 1 mixture of o-and p-nitrophenols is
   (a) crystallisation   (b) chromatography
   (c) sublimation   (d) steam distillation

90. Consider the reaction
   $M^{n+}_{(aq)} + ne^- \rightarrow M_{(s)}$
   The standard reduction potential values of the metals M_1, M_2 and M_3 are $-0.34V$, $-33.05V$ and $-1.66V$ respectively. The order of their reducing power will be
   (a) $M_1 > M_3 > M_2$ (b) $M_3 > M_2 > M_1$
   (c) $M_1 > M_2 > M_3$ (d) $M_2 > M_3 > M_1$

91. Specific conductance of 0.1 N KCl solution at 25°C is 0.012 ohm^{-1} cm^{-1}. The resistance of the cell containing the solution at the same temperature was found to be 55 ohm. The cell constant will be
   (a) 0.918 cm^{-1} (b) 0.66 cm^{-1}
   (c) 0.142 cm^{-1} (d) 1.12 cm^{-1}

92. $S + \dfrac{3}{2} O_2 \rightarrow SO_3 + 2x$ k cal

   $SO_2 + \dfrac{1}{2} O_2 \rightarrow SO_3 + y$ k cal

   Find out the heat of formation of SO_2
   (a) $(x + y)$ (b) $(2x + y)$

   (c) $(2x - y)$ (d) $\dfrac{2x}{y}$

93. How many layers are adsorbed in chemical adsorption ?
   (a) several   (b) 2
   (c) 1   (d) zero

94. Activation energy of a chemical reaction can be determined by
   (a) evaluating rate constants at two different temperatures
   (b) evaluating velocities of reaction at two different temperatures
   (c) evaluating rate constant at standard temperature
   (d) changing concentration of reactants

95. The pH of a solution obtained by mixing 50 ml 0.4N HCl and 50 ml 0.2N NaOH is
   (a) 1.0   (b) $-\log 0.2$
   (c) $-\log 2$ (d) 2.0

96. In which case K_p is less than K_c ?

   (a) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

   (b) $H_2 + Cl_2 \rightleftharpoons 2HCl$

   (c) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

   (d) $2SO_3 + O_2 \rightleftharpoons 2SO_3$

97. How many grams of dibasic acid (mol. wt. 200) should be present in 100 ml of the aqueous solution to give 0.1N normality ?
   (a) 2 g   (b) 20 g
   (c) 1 g   (d) 10 g

98. The ratio between the two mean square speed of H_2 at 50 K and that of O_2 at 800 K is
   (a) 1   (b) 2

   (c) 4   (d) $\dfrac{1}{4}$

99. If we mix a pentavalent impurity in a crystal lattice of germanium, what type of semi-conductor formation will occur ?
   (a) p-type   (b) n-type
   (c) both (a) and (b)   (d) none of the two

100. A solid has a structure in which 'W' atoms are located at the corners of a cubic lattice, 'O' atoms at the centre of edges and 'Na' atoms at the centre of the cube. The formula of the compound is
   (a) Na_2WO_3 (b) $NaWO_3$
   (c) $NaWO_2$ (d) $NaWO_4$

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) *If both assertion and reason are true and the reason is a correct explanation of the assertion*

(b) *If both assertion and reason are true but the reason is not a correct explanation of the assertion*

(c) *If the assertion is true, but the reason is false*

(d) *If both assertion and reason are falses*

101. *Assertion (A) :* Lead is a metal with a high density. It readily dissolves in moderately concentrated nitric acid giving colourless fumes which turn red in contact with air.

Reason (R) : Nitric oxide (NO) is a colourless oxide of nitrogen while NO_2 is a coloured oxide of nitrogen.

102. *Assertion (A) :* The reaction of ammonia solution with calomel is a disproportionation reaction in which mixture of Hg (ii) amido chloride and Hg are formed.

Reason (R) : In a disproportionation reaction species under reaction is neither oxidised nor reduced.

103. *Assertion (A) :* Sodium thiosulphate dissolves the white precipitate of silver chloride.

Reason (R) : The thiosulphate ions act as strong complexing agents.

104. *Assertion (A) :* When $SnCl_2$ solution is added to $HgCl_2$ solution, a milky white precipitate is obtained and on adding excess of $SnCl_2$, a black precipitate is formed.

Reason (R) · The disproportionation of Hg(II) is easier than its reduction only.

105. *Assertion (A) :* The electron affinity of chlorine is greater than that of fluorine.

Reason (R) : Chlorine is more electronegative than fluorine.

106. *Assertion (A) :* The boiling point of *n*-alkanes increases regularly with the increase in the number of carbon atoms.

Reason (R) : The magnitude of van der Waal's forces increases with the increases in molecular mass and molecular size.

107. *Assertion (A) :* *p*-nitroaniline is stronger base than *p*-toluidine.

Reason (R) : The electron with drawing NO_2 group in the *p*-nitroaniline makes it a stronger base.

108. *Assertion (A) :* All the amines, except tertiary amines are capable of forming intermolecular hydrogen bonds.

Reason (R) : Tertiary amines have larger molecules and surface area.

109. *Assertion (A) :* Phenol is strongly acidic than ethanol.

Reason (R) : Phenoxide ion is more stabilized by resonance than ethoxide ion.

110. *Assertion (A) :* The nuclear isomers are the atoms with the same atomic number and same mass number, but with different radioactive properties.

Reason (R) : The nucleus in the excited state will evidently have a different half-life as compared to that in the ground state.

111. *Assertion (A) :* Balloons made of Mylar films are better at containing helium than the conventional rubber balloons

Reason (R) : The root-mean-square speed of helium is very high so helium atoms can effuse rapidly through rubber balloons.

112. *Assertion (A) :* To separate ^{235}U from the more abundant ^{238}U isotope, all the uranium is converted into UF_6.

Reason (R) : UF_6 is one of the few compounds that exists in gaseous state under ordinary conditions.

113. *Assertion (A) :* One mole of helium atoms should occupy 22.4 litre volume at STP.

Reason (R) : Taking 31 pm as radius of helium atom, if we pack together a mole of helium atoms, the mole of atoms should have a volume of 22.4 litre.

114. *Assertion (A)* : A sample of 8.00 moles of chlorine gas in a 4.00 litre tank 27 C leads to a pressure of 49.2 atm according to ideal gas law.
Reason (R) : The actual pressure of the sample of chlorine is nearly 20 atmosphere less than the ideal pressure.

115. *Assertion (A)* : The pressure of a gas is inversely proportional to its volume at constant temperature and *n*.
Reason (R) : The gas volume is directly proportional to *n* at constant temperature and pressure.

116. *Assertion (A)* : Not only is the fraction of oxygen is reduced in diving gases, but nitrogen of normal air is replaced by helium.
Reason (R) : Nitrogen becomes more soluble in the body fluids at high pressure and causes a condition similar to alcohol intoxication.

117. *Assertion (A)* : When one talks after breathing helium, the sound becomes like that of Donald Duck.
Reason (R) : The vocal cords vibrate faster in an atmosphere less dense than air and the pitch of voice is raised.

118. *Assertion (A)* : The reacting gases combine in volumes that are ratios of small whole numbers.
Reason (R) : The partial pressure of a gas in a mixture is given by its mole fraction times the total pressure of the mixture.

119. *Assertion (A)* : The oxidation numbers are artificial, they are useful as a 'book-keeping' device of electrons in reactions.
Reason (R) : The oxidation numbers do not usually represent real charges on atoms, they are simply conventions that indicate what the maximum charge could possibly be on an atom in a molecule.

120. *Assertion (A)* : The structural-pair geometry of Formaldehyde molecule is trigonal planar.
Reason (R) : In H_2CO molecule, the carbon atom is surrounded by 3 sigma bonding electron pairs.

BIOLOGY

121. In which of the following animal, all the three important chordate characters exist throughout life ?
(a) amphibians   (b) mammals
(c) *Amphioxus*   (d) all of the above

122. Which cranial nerve has the highest number of branches ?
(a) vagus nerve   (b) facial nerve
(c) trigeminal   (d) all of the above

123. What is common among silver fish, crab, honey bee and prawn ?
(a) metamorphosis   (b) compound eye
(c) poison gland   (d) all of the above

124. The maximum formation of m-RNA occurs in
(a) ribosome   (b) nucleolus
(c) cytoplasm   (d) nucleoplasm

125. The most striking example of point mutation is found in a disease, called
(a) down's syndrome   (b) night blindness
(c) thalassemia
(d) sickle-cell anaemia

126. At high altitude, the RBCs in the human blood will
(a) increase in number
(b) decrease in size
(c) increase in size   (d) decrease in number

127. Typhus disease in humans is caused by
(a) rickettsiae   (b) protozoans
(c) virus   (d) none of the above

128. Rickettsiae form a group of
(a) bacterium-like prokaryotes
(b) viruses   (c) fungi
(d) none of the above

129. In the fertile human female, approximately on which day of the ovulation takes place ?
(a) 14th day   (b) 8th day
(c) 1st day   (d) 18th day

130. Which of the following is regarded as an unit of nervous tissue?
(a) neuron   (b) dendrite
(c) axon   (d) myelin sheath

131. Which of the follwing carries absorbed product from digestive tract ?
    (a) pulmonary vein
    (b) hepatic portal vein
    (c) hepatic artery
    (d) none of the above

132. Who proposed the 'signal hypothesis' meant for the biosynthesis of secretory type of proteins?
    (a) Blobel and Sabatini
    (b) Camillo Golgi   (c) Baltimore
    (c) Sheeler and Bianchi

133. Which of the following carries protein and lipid to other parts of the cell?
    (a) rough endoplasmic reticulum
    (b) smooth endoplasmic reticulum
    (c) both (a) and (b)
    (d) none of the above

134. Epidermal layer consisting of dividing cells, is
    (a) stratum granulosum
    (b) stratum malpighii
    (c) stratum lucidum
    (d) stratum corneum

135. The tissue having least power of regeneration is
    (a) skeletal tissue of long bones
    (b) endothelium of blood vessels
    (c) epidermis of skin
    (d) nervous tissue of brain

136. Which of the following evidences does not favour the Lamarckian concept of inheritance of acquired chracters ?
    (a) lack of pigment in cave dwelling animals
    (b) presence of webbed toes in aquatic birds
    (c) absence of limbs in snakes
    (d) melanization in peppered moth

137. A disease caused by eating fish contaminated with mercury, is called
    (a) osteosclerosis   (b) minimata disease
    (c) bright's disease
    (d) hashimoto's disease

138. Although much CO_2 is carried in blood, yet blood does not become acidic, because
    (a) buffer system of blood plays an important role

    (b) CO_2 continuously diffuses through the tissues
    (c) CO_2 combines with water to form H_2CO_3, which is neutralized by $NaCO_3$
    (d) all of the above

139. The concept that 'population tends to increase geometrically while food supply increases arithmetically' was put forward by
    (a) Thomas Malthus   (b) Adam Smith
    (c) Stuart Mill   (d) Charles Darwin

140. The transgenic animals are those which have
    (a) foreign DNA is some of its cells
    (b) foreign RNA in all its cells
    (c) foreign DNA in all of its cells
    (d) both (b) and (c)

141. Which of the following metabolic disease occurs only in males ?
    (a) Lesch–Nyhan disease
    (b) Gaucher's disease
    (c) Fabry's disease
    (d) Hunter's disease

142. Hurthle cells are present in
    (a) spleen   (b) liver
    (c) thyroid gland   (d) lymph

143. Phylogenetic classification is one which is based on
    (a) overall similarities
    (b) common evolutionary descent
    (c) habits
    (d) utilitarian system

144. In mitochondira, cristae act as sites for
    (a) oxidation-reduction reaction
    (b) protein synthesis
    (c) breakdown of macromolecules
    (d) phosphorylation of flavoporteins

145. A product may bind to the regulatory enzyme's active site, preventing it from binding substrate and temporarity shutting down the metabolic pathway. This is called
    (a) allosteric inhibition
    (b) competitive inhibition
    (c) negative feedback
    (d) non-competitive inhibition

146. During the formation of cell wall the secreted outermost layer of cellulose is
   (a) primary wall   (b) secondary wall
   (c) middle lamella   (d) both (b) and (c)

147. Segments of DNA which are capable of moving in and out of a chromosome are termed as
   (a) transposons   (b) recon
   (c) muton   (d) replicon

148. The transition reactions
   (a) connect glycolysis to the Krebs cycle
   (b) give off CO_2
   (c) utilize NAD^+
   (d) include all of the above

149. Who among the following placed gymnosperms between monocots and dicots as third taxon ?
   (a) Englar and Prantl
   (b) Bentham and Hooker
   (c) Hutchinson
   (d) all of the above

150. Plasmodesmata are formed around the membranes of
   (a) golgi bodies   (b) nucleus
   (c) chloroplast   (d) none of the above

151. Which of the following statements is/are correct?
   (a) both plasmids and viruses can serve as vectors
   (b) vectors carry only the foreign gene into the host cells
   (c) plasmids can carry recombinant DNA but viruses can not
   (d) all of the above

152. In hypogynous type of flowers all floral parts arise below the
   (a) sepals   (b) gynoecium
   (c) petals   (d) androecium

153. In *Selaginella*, heterosporous spores are
   (a) sexual and asexual
   (b) large and small
   (c) haploid and diploid
   (d) all spores are of the same size

154. Which of the following plants contains mercury in their tissues ?
   (a) *Fucus*   (b) *Laminaria*
   (c) both (a) and (b)   (d) *Fusarium*

155. Protein 'canaralin' is obtained from
   (a) carrots   (b) almonds
   (c) jack beans   (d) grapes

156. Certain pollutants remain unchanged for a long time in the environment. These are not easily degradable and are termed as
   (a) persistent   (b) non-biodegradable
   (c) both (a) and (b)   (d) biodergradable

157. When the procedure of bacterial staining is carried out, the negative bacteria stain
   (a) purple   (b) red
   (c) green   (d) both (b) and (c)

158. Diatoms are placed under
   (a) protozoans   (b) fungi
   (c) plantae   (d) protista

159. A group of isodiametric cells with intercellular spaces must be
   (a) prosenchyma   (b) collenchyma
   (c) sclerenchyma   (d) parenchyma

160. Man's utilization of starch as energy source depends on the ability to convert it completely to individual glucose units. This process is initiated by the action of enzymes
   (a) *Amylases*   (b) *Cellulases*
   (c) *Proteases*   (d) none of the above

Instructions for Q. No. 161 to 180
Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.
   (a) If both assertion and reason are true and the reason is a correct explanation of the assertion
   (b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
   (c) If the assertion is true, but the reason is false
   (d) If both assertion and reason are falses

161. *Assertion (A) : Gibberella fujikuroi* was first called as *Fusarium moniliforme*.
   Reason (R) : Its sexual stage was not discovered.

162. *Assertion (A)* : Tyloses are abundant in duramen.
Reason (R) : They provide rigidity and strength to heartwood.

163. *Assertion (A)* : Gram, pea and mango show epigeal germination.
Reason (R) : In epigeal germination radicle grows after hypocotyl.

164. *Assertion (A)* : Antitranspirants are material applied to plants for retarding transpiration.
Reason (R) : Abscisic acid and phenyl mercuric acetate are not antitranspirants.

165. *Assertion (A)* : The first activity in light reaction of photosynthesis is the photolysis of H_2O.
Reason (R) : PS I is not involved in the photolysis of water.

166. *Assertion (A)* : Olecranon process is present at the distal end of Ulna.
Reason (R) : It articulate with the trochlea.

167. *Assertion (A)* : Mule is an example of heterosis.
Reason (R) : Heterosis is the superiority of offspring to their parents.

168. *Assertion (A)* : Cardiac output is the volume of blood pumped by left or right ventricle in one minute.
Reason (R) : It is calculated by multiplying the heart rate by the stroke volume.

199. *Assertion (A)* : Tea, coffee and alcohols are diuretic.
Reason (R) : They suppress ADH (vasopressin).

170. *Assertion (A)* : Nephritis is the inflammation of kidney.
Reason (R) : It is caused by bacterial infection.

171. *Assertion (A)* : Enzymes are protein that catalyses biochemical reactions.
Reason (R) : The enzyme itself is unchanged in the reaction to take place.

172. *Assertion (A)* : Mimicry is a device adopted by the nature to protect the individuals for their own purposes.
Reason (R) : It helps the animal in self defence and survival.

173. *Assertion (A)* : The sustaining surface for the gliding in certain animals, is a fold or series of folds of the skin known as pataguim.
Reason (R) : The gliding flights are performed by arboreal animals.

174. *Assertion (A)* : Aldosterone is a steroid hormone and is important in the control of sodium and potassium ion concentration in mammals.
Reason (R) : It upgrades sodium ion concentration in the ECF by promoting reabsorption of sodium ions from renal tubules and excretion of potassium ions in urine.

175. *Assertion (A)* : Thyroid stimulating hormone is smallest polypeptide hormone of adenohypophysis of pituitary.
Reason (R) : Its role is to intensify the synthesis of hormones in adrenal cortex under a direct 'feedback' regulation.

176. *Assertion (A)* : There is a gradual decrease in the energy content at successive trophic level from producer to consumer.
Reason (R) : Pyramid of energy shows energy shows energy accumulation pattern at different trophic levels.

177. *Assertion (A)* : Meselson and stahl tested the Watson and Crick theory of DNA replication.
Reason (R) : They confirmed the mechanism of DNA replication by using the isotopic and centrifugation techniques.

178. *Assertion (A)* : Desired improved variety of economically useful crops are obtained by hybridization.
Reason (R) : When an ovary develops into a fruit without fertilization is called hybridization.

179. *Assertion (A)* : Chromosome appears longer during leptotene.
Reason (R) : The term chromosome was coined by Waldeyer.

180. *Assertion (A)* : Chromosome number is halved during Telophase-I.
Reason (R) : Chromosomes whose arms are equal, termed as submetacentric.

GENERAL KNOWLEDGE

181. 'Dazzler' is
    (a) virus
    (b) mascot for Cricket World Cup 2003
    (c) bacteria
    (d) none of these

182. Mohemmad Ali is associated with
    (a) boxing   (b) wrestling
    (c) cricket   (d) billiards

183. Who won the 2001 Miss World contest at the sun city resort in South Africa
    (a) Zerelda Lee   (b) Abgani Darego
    (c) Diya Mirza   (d) Juilet Jane Horne

184. 'Vande Matram' was taken from
    (a) raj tarangani
    (b) anand math
    (c) akbar nama
    (d) akbar khosa

185. 'Golden girl' is the biography of
    (a) P.T.Usha
    (b) Vijaya Lakshmi Pandit
    (c) Sarojini Naidu
    (d) Indira Gandhi

186. Who is the constitution head of our country?
    (a) the President
    (b) the Chief Justice
    (c) the Attorney General
    (d) the Prime Minister

187. When is the World Habitat Day?
    (a) october 10   (b) october 8
    (c) november 10   (d) october 3

188. Megasthenese visited India during the reign of
    (a) Chandragupta II
    (b) Chandragupta Maurya
    (c) Ashoka
    (d) Harsha

189. After returning from South Africa, Gandhiji launched his first successful 'Satyagraha' in
    (a) chauri-chaura   (b) dandi
    (c) bardoli   (d) champaran

190. The city which bore the brunt of the recent earthquake in Gujarat on January 26, 2001 is
    (a) Ahmedabad   (b) Bhuj
    (c) Valsad   (d) Gandhi Nagar

191. The Raga which is sung early in the morning is
    (a) Todi   (b) Darbari
    (c) Bhopali   (d) Bhimpalasi

192. For reproducing sound, CD (company disc) audioplayer uses a
    (a) quartz crystal
    (b) titanium needle
    (c) laser beam
    (d) barium titanate ceramic

193. Match List-1 (Books) with List II (Authors) and select the correct answer using the codes given below the Lists :

List I	List II
A. My Music, My Life	1. Laxman Garkward
B. Adha Gaon	2. Rahi Massom Raja
C. Radha	3. Ramakanta Nath
D. The Pilferer	4. Ravi Shankar

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

194. Hiroshima day in Japan was remembered on
    (a) August 6   (b) August 9
    (c) October 7   (d) August 13

195. A test tube baby means fertilisation of the ovum and development taking place in the
    (a) test tube
    (b) uterus
    (c) test tube and uterus respectively
    (d) uterus and test tube respectively

196. The Bus started between India and Bangladesh flies from
    (a) Delhi   (b) Guwahati
    (c) Calcutta   (d) Asansol

197. Harappas used which type of ancient script?
    (a) symbolic   (b) hieroglyphic
    (c) linear   (d) pictographic

198. The fourth Buddist council was held during the reign of
    (a) Ashoka
    (b) Chandragupta
    (c) Kanishka
    (d) Chandragupta Vikramaditya

199. Which of the following is not a computer language
    (a) BASIC   (b) JAVA
    (c) SUMATRA   (d) FORTRAN

200. Who played the leading role in the founding of the Indian National Congress?
    (a) A.O.Hume
    (b) Surendranath Banerjee
    (c) Gopal Krishna Gokhale
    (d) Khan Abdul Ghafer Khan

■ ■ ■