PHYSICS

(SECTION-A)

1. A force of 5 *N* acts on a particle along a direction making an angle of 60° with vertical. Its vertical component be
(A) 10 *N* (B) 3 *N*
(C) 4 *N* (D) 2.5 *N*

2. If $A = 3\hat{i} + 4\hat{j}$ and $B = 7\hat{i} + 24\,\hat{j}$, the vector having the same magnitude as *B* and parallel to *A* is
(A) $5\hat{i} + 20\,\hat{j}$ (B) $15\,\hat{i} + 10\,\hat{j}$
(C) $20\,\hat{i} + 15\,\hat{j}$ (D) $15\,\hat{i} + 20\,\hat{j}$

3. Five equal forces of 10 *N* each are applied at one point and all are lying in one plane. If the angles between them are equal, the resultant force will be
(A) Zero *(B)* 10 *N*
(C) 20 *N* *(D)* $10\sqrt{2}N$

4. The dimensional formula for young's modulus is
(A) $ML^{-1}T^{-2}$ (B) M^0LT^{-2}
(C) MLT^{-2} (D) ML^2T^{-2}

5. Which of the following quantities is dimensionless
(A) Gravitational constant
(B) Planck's constant
(C) Power of a convex lens
(D) None

6. The mean time period of *second*'s pendulum is 2.00*s* and mean absolute error in the time period is 0.05*s*. To express maximum estimate of error, the time period should be written as
(A) (2.00 ± 0.01) *s*
(B) (2.00 +0.025) *s*
(C) (2.00 ± 0.05) *s*
(D) (2.00 ± 0.10) *s*

7. The main scale of a vernier callipers reads 10 mm in 10 divisions. 10 divisions of Vernier scale coincide with 9 divisions of the main scale. When a cylinder is tightly placed between the two jaws, the zero of vernier scale lies slightly behind 3.2 cm and the fourth vernier division coincides with a main scale division. The diameter of the cylinder is :
(A) 3.09 cm (B) 3.14 cm
(C) 3.04 cm (D) 3.03 cm

8. According to *Joule*'s law of heating, heat produced $H = I^2\,Rt$, where *I* is current, *R* is resistance and *t* is time. If the errors in the measurement of *I*, *R* and *t* are 3%, 4% and 6% respectively then error in the measurement of *H* is
(A) $\pm$ 17% (B) $\pm$ 16%
(C) $\pm$ 19% (D) $\pm$ 25%

9. The period of oscillation of a simple pendulum in the experiment is recorded as 2.63 s, 2.56 s, 2.42 s, 2.71 s and 2.80 s respectively. The average absolute error is
(A) 0.1 s (B) 0.11 s
(C) 0.01 s (D) 1.0 s

10. A physical quantity is given by $X = M^aL^bT^c$. The percentage error in measurement of M, L and *T* are α, β and γ respectively. Then maximum percentage error in the quantity *X* is
(A) $a\alpha + b\beta + c\gamma$ (B) $a\alpha + b\beta - c\gamma$
(C) $\frac{a}{\alpha} + \frac{b}{\beta} + \frac{c}{\gamma}$ (D) None of these

11. If L, C and R represent inductance, capacitance and resistance respectively, then which of the following does not represent dimensions of frequency
(A) $\frac{1}{RC}$ (B) $\frac{R}{L}$
(C) $\frac{1}{\sqrt{LC}}$ (D) $\frac{C}{L}$

12. Assertion : Parallex method cannot be used for measuring distances of stars more than 100 light years away.
Reason : Because parallex angle reduces so much that it cannot be measured accurately.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If the assertion and reason both are false.

13. An athlete completes one round of a circular track of radius *R* in 40 *sec*. What will be his displacement at the end of 2 min. 20 *sec*
(A) Zero (B) 2*R*
(C) $2\pi R$ (D) $7\pi R$

14. One car moving on a straight road covers one third of the distance with 20 *km/hr* and the rest with 60 *km/hr.* The average speed is

(A) 40 *km/hr* (B) 80 *km/hr*

(C) $46\frac{2}{3}$ *km/hr* (D) 36 *km/hr*

15. Which of the following is a one dimensional motion

(A) Landing of an aircraft

(B) Earth revolving a round the sun

(C) Motion of wheels of a moving trains

(D) Train running on a straight track

16. The ratio of the numerical values of the average velocity and average speed of a body is always

(A) Unity

(B) Unity or less

(C) Unity or more

(D) Less than unity

17. The correct statement from the following is

(A) A body having zero velocity will not necessarily have zero acceleration

(B) A body having zero velocity will necessarily have zero acceleration

(C) A body having uniform speed can have only uniform acceleration

(D) A body having non-uniform velocity will have zero acceleration

18. A body is moving from rest under constant acceleration and let S_1 be the displacement in the first $(p-1)$ sec and S_2 be the displacement in the first $p\sec$. The displacement in $(p^2-p+1)^{th}$ sec. will be

(A) S_1+S_2 (B) S_1S_2

(C) S_1-S_2 (D) S_1/S_2

19. The displacement of a body is given to be proportional to the cube of time elapsed. The magnitude of the acceleration of the body is

(A) Increasing with time

(B) Decreasing with time

(C) Constant but not zero

(D) Zero

20. A body starts from rest. What is the ratio of the distance travelled by the body during the 4th and 3rd second

(A) $\frac{7}{5}$ (B) $\frac{5}{7}$ (C) $\frac{7}{3}$ (D) $\frac{3}{7}$

21. The position x of a particle varies with time t as $x=at^2-bt^3$. The acceleration of the particle will be zero at time t equal to

(A) $\frac{a}{b}$ (B) $\frac{2a}{3b}$

(C) $\frac{a}{3b}$ (D) Zero

22. If a train travelling at 72 *kmph* is to be brought to rest in a distance of 200 metres, then its retardation should be

(A) 20 ms^{-2} (B) 10 ms^{-2}

(C) 2 ms^{-2} (D) 1 ms^{-2}

23. Acceleration of a particle changes when

(A) Direction of velocity changes

(B) Magnitude of velocity changes

(C) Both of above

(D) Speed changes

24. Equation of displacement for any particle is $s=3t^3+7t^2+14t+8m$. Its acceleration at time $t=1$ sec is

(A) 10 m/s^2 (B) 16 m/s^2

(C) 25 m/s^2 (D) 32 m/s^2

25. A body of 5 *kg* is moving with a velocity of 20 *m/s*. If a force of 100*N* is applied on it for 10*s* in the same direction as its velocity, what will now be the velocity of the body

(A) 200 *m/s* (B) 220 *m/s*

(C) 240 *m/s* (D) 260 *m/s*

26. The displacement x of a particle varies with time $t, x=ae^{-\alpha t}+be^{\beta t}$, where a,b,α and β are positive constants. The velocity of the particle will

(A) Go on decreasing with time

(B) Be independent of α and β

(C) Drop to zero when $\alpha=\beta$

(D) Go on increasing with time

27. A train of 150 *meter* length is going towards north direction at a speed of $10m/\sec$. A parrot flies at the speed of $5\ m/\sec$ towards south direction parallel to the railway track. The time taken by the parrot to cross the train is

(A) 12 *sec* (B) 8 sec

(C) 15 sec (D) 10 sec

28. Two bodies of different masses m_a and m_b are dropped from two different heights a and b. The ratio of the time taken by the two to cover these distances are

(A) $a:b$ (B) $b:a$

(C) $\sqrt{a}:\sqrt{b}$ (D) $a^2:b^2$

29. A stone dropped from the top of the tower touches the ground in 4 sec. The height of the tower is about

(A) $80\,m$ (B) $40\,m$

(C) $20\ m$ (D) $160\ m$

30. Three different objects of masses m_1, m_2 and m_3 are allowed to fall from rest and from the same point '*O*' along three different frictionless paths. The speeds of the three objects, on reaching the ground, will be in the ratio of

(A) $m_1 : m_2 : m_3$ (B) $m_1 : 2m_2 : 3m_3$

(C) 1 : 1 : 1 (D) $\frac{1}{m_1} : \frac{1}{m_2} : \frac{1}{m_3}$

31. The length of second's hand in a watch is 1 *cm*. The change in velocity of its tip in 15 seconds is

(A) Zero (B) $\frac{\pi}{30\sqrt{2}}\,cm/\sec$

(C) $\frac{\pi}{30}\,cm/\sec$ (D) $\frac{\pi\sqrt{2}}{30}\,cm/\sec$

32. A body of mass 5 *kg* is moving in a circle of radius $1\,m$ with an angular velocity of 2 *radian/sec*. The centripetal force is

(A) 10 N (B) 20 N

(C) 30 N (D) 40 N

33. If a particle covers half the circle of radius *R* with constant speed then

(A) Momentum change is *mvr*

(B) Change in *K.E.* is 1/2 mv^2

(C) Change in *K.E.* is mv^2

(D) Change in *K.E.* is zero

34. A cyclist goes round a circular path of circumference 34.3 *m* in $\sqrt{22}$ *sec*. the angle made by him, with the vertical, will be

(A) 45° (B) 40°

(C) 42° (D) 48°

35. A car is moving with speed 30 $m/\sec$ on a circular path of radius 500 *m*. Its speed is increasing at the rate of $2m/\sec^2$, What is the acceleration of the car

(A) $2m/\sec^2$ (B) $2.7m/\sec^2$

(C) $1.8m/\sec^2$ (D) $9.8\,m/\sec^2$

(SECTION-B)

36. A particle starting from rest, moves in a circle of radius 'r'. It attains a velocity of V_0 m/s in the n^{th} round. Its angular acceleration will be:

(A) $\frac{V_o}{n}$ rad/s^2 (B) $\frac{V_o^2}{2\pi nr^2}$ rad/s^2

(C) $\frac{V_o^2}{4\pi nr^2}$ rad/s^2 (D) $\frac{V_o^2}{4\pi nr}$ rad/s^2

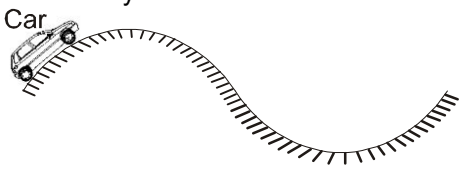
37. The range of a projectile for a given initial velocity is maximum when the angle of projection is 45^o. The range will be minimum, if the angle of projection is

(A) 90^o (B) 180^o

(C) 60^o (D) 75^o

38. **Assertion :** A car moves along a road with uniform speed. The path of car lies in vertical plane and is shown in figure.The radius of curvature(R) of the path is same everywhere. If the car does not loose contact with road at the highest point, it will travel the shown path without loosing contact with road anywhere else.

Reason : For car to loose contact with road, the normal reaction between car and road may not be zero.



(A) If both assertion and reason are true and reason is the correct explanation of assertion.

(B) If both assertion and reason are true but reason is not the correct explanation of assertion.

(C) If Assertion is true but reason is false.

(D) If both assertion and reason are false.

39. If a bullet of mass 5 *gm* moving with velocity 100 *m* /*sec*, penetrates the wooden block upto 6 *cm*. Then the average force imposed by the bullet on the block is

(A) 8300 N (B) 417 N

(C) 830 N (D) Zero

40. A person is standing in an elevator. In which situation he finds his weight less than actual when

(A) The elevator moves upward with constant acceleration

(B) The elevator moves downward with constant acceleration.

(C) The elevator moves upward with uniform velocity

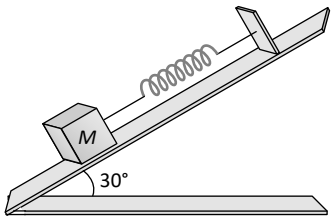
(D) The elevator moves downward with uniform velocity

41. A block of mass *m* is placed on a smooth wedge of inclination θ. The whole system is accelerated horizontally so that the block does not slip on the wedge. The force exerted by the wedge on the block (*g* is acceleration due to gravity) will be

(A) $mg\cos\theta$ (B) $mg\sin\theta$

(C) mg (D) $mg/\cos\theta$

42. A body of mass 5*kg* is suspended by a spring balance on an inclined plane as shown in figure. The spring balance measure



(A) 50 *N* (B) 25 *N*
(C) 500 *N* (D) 10 *N*

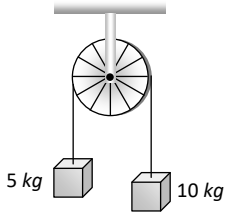
43. A player caught a cricket ball of mass 150 *gm* moving at a rate of 20 *m/s*. If the catching process be completed in 0.1 *s*, then the force of the blow exerted by the ball on the hands of the player is
(A) 0.3 N (B) 30 N
(C) 300 N (D) 3000 N

44. A wagon weighing 1000 *kg* is moving with a velocity 50*km/h* on smooth horizontal rails. A mass of 250 *kg* is dropped into it. The velocity with which it moves now is
(A) 2.5 *km*/*hour* *(B)* 20 *km*/*hour*
(C) 40 *km*/*hour* *(D)* 50 *km*/*hour*

45. Two forces with equal magnitudes *F* act on a body and the magnitude of the resultant force is *F*/3. The angle between the two forces is
(A) $\cos^{-1}\left(-\frac{17}{18}\right)$ (B) $\cos^{-1}\left(-\frac{1}{3}\right)$
(C) $\cos^{-1}\left(\frac{2}{3}\right)$ (D) $\cos^{-1}\left(\frac{8}{9}\right)$

46. A block of mass *M* is pulled along a horizontal frictionless surface by a rope of mass *m*. If a force *P* is applied at the free end of the rope, the force exerted by the rope on the block will be
(A) *P* *(B)* $\frac{Pm}{M+m}$
(C) $\frac{PM}{M+m}$ (D) $\frac{Pm}{M-m}$

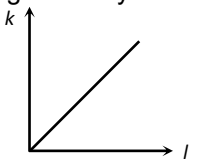
47. Two masses of 5*kg* and 10*kg* are connected to a pulley as shown. What will be the acceleration of the system $(g =$ acceleration due to gravity)

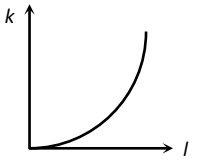


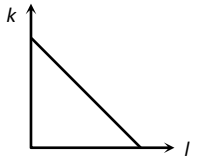
(A) g (B) $\frac{g}{2}$ (C) $\frac{g}{3}$ (D) $\frac{g}{4}$

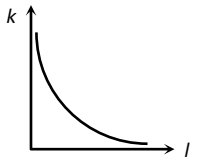
48. One day on a spacecraft corresponds to 2 days on the earth. The speed of the spacecraft relative to the earth is
(A) $1.5\times10^{8}\,ms^{-1}$ (B) $2.1\times10^{8}\,ms^{-1}$
(C) $2.6\times10^{8}\,ms^{-1}$ (D) $5.2\times10^{8}\,ms^{-1}$

49. Which of the following graph depicts spring constant *k* versus length *l* of the spring correctly

(A)


(B)


(C)


(D)


50. Assertion : Newton's third law of motion is applicable only when bodies are in motion.
Reason : Newton's third law applies to all types of forces, *e.g.* gravitational, electric or magnetic forces etc.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If the assertion and reason both are false.

CHEMISTRY

(SECTION-A)

51. Which property of an element is always a whole number
(A) Atomic weight
(B) Equivalent weight
(C) Atomic number
(D) Atomic volume

52. 1 mol of CH_4 contains
(A) 6.02×10^{23} atoms of *H*
(B) 4 *g* atom of Hydrogen
(C) 1.81×10^{23} molecules of CH_4
(D) 3.0 *g* of carbon

53. What is the concentration of nitrate ions if equal volumes of 0.1 $M\ AgNO_3$ and 0.1 $M\ NaCl$ are mixed together
(A) 0.1 *M* (B) 0.2 *M*
(C) 0.05 *M* (D) 0.25 *M*

54. 74.5 *g* of a metallic chloride contain 35.5 g of chlorine. The equivalent weight of the metal is
(A) 19.5 (B) 35.5
(C) 39.0 (D) 78.0

55. If N_A is Avogadro's number then number of valence electrons in 4.2 *g* of nitride ions (N^{3-})
(A) 2.4 N_A (B) 4.2 N_A
(C) $1.6\,N_A$ (D) $3.2\,N_A$

56. A 400 *mg* iron capsule contains 100 mg of ferrous fumarate, $(CHCOO)_2 Fe$. The percentage of iron pasent in it is approximately
(A) 33% (B) 25%
(C) 14% (D) 8%

57. A molar solution is one that contains one mole of a solute in
(A) 1000 *g* of the solvent
(B) One litre of the solvent
(C) One litre of the solution
(D) 22.4 litres of the solution

58. One mole of calcium phosphide on reaction with excess of water gives
(A) One mole of phosphine
(B) Two moles of phosphoric acid
(C) Two moles of phosphine
(D) One mole of phosphorus pentoxide

59. How many molecules are present in one gram of hydrogen
(A) 6.02×10^{23} (B) 3.01×10^{23}
(C) 2.5×10^{23} (D) 1.5×10^{23}

60. The empirical formula of a compound is CH_2O. 0.0835 moles of the compound contains 1.0 *g* of hydrogen. Molecular formula of the compound is
(A) $C_2H_{12}O_6$ (B) $C_5H_{10}O_5$
(C) $C_4H_8O_8$ (D) $C_3H_6O_3$

61. What is the normality of a 1 *M* solution of H_3PO_4
(A) 0.5 *N* (B) 1.0 *N*
(C) 2.0 *N* (D) 3.0 *N*

62. Haemoglobin contains 0.33% of iron by weight. The molecular weight of haemoglobin is approximately 67200. The number of iron atoms (At. wt. of *Fe* = 56) present in one molecule of haemoglobin is
(A) 6 (B) 1 (C) 4 (D) 2

63. How many *g* of a dibasic acid (Mol. wt. = 200) should be present in 100 *ml* of its aqueous solution to give decinormal strength
(A) 1 *g* (B) 2 *g*
(C) 10 *g* (D) 20 *g*

64. Mohr's salt is dissolved in dil. H_2SO_4 instead of distilled water to
(A) Enhance the rate of dissolution
(B) Prevent cationic hydrolysis
(C) Increase the rate of ionisation
(D) Increase its reducing strength

65. A solution containing Na_2CO_3 and *NaOH* requires 300 *ml* of 0.1 *N HCl* using phenolpthalein as an indicator. Methyl orange is then added to the above titrated solution when a further 25 *ml* of 0.2 *N HCl* is required. The amount of *NaOH* present in solution is $(NaOH = 40, Na_2CO_3 = 106)$
(A) 0.6 *g* (B) 1.0 *g*
(C) 1.5 *g* (D) 2.0 *g*

66. 1.5 *mol* of O_2 combine with Mg to form oxide MgO. The mass of Mg (at. mass 24) that has combined is
(A) 72 *g* (B) 36 *g*
(C) 48 *g* (D) 24 *g*

67. A compound possesses 8% sulphur by mass. The least molecular mass is
(A) 200 (B) 400
(C) 155 (D) 355

68. If 10^{21} molecules are removed from 200*mg* of CO_2, then the number of moles of CO_2 left are
(A) 2.85×10^{-3} (B) 28.8×10^{-3}
(C) 0.288×10^{-3} (D) 1.68×10^{-2}

69. In standardization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry, the equivalent weight of $K_2Cr_2O_7$ is
(A) $MW/2$ (B) $MW/3$
(C) $MW/6$ (D) $MW/1$

70. Complete combustion of $0.858\ g$ of compound *X* gives $2.63\ g$ of CO_2 and $1.28\ g$ of H_2O. The lowest molecular mass *X* can have
(A) $43\ g$ (B) $86\ g$
(C) $129\ g$ (D) $172\ g$

71. Assertion : Atoms can neither be created nor destroyed.
Reason : Under similar condition of temperature and pressure, equal volume of gases does not contain equal number of atoms.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If assertion is false but reason is true.

72. Assertion : One atomic mass unit (amu) is mass of an atom equal to exactly one-twelfth the mass of a carbon-12 atom.
Reason : Carbon-12 isotope was selected as standard.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If assertion is false but reason is true.

73. Assertion : A certain element *X,* forms three binary compounds with chlorine containing 59.68%,68.95% and 74.75% chlorine respectively. These data illustrate the law of multiple proportions.
Reason : According to law of multiple proportions, the relative amounts of an element combining with some fixed amount of a second element in a series of compounds are the ratios of small whole numbers.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If assertion is false but reason is true.

74. Assertion : Atomicity of oxygen is 2.
Reason : 1 mole of an element contains 6.023×10^{23} atoms.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If assertion is false but reason is true.

75. When P reacts with caustic soda, the products are PH_3 and NaH_2PO_2. This reaction is an example of
(A) Oxidation
(B) Reduction
(C) Oxidation and reduction (Redox)
(D) Neutralization

76. Which one of the following does not get oxidised by bromine water
(A) Fe^{+2} to Fe^{+3} (B) Cu^{+} to Cu^{+2}
(C) Mn^{+2} to MnO_4^- (D) Sn^{+2} to Sn^{+4}

77. In the course of a chemical reaction an oxidant
(A) Loses electrons
(B) Gains electrons
(C) Both loses and gains electron
(D) Electron change takes place

78. Following reaction describes the rusting of iron
$4Fe + 3O_2 \rightarrow 4Fe^{3+} + 6O^{2-}$
Which one of the following statement is incorrect
(A) This is an example of a redox reaction
(B) Metallic iron is reduced to Fe^{3+}
(C) Fe^{3+} is an oxidising agent
(D) Metallic iron is a reducing agent

79. In the following reaction
$Cr_2O_7^- + 14H^+ + 6I^- \rightarrow 2Cr^{3+} + 3H_2O + 3I_2$
Which element is reduced
(A) Cr (B) H (C) O (D) I

80. The reaction $H_2S + H_2O_2 \rightarrow 2H_2O + S$ shows
(A) Oxidizing action of H_2O_2
(B) Reducing action of H_2O_2
(C) Alkaline nature of H_2O_2
(D) Acidic nature of H_2O_2

81. In $C + H_2O \rightarrow CO + H_2$, H_2O acts as
(A) Oxidising agent
(B) Reducing agent
(C) (A) and (B) both
(D) None of these

82. Strongest reducing agent is
(A) F^- (B) Cl^-
(C) Br^- (D) I^-

83. In the reaction
$Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$, the H_2O_2 acts as
(A) Reducing agent
(B) Oxidising agent
(C) Bleaching agent
(D) None of the above

84. The oxidation number of sulphur in H_2SO_4 is
(A) – 2 (B) + 2
(C) + 4 (D) + 6

85. Sn^{++} loses two electrons in a reaction. What will be the oxidation number of tin after the reaction
(A) + 2 (B) Zero
(C) + 4 (D) – 2

(SECTION-B)

86. The oxidation number of Pt in $[Pt(C_2H_4)Cl_3]^-$ is
(A) + 1 (B) + 2
(C) + 3 (D) + 4

87. The process in which oxidation number increases is known as
(A) Oxidation
(B) Reduction
(C) Auto-oxidation
(D) None of the above

88. Which of the following statements is correct
(A) Hydrogen has oxidation number -1 and $+1$
(B) Hydrogen has same electronegativity as halogens
(C) Hydrogen will not be liberated at anode
(D) Hydrogen has same ionization potential as alkali metals

89. In which one of the following changes there are transfer of five electrons
(A) $MnO_4^- \rightarrow Mn^{2+}$
(B) $CrO_4^2 \rightarrow Cr^{3+}$
(C) $MnO_4^{2-} \rightarrow MnO_2$
(D) $Cr_2O_7^{2-} \rightarrow 2Cr^{3+}$

90. When SO_2 is passed through acidic solution of potassium dichromate, then chromium sulphate is formed. Change in valency of chromium is
(A) +4 to +2 (B) +5 to +3
(C) +6 to +3 (D) +7 to +2

91. For the redox reaction
$MnO_4^- + C_2O_4^{-2} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$
the correct coefficients of the reactants for the balanced reaction are

	MnO_4^-	$C_2O_4^{2-}$	H^+
(A)	2	5	16
(B)	16	5	2
(C)	5	16	2
(D)	2	16	5

92. Which of the following is a redox reaction
(A) $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$
(B) $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$
(C) $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl_2 + 2NH_4OH$
(D) $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$

93. In the balanced chemical reaction,
$IO_3^- + a\ I^- + b\ H^+ \rightarrow c\ H_2O + d\ I_2$
a, b, c and *d* respectively correspond to
(A) 5, 6, 3, 3 (B) 5, 3, 6, 3
(C) 3, 5, 3, 6 (D) 5, 6, 5, 5

94. The number of moles of $KMnO_4$ reduced by one mole of *KI* in alkaline medium is:
(A) One fifth (B) five
(C) One (D) Two

95. Which one of the following nitrates will leave behind a metal on strong heating
(A) Ferric nitrate (B) Copper nitrate
(C) Manganese nitrate (D) Silver nitrate

96. The product of oxidation of I^- with MnO_4^- in alkaline medium is
(A) IO_3^- (B) I_2
(C) IO^- (D) IO_4^-

97. Assertion : Stannous chloride is a powerful oxidising agent which oxidises mercuric chloride to mercury.
Reason : Stannous chloride gives grey precipitate with mercuric chloride, but stannic chloride does not do so.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If assertion is false but reason is true.

98. Assertion : $HClO_4$ is a stronger acid than $HClO_3$.
Reason : Oxidation state of Cl in $HClO_4$ is +VII and in $HClO_3$ +V.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If assertion is false but reason is true.

99. Assertion : Oxidation number of carbon in CH_2O is zero.
Reason : CH_2O formaldehyde, is a covalent compound.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If assertion is false but reason is true.

100. Assertion : H_2SO_4 cannot act as reducing agent.
Reason : Sulphur cannot increase its oxidation number beyond + 6.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If assertion is false but reason is true.

BIOLOGY

BOTANY (SECTION-A)

101. Who is known as 'the Darwin of the 20th century'?
(A) Lamarck (B) Ernst Mayr
(C) Carolus Linneaus (D) Robert May

102. For which organism, the growth is synonymous with reproduction?
(A) Unicellular algae (B) Amoeba
(C) Bacteria (D) All of these

103. Mark the correct statement.
(A) The growth in living organisms is from inside.
(B) Plants grow only up to a certain age.
(C) Only living organisms grow.
(D) All of these

104. The sum total of chemical reactions occurring in our body is called
(A) Metabolism (B) Homeostasis
(C) Catabolism (D) Anabolism

105. Which of the following organism does not reproduce?
(A) Mules
(B) Sterile worker bees
(C) Sterile human couple
(D) All of these

106. Organisms that can sense and respond to environmental cues
(A) Eukaryotes only
(B) Prokaryotes only
(C) Both (A) and (B)
(D) Those with a well-developed neuroendocrine system

107. Modern taxonomy studies require
(A) Knowledge of external and internal structure.
(B) Knowledge of structure of cell.
(C) Knowledge development process and ecological information of organisms.
(D) All of these

108. Binomial nomenclature seems to be difficult because a scientific name is derived from
(A) Hindi (B) Sanskrit
(C) Latin (D) Arabic

109. Botanical name of mango is
(A) Mangifera indica
(B) Solanum tuberosum
(C) Solanum melongena
(D) Panthera leo

110. Which is not a part of taxonomic hierarchy ?
(A) Genus and species
(B) Order and class
(C) Kingdom and class
(D) Catalogue and herbarium

111. ICBN stands for
(A) International Code for Biosphere Nomenclature
(B) International Code for Botanical Nomenclature
(C) International Class for Biological Nobel leurette
(D) International Committe for Biological Naming

112. Zoological name of house fly is
(A) Mangifera indica
(B) Solanum tuberosum
(C) Solanum melongena
(D) Musca domestica

113. Potato and brinjal belongs to the genus
(A) Mangifera (B) Solanum
(C) Allium (D) Brassica

114. Which of the following is a common feature of category 'insecta'?
(A) Presence of ostium
(B) Presence of coxal gland for excretion
(C) Three pair of jointed legs in thoracic region
(D) Exoskeleton of cutin

115. Which of the following represent the family of mango?
(A) Sapindales
(B) Anacardiaceae
(C) Poales
(D) Poaceae

116. Zoological park is a place where
(A) Wild animals are kept in protected environment under human care.
(B) We can learn about wild animal's food habit.
(C) We can learn about wild animal's behavior.
(D) All of these

117. NBRI is situated in
(A) Kolkata (B) Lucknow
(C) Delhi (D) Jodhpur

118. Match the column:

Column I	Column II
A. Man	1. Order–Carnivora
B. Mango	2. Family–Poaceae
C. House fly	3. Genus–Musca
D. Tiger	4. Phylum–Chordata
E. Wheat	5. Family–Anacardiaceae

(A) A–1, B–5, C–3, D–4, E–2
(B) A–4, B–5, C–3, D–1 and 4, E–2
(C) A–4, B–2, C–3, D–1, E–5
(D) A–1, B–2, C–3, D–4, E–5

119. Select the incorrect combination:
(A) Fragmentation Fungi, Planaria, Protonema of moss
(B) Budding Yeast, hydra and sponges
(C) Order Mammalia, primata, diptera, poales, polymoniales, sapindales
(D) Genus Homo, Triticum, Musca, Felis, Panthera, Datura, Petunia, Mangifera, Solanum

120. Assertion: Growth and reproduction is synonymous in amoeba .
Reason: Amoeba is unicellular organism.
(A) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
(B) If both the 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 the assertion and reason are false.

121. Assertion: Properties of tissues are arises due to interaction of cells.
Reason: Properties of tissues are present in constituent cells.
(A) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
(B) If both the 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 the assertion and reason are false.

122. The Indian rhinoceros is a natural inhabitant of which one of the Indian states?
(A) Uttarakhand (B) Uttar Pradesh
(C) Himachal Pradesh (D) Assam

123. Study the four statements (A-D) given below and select the two correct ones out of them:
A. Definition of biological species was given by Ernst Mayr.
B. Photoperiod does not affect reproduction in plants.
C. Binomial nomenclature system was given by R. H. Whittaker
D. In unicellular organisms, reproduction is synonymous with growth The two correct statements are
(A) C and D (B) A and B
(C) A and D (D) B and C

124. Aristotle classifi ed plants in herbs, shrubs and trees on the basis of
(A) Anatomical feature
(B) Morphological characters
(C) Physiological characters
(D) Biochemical characters

125. Whittaker's kingdom are
(A) Plantae and Animalia
(B) Monera and Protista
(C) Fungi
(D) All of these

126. All prokaryotic groups are put under —— —— kingdom
(A) Monera (B) Plantae
(C) Fungi (D) Protista

127. Archaebacteria can live in some of the most harsh habitats because of
(A) Presence of mesosome
(B) High power of multiplication
(C) Special cell wall structure
(D) All of these

128. Following are present in gut of cows and buffaloes and is responsible for the production of methane from the dung of these animals
(A) Methanogen
(B) Thermoacidophiles
(C) Halophils
(D) All of these

129. Specialized cell of nostoc and anabaena fix nitrogen are known as
(A) Cyst (B) Heterocyst
(C) Oocytes (D) Cholecyst

130. Heterotrophic bacteria helps in
(A) Curding of milk
(B) Production of antibiotic
(C) Nitrogen fixation in leguminous plant
(D) All of these

131. Which of the following is incorrect about protista?
(A) All are single cell eukaryotes
(B) Some have flagella or cilia
(C) Sexually reproduce by cell fusion and zygote formation
(D) Members of protista are primarily terrestrial

132. Red tide is because of
(A) Desmids (B) Gonyaulax
(C) Euglena (D) Red algae

133. Euglenoids have flexible body because of
(A) Cellulosic wall
(B) Protein rich pellicle
(C) Lipoic wall
(D) Pectinic wall

134. Which protist are believed to be the relatives of animals?
(A) Slime moulds
(B) Dinoflagellates
(C) Protozoans
(D) Diatoms

135. False feet is the characteristic of which protozoan?
(A) Sporozoan
(B) Ciliated protozoan
(C) Flagellated protozoan
(D) Amoeboid protozoans

(SECTION-B)

136. Which of the following pairs belongs to the same kingdom?
(A) Mycoplasma and Euglena
(B) Golden algae and Green algae
(C) Toadstool and Albugo
(D) Lichens and Alternaria

137. If hyphae are continuous tube filled with multinucleated cytoplasm it is known as
(A) Septate hyphae
(B) Coenocytic hyphae
(C) Mycelium
(D) None of these

138. Sexual reproduction in fungus is by
(A) Oospores
(B) Ascospores
(C) Basidiospores
(D) Any of the above

139. Basidiospores are produced on basidium
(A) Endogenously (B) Exogenously
(C) Both (A) and (B) (D) None of these

140. Life cycle in plant has generally two distinct phase the _____ sporophytic and the _____ gametophytic that alternate with each other. This phenomenon is called as alternation of generation.
(A) diploid, diploid
(B) diploid, haploid
(C) haploid, diploid
(D) haploid, haploid

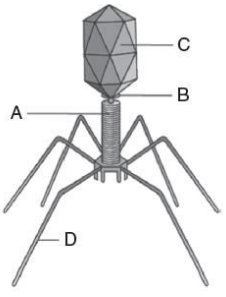
141. The molecular weight of RNA of viroid is
(A) High
(B) Low
(C) Very high
(D) Any of the above

142. Lichens are
(A) Pollution indicators
(B) Symbiotic association between algae and fungus
(C) Pioneer species in primary succession on rocks
(D) All of the above

143. Select the incorrect statement about the organism given in this diagram.

(A) Autotrophic in sunlight
(B) Heterotrophic in deprived sunlight
(C) Biflagellate
(D) They are surrounded by protein rich layer known as cell wall

144. What is indicating A to D in this figure.



(A) A–Collar, B–Tail Fibres, C–Head, D–Sheath
(B) A–Sheath, B–Collar, C–Head, D–Tail fibres
(C) A–Tail fibres, B–Sheath, C–Collar, D–Head
(D) A–Tail fibres, B–Collar, C–Head, D–Sheath

145. Assertion: Bladderwort and Venus fly trap are parasite
Reason: Cuscuta is insectivorous plant.
(A) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
(B) If both the 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 the assertion and reason are false.

146. Assertion: Fungi are no more considered as plant.
Reason: Fungi posses heterotrophic nutrition and their cell wall consist of chitin mainly.
(A) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
(B) If both the 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 the assertion and reason are false.

147. A location with luxuriant growth of lichen on the trees indicated that the
(A) Tress are very healthy
(B) Trees are heavily infested
(C) Location is highly polluted
(D) Location is not polluted

148. Chromatophores take part in
(A) Growth
(B) Movement
(C) Respiration
(D) Photosynthesis

149. Which of the following statements is wrong?
(A) Cyanobacteria are also called blue-green algae.
(B) Golden algae are also called desmids.
(C) Eubacteria are also called false bacteria.
(D) Phycomycetes are also called algal fungi.

150. Organisms living in salty areas are called as
(A) Methanogens
(B) Halophiles
(C) Heliophytes
(D) Thermoacidophiles

ZOOLOGY (SECTION-A)

151. The third germinal layer, that is, mesoderm appeared for the first time in
(A) Cnidaria (B) Ctenophora
(C) Platyhelminthes (D) Annelida

152. Mark the odd one out with respect to examples of radial symmetry.
(A) Coelenterata (B) Ctenophora
(C) Echinoderms (D) Aschelminthes

153. Metamerism is a characteristic feature of
(A) Aschelminthes (B) Annelida
(C) Echinodermata (D) Mollusca

154. The levels of organization, body symmetry, and coelom are similar in
(A) Aschelminthes and Platyhelminthes
(B) Ctenophora and Platyhelminthes
(C) Arthropoda and Annelida
(D) Coelenterata and Arthropoda

155. Which of the following is incorrect ?
(A) Chordates have a ventral heart.
(B) Most members of Porifera are asymmetrical.
(C) Segmentation is absent in Mollusca.
(D) Neurons are absent in Coelenterate.

156. In deuterostome animals, the first opening to develop in the embryonic digestive tube is
(A) Mouth (B) Anus
(C) Operculum (D) Osculum

157. Identify the wrong statement.
(A) There is no diploblastic animal with radial symmetry.
(B) Body of molluscs is unsegmented.
(C) Specialized excretory structures are absent in echinoderms
(D) Larvae of echinoderms are bilaterally symmetrical.

158. Match the following.

Column I	**Column II**
A. Archeocytes	(i) Store food granules
B. Thesocytes	(ii) Provide food to developing cells
C. Scleroblast	(iii) Totipotent cells
D. Trophocytes	(iv) Secrete spicules

(A) A(iii), B(i), C(iv), D(ii)
(B) A(iii), B(iv), C(i), D(ii)
(C) A(i), B(ii), C(iii), D(iv)
(D) A(i), B(iii), C(ii), D(iv)

159. Match the following.

Column I	Column I
A. Euspongia	(i) Deadman's fingers
B. Cliona	(ii) Bath sponge
C. Chalina	(iii) Freshwater sponge
D. Spongilla	(iv) Boring sponge

(A) A(i), B(iv), C(iii), D(ii)
(B) A(i), B(ii), C(iv), D(iii)
(C) A(i), B(iii), C(ii), D(iv)
(D) A(ii), B(iv), C(i), D(iii)

160. Which of the following is the most distinctive feature of sponges?
(A) They are acellular.
(B) They possess special cells called choanocytes.
(C) They reproduce asexually.
(D) They are all marine.

161. Some of the features are given below that evolved for the first time in cnidarians. Mark the wrong one.
(A) Tissue grade of organization
(B) Blind sac body plan
(C) Nerve cells
(D) Complete digestive tract

162. A colonial hydrozoan is
(A) Metridium (B) Hydra
(C) Obelia (D) Meandrina

163. In Hydra, egestion of undigested food and excretion of nitrogenous wastes occurs through
(A) Mouth and tentacles
(B) Mouth and body wall
(C) Mouth and mouth
(D) Body wall and tentacles

164. The totipotent cells of Cnidarians are
(A) Archaeocytes
(C) Flame cells
(B) Cnidoblasts
(D) Interstitial cells

165. Which of the following is incorrect with respect to the digestive system of ctenophores?
(A) Complete digestive tract
(B) One mouth and two anal pores
(C) Only intracellular digestion is seen
(D) All of the above.

166. Which of the following is correct with respect to ctenophores?
(A) Ctenophores have remarkable regeneration ability.
(B) They have eight ciliary plates for swimming.
(C) Only medusa form is seen.
(D) All of the above.

167. Cnidarians and ctenophores share common characteristics such as
(A) Tissue level of organization
(B) Both extracellular and intracellular digestion
(C) Diploblastic
(D) All of the above

168. Mostly hermaphrodite animals are present in
(A) Arthropoda
(B) Aschelminthes
(C) Platyhelminthes
(D) Echinodermata

169. Protrusible structure present over scolex is
(A) Proglottids (B) Sucker
(C) Amphid (D) Rostellum

170. Which of the following is the infective stage for sheep (primary host), in the life cycle of liver fluke?
(A) Miracidium (B) Redia
(C) Sporocyst (D) Metacercaria

171. Parenchyma tissue, which is characteristic of flatworms and fills the space between body wall and internal organ, is
(A) Loose connective tissue
(B) Mesodermal in origin
(C) Transports nutrients
(D) Related to all of the above

172. Female Ascaris is identified on the basis of
(A) Presence of two spicules at the hind end
(B) Straight posterior end
(C) A common cloacal aperture lanov
(D) Presence of preanal and postanal papillae

173. The sperms of Ascaris are
(A) Flagellate (B) Amoeboidal
(C) Ciliated (D) Biflagellate

174. Filariasis is also called elephantiasis because
(A) It is caused by elephant
(B) It is caused by Ascaris
(C) The body parts become huge and swollen
(D) It is caused by Taenia solium

175. The sequence of layers of body wall in Ascaris is
(A) Cuticle - Epidermis - Circular muscle layer
(B) Cuticle- Epidermis - Longitudinal muscle layer
(C) Cuticle- Longitudinal muscle layer - Epiderms
(D) Cuticle- Epidermis - Serosa

176. Which of the following is incorrect with respect to Ascaris?
(A) Its life span is 9-12 months.
(B) It is monogenetic
(C) Female is longer than male.
(D) Female lays 20,000 to 30,000 eggs at a time.

177. Earthworms are
(A) Uricotelic under conditions of water scarcity
(B) Ureotelic when plenty of water is available
(C) Uricotelic when plenty of water is available
(D) Ammonotelic when plenty of water is available

178. Blood of earthworm is
(A) Red in color due to presence of erythrocytes
(B) Red in color due to hemoglobin dissolved in plasma
(C) Colorless
(D) Red in color due to myoglobin

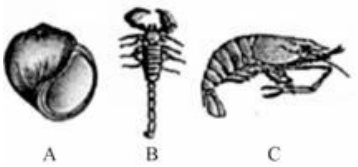
179. Which of the following is incorrect with respect to Nereis?
(A) Presence of setae and parapodiae
(B) Dioecious with trochophore larva
(C) Closed circulatory system
(D) Acts as an ectoparasite on cattle and humans

180. Which of the following is mismatch with respect to mouth parts in insects?
(A) Siphoning type-Butterfly
(B) Biting and chewing type-Cockroach
(C) Chewing and lapping type-Honeybee
(D) Piercing and sucking type-Housefly

181. Male Anopheles differs from female in having
(A) Smaller wings
(B) Brush-like antennae
(C) Salivary glands
(D) Balancing wings called halteres

182. Which of the following is incorrect?
(A) Peripatus is a connecting link between annelids and arthropods.
(B) Limulus is called living fossil.
(C) In honeybee, only fertile female is queen.
(D) Phlebotomus is called "gregarious pest."

183. The diagrams below illustrate different organisms. Study the images to answer the question that follows.



In which of the organisms the circulatory system is open,antennae are absent, and respiratory organs are book lungs?
(A) A only (B) A and C only
(C) B only (D) B and C only

184. Radula in molluscs is
(A) Excretory structure
(B) Part of gills
(C) File-like rasping organ in mouth
(D) Chemoreceptor

185. Aplysia is commonly called
(A) Sea mouse
(B) Sea hare
(C) Sea fan
(D) Sea gooseberry

(SECTION-B)

186. The larva of echinoderms are
(A) Asymmetrical
(B) Radially symmetrical
(C) Bilaterally symmetrical
(D) Star-shaped and pentamerous

187. Aristotle's lantern occurs in
(A) Asterias (B) Sea lily
(C) Sea urchin (D) Antedon

188. Which of the following is not an echinoderm?
(A) Sea cucumber
(B) Sea lily
(C) Sea urchin
(D) Sea gooseberry

189. Which of the following is not a hemichordate?
(A) Saccoglossus (B) Balanoglossus
(C) Cephalodiscus (D) Acidia

190. The body of Balanoglossus is divided into
(A) Head and trunk
(B) Head, neck, and abdomen
(C) Proboscis, collar, and trunk
(D) Prosoma, mesasoma, and metasoma

191. In urochordates, the notochord is
(A) Present throughout life
(B) Present only in head region
(C) Present from head to tail ol
(D) Present in the tail of larval

192. Which of the following statement is correct with respect to vertebrates and chordates?
(A) All vertebrates are chordates, and all chordates are vertebrates.
(B) All chordates are not vertebrates, but all vertebrates are chordates.
(C) All chordates are vertebrates, but all vertebrates are not chordates.
(D) All of the above.

193. The character common to both cartilaginous and bony fishes is the presence of
(A) Air bladder
(B) External fertilization
(C) Two-chambered heart
(D) Terminal mouth and placoid scales on skin

194. In sharks, the mouth and nares are
(A) Ventral and ventral
(B) Dorsal and ventral
(C) Ventral and dorsal
(D) Terminal and dorsal

195. Which of the following is not a character of bony fishes?
(A) They have ganoid, cycloid, or ctenoid scales.
(B) They have four pairs of gills with operculum.
(C) They have air bladder to maintain buoyancy.
(D) Their pelvic fins bear claspers.

196. Match list I with list II and select your correct answer from the following codes:

List I	**List II**
A. Ambystoma	1. Flying frog
B. Necturus	2. Blind worm
C. Rhacophorus	3. Mud puppy
D. Ichthyophis	4. Tiger salamander

Answer codes
(A) A-1, B-2, C-4, D-3
(B) A-4, B-3, C-1, D-2
(C) A-4, B-2, C-3, D-1
(D) A-3, B-4, C-2, D-1

197. Which of the following is commonly called flying lizard?
(A) Rhacophorus (B) Heloderma
(C) Naja (D) Draco

198. Classification of creeping vertebrates is based on
(A) Habitat
(B) Feeding habits
(C) Type of vertebrae
(D) Temporal fossa of skull

199. Which of the following is true regarding aves?
(A) 10 pairs of cranial nerves, mesonephric kidney
(B) 10 pairs of cranial nerves, metanephric kidney
(C) 12 pairs of cranial nerves, metanephric kidney
(D) 12 cranial nerves, mesonephric kidney

200. Only cutaneous gland present in birds is the
(A) Preen glands
(B) Green glands
(C) Buccal glands
(D) Sudoriferous glands