PHYSICS & CHEMISTRY

1. The dimension of $\frac{1}{2}\varepsilon_0 E^2$ (ε_0= permittivity of free space and E is the electric field) is

(a) MLT^{-1} (b) ML^2T^{-2} (c) ML^2T^{-1} (d) $ML^{-1}T^{-2}$

2. Rydberg constant

(a) has the dimension of inverse of length (b) has the dimension of inverse of time
(c) is dimensionless (d) has the dimension of inverse of mass

3.If L, C, R represent physical quantities – inductance, capacitance and resistance respectively, then which of the following combinations have the dimension of frequency?

(a) $\frac{1}{CR^2}$ (b) $\frac{R^2}{L}$ (c) $\frac{1}{\sqrt{LC}}$ (d) $\frac{C}{L}$

4. Two resistances $R_1=(4.0\pm0.4)k\Omega$ and $R_2=(3.0\pm0.3)k\Omega$ are connected in parallel. The percentage error in the equivalent resistance is

(a) 7% (b) 9% (c) 18% (d) 30%

5. Two forces of equal magnitude act at a point making an angle θ with each other. If the direction of one of forces is reversed, the direction of the resultant will turn through

(a) 30^o (b) 45^o (c) 60^o (d) 90^o

6. A car moves up a hill with a speed V_1 and then moves down with a speed V_2. The average speed of the car is

(a) $\frac{2V_1V_2}{V_1+V_2}$ (b) $\frac{V_1+V_2}{2}$ (c) $\frac{1}{V_1}+\frac{1}{V_2}$ (d) 0

7. A stone released with zero velocity from the top of a tower reaches the ground in 4 second. The height of the tower is about ($g=10\ m/s^2$)

(a) 20 m (b) 40 m (c) 80 m (d) 160 m

8. A particle is projected at 60^o to the horizontal with a kinetic energy K. The kinetic energy at the highest point is

(a) K/2 (b) K (c) zero (d) K/4

9.A brick of mass 5 Kg and dimensions (in cm) 25 15 10 lies on the ground on its largest face. If it is made to stand on its smallest face, the change in potential energy (in Joule) will be

(a) 3.675 (b) 376.3 (c) 365.7 (d) 357.6

10. A wind-powered generator converts wind energy into electrical energy. Assume that the generator converts a fixed fraction of wind energy intercepted by its blades into electrical energy. For wind speed v, the electrical power output will be proportional to

(a) v (b) v^2 (c) v^3 (d) v^4

11. Two boys carry a log of wood of length *l* on their shoulders. One boy who is at the end of the log of wood gets ¼ th load. What is the distance of the second boy from that end?

(a) $\frac{2l}{3}$ (b) $\frac{l}{3}$ (c) $\frac{l}{4}$ (d) *l*

12. A cyclist turns around a curve at a particular speed. If he turns at double the speed, then the tendency to overturn is

(a) doubled (b) quadrupled (c) halved (d) unchanged

13. A sphere of mass m and radius r slips on a rough horizontal plane. At some instant, it has translational velocity V_0 and rotational velocity $\frac{V_0}{2r}$ about the centre. The translational velocity after the sphere starts pure rolling is

(a) $\frac{2}{3}V_0$ (b) $\frac{2}{5}V_0$ (c) $\frac{3}{5}V_0$ (d) $\frac{6}{7}V_0$

14. The escape velocity for a body of mass m projected vertically upwards from the surface of Earth is 11 Km/sec. If the same body is projected at an angle 45^o with the vertical, the escape velocity will be

(a) 11 $\sqrt{}$ Km/sec (b) 11/ $\sqrt{}$ Km/sec (c) 11 Km/sec (d) 22 Km/sec

15. You are given 64 identical balls, all of equal mass except one which is heavier than the others. You are provided with a beam balance but no weight box. How many minimum numbers of weighings are required to identify the ball of different mass?

(a) 3 (b) 4 (c) 5 (d) 6

16. The interatomic distance for a metal is 3×10^{-10} m. If the interatomic force constant is 3.6×10^{-9} N/Å^{-1}, then the Young's modulus is

(a) 1.2×10^{11} Nm^{-2} (b) 4.2×10^{11} Nm^{-2} (c) 10.2×10^{11} Nm^{-2} (d) 2.4×10^{11} Nm^{-2}

17. An ice cube containing a sufficiently large iron ball is floating in water. When the ice melts, the level of water

(a) goes down (b) goes up (c) remains the same (d) first goes up and then falls

18. A cubical vessel of edge l is filled completely with a liquid of density d. The force on each wall of the vessel is

(a) dgl^3 (b) $2dgl^3$ (c) $4dgl^3$ (d) $dgl^3/2$

19. The height up to which water will rise in a capillary tube will be

(a) maximum when water temperature is 4^{o}C

(b) maximum when water temperature is 0^{o}C

(c) minimum when water temperature is 4^{o}C

(d) same at all temperature

20. A small drop of water falls from rest through a large height *h* in air. The final velocity is

(a) proportional to $\sqrt{h}$ (b) proportional to *h* (c) inversely proportional to *h*

(d) almost independent of *h*

21. A particle executes simple harmonic motion between x=-A and x=+A. The time taken for it to go from 0 to A/2 is T_1 and to go from A/2 to A is T_2. Then,

(a) $T_1<T_2$ (b) $T_1>T_2$ (c) $T_1=T_2$ (d) $T_1=2T_2$

22. The bob of a simple pendulum executes simple harmonic motion in water with period t, while the period of oscillation of the bob is t_0 in air. Neglecting frictional force of water and given that the density of the bob is $\frac{4}{3}\times 1000$ Kg/m^3, which of the following relationship between t and t_0 is true?

(a) $t=t_0$ (b) $2t=t_0$ (c) $t=2t_0$ (d) $t=4t_0$

23.The speed of sound in air under ordinary conditions is around 330 ms^{-1}. The speed of sound in hydrogen under similar conditions will be (in ms^{-1}) nearest to

(a) 330 (b) 1200 (c) 600 (d) 900

24. Decibel is

(a) a musical instrument (b) musical note (c) a measure of sound level
(d) the wavelength of noise

25. A sonometer wire is to be divided into three segments having fundamental frequencies in the ratio 1:2:3. What should be the ratio of lengths?

(a) 3:2:1 (b) 4:2:1 (c) 4:3:2 (d) 6:3:2

26. In a resonance tube with tuning fork of frequency 512 Hz, first resonance occurs at water level equal to 30.2 cm and second resonance occurs at 63.7 cm. The maximum possible error in the speed of sound is

(a) 51.2 cms^{-1} (b) 102.4 cms^{-1} (c) 153.6 cms^{-1} (d) 204.8 cms^{-1}

27.Consider a compound slab consisting of two different materials having equal thicknesses and thermal conductivities K and 2K respectively. The equivalent thermal conductivity of the slab is

(a) 2K/3 (b) 3K (c) 4K/3 (d) $\sqrt{2}$ K

28.Which of the following processes does not occur through convection?

(a) Boiling of water (b) Land Breeze and Sea Breeze
(c) Circulation of air around furnace (d) Heating of glass bulb through filament

29. Two stars A and B radiate maximum energy at 3600 Å and 4800 Å respectively. Then, the ratio of absolute temperatures of A and B is

(a) 4:3 (b) 3:4 (c) 256:81 (d) 81:256

30.If the intermolecular forces vanish away, then the volume occupied by the molecules contained in 4.5 Kg water at STP will be given by

(a) 5.6 m^3 (b) 11.2 litre (c) 11.2 m^3 (d) 4.5 m^3

31.You left the door of a domestic refrigerator open, while the switch is on. The contribution of this to the room will be that of

(a) heating (b) cooling (c) neither heating or cooling (d) the fuse will blow off

32.An endoscope is employed by a physician to view the internal parts of a body organ. It is based on the principle of

(a) refraction (b) reflection (c) total internal reflection (d) dispersion

33. Sixteen thin convex lenses of focal lengths f, 2f, 4f, 8f,….. are placed in contact with each other. The combination will behave as a convex lens of focal length

(a) 16f (b) 8f (c) 2f (d) f/2

34.When seen in green light, the saffron and green portions pf our National Flag will appear to be

(a) black (b) black and green respectively (c) green (d) green and yellow respectively

35. Two slits in Young's double slit experiment have widths in the ratio 1:25. The ratio of intensity at maxima and minima in the interference pattern is

(a) 4:3 (b) 9:4 (c) 7:2 (d) 7:4

36. Which of the following could be the best value of the dielectric constant suitable for insulator?

(a) -2 (b) 0 (c) ¼ (d) 4.8

37.Two equal point charges are fixed at x=-a and x=+a on the X-axis. Another point charge Q is placed at the origin. The change in the electrical potential energy of Q, when it is displaced by a small amount x along the X-axis, is approximately proportional to

(a) x (b) x^2 (c) x^3 (d) x^0

38. Eight drops of mercury of equal radii and possessing equal charge combine to form a big drop. The capacitance of the bigger drop as compared to each smaller drop is

(a) 2 times (b) 8 times (c) 4 times (d) 16 times

39. Given: three equal resistors. How many different combinations of these three resistances can be made?

(a) six (b) three (c) four (d) five

40. A metallic block has no potential difference applied across it. Then, the mean velocity of free electrons is

(a) proportional to T (b) proportional to $\sqrt{T}$ (c) finite but independent of temperature (d) zero

41. Two electric bulbs, rated P_1 watt, V volt and P_2 watt, V volt are connected in series across V volt mains. Then, their total power is

(a) $\sqrt{P_1 P_2}$ (b) $P_1 + P_2$ (c) $\frac{P_1 P_2}{P_1 + P_2}$ (d) $\frac{P_1 + P_2}{2}$

42. H^+, He^+ and O^{++} having same kinetic energy pass through a region of uniform magnetic field with their velocities perpendicular to the field. Then,

(a) H^+ deflects maximum (b) O^{++} deflects maximum
(c) He^+ and O^{++} deflect equally (d) all deflect equally

43. An ammeter of range 1A has a resistance of 0.9 ohm. To extend the range to 10 ampere, the necessary shunt required is of

(a) 0.1Ω (b) 0.9Ω (c) 9Ω (d) 8.1Ω

44. Liquid oxygen remains suspended between two pole pieces of a magnet because it is

(a) diamagnetic (b) paramagnetic (c) ferromagnetic (d) antiferromagnetic

45. In a LCR series circuit, the ac voltage across R, L and C come out as 10V, 10 V and 20 V respectively. The voltage across the entire combination will be

(a) 30 V (b) 40 $\sqrt{2}$ V (c) 20 V (d) 10 $\sqrt{2}$ V

46. An aeroplane with wing span of 50m flies at 540 Km per hour. The component of earth's magnetic field perpendicular to velocity of plane is 0.2 Gauss. The potential difference between the wing tips (1 Weber $m^{-2}=10^4$ Gauss)

(a) 0.15 V (b) 15 V (c) 1500 V (d) 0 V

47. The time taken by a radio wave to go and come back after reflection from a communication satellite at 36000 km above the earth's surface is

(a) 0.5 s (b) 1 s (c) 0.125 s (d) 0.25 s

48. If an electron and photon propagate in the form of waves having the same wavelength, it implies that they have the same

(a) energy (b) linear momentum (c) velocity (d) angular momentum

49. The work function of a substance is 4 eV. The longest wavelength of light that can cause photo electron emission from this substance is approximately

(a) 540 nm (b) 400 nm (c) 310 nm (d) 220 nm

50. A nucleus splits unto two nuclear parties having radii in the ratio 1:2. Their velocities are in the ratio

(a) 8:1 (b) 6:1 (c) 4:1 (d) 2:1

51. When a hydrogen atom is raised from the ground state to excited state

(a) both kinetic energy (KE) and potential energy (PE) increase
(b) both KE and PE decrease
(c) PE increases but KE decreases
(d) PE decreases but KE increases

52. After two hours, one-sixteenth of the initial amount of certain isotope remains undecayed. The half life of the isotope is

(a) 16 minute (b) 30 minute (c) 45 minute (d) 75 minute

53. In a common base circuit $\alpha = 0.96$. If base current is 60 μ A, then emitter current will be

(a) 0.5 mA (b) 1.5 mA (c) 0.5 A (d) 1.4 mA

54. Television signals broadcast from moon are received on the earth while TV broadcast at Delhi cannot be received at places 100 Km from Delhi because

(a) there is no atmosphere around moon
(b) of strong gravity on TV signals
(c) the TV signal travels straight and does not follow the curvature of the earth
(d) there is no atmosphere around the earth

55. In order to get one XOR using only NAND gates, the number of NAND gates required is

(a) 4 (b) 6 (c) 7 (d) 9

56. Three thin uniform rods, each of mass m and length l are placed along the three axes of a Cartesian coordinate system with one end each rod at the origin. The moment of inertia of the system about Z axis will be

(a) ml^2 (b) $ml^2/3$ (c) $ml^2/6$ (d) $(2/3)\ ml^2$

57. The thickness of the gold foil used in Rutherford experiment was only

(a) 1 micron (b) 2 micron (c) 3 micron (d) 10 micron

58. The weakest form of bonding in material is

(a) Ionic (b) Van der Waals (c) Covalent (d) Metallic

59.A household circuit has a fuse 5A rating. The maximum number of bulbs rating 60W-220V each which can be connected in this household circuit will be

(a) 11 (b) 13 (c) 18 (d) 22

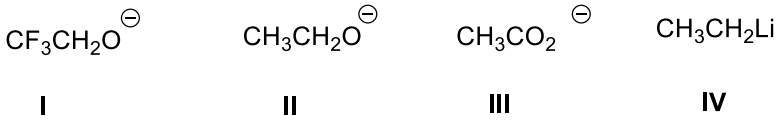
60. An X-ray tube is operated at 10 kV. If 10% of the energy of the electrons is converted in X-rays , the wavelength of the X-rays emitted will be

(a) 1.14 Å (b) 1.59 Å (c) 2.34 Å (d) 1.24 Å

61. The dipole moment of pyridine and benzene sequentially are in following manner

a) Both 0 D	b) Both 2.3 D	c) 2.3 D and 0 D	d) 0 D and 2.3 D

62. Rank the following in order of decreasing nucleophilicity



I II III IV

a) II>I>III>IV	b) IV>II>I>III	c) IV>III>II>I	d) III>I>II>IV

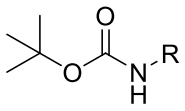
63. The shape of the $CH_3\bullet$ (radical) is like

a) pyramidal	b) planar	c) square pyramidal	d) linear

64. Among the given carboxylic acids which one will be maximum acidic?

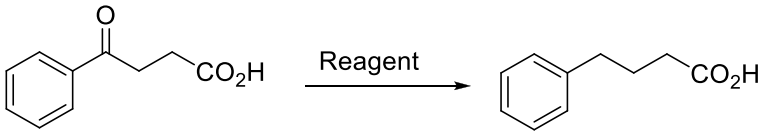
a) $MeCH_2CH_2CO_2H$	b) $MeCH(Cl)CH_2CO_2H$
c) $ClCH_2CH_2CH_2CO_2H$	d) $MeCH_2CH(Cl)CO_2H$

65. This organic molecule is a



a) ketal	b) amide	c) carbamate	d) lactone

66. What will be the reagent for this given transformation?

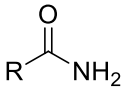


a) $NaBH_4$	b) BH_3	c) Zn/Hg, HCl	d) $LiAlH_4$

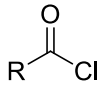
67. According to Hückel's rule aromatic compounds contain $(4n+2)\pi$ electrons. Here "n" is

a) A positive integer	b) A negative integer
c) Total number of ring	d) Total number of π bonds

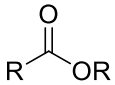
68. The relative rate (in decreasing order) for the following three compounds towards nucleophilic attack



I



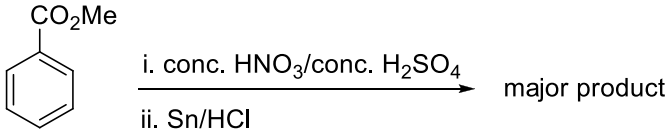
II

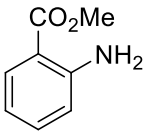
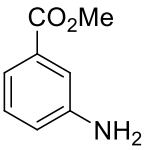
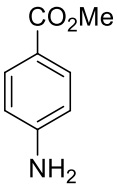
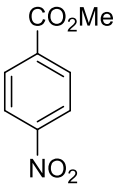


III

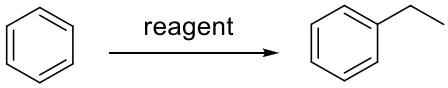
a) I>II>III	b) II>I>III	c) II>III>I	d) III>II>I

69. Which will be the major product in the given reaction?



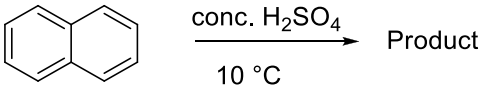
a) 	b) 	c) 	d) 

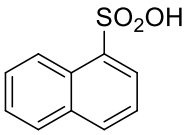
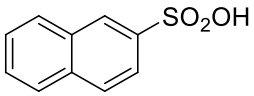
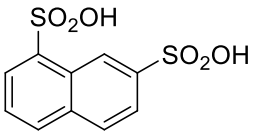
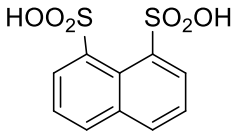
70. What are the preferred reagents in the following transformation?



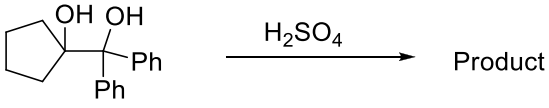
a) CH_3CH_2Cl/ anhyd. $AlCl_3$	b) CH_3CH_2OH/ $SnCl_4$
c) CH_3COCl/ anhyd. $AlCl_3$ Followed by Zn(Hg), HCl	d) CH_3CH_2I/ anhyd. $AlCl_3$

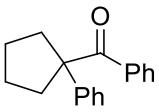
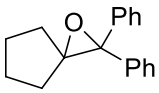
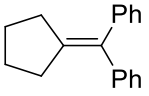
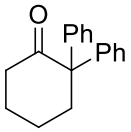
71. What is the major product in the following transformation?



a) 	b) 
c) 	d) 

72. What is the major product in the following transformation?



a) 	b) 
c) 	d) 

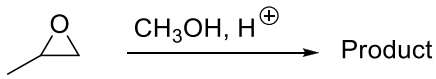
73. Which vitamin is protecting our body from dangerous and reactive radicals?

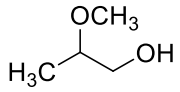
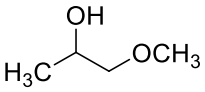
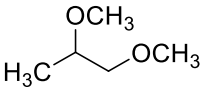
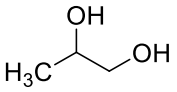
a)	b)	c)	d)
Vitamin A	Vitamin D	Vitamin C	Vitamin E

74. What is the monomer for the synthesis of neoprene?

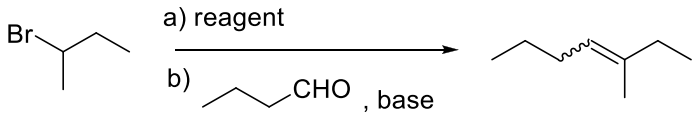
a)	b)	c)	d)
Styrene	2-Chlorobuta-1,3-diene	1-Chlorobuta-1,3-diene	Buta-1,3-diene

75. What is the major product in the following transformation?



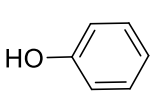
a)	b)	c)	d)
			

76. To make this reaction successful, the required reagent is

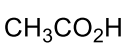


a) Ph_3P	b) O_3	c) $NaNH_2$	d)Anhyd. $AlCl_3$

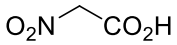
77. The decreasing order of acidity for the following compounds



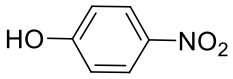
I



II



III



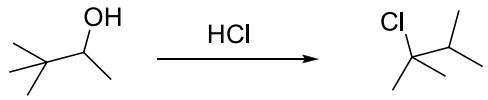
IV

a)	b)	c)	d)
I>II>IV>III	III>IV>II>I	III>II>IV>I	IV>I>III>II

78. Among the given amino acids which one contains primary alcohol group

a)	b)	c)	d)
threonine	serine	tyrosine	cysteine

79. This reaction is going through



a)	b)	c)	d)
S_N1	S_N2	E1	ipso

80. Which test will differentiate between 1-butanol, 2-butanol and 2-methyl-2-propanol?

a)	b)	c)	d)
Fehling's test	Denige's test	Iodoform test	Lucas test

81. In SF_4 the F–S–F angles are

(A) 103° and 179°

(B) 120° and 190°

(C) 90°

(D) 109.5°

82. 1-Propyne can be obtained from the hydrolysis of

(A) Ba_2C_3

(B) Ca_2C_3

(C) Na_4C_3

(D) Mg_2C_3

83. In XeO_3 and XeO_2F_2 the LP–Xe–O (LP = lone pair) angles are, respectively

(A) 120° and 109.5°

(B) 180° and 120°

(C) 109.5° and 120°

(D) 109.5° and 180°

84. Hydrolysis of PCl_3, $AsCl_3$ and $BiCl_3$ give

(A) H_3PO_3, AsOCl, BiOCl

(B) H_3PO_3, H_3AsO_3, BiOCl

(C) H_3PO_4, H_3AsO_4, H_3BiO_3

(D) $POCl_3$, AsOCl, BiOCl

85. The correct order of solubility of Bi_2S_3, AgS and CuS is

(A) AgS > Bi_2S_3 > CuS

(B) Bi_2S_3 > AgS > CuS

(C) CuS > Bi_2S_3 > AgS

(D) Bi_2S_3 > CuS > AgS

86. $^{27}Al_{13}$ is a stable isotope. The disintegration process for $^{27}Al_{13}$ is

(A) α-emission

(B) proton emission

(C) β-emission

(D) positron emission

87. On oxidation by O_2 elemental Si give a compoundwhich dissolves in molten Na_2CO_3. Treatment of this solution with aqueous hydrochloric acid gives the precipitate

(A) SiH_4

(B) $Si(CO_3)_2$

(C) SiO_2

(D) $SiCl_4$

88. In the structure of borax, there are

(A) two BO_4 tetrahedra and two BO_3 traingles

(B) one BO_4 tetrahedron and three BO_3traingles

(C) three BO_4 tetrahedra and one BO_3 traingle

(D) four BO_3 traingles only

89. In P_4S_3 the number of P–S bonds present are

(A) two

(B) six

(C) four

(D) three

90. Heating of a mixture of carbon and crushed ilmenite at 100 °C under flowing chlorine gas produces

(A) $TiCl_4$, $FeCl_3$ and CO

(B) $CrCl_3$, $FeCl_3$ and CO

(C) $TiCl_3$, $FeCl_2$ and CO_2

(D) $TiOCl_2$, $FeCl_2$ and CO_2

91. Disproportionation reaction between elemental white phosphorus and aqueous KOH solution gives

(A) P_2H_4 and K_2PO_2

(B) P_3H_6 and KH_2PO_2

(C) PH_3 and KH_2PO_2

(D) H_3PO_3 and K_3PO_4

92. The correct order of reactivity of different alkyl halides toward magnesium metal for the preparation of Grignard reagent is

(A) MeCl > MeBr > MeI > MeF

(B) MeI > MeCl > MeBr > MeF

(C) MeF > MeCl > MeBr > MeI

(D) MeI > MeBr > MeCl > MeF

93. The *spin-only* magnetic moment (μ_B) for $(Et_4N)_2[FeCl_4]$ is

(A) 2.83 μ_B

(B) 3.88 μ_B

(C) 4.90 μ_B

(C) 1.73 μ_B

94. Boron trifluorideetherate ($BF_3 \cdot OEt_2$) is widely used as a laboratory source of BF_3. In this adduct the F–B–O angle is close to

(A) 90°

(B) 120°

(C) 180°

(D) 109.5°

95. $^{27}Al_{13}$ is expected to disintegrate by

(A) α emission

(B) β^-emission

(C) proton emission

(D) β^+emission

96. The lattice energies of the carbonates of Mg, Ca, Sr and Ba follow the order

(A) $CaCO_3 > SrCO_3 > BaCO_3 > MgCO_3$

(B) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$

(C) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$

(D) $SrCO_3 > MgCO_3 > CaCO_3 > BaCO_3$

97. Reaction of nitric acid with phosphorus pentoxide produces

(A) NO_2 and HPO_3

(B) N_2O_5 and HPO_3

(C) N_2O_5 and H_3PO_3

(D) NO_2 and H_3PO_3

98. The correct number of unpaired electrons present on the central metal ion of $[CoCl_4]^{2-}$ is

(A) one

(B) zero

(C) three

(D) two

99. The number of unshared pair of electrons present in S_8 is

(A) 17

(B) 8

(C) 10

(D) 16

100. In aqueous solution heating of thioacetamide gives H_2S and

(A) ammonium acetate

(B) acetic acid

(C) ammonium formate

(D) acetaldehyde

101. Surface tension of water is decreased by

A. decreasing temperature	B. decreasing the amount of liquid
C. dissolving a detergent	D. decreasing pressure above the liquid

102. Internal energy of an ideal gas in a closed system will NOT change if

A. pressure is increased keeping volume fixed	B. pressure is increased keeping temperature fixed
C. volume is increased keeping pressure fixed	D. temperature is increased keeping volume fixed

103. The standard enthalpy of reaction ($\Delta_r H^\circ$) of the following reaction at 298 K is -555 kJ mol^{-1}

$4C\ (graphite,s) + 6H_2\ (g) + O_2\ (g) \rightarrow 2C_2H_5OH(1)$;
Standard molar enthalpy of formation ($\Delta_f H^\circ$) of C_2H_5OH at 298 K is

A. – 277.5 kJ mol^{-1}	B. –555 kJ mol^{-1}
C. 277.5 kJ mol^{-1}	D. –555 kJ

104. The standard state of a substance correspond to pure substance at

A. 0 °C, 1 bar	B. a specified temperature, 1 bar
C. 25 °C, 1 atm	D. 25 °C, 1 bar

105. For any spontaneous process which of the following condition must satisfy

A. enthalpy of the system decreases	B. entropy of the system increases
C. internal energy of the system decreases	D. entropy of the universe increases

106. The pH of a 10 ml HCl solution is 2. The volume of water need to be added to change the pH to 4 is

A. 90 ml	B.10 ml
C. 990 ml	D. 100 ml

107. The reaction for which the values of Kp and Kc at a given temperature are equal is

A. $N_2(g) + 3H_2(g) \rightarrow NH_3(g)$	B. $Cl_2(g) + H_2(g) \rightarrow 2HCl(g)$
C. $N_2O_4(g) \rightarrow 2NO_2(g)$	D. $O_2(g) + 2H_2(g) \rightarrow 2H_2O(g)$

108. A compound containing gold and copper have a cubic lattice structure in which the gold atoms occupy the lattice points at the corners of a cube and the copper atoms occupy the centers of each of the cube faces. The formula of the compound is

A. Au_2Cu_3	B. $AuCu_2$
C. $AuCu_3$	D. Au_3Cu

109. The kind of defects are introduced by doping is

A. Electronic defects	B. Frenkel defects
C. Schottky defect	D. Dislocation defect

110. Which of the following is NOT a colligative property of a solution

A. osmotic pressure	B. density
C. elevation of boiling point	D. depression of freezing point

111. A certain mass of glycerol (MW = 92) was mixed with equal mass of water to produce a solution with density of 1.104 g/mL. The molarity of glycerol in the solution is

A. 2 M	B. 6 M
C. 12 M	D. 3 M

112. Which among the following is NOT the value of universal gas constant, R

A. 0.082 L atm K^{-1} mol^{-1}	B. 8.314×10^{6} cm^{3} Pa K^{-1} mol^{-1}
C. 0.083 dm^{3} bar K^{-1} mol^{-1}	D. 8.2×10^{-5} m^{2} atm K^{-1} mol^{-1}

113. The ratio of molar kinetic energy of 0.25 mol of He at 300 K and 1.0 mol of Ar at 300 K is

A. 4.0	B. 0.25
C. 0.5	D. 1.0

114. Above Boyle temperature, the compressibility factor, Z always has value

A. = 1	B. > 1
C. < 1	D. 0

115. A catalyst The standard electrode potential of a $Cu^{2+}(aq)$ / Cu electrode is 0.34 V at 298 K. What is the electrode potential of $Cu^{2+}(aq)$ / Cu at 298 K when concentration of Cu^{2+} is 0.02 M?

A. decreases the rate of backward reaction	B. increases the rate of forward reaction only
C. increases the rate of forward reaction to a greater extent than the backward reaction	D. increases the rate of the forward and backward reaction equally

116. The rate constant for the following reaction at 300 °C is 5.0×10^{-4} sec^{-1}

$SO_2Cl_2 \rightarrow SO_2 + Cl_2$. If the initial concentration of SO_2Cl_2 is doubled, the rate of the reaction at same temperature, pressure will

A. remain same	B. becomes double
C. becomes half	D. becomes four times.

117. For an exothermic reaction what is the remation between the activation energy of forward direction (E_f) and that of the backward reaction (E_b).

A. $E_f = E_b$	B. $E_f > E_b$
C. $E_f < E_b$	D. Relation will depend on the temperature of the reaction.

118. Which one among the following is the strongest oxidising agent? Given

$Fe^{2+} + 2e^- \longrightarrow Fe$ (- 0.44 V)
$Zn^{2+} + 2e^- \longrightarrow Zn$ (- 0.76 V)
$Ni^{2+} + 2e^- \longrightarrow Ni$ (- 0.25 V)
$Sn^{2+} + 2e^- \longrightarrow Sn$ (- 0.14 V)

A. Ni	B. Fe
C. Zn	D. Sn

119. Which of the followings is an extensive property?

A. coefficient of viscosity	B. Gibbs free energy
C. density	D. molar heat capacity at constant temperature

120. Which of these three is likely to be radioactive ${}^{114}_{48}Cd$, ${}^{115}_{49}In$, ${}^{114}_{50}Sn$

A. ${}^{114}_{48}Cd$	B. ${}^{115}_{49}In$
C. ${}^{114}_{50}Sn$	D. none of the above