



1. A glass tube of internal diameter 3.5 cm and thickness 0.5 cm is held vertically with its lower end immersed in water. The downward pull on the tube due to surface tension (S.T. of water = 0.074 N/m) is

- A. 1.86 N
- B. 1.86×10^{-1} N
- C. 1.86×10^{-2} N
- D. 1.86×10^{-3} N

Ans : c

2. The gas equation $PVT = \text{constant}$ is true for a constant mass of an ideal gas undergoing

- A. Isothermal change
- B. Adiabatic change
- C. Isobaric change
- D. Any type of change

Ans : D

3. A 10 ohm resistance, 5 mH coil and 10 μF capacitor are joined in series. When a suitable

frequency alternating current source is joined to this combination, the circuit resonates. If

the resistance is halved, the resonance frequency.

- A. is halved.
- B. is doubled.
- C. remains unchanged.
- D. is quadrupled.

Ans : C

4. The buckling of a beam is found to be more if _____.

- A. the breadth of the beam is large.
- B. the beam material has large value of Young's modulus.
- C. the length of the beam is small.
- D. the depth of the beam is small.

Ans : D

5. In AM, the centpercent modulation is achieved when _____.

- A. carrier amplitude = signal amplitude



- B. carrier amplitude \neq signal amplitude
- C. carrier frequency = signal frequency
- D. carrier frequency \neq signal frequency

Ans : A

6. A potentiometer wire of length 100 cm has a resistance of 10Ω . It is connected in series with a resistance and an accumulator of e.m.f 2 V and of negligible internal resistance. A

source of e.m.f 10 mV is balanced against a 40 cm length of the potentiometer wire.

The

value of the external resistance is

- A. 395Ω
- B. 790Ω
- C. 405Ω
- D. 810Ω

Ans : B

7. For stationary waves in the medium,

- A. phase of SHM of particles at any time is same, between two successive nodes.
- B. phase of SHM of particles increases as path increases.
- C. the amplitude of vibration is same for each point.
- D. phase of all points between two successive antinodes is same.

Ans : A

8. To increase the range of voltmeter the series resistance should be _____.

- A. increased
- B. decreased
- C. constant
- D. low

Ans : A

9. The moment of inertia of a sphere is 20 kg-m^2 about the diameter. The moment of inertia

about any tangent is

- A. 25 kg-m^2
- B. 50 kg-m^2



- C. 70 kg-m²
- D. 80 kg-m²

Ans : C

10. The limit of resolution of 100 cm telescope for $\lambda = 5000 \text{ \AA}$ is approximately equal to

- A. 0.13''
- B. 0.3''
- C. 1''
- D. 1.4''

Ans : A

11. 'Half-life' of a radioactive substance accounts for

- A. time required for complete disintegration of radioactive substance.
- B. time required for two-third disintegration of radioactive substance.
- C. time required for the disintegration of half the radioactive substance.
- D. time required for one-third disintegration of radioactive

Ans : C

12. According to Huygen's principle,

- A. each point on the wavefront is in different phase.
- B. each point on the wavefront is centre of a new disturbance and emits secondary waves.
- C. the tangent to wavefront is the direction of the propagation of the wave.
- D. the wave is transverse.

Ans : B

13. Gyromagnetic ratio is a ratio of magnetic dipole moment to

- A. mass of electron.
- B. momentum of electron.
- C. radius of electron.
- D. angular momentum of electron.

Ans : D

14. An air column, closed at one end and open at the other resonates with a tuning fork of frequency ν , when its length is 45 cm, 99 cm and at two other lengths in between these values. The wavelength of sound in air column is



- A. 180 cm
- B. 108 cm
- C. 54 cm
- D. 36 cm

Ans :D

15. The angle of incidence at which reflected light is totally polarized for reflection from air to glass (refraction index n) is

- A. $\sin^{-1}(n)$
- B. $\sin^{-1}(1/n)$
- C. $\tan^{-1}(1/n)$
- D. $\tan^{-1}(n)$

Ans :D

16. Due to propagation of longitudinal wave in a medium, the following quantities also propagate in the same direction

- A. Energy, momentum and mass
- B. Energy
- C. Energy and mass
- D. Energy and linear momentum

Ans :D

17. In a potentiometer experiment, a balance point is obtained, when

- A. The e.m.f of the battery becomes equal to the e.m.f of the experimental cell.
- B. The potential difference of the wire between the +ve end to jockey becomes equal to the e.m.f of the experimental cell.
- C. The potential difference of the wire between +ve point and jockey becomes equal to the e.m.f of the battery.
- D. The potential difference across the potentiometer wire becomes equal to the e.m.f of the battery.

Ans :B

18. A gas in an enclosure has a pressure P and the temperature T K. Another gas enclosed in a container of the same volume has a pressure $2P$ and the temperature $T/2$ K. The ratio of the



average kinetic energy per molecule of the two gases is

A. 4 : 1 B. 2 : 1 C. 1 : 2 D. 1 : 4

Ans :B

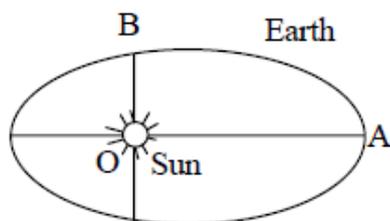
19. Lenz's law gives

- A. the magnitude of the induced e.m.f.
- B. the direction of the induced current.
- C. both the magnitude and direction of the induced current.
- D. the magnitude of the induced current.

Ans :B

20. The earth moves around the sun in an elliptical orbit as shown in the figure. The ratio, $OA/OB = X$.

The ratio of the speed of the earth at B and at A is



- | | |
|-----------------|-----------|
| (A) \sqrt{X} | (B) x |
| (C) $x\sqrt{X}$ | (D) x^2 |

Ans :B

21. When a body moves with a constant speed along a circle,

- A. no work is done on it.
- B. no acceleration is produced in the body.
- C. no force acts on the body.
- D. its velocity remains constant.

Ans :A

22. The graph between restoring force and time in case of S.H.M is

- A. a straight line
- B. a circle



- C. a parabola
- D. a sine curve

Ans :D

23. A capacitor of capacitance $2 \mu\text{F}$ is charged to a potential of 100 V and another capacitance $6 \mu\text{F}$ is charged to a potential of 300 V . These capacitors are joined, with plates of like charges connected together, the total charge is

- A. $16 \times 10^{-4} \text{ C}$
- B. $18 \times 10^{-4} \text{ C}$
- C. $20 \times 10^{-4} \text{ C}$
- D. $24 \times 10^{-4} \text{ C}$

Ans :C

24. According to de Broglie, wave is associated with matter

- A. when it is stationary.
- B. when it is in motion with the velocity of light only.
- C. when it is in motion with any velocity.
- D. none of the above

Ans :C

25. The moment of inertia of a body does not depend upon

- A. the mass of the body.
- B. the distribution of the mass in the body.
- C. the axis of rotation of the body
- D. the angular velocity of the body.

Ans :D

26. In insulators,

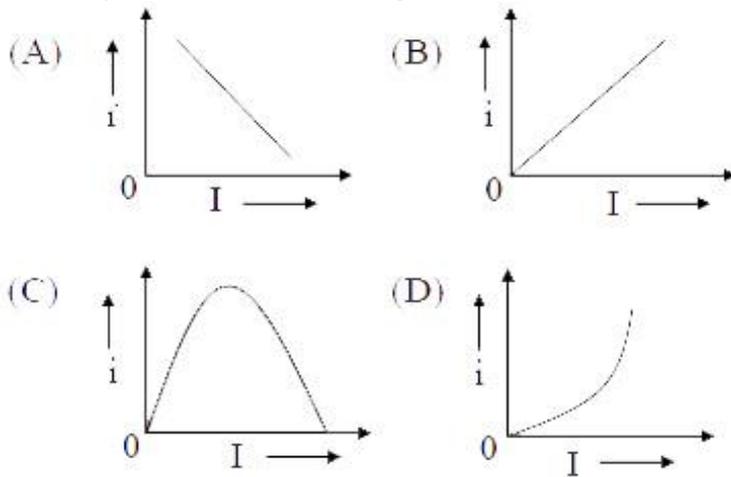
- A. The valence band is partially filled with electrons.
- B. The conduction band is partially filled with electrons.
- C. The conduction band is filled with electrons and valence band is empty.
- D. The conduction band is empty and valence band is filled with electrons.

Ans :B

27. Which one of the following graphs represents the variation of photoelectric current (i) with



intensity (I) of the incident light?



Ans :B

28. To produce constructive interference at a point the path difference between two waves

superposing at a point should be

A. $x = 0, \lambda, 2\lambda, 3\lambda, \dots, n\lambda$

B. $x = \lambda, 3\lambda, 5\lambda, \dots, (2n - 1)\lambda$

(C) $x = 0, \frac{\lambda}{2}, \lambda, \frac{3\lambda}{2}$

(D) $x = \frac{\lambda}{2}, \frac{3\lambda}{2}, \frac{5\lambda}{2}, \dots, (2n - 1)\frac{\lambda}{2}$

Ans :A

29. If a body weighing 40 kg-wt is taken inside the earth to a depth to $\frac{1}{2}$ th radius of the earth,

then the weight of the body at that point is

A. 40 kg-wt B. 20 kg-wt C. 30 kg-wt D. zero

Ans :A

30. Two similar wires A and B are made of different materials. A is twice more elastic than B. When same force is applied, the ratio of elongation of B to A is

A. 1 : 1 B. 1 : 4 C. 2 : 1 D. 4 : 1

Ans :C

31. If two identical mercury drops are combined to form a single drop, then its temperature will

A. decrease.

B. increase.



- C. remain the same.
- D. depend upon surrounding temperature.

Ans :B

32. If temperature of a black body increases from 7 °C to 287 °C, then the rate of energy radiation increases by

- A. $\left(\frac{287}{7}\right)^4$
- B. 16
- C. 4
- D. 2

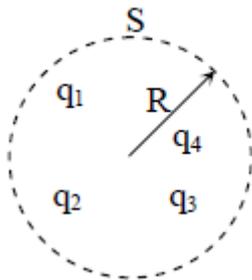
Ans :B

33. Gaussian surface cannot pass through discrete charge because

- A. its an imaginary surface.
- B. electric field is not defined at the location of charge.
- C. electric field is normal at that point.
- D. electric field is tangential at that point.

Ans :C

34. q_1, q_2, q_3 and q_4 are point charges located at points as shown in the figure and S is a spherical gaussian surface of radius R . Which of the following is true according to the Gauss' law?



(A) $T.N.E.I = \frac{q_1 + q_2 + q_3}{2\epsilon_0}$



$$(B) \quad T.N.E.I = \frac{(q_1 + q_2 + q_3)}{\epsilon_0}$$

$$(C) \quad T.N.E.I = \frac{(q_1 + q_2 + q_3 + q_4)}{\epsilon_0}$$

$$(D) \quad T.N.E.I = q_1 + q_2 + q_3 + q_4$$

Ans :D

35. In an npn transistor circuit, the collector current is 10 mA. If 90% of the electrons emitted reach the collector, the emitter current (IE) and base current (IB) are given by

A. $I_E = -1 \text{ mA}$, $I_B = 9 \text{ mA}$

B. $I_E = 9 \text{ mA}$, $I_B = -1 \text{ mA}$

C. $I_E = 1 \text{ mA}$, $I_B = 11 \text{ mA}$

D. $I_E = 11 \text{ mA}$, $I_B = 1 \text{ mA}$

Ans :D

36. A small sphere is attached to a cord and rotates in a vertical circle about a point O. If the average speed of the sphere is increased, the cord is most likely to break at the orientation when the mass is at

A. Bottom point B

B. The point C

C. The point D

D. Top point A

Ans :A

37. An alternating e.m.f, $e = 300 \sin(100\pi t)$ volt is applied to a pure resistance of 100 ohm.

Calculate r.m.s current through the circuit.

A. 2.121 A

B. 3.121 A

C. 4.121 A

D. 1.121 A

Ans :A



38. When equal forces are applied at different points of objects of same material but of different shapes, the same strain is not produced because

- A. the external force causes different strains.
- B. the property of matter at every point is not same.
- C. the coefficient of elasticity of the same material is not constant.
- D. the nature of external force changes.

Ans :A

39. In Bohr's model of hydrogen atom, which of the following pairs of quantities are quantized?

- A. Energy and linear momentum.
- B. Linear and angular momentum.
- C. Energy and angular momentum.
- D. Energy but not the angular momentum.

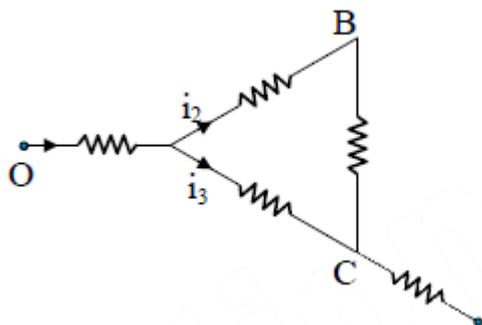
Ans :C

40. ϕ_1 and ϕ_2 ($\phi_1 > \phi_2$) are the work functions of metals A and B. When light of same wavelength is incident on A and B, the fastest emitted electrons from A are _____ those emitted from B.

- A. more energetic than
- B. less energetic than
- C. of the same energy as
- D. data insufficient

Ans :B

41. The current in the arm CD of the circuit will be



- (A) $i_1 + i_2$ (B) $i_2 + i_3$
(C) $i_1 + i_3$ (D) $i_1 - i_2 + i_3$

Ans :B

42. Out of following, the only correct statement about satellites is

- A. A satellite cannot move in a stable orbit in a plane passing through the earth's centre.
- B. Geostationary satellites are launched in the equatorial plane.
- C. We can use just one geostationary satellite for global communication around the globe.
- D. The speed of satellite increases with an increase in the radius of its orbit.

Ans :A

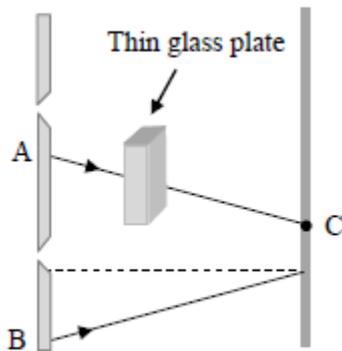
43. The first line of Balmer series has wavelength 6563 \AA . What will be the wavelength of the first member of Lyman series?

- A. 1215.4 \AA
- B. 2500 \AA
- C. 7500 \AA
- D. 600 \AA

Ans :D

44. In Young's experiment, monochromatic light is used to illuminate the two slits A and B.

Interference fringes are observed on a screen placed in front of the slits. Now if a thin glass plate is placed normally in the path of the beam coming from the slit



- A. the fringes will disappear.
- B. the fringe width will increase.
- C. the fringe width will decrease.
- D. there will be no change in the fringe width but the pattern shifts.

Ans :C

45. If I_1 is the moment of inertia of a thin rod about an axis perpendicular to its length and passing through its centre of mass and I_2 is the moment of inertia of the ring formed by

bending the rod about an axis perpendicular to the plane, the ratio of I_1 and I_2 is

- A. $I_1 : I_2 = 1 : 1$
- B. $I_1 : I_2 = \pi^2 : 3$
- C. $I_1 : I_2 = \pi : 4$
- D. $I_1 : I_2 = 3 : 5$

Ans :B

46. In remote controlled receivers, the sensor are,

- A. LEDs
- B. Solar cells
- C. Photodiodes
- D. Zener diodes

Ans :C



47. The potential energy of a particle executing S.H.M is 2.5 J, when its displacement is half

of amplitude. The total energy of the particle is

- A. 2.5 J
- B. 10 J
- C. 12 J
- D. 20 J

Ans :B

48. A long straight wire carries a current of π A. The magnetic field due to it will be 5×10^{-5} weber/m² at what distance from the wire? [μ_0 = permeability of air]

- (A) $10^4 \mu_0$ metre
- (B) $\frac{10^4}{\mu_0}$ metre
- (C) $10^6 \mu_0$ metre
- (D) $\frac{10^6}{\mu_0}$ metre

Ans :A

49. Conductivity of 0.1 M nitric acid is 6.3×10^{-2} ohm⁻¹cm⁻¹. The molar conductivity of solution is _____.

- A. 630 ohm⁻¹cm²mole⁻¹
- B. 315 ohm⁻¹cm²mole⁻¹
- C. 100 ohm⁻¹cm²mole⁻¹
- D. 6300 ohm⁻¹cm²mole⁻¹

Ans :A

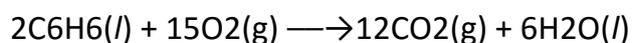
50. In the linear packing arrangement in one dimension, the coordination number is _____.

- A. 1 B. 2
- C. 3 D. 4

Ans :B



51. The difference between heats of reaction at constant pressure and at constant volume for the reaction



at 25°C in kJ is _____.

- A. - 7.43 B. + 3.72
C. - 3.72 D. + 7.43

Ans :A

52. The atomic number of third member of the nitrogen family is _____.

- A. 23 B. 15
C. 33 D. 43

Ans :C

53. An alkyl halide may be converted into an alcohol by _____.

- A. addition
B. substitution
C. dehydrohalogenation
D. elimination

Ans :B

54. The drug which binds to receptor site and stops communication process of cell is called

_____.

- A. antagonists
B. agonists
C. target
D. enzyme

Ans :B

55. C₃H₉N represents _____.

- A. primary amine
B. secondary amine
C. tertiary amine
D. all of these

Ans :A

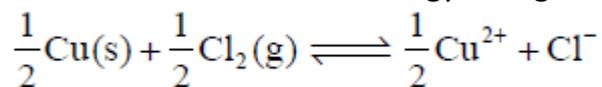


56. Sugar dissolved in water is a type of _____ solution.

- A. solid in solid
- B. solid in gas
- C. solid in liquid
- D. gas in solid

Ans :D

57. Calculate standard free energy change for the reaction 2



taking place at 25 °C in a cell whose standard e.m.f. is 1.02 volts.

- A. – 98430 J
- B. 98430 J
- C. 96500 J
- D. – 49215 J

Ans :C

58. Which of the following metal is found exclusively in free state?

- A. Iron
- B. Platinum
- C. Aluminium
- D. Zinc

Ans :A

59. The formation of the complex ion $[\text{Co}(\text{NH}_3)_6]^{3+}$ involves the d^2sp^3 hybridization of Co^{3+} and so, the complex ion should have _____ geometry.

- A. an octahedral
- B. a tetrahedral
- C. a square-planar
- D. a triangular

Ans :B



60. If acetaldehyde is treated with Fehling's solution, the change that occurs in the system

is _____.

- A. $\text{Ag}^+ \rightarrow \text{Ag}^\circ$
- B. $\text{Cu}^{+2} \rightarrow \text{Cu}^\circ$
- C. $\text{Cu}^{+2} \rightarrow \text{Cu}^+$
- D. $\text{Na}^+ \rightarrow \text{Na}^\circ$

Ans :C

61. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$ in IUPAC is known as _____.

- A. 1-Propoxyethane
- B. 1-Ethoxypropane
- C. 3-Ethoxypropane
- D. 3-Propoxyethane

Ans :B

62. Empirical formula of PAN is same as empirical formula of _____.

- A. vinyl chloride
- B. vinyl cyanide
- C. tetrafluoroethylene
- D. propylene

Ans :B

63. All of the following are diamagnetic materials EXCEPT _____.

- A. water
- B. NaCl
- C. benzene
- D. CuO

Ans :D

64. A gaseous hypothetical chemical equation $2\text{A} \rightleftharpoons 4\text{B} + \text{C}$ is carried out in a closed vessel.



The concentration of B is found to increase by $5 \times 10^{-3} \text{ mol L}^{-1}$ in 10 second. The rate of appearance of B is _____.

- (A) $5 \times 10^{-4} \text{ mol L}^{-1} \text{ sec}^{-1}$
- (B) $5 \times 10^{-5} \text{ mol L}^{-1} \text{ sec}^{-1}$
- (C) $6 \times 10^{-5} \text{ mol L}^{-1} \text{ sec}^{-1}$
- (D) $4 \times 10^{-4} \text{ mol L}^{-1} \text{ sec}^{-1}$

Ans :A

65. The vapour pressure of pure solvent and solution are 120 mm Hg and 108 mm Hg respectively. The mole fraction of the solvent in the solution is _____.

- A. 0.1 B. 0.9
- C. 1.2 D. 1.08

Ans :A

66. Chemical reaction taking place at cathode is _____.

- A. reduction
- B. oxidation
- C. ionization
- D. dissociation

Ans :B

67. Tetragonal crystal system has the following unit cell dimensions:

- A. $a = b = c$ and $\alpha = \beta = \gamma = 90^\circ$
- B. $a = b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$
- C. $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$
- D. $a = b \neq c$ and $\alpha = \beta = 90^\circ, \gamma = 120^\circ$

Ans :A

68. $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2]\text{Br}_2$ and $[\text{Pt}(\text{NH}_3)_4\text{Br}_2]\text{Cl}_2$ are related to each other as _____ isomers.

- A. optical
- B. coordination
- C. ionization



D. linkage

Ans :B

69. Acetone reacts with iodine (I_2) to form iodoform, in the presence of _____.

- A. K_2SO_4
- B. NaOH
- C. $CaCO_3$
- D. $MgCO_3$

Ans :B

70. The oxidation state of oxygen in H_2O_2 is _____.

- A. +1
- B. 0
- C. -1
- D. -2

Ans :C

71. Which of the following property is NOT expected to be shown by copper?

- A. High thermal conductivity
- B. Low electrical conductivity
- C. Ductility
- D. Malleability

Ans :B

72. In thermodynamics, which one of the following is NOT an intensive property?

- A. Melting point
- B. Density
- C. Volume
- D. Temperature

Ans :C

73. The rate constant of a reaction has same units as the rate of reaction. The reaction is of _____.

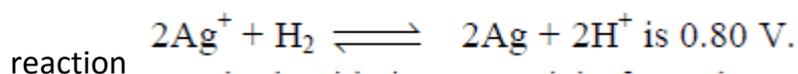
- A. zero order



- B. first order
- C. second order
- D. none of

Ans :A

74. The emf of the cell involving the cell



The standard oxidation potential of Ag electrode is

- _____.
- A. +0.80 V
 - B. -0.80 V
 - C. +0.40 V
 - D. -0.40 V

Ans :B

75. The molecular mass of acetic acid dissolved in water is 60 g/mol and when dissolved in

benzene it is 120 g/mol. This difference in behaviour of CH_3COOH is because

- _____.
- A. acetic acid molecules associate to form dimers in benzene
 - B. acetic acid does not fully dissolve in water
 - C. acetic acid fully dissolves in benzene
 - D. acetic acid molecules dissociates in benzene

Ans :A

76. Which of the following hydrogen halide is a low boiling liquid at 25 °C?

- A. Hydrogen iodide
- B. Hydrogen bromide
- C. Hydrogen chloride
- D. Hydrogen fluoride

Ans :D



77. Alkene $R - CH = CH_2$ reacts with B_2H_6 in the presence of dilute H_2O_2 , to give _____.

- (A) $R - \overset{\overset{O}{||}}{C} - CH_3$
- (B) $R - \overset{\overset{OH}{|}}{CH} - \overset{\overset{OH}{|}}{CH_2}$
- (C) $R - CH_2 - CHO$
- (D) $R - CH_2 - CH_2 - OH$

Ans :D

78. Which pair of bases is present both in DNA and RNA?

- A. Adenine, uracil, thymine
B. Adenine, guanine, cytosine
C. Adenine, guanine, uracil
D. Adenine, guanine, thymine

Ans :B

79. The IUPAC name of $Fe(CO)_5$ is _____.

- A. pentacarbonylferrate (0)
B. pentacarbonylferrate (III)
C. pentacarbonyliron (0)
D. pentacarbonyliron (II)

Ans :C

80. The standard heats of formation for $CCl_4(g)$, $H_2O(g)$, $CO_2(g)$ and $HCl(g)$ are -25.5 , -57.8 , -94.1 and -22.1 kcal, respectively. ΔH for the reaction $CCl_4(g) + 2H_2O(g) \rightarrow CO_2(g) + 4HCl(g)$ at 298 K is _____.

- A. -265.8 kcal
B. -199.5 kcal
C. -32.9 kcal
D. -41.4 kcal



Ans :D

81. In which one of the following conversions, phosphorus pentachloride is used as a reagent?

- (A) $\text{H}_2\text{C} = \text{CH}_2 \rightarrow \text{CH}_3\text{CH}_2\text{Cl}$
- (B) $\text{C}_2\text{H}_6 \rightarrow \text{C}_2\text{H}_5\text{Cl}$
- (C) $\text{CH}_3\text{CH}_2\text{OH} \rightarrow \text{CH}_3\text{CH}_2\text{Cl}$
- (D) $\text{C}_6\text{H}_6 \rightarrow \text{C}_6\text{H}_5\text{Cl}$

Ans :C

82. Amine that CANNOT be prepared by Gabriel phthalimide synthesis is _____.

- A. Aniline
- B. Benzylamine
- C. Methylamine
- D. iso-Butylamine

Ans :A

83. The bond that undergoes cleavage in ethyl alcohol to give its acidic properties is _____.

- A. C – C
- B. C – O
- C. C – H
- D. O – H

Ans :D

84. In hydrides of group 16 elements, the order of H–M–H bond angle is _____.

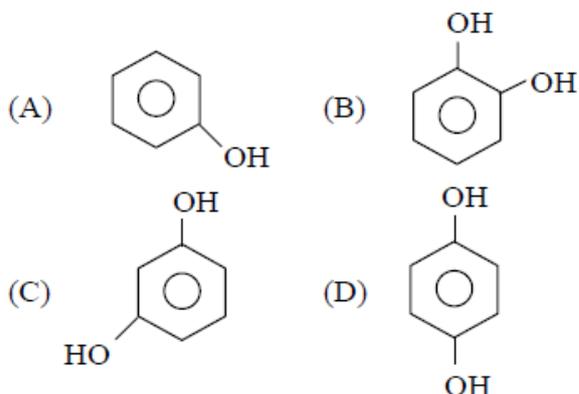
(where M = O, S, Se and Te)

- A. $\text{H}_2\text{O} < \text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te}$
- B. $\text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Se} > \text{H}_2\text{Te}$
- C. $\text{H}_2\text{O} > \text{H}_2\text{Se} > \text{H}_2\text{S} > \text{H}_2\text{Te}$
- D. $\text{H}_2\text{O} < \text{H}_2\text{Se} < \text{H}_2\text{S} < \text{H}_2\text{Te}$



Ans :C

85. Which of the following is resorcinol?



86. Ribose is an example of _____.

- A. ketohexose
- B. aldopentose
- C. disaccharide
- D. aldohexose

Ans :B

87. The number of possible optical isomers is given by the formula _____.

- A. 4^n
- B. 3^n
- C. 1^n
- D. 2^n

Ans :D

88. $C_6H_5CH_2Cl + KCN(alc) \rightarrow X + Y$

Compounds X and Y are _____.

- A. C_6H_6 , KCl
- B. $C_6H_5CH_2CN$, KCl
- C. $C_6H_5CH_3$, KCl
- D. CH_3Cl , KCl

Ans :B



89. Which of the following belongs to the actinides series?

- A. Ce B. Pu
- C. Ca D. Cs

Ans :B

90. Which of the following statement is FALSE?

- A. Vapour phase nitration of higher alkanes involves substitution as well as C–C bond fissions.
- B. Liquid phase nitration yields large number of polynitro compounds.
- C. Temperature maintained during vapour phase nitration is about 423K to 698K.
- D. Methane on nitration gives nitromethane.

Ans :D

91. Which of the following is used in the preparation of chlorine by the oxidation of HCl?

- A. NaCl
- B. CaSO₄
- C. MnCl₂
- D. PbO₂

Ans :D

92. The general formula of aliphatic monocarboxylic acid is _____.

- A. C_nH_{2n+1}COOH
- B. C_nH_{2n}O₂
- C. C_nH_{2n-2}COOH
- D. Both A. and B.

Ans :B

93. Helium and oxygen mixture is used by deep sea divers instead of air because _____.

- A. helium less soluble in blood than nitrogen under high pressure
- B. helium is lighter than nitrogen
- C. helium is readily miscible in oxygen



D. helium is less poisonous than nitrogen

Ans :A

94. In the preparation of $K_2Cr_2O_7$, sodium sulphate formed during conversion of sodium

chromate to sodium dichromate, is removed by _____.

A. crystallization and filtration

B. dissolving it in water

C. sublimation

D. treating it with KCl

Ans :A

95. During preparation of diazonium salts, temperature is maintained at/between_____.

A. 273 K – 278 K

B. 373 K

C. 413 K

D. 523 K – 723

Ans :A

96. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word 'SACHIN' appears at serial number.

(A) 601

(B) 600

(C) 603

(D) 602

97. How many ways are there to arrange the letters in the word GARDEN with the vowels

In alphabetical order ?

A. 120



- B. 240
- C. 360
- D. 480

98. The value of $\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$ is

- (A) 1/4
- (B) 1/2
- C. does not exist
- D. none of these

99. In a throw of coin what is the probability of getting head.

- (A) 1
 - B. 2
 - C. 1/2
 - D. 0
- Ans: C

100. In a throw of coin what is the probability of getting tails.

- (A) 1
- B. 2
- C. 1/2
- D. 0

Ans: C

101. Three unbiased coins are tossed, what is the probability of getting at least 2 tails ?

- (A) 1/3
- B. 1/6
- C. 1/8
- D. 1/2



Ans:C

102. What is the probability of getting a sum 9 from two throws of dice.

- A. $1/3$
- B. $1/9$
- C. $1/12$
- D. $2/9$

Ans:B

103. Dice are thrown simultaneously. What is the probability of getting two numbers whose product is even ?

- A. $3/4$
- B. $1/4$
- C. $7/4$
- D. $1/2$

Ans:A

104. In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither blue nor green?

- A. $2/3$
- B. $8/21$
- C. $3/7$
- D. $9/22$

Ans:B

105. A card is drawn from a pack of 52 cards. The probability of getting a queen of club or a king of heart is

- A. $1/13$
- B. $2/13$
- C. $1/26$
- D. $1/52$



Ans:C

106. From a pack of 52 cards, two cards are drawn together, what is the probability that both the cards are kings

- A. $\frac{2}{121}$
- B. $\frac{2}{221}$
- C. $\frac{1}{221}$
- D. $\frac{1}{13}$

Ans:C

107. A speaks truth in 75% of cases and B in 80% of cases. In what percentage of cases are they likely to contradict each other, narrating the same incident

- A. 30%
- B. 35%
- C. 40%
- D. 45%

Ans:B

108. Bag contain 10 black and 20 white balls, One ball is drawn at random. What is the probability that ball is white

- A. 1
- B. $\frac{2}{3}$
- C. $\frac{1}{3}$
- D. $\frac{4}{3}$

Ans:C

109. From a pack of 52 cards, 1 card is drawn at random. Find the probability of a face card drawn.

- A. $\frac{4}{13}$
- B. $\frac{1}{52}$
- C. $\frac{1}{4}$
- D. None of above



Ans:A

110. $\sec^2\theta =$

A. $1 - \cos^2\theta$

B. $1 - \tan^2\theta$

C. $1 + \tan^2\theta$

D. $1 + \cot^2\theta$

Ans:c

111. $\cos^2\theta/2 =$

A. $1 - \sin^2\theta/2$

B. $1 - \sin^2\theta$

C. $\csc^2 2\theta$

D. $\sec^2 2\theta$

Ans: A

112. If $\cos\theta = 1/\sqrt{2}$, then θ is equal to

A. 30°

B. 45°

C. 60°

D. 90°

Ans:B

113. One second is denoted by

A. 1 rad

B. 1'

C. 1"

D. 1°

Ans:B



114. $(\sec\theta - \tan\theta)^2 =$

- A. $1 + \sin\theta/1 - \sin\theta$
- B. $(1 - \sin\theta)/(1 + \sin\theta)$
- C. $(1 - \cos\theta)/(1 + \cos\theta)$
- D. $\csc\theta$

Ans: B

115. $\csc\theta =$

- A. $1/\cos\theta$
- B. $\cos\theta/\sin\theta$
- C. $\sin\theta/\cos\theta$
- D. $1/\sin\theta$

Ans: D

116. Vertex of an angle in standard form is at

- A. (1,0)
- B. (0,1)
- C. (1,1)
- D. (0,0)

Ans: D

117. 1 radian =

- A. $57^\circ 17' 45''$
- B. 1°
- C. 180°
- D. $180'$

Ans: A

118. An arc AB of length of 5 cm is marked on a circle of radius 3cm. area of sector bounded by this arc and radii from A and B is

- A. 7.5 cm^2



- B. 7.5 m^2
- C. 75 m^2
- D. 75 cm^2

Ans:A

119. $1 + \tan^2 2\theta =$

- A. $\sec^2 \theta$
- B. $\csc^2 \theta$
- C. $\csc^2 2\theta$
- D. $\sec^2 2\theta$

Ans:D

120. In 30 minutes, hours hand of a clock turns through

- A. $\pi/6$ radians
- B. $\pi/12$ radians
- C. $\pi/24$ radians
- D. π radians

Ans: B

121. π radians =

- A. 360°
- B. $360'$
- C. 180°
- D. $180'$

Ans:C

14. $\csc^2 \theta/2 - \cot^2 \theta/2 =$

- A. 1
- B. -1
- C. 0
- D. $\sec^2 2\theta$



Ans:B

122. $\cos^2\theta + \sin^2\theta =$

- A. -2
- B. -1
- C. 0
- D. 1

Ans:D

123. $1^\circ =$

- A. 60'
- B. 60"
- C. 3600'
- D. 360'

Ans:A

124. $\csc^2\theta - \cot^2\theta =$

- A. 1
- B. 0
- C. -1
- D. $\tan^2\theta$

Ans:C

125. Additive inverse of a matrix A is

- A. A
- B. $|A|$
- C. A^2
- D. $\text{adj } A|A|$

Ans:D

126. Two matrices A and B are multiplied to get BA if

- A. both are rectangular
- B. both have same order



- C. no of columns of A is equal to columns of B
- D. no of rows of A is equal to no of columns of B

Ans:D

127. $[a\ b\ c]$ is a

- A. zero matrix
- B. diagonal matrix
- C. column matrix
- D. row matrix

Ans:D

128. Transpose of a row matrix is

- A. zero matrix
- B. diagonal matrix
- C. column matrix
- D. row matrix

Ans:C

130. $[0\ 0\ 0]$ is

- A. Scaler matrix
- B. diagonal matrix
- C. identity matrix
- D. null matrix

Ans:D

131. If A is a matrix of order $m \times n$ and B is a matrix of order $n \times p$ then order of AB is

- A. $p \times m$
- B. $p \times n$
- C. $n \times p$
- D. $m \times p$

Ans:D



131. If $|A| \neq 0$, then A is

- A. zero matrix
- B. singular matrix
- C. non - singular matrix
- D. diagonal matrix

Ans:C

132. Two matrices A and B are equal if

- A. both are rectangular
- B. both have same order
- C. no of columns of A is equal to columns of B
- D. both have same order and equal corresponding elements

Ans:D

133. Order of a matrix $[2 \ 5 \ 7]$ is

- A. 3×3
- B. 1×1
- C. 3×1
- D. 1×3

Ans:D

134. If a matrix has m rows and n columns then order is

- A. $m + n$
- B. $n \times n$
- C. $m \times m$
- D. $m \times n$

Ans:D

135. If $f(x) = x \sec x$, then $f(0) =$

- A. -1
- B. 0



- C. 1
- D. $\sqrt{2}$

Ans:B

136. If $f: X \rightarrow Y$ is a function, then $y \in Y$ is called

- A. dependent variable of f
- B. Independent variable of f
- C. value of f
- D. range of f

Ans:A

137. If $f: x \rightarrow x \sec(x)$ is a function, then $f(0) =$

- A. -1
- B. 0
- C. 1
- D. ∞

Ans:B

138. If $f(x) = 1/2 - \sin 3x$, then $f^{-1}(x) =$

- A. $1/3 \sin^{-1}(x/2x-1)$
- B. $1/3 \sin(2x-1/x)$
- C. $1/3 \sin^{-1}(2x-1/x)$
- D. $2 - \sin 3x$

Ans:C

139. $\cosh^2 x + \sinh^2 x =$

- A. $-\cosh(2x)$
- B. $\sinh(2x)$
- C. $\tanh(2x)$
- D. $\cosh(2x)$

Ans:D



140. If $f: x \rightarrow x+1$ is a function, then $f(t^2-1) =$

- A. $t+1$
- B. $t^2 + 1$
- C. t
- D. t^2

Ans:D

141. $\sinh(x) =$

- A. $e^x + e^{-x/2}$
- B. $e^x - e^{-x/2}$
- C. $e^x - e^{-x/ex} + e^{-x}$
- D. $e^x + e^{-x/ex} - e^{-x}$

Ans:B

142. $(A \cup B) \cup C =$

- A. $A \cap (B \cup C)$
- B. $A \cup (B \cup C)$
- C. π
- D. $A \cup (B \cup C)$

Ans:D

143. Every even integer is also

- A. Natural number
- B. Irrational number
- C. Rational number
- D. Whole number

Ans:C

144. $(A \cap B) \cap C =$

- A. $A \cap (B \cap C)$
- B. $A \cup (B \cup C)$
- C. π
- D. $A \cup (B \cup C)$



Ans:A

145. Union of two sets A and B is

- A. $A = B$
- B. $A \neq B$
- C. $A \cup B$
- D. $A \cap B$

Ans:C

146. Identity element of a set X with respect to intersection in $P(X)$ is

- A. X
- B. π
- C. does not exist
- D. 0

Ans:A

147. Set $\{\{1, 2, 3\}, \{4, 5\}\}$ has

- A. two elements
- B. five elements
- C. infinite elements
- D. one element

Ans:B

148. If a, b are elements of a group G, then $(ba)^{-1} =$

- A. $a^{-1} b^{-1}$
- B. $b^{-1} a^{-1}$
- C. $a^{-1} b$
- D. $b^{-1} a$

Ans:A

149. Intersection of two sets A and B is

- A. $A = B$
- B. $A \neq B$



C. $A \cup B$

D. $A \cap B$

Ans:D

150. $A^2 + b^2$

A. $(a + b)(a - b)$

B. $(a + ib)(a - ib)$

C. $(a + b)(a - ib)$

D. $(a + ib)(a - b)$

Ans:B

151. If $A = \{a, b, c\}$, $B = \{1, 2, 3\}$, $f = \{(a, 1), (b, 1), (c, 1)\}$ is

A. onto function

B. one-one function

C. identity function

D. constant function

Ans:D

152. Unary operation is one in which yields another number when performed on

A. two numbers

B. a single number

C. three numbers

D. four numbers

Ans:B

153. $A \cup B =$

A. π

B. $B \cap A$

C. $A \cap B$

D. $B \cup A$

Ans:D



154. Range of $f = \{ (a,1), (b, 1), (c,1) \}$ is

- A. $\{a,b,c\}$
- B. $\{a\}$
- C. $\{b\}$
- D. $\{1\}$

Ans:A

155. If a, b are elements of a group G , then $(ab)^{-1} =$

- A. $a^{-1} b^{-1}$
- B. $b^{-1} a^{-1}$
- C. $a^{-1} b$
- D. $b^{-1} a$

Ans:B

156. $A \cup (A \cap B) =$

- A. B
- B. $A \cup B$
- C. A
- D. π

Ans:C

157. Solution of a quadratic equation $x^2 + 5x - 6 = 0$

- A. $x = -1, x = 6$
- B. $x = 1, x = -6$
- C. $x = 1$
- D. $x = 6$

Ans:B

158. Two square roots of unity are

- A. $1, -1$
- B. $-1, \omega$
- C. $1, -\omega$
- D. i, i^2



Ans:A

159. $3x^2 + 2x + 1$ is a

- A. polynomial of degree 2
- B. polynomial of degree 0
- C. polynomial of degree 3
- D. polynomial of degree n

Ans:D

160. If $x^2 - 7x + a$ has a remainder 1 when divided by $x + 1$, then

- A. $a = -7$
- B. $a = 7$
- C. $a = 0$
- D. $a = 1$

Ans:D

161. Sum and product of roots of equation $4x^2 + 7x - 3 = 0$ are

- A. $-3/4, -7/4$
- B. $-7/4, -3/4$
- C. $-7/4, 3/4$
- D. None of Above

Ans:B

162. If ω is imaginary cube root of unity, then $\omega =$

- A. 1
- B. 0
- C. ω^{-2}
- D. 2ω

Ans:C

163. $X^2 + 4x + 4$ is

- A. polynomial
- B. equation



- C. identity
- D. None of Above

Ans:A

164. If $x^2 + ax + b$ is divided by $x + c$, then remainder is

- A. $c^2 - ac - b$
- B. $c^2 - ac + b$
- C. $c^2 + ac + b$
- D. $-c^2 - ac + b$

Ans:A

165. Root of equation $x^4 - 5x^4 + 4 = 0$ is

- A. 1
- B. 3
- C. 4
- D. None of Above

Ans:A

166. Solution set of $6x^2 + x - 15 = 0$ is

- A. { 9, 10 }
- B. { -9, -10 }
- C. { -9, 10 }
- D. { 9, -10 }

Ans:D

167. An equation of form $ax^2 + bx + c = 0$, $a \neq 0$ is called the

- A. Quadratic equation
- B. cubic equation
- C. linear equation
- D. polynomial of degree n

Ans:A



168. $\cos\theta + \cos\pi =$

- A. $-2\sin(\theta + \pi/2)\sin(\theta - \pi/2)$
- B. $2\cos(\theta + \pi/2)\sin(\theta - \pi/2)$
- C. $2\cos(\theta + \pi/2)\cos(\theta - \pi/2)$
- D. None of Above

Ans:C

169. $\sin(A+45^\circ)\sin(A-45^\circ) =$

- A. $-1/2\cos(2A)$
- B. $-1/2\sin(2A)$
- C. $1/2\cos(2A)$
- D. None of Above

Ans:A

170. $\sin 5\theta \cos 2\theta =$

- A. $1/2[\sin 7\theta + \sin 3\theta]$
- B. $[\sin 7\theta + \sin 3\theta]$
- C. $1/2[\sin 7\theta - \sin 3\theta]$
- D. None of Above

Ans:A

171. $\cos 728^\circ =$

- A. $-\cos 8^\circ$
- B. $-\sin 8^\circ$
- C. $\sin 8^\circ$
- D. $\cos 8^\circ$

Ans:D

172. $\sin(3\pi/2 - \theta) =$

- A. $\sin\theta$
- B. $\cos\theta$
- C. $-\sin\theta$
- D. $-\cos\theta$



Ans:D

173. $2\sin 12^\circ \sin 46^\circ =$

- A. $\cos 34^\circ \cos 58^\circ$
- B. $\sin 34^\circ + \sin 58^\circ$
- C. $\sin 34^\circ - \sin 58^\circ$
- D. $\cos 34^\circ - \cos 58^\circ$

Ans:D

174. $\sin 8\theta - \sin 4\theta =$

- A. $2\sin 4\theta \sin 3\theta$
- B. $2\sin 6\theta \cos 2\theta$
- C. $2\cos 6\theta \sin 2\theta$
- D. $2\cos 4\theta \sin \theta$

Ans:C

175. $\cos 540^\circ =$

- A. $-1/\sqrt{2}$
- B. $1/\sqrt{2}$
- C. $3/\sqrt{2}$
- D. 0

Ans:D

176. $\cos 6\theta + \operatorname{cosec} 3\theta =$

- A. $2\cos 9\theta/2 \cos 3\theta/2$
- B. $2\sin 9\theta/2 \sin 3\theta/2$
- C. $2\sin 9\theta/2 \cos 3\theta/2$
- D. None of Above

Ans:A

177. $1 + \cos 3\alpha =$

- A. $2\cos^2(3\alpha/2)$
- B. $\sin^2(3\alpha/2)$



C. $\frac{3}{2} \cos^2(3\alpha/2)$

D. $2\sin^2\alpha$

Ans:A

178. $\cos 20^\circ + \cos 100^\circ + \cos 140^\circ =$

A. 2

B. 1

C. 0

D. -1

Ans:C

179. $1 + \cos 6\alpha =$

A. $3\sin^2\alpha$

B. $2\sin^2 3\alpha$

C. $3\sin^2 3\alpha$

D. $2\cos^2 3\alpha$

Ans:D

180. $\sin \alpha =$

A. $\pm\sqrt{(1 - \cos 2\alpha)}/2$

B. $\pm\sqrt{(1 + \cos 2\alpha)}/2$

C. $\pm(\sqrt{(1) + \sin 2\alpha})/2$

D. None of Above

Ans:A