01. The one which does not represent a force in any context is
(A) Friction   (B) Impulse   (C) Tension   (D) Weight   (E) Viscous drag
ANSWER : B

02. The Work-Energy theorem states that the change in
(A) Kinetic energy of a particle is equal to the work done on it by the neat force
(B) Kinetic energy of a particle is equal to the work done by one of forces acting on it
(C) Potential energy of a particle is equal to the work done on it by the net force
(D) Potential energy of a particle is equal to the work done by one of forces acting on it
(E) Total energy of a particle is equal to the work done on it by the net force
ANSWER : A

03. A car of mass 1500 kg is lifted up a distance of 30 m by crane A in 0.5 minutes. The second crane B does the same job in 1 minute. The ratio of their power is
(A) 1 : 2   (B) 2 :1   (C) 1 : 1   (D) 1 : 4   (E) 4 : 1
ANSWER :B

04. Water from a house pipe of radius 5 cm strikes a wall normally at a speed of $5ms^{-1}$. The force exerted on the wall in netwton is
(A) 13.5π (B) 6.25π (C) 62.5π (D) 27π (E) 125π
ANSWER : C

05. The position vectors of two identical particles with respect to the origin in three dimensional co-ordinate system are $\vec{r_1}$ and $\vec{r_2}$. The position vector of centre of mass of the system is given by

(A) $\vec{r_1}+\vec{r_2}$ (B) $\dfrac{\vec{r_1}-\vec{r_2}}{2}$ (C) $\vec{r_1}-\vec{r_2}$ (D) $\dfrac{\vec{r_1}+\vec{r_2}}{2}$ (E) $\dfrac{\vec{r_1}+\vec{r_2}}{3}$
ANSWER : D

06. If a body of moment of inertia 2 kg m^2 revolves about its own axis making 2 rotations per second, then its angular momentum (in Js) is
(A) 2π (B) 4π (C) 6π (D) 8π (E) 10π
ANSWER : D

07. A rigid body is the one in which
(A) It can have only rotational motion   (B) It can have only translational motion
(C) The distance between all pairs of particles of the body do not change
(D) Its shape can be deformed
(E) Its centre of mass always lies inside the material of the body
ANSWER : C

08. A body hanging from a massless spring stretches it by 3 cm on earth's surface. At a place 800 km above the earth's surface, the same body will stretch the spring by (Radius of earth= 6400 km)

(A) $\left(\dfrac{34}{27}\right)cm$ (B) $\left(\dfrac{64}{27}\right)cm$ (C) $\left(\dfrac{27}{64}\right)cm$ (D) $\left(\dfrac{27}{34}\right)cm$ (E) $\left(\dfrac{35}{81}\right)cm$
ANSWER : B

09. The acceleration due to gravity on the surface of a planet is one-fourth of the value on earth. When a brass ball is brought to this planet, its
(A) Mass is halved   (B) Weight is halved   (C) Mass becomes one-fourth
(D) Weight becomes one-fourth   (E) Mass and weight remain the same
ANSWER : D

10. Polara satellites
(A) Are high altitude satellites   (B) Are widely used for telecommunication
(C) Are used for environmental studies   (D) Go around the earth in a east-west direction
(E) Have time-period of rotation of 24 hours
ANSWER : C

11. If a capillary tube of radius r is the immersed in a liquid, the liquid rises to a height h. The corresponding mass of liquid column is m. The mass of water that would rise in another capillary tube of twice the radius is
(A) 2m   (B) 5m   (C) 3m   (D) 4m   (E) m/2
ANSWER : A

12. In a horizontal pipe of non-uniform cross-section, water flows with a velocity of 1 ms^{-1} at a point where the diameter of the pipe is 20cm. The velocity of water (in ms^{-1}) at a point where the diameter of the pipe is 5 cm is
(A) 64   (B) 24   (C) 8   (D)32   (E) 16
ANSWER : E

13. A spherical ball of diameter 1 cm and density 5×10^3 kg m^{-3} dropped gently in a large tank containing viscous liquid of density 3×10^3 kg m^{-3} and coefficient of viscosity 0.1 Ns m^{-2}. The distance, the ball moves in 1s after attaining terminal velocity is (g = 10 ms^{-2})
(A) 10/9 m   (B) 2/3 m   (C) 4/9 m   (D) 4/5 m   (E) 9/10 m
ANSWER : A

14. A stone of density 2000 kg m^{-3} completely immersed in a lake is allowed to sink from rest. If the effect of friction is neglected, then after 4 seconds, the stone will reach a depth of
(A) 78.4 m   (B) 39.2 m   (C) 19.6 m   (D) 9.8 m   (E) 24.6 m
ANSWER :B

15. The Zeroth law of thermodynamics leads to the concept of
(A) Internal energy   (B) Heat content   (C) Pressure
(D) Temperature   (E) Work done
ANSWER : D

16. If the average kinetic energy of a molecule of a hydrogen gas at 300 K is E, the average kinetic energy of a molecule of a nitrogen gas at the same temperature is
(A) 7E   (B) E/14   (C) 14E   (D) E/7   (E) E
ANSWER : E

17. The difference between the specific heats of a gas is 4150 J kg^{-1} K^{-1} the ratio of specific heats is 1.4, then the specific heat at constant volume of the gas (in J kg^{-1} K^{-1}) is
    (A) 1037.5   (B) 2037.5   (C) 8300   (D) 10375   (E) 4150
    ANSWER : D

18. The Carnot cycle of a reversible heat engine consists of
    (A) One isothermal and two adiabatic processes   (B) Two isothermal and one adiabatic processes
    (C) Two isothermal and two adiabatic processes   (D) Two isobaric and two isothermal processes
    (E) Two isochoric and two adiabatic processes
    ANSWER : C

19. Two equal masses hung from two massless springs of a spring constants k_1 and k_2 have equal maximum velocity when executing simple harmonic motion. The ratio of heir amplitudes is
    (A) $\left(\dfrac{k_1}{k_2}\right)^{1/2}$ (B) $\left(\dfrac{k_1}{k_2}\right)$ (C) $\left(\dfrac{k^2}{k_1}\right)$ (D) $\left(\dfrac{k_2}{k_1}\right)^{1/2}$ (E) $\left(\dfrac{k_1^2}{k_2^2}\right)$
    ANSWER : D

20. The simple harmonic motion of a particle is given by x = a sing 2π t. Then the location of the particle from its mean position at a time 1/8th of a second is
    (A) a   (B) a/2   (C) a/$\sqrt{2}$ (D) a/4   (E) a/8
    ANSWER : C

21. The time period of a simple pendulum of length $\sqrt{5}$ m suspended in a car moving with uniform acceleration of a 5 ms^{-2} in a horizontal straight road is (g = 10 ms^{-2})
    (A) $\dfrac{2\pi}{\sqrt{5}}s$ (B) $\dfrac{\pi}{\sqrt{5}}s$ (C) 5π s   (D) 4π s   (E) 3π s
    ANSWER : A

22. The apparent change in frequency of a sound due to the relative motion between the observer and the sources of sound is called
    (A) Doppler effect   (B) Phenomenon of beats
    (C) Phenomenon of stationary waves   (D) Diffraction of sound waves
    (E) Interference of sound waves
    ANSWER : A

23. Pick out the condition which is not required for the formation of stationary waves
    (A) The medium on which waves are formed should be bound medium
    (B) Both the waves should have same frequency
    (C) Both the waves should have same velocity
    (D) The waves should travel in same direction
    (E) Both the waves should have same wavelength
    ANSWER :D

24. The harmonic mode which resonates with a closed pipe of length 22 cm, when excited by a 1875 Hz source and the number of nodes present in its respectively are (velocity of sound in air = 330 ms^{-1})
(A) I^{st}, 1   (B) 3rd, 1   (C) 3rd, 2   (D) 5th, 4   (E) 5th, 3

ANSWER :E

25. The force between two point charges placed in a material medium of dielectric constant ε_r is F. If the material is removed, then the force between them becomes
(A) ε_r F   (B) ε F   (C) F/ε_r (D) ε /F   (E) ε_0 F

ANSWER : A

26. The electric field strength in N C^{-1} that is required to just prevent a water drop carrying a charge 1.6×10^{-19} C from falling under gravity is (g = 9.8 ms^{-2}, mass of water drop = 0.0016g)
(A) 9.8×10^{-16} (B) 9.8×10^{16} (C) 9.8×10^{-13} (D) 9.8×10^{13} (E) 9.8×10^{10}

ANSWER :D

27. A cylinder of radius r and length l is placed in a uniform electric field of intensity E acting parallel to the axis of the cylinder. The total flux over curved surface area is
(A) $2\pi rE$ (B) $\left(\dfrac{2\pi}{l}\right)E$ (C) $2\pi rlE$ (D) $\dfrac{E}{2\pi rl}$ (E) Zero

ANSWER : E

28. A conductor with a cavity is charged positively and its surface charge density of σ . If E and V represent the electric field and potential, then inside the cavity
(A) $\sigma = 0$ and V= 0   (B) E= 0 and V= 0   (C) E = 0 and σ = constant
(D) V = 0 and σ = constant   (E) E= 0 and V= constant

ANSWER : E

29. Electric lines of force about a positive point charge are
(A) Radially outwards   (B) Circular clockwise   (C) Radially inwards
(D) Parallel straight lines   (E) Circular anticlockwise

ANSWER : A

30. An ammeter, voltmeter and a resistor are connected in series to a cell and the readings are noted as I and V. If another resistor R is connected in parallel with voltmeter, then
(A) I and V increase   (B) I increases   (C) I and V will remain same
(D) I decreases   (E) 1 remains constant

ANSWER : B

31. One gram of copper is deposited in a copper voltmeter when a current of 0.5 A flows for 30 minutes. Then the current required to deposit 2 g of silver in a silver voltmeter in the same time is (ece of coper = 3.3×10^{-4} g C^{-1}, ece of silver = 1.1×10^{-4} gC^{-1})
(A) 4A   (B) 6A   (C) 2A   (D) 5   (D) 3A

ANSWER :E

32. The amount of charge flowing per second per unit area normal to the flow is called
    (A) Electrical conductivity   (B) Electrical resistivity   (C) Mobility
    (D) Current density   (E) Areal current

    ANSWER : D

33. A galvanometer of resistance G is conver ted into an ammeter using a shunt of resistance R. If the ratio of the heat dissipated through the galvanometer and shunt is 3 : 4 then R equals
    (A) 4/3 G   (B) 3/4G   (C) 16/9G   (D) 9/16 G   (E) G

    ANSWER : B

34. Two bulbs of equal power are connected in a parallel and they totally consume 110 W at 220V. The resistance of each bulb is
    (A) 550 Ω (B) 440 Ω (C) 330 Ω (D) 880 Ω (E) 660 Ω

    ANSWER : D

35. The wire of length l is bent into a circular loop of a single turn and is suspended in a magnetic field of induction B. When a current I is passed through the loop, the maximum torque experienced by it is

    (A) $\left(\dfrac{1}{4\pi}\right)BIl^2$ (B) $\dfrac{1}{4\pi}BI^2l$ (C) $\left(\dfrac{1}{4\pi}\right)BIl$

    (D) $\left(\dfrac{1}{4\pi}\right)B^2Il$ (E) $\left(\dfrac{1}{4\pi}\right)B^2I^2l^2$

    ANSWER :A

36. A Particle having charge 10 times that of the electron revolves in a circular path of radius 0.4 m with an angular speed of one rotation per second. The magnetic induction produced at the centre of the circular path is
    (A) $4\pi\times10^{-26}T$ (B) $2\pi\times10^{-26}T$ (C) $16\pi\times10^{-26}T$ (D) $8\pi\times10^{-25}T$ (E) $9\pi\times10^{-25}T$

    ANSWER : D

37. Pick out the wrong statement among the following
    (A) Time varying magnetic field creates an electric field
    (B) Charges in motion can exert force on a stationary magnet
    (C) Stationary charge can exert torque on a stationary magnet
    (D) A bar magnet in motion can exert force on a stationary charge
    (E) Electric field produced by static charges have different properties from those produced by time varying magnetic field

    ANSWER : C

38. If a magnet is plunged into a coil, then the magnitude of induced emf does not depend upon
    (A) The number of turns in the coil   (B) The medium of the sore of the coil
    (C) The insertion speed of the magnet   (D) The strength of the magnet
    (E) The resistance of the coil

    ANSWER : E

39. A bar magnet has a period of oscillation T. If a similar brass piece of the same mass is placed over it, then the number of oscillations it makes in one second is

(A) $\dfrac{1}{\sqrt{2}T}$ (B) $\dfrac{\sqrt{2}}{T}$ (C) $\dfrac{1}{2T}$ (D) 2/T   (E)1/T

ANSWER : A

40. If 0.1 J of energy is stored for the flow of current of 0.2 A in an inductor, then its inductance value is

(A) 5 H   B) 0.5 H   (C) 5 mH   (D) 50 H   (E) 50mH

ANSWER : A

41. The self inductance of a long solenoid carrying current is independent of
(A) its length   (B) The current   (C) Its cross-sectional area
(D) Magnetic permeability of the core   (E) The number of turns

ANSWER : B

42. The r.m.s. value of A.C which when passed through a resistor produces heat, which is twice that produced by a steady current of 1,414 amp in the same resistor is
(A) 2A   (B) 3.46 A   (C) 2.818 A   (D) 1.732 A   (E) 1A

ANSWER : A

43. In a series LCR ac circuit, the current is maximum when the impedance is equal to
(A) The reactance   (B) The resistance   (C) Zero
(D) Twice the reactance   (E) Twice the resistance

ANSWER : B

44. γ -rays are detected by

(A) Point contact diodes   (B) Thermopiles   (C) Ionization chamber
(D) Photocells   (E) Bolometers

ANSWER : C

45. If the direction of electric and magnetic field vectors of a plane electromagnetic wave are along positively y direction and positive z direction respectively, then the direction of propagation of the wave is along
(A) Positive z direction   (B) Negative z direction   (C) Negative y direction
(D) Positive x direction   (E) Negative x direction

ANSWER : D

46. When an object is viewed with a light of wavelength $6000\,\overset{\circ}{A}$ under a microscope its resolving power is 10^4. The resolving power of the microscope when the same object is viewed with a light

of wavelength $4000\,\overset{\circ}{A}$ is

(A) 10^4 (B) 2×10^4 (C) $3\sqrt{2}\times10^4$ (D) 3×10^4 (E) 1.5×10^4

ANSWER : E

47. Secondary rainbow in the atmosphere is
(A) the result of polarization and dispersion of light   (B) brighter than the primary rainbow
(C) Due to the phenomenon of double refraction   (D) Formed with red colour on the top
(E) formed due to two reflections in the rain drop

ANSWER : E

48. For a diffraction from a single slit, the intensity of the central point is
(A) Infinite   (B) finite and same magnitude as the surrounding maxima
(C) finite but much larger than the surrounding maxima
(D) finite and substantially smaller than the surrounding maxima
(E) Zero

ANSWER : C

49. If the radius of curvature of the curved surface of a plano-convex lens is 50 cm, its focal length is ($\mu = 1.5$)
(A) 0.5 m   (B) 0.75 m   (C) 1.25m   (D) 0.25 m   (E) 1 m

ANSWER : E

50. The magnification of an image by a convex lens is positive only when the object is placed
(A) at its focus F   (B) Between F and 2F   (C) at 2F
(D) between F and optical centre   (E) Beyond 2F

ANSWER :D

51. IF the work, functions of three photosensitive materials are 1 eV, 2 eV and 3 eV respectively then the ratio of the respective frequencies of light that produce photoelectrons of maximum kinetic energy of 1 eV from each of them is
(A) 1 : 2 : 3   (B) 2 : 3 : 4   (C) 1 : 1 : 1   (D) 3 : 2 : 1   (E) 4 : 3 : 2

ANSWER : B

52. During β^- emission
(A) A neutron in the nucleus decays emitting an electron
(B) An atomic electron is rejected
(C) An electron already present within the nucleus is ejected
(D) A part of the binding energy of the nucleus is converted into an electron
(E) A proton in the nucleus decays emitting an electron

ANSWER : A

53. The binding energy per nucleon of ^{16}O is 7.97 MeV and that of ^{17}O is 7.75 MeV. The energy in MeV required to remove a neutron from ^{17}O is
(A) 3.52   (B) 3.64   (C) 4.23   (D) 7.86   (E) 1.68

ANSWER : C

54. IF the ratio of the radius of a nucleus with 61 neutrons to that of helium nucleus is 3, the atomic number of this nucleus is
(A) 27   (B) 47   (C) 51   (D) 61   (E)108

ANSWER :B

55. The electron density of intrinsic semi-conductor at room temperature is 10^{16} m^{-3}. When doped with a trivalent impurity, the electron density is decreased to 10^{14} m^{-3} at the same temperature. The majority carrier density is
    (A) 10^{16} m^{-3} (B)10^{18} n^{-3} (C) 10^{21} m^{-3} (D) 10^{20} m^{-3} (E) 10^{19} m^{-3}

    ANSWER : B

56. In a Zener diode regulated power supply, unregulated d.c input of 10V is applied. If the resistance (R_s) connected in series with a Zener diode is $200\,\Omega$ and the Zener voltage $V_z = 5$ V, the current across the resistance R_s is
    (A) 15 mA   (B) 10mA   (C) 20mA   (D) 5mV   (E) 25mA

    ANSWER : E

57. The circuit gives the output as that of
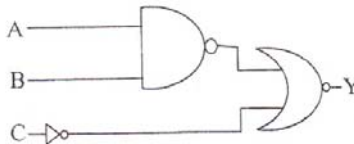
    (A) AND gate   (B) OR gate   (C) NAND gate   (D) NOR gate   (E) NOT grate

    ANSWER : A

58. To detect light of wavelength 500 nm, the photodiode must be fabricated from a semi-conductor of minimum bandwidth of
    (A) 1.24 eV   (B) 0.62eV   (C) 2.48 eV   (D) 3.2 eV   (E) 4.48eV

    ANSWER :C

59. If the height of TV tower is increased by 21%, the transmission range is enhanced by
    (A) 10%   (B) 5%   (C) 15%   (D) 25%   (E) 12%

    ANSWER : A

60. The range of a communication system can be extended by a
    (A) Modulator   (B) Transmitter   (C) Demodulator   (D) Receiver   (E) Repeater

    ANSWER : E

61. For commercial telephonic communication, the frequency range for speech signals is
    (A) 50 Hz to 1000Hz   (B) 3000 Hz to 4500 Hz   (C) 1000 Hz to 200 Hz
    (D) 5000 Hz to 6500 Hz   (E) 300 Hz to 3100 Hz

    ANSWER : E

62. The role of envelope detector in an AM receiver is to
    (A) retrieve the message signal   (B) Rectify the AM signal   (C) Modify the AM signal
    (D) Modulate the message signal   (E) retrieve the AM signal
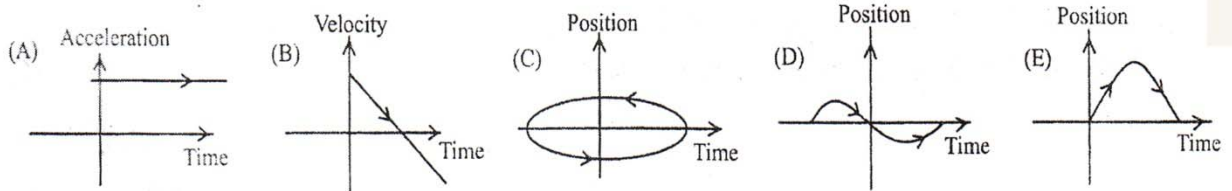
    ANSWER : A

63. When the voltage and current in a conductor are measured as (100 ± 4) V and (5 ± 0.2)A, then the percentage of error in the calculation of resistance is
    (A) 8%   (B)4%   (C) 20%   (D) 10%   (E) 6%

    ANSWER : A

64. The set of physical quantities among the following which are dimensionally different is
(A) Terminal velocity, drift velocity, critical velocity
(B) Potential energy, work done, kinetic energy
(C) Pressure, stress, rigidity modulus
(D) Disintegration constant, frequency, angular velocity
(E) Dipole moment, electric flux, electric field
ANSWER : E

65. The graph which cannot possibly represent one-dimensional motion is

ANSWER : C

66. An aeroplane is flying with a uniform speed of 150 Km hr^{-1} along the circumference of a circle. The change in its velocity in half the revolution (in Km hr^{-1}) is
(A) 150   (B) 100   (C) 200   (D) 300   (E) 50
ANSWER :D

67. In uniform circular motion, the centripetal acceleration is
(A) Towards the centre of the circular path and perpendicular to the instantaneous velocity
(B) A constant acceleration
(C) Away from the centre of the circular path and perpendicular to the instantaneous velocity
(D) A variable acceleration making 45° with the instantaneous velocity
(E) A variable acceleration, parallel to the instantaneous velocity
ANSWER : A

68. A man rides a bicycle with a speed of 17.32 ms^{-1} in east-west direction. If the rain falls vertically with a speed of 10ms^{-1}, the direction in which he must hold his umbrella is
(A) 30° with the vertical towards east   (B) 60° with the vertical towards west
(C) 30° with the vertical towards west   (D) 60° with the vertical towards east
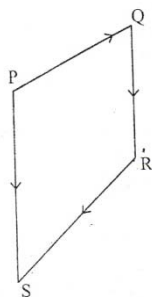(E) 0° with the vertical
ANSWER : B

69. A body is thrown up with a speed u, at an angle of projection θ . If the speed of the projectile becomes $\dfrac{u}{\sqrt{2}}$ on reaching the maximum height, the maximum vertical height attained by the projectile is

(A) $\dfrac{u^2}{4g}$ (B) $\dfrac{u^2}{3g}$ (C) $\dfrac{u^2}{2g}$ (D) $\dfrac{u^2}{g}$ (E) $\dfrac{2u^2}{g}$

ANSWER : A

70. In the given diagram, if $\overrightarrow{PQ} = \vec{A}, \overrightarrow{QR} = \vec{B}$ and $\overrightarrow{RS} = \vec{C}$ then $\overrightarrow{PS}$ equals

(A) $\vec{A} - \vec{B} + \vec{C}$　　　　(B) $\vec{A} + \vec{B} - \vec{C}$　　　　(C) $\vec{A} + \vec{B} + \vec{C}$

(D) $\vec{A} - \vec{B} - \vec{C}$　　　　(E) $-\vec{A} - \vec{B} - \vec{C}$

ANSWER : C

71. The net force acting is not zero on
(A) A retarding train　　　(B) A ball falling with terminal velocity
(C) a kite held stationary in the sky　　　(D) A truck moving with constant velocity
(E) A book placed on a table

ANSWER : A

72. An engine of power 58.8 kW pulls a train of mass 2×10^5 kg with a velocity of 36 km h^{-1}. The coefficient of friction is
(A) 0.3　　　(B) 0.03　　　(C) 0.003　　　(D) 0.0003　　　(E) 0.04

ANSWER : C

73 Chlorophyll is a coordination compound of
(A) Iron　　　　　　(B) Magnesium　　　　　　(C) Manganese
(D) Chromium　　　(E) Zinc

ANSWER : B

74. Which one of the following is a benzenoid aromatic compound?
(A) Furan　　　　　(B) Thiophene　　　(C) Pyridine
(D) Aniline　　　　(E) Cyclopentadienyl anion

ANSWER : D

75. The major product obtained by the addition reaction of HBr to 4-Methylpent-1-ene in the presence of peroxide is
(A) 1-Bromo-4-methylpentane
(B) 1-Bromo-2-methylpentane
(C) 2-Bromo-4-methylpentane
(D) 3-Bromo-2-methylpentane
(E) 2-Bromo-2-methylpentane

ANSWER : A

76. Which one of the following involves nucleophilic addition?
    (A) Kolbe's reaction of phenol
    (B) Williamson's synthesis of ethers
    (C) Reimer-Tiemann's reaction of phenol
    (D) Kolbe's electrolytic synthesis of ethane from sodium acetate
    (E) Aldol formation from ethanol
    ANSWER : E

77. The number of possible stereoisomers of the compound CH_3-CH=CH-CH_3 is
    (A) 2   (B) 4   (C) 3   (D) 5   (E) 6
    ANSWER : A

78. Some organic compounds are given in List I and their uses in List II. Choose the   correct matching

	List I		List II
(a)	Triiodomethane		(i) Solvent for alkaloids
(b)	p, p'-Dichlorodiphenyltrichloroethane		(ii) Propellant in aerosols
(c)	Trichloromethane		(iii) Antiseptic
(d)	Dichloromethane		(iv) Insecticide

    (A) (a) – (ii), (b) –(iv),   (c) – (i), (d) – (iii)
    (B) (a) – (iii), (b) –(iv),   (c) – (i), (d) – (ii)
    (C) (a) – (ii), (b) –(i),   (c) – (iv), (d) – (iii)
    (D) (a) – (iii), (b) –(i),   (c) – (iv), (d) – (i)
    (E) (a) – (i),   (b) –(iii), (c) – (ii), (d) – (iv)
    ANSWER : B

79. The total number of monohalogenated products formed by halogenations of 2, 4, 4-Trimethylhexane is
    (A) 5   (B) 7   (C) 6   (D) 8   (E) 9
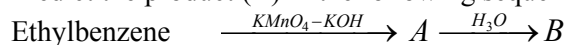   **ANSWER : C**
    * Correct answer is 10

80. Number of acyclic structural isomers of the compound having the molecular formula $C_4H_{10}O$ is
    (A) 4   (B) 5   (C) 6   (D) 7   (D) 3
    ANSWER : D

81. 375 mg of an alcohol reacts with required amount of methyl magnesium bromide and   releases 140 mL of methane gas at STP. The alcohol is
    (A) Ethanol   (B) n-Butanol   (C) Methanol
    (D) n-Propanol   (D) Phenol
    ANSWER :D

82. Predict the product (B) in the following sequence of reactions

Ethylbenzene $\xrightarrow{KMnO_4-KOH}$ A $\xrightarrow{H_3O}$ B

(A) Benzaldehyde   (B) Benzophenone   (C) Benzene

(D) Acetophenone   (E) Benzoic acid

ANSWER : E

83. Feron 12 is manufactured from CCI_4 by

(A) Wurtz reaction   (B) Swarts reaction   (C) Fitting reaction

(D) Wurtz-fitting reaction   (E) Sandmeyer reaction

ANSWER :B

84. Which one of the following can be prepared by Gabriel phthalimide synthesis?

(A) Aniline   (B) o-Toluidine   (C) Benzylamine

(D) N-Methylethanamine   E) 4-Bromoaniline

ANSWER : C

85. 4-Nitrotoluene is treated with bromine to get compound 'P'. 'P' is reduced with Sn and HCL to get compound 'Q'. 'Q' is diazotized and the product is treated with phosphinic acid to get compound 'R'. 'R' is oxidized with alkaline $KMnO_4$ to get compound 'S'. Compound 'S' is

(A) 2-Bromo-4-hydroxybenzoic acid   (B) Benzoic acid   (C) 4-Bromobenzoic acid

(D) 3-Bromobenzoic acid   (E) 2-Bromobenzoic acid

ANSWER : E

86. Narcotic analgesic is

(A) Aspirin   (B) Paracetamol   (C) Codeine   (D) Zantac   (E) Cimetidine

ANSWER : C

87. In double strand helix structure of DNA, heterocyclic base cytosine forms hydrogen bond with

(A) Adenine   (B) Guanine   (C) Purine   (D) Thyamine   (E) Uracil

ANSWER : B

88. The amino acid containing mercaptan unit is

(A) Leucine   (B) Glutamine   (C) Cysteine   (D) Lysine   (E) Isoleucine

ANSWER :C

89. Which one of the following is a non-reducing sugar?

(A) Maltose   (B) Lactose   (C) Sucrose   (D) Glucose   (E) Fructose

ANSWER : C

90. In the hydrogen atomic spectrum, the emission of the least energetic photon takes place during the transition from n = 6 energy level to n = …..energy level

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

ANSWER : C

91. If 27 g of water is formed during complete combustion of pure propene (C_3H_6), the mass of propene burnt is
(A) 42 g (B) 21g (C) 14g (D) 56g (E) 40g
ANSWER :B

92. When 2.46g of a hydrated salt ($MSO_4.xH_2O$) is completely dehydrated, 1.20 g of anhydrous salt is obtained. If the molecular weight of anhydrous salt is 120 g mol^{-1} what is the value of x?
(A) 2 (B) 4 (C) 5 (D) 6 (E) 7
ANSWER : E

93. Identify the t-shaped molecule in the following
(A) BF_3 (B) NH_3 (C) NF_3 (D) CIF_3 (E) PCI_3
ANSWER : D

94. Which one of the following molecules has the least dipole moment?
(A) H_2O (B)BeF_2 (C) NH_3 (D) NF_3 (E) BF_3
ANSWER : B
* E also correct

95. Dipole-dipole interaction energy between polar molecules in solids depends on the radius of the molecule (r) and it is directly proportional to
(A) $(1/r^2)$ (B) $(1/r^6)$ (C) $(1/r)$ (D) $(1/r^5)$ (E) $(1/r^3)$
ANSWER : E

96. Critical density of a gas having molecular weight 39g mol^{-1} is 0.1gcm^{-3}. Its critical volume in L mol^{-1} is
(A) 0.390 (B) 3.90 (C) 0.039 (D) 39.0 (D) 390
ANSWER : A

97. The various types of hydrides and examples of each type are given below

	Hydride type		Compound
(a)	Electron deficient	(i)	LiH
(b)	Saline	(ii)	CH_4
(c)	Electron-precise	(iii)	NH_3
(d)	Interstitial	(iv)	B_2H_6
(e)	Electron rich	(v)	CrH

Choose the correct matching from the codes given below
(A)   (a) – (ii),   (b) –(iv),   (c) – (v),   (d) – (iii)   (e) – (i)
(B)   (a) – (iv),   (b) –(i),   (c) – (ii),   (d) – (v)   (e) – (iii)
(C)   (a) – (iv),   (b) –(iii),   (c) – (v),   (d) – (ii)   (e) – (i)
(D)   (a) – (v),   (b) –(iii),   (c) – (iv),   (d) – (ii)   (e) – (i)
(E)   (a) – (iv),   (b) –(v),   (c) – (i),   (d) – (ii)   (e) – (iii)
ANSWER : B

98. One mole of hydrazine (N_2H_4) loses 10 moles of electrons in a reaction to form a new compound X. Assuming that all the nitrogen atoms in hydrazine appear in the new compound, what is the oxidation state of nitrogen in X ? (Note: There is no change in the oxidation state of hydrogen in the reaction)
(A) -1 (B) -3 (C) +3 (D) +5 (E) +1
ANSWER : C

99.   The low solubility of LiF and that of CsI in water are respectively due to which of the
      properties of the alkali metal ions?
      (A) Higher hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+
      (B) Smaller hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+
      (C) Smaller lattice enthalpy of Li^+, higher hydration enthalpy of Cs^+
      (D) Smaller hydration enthalpy of Li^+, smaller lattice enthalpy of Cs^+
      (E) Higher lattice enthalpy of Li^+, higher hydration enthalpy of Cs^+
      ANSWER : E

100. The second ionization enthalpy of which of the following alkaline earth metals is the
      highest?
      (A) Ba   (B) Mg   (C)Ca   (D)Sr   (E) Be
      ANSWER : E

101. Which one of the following group 16 elements does not exist in -2 oxidation state?
      (A) S   (B) Se   (C) O   (D) Po   (E) Te
      ANSWER : D

102. In which one of the following compounds of xenon, highest number of lone pair of
      electrons is present on xenon?
      (A) XeF_6 (B) XeF_4 (C) $XeOF_4$ (D) XeO_3 (E) XeF_2
      ANSWER :E

103. The hybridized state of Al^{3+} in the complex ion formed when $AlCl_3$ is treated with
      aqueous acid is
      (A) sp^3 (B) dsp^2 (C) sp^3d^2 (D) sp^2d (E) sp^2
      ANSWER : C

104. Choose the wrong statement in the following
      (A) TiO_2 is used in the pigment industry
      (B) MnO_2 is used in dry battery cells
      (C) V_2O_5 catalyses the oxidation of SO_2 in the manufacture of sulphuric acid
      (D) Ziegler catalyst is used in the manufacture of high density polyethylene
      (E) The 'silver' UK coins are made of Ag/Ni alloy
      ANSWER : E

105. In aqueous solution, Cr^{2+} is stronger reducing agent than Fe^{2+}. This is because
      (A) Cr^{2+} ion is more stable than Fe^{2+}
      (B) Cr^{3+} ion with d3 configuration has favourable crystal field stabilization energy
      (C) Cr^{3+} has half-filled configuration and hence more stable
      (D) Fe^{3+} in aqueous solution is more stable than Cr^{3+}
      (E) Fe^{2+} ion with d^6 configuration has favourable crystal field stabilization energy
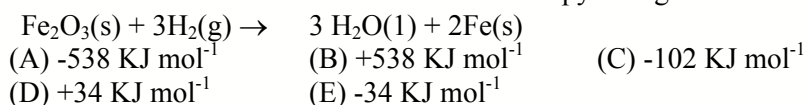   **ANSWER : B**

106. Choose the correct matching of transition metal ion and magnetic moment from the codes given below (At. No.Ti = 22, V = 23, Fe = 26)

Transition element   Magnetic moment (BM)
(a) Titanium (III)   (1)   4.9
(b) Vanadium (II)   (2)   1.73
(c) Iron(II)   (3)   3.87
(A) (a) – (2), (b) – (3),   (c) – (1)   (B) (a) – (2), (b) – (1),   (c) – (3)
(C) (a) – (1), (b) –(2),   (c) – (3)   (D) (a) – (1), (b) –(3),   (c) – (2)
(E) (a) – (3), (b) – (2), (c) – (1)

ANSWER : A

107. The standard enthalpy of formation of $H_2O(1)$ and $Fe_2O_3(s)$ are respectively -286 KJ mol^{-1} and -824 KJ mol^{-1}. What is the standard enthalpy change for the following reaction?

$Fe_2O_3(s) + 3H_2(g) \rightarrow$ 3 $H_2O(1)$ + 2Fe(s)
(A) -538 KJ mol^{-1} (B) +538 KJ mol^{-1} (C) -102 KJ mol^{-1}
(D) +34 KJ mol^{-1} (E) -34 KJ mol^{-1}

ANSWER : E

108. The correct descending order of the heat liberated (in KJ) during the neutralization of the aids $CH_3COOH(W)$, HE(X), HCOOH (Y) and HCN(Z) under identical conditions (K_a of CH_3COOH = 1.8×10^{-5}, HCOOH = 1.8×10^{-4}, HCN = 4.9×10^{-10},   and HF = 3.2×10^{-4}

(A) Y > X > Z > W   (B) X > Y > W > Z   (C) W > X > Z > Z
(D) Z > W > Y > X   (E) Z > W > Y > X

ANSWER : B

109. How many times a 0.1 M strong monobasic acid solution should be diluted so that pH   of the resulting solution is tripled?

(A) 50   (B) 10   (C) 25   (D) 100   (E) 1000

ANSWER : D

110. The equilibrium pressure for the reaction $MSO_4.2H_2O(s) \rightleftharpoons MSO_{4(s)} + 2 H_2O_{(g)}$ is $\pi/4$ atm at 400 K. The Kp for the given reaction (in $atm.^2$) is

(A) $\pi^2/4$ (B) $\pi/6$ (C) $\pi^2/16$ (D) $\pi/16$ (E) $16/\pi$

ANSWER : C

111. Calculate the molality of a solution that contains 51.2 g of naphthalene. ($C_{10}H_8$),   in 500 mL of carbon tetrachloride. The density of CCI_4 is 1.60g/mL.

(A) 0.250 m   (B) 0.500 m   (C) 0.750 m
(D) 0.840 m   (E) 1.69 m

ANSWER : B

112. 31 g of ethylene glycol ($C_2H_6O_2$) is mixed with 500 g of solvent (K_f of the solvent is 2 k kg mol^{-1}). What is the freezing point of the solution in K? (Freezing point of solvent = 273 K)

(A) 272   (B) 271   (C) 270   (D) 274   (E) 275

ANSWER : B

113. The standard reduction potential for Zn^{2+} / Zn, Ni^{2+} / Ni and Fe^{2+} / Fe are -0.76, -0.23 and -0.44 V respectively. The reaction $X + Y^{2+} \rightarrow x^2 + y$ will have more negative ΔG value when X and Y are
(A) X = Ni ; Y = Fe   (B) X = Ni ; Y = Zn   (C) X = Fe ; Y = Zn
(D) X = Zn ; Y = Ni   (E) X = Fe ; Y = Ni

ANSWER : D

114. Thermal decomposition of ammonium dichromate gives
(A) N_2, H_2O and Cr_2O_3 (B) N_2, NH_3 and CrO   (C) $(NH_4)_2CrO_4$ and H_2O
(D) N_2, H_2O and CrO_3 (E) N_2, H_2O and CrO

ANSWER : A

115. An element crystallizing in body centred cubic lattice has an edge length of 500pm. If   its density is 4 g cm^{-3}, the atomic mass of the element in g mol^{-1} is (consider $N_A = 6 \times 10^{23}$)
(A) 100   (B) 250   (C) 125   (D) 150   (E) 50

ANSWER : D

116. The rate constant of the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$ at 300K is 3×10^{-5} s^{-1}. If   the rate of the reaction at the same temperature is 2.4×10^{-5} mol dm^{-3} s^{-1}, then the molar concentration of N_2O_5 is
(A) 0.4 M   (B) 0.8 M   (C) 0.04 M   (D) 0.08 M   (E) 0.6 M

ANSWER : B

117. In the reaction A $\rightarrow$ Products when the concentration of A was reduced from 2.4×10^{-2} M to 1.2×10^{-2} M the rate decreased 8 times at the same temperature. The order of the reaction is
(A) 0   (B) 1   (C) 2   (D) 3   (E) 0.5

ANSWER :D

118. Enzymatic reactions are given in Column I and enzymes in Column II

Column I		Column II	
(a)	Maltose $\rightarrow$ Glucose	(i)	Zymase
(b)	Sucrose $\rightarrow$ Glucose + Fructose	(ii)	Pepsin
(c)	Glucose $\rightarrow$ Ethyl alcohol + CO_2	(iii)	Maltase
(d)	Starch $\rightarrow$ Maltose	(iv)	Invertase
(e)	Proteins $\rightarrow$ Amino acids	(v)	Diastase

Choose the correct matching of enzymatic reaction and enzxyme that catalyses the   correct reaction from the codes given below
(A) (a) – (ii),   (b) –(iv),   (c) – (v),   (d) – (iii)   (e) – (i)
(B) (a) – (iii),   (b) –(iv),   (c) – (i),   (d) – (v)   (e) – (ii)
(C) (a) – (v),   (b) –(iv),   (c) – (ii),   (d) – (i) (e) – (iii)
(D) (a) – (v),   (b) –(iii),   (c) – (iv),   (d) – (ii)   (e) – (i)
(E) (a) – (ii),   (b) –(iii),   (c) – (i),   (d) – (v)   (e) – (iv)

ANSWER : B

119. In which one of the following properties, physusirption and chemisorptions resemble each other?
(A) Force of attraction   (B) Enthalpy of adsorption   (C) Temperature effect
(D) Effect of surface area   (E) Number of adsorption layers

ANSWER : D

120. Consider the following two complex ions: $[CoF_6]^{3-}$ and $[Co(C_2O_4)_3]^{3-}$. Which of the following statement (s) is/are false?

(I) Both are octahedral

(II) $[Co(C_2O_4)_3]^{3-}$ is diamagnetic while $[CoF_6]^{3-}$ is paramagnetic

(III) Both are outer orbital complexes

(IV) In both the complexes the central metal is in the same oxidation state

(A) (II) and (III)　　　　　　　(B) (II), (III) and (IV)　　　　　(C) (III) only

(D) (III) and (IV)　　　　　　　(E) (I), (II) and (IV)

ANSWER : C