1. $CH_3 – CH = CH_2$ reacts readily with B_2H_6 and the product on oxidation with alkaline H_2O_2 gives

(A) CH_3-CH(OH)-CH_2OH (B) CH_3-CO-CH_3

(B) CH_3-CH_2-CH_2-OH (D) CH_3-CH_2-CHO

(E) CH_3-CH_2-CH_2-CHO

ANSWER : C

2. Which one of the following exhibits positive resonance effect (+R effect)?

(A) –CHO (B) –CN (C) –COOH

(D) –OCOR (E) $–NO_2$

ANSWER : D

3. Finkelstein reaction is an example of

(A) Aliphatic nucleophilic substitution reaction

(B) Aliphatic electrophilic substitution reaction

(C) Aromatic electrophilic substitution reaction

(D) Aliphatic free radical substitution reaction

(E) Aliphatic elimination reaction

ANSWER : A

4. Consider the following haloalkanes

(I) 1-Bromobutane

(II) 2-Bromo-2-methylpropane

(III) 2-Bromobutane

The boiling points of the above isomeric haloalkanes decrease in the order

(A) (I) > (II) > (III) (B) (III) > (II) > (I) (C) (II) > (III) > (I)

(D) (II) > (I) > (III) (E) (I) > (III) > (II)

ANSWER : E

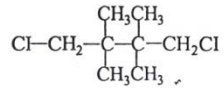
5. Which one of the following compounds will show geometrical isomerism?

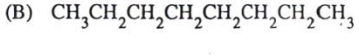
(A) BrCH = CHBr (B) $CH_3CH = CH_2$ (C) $(CH_3)_2C = CHCH_3$

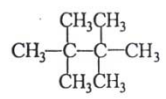
(D) $CH_3CH_2CH = CH_2$ (E) 1, 2 Dimethylbenzene

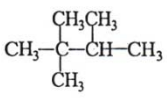
ANSWER : A

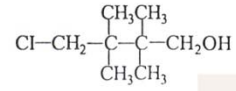
6. Compound ‘A’ with molecular formula $C_4H_{10}O$ reacts instantaneously with cold HCI in the presence of anhydrous $ZnCl_2$ to form a compound ‘B’. ‘B’ when heated with metallic sodium in dry ether forms a compound ‘C’. Compound C is

(A) 

(B) 

(C) 

(D) 

(E) 

ANSWER :C

7. Which one of the following is an achiral molecule?
(A) 2-Butanol (B) 2, 3-Dihydroxypropanal
(C) Bromochloroiodomethane (D) Ethylene glycol (E) Lactic acid
ANSWER : D

8. The major product obtained when 4-Chloronitrobenzene is heated with NaOH at 443 K and then treated with dil. HCI is
(A) Nitrobenzene (B) p-Aminophenol (C) Benzene
(D) p-Nitrophenol (E) p-Dihydroxybenzene
ANSWER : D

9. The product formed when acetone is heated with $Ba(OH)_2$ is
(A) 4-Methylpent-3-en-2-one (B) 3-Methylpent-3-en-2-one
(C) Hex-3-en-2-one (D) 4-Hydroxy-4-Methylpentan-2-one
(E) 4-Methylpent-4-en-2-one
ANSWER :A

10. Which one is preferred reagent for the conversion of ester to aldehyde?
(A) SnC_{I2}/HCI (B) $Pd/BaSO_4$ (C) DIBAL-H
(D) CO/HCI (E) Sn/HCI
ANSWER : C

11. A compound 'A'with molecular formula $C_5H_{10}O$ gives a positive 2, 4 DNP test but a negative Tollen's test. On treatment with sodium hypochlorite, it gives $CHCl_3$ and compound 'B'. Compound 'B' is
(A) Sodium propanoate (B) Sodium butanoate (C) Sodium acetate
(D) n-Butane (E) Isobutane
ANSWER : B

12. Which of the following reactions can convert butanone to n-butane?
(I) Rosenmund's reduction (II) Clemmensen reduction
(C) Reduction with NiAIH4 (IV) Wolff-Kishner reduction
Choose the correct answer from the codes given below
(A) (I), (II) and (IV) (B) (I) and (II) (C) (I), (II), (III) and (IV)
(D) (II) and (IV) (E) (I) and (IV)
ANSWER : D

13. Which one of the following compounds will give propanamine in Hofmann's bromamide reaction?
(A) Nitropropane (B) Propanamide (C) Butanamide
(D) Propanenitrile (E) Butanamine
ANSWER : C

14. Which one is preferred reagent for the reduction of nitrobenzene to aniline?
(A) H_2 /Pd / Ethanol (B) H_2 /Pt / Ethanol (C) Finely divided Nickel
(D) Zn / NaOH (E) Fe / HCI
ANSWER : E

15. When aniline is treated with excess CH_3I, the major product obtained is
(A) N-Methylaniline (B) N, N-Dimethylaniline
(C) p-Toluidine (D) 2, 4, 6-Trimethylaniline
(E) Trimethylphenyl ammonium iodide
ANSWER : E

16. N-Phenylethanamide is treated with Br_2 in acetic acid and the major product formed is hydrolysed by dilute alkali to get compound 'A'. Compound 'A' is
(A) 2-Bromoaniline (B) 3-Bromoaniline (C) Aniline
(D) 4-Bromoaniline (E) 2-Bromobenzoic acid
ANSWER :D

17. The linkage of the two monosaccharide units in lactose is
(A) C_1 of the one glucose with C_2 of another glucose
(B) C_1 of the one glucose with C_4 of another glucose
(C) C_1 of glucose with C_4 of galactose
(D) C_1 of galactose with C_4 of glucose
(E) C_1 of galactose with C_2 of glucose
ANSWER : D

18. Which of the following vitamin is responsible for increased fragility of RBCs?
(A) Vitamin B_1 (B) Vitamin E (C) Vitamin K
(D) Vitamin C (E) Vitamin B_6
ANSWER :B

19. Which one of the following is incorrectly matched?

(A) α and β-Glucose	-	Anomer
(B) Amylose	-	Starch
(C) Glycogen	-	Animal starch
(D) Cellulose	-	Polymer of β-D-glucose
(E) Myosin	-	Globular protein

ANSWER : E

20. The three bases present both in DNA and RNA are
(A) Guanine, cytosine and uracil (B) Adenine, guanine and thymine
(C) Adenine, guanine and uracil (D) Adenine, guanine and cytosine
(E) Adenine, thymine and uracil
ANSWER : D

21. One of the builders present in scouring soaps?
(A) Trisodium phosphate (B) Sodium sulphate
(C) Sodium rosinate (D) Borax (E) Glycerol
ANSWER : A

22. The major contributor to global warming is
(A) Methane (B) Carbon dioxide (C) Ozone
(D) Water vapour (E) CFCs
ANSWER : B

23. The number of molecules in 100 mg of heptanes is ……than those in 10 mg of propyne.
(A) 4 times greater (B) 4 times lesser (C) 2.5 times lesser
(D) 2.5 times greater (E) 16 times greater
ANSWER : A

24. The value of the de Broglie wavelength of He atom at -173^0C is how many times its de Broglie wavelength at 327^0C?
(A) $\sqrt{5}$ (B) $\sqrt{6}$ (C) $\sqrt{2}$ (D) $\sqrt{12}$ (E) $\sqrt{15}$
ANSWER : B

25. Two electrons I and II have the following set of quantum numbers
I = 3, 2, 0, -1/2 II = 4, 0, 0, +1/2
Which of the following statements is true?
(A) Electrons I and II have same energy.
(B) Electrons I has lower energy than II
(C) Electrons I is in 3p orbital while electron II is in 4s orbital
(D) Electrons I has higher energy than II
(E) Electrons I has clockwise spin while electron II has anti-clockwise spin
ANSWER : D

26. Which of the following species among the following are iso electronic?
Na^+, K^+, Li^+, Ne, Mg^{2+} and Cl^-
(A) Na^+, K^+, and Li^+, (B) Ne, Mg^{2+} and Cl^- (C) Li^+, Ne and Cl^-
(D) Na^+, Ne and Mg^{2+} (E) K^+, Cl^- and Mg^{2+}
ANSWER : D

27. The correct ascending order of atomic radius in the following atoms is
(A) B < Be < Li < AI (B) B < Li < Be < AI (C) B < Be < AI < Li
(D) Be < B < AI < Li (E) Be < B < Li < AI
ANSWER : C

28. Which one of the following diatomic molecules has the highest dipole moment?
(A) H_2 (B) HF (C) HCI (D) HBr (E) HI
ANSWER : B

29. The species with fractional bond order is
(A) O^{2+} (B) O_2^{2-} (C) CO (D) He_2 (E) N_2
ANSWER : A

30. Equal masss of a gas X and oxygen were present in a closed vessel at 2.5^0C . Tha partial pressure of oxygen was found to be (5/6) times of the total pressure. The molar mass of the gas X in g mol^{-1} is
(A) 64 (B) 60 (C) 160 (D) 80 (E) 128
ANSWER : C

31. At constant temperature, a bulb 'A' of volume 100 mL containing an ideal gas was connected to another evacuated bulb 'B'. The pressure fell down to 40% of its initial pressure. The volume of bulb 'B' (in mL) is

(A) 75 (B) 150 (C) 125 (D) 200 (E) 250

ANSWER : B

32. The compressibility factor (Z) of one mole of a van der Waals' gas with negligible 'a' value is

(A) bP/RT (B) [1 – (bP/RT] (C) [1 + (bP/RT]
(D) (1/bP) (E) RT/bP

ANSWER : C

33. The element used in jewellery occupying the position of 6^{th} period and 10^{th} group in the long term of the periodic table is

(A) Ag (B) Au (C) Cu (D) Pt (E) Ir

ANSWER : D

34. The increasing order of electronegativity of the three elements O,F and Na is

(A) Na < O < F (B) O < F < Na (C) Na < F < O
(D) F < O < Na (E) O < Na < F

ANSWER :A

35. What is the IUPAC official name of element with atomic number 110?

(A) Darmstadtium (B) Hassium (C) Seaborgium
(D) Nobelium (E) Bohrium

ANSWER :A

36. What are the constituents present in German silver?

(A) Cu, zn and Fe (B) Pb, Ag and Ge (C) Cu, Zn and Ni
(D) AI, Ag and Ge (E) Ni, Zr and In

ANSWER : C

37. Froth floatation is not used in the concentration of

(A) Magnetite (B) Iron Pyrites (C) Copper pyrites
(D) zinc blende (E) Copper glance

ANSWER : A

38. The liquid alkali metal used as coolant in fast breeder nuclear reactors is

(A) Lithium (B) Sodium (C) Potassium
(D) Rubidium (E) Caesium

ANSWER : B

39. In which one of the following oxyacids, phosphorus exhibits +4 oxidation state?

(A) Metaphosphoric Acid (B) Hypophosphorous acid
(C) Pyrophosphorous acid (D) Orthophosphorous acid
(E) Hypophosphoric acid

ANSWER : E

40 When B_2H_6 is heated with NH_3, the final product is

(A) Borazine (B) Boron nitride (C) Boron trioxide

(D) Boron (E) Boric acid

ANSWER : A

41. Which one of the following oxides of nitrogen has linear shape?

(A) N_2O_3 (B) NO_2 (C) N_2O_4

(D) N_2O_5 (E) N_2O

ANSWER : E

42. The hybridized state of the bromine atom is BrF_5 is

(A) sp^3d (B) dsp^2 (C) sp^3d^3 (D) sp^3d^2 (E) sp^3

ANSWER : D

43. Which pair of the following 4d series of elements has the same number of electrons in 4d subwell?

(A) Mo and Tc (B) Nb and Mo (C) Pd and Ag

(D) Rh and Pd (E) Ru and Rh

ANSWER :C

44. In which of the following pairs, both the ions are coloured in aqueous solutions?

(A) $Ni^{2+,}$ Ti^{4+} (B) $Ni^{2+,}$ Ti^{3+} (C) $Sc^{3+,}$ Ti^{3+}

(D) $Cr^{2+,}$ Zn^{2+} (E) $Sc^{3+,}$ Mn^{2+}

ANSWER : B

45. In which one of the following actinoid elements 6d subshell is vacant?

(A) Pa (B) Np (C) Lr (D) Cm (E) Pu

ANSWER : E

46. Which one of the lanthanide ions is diamagnetic?

(A) Pr^{3+} (B) Nd^{3+} (C) Ce^{4+} (D) Er^{3+} (E) sm^{3+}

ANSWER : C

47. The work done on the system when one mole of an ideal gas is compressed isothermally to a final volume of 0.01 m^3 at constant external pressure of 5 bar is 20kJ. What is the initial volume of the gas?

(A) 0.045 m^3 (B) 0.035 m^3 (C) 0.025 m^3

(D) 0.05m^3 (E) 0.04 m^3

ANSWER : D

48. The values if ΔH and ΔS for the reaction

$C(graphite) + CO_2(g) \rightarrow 2CO(g)$

Are 170 kJ and 170 JK-1 respectively. The reaction will be spontaneous only a

(A) 910 K (B) 510 K (C) 710 K (D) 1110K (E) 810K

ANSWER : D

49. The value of (ΔH-ΔE) for the reaction

$C_6H_6(1) + 7\frac{1}{2}O_2(g) \rightarrow 6CO_2(g) + 3H_2O(I)$ at 270C is (R = 2 cal K-1 mol-1)

(A) 0.9 kcal (B) 9 kcal (C) -0.9 kcal (D) -9 kcal (E) -1.8kcal

ANSWER :C

50. The pH of a colution obtained by mixing 60 mL of 0.1 M BaOH solution at 40mL of 0.15 m.HCI solution is

(A) 10 (B) 12 (C) 2 (D) 8 (E) 7

ANSWER : E

51. The colubility product (Ksp) of the following compounds are given at 298K

Compound	Ksp
$BaSO_4$	1.0×10^{-10}
$CaSO_4$	9.0×10^{-6}
MnS	2.5×10^{-13}
$Ni(OH)^2$	5.0×10^{-16}

The most soluble and least soluble compound are respectively

(A) $BaSO_4$ $CaSO_4$ (B) MnS and $Ni(OH)_2$ (C) $CaSO_4$ and MnS

(D) $BaSO_4$ and $Ni(OH)_2$ (E) MnS and $CaSO_4$

ANSWER : C

52. The equilibrium constant for the following reactions

$N_2(g) + 3H_2(g) \rightleftarrows 2NH3(g)$, $N_2(g) + O_2(g) \rightleftarrows 2NO(g)$

and $H_2(g) + \frac{1}{2}O_2(g) \rightleftarrows H_2O(1g)$ are K_1, K_2 and K_3 respectively.

The equilibrium constant (K) for the reaction

(A) $K_2.K_3^3/K_1$ (B) $K_2^2K_3/K_1$ (C) $K_1.K_2/K_3^2$

(D) $K_2.K_3/K_1^2$ (E) $K_1\ K_2/K_3^2$

ANSWER : A

53. Consider the following equilibrium reaction

$2CO_2(g) \rightleftarrows 2CO(g) + O_2(g)$

Let Chatelier's principles predicts that adding $O_2(g)$ to the reaction container at constant temperature will

(A) Decrease the partial pressure of $Co_2(g)$ at equibrium

(B) Increase the value of the equilibrium constant

(C) Increase the partial pressure of $CO_2(g)$ at equilibrium

(D) Increase the partial pressure of CO(g) at equilibrium

(E) Decrease the value of the equilibrium constant

ANSWER : C

54. A solution obeying Raoult's law has an elevation of boiling point of 1^0C. What is the mass percentage of solute in the solution?

(A) 10 (B) 12 (C) 8 (D) 2 (E) 4

ANSWER : E

55. An aqueous solution of glucose containing 60 g glucose ($C_6H_{12}O_{16}$) per litre an osmotic pressure of 5.2 bar at 300 K. The concentration of the gluco solution having osmotic pressure of 1.3 bar at the same temperature is

(A) 1/10M (B) 1/5 M (C) 1/20 M (D) 1/3 M (E) 1/12 M

ANSWER : E

56. A solution contains 4 g of NaOH and 16.2 g of water. The mole fraction solute and solvent are respectively

(A) 0.1, 0.9 (B) 0.2, 0.8 (C) 05., 0.5

(D) 0.4, 0.6 (E) 0.3, 0.7

ANSWER : A

57. Three elements x, y and z have the respective oxidation states -2, +3 and -1 which one of the following could be possible formula of the compound form by these elements ?

(A) $X_2(yx_4)_3$ (B) $y_2(z_4x)_3$ (C) $x_2(zy_4)_3$

(D) $y_2(zx_4)_3$ (E) $z_2(xy_4)_3$

ANSWER :D

58. Given the standard reduction potential $F_2/F = +2.85$ V, $CI_2/CI^- = +1.36$, $Br_2/Br- = +1.06$V and $I_2/I = +0.53$ V. The strongest oxidizing and reduce agents respectively among these species are

(A) F_2 and I (B) Br_2 and CI^- (C) CI_2 and Br^-

(D) CI_2 and I_2 (E) F^- and I_2

ANSWER : A

59. At a particular temperature, the ratio of molar conductivity to conductivity 0.1N solution of sodium chloride is

(A) 10^4 cm^3 (B) 10^3 cm^3 (C) 10^{-1} cm^3

(D) 10^2 cm^3 (E) 10 cm^3

ANSWER : A

60. In the electrolysis of aquous sodium chloride solution, the products are

(A) NaOH and CI_2 only (B) NaOH, CI_2 and O_2 only

(C) NaOH, CI_2, O_2 and H_2 (D) Na and CI_2 only

(E) NaOH, CI_2 and H_2 only

ANSWER : E

61. The time required for 75% completion of a first doer reaction is (k = rate constant)

(A) $\frac{0.6932}{k}$ (B) $\frac{0.3466}{k}$ (C) $\frac{0.6932\times 4}{3}$

(D) $\frac{0.6932\times 3}{4k}$ (E) $\frac{1.3864}{k}$

ANSWER : E

62. The slope of Arrhenius plot (In k vs 1/T) of a first order reaction is -5×10^3. The value of E_a of the reaction si (R = 8.3 JK^{-1} mol^{-1})
(A) 41.5 kJ mol^{-1} (B) 83 kJmol^{-1} (C) – 41. 5 j/Jmol^{-1}
(D) – 83 kJ mol^{-1} (E) 166 kJ mol^{-1}
ANSWER : A

63. A reaction P $\longrightarrow$ Q has an activation energy of 25 kJ mol^{-1} and enthalpy change of - 5 kJ mol^{-1}. The activation energy for the reaction Q $\longrightarrow$ P is
(A) 30 kJmol^{-1} (B) 20 kJ mol^{-1} (C) 15 kJ mol^{-1}
(D) 25 kJ mol^{-1} (E) 30 kJ mol^{-1}
ANSWER : E

64. Which one is **not correctly** matched?

(A) Lyophobic collid	-	Metal sulphide sol
(B) Multimoleualr colloid	-	Gold sol
(C) Lyophilic colloid	-	Sulphur sol
(D) Macromolecular colloid	-	Cellulose
(E) Associated colloid	-	Detergent

ANSWER : C

65. In a Freundlich's adsorption isotherm, the slope is unity and k is 0.1. The extent of adsorption at 2 atmosphere is (log 2 = 0.3010)
(A) 0.6 (B) 0.2 (C) 0.4 (D) 0.3 (E) 0.8
ANSWER : B

66. Math the correct pair

Process	Adsorbent
(a) Control of humidity	(i) Activated charcoal
(b) Gas masks in coal mine	(ii) Nickel
(c) Adsorption indicators	(iii) Silica get
(d) Hydrogenation of oils	(iv) Silver halides

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

67. Identify the heteroleptic complex
(A) $\left[Zn(NH_3)_4\right]^{2+}$ (B) $\left[CoF_6\right]^{3-}$ (C) $\left[Pt(NH_3)_2Cl_2\right]$
(D) $\left[Cr(C_2O_4)_3\right]^{3-}$ (E) $\left[Fe(CN)_6\right]^{4-}$
ANSWER : C

68. Among the following complexes
(i) $[Ni(CO)_4]$ (ii) $[Ni(CN)_4]^{2-}$ (iii) $[NiCl_4]^{2}$
(A) (i) and (ii) are diamagnetic but (iii) is paramagnetic
(B) (i) and (ii) are diamagnetic but (ii) is paramagnetic
(C) (ii) and (iii) are diamagnetic but (i) is paramagnetic
(D) (i) and (iii) are paramagnetic but (ii) is diamagnetic
(E) (ii) and (iii) are paramagnetic but (i) is diamagnetic
ANSWER : A

69. The correct formula of dichlorobis (triphenylphosphine) nickel (II) is
(A) [Ni Cl_2 $(PPH_3)_2$]Cl (B) [$NiCl_2$ $(Ph_3)_2$] (C) [$NiCl_2(PPh_2)_3$]
(D) [NiCl $(PPh_3)_2$] Cl (E) [$NiCl_2(PPh_3)_2$]
ANSWER : E

70. Which one of the following molecules contains carbon atoms in three hybridized states?
(A) Phenyl cyanide (B) Triphenylmethane (C) Toluene
(D) Cumene (E) Phenyl methyl cyanide
ANSWER : E

71. The number of σ_{c-c}, π_{c-c} and $\sigma_{c-H,}$ bonds in cumene are respectively
(A) 9,12 and 3 (B) 12,9 and 3 (C) 9,3 and 12
(D) 3,9 and 12 (E) 12,3 and 9

ANSWER : C

72. Among the following the compound that possesses primary, secondary, tertiary and quaternary carbon atoms, is
(A) 2,3 – Dimethylpentane (B)2,3,4-Trimethylpentane (C) 3,3-Dimethylpentane
(D) 2,2,4-Trimethylpentane (E) 2,4-Dimethylpentane
ANSWER : D

73. Choose the wrong statement
(A) Magnetic flux is a scalar quantity
(B) Coefficient inductance is a vector quantity
(C) The mutual inductance of a pair of solenoids depends on their relative orientation
(D) Lenz law gives the direction of the induced emf
(E) AC generator converts mechanical energy into electrical energy
ANSWER : B

74 Two different coils having self-inductance values L_1 = 8 mH and L_2 = 2 mH are kept far apart. If the rate of change of current in the second coil is twice that in the first coil, then the ratio of induced emf in the first coil to that in the second coil is
(A) 2: 3 (B) 1 : 2 (C) 1 : 1 (D) 2 : 1 (E) 1 : 3
ANSWER : D

75. In an ac generator, mechanical energy is converted into electrical energy by virtue of
(A) Electrostatic induction (B) Magnetic induction
(C) Electric induction (D) Electromagnetic induction
(E) Mutual induction
ANSWER : D

76. Choose the **wrong** statement
(A) Electromagnetic waves travel at the speed of light
(B) Electromagnetic waves are transverse waves
(C) The ratio of the electric field to the magnetic field in an electromagnetic wave equal the speed of light
(D) Electromagnetic waves carry both energy and momentum
(E) Electromagnetic waves can be deflected by magnetic field.
ANSWER : E

77. The convex lenses of focal lengths 10 cm and 20 cm are kept in contact. The effective power of the lens system is
(A) 30D (B) 15D (C) 20D (D) 12D (E) 25D
ANSWER : B

78. The emergent ray of light after refraction at a rectangular glass slab
(A) Suffers deviation
(B) Suffers no lateral displacement with respect to the incident ray
(C) Emerges perpendicular to the incident ray
(D) Emerges parallel to the incident ray
(E) Emerges along the incident ray direction
ANSWER : D

79. When unpolarised light is incident at Brewster's angle on the boundary between to transparent media, the reflected light is polarized with its electric vector is
(A) A plane parallel to the plane of incidence
(B) A plant 45^o to the plant of incidence
(C) A plane perpendicular to the plane of incidence
(D) A plant 30^o to the plane of incidence
(E) A plane 60^o to the plane of incidence
ANSWER : C

80. The following pair of physical quantities of the photoelectric phenomenon that gives a straight line graph is
(A) Intensity of radiation and photoelectric current
(B) Potential of the anode and photoelectric current
(C) Threshold frequency and velocity of photoelectrons
(D) Intensity of radiation and the stopping potential
(E) Frequency of incident radiation and the photoelectric current
ANSWER : A

81. If 10% of a radioactive material decays in 10 days the percentage of the material that decays in 20 days is
(A) 20% (B) 41% (C) 81% (D) 19% (E) 90%
ANSWER : D

82. $^{22}Ne_{10}$ nucleus, decays into two alpha particles and an unknown nucleus. The unknown nucleus is
(A) Nitrogen (B) Carbon (C) Boron (D) Oxygen (E) Fluorine
ANSWER : B

83. A device which is used to detect optical signals is a
(A) Junction diode (B)Light emitting diode (C) Photovoltaic device
(D) Zener diode (E) Photodiode
ANSWER : E

84. Identify the **incorrect** matching among the following
(A) Transistor - Switch in saturation state
(B) Photodiode - Forward baised p-n junction diode
(C) Zener diode - Heavily doped p-n junction diode
(D) Solar cell - Unbaised photodiode
(E) Light emitting diode - Heavily doped forward biased p-n junction diode
ANSWER : B

85. The angular frequency of a tuned collector oscillator having an LC feedback network is

(A) $\sqrt{LC}$ (B)LC (C) $\frac{1}{\sqrt{LC}}$ (D) $\frac{L}{C}$ (E) $\sqrt{\frac{L}{C}}$

ANSWER : C

86. The layer which reflects HF waves efficiently during night time is

(A) troposphere (B) thermosphere (C) lower part of stratosphere
(D) upper part of stratosphere (E) mesosphere

ANSWER : B

87. In a receiver, the deice which changes the AM wave into a lower frequency wave before its detection is

(A) If stage amplifier (B) Amplifier (C) Rectifier
(D) Envelope detector (E) Band-pass filter

ANSWER : A

88. Digital signals

(A) Provide a continuous set of values
(B) Can utilize decimal as well as binary system
(C) Can utilize only decimal system
(D) Represent values as discrete steps
(E) Cannot utilize binary system

ANSWER : D

89. Two physical quantities P and Q have different dimensions. The physically meaningful mathematical relation is

(A) P+ Q (B) P – Q (C) $\frac{P}{Q}$ (D) $\frac{(P-Q)}{Q}$ (E) $\frac{(P+Q)}{Q}$

ANSWER : C

90. In one dimension, the angle between velocity vector and acceleration vector of an object is

(A) either 0^o or 180^o (B) Between 0^o and 180^o (C) Between 90^oo and 180^o
(D) More than 180^o (E) 90^o

ANSWER : A

91. If a train of length 300m crosses a bridge at a speed of 108 km h^{-1} in 30 s, then the length of the bridge is

(A) 200 m (B) 600 m (C) 400 m (D) 300 m (E) 100 m

ANSWER : B

92. The y-component of the velocity of a body moving with a velocity, $\vec{u} = 4\hat{i} + 3\hat{j}\ ms^{-1}$ is

(A) 1 ms^{-1} (B) 5 ms^{-1} (C) 4 ms^{-1} (D) 7 ms^{-1} (E) 3 ms^{-1}

ANSWER : E

93. Two particles each of mass m_1 and m_2 are moving in concentric circles of radii r_1 and r_2 respectively such that their periods are same. Then the ratio of their centripetal accelerations is

(A) r_1/r_2 (B) r_2/r_1 (C) $\frac{r_1}{2r_2}$ (D) $\frac{2r_1}{r_2}$ (E) $\sqrt{\frac{r_1}{r_2}}$

ANSWER : A

94. The propulsion of a rocket is based on the principle of conservation of
(A) Angular momentum (B) Mass (C) Linear momentum
(D) Kinetic energy of the system (E) Total energy of the system
ANSWER : C

95. Identify the **incorrect** statement
(A) Rolling friction is always less than siding friction
(B) The mechanical efficiency of a machine increases with the use of lubricants
(C) Inertia of a body is a measure of its mass
(D) Cream separator is an example of centrifuge
(E) Newton's law hold good in a non-inertial frame
ANSWER : E

96. A force of 1N acting on a body of mass 2 kg produces in it an acceleration of (in ms^{-2})
(A) 1 (B) 0.5 (C) 1.5 (D) 2 (E) 4
ANSWER : B

97. When a same force of 5 N is applied to two balls A and B separately, they move along the direction of the force with a velocity of 5 ms^{-1} and 10 ms^{-1} respectively. The rate of work done on the ball A to that on B are in the ratio
(A) 1 : 3 (B) 1 : 2 (C) 1 : 1 (D) 2 :1 (E) 3 : 1
ANSWER : B

98. When rigid body has neither linear acceleration nor angular acceleration then it is said to be in
(A) Rational equilibrium (B) Relative equilibrium (C) Mechanical equilibrium
(D) Partial equilibrium (E) Translational equilibrium
ANSWER : C

99. The pair of rigid bodies with mass M and radius R, having the moment of inertia $\frac{MR^2}{2}$ can be
(A) A ring and a solid cylinder (B) A ring and a hollow cylinder
(C) A disc and a hollow cylinder (D) A solid cylinder and a solid sphere
(E) A solid sphere and a hollow cylinder
ANSWER : A

100. Kepler's second law (law of areas) of planetary motion leads to law of conservation of
(A) Total Energy (B) Linear momentum (C) Gravitational potential energy
(D) Kinetic energy (E) Angular momentum
ANSWER : E

101. The ratio between the altitude and depth (<< radius of earth R) from the surface of earth at which the change in the value of g is same, is
(A) 2 : 1 (B) 1 : 2 (C) 1 : 1 (D) $\sqrt{2}$:1 (E) 1 : $\sqrt{2}$
ANSWER : B

102. The equation of continuity in incompressible fluid flow is based on the principle of conservation of
(A) Potential energy of the fluid (B) Kinetic energy of the fluid
(C) Total energy of the fluid (D) Fluid mass
(E) Fluid momentum
ANSWER : D

103. The maximum length of a wire of density ρ and breaking stress S that can hang freely without breaking is

(A) $\frac{S}{\rho g}$ (B) $\frac{2S}{\rho g}$ (C) $\frac{\rho g}{2S}$ (D) $\frac{3S}{\rho g}$ (E) $\frac{\rho gS}{2}$

ANSWER : A

104. The flow of liquid in a tube is laminar, when the value of Reynold's number lies between

(A) 1000 and 3000 (B) Zero and 2000 (C) 2000 and 4000
(D) Zero and 3000 (E) 2000 and 5000

ANSWER : B

105. A monoatomic gas at pressure P is compressed adiabatically to $\left(\frac{1}{8}\right)$ of its initial volume. Then the pressure of the gas will change to

(A) 8P (B) 16 P (C) $\frac{40}{3}P$ (D) $\frac{22}{5}P$ (E) 32P

ANSWER : E

106. In a refrigerator, if the system extracts heat Q_2 from the cold reservoir and releases heat Q_1 to the hot reservoir, then the coefficient of performance of the refrigerator is

(A) $\frac{Q_1}{Q_1 - Q_2}$ (B) $\frac{Q_2}{Q_1 - Q_2}$ (C) $\frac{Q_1}{Q_2}$ (D) $\frac{Q_2}{Q1}$ (E) $\frac{Q_1 - Q_2}{Q_2}$

ANSWER : B

107. Equal masses of a diatomic gas in separate containers undergo same change of temperature by two different processes, one at constant volume and another at constant pressure. The ratio of the respective heats supplied is

(A) 1 : 1 (B) 1 : 2 (C) 2 : 5 (D) 5 : 7 (E) 3 : 5

ANSWER : D

108. A linear harmonic oscillator with force constant 3.210^6 N m^{-1} and amplitude 0.01 m has a

(A) Maximum potential energy 80 J (B) Maximum potential energy 160 J
(C) Maximum kinetic energy 80 J (D) Minimum kinetic energy 160 J
(E) Minimum potential energy 100 J

ANSWER : B

109. Motion of a planet around the sun is a

(A) Periodic and simple harmonic motion
(B) Mon-periodic but simple harmonic motion
(C) Periodic but not simple harmonic motion
(D) Oscillatory and simple harmonic motion
(E) Non-periodic and damped harmonic motion

ANSWER : C

110. During wave propagation in a medium, whenever the temperature of the medium changes, there is a change in

(A) Time period (B) Wavelength (C) Frequency
(D) Phase (E) Amplitude

ANSWER : B

111. The fundamental frequency of a closed organ pipe is 256 Hz. The unallowed overtone frequency is
(A) 512 Hz (B) 768 Hz (C) 1280 Hz (D) 1792 Hz (E) 2304 Hz
ANSWER : A

112. The SI unit of surface integral of electric field is
(A) Cm^3 (B) V (C) Vm^{-1} (D) Bm (E) NC^{-1} m
ANSWER : D

113. An electric dipole consists of two charges of 0.2 C separated by a distance of 2.0 cm. The dipole is placed in an external electric field of 10^5 NC^{-1}. The maximum torque experienced by the dipole is
(A) 4 Nm (B) 4×10^{-7} Nm (C) 4×10^{4} Nm (D) 4×10^{-5} Nm (E) 4×10^{-4} Nm
ANSWER : E

114. If conductor A is positively charged and conductor B is negatively charged, then the conductor(s)
(A) A has lost electrons
(B) B has lost electrons
(C) Both A and B have lost electrons
(D) A has lost protons
(E) B has lost protons
ANSWER : A

115. Electrical conductivity is the reciprocal of
(A) Mobility (B) Conductance (C) Resistivity (D) Resistance (E) Current density
ANSWER : C

116. Nichrome is used as electrical heating element because of its
(A) Negative temperature coefficient of resistance
(B) Strong dependence of resistivity with temperature
(C) Low melting point
(D) Weak dependence of resistivity with temperature
(E) Semiconducting nature
ANSWER : D

117. The circuit element to which Ohm's law is applicable is
(A) Junction diode (B) Zener diode (C) Resistor (D) Transistor (E) Photodiode
ANSWER : C

118. The magnetic field at any point on the axial line of a short bar magnet at a distance r from its centre is proportional to
(A) r (B)1/r (C) $1/r^2$ (D) r^3 (E)$1/r^3$
ANSWER : E

119. If a helium nucleus makes a full rotational in a circle of radius 0.8 m in 2 nano second, then the magnetic induction at the centre of the circle is
(A) $2\pi\times10^{-10}$T (B) $4\pi\times10^{-17}$T (C) $2\pi\times10^{-17}$T (D) $4\pi\times10^{-10}$T (E) 1.6×10^{-10}T
ANSWER : B

120. The vertical component of earth's magnetic field is $\frac{1}{\sqrt{3}}$ times the horizontal component at a certain place. Angle of dip at that place is
(A) 90^o (B) 45^o (C) 0^o (D) 60^o (E) 30^o
ANSWER : E