Time : 1 hour

Full Marks : 100

Each question carries 1 mark.

There is negative marking of 0.25 mark for each wrong answer.

Answer all questions, choosing the correct one from the alternatives suggested and darken the appropriate circle using BLUE or BLACK BALL POINT PEN.

1. Which of the following alloys generally does not contain zinc ?
   (1) Brass
   (2) Bronze
   (3) German Silver
   (4) Gun metal

2. Which of the following substances contains maximum number of water molecules per mole in its crystal ?
   (1) Potash alum
   (2) Mohr salt
   (3) Washing soda
   (4) Blue vitriol

3. The pure form of iron is :
   (1) Pig Iron
   (2) Cast Iron
   (3) Wrought Iron
   (4) Invar

4. Which of the following pair of electrodes has positive values of standard electrode potential ?
   (1) $K^+/K$, $Fe^{2+}/Fe$

   (2) $Cu^{2+}/Cu$, $Ag^+/Ag$

   (3) $Co^{2+}/Co$, $Ba/Ba^{2+}$

   (4) $\frac{1}{2}F_2/F^-$, $Li^+/Li$

5. Which of the following salts provides coloured gas on thermal decomposition ?
   (1) Potassium chlorate
   (2) Ammonium nitrite
   (3) Sodium nitrate
   (4) Lead nitrate

6. The reagent used to distinguish formaldehyde and acetaldehyde is :
   (1) Alkaline iodine
   (2) Alkaline phenol
   (3) Tollen's reagent
   (4) Baeyer's reagent

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7. Nylon 6 is a polymer, its monomer is :

(1) Hexamethylenediamine co-polymer of

(2) Adipoly chloride

(3) Both (1) and (2)

(4) Caprolactam

8. The percentage of empty space in a body centred cubic arrangement is :

(1) 74

(2) 68

(3) 32

(4) 26

9. 1 mole of liquid A and 2 moles of liquid B make a solution having a total vapour pressure of 38 torr. The vapour pressure of pure A and pure B are 45 torr and 36 torr respectively. The given solution .

(1) Is an ideal solution

(2) Shows negative deviation

(3) Is a minimum boiling azeotrope

(4) Shows positive deviation

10. When a catalyst increases the rate of a chemical reaction, the rate constant :

(1) Remains constant

(2) Increases

(3) Decreases

(4) May increase or decrease depending on order of reaction

11. The term 'sorption' stands for :

(1) Absorption

(2) Adsorption

(3) Both absorption and adsorption

(4) Desorption

12. Among the following electrolytes, the most effective coagulating agent for $Sb_2S_3$ solution is :

(1) $K_2SO_4$

(2) $CaCl_2$

(3) $Al_2(SO_4)_3$

(4) $Na_3PO_4$

13. Which of the following compounds has higher magnetic moment ?

(1) $[Fe(CN)_6]^{3-}$

(2) $[Fe(CN)_6]^{4-}$

(3) $[Ni(CO)_4]$

(4) $[Fe(H_2O)_6]^{3+}$

14. Among the trihalides of phosphorus _____ has higher bond angle.

(1) $PF_3$

(2) $PBr_3$

(3) $PI_3$

(4) $PCl_3$

15. Which of the following are peroxoacids of sulfur ?

   (1) $H_2SO_5$ and $H_2S_2O_8$

   (2) $H_2SO_5$ and $H_2S_2O_7$

   (3) $H_2S_2O_7$ and $H_2S_2O_8$

   (4) $H_2S_2O_6$ and $H_2S_2O_7$

16. In which of the following pair, the nature of hybridisation is not same ?

   (1) $PCl_3$, $CHCl_3$

   (2) $SO_2$, $SnCl_2$

   ✓(3) $NH_3$, $NH_4^+$

   (4) $XeF_2$, $BeF_2$

17. In the preparation of xenon compounds, Bartlett had taken $O_2PtF_6$ as a base compound. This is because :

   (1) Both $O_2$ and Xe have same size

   (2) Xenon and Oxygen are gases

   (3) Oxygen molecule is paramagnetic

   (4) Both dioxygen and Xenon have almost same $\Delta_iH$ values

18. In which of the following compounds, nitrogen exhibits highest oxidation state ?

   (1) Hydrazine

   (2) Ammonia

   (3) Hydrazoic acid

   (4) Hydroxylamine

19. HI cann't be prepared by action of conc. $H_2SO_4$ on KI because :

   (1) HI is a weaker acid than $H_2SO_4$

   (2) KI is an insoluble salt

   (3) Both HI and $H_2SO_4$ are oxidants

   (4) HI is a strong reducing agent

20. Explosive reaction takes place when conc. $H_2SO_4$ is added to potassium permanganate. This is due to the formation of :

   (1) MnO

   (2) $Mn_2O_3$

   (3) $Mn_2O_5$

   (4) $Mn_2O_7$

21. Which of the following is wrongly matched ?

   (1) $[Cu(NH_3)_4]^{2+}$ — Square planar

   ✓(2) $[NiCO)_4]$ — Neutral ligand

   (3) $[Co(en)_3]^{3+}$ — follows EAN rule

   (4) $[Cr(NH_3)_6]^{3+}$ — $sp^3d^2$

(5)

( Turn over )

22. Flerovium is a superheavy artificial element with symbol Fl. Its atomic number is :

    (1) 114

    (2) 115

    (3) 113

    (4) 116

23. Acetic acid exists as a dimer in benzene due to :

    (1) Solvation

    (2) Intermolecular H-bonding

    (3) Presence of – COOH

    (4) Presence of $\alpha$-H atom

24. Equanil is a drug to control :

    (1) Pneumonia

    (2) Malaria

    (3) Cold fever

    (4) Mental disease

25. Which hormone contains iodine ?

    (1) Thyroxine

    (2) Insulin

    (3) Adrenaline

    (4) Testosterone

26. Which of the following solution has lower pH value ?

    (1) 2M NaCl(aq.)

    (2) 0.2M caustic soda solution

    (3) 1M $NH_4Cl$(aq.)

    (4) 1M sodium acetate solution

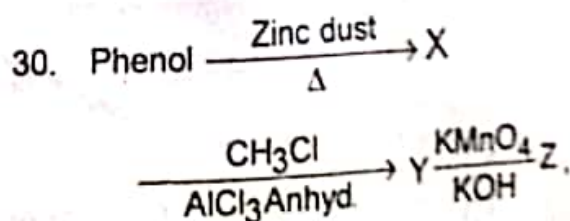27. The compound which reacts faster with Lucas reagent at room temperature is :

    (1) Benzyl alcohol

    (2) Butan-2-ol

    (3) 2-methylpropan-1-ol

    (4) 2-methylpropan-2-ol

28. Which of the following process is not exothermic ?

    (1) Adsorption

    (2) Combustion

    (3) Neutralisation

    (4) Evaporation

29. Which of the following is a stronger conjugate base ?

    (1) $ClO_4^-$

    (2) $ClO_3^-$

    (3) $ClO_2^-$

    (4) $ClO^-$

30. Phenol $\xrightarrow[\Delta]{\text{Zinc dust}}$ X

    $\xrightarrow[\text{AlCl}_3\text{Anhyd.}]{\text{CH}_3\text{Cl}}$ Y $\xrightarrow[\text{KOH}]{\text{KMnO}_4}$ Z.

    the product 'Z' is :

    (1) Benzaldehyde

    (2) Benzoic acid

    (3) Benzene

    (4) Toluene

31. A body is projected vertically upward. The times corresponding to height h while ascending and descending are $t_1$ and $t_2$ respectively. Then velocity of projection is :

(1) $g\sqrt{t_1 t_2}$

(2) $\dfrac{g(t_1 + t_2)}{2}$

(3) $\dfrac{g\sqrt{t_1 t_2}}{2}$

(4) $g\dfrac{t_1 t_2}{t_1 + t_2}$

32. A body of mass 5 kg is thrown vertically up with K. E. = 490J. The height at which the K. E. of the body becomes half of the original is :

(1) 12.5 m

(2) 10 m

(3) 5 cm

(4) 500 cm

33. A child is sitting on a swing. Its minimum and maximum heights from the ground are 0.75 m and 2 m respectively. Its maximum speed will be : Techofworld.In

(1) 10 m/s

(2) 5 m/s

(3) 8 m/s

(4) 15 m/s

34. A string vibrates with frequency of 200 Hz. When its length is doubled and tension is altered, it begins to vibrate with a frequency of 300 Hz. Ratio of new tension to original tension is :

(1) 9 : 1

(2) 1 : 9

(3) 1 : 3

(4) 3 : 1

35. A simple pendulum is suspended from the ceiling of a lift. When the lift is at rest, its time period is T. With what acceleration should the lift be accelerated upwards to reduces its period to $\dfrac{T}{2}$ ?

(1) 2g          (2) 4g

(3) 3g          (4) g

36. Two simple harmonic motions are represented by $y_1 = 5[\sin 2pt + \sqrt{3}\cos 2pt]$ and $y_2 = 5\sin(2\pi t + \pi/4)$. The ratio of their amplitudes is :

(1) 1 : 3          (2) $\sqrt{3}$ : 1

(3) 1 : 1          (4) 2 : 1

37. A planet moving along an elliptical orbit is closest to the sun at a distance $r_1$ and farthest away at a distance $r_2$. If $v_1$ and $v_2$ are linear velocities at $r_1$ and $r_2$. then $\dfrac{v_1}{v_2}$ is :

(1) $\dfrac{r_1}{r_2}$          (2) $\left(\dfrac{r_1}{r_2}\right)^2$

(3) $\left(\dfrac{r_2}{r_1}\right)$          (4) $\left(\dfrac{r_2}{r_1}\right)^2$

45. How many 6mF, 200V condensors are needed to make a condensor of 18pF, 600V ?

   (1) 9

   (2) 18

   (3) 3

   (4) 27

46. If $\mu_0$ is permeability and $\epsilon_0$ is permittivity of free space, then the speed of light in vacuum is :

   (1) $\sqrt{\mu_0 \epsilon_0}$

   (2) $\dfrac{1}{\sqrt{\mu_0 \epsilon_0}}$

   (3) $\sqrt{\dfrac{\mu_0}{\epsilon_0}}$

   (4) $\sqrt{\dfrac{\epsilon_0}{\mu_0}}$

47. Two identical conducting ball have different +ve charges $q_1$ and $q_2$ respectively. The balls are brought together so that they touch each other and then kept in their original position. The force between them is :

   (1) Greater than before the balls touched

   (2) Same as that of before the balls touched

   (3) Zero

   (4) Less than that of before the balls touched

48. A beam of parallel rays is brought to a focus by a plano convex lens. A thin concave lens of same focal length is joined to the first lens. The effect is :

   (1) The focal point shifts towards the lens

   (2) The focus remains undisturbed

   (3) The focus shifts to infinity

   (4) The focus shifts away from the lens

49. A fish in water of refractive index n looks at a bird vertically above in the air. If Y is the height of the bird and X is the depth of the fish from the surface, the distance of the bird estimated by the fish is :

   (1) $X + nY$

   (2) $X + Y\left(1 - \dfrac{1}{n}\right)$

   (3) $X + Y\left(1 + \dfrac{1}{n}\right)$

   (4) $Y + X\left(1 - \dfrac{1}{n}\right)$

50. A ray of light enters from rarer to denser medium. The angle of incidence is i. The reflected and refracted rays are mutually perpendicular. The critical angle is :

   (1) $\sin^{-1}(\tan i)$

   (2) $\sin^{-1}(\cot i)$

   (3) $\tan^{-1}(\sin i)$

   (4) $\cos^{-1}(\tan i)$

51. The spectrum of an oil flame is an example of :

(1) Line absorption spectrum

(2) Band emission spectrum

(3) Line emission spectrum

(4) Continuous emission spectrum

52. Magnetic field at the centre of a circular current carrying coil of radius r is $B_c$. The magnetic field on its axis at a distance r from the centre is $B_a$.

The ratio $\dfrac{B_c}{B_a}$ is :

(1) $1 : \sqrt{2}$

(2) $1 : 2\sqrt{2}$

(3) $2\sqrt{2} : 1$

(4) $\sqrt{2} : 1$

53. There is a uniform magnetic field directed perpendicular and into the plane of the paper. An irregular shaped conducting loop is slowly changing into circular loop in the plane of the paper. Then :

(1) AC is induced in the loop

(2) Current is induced in the loop in anti-clockwise direction

(3) No current is induced in the loop

(4) Current is induced in the loop in clockwise direction

54. An electron is moving in an orbit of a hydrogen atom for which there can be maximum of six transitions. An

electron moving in an orbit of another hydrogen atom for which there can be maximum of three transitions. The ratio of velocities of the electron in these two orbits is :

(1) $\dfrac{5}{4}$

(2) $\dfrac{3}{4}$

(3) $\dfrac{1}{2}$

(4) $\dfrac{2}{3}$

55. The dimensions of resistance are same as those of _____, where h is Planck's constant and e is the charge.

(1) $\dfrac{h}{e^2}$

(2) $\dfrac{h}{e}$

(3) $\dfrac{h^2}{e^2}$

(4) $\dfrac{h^2}{e}$

56. A and B are two metals with threshold frequency $1.8 \times 10^{14}$ Hz and $2.2 \times 10^{14}$ Hz. Two identical photons of energy 0.825 eV each are incident on them. Then photo electrons are emitted from :

(1) A alone

(2) B alone

(3) Both (1) and (2)

(4) Neither (1) nor (2)

Contd.

57. A radioactive sample $S_1$ having activity $A_1$ has twice number of nuclei as another sample $S_2$ of activity $A_2$. If $A_2 = 2A_1$, then the ratio of half life of $S_1$ to that of $S_2$ is :

(1) 2

(2) 0.75

(3) 3

(4) 4

58. A radioactive element forms its own isotopes after 3 consecutive disintegration. The particles emitted are :

(1) 2 α-particles and 1 β-particle

(2) 2 β-particles and 1 α-particle

(3) 1 α-particle and 2 β-particles

(4) 3 β-particles

59. The ratio of velocity of sound in hydrogen and oxygen at STP is :

(1) 16 : 1

(2) 8 : 1

(3) 4 : 1

(4) 2 : 1

60. If the Sun were to increase in temperature from T to 2T and its radius from R to 2R, then the ratio of radiant energy received on earth to what it was previously will be :

(1) 4

(2) 16

(3) 32

(4) 64

61. Which of the following types of light are strongly absorbed by the plants ?

(1) Blue and red

(2) Indigo and yellow

(3) Orange and violet

(4) Yellow and violet

62. Who wrote Akbarnama ?

(1) Abdul Qadir Badauni

(2) Abdul Rahim Khan-e-Khana

(3) Abu'l Fazl ibn Mubarak

(4) Faizi

63. What was the form of government suggested by the Cabinet Mission Plan 1946 for India ?

(1) A federation

(2) A confederation

(3) A unitary form of states

(4) A union of states

64. On which of the following hills is the hill station 'Yercaud' located ?

(1) The Javadi Hills

(2) The Nilgiri Hills

(3) The Palani Hills

(4) The Shevaroy Hills

65. Which among the following rivers is not a tributary of the river Mahanadi ?

(1) The Ib

(2) The Indravati

(3) The Ong

(4) The Tel

66. Which type of farming is generally practised in the densely populated areas of the world ?

    (1) Commercial farming
    (2) Extensive farming
    (3) Intensive farming
    (4) Plantation farming

67. Which of the following Union Territories has been provided with Legislative Assembly ?

    (1) Chandigarh
    (2) Dadra and Nagar Haveli
    (3) Delhi
    (4) Lakshadweep

68. Which district in Odisha has the highest literacy rate as per the Census 2011 ?

    (1) Cuttack
    (2) Jagatsinghpur
    (3) Kendrapara
    (4) Khordha

69. Which of the following trophies is meant for a game different from the other three ?

    (1) Durand Cup
    (2) Rangaswamy Cup
    (3) Santosh Trophy
    (4) Rovers Cup

70. Which of the following ethnic people of the Andaman and Nicobar Islands is different from the other three on the basis of racial heritage ?

    (1) Jarwa
    (2) Onge
    (3) Sentinelese
    (4) Shompen

71. The balloon like outgrowth of parenchyma into the lumen of the vessel is known as :

    (1) Histogen
    (2) Tyloses
    (3) Phellogen
    (4) Tunica

72. Vascular bundles are bicolateral in the stem of :

    (1) Canna
    (2) Tridax
    (3) Cucurbita
    (4) Pisum

73. Which of the following was used by Harshey and Chase to prove that DNA is the chemical basis of heredity ?

    (1) TMV
    (2) CMV
    (3) $T_2$ phase
    (4) SPV

Contd.

74. Which of the following is a bacterial disease ?
    (1) Influenza and Mumps
    (2) Small pox and Chicken pox
    (3) Polio and hydrophobia
    (4) None of these

75. What is the first intermediate stable product of photosynthesis ?
    (1) PEP
    (2) PGA
    (3) PGAL
    (4) Pyruvic acid

76. Camellia Sinensis belongs to which family ?
    (1) Theaceae
    (2) Musaceae
    (3) Loganiaceae
    (4) Gamineae

77. Fungi differs from algae in :
    (1) Lacking chlorophyll
    (2) Having cell wall of chitin and cellulose
    (3) Having glycogen as reserve food material
    (4) All of these

78. Which plant hormone solely responsible for fruit ripening ?
    (1) Auxin
    (2) Abscisic acid
    (3) Ethylene
    (4) Cytokinins

79. The point where the funicle is attached to the body of ovule is called :
    (1) Chalaza
    (2) Hilum
    (3) Endosperm
    (4) Micropyle

80. Which of the following is not a free living nitrogen fixer ?
    (1) Rhizobium
    (2) Azotobacter
    (3) Nostoc
    (4) Anabaena

81. In which form the synthesised food in plants is transported through phloem ?
    (1) Maltose
    (2) Fructose
    (3) Glucose
    (4) Sucrose

82. The biological interpreter of genetic code is :
    (1) t-RNA
    (2) m-RNA
    (3) Ribosome
    (4) All of these

83. The bacterial and blue-green algae cells contain .

    (1) Many linkage groups of each

    (2) One linkage group of each

    (3) No linkage group

    (4) Only two linkage groups of each

84. Non-green large sized parenchyma with waste products is called :

    (1) Mesophylls

    (2) Prosenchyma

    (3) Idioblast

    (4) Spongy parenchyma

85. Which type of lichens are phycsia and parmelia ?

    (1) Crustose

    (2) Foliose

    (3) Fruticose

    (4) None of these

86. Antihaemorrhagic vitamin is :

    (1) Vit – A

    (2) Vit – B

    (3) Vit – E

    (4) Vit – K

87. A haemophilic man marries a normal woman whose father was known to be a bleeder. Then it is expected that :

    (1) All their children will be bleeder

    (2) Half of their children will be bleeder

    (3) 1/4th of their children will be bleeder

    (4) 1/3rd of their children will be bleeder

88. Self fertilization in hydra never occurs, because they are :

    (1) Asexual

    (2) Unisexual

    (3) Protandrous

    (4) Protogynous

89. Lamina propria or stroma is related to :

    (1) Mammalian Liver

    (2) Human Intestine

    (3) Pancreatic Acini

    (4) Ovary of Mammal

90. Mammary glands are modifications of :

    (1) Sweat Gland

    (2) Sebaceous Gland

    (3) Ceruminous Gland

    (4) Milk Glands

91. Which of the following organ is called as 'jack of all trades' ?

    (1) Kidney

    (2) Pancreas

    (3) Pituitary

    (4) Skin

92. Ramsar Convention was held in :
(1) India
(2) Indonesia
(3) Iran
(4) German

93. Anagenesis is also known as :
(1) Phyletic Speciation
(2) Multiplicative Speciation
(3) Gradual Speciation
(4) Allopatric Speciation

94. What belongs to a class but not to a family ?
(1) Species
(2) Genus
(3) Order
(4) Phylum

95. Alimentary canal is not found in :
(1) Arachnida
(2) Apoda
(3) Decapoda
(4) Cestoda

96. Which of the following is not a component of innate immunity ?
(1) Antibodies
(2) Interferon
(3) Complement protein
(4) Phagocytes

97. Which date is observed as World Animal Day ?
(1) 5$^{th}$ June
(2) 25$^{th}$ July
(3) 3$^{rd}$ October
(4) 19$^{th}$ December

98. How many meiotic divisions are needed to form 100 spermatozoa ?
(1) 25
(2) 50
(3) 100
(4) None of these

99. A cross between two red tomatoes produced 92 red and 31 yellow offsprings. What are the genotypes of the parents ?
(1) RR × rr
(2) Rr × rr
(3) Rr × Rr
(4) Rr × RR

100. Papillary muscles are found in :
(1) Haemocoel of cockroach
(2) Auricles of heart
(3) Ventricles of heart
(4) Arm

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