

1. The variability in errors in a set of measurement, which is usually estimated by least square method is called

A. Personal error  
B. Indeterminate error  
C. Operative error  
D. Relative error

Answer: B

2. Which of the types of errors is best described as the reproducibility of measurements?

A. Relative accuracy  
B. Probable error  
C. Precision  
D. Average deviation

Answer: C

3. If  $Z = G/Y$ , the maximum error in Z is best expressed as

A.  $E_Z = \left(\frac{E_G}{G} + \frac{E_Y}{Y}\right)$   
B.  $E_Z = Z \left(\frac{E_A}{A} + \frac{E_B}{B}\right)$   
C.  $E_Z = Z \left(\frac{E_A}{A} - \frac{E_B}{B}\right)$   
D.  $E_Z = Z \left(\frac{E_G}{G} + \frac{E_Y}{Y}\right)$

Answer: D

4. Given the summation  $Y = 1.05(\pm 0.02) + 4.10(\pm 0.03) - 1.97(\pm 0.05)$ , the absolute error and percentage relative error in the measurement is

A. 0.06 and 1.89%  
B. 0.05 and 1.87%  
C. 0.06 and 1.87%  
D. 0.05 and 1.89%

Answer: A

5. A solution of 0.5mol $dm^{-3}$  NaOH was titrated against 0.2mol $dm^{-3}$  H<sub>2</sub>SO<sub>4</sub> in the burette using phenolphthalein as indicator. The results obtained are:

Initial Burette reading =  $2.98 \pm 0.05 cm^3$

Final Burette reading =  $38.75 \pm 0.05 cm^3$  where  $\pm 0.05$  is the maximum errors

Determine the absolute error and relative error in ppt. of the measurements.

A.  $\pm 0.20$ , 2.8‰  
B.  $\pm 0.20$ , 3.8‰  
C.  $\pm 0.10$ , 4.8‰  
D.  $\pm 0.10$ , 2.8‰

Answer: D

6. Which of the following is/are true? I. Numbers 1-9 are significant II. 0 digit is most times III. Zeros before figures are not significant IV. Zeros after decimal are significant

- A. I, II, III
- B. I, III, IV
- C. I, IV
- D. III, IV

Answer: B

7. Evaluate  $V = \frac{22.1dm^3 \times 751.2mmHg}{760mmHg}$

- A.  $76.20dm^3$
- B.  $76.2dm^3$
- C.  $76dm^3$
- D.  $76.2072dm^3$

Answer: B

8. The relationship between the substances undergoing chemical reactions is known as

- A. Chemical Formula
- B. Molecular formula
- C. Stoichiometry
- D. Mass Spectrometry

Answer: Stoichiometry

9. The general formula for balancing organic chemical reactions is written as:

- A.  $C_xH_y + yO_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$
- B.  $C_xH_y + \left(\frac{x+y}{4}\right)O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$
- C.  $C_xH_y + \left(x + \frac{y}{4}\right)O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$
- D.  $C_xH_y + \left(\frac{x-y}{4}\right)O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$

Answer: C

10. Empirical formula is best defined as

- A. The simplest formula that shows the number of atoms of a compound
- B. The simplest formula that shows the number of atoms of each element in one ion of a compound
- C. The simplest formula that shows the number of atoms of each element in one molecule of a compound
- D. The simplest formula that shows the actual composition of a molecule of a compound

Answer: C

11. Molecular formula is best defined as

- A. The formula that shows the number of atoms of a compound
- B. The formula that shows the number of atoms of each element in one ion of a compound
- C. The formula that shows the number of atoms of each element in one molecule of a compound
- D. The formula that shows the actual composition of a molecule of a compound

Answer: D

12. 6g of metal M reacts completely with 23.66g of chlorine to form 29.66g of the metallic chloride. Find the empirical formula of the metallic fluoride

- A.  $MCl$
- B.  $MCl_3$
- C.  $MCl_4$
- D.  $MCl_2$

Answer: B

13. The equivalence of 1mole of any gas at s.t.p. is

- A.  $22.4\text{cm}^3$
- B.  $22400\text{dm}^3$
- C.  $0.0224\text{m}^3$
- D.  $2.24\text{m}^3$

Answer: C

14. How many moles of atoms of oxygen are there in 0.3mole of  $\text{SO}_2$ ?

- A. 0.3mole
- B. 0.6mole
- C. 0.9mole
- D. 1.2mole

Answer: B

15. How many atoms of oxygen are there in 10g of  $\text{H}_2\text{SO}_4$ ?

- A.  $2.47 \times 10^{23}$
- B.  $2.46 \times 10^{23}$
- C.  $2.45 \times 10^{23}$
- D.  $2.44 \times 10^{23}$

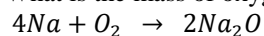
Answer: B

16. What is the number of copper atoms in a 1naira coin which weighs 7.39g, assume the material from the coin is made is contains 86% copper

- A.  $6.02 \times 10^{23}$
- B.  $6.02 \times 10^{22}$
- C.  $6.02 \times 10^{21}$
- D.  $6.2 \times 10^{23}$

Answer: B

17. What is the mass of oxygen  $\text{O}_2$  needed to burn 4.6g of Na in the reaction below?



- A. 1.3g
- B. 1.6g
- C. 1.5g
- D. 1.4g

Answer: B

18. How many moles of  $\text{NH}_3$  are there in  $500\text{cm}^3$  of the gas?

- A. 0.02mol
- B. 0.2mol

- C. 0.002mol
  - D. 2.00mol
- Answer: A

19. What is the mass in grams of  $1.45 \times 10^{23}$  molecules of sucrose  $C_{12}H_{22}O_{11}$ ?

- A. 82.11g
  - B. 82.09g
  - C. 82.08g
  - D. 82.12g
- Answer: C

20. What mass of  $CuSO_4$  will be obtained by starting with 10g of  $CuO$  from the following reaction ( $Cu = 63.5g$ )?

- A. 20.04g
  - B. 20.05g
  - C. 20.06g
  - D. 20.07g
- Answer: C

21. Calculate the solubility of a solution containing 6g of  $NaCl$  ( $NaCl = 58.44$ ) in  $200cm^3$  of solution

- A. 1.531
  - B. 0.153
  - C. 0.513
  - D. 1.153
- Answer: C

22. Calculate the amount in moles and grams of  $KMnO_4$  present in  $3dm^3$  of 0.250mol

- A. 1.23mol & 54g
  - B. 0.75mol & 119g
  - C. 0.25mol & 233g
  - D. 0.135mol & 23g
- Answer: B

23. A 0.6025g of sample of a chloride salt was dissolved in water and the chloride precipitated by adding excess silver nitrate. The precipitate of silver nitrate was filtered, washed, dried and found to weight 0.7134g. Calculate the percentage chloride in the sample [ $Cl = 35.45$ ,  $Ag = 107.87$ ]

- A. 22.95%
  - B. 95.22%
  - C. 29.25%
  - D. 25.29%
- Answer: C

24. The smallest unit of matter than has the properties of an element is called

- A. Atom
  - B. Molecule
  - C. Ion
  - D. Particles
- Answer: A

25. The nucleus of an atom contributes to its .....while electrons contributes to its.....

- A. Mass/weight
  - B. Volume/Mass
  - C. Mass/volume
  - D. volume/volume
- Answer: C

26. Given an atomic species:  ${}^D_MX$ , The atomic identity of X is determined by its

- A. D
- B. M
- C. M-D

D. D-M

Answer: B

27. Isotopes are

- A. Atoms of same element with different atomic numbers
- B. Atoms of same element with differences in their number of neutrons
- C. Atoms of different elements with same mass number
- D. Atoms of different elements with the same atomic number

Answer: B

28. Isobars are

- A. Atoms of same element with the same number of neutrons
- B. Atoms of same element with differences in their number of neutrons
- C. Atoms of different elements with same mass number
- D. Atoms of different elements with the same atomic number

Answer: C

29. Isotones are

- A. Atoms of same element with the same number of neutrons
- B. Atoms of same element with differences in their number of neutrons
- C. Atoms of different elements with same mass number
- D. Atoms of different elements with the same atomic number

Answer: A

30. The father of atomic theory was

- A. J.J. Thompson [1766 – 1823]
- B. Ernest Rutherford [1911 – 1934]
- C. John Dalton [1766 – 1844]
- D. R.A. Millikan [1835-1927]

Answer: C

31. Atoms are .....

- A. Indestructible and unchangeable
- B. Indestructible and predictable
- C. The smallest particle of an ion
- D. All of the above

Answer: A

32. When elements combine, they do so in

- A. Simple whole number fractions
- B. Multiple whole number ratios
- C. Simple whole number ratios
- D. Multiple whole number fractions

Answer: C

33. Atom of the same two or more given elements can combine indifferent single whole numbers ratio to form different compounds. This statement is best described as

- A. Law of Mass Action
- B. Law of Variable proportion
- C. Law of Standard proportion
- D. Law of Multiple proportion

Answer: D

34. The parameters that describe the distribution of electrons in an atom and their fundamental nature are called

- A. The Principal quantum numbers
- B. The Azimuthal quantum numbers
- C. The Magnetic quantum numbers
- D. The Quantum numbers

Answer: D

35. Principal quantum number describes
- A. Main energy distribution
  - B. Main energy shell
  - C. Main energy sub-level
  - D. Main energy orientation
- Answer: B
36. Azimuthal quantum number describes
- A. Main energy distribution
  - B. Main energy shell
  - C. Main energy sub-level
  - D. Main energy orientation
- Answer: C
37. Azimuthal quantum number is otherwise known as
- A. Subordinate quantum number
  - B. Proportional quantum number
  - C. Analytical quantum number
  - D. Subsidiary quantum number
- Answer: D
38. The respective shapes of *d, f, s & p – orbitals* are
- A. Dumbbell, spherical, characteristic shape & double-dumbbell
  - B. Spherical, double-dumbbell, dumbbell & characteristic shape
  - C. Dumbbell, double-dumbbell, spherical & characteristic shape
  - D. Double-dumbbell, characteristic shape, spherical & dumbbell
- Answer: D
39. The number of possible orientations in a 3-dimensional space for each type of orbital can best be described as
- A. Spin Quantum number
  - B. Magnetic Quantum number
  - C. Azimuthal quantum number
  - D. Principal quantum number
- Answer: B
40. The number of possible orientations that an electron can have in the presence of a magnetic field or in relation to another is best be described as
- A. Spin Quantum number
  - B. Magnetic Quantum number
  - C. Azimuthal quantum number
  - D. Principal quantum number
- Answer: A
41. f student took a reading for 20.44% instead of 20.34%. calculate the absolute error and the relative error respectively
- A. 0.10%, 0.05
  - B. 0.10%, 0.005
  - C. 1.0%, 0.005
  - D. 1.0%, 0.05
- Answer: B
42. The molar concentration of a solution is determined by four separate titrations, the results being 0.2041, 0.2039, 0.2049 and 0.2043. calculate the mean & median of the data
- A. 0.2042 & 0.2044
  - B. 0.2043 & 0.2042
  - C. 0.2043 & 0.2043
  - D. 0.2043 & 0.2041
- Answer: B

43. Calculate the root mean square velocity (r.m.s.) of 1 mole of CO<sub>2</sub> at 27°C ( $m = 44\text{g mol}^{-1}$ )
- $4.12 \times 10^2\text{m/s}$
  - $12 \times 10^2\text{m/s}$
  - $5.2 \times 10^2\text{m/s}$
  - $1.2 \times 10^2\text{m/s}$
- Answer: A
44. In a first order reaction, half of the reactant is decomposed in 300seconds. The time taken for  $\frac{2}{3}$  of the reactant to be decomposed is .....
- 198.84sec
  - 475.49sec
  - $2.54 \times 10^{-3}\text{sec}$
  - 4.75 sec
- Answer: B
45. The rate constant for the first order reaction at 50°C is twice that at 30°C. the activation energy (E<sub>a</sub>) of the reaction is ..... (R = 8.314Jmol<sup>-1</sup>)
- 178KJ
  - 187KJ
  - 188KJ
  - 177KJ
- Answer: C
46. Addition of catalyst to a reaction at a particular temperature .....the rate of reaction by .....the activation energy
- increase, lowering
  - decreasing, lowering
  - increase, increasing
  - decreasing, increasing
- Answer: A
47. The electronic configuration of potassium with the atomic number 19 is .....
- $1s^2 2s^2 2p^6 3s^2 3p^6$
  - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
  - $1s^2 2s^2 2p^6 3d^9$
  - $1s^2 2s^2 2p^6 3s^2 3p^4 3d^1$
- Answer: B
48. ....ions/molecules are always larger than the atoms from which they are formed
- neutral
  - positive
  - negative
  - none
- Answer: C
49. The value of  $m_l$  when  $l = 2$  is
- +2, +1, 0, -1, -2
  - +2, +1, 0
  - +2, +1, 0, -1
  - 2, -1, 0
- Answer: A
50. ....is a substance which accepts a lone pair of electrons in forming a co-ordinate bond
- base
  - acid
  - salt
  - proton
- Answer: B
51. ....is an example of Lewis base

- A.  $\text{NH}_3$
- B.  $\text{H}^+$
- C.  $\text{SO}_3$
- D. He

Answer: B

52. .... is an example of a monoprotic acid

- A.  $\text{CH}_3\text{COOH}$
- B.  $\text{H}_2\text{SO}_4$
- C.  $\text{H}_2\text{C}_2\text{O}_4$
- D.  $\text{H}_3\text{PO}_4$

Answer: A

53. Find the  $pOH$  of  $0.1\text{mol dm}^{-3}$  hydrochloric acid

- A. 1
- B. 12
- C. 13
- D. 8

Answer: 13

54. A  $0.453\text{g}$  sample of a liquid consisting C, H and O was burned in pure oxygen and  $1.039\text{g}$  of  $\text{CO}_2$  and  $0.6369$  of  $\text{H}_2\text{O}$  were obtained. What is the empirical formula of this compound? [C =  $12.01115$ , H =  $1.00797$ , O =  $15.9994$ ]

- A. CHO
- B.  $\text{C}_4\text{H}_{12}\text{O}$
- C.  $\text{C}_2\text{H}_6\text{O}_2$
- D.  $\text{C}_2\text{H}_6\text{O}$

Answer: B

55. A reducing agent does

- A. accepts electrons
- B. donates a lone pair of electrons
- C. donates electrons
- D. donates and accepts at the same time

Answer: C

56. How many moles of oxygen atom are combined with  $4.20$  moles of Cl atoms in  $\text{Cl}_2\text{O}_7$ ?

- A. 4.20
- B. 42.00
- C. 17.40
- D. 14.70

Answer: D

57. What is the pH of a solution that is  $0.5\text{mol/dm}^3$  in acetic acid ( $\text{CH}_3\text{COOH}$ ) and  $2.5\text{mol/dm}^3$  in sodium acetate ( $\text{CH}_3\text{COONa}$ ),  $K_a$  of acetic acid is  $1.75 \times 10^{-3}$

- A. 5.23
- B. 4.12
- C. 5.44
- D. 3.50

Answer: D

58.  $K_p = K_c$  when and only when  $\Delta n$  is

- A.  $< 1$
- B.  $> 1$
- C. Zero
- D.  $\geq 1$

Answer: C



59. The oxidation number of 'B' in the compound  $E_2BK_3$  is ..... [E = +1; K = -2]
- A. +3
  - B. +2
  - C. +4
  - D. -2
- Answer: C
60. The following principles are applicable to writing electronic configurations except
- A. Hundi's principle
  - B. Aufbau principle
  - C. Pauli's principle
  - D. Hund's principle
- Answer: A
61. The process of building atoms from the ground level, placing the first electron at the lowest potential energy is known as
- A. Hundi's principle
  - B. Aufbau principle
  - C. Pauli's principle
  - D. Hund's principle
- Answer: B
62. The electronic configuration of oxygen is
- A.  $1s^2 2s^2 2p_x^2 2p_y^1 2p_z^1$
  - B.  $1s^2 2s^2 2p^2 4d^2$
  - C.  $1s^2 2s^2 3p^2 4d^2$
  - D.  $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^1$
- Answer: A
63. The idea of arranging electrons into generated orbitals one by one before pairing is known as
- A. Hundi's principle
  - B. Aufbau principle
  - C. Pauli's principle
  - D. Hund's principle
- Answer: D
64. The statement "Electrons to the opposite spin can occupy the same orbital" is best described as
- A. Hundi's principle
  - B. Aufbau principle
  - C. Pauli's principle
  - D. Hund's principle
- Answer: C
65. The state of equilibrium is limited to chemical reactions in
- A. An open system
  - B. A reversible system
  - C. A closed system
  - D. A dynamic system
- Answer: C
66. The Law of Mass Action states that:
- A.  $Rate \propto Concentration\ of\ reaction$
  - B.  $Rate \propto Concentration\ of\ products$

- C.  $\text{Rate} \propto \text{Concentration}$
- D.  $\text{Rate} \propto \text{Concentration of reactants}$

Answer: D

67. Consider a hypothetical reaction:  $aA + bB \rightarrow cC + yY$

Which of the following statements is correct?

- A.  $k_f [C]^c [Y]^y = k_r [A]^a [B]^b$
- B.  $k_f [A]^a [B]^b = k_r [C]^c [D]^d$
- C.  $k_f [A]^a [B]^b = k_r [C]^c [Y]^y$
- D.  $k_r [C]^c [Y]^y = k_f [A]^a [B]^b$

Answer: C

68. For the reaction:  $N_2 + 3H_2 \leftrightarrow 2NH_3$ , the value of  $k_p$  is

- A.  $\frac{P_{NH_3}^2}{P_{N_2} P_{H_2}^3}$
- B.  $\frac{P_{NH_3}^2}{P_N P_{H_2}^3}$
- C.  $\frac{P_{NH_3}^3}{P_{N_2} P_{H_2}^2}$
- D.  $\frac{P_{NH_3}}{P_{N_2} P_{H_2}^3}$

Answer: A

69. The relationship between  $k_p$  and  $k_c$  is

- A.  $k_p = k_c \cdot (RT)$
- B.  $k_p = k_c \cdot (RT)^{\Delta n}$
- C.  $k_c = k_p \cdot (RT)^{\Delta n}$
- D.  $k_p = k_c \cdot (RT)$

Answer: B

70. When  $\Delta n$  is positive, the value of  $k_p$  is

- A. Greater than  $k_c$
- B. Less than  $k_c$
- C. Equal to  $k_c$
- D. Less than  $k_c$  by 1

Answer: A

71. When  $\Delta n$  is negative, the value of  $k_p$  is

- A. Greater than  $k_c$
- B. Less than  $k_c$
- C. Equal to  $k_c$
- D. Less than  $k_c$  by 1

Answer: B

72. When  $\Delta n$  is zero, the value of  $k_p$  is

- A. Greater than  $k_c$
- B. Less than  $k_c$
- C. Equal to  $k_c$
- D. Less than  $k_c$  by 1

Answer: C

73. For the reaction:  $N_2 + O_2 \leftrightarrow 2NO$ , the value of  $k_c$  is

A.  $\frac{4x^2}{[a-x][b-x]}$

B.  $\frac{4x^2}{[a-x][b+x]}$

C.  $\frac{2x^2}{[a-x][b-x]}$

D.  $\frac{4x^2}{[a+x][b+x]}$

Answer: A

74. Phosphorus pentachloride dissociates on heating according to the equation  $PCl_5 \leftrightarrow PCl_3 + Cl_2$ . If the  $k_c$  for the reaction is  $0.0326 \text{ mol dm}^{-3}$ , calculate the value of  $k_p$  in Pascal at  $191^\circ C$  and  $R = 8.314 \text{ J/molK}$  is

A. 152.67

B. 125.69

C. 125.76

D. 127.56

Answer: C

75. Factors affecting reactions in equilibrium are

A. Catalyst, Light, Concentration, Pressure

B. Catalyst, Temperature, Concentration, Pressure

C. Catalyst, Light, Concentration, Surface Area

D. Catalyst, Surface Area, Concentration, Pressure

Answer: B

76. The shifting of the equilibrium position to annul the effect of changes to re-establish equilibrium is termed

A. Pauli's Exclusion Principle

B. Le-Chatelier Principle

C. Aufbau Principle

D. Exclusion Principle

Answer: B

77. In an equilibrium reaction, pressure increase will favour the side with

A. Lower Volume

B. Equivalent Volume

C. Higher Volume

D. Volume

Answer: A

78. In the reaction:  $H_2 + I_2 \leftrightarrow 2HI$ ,

A. Pressure has no effect

B. Increase in pressure will cause equilibrium to shift to the right

C. decrease in pressure will cause equilibrium to shift to the right

D. decrease in pressure will cause equilibrium to shift to the left

Answer: A

79. In the reaction:  $PCl_5 \leftrightarrow PCl_3 + Cl_2$ ,

A. Pressure has no effect

B. Increase in pressure will cause equilibrium to shift to the right

C. decrease in pressure will cause equilibrium to shift to the left

D. No Answer

Answer: D

80. Increase in the concentration of products in a reaction will cause the equilibrium position to
- A. Shift to the left
  - B. Shift to the right
  - C. Will have no effect
  - D. Shift to both right and left

Answer: A

81. What is the effect of increase in concentration on the equilibrium constant of a reaction?
- A. The value of equilibrium constant increases
  - B. The value of equilibrium constant decreases
  - C. The value of equilibrium constant remains constant
  - D. The value of equilibrium constant first increases, and later decreases

Answer: C

82. Increase in temperature will
- A. Favour the forward reaction of an exothermic reaction
  - B. Favour the reverse reaction of an exothermic reaction
  - C. Favour both forward and reverse reaction of an exothermic reaction
  - D. Have no effect

Answer: B

83. Does temperature changes affect the equilibrium constant of a reaction?
- A. No, it doesn't
  - B. Yes it does
  - C. Yes, it doesn't
  - D. No, it does
  - E. Answer: B

84. Catalyst speeds up the rate of
- A. Forward reaction
  - B. Reverse reaction
  - C. Both forward and reverse reaction
  - D. All reactions

Answer: C

85. Catalyst speeds up the rate of
- A. Forward reaction
  - B. Reverse reaction
  - C. Both forward and reverse reaction
  - D. All reactions

Answer: C

86. Catalyst ..... the rate of reaction by ..... the activation energy
- A. decreases/raising
  - B. decreases/lowering
  - C. increases/raising
  - D. increases/lowering

Answer: D

87. Calculate the solubility in  $\text{gdm}^{-3}$  at 298K of calcium fluoride ( $\text{CaF}_2$ ) in a 0.1M NaF solution.  
 $[K_{sp} = 3.9 \times 10^{-14} \text{mol}^3 \text{dm}^{-9}, Ca = 40, F = 19\text{g}]$
- $3.04 \times 10^{-9} \text{gdm}^{-3}$
  - $3.04 \times 10^{-10} \text{gdm}^{-3}$
  - $3.04 \times 10^{-8} \text{gdm}^{-3}$
  - $3.04 \times 10^{-7} \text{gdm}^{-3}$
- Answer: A
88. The reducing and oxidizing agents respectively in the reaction  $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$  are
- $\text{Fe}_2\text{O}_3$  and  $\text{CO}$
  - $\text{Fe}$  and  $\text{CO}$
  - $\text{CO}$  and  $\text{Fe}_2\text{O}_3$
  - $\text{CO}_2$  and  $\text{NH}_3$
- Answer: C
89. The oxidation numbers of hydrogen and oxygen are respectively +1 and -2 except in
- Peroxides and Halogens
  - Peroxides and Metallic Halides
  - Metallic hydrides and peroxides
  - Peroxides
- Answer:  
C
90. In the reaction  $\text{MnO}_4^- + \text{Fe}^{2+} + \text{H}^+ \rightarrow \text{Mn}^{2+} + \text{Fe}^{3+}$ , the oxidation number of manganese changes from
- +5 to +2
  - +7 to +2
  - +2 to +3
  - +6 to +2
- Answer: B
91. To balance a redox reaction in basic medium,  $\text{H}_2\text{O}$  is added to the side with
- Lesser number of oxygen atoms
  - Lesser number of hydrogen atoms
  - More oxygen atoms
  - Equivalent number of oxygen atoms
- Answer: C
92. The values of w, x and g in the redox reaction:  $\text{IO}_3^- + w\text{Cr}^{3+} + x\text{OH}^- \rightarrow z\text{I}^- + 2\text{CrO}_4^{2-} + 5\text{H}_2\text{O}$  is
- 2,10, 1
  - 2,1,10
  - 10,1,2
  - 10,2,1
- Answer: A
93. A reaction in which the same substance on the reactant side is being oxidized and reduced simultaneously is known as
- Combustion reaction
  - Addition reaction
  - Disproportionation reaction
  - Substitution reaction
- Answer: C

94. Substances that dissolve in water to release hydroxonium ion is known as

- A. Base
- B. Salt
- C. Lewis Base
- D. Acid

Answer: D

95. A substance that ionizes in solution to produce hydroxyl ion is

- A. Base
- B. Salt
- C. Acid
- D. Lewis Acid

Answer: A

96. The definitions of Arrhenius emphasizes .....and..... in water

- A.  $IO_3^-$  &  $H^{2+}$
- B.  $OH^-$  &  $H^+$
- C.  $H^{2+}$  &  $2OH^-$
- D.  $IO_3^{3-}$  &  $H^{3+}$

Answer: B

97. The Arrhenius acid and base respectively in the reaction  $NH_3 + H_2O \leftrightarrow NH_4^+ + OH^-$

- A.  $H_2O$  and  $NH_3$
- B.  $NH_3$  and  $H_2O$
- C.  $OH^-$  and  $H_2O$
- D.  $NH_4^+$  and  $NH_3$

Answer: A

98. The conjugate base and acid respectively in question 97 above are

- A.  $H_2O$  and  $NH_3$
- B.  $NH_3$  and  $H_2O$
- C.  $OH^-$  and  $H_2O$
- D.  $NH_4^+$  and  $NH_3$

Answer: A

99. Water is best described as

- A. Acid
- B. Base
- C. Amphiprotic
- D. Ampiteric

Answer: C

100. In the dissociation of water:  $H_2O \leftrightarrow H^+ + OH^-$ , the value of  $k_w$  is

- A.  $k_w = \frac{[OH^-][H^+]}{[H_3O]}$
- B.  $k_w = \frac{[OH^-][H^+]}{[H_2O]}$
- C.  $k_w = \frac{[H_2O]}{[OH^-][H^+]}$
- D.  $k_w = \frac{[H_3O]}{[OH^-][H^+]}$

Answer: B

101. The hydrogen ion concentration of pure water is

- A.  $1 \times 10^{14}$
- B.  $1 \times 10^{-14}$
- C.  $1 \times 10^{-7}$
- D.  $1 \times 10^7$

Answer: C

102. The pH of pure water is

- A. 14
- B. -14
- C. -7
- D. 7

Answer: D

103. What is the pH of a neutral solution at 25°C?

- A. 14
- B. 3
- C. 7
- D. 1

Answer: C

104. What is the pH of a basic solution whose hydroxyl ion concentration is 0.00001M?

- A. 9
- B. 5
- C. 1
- D. 4

Answer: A

105. The pH of a 0.25M solution of acetic acid [ $\text{HC}_2\text{H}_3\text{O}_2$ ] is found to be 2.68. What is the  $K_a$  for this solution and what percentage of the acid ionized?

- A.  $1.76 \times 10^{-5}\text{M}$  and 0.74%
- B.  $1.76 \times 10^{-5}\text{M}$  and 0.84%
- C.  $6.17 \times 10^{-5}\text{M}$  and 0.64%
- D.  $6.71 \times 10^{-5}\text{M}$  and 0.54%

Answer: B

106. The change in the concentration of reactant or product per unit time is known as

- A. Rate Law
- B. Order of a reaction
- C. Rate of a reaction
- D. Molecularity of a reaction

Answer: C

107. In a hypothetical reaction  $A \rightarrow B$ , the rate of the reaction is expressed as:

- A.  $\frac{d[A]}{dt} = \frac{+d[B]}{dt}$
- B.  $\frac{-d[A]}{dt} = \frac{-d[B]}{dt}$
- C.  $\frac{\pm d[A]}{dt} = \frac{+d[B]}{dt}$
- D.  $\frac{-d[A]}{dt} = \frac{+d[B]}{dt}$

Answer: D

108. Rate of a reaction is measured in

- A.  $\text{mol lit}^{-1}\text{min}^{-1}$
- B.  $\text{mol cm}^{-1}\text{sec}^{-3}$
- C.  $\text{mol cm}^{-3}\text{sec}^{-1}$
- D.  $\text{mol cm}^{-1}\text{hr}^{-1}$

Answer: A

109. The rate of a reaction is directly proportional to the concentration of reactants. This is referred to as

- A. Order of a Reaction
- B. Rate of a Reaction
- C. Overall order of a Reaction
- D. Molecularity of a Reaction

Answer: B

110. The correct expression for the rate of the reaction:  $A \rightarrow \text{Products}$  is

- A.  $\text{Rate} = [A]^n$
- B.  $\text{Rate} = [B]^n$
- C.  $\text{Rate} = k[A]^n$
- D.  $\text{Rate} \propto k[A]^n$

Answer: C

111. The correct expression for the rate of the reaction:  $2A + B \rightarrow \text{Products}$  is

- A.  $\text{Rate} = k[A]^{2x}[B]^y$
- B.  $\text{Rate} = [A]^x[B]^y$
- C.  $\text{Rate} \propto [A]^x[B]^y$
- D.  $\text{Rate} \propto [A]^{2x}[B]^y$

Answer: C

112. An expression which shows how a reaction is related to concentration is termed

- A. Order of reaction
- B. Molecularity of reaction
- C. Equilibrium Law
- D. Rate Equation

Answer: D

113. The powers to which the concentration of each reactant is raised to give a correct dependence of rate on concentration is termed

- A. Order of reaction
- B. Molecularity of reaction
- C. Equilibrium Law
- D. Rate Equation

Answer: D

114. For a given reaction whose rate expression is given as:  $\text{Rate} = k[A]^m[B]^n$ , the order of reaction is

- A. m, n
- B. m+n
- C. m-n
- D. n-m

Answer: A



115. The sum of all exponents of the reactants as contained in the experimentally determined rate law is known as

- A. Overall rate law
- B. Overall molecularity of reaction
- C. Overall order of reaction
- D. Overall equilibrium law

Answer: C

116. Order of a given reaction can only be determined

- A. Experimentally
- B. From the Rate Equation
- C. From the Molecularity of reaction
- D. From the chemical reaction

Answer: A

117. The number of molecules/ions of the reactants present in the balanced stoichiometric equation is referred to as:

- A. Order of reaction
- B. Molecularity of reaction
- C. Equilibrium Law
- D. Rate Equation

Answer: B

118. For a second order reaction  $A + B \rightarrow \text{Product}$ , the rate constant expression is

- A.  $k_2 = \frac{2.303}{t} \log_{10} \frac{b(a-x)}{a(b-x)}$
- B.  $k_2 = \frac{2.303}{t} \log_{10} \left( \frac{a}{a-x} \right)$
- C.  $k_2 = \frac{1}{t} \log_{10} \frac{x}{a-x}$
- D.  $k_2 = \frac{x}{t}$

Answer: A

119. For a zero order reaction  $A + B \rightarrow \text{Product}$ , the rate constant expression is

- A.  $k_0 = \frac{2.303}{t} \log_{10} \frac{b(a-x)}{a(b-x)}$
- B.  $k_0 = \frac{2.303}{t} \log_{10} \left( \frac{a}{a-x} \right)$
- C.  $k_0 = \frac{1}{t} \log_{10} \frac{x}{a-x}$
- D.  $k_0 = \frac{x}{t}$

Answer: D

120. For a first order reaction  $A + B \rightarrow \text{Product}$ , the rate constant expression is

- A.  $k_0 = \frac{2.303}{t} \log_{10} \frac{b(a-x)}{a(b-x)}$
- B.  $k_0 = \frac{2.303}{t} \log_{10} \left( \frac{a}{a-x} \right)$
- C.  $k_0 = \frac{1}{t} \log_{10} \frac{x}{a-x}$
- D.  $k_0 = \frac{x}{t}$

Answer: B

121. The half-life of a first order reaction depends on

- A. Initial concentration of the reactions
- B. Concentration of the reactant left

- C. Concentration of product
- D. Rate constant

Answer: D

122. The half-life of a first order reaction depends on

- A. Initial concentration of the reactants
- B. Concentration of the reactant left
- C. Concentration of product
- D. Rate constant

Answer: A

123. The unit of rate constant, K, in a first order reaction is

- A.  $\text{mollitre}^{-1}\text{sec}^{-1}$
- B.  $\text{sec}^{-1}$
- C.  $\text{litremol}^{-1}\text{sec}^{-1}$
- D.  $\text{seclitre}^{-1}\text{mol}^{-1}$

Answer: B

124. Photolytic reactions take place in the presence of

- A. Pressure
- B. Light
- C. Catalyst
- D. Heat

Answer: B

125. The unit of rate constant, K, in a first order reaction is

- A.  $\text{mollitre}^{-1}\text{sec}^{-1}$
- B.  $\text{sec}^{-1}$
- C.  $\text{litremol}^{-1}\text{sec}^{-1}$
- D.  $\text{seclitre}^{-1}\text{mol}^{-1}$

Answer: A

## OBJECTIVE CBT QUESTIONS ON SET THEORY (MTH 101)

1. If A is a subset of a universal set U, the compliment of set A is given as:

- A. U
- B. U - A
- C. U + B
- D. U - B

Answer: B

2. The set statement  $(A \cup B) \cap C = A \cup (B \cap C)$  is relevant to

- A. Associative Law
- B. Cummulative Iowa
- C. Distributibe Law
- D. Closure

Answer: A

3. If  $U = (\text{Integers} \leq 20)$ ;  $D = \{\text{multiples of } 4\}$ ;  $E = \{\text{multiples of } 3\}$ , the element of  $D' \cap E$  are

- A. {1,2}

- B. {3,6,9,15,18}
- C. {4,8,16,20}
- D. {3,6,9,12,15,18}

Answer: B

4. The notation  $A - B$  is equivalent to

- A.  $A \cup B^c$
- B.  $A \cup B$
- C.  $A \cap B$
- D.  $A \cap B^c$

Answer: D

5. The notation  $(A \cup B)^c$  is equivalent to

- A.  $A^c \cap B^c$
- B.  $A^c - B^c$
- C.  $A \cup B$
- D.  $A \cap B^c$

Answer: A

6. The number of distinct elements found in a given set is called

- A. Power set of a set
- B. Order of a set
- C. Power of a cardinality
- D. Cardinality of a power set

Answer: B

7. If two sets A and B are subsets of a universal set, then the notation  $n(A \cup B)$  is equal to

- A.  $n(A) + n(B)$
- B.  $n(A) + n(B) - n(A \cap B)$
- C.  $n(A) + n(B) + n(A \cap B)$
- D.  $n(A) + n(B) - n(A \cap B)$

Answer: D

In a survey of 60 students, 60 study botany, 50 zoology and 48 biology. If 38 students study botany, zoology and biology,

Use the information above to answer questions 8 & 9

8. How many study only zoology?

- A. 12
- B. 10
- C. 0
- D. 5

Answer: C

9. How many study non of the three courses?

- A. 12
- B. 10
- C. 0
- D. 5

Answer: C

10. How many study the Zoology and Botany?

- A. 12
- B. 10
- C. 0
- D. 5

Answer: A

In a particular group of students during a school's sports competition, 15 play lawn tennis, 11 swim, 9 play lawn tennis and swim and 3 none of the sport activities

11. How many students swim only?

- A. 6
- B. 2
- C. 9
- D. 20

Answer: B

12. How many students play lawn tennis only?

- A. 6
- B. 2
- C. 9
- D. 20

Answer: A

13. How many students are in the group?

- A. 6
- B. 2
- C. 9
- D. 20

Answer: D

14. In a group of 40 students, 22 study Maths, 18 study physics, 14 study statistics, 9 study both Maths and Physics, 7 study both Maths and Statistics, 5 study both Physics and Statistics and 2 study all the subjects. How many study none of the subjects?

- A. 4
- B. 5
- C. 6
- D. 7

Answer: B

15. Simplify  $\frac{1}{2-\sqrt{3}} + \frac{5}{\sqrt{3}+2} - \frac{1}{\sqrt{3}-\sqrt{2}}$

- A.  $12 - 5\sqrt{3} - \sqrt{2}$
- B.  $12 - 5\sqrt{3} + \sqrt{2}$
- C.  $12 + 5\sqrt{3} + \sqrt{2}$
- D.  $12 + 5\sqrt{3} - \sqrt{2}$

Answer: D

16. Find the square root of  $7 - \sqrt{13}$

- A. 0.8424
- B. 1.8424
- C. 1.8244
- D. 0.8244

Answer: B

17. Find the roots of the equation:  $x^3 + 5x^2 - 2x - 24$

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

Answer: C

18. Find the roots of the equation  $2x^3 + 11x^2 - 17x - 6$

- A. d
- B. d
- C. d
- D. d

Answer:

19. Solve the equation  $2x^2 - 5x + 7 = 0$

- A.  $\frac{5 \pm \sqrt{31}}{4}$
- B.  $\frac{5 \pm i\sqrt{31}}{4}$
- C.  $\frac{5 \pm i\sqrt{31}}{2}$
- D.  $\frac{5 \pm \sqrt{31}}{2}$

Answer: B

20. In the expression  $\frac{2}{y^2+2y+1} = \frac{1}{y^2+2y-2} + \frac{3}{y^2+2y+3}$ , determine the value of  $y^2 + 2y + 1$

- A.  $\frac{5 \pm \sqrt{71}}{4}$
- B.  $\frac{5 \pm i\sqrt{-71}}{2}$
- C.  $\frac{5 \pm i\sqrt{71}}{4}$
- D.  $\frac{5 \pm i\sqrt{71}}{2}$

Answer: C

21. The value of k in  $\sqrt{k-1} + 5\sqrt{k-9} = 4\sqrt{k-6}$  is

- A. 9
- B. 10
- C. 11
- D. 12

Answer: B

22. If  $5g^4 + 9g^3 - 12g^2 - 9g + 5 = 0$ , find the value of R where R is a positive integer and  $R = g - \frac{1}{g}$

- A. 2
- B. 1
- C. 1/5
- D. -2

Answer: C

23. The values of x, y in the equations  $x + 2y = 3$  &  $x^2 + 2y^2 = 6$  are

- A.  $1 + \sqrt{2}, \frac{2-\sqrt{2}}{2}$
- B.  $1 + \sqrt{2}, \frac{2+\sqrt{2}}{2}$
- C.  $1 - \sqrt{2}, \frac{2-\sqrt{2}}{2}$
- D.  $1 - \sqrt{2}, \frac{2+\sqrt{2}}{2}$

Answer: A

24. a, b & c respectively in the equations  $2ab = a + b$ ,  $5ac = 6c - 2a$  &  $3bc = 3b + 4c$  are

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

Answer: B

25. Solve for x in the equation  $16^{3x} = \frac{1}{4}(32)^{x-1}$

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

Answer: D

26. Simplify  $(216)^{-1/3} \times (0.16)^{-1/2}$

- A. 12/17
- B. 5/13
- C. 12/15
- D. 5/12

Answer: D

27. Given that  $y = 3x$ , and  $3^{x-y} = \frac{1}{81}$ , find  $x$

- A. 2
- B. 3
- C. 4
- D. 5

Answer: A

28. If  $8^{x/2} = 2^{3/8} \times 4^{3/4}$ , find the value of  $4x$

- A. 4
- B. 5
- C. 6
- D. 7

Answer: 5

29. Solve for  $x$  in  $3^{2x+1} - 18(3^x) - 81 = 0$

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

Answer: D

30. Solve for  $x$  in  $26(5^{x-1}) = 5^{2x} + 1$

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

Answer: B

31. Evaluate  $\log_a 256 = 4$

- A. 2
- B. 3
- C. 4
- D. 5

Answer: 4

32. Given that  $\log_2 64 = k$ , find  $4k \log_{16} 32$

- A. 60
- B. 50
- C. 40
- D. 30

Answer: D

33. The value of  $x$  in  $\log_3 x - 3 \log_x 3 = 2$  is

- A. -1/3
- B. -27
- C. 27
- D. 3

Answer: C

34. What is the positive value of  $y$  in  $3 \log_8 y = \log_4 (y + 4)$ ?

- A. -2,3
- B. -2,-3
- C. 2,-3
- D. 2,3

Answer: A

35. If  $25^{x+1} = 64 \left(\frac{5}{2}\right)^6$ , find  $x$

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

Answer: D

36. Simplify  $\left(\frac{8}{27}\right)^{1/3} - \left(\frac{4}{9}\right)^{1/2}$

- A. 0
- B. 1
- C. 2
- D. 3

Answer: A

37. Simplify  $\frac{6^{2n+2} \times 9^n \times 4^{2n-1}}{18^{n+1} \times 2^{n-1} \times 12^{2n+1}}$

- A. 6
- B. 12
- C. 1/6
- D. 1/12

Answer: D

38. If  $|x| < p$ , then

- A.  $p < x < -p$
- B.  $-p < x < p$
- C.  $-p > x < p$
- D.  $-p < x > p$

Answer: B

39. The value of  $x$  in  $\frac{5x-1}{3} - \frac{1-2x}{5} < 8 + x$

- A.  $x < 8$
- B.  $x < -8$
- C.  $x > 8$
- D.  $x > -8$

Answer: A

40. Find the range of  $x$  for which  $12 + x - x^2 < 0$

- A.  $x < 3$  or  $x < -4$
- B.  $x < -3$  or  $x < 4$
- C.  $-3 < x < 4$
- D.  $3 < x < -4$

Answer: C

41. The equivalent of  $(a + b) \left(\frac{1}{a} + \frac{1}{b}\right) \left(\frac{a^2}{b^2} + \frac{b^2}{a^2}\right)$  is

- A.  $16\sqrt{ab}$
- B. 16
- C.  $8\sqrt{ab}$
- D. 8

Answer: D

42. The equivalent of  $(a + b) \left(\frac{1}{a^2} + \frac{1}{b^2}\right) \left(\frac{a^4}{b^2} + \frac{b^4}{a^2}\right)$

- A.  $16\sqrt{ab}$
- B. 16

C.  $8\sqrt{ab}$

D. 8

Answer: C

43. If  $\frac{x}{(x-1)^2(x+3)} = \frac{P}{16(x-1)} + \frac{G}{4(x-1)^2} + \frac{H}{16(x+3)}$ , the value of P + G + H is

A. 3

B. 1

C. 7

D. 10

Answer: B

44. The first 3 terms of the sequence given by  $T_n = \frac{n+1}{3n+2}$  respectively are

A.  $3/8, 4/11, 5/14$

B.  $4/11, 5/14, 6/17$

C.  $2/5, 3/8, 4/11$

D.  $3/8, 4/11, 6/17$

Answer: C

45. Given the nth term of a sequence  $\log_{16}(n+3)$ , what is the difference between the 13<sup>th</sup> and first terms?

A.  $1/2$

B. 2

C. 1

D. -1

Answer: A

46. The sum of the terms of a sequence is known as

A. Series

B. Arithmetic sequence

C. Geometric sequence

D. Sequence

Answer: A

47. The type of sequence in which the next term differs from the preceding term by a difference is termed

A. Arithmetic Sequence

B. Geometric sequence

C. Geometric Infinity

D. Infinite series

Answer: A

48. The correct expression for the common difference in an A.P. is

A.  $T - T_n$

B.  $T_n - T_{n+1}$

C.  $T_n - T_{n-1}$

D.  $T_n - T_{n+2}$

Answer: C

49. The common difference in the series  $K, K+3, K+6, \dots$  is

A. 2

B. 3

C. 4

D. -4

Answer: B

50. If the first 3 terms of an A.P. are  $y, 3y+1, 7y-4$ , find the 10<sup>th</sup> term of the sequence

A. 66

B. 55

C. 44

D. 33



Answer: A

51. The 6<sup>th</sup> and 13<sup>th</sup> term of an A.P. are 0 and 14 respectively, find the 20<sup>th</sup> term

- A. 18
- B. -18
- C. 28
- D. -28

Answer C

52. If  $P = \{\text{prime factors of } 84\}$  and  $Q = \{\text{prime factors of } 315\}$ , the elements of  $P \cup Q$  &  $P \cap Q$  are respectively

- A.  $\{3,4,5,7,9\}$  &  $\{3,7\}$
- B.  $\{3,4,5,7\}$  &  $\{5,7\}$
- C.  $\{2,3,5,7\}$  &  $\{3,7\}$
- D.  $\{2,3,5,7\}$  &  $\{2,7\}$

Answer: C

53. In a class of 100 students, 40 students study botany, 32 study microbiology while 44 study zoology. The number of students that study botany and microbiology is 24, botany and zoology is 24, while 20 study microbiology and zoology. If 20 students study all the three subjects, how many study none of the three courses

- A. 32
- B. 42
- C. 68
- D. 24

Answer: A

54. The union of the set A and B denoted by  $A \cup B$  denoted by  $A \cup B$ , is the set of elements which belong to

- A. either A nor B nor both
- B. either A or B or both
- C. neither A nor B or both
- D. neither A or B nor both

Answer: B

55. The word "Infinity" is

- A. a real number
- B. a complex number
- C. an integer number
- D. constant

Answer: C

56. In a class, 220 students offer Mathematics or Chemistry or both. 125 offer Mathematics and 110 offer Chemistry. How many offer Chemistry but not Mathematics? (a) 80 (b) 110 (c) 125 (d) 95

- A. 80
- B. 110
- C. 125
- D. 95

Answer: D

57. The universal set U contains only elements of the sets A, B, C where  $A = \{3,q,r\}$ ,  $B = \{a,2,c\}$  and  $C = \{1,3,4,b\}$ . what are the elements in  $[(A - B) \cap \{C - (A \cap C)\}]$

- A.  $\{3,q,r\}$
- B.  $\{q,r\}$
- C.  $\{3\}$
- D.  $\{3,1\}$

Answer: C

58. If  $R = \{x: x^2 = 16, x > 5\}$ , then R is equal to

- A. 0

- B. {0}
- C.  $\emptyset$
- D.  $\{\emptyset\}$

Answer: C

59. In a certain class, 22 pupils take one or more of Chemistry, Economics and Government. 12 take Economics (E), 8 take Government (G) and 7 take Chemistry (C). Nobody takes Economics and Chemistry and 4 pupils take Economics and Government. How many pupils take both Chemistry and Government?
- A. 1
  - B. 2
  - C. 3
  - D. 4

Answer: A

60. The universal set U has subsets M and N such that  $M \subseteq N$ . The set of  $M \cap (M \cap N)^c$  is
- A. M
  - B.  $\emptyset$
  - C. N
  - D. U

Answer: B

61. Given the universal set  $U = \{2,3,4,5,6,7,8,9\}$  and subsets  $P = \{2,4,6,8\}$  and  $Q = \{x: x^2 < 50, x \text{ is odd}\}$ , find  $(P \cap Q)^c$
- A. {9}
  - B. {0}
  - C.  $\emptyset$
  - D. U

Answer: U

62. Simplify  $\sqrt[3]{(729y^{-6})^{1/2}}$
- A.  $\frac{1}{3y}$
  - B.  $3y$
  - C.  $\frac{y}{3}$
  - D.  $\frac{3}{y}$

Answer: D

63. Evaluate  $\sqrt[3]{\frac{0.0024 \times 35000}{0.0105}}$ , leaving your answer in standard form

- A.  $2 \times 10^1$
- B.  $2 \times 10^2$
- C.  $1 \times 10^2$
- D.  $1 \times 10^1$

Answer: A

64. The square root of  $3 - \sqrt{2}$  is

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

Answer: D

65. If a & b are positive numbers, evaluate  $4(a+b)\left(\frac{1}{a^2} + \frac{1}{b^2}\right)\left(\frac{a^4}{b^2} + \frac{b^4}{a^4}\right)$

- A. 32

- B.  $32\sqrt{ab}$
- C. 16
- D.  $16\sqrt{ab}$

Answer: B

66. In the equation  $5x^4 + 9x^3 - 12x^2 - 9x + 5 = 0$ , find the value of  $x - \frac{1}{x}$

- A.  $-\frac{1}{5}, 2$
- B.  $\frac{1}{2}, 5$
- C.  $\frac{1}{5}, -2$
- D. 5, 2

Answer: C

67. Determine the square of the remainder when  $3x^4 - 2x^3 - 10x - 5$  is divided by  $x - 4$

- A. 595
- B. 475
- C. 354025
- D. 225625

Answer: C

68. In resolving  $\frac{1}{x(x^2-1)}$  into partial fraction, what are the values of the constants A, B & C?

- A.  $-2, \frac{1}{2}, \frac{1}{2}$
- B.  $-1, \frac{1}{2}, \frac{1}{2}$
- C.  $-1, \frac{1}{2}, -1\frac{1}{2}$

Answer: B

69. Find the range of the validity of  $x$  in the equation  $\frac{2x-1}{x} > 1$

- A.  $x < 1$  or  $x > 0$
- B.  $x < 0$  or  $x < 1$
- C.  $x < 0$  or  $x < 1$
- D.  $x > 0$  or  $x > 1$

Answer: D

70. What is the remainder when  $x^3 + 3x^2 - 13x - 10$  is divided by  $(x - 3)$ ?

- A. 4
- B.  $4\frac{1}{4}$
- C. 6
- D. 5

Answer: D

71. Given that  $-2 = A(x - 1)^2 + B(x - 1)(x - 2) + C(x - 2)$ , find the value of C

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

Answer: A

72. Resolve into partial fraction  $\frac{x^3 - x^2 - 5x + 15}{(x+1)(x-2)^2}$  & give the values of A, B, C respectively

- A. 2,3,4
- B. 2,3,0
- C. 2,0,3
- D. 2, -2, 3

Answer: D

73. Determine the range of values of  $x$  for which  $\frac{x^2+x-2}{x^2+4} > \frac{1}{2}$

- A.  $x > -4$  or  $x > 2$
- B.  $x < -4$  or  $x < 2$
- C.  $x < 4$  or  $x > 2$
- D.  $x < -4$  or  $x > 2$

Answer: A

74. In the equation  $5x^4 - x^3 + 9x^2 - x + 5 = 0$ , find the value of  $\left(x + \frac{1}{x}\right)$

- A.  $\frac{17\sqrt{21}}{10}$
- B.  $\frac{1\pm\sqrt{21}}{5}$
- C.  $\frac{1\pm\sqrt{21}}{15}$
- D.  $\frac{1\pm\sqrt{21}}{10}$

Answer: D

75. Determine the values of  $p$  &  $q$  if  $(x - 1)$  &  $(x + 2)$  are factors of  $2x^3 + px^2 - x + q$

- A.  $p = -5, q = -6$
- B.  $p = 5, q = 6$
- C.  $p = 5, q = -6$
- D.  $p = -6, q = -5$

Answer: C

76. Find the value of the constant  $k$  if  $4x^3 + kx^2 + 7x - 23$  has a remainder 7 when divided by  $2x - 5$

- A. 8
- B. -16
- C. -8
- D. 16

Answer: C

77. Expresses  $\frac{3x^2+x+1}{x(x+1)^2}$  in partial fractions and find the value of  $A + B - C$

- A. -3
- B. 2
- C. 6
- D. 7

Answer: C

78. Solve the inequality  $\left|\frac{y-4}{y+4}\right| > 1$

- A.  $-4 < y < 0$
- B.  $4 < y < 0$
- C.  $0 > y > -4$
- D.  $0 < y < 4$

Answer: A

79. The sum of the square of three positive numbers in arithmetic progression is 165. If the sum of the number is 21, find the sum of cubes of each of the numbers?

- A. 4
- B. 1400
- C. 1407
- D. 104

Answer: C

80. The sum of the first  $n$  terms of an AP whose difference is not zero equals half the sum of its subsequent  $n$  members. Find the ratio of the sum of the first  $3n$  terms and the sum of the first ...terms

- A. 6
- B. 4
- C. 8
- D. 3

Answer: A

81. Given the following series:  $\ln x, \ln x^2, \ln x^4, \ln x^8$ , find the 21<sup>st</sup> term

- A.  $20 \ln x$

- B.  $2^{20} \ln x$
- C.  $20^2 \ln x$
- D.  $20 \ln x^2$

Answer: B

82. Find the 8<sup>th</sup> term and the sum of the first 8 terms of the GP sequence:  $\frac{1}{2}, -1, 2, -4, \dots$ ?

- A.  $-64, -42.5$
- B.  $-64, 42.5$
- C.  $64, 42.5$
- D.  $-64, 45.4$

Answer: A

83. The sum of the first eight terms of the AP:  $\ln x, \ln x^2, \ln x^3, \dots$  is

- A.  $\ln x^8$
- B.  $\ln x^9$
- C.  $\ln x^{36}$
- D.  $\ln x^{72}$

Answer: C

84. Don Mike places a sum of money on a savings account in the bank. On each succeeding birthday, he deposits two times more than on the previous birthday. His total sum of the first eleven deposits is N20,480. How much was his first deposit?

- A. N20
- B. N25
- C. N10
- D. N12.50

Answer: C

85. The fourth term and the seventh term of an AP are in the ratio 5:8. Find the ratio of the 3<sup>rd</sup> and 6<sup>th</sup> term.

- A. 4:5
- B. 6:5
- C. 4:6
- D. 4:7

Answer: D

86. The second term of an AP is four times the first term, the last term is 13 times the first term and the sum of the series is 70. Find the first three terms of the progression

- A. 2,4,6
- B. 2,8,14
- C. 2,4,8
- D. 8,12,14

Answer: B

87. A polygon has 25 sides, the length of which starting from the smallest side are in AP. If the perimeter of the polygon is 1100cm, and the length of the largest side is ten times that of the smallest, find the length of the smallest side

- A. 5cm
- B. 6cm
- C. 7cm
- D. 8cm

Answer: D