ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.

M.Sc. Five Year Integrated Programme (APPLIED GEOLOGY CHEMISTRY AND PHYSICS)

COURSE CODE : 380

Register Number :

Signature of the Invigilator
(with date)

COURSE CODE : 380

Time : 2 Hours

Max : 400 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.

2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.

3. Read each question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.

4. Avoid blind guessing. A wrong answer will fetch you −1 mark and the correct answer will fetch 4 marks.

5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.

-6. Do not open the question paper until the start signal is given.

7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.

8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.

9. Use of Calculators, Tables, etc. are prohibited.

1. The sun appears to cross the meridian at a certain location on the earth at 12 noon. At what angular position was that sun when it emitted the observed light?

   (A) $\theta = 2.06°$ west of the meridian
   (B) $\theta = 1.03°$ east of the meridian
   (C) $\theta = 1.03°$ west of the meridian
   (D) $\theta = 2.06°$ east of the meridian

2. In Young's double slit experiment, the band width of the fringe obtained with light of wavelength 6000 Å is 2 mm. Assume that the entire apparatus is immersed in a refractive index of liquid 1.33. What is the resultant band width ?

   (A) 3.0×10^{-4} mm
   (B) 1.5 mm
   (C) 1.0 mm
   (D) 2.0 mm

3. Three charges of +20 μC each, are placed along a straight line, successive charges being 2 m apart as shown in figure. The force acting on the charge Q3 is :


   (A) 0.9 N
   (B) 0.675 N
   (C) 1.125 N
   (D) 0.225 N

4. A point charge is kept at the centre of a 10 cm radius Gaussian surface. This causes an electric flux of $- 6 \times 10^3$ Nm²C⁻¹ to pass through this spherical surface. When the radius of the Gaussian surface is tripled, what will be the value of charge?

   (A) $- 15.9 \times 10^{-2}$ C
   (B) $- 1.9$ C
   (C) 15.9×10^{-2} C
   (D) $- 5.31 \times 10^{-8}$ C

5. A current of 3.0 A flows down a straight metal rod of 0.20 cm diameter. The rod is 1.5 m long. The potential difference between its ends is 40 V. The resistivity of the material of the rod is:

   (A) 2.8 μΩ. m
   (B) 28 Ω. m
   (C) 2.8 Ω. m
   (D) 28 μΩ. m

6. Find the charge accumulated by the 4 μF capacitor from the following capacitors circuit,
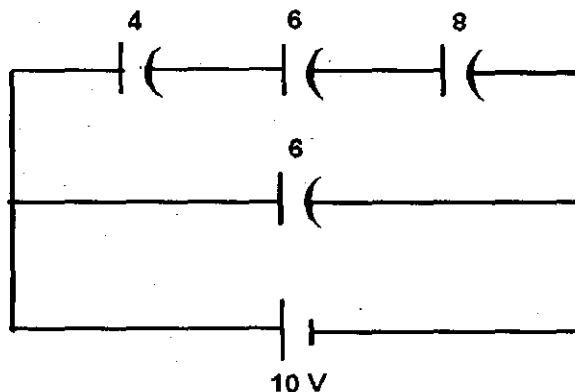
   (A) 0.185 μC
   (B) 78.5 μC
   (C) 7.85 μC
   (D) 18.5 μC

7. The resistance of the conductor is 5 Ω and 6 Ω at 50 °C and 100 °C respectively. Find the resistance of a conductor at 0 °C from the mean temperature co-efficient of resistance of the material.

   (A) 4 Ω   (B) 0 Ω .   (C) 6.25 Ω   (D) 7 Ω

8. Which law is used to calculate the magnetic induction due to current carrying conductor?

   (A) Gauss law   (B) Biot-Savart law

   (C) Amphere's law   (D) Kirchoff's law

9. Calculate the current through a long straight wire which produces a magnetic induction of 4×10^{-6} T at a point 20 cm from the wire.

   (A) 3 A   (B) 40 A   (C) 30 A   (D) 4 A

10. In the Bohr-model hydrogen atom, the single electron orbits the nucleus in a circle of radius a $\approx 5.3 \times 10^{-11}$ m, making 6.6×10^{-15} revolutions each second. The magnetic field at the nucleus is,

    (A) 13 mT   (B) 13 T   (C) 10 mT   (D) 10 T

11. A possible bridge for measuring capacitance is shown in following figure. Assume that when key is closed, no current flows through the galvanometer, which means the circuit is balanced. What is the condition for which the bridge is balanced?
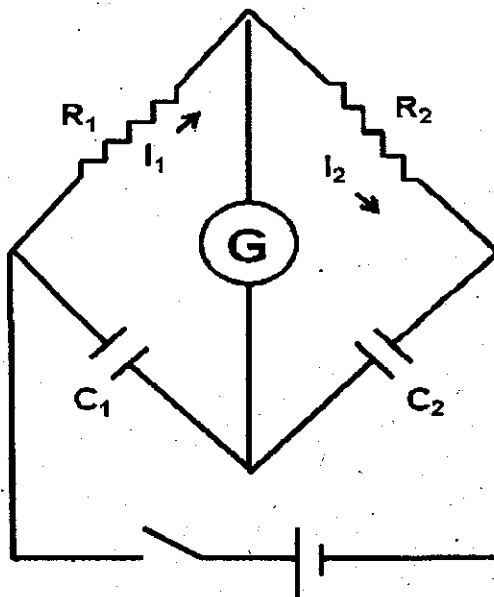

    (A) $R_1C_2 = R_2C_1$ (B) $I_1R_1 = I_2R_2$ (C) $I_1R_1C_1 = I_2R_2C_2$ (D) $R_1C_1 = R_2C_2$

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12. What is the force per unit length between the wires?

I$_1$ = 35 A

→

↕ 15 cm

←

I$_1$ = 45 A
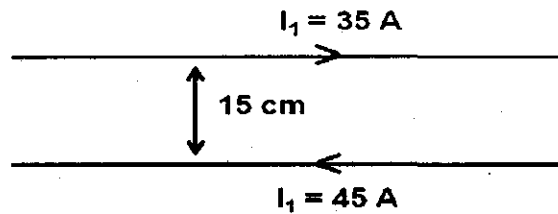
(A) $f = 21 \times 10^{-4} T/A$ (B) $f = 21 \times 10^{-4} N/m$

(C) $f = 21 \times 10^{-4} N.m$ (D) $f = -21 \times 10^{-4} N/m$

13. Calculate the induced emf in a 250 cm^2 circular coil having 100 turns when the field strength B passing through the coil changes from 0.0 T to 0.0001 T in 0.01 s at a constant rate.

(A) 0.25×10^{-2} V   (B) -0.25×10^{-2} V   (C) -2.5×10^{-2} V   (D) 2.5×10^{-2} V

14. A generator develops an emf of 120 V and has a terminal potential difference of 115 V when the armature current is 25 A. What is the resistance of the armature?

(A) 0.2 Ω   (B) 125 Ω   (C) 0   (D) 5 Ω

15. Two rails of a railway track are insulated from each other. A millivoltmeter is connected between the rail and ground. The train runs at a speed of 180 Km/hr. Vertical component of earth's magnetic field is 0.2×10^{-4} Wb/m^2 and the rails are separated by 1 m. Estimate the reading of the voltmeter.

(A) 1 mV   (B) 100 V   (C) 1 V   (D) 10 V

16. A step down transformer is used on a 2000 V line to deliver 100 V. How many turns are on the primary winding if the secondary has 25 turns?

(A) 20   (B) 500   (C) 250   (D) 50

17. Whenever an emf is induced, the induced current is in such a direction as to oppose the cause. This is....

(A) Gauss law   (B) Fleming's left hand rule

(C) Faraday's law   (D) Lenz's law

18. When a fish looks up at the surface of a perfectly smooth lake, the surface appears dark except inside a circular area directly above it. Calculate the angle Φ that this illuminated region subtends.

(A) 27.9°   (B) 29.7°   (C) 97.2°   (D) 92.7°

19. In ray optics, to derive a relevant formula for reflection by spherical mirrors and refraction by spherical lenses Cartesian sign convention is adopted. In this sign convention all distances are measured :

    (A) From the pole of the mirror and optical centre of lens

    (B) From the pole of the lens and optical centre of a mirror.

    (C) From the pole of the mirror only

    (D) From the optical centre of lens only

20. Consider two thin bi-convex lens, each of focal length of 10 cm. The distance between these lenses is 5 cm. An object is placed to the left of the lens-1, as shown in the figure, at a distance of 30 cm. The position of image from the lens-2 is :
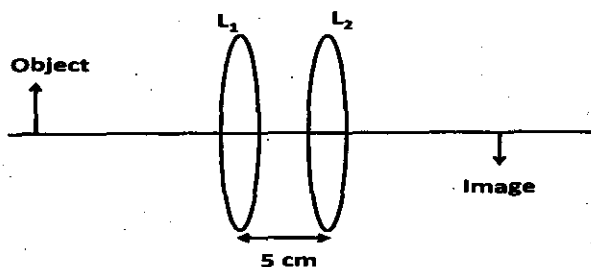
    (A) 7.5 cm   (B) 12.5 cm   (C) 2 cm   (D) 5 cm

21. Consider a light beam travelling in medium-1 with velocity V_1 and that it enters medium-2 and travels with a velocity V_2. Let λ and f denote the wavelength and frequency respectively. Lets use suffix 1 and 2 for medium-1 and medium -2 respectively. Which of the following expression is correct?

    (A) $V_1 f_1 = V_2 f_2$ (B) $V_1 \lambda_2 = V_2 \lambda_1$

    (C) $V_1 f_2 = V_2 f_1$ (D) $V_1 \lambda_1 = V_2 \lambda_1$

22. Two light beams of equal intensities I, are incident on a plane sheet of paper at point P, at an angle θ with respect to each other. The measured intensity at the point P is found to be 2I. This implies that :

    (A) These two beams are of different wavelength and incoherent

    (B) These two beams are of the same wavelength and coherent.

    (C) These two beams are of same wavelength and incoherent

    (D) These two beams are of different wavelength and coherent

23. An unpolarised light is incident from air to a medium of higher refractive index. The plane of interface is perpendicular to this sheet of paper. Let the angle of incidence be at Brewster's angle. Thus the nature of reflected light will be :

    (A) Polarized perpendicular respect to this sheet of paper

    (B) Unpolarised

    (C) Polarized with an angle of 45 degrees with respect to this sheet of paper

    (D) Polarized parallel with respect to this sheet of paper

24. If we try to understand photo-electric effect using wave theory, then the time taken (since the time of incidence of light) for the emission of photo electrons from the surface will be:

(A) Few seconds

(B) In the order of hours

(C) Almost zero second, i.e., instantaneous

(D) Infinity

25. Assume that an electron, an alpha particle of He, an alpha particle of Li and proton are all having the same kinetic energy. Which of these has the shortest de-Broglie wavelength?

(A) Electron   (B) Alpha particle of Lithium

(C) Alpha particle of helium   (D) Proton

26. According to classical electromagnetic theory, an electron revolving around the protons will emit radiation whose frequency will be of the order of :

(A) 10^{20} Hz   (B) 10^5 Hz   (C) 10^{10} Hz   (D) 10^{15} Hz

27. Binding energy per nucleon is constant for mass numbers between 30 and 170, due to the reason that nuclear force is short ranged. But nuclear forces becomes attractive for distances larger ————— femtometers.

(A) 0.9   (B) 0.6   (C) 0.7   (D) 0.8

28. A gamma decay involves emission of energies and wavelength such as :

(A) Kev and longer than X- rays   (B) MeV and shorter than X- rays

(C) MeV and longer than X – rays   (D) KeV and shorter than X- rays

29. In an intrinsic semiconductor the total current I is a function of electron current (I_e) and hole current (I_h). The expression governing this dependence is :

(A) $I = I_e + I_h$ (B) $I = I_e + 0.5 I_h$

(C) $I = 0.5I_e + 0.5 I_h$ (D) $I = 0.5I_e + I_h$

30. A Zener diode is different from an ordinary diode due to the fact that both p and n regions are ————— doped and thus it can be used as ————— regulator.

(A) Heavily, Current   (B) Normally , Current

(C) Normally, Voltage   (D) Heavily, Voltage

31. If uncertainties in the measurement of position and momentum are equal, then uncertainty in the measurement of velocity will be

(A) $h/4\pi m$ (B) $\dfrac{1}{2m}\sqrt{\dfrac{h}{\pi}}$ (C) $\dfrac{h}{2\pi m}$ (D) $h/4\pi$

32. Under isochoric condition, graphs between p and T are shown below. Arrange V1, V2 and V3 in increasing order
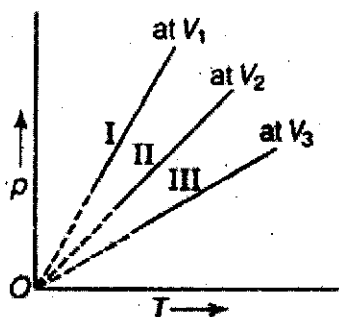
(A) V1 < V2 < V3
(B) V3 < V2 < V1
(C) V3 < V1 < V2
(D) V1 = V2 = V3

33. Two elements A and B form non-volatile compounds having formula AB_2 and AB,. About 10% solution of AB_2 in water lowers the freezing point by 1.86° while 18% solution of AB, in water also lowers the freezing point by 1.86°. Molal depression constant of water is 1.86° mol^{-1} kg. Thus, atomic masses of A and B are;

(A) 40, 20
(B) 100, 180
(C) 180, 100
(D) 20, 40

34. The molar conductivity of 0.025 mol L^{-1} methanoic acid at 298 K is 50.0 S cm^2 mol^{-1}. At infinite dilution the limiting molar conductivities of H$^+$ and $HCOO^-$ are 350.0 S cm^2 mol^{-1} and 50.0 S cm^2 mol^{-1}, respectively, thus, degree of dissociation (x) and dissociation constant (Ka) respectively are;

(A) 0.125, 1.6 x 10^{-2}
(B) 0.0125, 3.9 x 10^{-4}
(C) 0.125, 3.9 x 10^{-4}
(D) 0.125, 4.5 x 10^{-4}

35. Four atoms are arbitrarily labelled D, E, F and G. Their electronegativity values are: D = 3.8, E = 3.3, F = 2.8 and G = 1.3. Consider they form molecules DF, DG, EG, and DF, then the Increasing covalent character of the molecules is;

(A) DG < EG < DE < DF
(B) EG < DE < DF < DG
(C) DG < EG < DF < DE
(D) DE < EG < DF < DG

36. Given, $E^0_{MnO_4^{2-}/MnO_2} = 2.26V$; $E^0_{MnO_4^-/MnO_4^{2-}} = 0.56V$. Which one of the following reactions will be spontaneous?

(A) $MnO^-_4 \rightarrow MnO_2 + MnO_4^{2-}$
(B) $MnO_4^{-2} \rightarrow MnO_2 + MnO_4^-$
(C) $MnO_4^{-2} \rightarrow MnO^-_4$
(D) None of the above

37. A solution containing 0.0012 mole of the complex CrCl$_3$. 6H$_2$O was passed through a cation exchange resin then the acid coming out of this resin required 28.5 mL of 0.125 M NaOH, therefore, the complex is;

(A) $\left[Cr(H_2O)_6\right]Cl_3$
(B) $\left[Cr(H_2O)_4Cl_2\right]Cl \cdot 2H_2O$
(C) $\left[Cr(H_2O)_3Cl_3\right] \cdot 3H_2O$
(D) $\left[Cr(H_2O)_6Cl_3\right]$

38. The major product of the following reaction is

$$\text{(structure with Me, Br on stereocenter, F, NO}_2\text{)} \xrightarrow[\text{DMF}]{\overset{-}{\text{PhS}}\ \overset{+}{\text{Na}}}$$

(A) (structure: Me, SPh, F, NO₂)

(B) (structure: Me, SPh, F, NO₂)

(C) (structure: Me, Br, SPh, NO₂)

(D) (structure: Me, SPh, SPh)
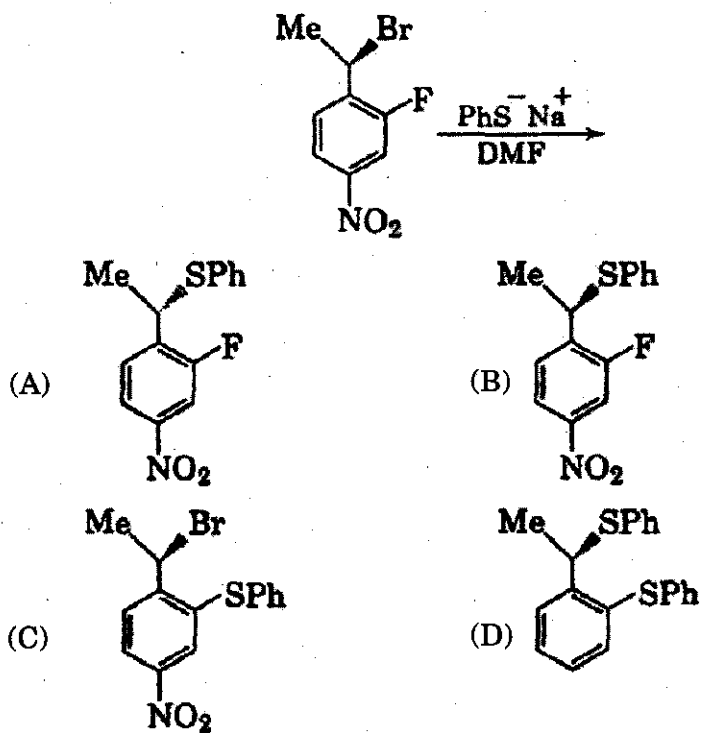
39. Final product of the following reaction can be;

$$\xrightarrow{\text{OH}^-}$$

(A) (structure: O₂N–C₆H₄–CH₂OH)

(B) (structure: HO–C₆H₄–CH₂OH)

(C) (structure with two nitrophenyl groups, CH₂, CHCl)

(D) (structure: stilbene with two NO₂ groups)
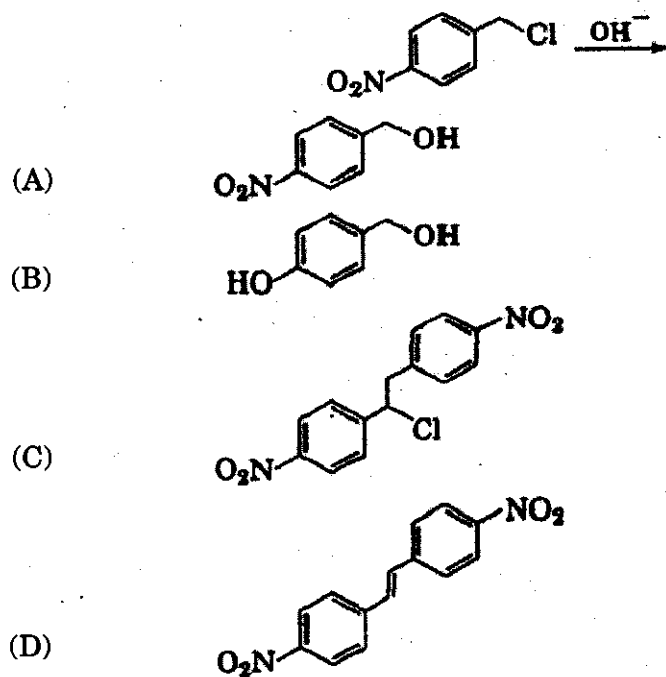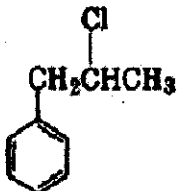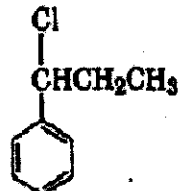
40. 200 L of hard water requires 0.56 g of lime (CaO) for removing hardness. What is the temporary hardness in ppm of $CaCO_3$?

   (A) 6   (B) 8   (C) 10   (D) 2

41. How do you represent the formula for mercurous ion?

   (A) Hg_2^{2+} (B) Hg^{2+} (C) Hg^+ (D) Hg_2^+

42. How many moles of water are present in 720 g of water at room temperature?
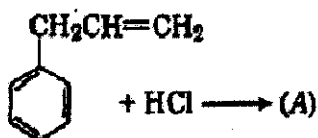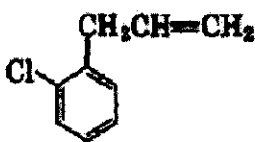
   (A) 400   (B) 40   (C) 720   (D) 72

43. The specific heat of an element is 0.214 cal/g, the atomic weight can be equated to;

   (A) 30   (B) 65   (C) 6.6   (D) 12

44. Reduction potentials of some ions are given below. Arrange them in decreasing order of oxidising power.

Ion	ClO_4^-	IO_4^-	BrO_4^-
E°_{red}/V	1.19 V	1.65 V	1.74 V

   (A) $BrO_4^- > IO_4^- > ClO_4^-$ (B) $BrO_4^- > ClO_4^- > IO_4^-$

   (C) $ClO_4^- > IO_4^- > BrO_4^-$ (D) $IO_4^- > BrO_4^- > ClO_4^-$

45. Why is HCl not used to acidify a solution in which medium oxidation reaction of $KMnO_4$ is carried out?

   (A) $KMnO_4$ is a weaker oxidising agent than HCl.

   (B) $KMnO_4$ acts as a reducing agent in the presence of HCl

   (C) Both HCl and $KMnO_4$, act as oxidising agents.

   (D) $KMnO_4$ oxidises HCl into Cl_2 which is also an oxidising agent.

46. What is 'A' in the following reaction?

$$\text{C}_6\text{H}_5\text{CH}_2\text{CH}=\text{CH}_2 + \text{HCl} \longrightarrow (A)$$

   (A) $C_6H_4(Cl)CH_2CH=CH_2$ (B) $C_6H_5CH_2CH_2CH_2Cl$

   (C) $C_6H_5CH_2CHClCH_3$ (D) $C_6H_5CHClCH_2CH_3$

47. Three cyclic structures of monosaccharides are given below. Which of these are anomers?

```
 H ——OH │    HO——H │    HO——H │
 H ——OH │     H——OH │    HO——H │
HO——H  O   HO——H  O   HO——H  O
 H ——OH │     H——OH │     H——OH │
 H ————││     H————│     H————│
   CH₂OH        CH₂OH        CH₂OH
    (I)          (II)         (III)
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(A) I and III

(B) III is the anomer of I and II

(C) I and II

(D) II and III

48. Calculate the change in pH when a 0.1 M solution of CH_3COOH in water at 25°C is diluted to a final concentration of 0.01 M. (Ka = 1.85 x 10⁻¹ log 1.36 = 0.1335, log 4.3 = 0.6335)

(A) ~0.7   (B) ~0.6   (C) ~0.5   (D) ~0.4

49. A gaseous equilibrium: $2A(g) = 2B(g) + C(g)$ is set up at temperature T, with only A as the starting material. The total equilibrium pressure is P atm and $P_c = p/n$, If $K_p/p = 1/81$ calculate the value of n.

(A) 9   (B) 12   (C) 3   (D) 6

50. The effective nuclear charge (Z^*) experienced by the '4s electron in potassium atom (At. no. = 19) is;

(A) 21.20   (B) 17.70   (C) 19   (D) 2.20

51. About 2.6 g of an element X is reacted in an aqueous solution containing NaOH and $NaNO_3$ to yield Na_2XO_2 and NH_3. The NH_3 thus liberated is absorbed in 100 mL of 0.11 M H_2SO_4. The excess acid required is 48 ml against 0.25 M NaOH to complete neutralisation. Find the atomic weight of X.

(A) 16   (B) 65   (C) 33   (D) 130

52. One mole of an organic hydrocarbon 'X' requires three moles of hydrogen gas for catalytic hydrogenation. The hydrogenation product is 1,4-diethylcyclohexane. Calculate molecular weight of 'X', number of chemically different hydrogen present in 'X' and number of structural monochloride isomers of 1,4-diethylcyclohexane and report the sum.

(A) 36   (B) 72   (C) 143   (D) 286

53. A gas 'X' is passed through water to form a saturated solution. The aqueous solution on treatment with $AgNO_3$ gives a white precipitate. The saturated aqueous solution dissolves magnesium ribbon with evolution of colorless gas 'Y'. Identify 'X' and 'Y'.

(A) $X = H_2$, $Y = Cl_2$ (B) $X = CO_2$. $Y = Cl_2$

(C) $X = Cl_2$ $Y = CO_2$ (D) $X = Cl$, $Y = H_2$

54. The heat of reaction (ΔH) for the formation of NH_3 according to reaction $N_2 + 3H_2 \rightarrow 2NH_3$ at 27°C was found to be -91.94 kJ. What will be the heat of reaction at 50°C, $(R = 8.31 \ J/mol \ K)$?

(A) -86.38   (B) 93.087   (C) -93.087   (D) 86.38

55. How much volume of $M/10$ $KMnO_4$ must be treated with H_2O_2 in acidic medium to produce with sufficient amount of O_2 at STP for the complete combustion of 560 mL CH_4 at STP?

(A) 50 mL   (B) 200 mL   (C) 20 mL   (D) 500 mL

56. The statement which is incorrect with respect to transition metals is;

(A) the complex formation of transition metal ions is often accompanied by a change of colour and sometimes by a changes in the intensity of the colour

(B) most transition metals, should on thermodynamic considerations liberate hydrogen from acids

(C) the colour of the hydrated ions is due to transitions of electrons from different 'd'-orbitals of the same principal quantum number

(D) the compounds of the elements in low oxidation states are generally ionic

57. Consider SbF_5 reacts with XeF_4 to form an adduct. The shapes of cation and anion in the adduct respectively are;

(A) Square planar, octahedral

(B) Square planar, trigonal bipyramidal

(C) T-shaped, octahedral

(D) Square pyramidal, octahedral

58. About 4.617×10^{-3} moles of $NaNO_3$ requires 4.04 moles of reducing agent to get reduced to NH_3., what is the n-factor of the reducing agent?

(A) 8   (B) 5   (C) 6   (D) 7

59. The crystal field splitting energy (CFSE) for octahedral (Δ_o) and tetrahedral (Δ_t) complex is related as;

(A) $\Delta_0 = \dfrac{4}{9}\Delta_t$ (B) $\Delta_t = \dfrac{4}{9}\Delta_0$ (C) $\Delta_t = \dfrac{1}{2}\Delta_0$ (D) $\Delta_0 = -2\Delta_t$

60. A 0.01 m solution of $Pt(NH_3)_4Cl_4$ in water had the freezing point of - 0.056°C. Assuming 100% ionisation of the complex in solution. Find the number of ionisable chloride ion. ($K_f = 1.86$)

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

61. The number of terms are there in 2,4,8,16, —————— 1024 is

(A) 20   (B) 10   (C) 17   (D) 512

62. The H.C.F of 1.75, 5.6 and 7 is:

(A) 0.35   (B) 0.75

(C) 3.5   (D) None of the above

63. Find the average of first 40 natural numbers.

(A) 20   (B) 20.5   (C) 25.7   (D) 19.5

64. $\lim\limits_{x \to \infty} \dfrac{\sin x}{x} = ?$

(A) 1   (B) ∞ (C) 0   (D) No limit exist

65. The distance between the lines $4x + 3y = 9$ and $8x + 6y = 15$ is

(A) 0.3   (B) 0.6   (C) 0.7   (D) 3

66. If $\log 2 = 0.30103$, the number of digits in 4^{50} is :

(A) 31   (B) 32   (C) 71   (D) 30

67. A man and his wife appear in an interview for two vacancies in the same post. The probability of husband's selection is 1/7 and the probability of wife's selection is 1/5. What is the probability that only one of them is selected is

(A) 2/7   (B) 8/15   (C) 9/25   (D) 4/5

68. If 2 cards are drawn from a well shuffled pack of 52 cards, the probability that they are of the same colours is

    (A) $\dfrac{26}{51}$ (B) $\dfrac{25}{51}$ (C) $\dfrac{25}{102}$ (D) $\dfrac{1}{2}$

69. When 75% of a number is added to 75, the result is the number again. Then the number is

    (A) 300   (B) 400   (C) 450   (D) 250

70. The three sides of a triangles are 3 cm, 4 cm and 5 cm. Then the area of the triangle is

    (A) 5 square units   (B) 10 square units

    (C) 8 square units   (D) 6 square units

71. A point on the parabola $y^2 = 2x$ that is closest to that point (1,4) is

    (A) (2, 3)   (B) (3, 2)   (C) (2, 2)   (D) (3, 3)

72. The work done by the force $\vec{F} = a\vec{i} + \vec{j} + \vec{k}$ in moving the point of application from (1, 1, 1) to (2, 2, 2) along a straight line is given to be 5 units, where the value of 'a' is

    (A) 9   (B) 12   (C) 3   (D) 6

73. The complementary function of $(D^2 + 1)y = e^{2x}$ is

    (A) (Ax+B) e^{2x} (B) (Ax+B) e^{-x}

    (C) (Ax+B) e^x (D) A cos x + B sin x

74. The values of t for which $\begin{vmatrix} t-2 & 3 \\ 4 & t-1 \end{vmatrix} = 0$ are

    (A) -5, 2   (B) 5, -2   (C) 4, 0   (D) 6, 2

75. Integrating factor of $\dfrac{dy}{dx} + \dfrac{1}{x\log x} \cdot y = \dfrac{2}{x^2}$ is

    (A) $\dfrac{1}{x}$ (B) e^{-x} (C) e^x (D) log x

76. The value of $(1+i)^4$ is

    (A) -4   (B) -4i   (C) 4   (D) 4i

77. $\int\limits_0^2 |x-1|\,dx = ?$

(A) 2   (B) 4   (C) 0   (D) 1

78. Find the distance of the straight line from point A(-3,0) to B(0,1)

(A) $\sqrt{5}$ (B) $\sqrt{10}$ (C) 5   (D) 10

79. $(-2)^4 \times (-2)^4 = ?$

(A) 256   (B) -256   (C) 64   (D) -64

80. If the product of two numbers is 10 and the sum of the two numbers is 7 then the larger of the two numbers is

(A) 7   (B) 10   (C) 2   (D) 5

81. Find x if $\log_x \dfrac{1}{81} = -4$

(A) -1/3   (B) 3   (C) 1/3   (D) -3

82. If $f(x) = \dfrac{x+2}{3}$ then $f^{-1}(x)$ is

(A) $\dfrac{3}{x+2}$ (B) $3x-2$ (C) $2x-3$ (D) does not exist

83. The order of $[7]$ in $(Z_9, +_9)$ is

(A) 1   (B) 9   (C) 6   (D) 3

84. If $u = \left(\dfrac{x^4 + y^4}{x^2 + y^2} \right)$ and $f = \sin u$ then f is a homogeneous function of degree

(A) 4   (B) 0   (C) 1   (D) 2

85. Which of the following curves in concave down?

(A) $y = x^2 + 2x - 3$ (B) $y = -x^2$ (C) $y = x^2$ (D) $y = e^x$

86. If $u = x^y$ then $\dfrac{\partial y}{\partial x}$ is equal to

(A) $x\ y^{x-1}$ (B) $y\ x^{y-1}$ (C) $u \log x$ (D) $u \log y$

87. The tangents at the end of any focal chord to the parabola $y^2 = 12x$ intersect on the line

(A) $y - 3 = 0$ (B) $x - 3 = 0$ (C) $x + 3 = 0$ (D) $y + 3 = 0$

88. If $\vec{a}\ and\ \vec{b}$ are two unit vectors and θ is the angle between them, then $(\vec{a} + \vec{b})$ is a unit vector if

(A) $\theta = \dfrac{2\pi}{3}$ (B) $\theta = \dfrac{\pi}{3}$ (C) $\theta = \dfrac{\pi}{4}$ (D) $\theta = \dfrac{\pi}{2}$

89. The point inflection of the curve is $y = x^4$ is at

(A) $x = 0$ (B) $x = 3$ (C) $x = 12$ (D) nowhere

90. The radius of a wheel is 21 cm. How many revolutions will it make in traveling 924 meters? (use $\pi = 22/7$)

(A) 700   (B) 7   (C) 11   (D) 200

91. From the following words, choose the mis-spelt word:

(A) Alitration   (B) Alliteration   (C) Allitration   (D) Aliteration

92. Choose the correct antonym of the given word: ENOUGH

(A) Inadequate   (B) Scarce   (C) Deficit   (D) Less

93. Choose the correct alternative so as to fill in the blank and make the sentence meaningfully complete.

"Whichever way you approach the problem —————".

(A) no one will not solve it   (B) it will not be solve

(C) it will not solve   (D) it will not be solved

94. Choose the word which can be substituted for the given sentence. "A person living permanently in a certain place."

(A) Native   (B) Resident   (C) Domicile   (D) Subject

95. Fill up the blank in the following sentence:

"He made a slight ——————— of judgement for which he had to repent later."

(A) error   (B) slip   (C) mistake   (D) blunder

96. Fill up the blank in the following sentence:

"A great change has come ——————— the world since the war."

(A) about   (B) over   (C) into   (D) in

97. Fill up the blank in the following sentence:

"There is an exception ——————— every rule."

(A) on   (B) to   (C) in   (D) for

98. Even if it rains all day I will not be able to ——————— my journey.

(A) put by   (B) put out   (C) put off   (D) put away

99. A sentence has been given in Direct/Indirect Speech. Out of four alternatives suggested select the one which best express the same sentence in Indirect/Direct Speech.

She said to him, "Why don't you go today?".

(A) She said to him that why he don't go today.

(B) She asked him if he was going that day.

(C) She asked him why he did not go today.

(D) She asked him why he did not go that day.

100. A sentence has been given in Active (or Passive) Voice. Out of four alternatives suggested select the one which best express the same sentence in Passive (or Active) Voice.

"His Pocket has been picked."

(A) They have his pocket picked.

(B) Picking has been done to his pocket.

(C) Someone has picked his pocket.

(D) Picked has been his pocket.