CLASS XI

SUBJECT- ENGLISH

1. Describe the changing relationship between the author and his grandmother. Did their feelings for each other change?

2. Discuss the difference between the Chinese and the Western art.

3. Give a character sketch of Uncle Khosrove. Narrate the incident that proves that he was indeed crazy.

4. "We have not inherited this earth from our forefathers, we have borrowed it from our children". Discuss.

5. Which are the earth's principal biological systems? What is their current ecological status?

6. What did the captain of the 'Wavewalker' do to protect his ship when rough weather struck?

7. Prepare a speech in 80 – 120 words on the topic, ''Female education would lead to removal of many social evils from society.'' You are Laxman/Lata.

8. Lack of physical exercise leads to several ailments. Write an article in 80 – 120 words on, ''The benefits of physical and yogic exercises will lead the nation to progress and prosperity.'' You are Amar/Amrita.

9. Skill development is the key to getting a job. As a career counsellor, write an article in 150 – 200 words on, ''Need to promote skill development among students.'' You are Inder/Indira.

10. ''Participation in extra-curricular activities should be made compulsory in schools.'' Write a debate in 150 – 200 words either for or against the motion. You are Rakesh/Reena.

11. MMR Eye Clinic is holding a free Eye Camp and Diabetes Check up in your school. The camp will be held in the school auditorium from 8.00 am to 5.30 pm. Qualified and experienced doctors will be available for consultation through the day. Design a poster informing the students about the camp. Invent necessary details. You are /Rita, Secretary, Health Club. (50 – 60 words).

12. Saarthi, an NGO, will be visiting your school to collect old books and stationery items. These books will be donated to the newly set up neighbourhood slum school. Cartons for collection have been placed in various corners of the school. As In charge, Social Service Club, draft a notice motivating students to donate. Invent necessary details. You are Amrit/Amrita. (50 - 60 words).

13. You have made your annual payment for home garbage collection to the Residents Welfare Association. However, the collection is irregular and the collectors do not pick up all the garbage bags, leading to a further mess outside your house due

to stray animals. The uncollected garbage is also a breeding ground for mosquitoes. Write a letter of complaint to the President of the Association, drawing his attention to this irregularity. Mention the inconvenience caused. You are Amrit/Amrita, 12-B Mall Apartments, Delhi. (120 - 150 words).

14. Television today has reached every home, even in the remotest villages. The number of news channels is also increasing and the common man is aware of what is happening around him. Write a letter in 120 - 150 words to the Editor, National News, Delhi, expressing your views on the need for a responsible media that does not sensationalize news. You are Amrit/Amrita, 12-B Mall Apartments, Delhi.

15. Your school recently organized an Art and Craft Exhibition. The highlight of the exhibition was a section called 'I-SPACE' put up by students from classes sixth to twelfth. In addition, there was the sculpture section titled, 'Best from Waste' and a 10-foot high statue of the Buddha made by the Fine Arts Department. Renowned painter, Meera Menon, was the Chief Guest. As Chief Editor, write a report on the inauguration and exhibition in 150 - 200 words for the school magazine. You are Shaurya/Shirin.

16. You recently attended a week-long Student Leadership Camp at Greenville School. 23 schools from India and abroad participated in the camp. The theme of the camp was 'Be the Change'. The camp organised panel discussions followed by question and answer sessions. A workshop on leadership and need of community service was held followed by a cultural show. Based on your experience of participation, write a speech in 150 - 200 words on the importance of community service and role of students in organising it. You are Shaurya/Shirin.

17. Education today is no longer limited to academic excellence. There is an emphasis on mental, emotional and cultural development of our youth so that they become responsible and concerned citizens. Write an article in 150 - 200 words titled - 'Education : A New Perspective'. You are Manish/Meera.

18. India is standing at the threshold of joining the developed nations but that is not possible till we achieve complete literacy in the country. In order to do so, students can play a very significant role by volunteering a few hours a week to be part of the 'Each One Teach One' initiative. Write an article in 150 - 200 words expressing your views on 'Teaching the Masses' A Student's Commitment'. You are Manish/Meera.

19. You are Ram/Rajani, Secretary, Social Service Club, Sun Public School, Nagpur. Your club is organizing a health awareness camp for your school students. There will be a special focus on obesity among children. Draft a notice for your school notice board giving all relevant information about the camp, in not more than 50 words.

20. You are Ram/Rajani. Draft a classified advertisement, in not more than 50 words, for the purchase of a house, giving all necessary details of your requirement.

21. You are Ram/Rajani, Librarian, Sun Public School, Nagpur. Write a letter in120-150 words to Blossom Books Ltd., 9, Bund Marg, Hyderabad, placing an order for the books you require for your school library. Also ask about the discount allowed and the mode of payment. Insist on prompt delivery and good packing.

SUBJECT- PHYSICS

1.A bats man hits back a ball straight in the direction of the bowler without changing its initial speed of 12m/s if the mass of the ball is 0.15 kg determine the impulse imparted to the ball [Assume linear motion of the ball]

2. A body rolled on ice with a velocity of 8m/s comes to rest after travelling 4m. Compute the coefficient of friction given g=9.8m/s^2.

3. If three point masses m1, m2, m3 are situated at the vertices of an equilateral triangle of side "a" then what will be the co-ordinates of the center of mass of this system? [Consider m1 is at origin, m2 is on x-axis]

4. A particle of mass 0.5 kg travels in a straight line with velocity V=$ax^{3/2}$.where a=$5m^{-1/2}$ s^{-1}.what is the work done by the net force during its displacement from x=o to x=2m.

5.What is the weight felt by a person in a lift when the lift has free fall?

6.Write the mathematical expression for the potential energy stored in a compressed or stretched spring.

7. Convert kilowatt hour into electron-volts.

8. Derive the expression for the elastic potential energy stored in a stretched or compressed spring. Write the dimension of spring constant.

9. A body constrained to move along the Z –axis of a co-ordinate system is subject to a constant force $\vec{F} = -\hat{i} + 2\hat{j} + 3\hat{k}$ N. What is the work done by this force in moving the body a distance of 4 m along Z – axis?

10. A monkey of mass 40 kg climbs on a rope which can stand a maximum tension of 600 N. State mathematically, in which of the following cases will the rope break : the monkey (I)Climbs up with an acceleration of 6 m/s^2(II)Climbs down with an acceleration of 4 m/s^2(III)Climbs up with a uniform speed of 5 m/s (Ignore the mass of the rope)

11. Deduce the dimensional formula for the following physical quantities?
(1)Gravitational constant (2) Power (3) young's modulus (4) coefficient of viscosity (5)surface tension(6)Planks constant.

12. The velocity "v" of water waves depends on wavelength "λ",density of water " ρ" and acceleration due to gravity "g". Deduce by the method of dimensions the relationship between these quantities?

13. The position of an object moving along x-axes is given by $x=a+bt^2$, where a=8.5 m, b=2.5m/s^2 and t is measured in seconds .what is velocity at t=0s and t-2s?What is the average velocity between t= 2s and t=4s?

14. A cat is able to land on its feet after a fall. Why?

15. Why there are two propellers in a helicopter?

16. If earth contracts to half of its radius, what would be the length of the day?

17A person is standing on a rotating table is able to adjust his rotation easily by stretching his hand. How?

18. A swimmer can able to take turn by resizing his body. How?

19. How does an ice skater or a ballet dancer or an acrobat take advantage of the principle of conservation of angular momentum?

20. If earth were to shrink suddenly to half of its present radius, what would happen to the length of the day?

21. Derive the Expression for displacement and time relation by calculus method?

22.The period of oscillations of a simple pendulum is T= $2\pi\sqrt{(l/g)}$.measured value of "l" is 20 cm known to 1 mm accuracy and time for 100 oscillations of the pendulum is found to be 90 s using a wrist watch of 1s resolution .what is the accuracy in the determination of the g?

23.The position of particle is given by r=(3ti-$2t^2$j+4k)m where t is in seconds and the coefficient have the proper units for "r" to be in meters.(a)Find the velocity and acceleration of the partials (b) what is the magnitude and direction of velocity of the particle at t=2s?

24. How will you distinguish between a hardboiled egg and a raw egg by spinning it on a table?

25. Explain how the duration of day will vary if the polar ice caps of earth melts?

26. Find an expression for the work done against friction when a body is made to slide up an inclined plan? And also derive the expression for the work done against the friction when a body is made to slide down an inclined plane? Draw the neat diagram in both cases?

27. If I and j are unit vectors along x-and y-axis respectively then find(a)The magnitude and direction of (i+j) and(i-j) (b)Find the components of a=2i+3j along the direction of vectors (i+j) and(i-j)

28. Aprojectile is fired horizontally with a velocity "u". Show that its trajectory is a parabola. Also obtain expression for its(i)Time of flight(ii)Horizontal range (iii)Velocity at any instant?

29. The angular velocity of the earth around the sun increases, when it comes closer to the sun. Why?

30. Deduce the relations between angular velocity frequency and time period and also derive the relation between linear velocity and angular velocity? An instant trapped in a circular grove of radius 12cm moves along the groove steadily and completes 7 revolutions in 100s.(i)what is the angular speed and the linear speed of the motion?(ii)Is the acceleration vector a constant vector ? What is the magnitude? (iii)What is its linear displacement?

31. Define potential energy hence write an expression for the potential energy of an elastic spring? With neat diagram?

32. A cricket ball is thrown at a speed of 28 m/s in a direction 30^0 above the horizontal. calculate (a)The maximum height (b)The time taken by the ball to return to the same level.(c)The horizontal distance from the thrower to the point where the ball returns to the same level(take g=9.8m/s^2)

33. Which is greater? The angular velocity of hour hand of a watch or angular velocity of earth around its own axis? give their ratio?(take the hour hand completes one revolution in 12 hours and the earth completes one revolution about its axes in 24 hours

34. What do you mean by banking of a curved road? Determine the angle of banking so as to minimize the wear and tear of the tires of a car negotiating a banked curve?

35.A pump on the ground floor of a building can pump up water to fill a tank of volume 30 m^3 in 15 min. If the tank is 40 m above the ground, and the efficiency of the pump is 30 %, how much electric power is consumed by the pump? (Density of water 1000 kg/m^3)

SUBJECT- CHEMISTRY

THERMODYNAMICS

Q1: For, Methane, di-hydrogen and and graphite the enthalpy of combustion at 298K are given -890.3kJ mol^{-1}, -285.8kJmol^{-1} and -393.5kJmol^{-1} respectively. Find the enthalpy of formation of Methane gas?

Q2: In the process, system absorbs 801 J and work done by the system is 594 J. Find ΔU for the given process.

Q3: The reaction given below was done in bomb calorimeter, and at 298K we get, ΔU = -753.7 kJ mol^{-1}. Find ΔH at 298K.

$NH_2CN_{(g)} + 3/2O_{2(g)} \longrightarrow N_{2(g)} + CO_{2(g)} + H_2O_{(l)}$

ΔH = -754.9 kJmol^{-1}

Q4: Calculate the heat (in kJ) required for 50.0 g aluminium to raise the temperature from 45∘Cto65∘C. For aluminium molar haet capacity is 24 J$mol^{-1}K^{-1}$

Q5: Calculate ΔH for transformation of 1 mole of water into ice from10∘Cto(−10)∘C.. ΔfusH=6.03kJmol^{-1} at 10∘C.

Cp[H2O(l)]=75.3J$mol^{-1}K^{-1}$

Cp[H2O(s)]=36.8J$mol^{-1}K^{-1}$

Q6: Enthalpies of formation for $CO_{2(g)}$, $CO_{(g)}$, $N_2O_{4(g)}$, $N_2O_{(g)}$ are -393kJmol^{-1},-110kJmol^{-1}, 9.7kJmol^{-1} and 81kJmol^{-1} respectively. Then, calculate ΔrH .

$N_2O_{4(g)} + 3CO_{(g)} \longrightarrow N_2O_{(g)} + 3\ CO_{2(g)}$

Q7: Enthalpy of combustion of C to CO_2 is -393.5 kJmol^{-1}. Determine the heat released on the formation of 37.2g of CO_2 from dioxygen and carbon.

Q8: $N_{2(g)} + 3H_{2(g)} \longrightarrow 2NH_{3(g)}$; $\Delta rH^{\ominus}$ = -92.4 kJmol^{-1}

Calculate Standard Enthalpy for formation of ammonia gas .

Q9: Determine Standard Enthalpy of formation for $CH_3OH_{(l)}$ from the data given below:

$CH_3OH_{(l)} + (3/2)O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(l)}$; $\Delta rH^{\ominus}$ = -726 kJmol^{-1}

$C_{(g)} + O_{2(g)} \longrightarrow CO_{2(g)}$; $\Delta cH^{\ominus}$ = -393 kJmol−1

$H_{2(g)} + (1/2)O_{2(g)} \longrightarrow H_2O_{(l)}$; $\Delta fH^{\ominus}$ = -286 kJmol^{-1}

Q10: Calculate ΔH for the following process

$CCl_{4(g)} \longrightarrow C_{(g)} + 4Cl_{(g)}$ and determine the value of bond enthalpy for C-Cl in $CCl_{4(g)}$.

$\Delta_{vap}H^{\ominus}$ (CCl_4) = 30.5 kJmol^{-1}.

$\Delta_fH^{\ominus}$ (CCl_4) = -135.5 kJmol^{-1}.

$\Delta_aH^{\ominus}$ (C) = 715 kJmol^{-1},

$\Delta_aH^{\ominus}$ is a enthalpy of atomisation

$\Delta_aH^{\ominus}$ (Cl_2) = 242 kJmol^{-1}.

Q11: ΔU = 0 for isolated system, then what will be ΔU?

Q12: Following reaction takes place at 298K,

$2X + Y \longrightarrow Z$

$\Delta H = 400\ kJmol^{-1}$

$\Delta S = 0.2kJmol^{-1}\ K^{-1}$

Find the temperature at which the reaction become spontaneous considering ΔS and ΔH to be constant over the entire temperature range?

Q13: $2Cl_{(g)} \longrightarrow Cl_{2(g)}$

In above reaction what can be the sign for ΔS and ΔH?

Q14: $2X_{(g)} + Y_{(g)} \longrightarrow 2D_{(g)}$

$\Delta U^{\Theta} = -10.5\ kJ$ and $\Delta S^{\Theta} = -44.1JK^{-1}$

Determine ΔG^{Θ} for the given reaction, and predict that whether given reaction can occur spontaneously or not.

Q15: Find the value of ΔG^{Θ} for the reaction, if equilibrium is given 10.given that T = 300K and

$R = 8.314\times10^{-3}kJK^{-1}mol^{-1}$.

Q16: What can be said about the thermodynamic stability of NO(g), given

$(1/2)N_{2(g)} + (1/2)O_{2(g)} \longrightarrow NO_{(g)}$; $\Delta rH\Theta=90kJmol^{-1}$

$NO_{(g)} + (1/2)O_{2(g)} \longrightarrow NO_{2(g)}$; $\Delta rH\Theta=-74kJmol^{-1}$

Q17: Determine ΔS in surrounding given that 1 mole of $H_2O(l)$ formed at standard Condition is $\Delta rH^{\Theta}=-286kJmol^{-1}$.

EQULIBRIUM

Q1. At a fixed temperature a liquid is in equilibrium with its vapour in a closed vessel. Suddenly, the volume of the vessel got increased.

I)What will be the final vapour pressure and what will happen when equilibrium is restored finally?

II)Write down, how initially the rates of evaporation and condensation got changed?

III)Write down the effect observed when there was a change in vapour pressure.

Q2. Find out K_c for the given reaction in equilibrium state : $[SO_2]$= 0.6 M, $[O_2]$ = 0.82 M and $[SO_3]$ = 1.9 M ?

$2SO2(g)+O2(g)\leftrightarrow2SO3(g)$

Q3. At a definite temperature and a total pressure of 10^5 Pa, iodine vapour contains 40% by volume of I atoms

$I2(g)\leftrightarrow2I(g)$

Find K_p for the equilibrium

.4. For the given reaction , find expression for the equilibrium constant

(i)$2NOCl(g)\leftrightarrow2NO(g)+Cl2(g)$

(ii)$2Cu(NO3)2(s)\leftrightarrow2CuO(s)+4NO2(g)+O2(g)$

(iii)$CH3COOC2H5(aq)+H2O(1)\leftrightarrow CH3COOH(aq)+C2H5OH(aq)$

(iv)$Fe3+(aq)+3OH-(aq)\leftrightarrow Fe(OH)3(s)$

(v)I2(s)+5F2↔2IF5

Q5.Find the value of , K_c for each of the following equilibria from the given value of K_p:

(i)2NOCl(g)↔2NO(g)+Cl2(g);Kp=1.8×10−2at500K

(ii)CaCO3(s)↔CaO(s)+CO2(g);Kp=167at1073K

Q6. For the following equilibrium, Kc=6.3×1014at1000KNO(g)+O3(g)↔NO2(g)+O2(g) Both the reverse and forward reactions in the equilibrium are elementary bimolecular reactions. Calculate K_c, for the reverse reaction?

Q.7. Explain why solids and pure liquids can be ignored while writing the equilibrium constant expression?

Q8. When oxygen and nitrogen react with each other, then the following reaction takes place:

2N2(g)+O2↔2N2O(g)

If a solution of 0.933 mol of oxygen and 0.482 mol of nitrogen is placed in a 10 L reaction vessel and allowed to form N_2O at a temperature for which K_c =2.0×10−37, determine the composition of equilibrium solution.

Q9. Nitric oxide reacts with bromine and gives nitrosyl bromide as per reaction is given below:

$2NO(g)+Br_2(g) \Rightarrow 2NOBr(g)$

When 0.087 mol of NO and 0.0437 mol of Br_2 are mixed in a closed container at a constant temperature, 0.0518 mol of NOBr is obtained at equilibrium. Calculate equilibrium amount of NO and Br_2.

Q10. At 450 K, K_p= 2.0×1010/bar for the given reaction at equilibrium.

$2SO_2(g)+O_2(g) \Rightarrow 2SO_3(g)$

What is K_c at this temperature?

Q11. A sample of $HI_{(g)}$ is placed in flask at a pressure of 0.2 atm. At equilibrium the partial pressure of $HI_{(g)}$ is 0.04 atm. What is K_p for the given equilibrium?

$2HI(g) \Rightarrow H_2(g)+I_2(g)$

Q12. A mixture of 1.57 mol of N_2, 1.92 mol of H_2 and 8.13 mol of NH_3 is introduced into a 20 L reaction vessel at 500 K. At this temperature, the equilibrium constant, K_c for the reaction

$N_2(g)+3H_2(g) \Rightarrow 2NH_3(g)$ is 1.7×102

Is the reaction mixture at equilibrium? If not, what is the direction of the net reaction?

Q13. The equilibrium constant expression for a gas reaction is,

Kc=[NH3]4[O2]5[NO]4[H2O]6

Write the balanced chemical equation corresponding to this expression.

Q14. One mole of H_2O and one mole of CO are taken in 10 L vessel and heated to 725 K. At equilibrium 60% of water (by mass) reacts with CO according to the equation,

$H_2O(g) + CO(g) \Rightarrow H_2(g) + CO_2(g)$

Calculate the equilibrium constant for the reaction.

$H_{2(g)}+I_{2(g)} \Rightarrow 2HI_{(g)}$

is 54.8. If 0.5 molL^{-1} of $HI_{(g)}$ is present at equilibrium at 700 K, what are the concentration of $H_{2(g)}$ and $I_{2(g)}$assuming that we initially started with $HI_{(g)}$ and allowed it to reach equilibrium at 700 K?

Q15. What is the equilibrium concentration of each of the substances in the equilibrium when the initial concentration of ICl was 0.78 M?

$2ICl_{(g)} \Rightarrow I_{2(g)}+Cl_{2(g)}$; $K_c = 0.14$

Q17. K_p = 0.04 atm at 899 K for the equilibrium shown below. What is the equilibrium concentration of $C_2H_6$when it is placed in a flask at 4.0 atm pressure and allowed to come to equilibrium?

$C_2H_6(g) \Rightarrow C_2H_4(g) + H_2(g)$

Q18. Ethyl acetate is formed by the reaction between ethanol and acetic acid and the equilibrium is represented as:

$CH_3COOH(l)+c_2H_5OH(l) \Rightarrow CH_3COOC_2H_5(l)+H_2O(l)$

(i)Write the concentration ratio (reaction quotient), Q_c, for this reaction (note: water is not in excess and is not a solvent in this reaction)

(ii)At 293 K, if one starts with 1.00 mol of acetic acid and 0.18 mol of ethanol, there is 0.171 mol of ethyl acetate in the final equilibrium mixture. Calculate the equilibrium constant.

(iii)Starting with 0.5 mol of ethanol and 1.0 mol of acetic acid and maintaining it at 293 K, 0.214 mol of ethyl acetate is found after sometime. Has equilibrium been reached?

Q19. A sample of pure PCl_5 was introduced into an evacuated vessel at 473 K. After equilibrium was attained, concentration of PCl_5 was found to be 0.5×10−1mol L^{-1}. If value of K_c is 8.3×10−3, what are the concentrations of PCl_3 and Cl_2 at equilibrium?

$PCl_5(g) \Rightarrow PCl_{3(g)} + Cl_{2(g)}$

Q20. One of the reactions that takes place in producing steel from iron ore is the reduction of iron (II) oxide by carbon monoxide to give iron metal and CO_2.

FeO (s) + CO (g) ⇒ Fe (s) + CO2 (g); K_p= 0.265 at 1050 K.

What are the equilibrium partial pressures of CO and CO_2 at 1050 K if the initial partial pressures are: p_{CO} = 1.4 atm and $?_{??2}$= 0.80 atm?

$N_2(g)+3H_2(g) \Rightarrow 2NH_3$

For the above equation, Equilibrium constant = 0.061 at 500 K

At a specific time, from the analysis we can conclude that composition of the reaction mixture is, 2.0 mol L^{-1}H_2 , 3.0 mol L $^{-1}$ N_2 and 0.5 mol L^{-1} NH_3. Find out whether the reaction is at equilibrium or not? Find in which direction the reaction proceeds to reach equilibrium.

Q22.Bromine monochloride(BrCl) decays into bromine and chlorine and reaches the equilibrium:

$2BrCl(g) \Rightarrow Br_2(g) + Cl_2(g)$

For which K_c= 42 at 600 K.

If initially pure BrCl is present at a concentration of $5.5\times10-5molL^{-1}$, what is its molar concentration in the mixture at equilibrium?

Q23. Find out K_c for the given reaction at temperature 1127K where the pressure is 1 atm. A solution of CO and CO_2 is in equilibrium with carbon(solid). It has 93.55% CO by mass.

$C(s)+CO_2\ (g) \Rightarrow 2CO\ (g)$

Q24.Find out

(I)The equilibrium constant for the formation of NO_2 from NO and O_2 at 298 K and

(II) $\Delta G°$

$NO(g)+12O2(g)\leftrightarrow NO2(g)$

Where;

$\Delta_f G°\ (NO_2) = 52.0$ kJ/mol

$\Delta_f G°\ (NO) = 87.0$ kJ/mol

$\Delta_f G°\ (O_2) = 0$ kJ/mol

or remain same?

(I) $PCl_5(g) \Rightarrow PCl_3 + Cl_2\ (g)$

(II) $Cao(s) + CO_2\ (g) \Rightarrow CaCO_3(s)$

(III) $3Fe\ (s) + 4H_2O\ (g) \Rightarrow Fe_3O_4\ (s) + 4H_2\ (g)$

the pressure? Also, mention whether change will cause the reaction to go into forward or backward direction.

(I)$COCl_2\ (g) \Rightarrow CO\ (g) + Cl_2\ (g)$

(II)$CH_4\ (g) + 2S_2\ (g) \Rightarrow CS_2\ (g) + 2H_2S\ (g)$

(III)$CO_2\ (g) + C\ (s) \Rightarrow 2CO\ (g)$

(IV)$2H_2\ (g) + CO\ (g) \Rightarrow CH_3OH(g)$

(V)$CaCO_3\ (s) \Rightarrow Cao\ (s) + CO_2\ (g)$

(VI)$4NH_3\ (g) + 5O_2\ (g) \Rightarrow 4NO\ (g) + 6H_2O\ (g)$

Q27. The equilibrium constant for the following reaction is 1.6×105at 1024 K.

$H_2\ (g) + Br_2\ (g) \Rightarrow 2HBr\ (g)$

Find the equilibrium pressure of all gases if 10.0 bar of HBr is introduced into a sealed container at 1024 K.

Q28.Dihydrogen gas is obtained from natural gas by partial oxidation with steam as per following endothermic reaction:

$CH4(g)+H2O(g)\leftrightarrow CO(g)+3H2(g)$

(I)Write as expression for K_p for the above reaction.

(II) How will the values of Kp and composition of equilibrium mixture be affected by

(i)Increasing the pressure

(ii)Increasing the temperature

(iii)Using a catalyst?

Q29. Describe the effect of:

I) Removal of CO

II) Addition of H_2

III) Removal of CH_3OH on the equilibrium of the reaction:

IV) Addition of CH_3OH

$2H_2$ (g)+CO (g) ⇒ CH_3OH (g)

Q30. At 473 K, equilibrium constant Kc for decomposition of phosphorus pentachloride, PCl_5 is 8.3×10−3. If decomposition is depicted as,

PCl5 (g)↔PCl3(g)+Cl2(g)

$\Delta_r H° = 124.0$ kJmol^{-1}

a) Write an expression for Kc for the reaction.

b) What is the value of Kc for the reverse reaction at the same temperature?

c) What would be the effect on Kc if

(i) more PCl5 is added

(ii) pressure is increased?

(iii) The temperature is increased?

Q31. Dihydrogen gas used in Haber's process is produced by reacting methane from natural gas with high temperature steam. The first stage of two stage reaction involves the formation of CO and H2. In second stage, CO formed in first stage is reacted with more steam in water gas shift reaction,

CO(g)+H2O(g)↔CO2(g)+H2(g)

If a reaction vessel at 400°C is charged with an equimolar mixture of CO and steam such that $P_{co}=P_{H2O}$ = 4.0 bar, what will be the partial pressure of H2 at equilibrium? K_p= 10.1 at 400°C

Given K_p = 10.1 So, partial pressure of H_2 is 3.04 bar at equilibrium.

Q32. Predict which of the following reaction will have appreciable concentration of reactants and products:

(a)Cl2(g)↔2Cl(g);Kc=5×10−39

(b)Cl2(g)+2NO(g)↔2NOCl(g);Kc=3.7×108

(c)Cl2(g)+2NO2(g)↔2NO2Cl(g);Kc=1.8

Q33. The value of Kc for the reaction $3O_2$ (g) ⇒ $2O_3$ (g) is 2.0×10−50 at 25°C. If the equilibrium concentration of O_2 in air at 25°C is 1.6×10−2 , what is the concentration of O_3?

Q34. The reaction, CO(g)+3H2(g)→CH4(g)+H2O(g) at 1300K is at equilibrium in a 1L container. It has 0.30 mol of CO, 0.10 mol of H2 and 0.02 mol of H2O and y amount of CH4 in the container. Find the concentration of CH4 in the mixture.

The equilibrium constant, Kc is 3.90 at the given temp.

Q35. What is conjugate acid-base pair? Find the conjugate acid/base of the given species:

(i) HNO_2
(ii) CN^-
(iii) $HClO_4$
(iv) F^-
(v) OH^-
(vi) CO_3^{2-}
(vii) S^-

Q36. From the compounds given below which are Lewis acids?

(i) H_2O
(ii) BF_3
(iii) H^+
(iv) NH_4^+

Q37. From the compounds given below which will be the conjugate base for the Bronsted acids?

(i) HF
(ii) H_2SO_4
(iii) HCO_3

Q38. For the Brönsted bases given below find their conjugate acids.

1. NH_3
2. $HCOO^-$
3. NH^{-2}

Q39. The species given below can act as both Brönsted bases as well as Brönsted acids. For each of them give their conjugate acid and base.

1. HCO_3^-
2. HSO_4^-
3. NH_3
4. H_2O

Q40. Classify the species given below into bases and acids and also show that these species act as base/acid:

1. BCl_3
2. H^+
3. OH^-
4. F

Q41.A sample soft drink is taken, whose hydrogen ion concentration is $2.5\times10^{-4}M$.Find out pH.

Q42.A sample of white vinegar is taken , whose pH is 2.36. Find out the hydrogen ion concentration in the sample.

Q43. Ionization constant for the following acids are given:

HF = 5.7×10−5 at 298K
HCOOH = 1.7×10−3 at 298K
HCN = 3.7×10−8 at 298K
Find out the conjugate bases for the above acids.

Q44.Phenol has ionization constant of 1.0×10−8. In a 0.06M of phenol solution calculate the presence of phenolate ion. Find out the degree of ionization if 0.02M of sodium phenolate is given.

Q.45. Given, 9.1×10−8 is the initial(first) ionization constant of the gas H_2S.Find out concentration of the ion HS^- in 0.1M solution of H_2S . Find the changes in concentration if the concentration is 0.1M in HCl. Find the concentration of S^{2-} under both conditions, if 1.2×10−13 is the second dissociation constant of H_2S.

Q.47. It has been found that the pH of a 0.01M solution of an organic acid is 4.15. Calculate the concentration of the anion, the ionization constant of the acid and its pK_a.

Q48.Consider complete dissociation, find out the pH of the following :

(I)0.004 M HCl

(II)0.003 M NaOH

(III)0.002 M HBr

(IV)0.002 M KOH

Q49.Find out the pH of the following solution:

(I)2g of TIOH dissolved in water to give 2 litre of the solution

(II)0.3g of $Ca(OH)_2$ dissolved in water to given 500mL of the solution

(III)0.3g of NaOH dissolved in water to give 200mL of the solution

(IV)1 mL of 13.6 M HCl is diluted with water to given 1 litre of the solution

Q50. The degree of ionization of a 0.1M bromoacetic acid solution is 0.132. Calculate the pH of the solution and the p_{Ka} of bromoacetic acid.

Q51. The degree of ionization of a 0.1M bromoacetic acid solution is 0.132. Calculate the pH of the solution and the p_{Ka} of bromoacetic acid.

Q52. What is the pH of 0.001 M aniline solution? The ionization constant of aniline can be taken from Table 7.7. Calculate the degree of ionization of aniline in the solution. Also calculate the ionization constant of the conjugate acid of aniline.

Q53. Calculate the degree of ionization of 0.05M acetic acid if its p_{Ka} value is 4.74. How is the degree of dissociation affected when its solution also contains

(I)0.01 M

(II)0.1 M in HCl?

Q54. The ionization constant of dimethylamine is5.4××10−4. Calculate its degree of ionization in its 0.02 M solution. What percentage of dimethylamine is ionized if the solution is also 0.1 M in NaOH?

Q.55. Calculate the hydrogen ion concentration in the following biological fluids whose pH are given below:

(I)Human saliva, 6.4

(II)Human stomach fluid, 1.2

(III)Human muscle-fluid, 6.83

(IV)Human blood, 7.38

Q56. The pH of milk, black coffee, tomato juice, lemon juice and egg white are 6.8, 5.0, 4.2, 2.2 and 7.8 respectively. Calculate corresponding hydrogen ion concentration in each.

Q57. If 0.561 g of KOH is dissolved in water to give 200 mL of solution at 298 K. Calculate the concentrations of potassium, hydrogen and hydroxyl ions. What is its pH?

Q58. The solubility of $Sr(OH)_2$ at 298 K is 19.23 g/L of solution. Calculate the concentrations of strontium and hydroxyl ions and the pH of the solution.

Q59. The ionization constant of propanoic acid is 1.32××10−15. Calculate the degree of ionization of the acid in its 0.05M solution and also its pH. What will be its degree of ionization if the solution is 0.01M in HCl also?

Q60. The pH of 0.1M solution of cyanic acid (HCNO) is 2.34. Calculate the ionization constant of the acid and its degree of ionization in the solution.

Q61. For nitrous acid K_a = 4.5×10−4. Calculate degree of hydrolysis and pH for 0.04M of sodium nitrite.

Q62. 0.02M solution of pyridinium hydrochloride (C_5H_6ClN) is having pH = 3.44. Determine the ionization constant of C_5H_5N (pyridine).

Q63. Few salts are given below;

1. KBr
2. NH_4NO_3
3. KF
4. NaNO2
5. NaCN
6. NaCl

Determine the nature of solution of these salts i.e. Is it acidic or basic or neutral?

Q64. Find the pH of 0.1M acid and its 0.1M NaCl solution. The Ka for chloroacetic acid is 1.35×10−3.

Q65. Determine the pH of neutral water at 310K temperature. Ionic product of H_2O is 2.7×10−14.

Q66. Find out the pH of resultant mixture;

i) 10 ml of 0.02M H_2SO_4 + 10 ml of 0.02M $Ca(OH)_2$

ii) 10 ml of 0.1M H_2SO_4 + 10 ml of 0.1M KOH

iii) 10 ml of 0.2M $Ca(OH)_2$ + 25 ml of 0.1M HCl

Q67. Calculate the solubilities of

a) barium chromate
b) ferric hydroxide
c) lead chloride
d) mercurous iodide
e) silver chromate

At 300K from their solubility product constant. Also calculate the molarities of the individual ions.

Q68. Determine the ratio of molarities to their saturated solutions for the following: Ag_2CrO_4 and AgBr

The solubility product constant of Ag_2CrO_4 and AgBr are 1.1×10^{-12} and 5.0×10^{-13} respectively.

Q69. Cupric chlorate and sodium iodate having equal volume of 0.002M. Will the precipitation of copper iodate will occur or not?

Q70. For benzoic acid the ionization constant is 6.46×10^{-5}M and for silver benzoate K_{sp} is 2.5×10^{-5}M. Give relation between the solubility of silver benzoate in buffer of pH = 3.19 and its solubility in water.

NOTE:

1. Write the answers in a separate note copy.

2. All the questions are given from chemistry part-I book keeping in mind the ANNUAL exam.

SUBJECT- MATHS

1. The equation $3\sin x + \cos x = 4$ has :
   (*a*) only one solution (*b*) two solutions
   (*c*) infinite many solutions (*d*) no solution
2. The value of $\cos 52^0 + \cos 68^0 + \cos 172^0$ is :
   (*a*) 1 (*b*) 0 (*c*) –1 (*d*) 3
3. The value of $\cos 15^0 . \cos 7\frac{1^0}{2} . \sin 7\frac{1^0}{2}$ is
   (*a*) 1/2 (*b*) 1/4 (*c*) 1/8 (*d*) 1/16
4. Additive inverse of complex number 4 – 7i is:
   (*a*) 4 + 7i (*b*) –4 + 7i (*c*) –4 – 7i (*d*) None of these
5. The value of $i^{-13} + i^{-14} + i^{-15} + i^{-16}$ is :
   (*a*) i (*b*) –i (*c*) zero (*d*) –1
6. 7! ÷ 5! is :
   (*a*) 7! (*b*) 2! (*c*) 42 (*d*) 24
7. If n = 8 and r = 3 then the value of ${}^nP$ is :
   (*a*) 140 (*b*) 336 (*c*) 40 (*d*) 85

8.The number of ways in which 6 men and 5 women can sit at a round table if no two women are to sit together is given by :

(*a*) 30 (*b*) 5! × 4! (*c*) 7! × 5! (*d*) 6! × 5!

9.The sum of three consecutive terms in AP is 27 and the sum of their squares is 293, th en the three terms are

(a) 6,11,16 (b) 4,9,14 (c)2,7,12 (d)8,13,18

10.The common difference of an AP whose first term is 100 and the sum of whose first s ix terms is five times the sum of next six terms is

(a) 10 (b) -10 (c) 12 (d) 10

11. Evaluate : ${}^{10}C_2 + {}^{10}C_3 + \ldots\ldots\ldots + {}^{10}C_{10}$

12.The function 't' which maps temperature in Celsius into temperature in Fahrenhe it (Physics formula)

find (i) t(0) (ii) t(28) (iii) t(10) (iv) the value of c when t(c)=212 .

13. Find the Value of $\sin 765^0$

14.Find the angle between the minute hand and the hour hand of a clock when th e time is

(a) 5:20am (b) 11:25 am (c) 1: 10 pm (d) 6: 05 pm.

15. Prove that : $\tan 70^0 + \tan 20^0 + 2\tan 50^0$

16. Let P(n) be the statement "$3^{(n)} > n^3$"

(*a*) Is P(1) true? (*b*) What is P(n + 1)?

(*c*) If P(n) is true, prove that P(n + 1) is true.

17. By using the Principle of mathematical induction $3^{2n} - 1$ is divisible by 8 for all natural.

18. For what values of m the equation $m^2x^2 + (2m+1)x + 4 = 0$ will have exactly one zero.

19. Find the value of :

$\sin 12^0, \cos 15^0, \tan 18^0, \sin 22\frac{1^0}{2}, \tan 54^0, \cot 72^0, cosec\ 67.5^0$

20. Find the value of $(1 + \tan 1^0)(1 + \tan 2^0)\ldots\ldots\ldots(1+ \tan 44^0)$

21. A building with ten storeys, each storey of height 3 metres, stands on one side of a wide street. From a point on the other side of the street directly opposite to the building, it is observed that the three uppermost storeys together subtend an angle equal to that subtended by the two lowest storeys. Find the width of the street.

22. Consider all the 8-letter words that can be formed by arranging the letters in BACHELOR in all possible ways. Any two such words are called *equivalent* if those two words maintain the same relative order of the letters A, E and O. For example, BACOHELR and CABLROEH are equivalent. How many words are there which are equivalent to BACHELOR?

23. For a party 8 guests are invited by a husband and his wife. They sit around a circular table for dinner. How many ways the husband and his wife can sit together ?

24. The equation $(x-b)(x-c)+(x-a)(x-b)+(x-a)(x-c)=0$ has all its roots

(a) positive (b) real (c) imaginary (d) negative

25. The sum of coefficients of the expansion $\left(\frac{1}{x}+2x\right)^n$ is 6561. Find the coefficient of term independent of x .

26. How many rectangles are there in a 8 x 8 chess board ?

27. Find the greatest term in the expansion of $(1+3x)^{54}$ where $x = 1/3$.

28. If A.M. of two numbers is twice of their G.M. then the ratio of greatest number to smallest number is ?

29. The value of $(A \cup B \cup C) \cap (A \cap B' \cap C')' \cap C'$ is ?

30. Find the range of the function $P(7-x, x-3)$ where P indicates permutation.

or

Find the number of values of x in the interval [0, 3π] satisfying the equation $2\sin^2 x + 5\sin x - 3 = 0$.

SUBJECT- BIOLOGY

BIOMOLECULES

1. Write the name of any one aminoacid, sugar, nucleotide and fatty acid.
2. Reaction given below is catalysed by oxidoreductase between two substrate complete the reaction.

   A reduced + A' oxidised →
3. How are prosthetic groups different from co-factors?
4. Nucleic acids exhibit secondary structure. Describe through Watson- Crick Model.
5. What is the difference between a nucleotide and nucleoside? Give two examples with their structure.
6. What is enzymatic competitive inhibition? Give one example?
7. Why does starch give blue black colour with iodine?
8. Name two examples for each of the following in living tissues:

   Pigments in plants

   Alkaloids

   Terpenoides

   Toxins

   Polymeric substances

9. (a)What is enzyme?

   (b) Give an example of co-enzyme.

   (c) Distinguish between apoenzyme and co-enzyme.

10. Differentiate between cofactors, coenzymes & prosthetic group

CELL DIVISION

1. Name a specific scientific term for each of the following:
   a) The period between two successive mitotic divisions.
   b) Process of cell division by which chromosome number is halved
   c) Point at which two sister chromatids are held together.
   d) Nuclear division in mitosis
   e) Phase in the cell cycle when proteins and RNA are synthesized
2. In which phase of meiosis are the following formed?
   a) Synaptonemal complex
   b) Recombination nodules
   c) Appearance/activation of enzyme recombinase
   d) Termination of chiasmata
   e) Interkinesis
   f) Formation of dyad of cells
3. An organism has two pair of chromosomes (i.e., chromosome number = 4).

Diagrammatically represent the chromosomal arrangement during different phases of meiosis-II.

4. Write brief note on the following
   a) Synaptonemal complex
   b) Metaphase plate
5. Write briefly the significance of mitosis and meiosis in multicellular organism.
6. How does cytokinesis in plant cells differ from that in animal cells?

MINERAL NUTRITION

1. Carefully observe the following figure

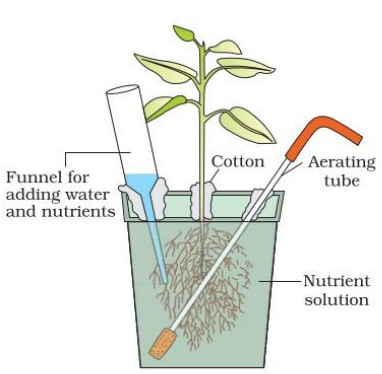

Figure 12.1 Diagram of a typical set-up for nutrient solution culture

a) Name the technique shown in the figure and the scientist who demonstrated this technique for the first time.

b) Name atleast three plants for which this technique can be employed for their commercial production.

c) What is the significance of aerating tube and feeding funnel in this setup?

2. Name the most crucial enzyme found in root nodules for N2 fixation? Does it require a special pink coloured pigment for its functioning? Elaborate.

3. Write two names for each of the following:

(a) A free living nitrogen-fixing cyanobacteria

(b) Free-living aerobic nitrogen fixing bacteria

(c) Symbiotic nitrogen-fixing bacteria

4. What is denitrification? Name two organisms that carry out denitrification.

SUBJECT- COMPUTER SCIENCE

Q1(a) What are the distinct features of fifth generations of computer?
(b) How is it possible to run a larger program in smaller memory? Justify your answer in short.
(c) Convert decimal number 345.56 to binary.
(d) Express -12 in two's complement.
(e) What do you understand by cache memory?Write the significance of each type of it.
(f) How ROM is different from RAM?
Q2(a) Describe the role of compiler.
(b) What are literals?
(c) Explain the difference between
(i) '0' and "0"
(ii) 234L and 234
(d) What is data type? Explain. Why are they needed?

Q3 (a).What do you understand by programming paradigm? Describe types of it.
(b) Write short note on Object Oriented Programming and its features.
(c) What is a byte? How a byte is related to nibble?
Q4.What do you mean by the terms multitasking and multiprogramming?
Q5.What is word processor? What are the important features of word processor which ease in drafting letters? Write at least four.
Q6. How "SSB" will be represented in computer's memory?
Q7.What is an Operating System? How many types of operating systems are found?
Q8.Describe the stored program concept and explain how it changed computer processing?
Q9.What is IO channel? How a device is addressed? Also draw a diagram of hierarchy of Information management modules.
Q10.What do you mean by virtual memory? How is the concept of virtual memory realized by Operating System? Describe any one of them.
Q11.What is binary system? Why binary language is called machine language? Why is machine language required?
Q12. What is a computer? Describe the functional components of it with a neat labeled diagram?
Q13. What is digital computer? How is it classified? Describe.
Q14. What do you mean by classification of software? Discuss their functioning in short.
Q15. What floating point number 1100110000.100001 does this binary number represent in decimal?
Q16. How the number -12 will be represented using sign and magnitude representation?
Q17. Convert the followings:-
a) $(7CA3)_{16} = (?)_{10}$
b) $(1111101110101111)_2=(?)_{16}$
c) $(10101.0101)_2=(?)_{10N}$
d) $(7654)_8 = (?)_2$
e) $(294.617)_{10}=(?)_{16}$
Q18. What is Operating System? Enlist the types of Operating system
Q19. What are the features of computer? Explain.
Q20. What are super computers and for what purpose they are used?
Q 21. What is CPU scheduling? Explain the scheduling technique (any one) .
Q22. Convert the followings:-
(a) 196_{10} to binary.
(b) 1100011.11_2 to hexadecimal
Q23 Find two's complement form of -144
Q24. What are translating programs? Explain.
Q25. Explain paging.
Q26. What is the difference between analog and digital computer?
