



SAINIK SCHOOL REWARI
VACATION WORK (2019-20)
CLASS – XII

Instructions to be followed for cadets:

1. Do all the Vacation Work in one Notebook only.
2. Do the work in notebook in a sequence as mentioned below:
 - (i) English, Hindi, Maths, Science, Social Studies for classes VI –X
 - (ii) English, Maths, Physics, Chemistry Bio/Computer for classes XI-XII
3. Vacation Work should be done neatly and efficiently. **It will be duly marked as a part of your assessment.**
4. Any additional chart paper/Map /Model if any required in vacation work, should be submitted separately along with vacation work note book.
5. Do not get up late. Rise at the usual time and go for a morning walk, or play a game that interests you. Talk about things you see around. Plan some outdoor and indoor games. Spend some time on a hobby.
6. Read newspaper. Keep yourself updated. Reading from colourful illustrated story books will develop your language skills. Listen to stories from family members and try to narrate the stories you have read from various story books.
7. Assign a permanent workplace and a work-time. This brings in discipline in your life. If there is a subject you are weak in, try and work on improving that weakness. You will be more confident when you go back to school.
8. Inculcate good manners – 4 magic words 'Please, Thank you, Excuse me, Sorry' – Use them and see the difference.
9. Do not spend time playing video games or using the smart phone, they tend to numb your senses and are a pure mechanical activity on hot summer afternoon, try playing scrabble or chess. Your vocabulary as well as concentration power will improve.

ENGLISH

1. Write 20 new words daily (approximately 800 words) with their synonyms and antonyms.

2. Write 10 Letters (2 Letters to the Editor, 4 Business Letters, 2 Applications for Job, and 2 Official Letters) on the topics of your choice as per the formats and language discussed in the classroom.
3. Write five Articles on the topics of your choice.
4. Prepare content for the following topics for Group Discussion and Lecturette:
 - (a) Start-up-India: Boosting Entrepreneurship
 - (b) Merger of Public Sector Banks: How beneficial is the merger of Banks?
 - (c) Water Transport Tourism: A shot in the Arm for economic development
 - (d) Budget Cycle Change: Only a move of convenience
 - (e) Bank Recapitalization: NPA reduction and not bank recapitalization can cure the health of PSBs in India
 - (f) RERA: Will it restore the trust of home buyers?
 - (g) Moody's Rating Upgrade: Will the improvement enhance economic growth of India?
 - (h) Demonetisation: Success & failures
 - (i) GST: Will economy grow faster with reduced rates of Goods & Services Tax?
 - (j) Farmers' Income: Will India be able to double it in next 5 years?
 - (k) Privatization of Indian economy: Should India go ahead with the idea?
 - (l) High Deficit Financing V/s high interest rates: Both cannot go together
 - (m) Union Budget: Merging the General & Railway Budget will save exchequer from unnecessary spending
 - (n) India v/s China: Will India remain way behind China?
 - (o) Employment Generation: IT industry will create huge job opportunities in India
 - (p) FDI in retail: Good for India?
 - (q) Business Lobbying: Make it legal in India
 - (r) Corruption in Economy: It is the root cause for Indian Economic slowdown
 - (s) Make in India: The idea will make India a manufacturing hub
 - (t) End of subsidy regime: Step needed to propel the wheel of growth
 - (u) E-commerce: Discounts are harmful in long run?
 - (v) War Kashmir Crisis: War not dialogue will end the Crisis?
 - (w) Preponing the General Budget: Is preponing the presentation date a good decision?
 - (x) Terrorism: Is this the price we have to pay for democracy?
 - (y) Linking of Aadhaar: Is making Aadhar mandatory a good idea?
 - (z) Beti Bachao Beti Padhao: Will it abolish the orthodox mindset?
 - (aa) Law should be an instrument of Social Change
 - (bb) Browsing at Workplace affects productivity

- (cc) Social Activism is necessary for survival of democratic society
- (dd) India needs a uniform civil code
- (ee) Difficulties in implementation of Climate Change Summit Resolutions
- (ff) Net Neutrality is essential to make India Digital
- (gg) Smart City Project will give wings to growth
- (hh) Gender bias in portraying Women in Advertisements
- (ii) India needs a uniform civil code

5. Make two posters on the themes of social, economic, educational, political, health related issues as per the format.
 6. Write summaries of the chapters taught in the class so far. Word limit for each summary is 150-200 words.
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MATHEMATICS

General Instructions:

- (i). All questions are compulsory.
 - (ii). Students are required to do this assignment in their separate assignment notebook.
1. NCERT examples and questions of Chapter 1,2 and 3.
 - (a) Chapter 1: Matrices
 - (b) Chapter 2: Determinants
 - (b) Chapter 3: Relation and Function
 2. Practice all the questions:
Solve objective type questions from NDA Pathfinder Book
 - (a) Chapter 1- Matrices (50 Question)
 - (b) Chapter2- Determinants (50 Question)
 - (c) Chapter2-Relation and Function (50 Question)
 3. Learn all Differentiation Formulas.
 4. Do first 50 subjective type questions from R.D Sharma from the following chapters.
 - (a) Matrices
 - (b) Determinants.
 5. Make a pocket Maths dictionary covering the definitions, facts and formulae of all the concepts that you have learnt in class XI and XII. The following units should be covered:
 - (a) Sets and functions
 - (b) Algebra
 - (c) Calculus
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PHYSICS

General Instruction:

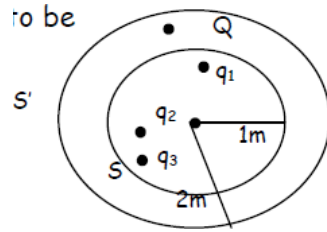
All questions are compulsory.

- (i) NCERT examples and questions of unit 1 and 2
 - (a) Unit 1: Electric field, electric potential and capacitance
 - (b) Unit 2: Current and Electricity
- (ii) Previous year board questions of the completed chapters.
- (iii) Project report on the topics assigned to the cadets.
- (iv) Practice all the questions:
 1. The electric charge of any body is actually a surplus or deficit of electrons. Why not protons?
 2. When a glass rod is rubbed with silk, both acquire charges. What is the source of their electrification?
 3. Is the mass of a body affected on charging?
 4. Two identical metallic spheres of exactly equal masses are taken. One is given a positive charge q coulomb and other an equal negative charge. Are their masses after charging equal?
 5. Ordinary rubber is an insulator. But the special rubber tyres of aircrafts are made slightly conducting. Why is this necessary?
 6. Vehicles carrying inflammable materials usually have metallic ropes touching the ground during motion. Why?
 7. What does $q_1 + q_2 = 0$ signify in electrostatics? Or Two charges q_1 and q_2 , separated by a small distance satisfy the equation $q_1 + q_2 = 0$. What does it tell about the charges?
 8. Can a body have a charge of 0.8×10^{-19} C Justify your answer by comment?
 9. The dielectric constant of water is 80. What is its permittivity?
 10. Give an example to illustrate that electrostatic forces are much stronger than gravitational forces
 11. Force between two points charges kept at a distant d apart in air is F . If these charges are kept at the same distance in water, how does the electric force between them change?
 12. An electron moves along a metal tube with variable cross-section, as shown in Fig. How will its velocity change when it approaches the neck of the
 13. An electron and a proton are kept in the same electric field. Will they experience same force and have same acceleration?
 14. Do the electric lines of force really exist? What is about the field they represent?
 15. A positive point charge ($+q$) is kept in the vicinity of an uncharged conducting plate. Sketch electric field lines originating from the point charge on to the surface of the plate.

17. The electric lines of force tend to contract lengthwise and expand laterally. What do they indicate?
18. What is the number of electric lines of force that radiate outwards from one coulomb of charge in vacuum?
19. Draw lines of force to represent a uniform electric field.
20. What is the number of electric lines of force that radiate outwards from one coulomb of charge in vacuum?
21. Distinguish between electric charge and mass.
22. Two-point charges $+q$ and $-q$ are placed a distance d apart. Draw the line on which the resultant field is parallel to the line joining the two charges.
23. An electric dipole free to move is placed in a uniform electric field. Explain along with diagram its motion when it is placed, (a) parallel to the field, (b) perpendicular to the field.
24. Define electric flux. Write its SI units. A spherical balloon carries a charge that is uniformly distributed over its surface. As the balloon is blown up and increases in size, how does the total electric flux coming out of the surface change? Give reason.
25. A spherical rubber balloon carries a charge that is uniformly distributed over its surface. As the balloon is blown up; how does E vary for points (i) inside the balloon, (ii) on the surface of the balloon and (iii) outside the balloon?
26. Distinguish between gravitational force and electrostatic force.
27. A positive point charge ($+q$) is kept in the vicinity of an uncharged conducting plate. Sketch electric field lines originating from the point on to the surface of the plate. Derive the expression for the electric field at the surface of a charged conductor.
28. State Gauss's theorem in electrostatics. Apply this theorem to derive an expression for electric field intensity at a point outside a uniformly charged thin spherical shell.
29. A thin conducting spherical shell of radius R has charge Q spread uniformly over its surface. Using Gauss law, derive an expression for an electric field at a point outside the shell. Draw a graph of electric field $E(r)$ with distance r from the centre of the shell.
30. (a) Using Gauss law obtain the expression for the electric field due to a uniformly charged thin spherical shell of radius R at a point outside the shell. Draw a graph showing the variation of electric field with r , for $r < R$ and $r > R$.
 (b) What are the magnitudes of the torques on the coil in the initial and final position?
 (c) What is the angular speed acquired by the coil when it has rotated by 90° ? The moment of inertia of the coil is 0.1 kg m^2 .

31. The flux of the electrostatic field through the closed spherical surface S' is found to be 4 times through the closed spherical S . Find the magnitude of the charge Q . Given $q_1 = 1 \mu\text{C}$, $q_2 = -2 \mu\text{C}$, $q_3 = 9.854 \mu\text{C}$.

32. A parallel plate capacitor with air between the plates has a capacitance of 8 pF ($1 \text{ pF} = 10^{-12} \text{ F}$).



12 F). What will be the capacitance if the distance between the plates is reduced by half, and the space between them is filled with a substance of dielectric constant 6?

33. In a hydrogen atom, the electron and proton are bound at a distance of about 0.53 \AA :
- Estimate the potential energy of the system in eV, taking the zero of the potential energy at infinite separation of the electron from proton.
 - What is the minimum work required to free the electron, given that its kinetic energy in the orbit is half the magnitude of potential energy obtained in (a)?
 - What are the answers to (a) and (b) above if the zero of potential energy is taken at 1.06 \AA separation?

34. Two charged conducting spheres of radii a and b are connected to each other by a wire. What is the ratio of electric fields at the surfaces of the two spheres? Use the result obtained to explain why charge density on the sharp and pointed ends of a conductor is higher than on its flatter portions.

35. An electrical technician requires a capacitance of $2 \mu\text{F}$ in a circuit across a potential difference of 1 kV . A large number of $1 \mu\text{F}$ capacitors are available to him each of which can withstand a potential difference of not more than 400 V . Suggest possible arrangement that requires the minimum number of capacitors.

36. A room has AC run for 5 hours a day at a voltage of 220V . The wiring of the room consists of Cu of 1 mm radius and a length of 10 m . Power consumption per day is 10 commercial units. What fraction of it goes in the joule heating in wires? What would happen if the wiring is made of aluminium of the same dimensions?

$$[\rho_{\text{Cu}} = 1.7 \times 10^{-8} \Omega \text{ m}, \rho_{\text{Al}} = 2.7 \times 10^{-8} \Omega \text{ m}]$$

37. First a set of n equal resistors of R each are connected in series to a battery of emf E and internal resistance R . A current I is observed to flow. Then the n resistors are connected in parallel to the same battery. It is observed that the current is increased 10 times. What is 'n'?

38. Let there be n resistors R_1, \dots, R_n with $R_{\max} = \max(R_1, \dots, R_n)$ and $R_{\min} = \min\{R_1, \dots, R_n\}$. Show that when they are connected in parallel, the resultant resistance $R_p < R_{\min}$ and when they are connected in series, the resultant resistance $R_s > R_{\max}$. Interpret the result physically.
39. Two conductors are made of the same material and have the same length. Conductor A is a solid wire of diameter 1mm. Conductor B is a hollow tube of outer diameter 2mm and inner diameter 1mm. Find the ratio of resistance R_A to R_B .

Multiple Choice Questions (MCQ I)

1. Consider a current carrying wire (current I) in the shape of a circle. Note that as the current progresses along the wire, the direction of j (current density) changes in an exact manner, while the current I remain unaffected. The agent that is essentially responsible for is
- source of emf.
 - electric field produced by charges accumulated on the surface of wire.
 - the charges just behind a given segment of wire which push them just the right way by repulsion.
 - the charges ahead.
2. A resistance R is to be measured using a meter bridge. Student chooses the standard resistance S to be 100Ω . He finds the null point at $l_1 = 2.9$ cm. He is told to attempt to improve the accuracy. Which of the following is a useful way?
- He should measure l_1 more accurately.
 - He should change S to 1000Ω and repeat the experiment.
 - He should change S to 3Ω and repeat the experiment.
 - He should give up hope of a more accurate measurement with a meter bridge.
3. Two cells of emf's approximately 5V and 10V are to be accurately compared using a potentiometer of length 400cm.
- The battery that runs the potentiometer should have voltage of 8V.
 - The battery of potentiometer can have a voltage of 15V and R adjusted so that the potential drop across the wire slightly exceeds 10V.
 - The first portion of 50 cm of wire itself should have a potential drop of 10V.
 - Potentiometer is usually used for comparing resistances and not voltages.
4. A metal rod of length 10 cm and a rectangular cross-section of $1\text{cm} \times \frac{1}{2}$ is connected to a battery across opposite faces. The resistance will be
- maximum when the battery is connected across $1\text{cm} \times \frac{1}{2}$ cm faces.
 - maximum when the battery is connected across $10\text{cm} \times 1$ cm faces.

- (c) maximum when the battery is connected across $10\text{ cm} \times 1/2\text{ cm}$ faces.
- (d) same irrespective of the three faces.
5. Which of the following characteristics of electrons determines the current in a conductor?
- (a) Drift velocity alone.
- (b) Thermal velocity alone.
- (c) Both drift velocity and thermal velocity.
- (d) Neither drift nor thermal velocity.
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CHEMISTRY

SOLUTION

1. Write two differences between a solution showing positive deviation and a solution showing negative deviation from Raoult's law.
2. Calculate the freezing point of a solution when 3 g of CaCl_2 ($M=111\text{ g mol}^{-1}$) was dissolved in 100 g of water, assuming CaCl_2 undergoes complete ionization. (K_f for water = $1.86\text{ K kg mol}^{-1}$)
3. Vapour pressure of water at 20°C is 17.5 mm Hg. Calculate the vapour pressure of water at 20°C when 15g of glucose (Molar mass = 180 g mol^{-1}) is dissolved in 150 g of water.
4. (a) On mixing liquid X and liquid Y, the volume of resulting solution increases. What type of deviation from Raoult's law is shown by the resulting solution? What change in temperature would you observe after mixing liquids X and Y?
- (b) How can the direction of osmosis be reversed? Write one use of reverse osmosis.
5. A solution is prepared by dissolving 5 g of non-volatile solute in 95 g of water. It has a vapour pressure of 23.375 mm Hg at 25°C . Calculate the molar mass of the solute. (vapour pressure of pure water at 25°C is 23.75 mm Hg).
6. A 5% solution (by mass) of cane -sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) in water has f.p. of 271 K. Calculate the f.p. of 5% glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) in water, if f.p. of water is 273.15 K.
7. What is meant by positive deviations from Raoult's law? Give one example. What is the sign of $\Delta_{\text{mix}}H$ for positive deviation?
8. 3.9 g of benzoic acid dissolved in 49 g of benzene shows a depression in freezing point of 1.62K. Calculate the van't Hoff factor and predict the nature of solute (associated or dissociated) (Given molar mass of benzoic acid = 122 g mol^{-1} , K_f for benzene = 4.9 K kg mol^{-1})
9. State Henry's law. Why do gases always tend to be less soluble in liquids as the temperature is raised?

10. State Raoult's law for the solution containing volatile components. Write two differences between an ideal solution and a non-ideal solution.

ELECTROCHEMISTRY

1. (a) Calculate ΔG^0 and $\log K_c$ for the following reaction at 298K:
 $2Al(s) + 3Cu^{2+}(aq) \rightarrow 2Al^{3+}(aq) + 3Cu(s)$; Given $E^0_{Cell} = 2.02V$
 (b) Using E^0 values of A & B, predict which is better for coating the surface of iron [$E^0(Fe^{2+}/Fe) = -0.44V$] to prevent corrosion and why? Given: $E^0(A^{2+}/A) = -2.37V$, $E^0(B^{2+}/B) = -0.14V$
2. (a) The conductivity of 0.001 mol L^{-1} solution of CH_3COOH is $3.905 \times 10^{-5} \text{ S cm}^{-1}$. Calculate its molar conductivity and degree of dissociation. Given: $\lambda^0(H^+) = 349.6 \text{ S cm}^2 \text{ mol}^{-1}$ and $\lambda^0(CH_3COO^-) = 40.9 \text{ S cm}^2 \text{ mol}^{-1}$
 (b) what type of battery is dry cell? Write the overall reaction occurring in dry cell.
3. Calculate the time to deposit 1.5 g of silver at cathode when a current of 1.5 A was passed through the solution of $AgNO_3$. (Molar mass of Ag = 109 g mol^{-1} , $1F = 96500 \text{ C mol}^{-1}$)
4. Calculate E^0_{Cell} and $\Delta_r G^0$ for the following reaction at $25^\circ C$.
 $A^{2+} + B^+ \rightarrow A^{3+} + B$
 Given: $K_c = 10^{10}$, $1F = 96500 \text{ C mol}^{-1}$
5. How much charge in Faraday is required for the reduction of 1 mol of Ag^+ to Ag?
6. Calculate e.m.f. and ΔG for the following cell at 298K.
 $Mg(s)/Mg^{2+}(0.01M) || Ag^+(0.0001M)/Ag(s)$ Given: $E^0(Mg^{2+}/Mg) = -2.37V$, $E^0(Ag^+/Ag) = +0.80V$
7. Define limiting molar conductivity. Why conductivity of an electrolyte solution decreases with the decrease in concentration?
8. Calculate e.m.f. of the following cell at $25^\circ C$.
 $Fe(s) | Fe^{2+}(0.001M) || H^+(0.01M) | H_2(g)(1bar) | Pt(s)$
 Given: $E^0(Fe^{2+}/Mg) = -0.44V$, $E^0(H^+/H_2) = +0.00V$
9. (a) Following reactions occur at cathode during the electrolysis of aqueous sodium chloride solution:
 $Na^+(aq) + e^- \rightarrow Na(s) \quad E^0 = -2.71V$
 $H^+(aq) + e^- \rightarrow \frac{1}{2} H_2(g) \quad E^0 = 0.00V$
 On the basis of their reduction electrode potential (E^0) values, which reaction is feasible at cathode and why?
 (b) Why does the cell potential of mercury cell remain constant throughout its life?

CHEMICAL KINETICS

1. Show that the time required for completion of $3/4^{\text{th}}$ of reaction of first order is twice that of half-life

($t_{1/2}$) of the reaction.

- Derive the integrated rate equation for rate constant of a zero order reaction.
- For the hydrolysis of methyl acetate in aqueous solution, the following result were obtained:

t/s	0	30	60
[CH ₃ COOCH ₃]mol L ⁻¹	0.60	0.30	0.15

- Show that it follows pseudo first order reaction, as the concentration of water remains constant.
 - Calculate the average rate of reaction between the time intervals 30 to 60 seconds.
- A first order reaction takes 23.1 minutes for 50% completion. Calculate the time required for 75% completion of this reaction.
 - Write two differences between order of a reaction and molecularity of a reaction.
 - A first order reaction takes 10 minutes for 25% decomposition. Calculate $t_{1/2}$ for the reaction. (Given : $\log 2 = 0.301$, $\log 3 = 0.4771$, $\log 4 = 0.6021$)
 - For a reaction $A + B \rightarrow P$, the rate is given by, $\text{Rate} = k[A][B]^2$
 - How is the rate of reaction affected if the concentration of B is doubled?
 - What is the overall order of reaction if A is present in large excess?
 - A first order reaction takes 30 minutes for 50% completion. Calculate the time required for 90% completion of this reaction. (Given : $\log 2 = 0.301$, $\log 3 = 0.4771$)
 - What is rate of reaction? Write two factors that affect the rate of reaction.
 - Rate of a first order reaction increases from 4×10^{-2} to 8×10^{-2} when the temperature changes from 27°C to 37°C. Calculate the energy of activation (E_a) (Given : $\log 2 = 0.301$, $\log 3 = 0.4771$, $\log 4 = 0.6021$, $\log 6 = 0.7782$)

SURFACE CHEMISTRY

- Define the following terms:
 - Peptization
 - Zeta potential
 - Brownian movement
- Out of AlCl₃ and NaCl, which is more effective in causing coagulation of a negative sol and why?
- What is the type of charge on AgI colloidal sol formed when AgNO₃ solution is added to KI solution?
- Differentiate between the following:
 - Solution and colloid
 - Homogeneous catalysis and Heterogeneous catalysis
 - O/W emulsion and W/O emulsion
- What is the effect of temperature on adsorption?

6. Give the reason for the following:
- Some substances can act both as colloids and crystalloids.
 - Artificial rain is caused by spraying salt over clouds.
 - Deltas are formed when river meets sea water.
7. Define the following terms:
- Sorption
 - Lyophilic colloids
 - Associated colloids
8. Out of $BaCl_2$ and KCl , which one is more effective in causing coagulation of a negatively charged colloidal sol? Give reason.
9. Write a method by which lyophobic colloids can be coagulated.
10. Give the reason for the following observations:
- Physisorption increases with increase in temperature.
 - Addition of alum purifies water.
 - Brownian movement provides stability to the colloidal solution.

COMPUTER SCIENCE

SQL

1. Write SQL commands and output on the basis of Teacher relation given below.

No	Name	Age	Department	Date of Join	Salary	Sex
1.	Jigal	34	Computer	10/01/97	12000	M
2.	Sharmila	31	History	24/03/98	20000	F
3.	Sandeep	32	Maths	12/12/96	30000	M
4.	Sangeeta	35	History	01/07/99	40000	F
5.	Rakesh	42	Maths	05/09/97	25000	M
6.	Shyam	50	History	27/02/97	30000	M
7.	Shiv Om	44	Computer	25/02/97	21000	M
8.	Shalakra	33	Maths	31/07/97	20000	F

- To show all information about the teacher of history department.
- To list the names of female teachers who are in Maths department
- To list names of all teachers with their date of joining in ascending order.
- To display students name, fee, age for male teacher only

- (e) To count the number of teachers with age>23.
- (f) To insert a new row in the TEACHER table with the following data:
9, "Raja",26,"Computer",13/05/95,2300,"M".
- (g) To show all information about the teachers in this table
- (h) Add a new column named "Address".
- (i) Arrange the whole table in the alphabetical order to name
- (j) Display the age of the teachers whose name starts with 'S,.
- (k) Give the output of following statement.
 - (i) Select COUNT (distinct department) from TEACHER.
 - (ii) Select MAX(Age)from Teacher where sex="F"
 - (iii) Select AVG(Salary) from Teacher where Date of join<12/07/96
 - (iv) Select SUM(Salary) from teacher where Date of join<12/07/96

2. **TABLE : EMP**

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7839	REA	MANAGER	67	12-DEC-98	5000	0	10
1234	PREM	CLERK	87	11-FEB-77	12000	1500	20
6754	SITA	MANAGER	89	12-MAR-99	10000	1000	20
6574	GITA	SALESMAN	98	11-JUN-99	9000	0	30
9876	HONEY	CLERK	65	12-JUN-00	12000	800	20
8976	REEMA	SALESMAN	91	10-SEP-88	6000	100	30

- (a) Display names of employees whose names include either of the substring "TH" or "LL".
- (b) Display data of all employees sorted by their department, seniority and salary.
- (c) Find all the employees who have no manager.
- (d) To display all employees who were hired during 1995.
- (e) Show the average salary for all departments with more than 3 people for a job.
- (f) Find out number of employees having 'MANAGER' as job.
- (g) Create view DEPT20 with name and the salary of employees for dept 20.
- (h) Display department no. and number of employees in each department.
- (i) Find the output of the following:

- (i) SELECT SYSDATE FROM DUAL;
- (ii) SELECT ENAME, SAL FROM EMPLOYEE WHERE DEPTNO=20;
- (iii) SELECT COUNT (*) FROM EMP;
- (iv) SELECT AVG(SAL) FROM EMP;

3. Consider the following WORKERS and DESIG. Write SQL commands and output of following:

WORKERS

W_ID	FIRSTNAME	LASTNAME	ADDRESS	CITY
102	Sam	Tones	33 Elm St.	Paris
105	Sarah	Ackerman	440 U.S. 110	New York
144	Manila	Sengupta	24 Friends Street	New Delhi
210	George	Smith	83 First Street	Howard
255	Mary	Jones	842 Vine Ave.	Loganville
300	Robert	Samuel	9 Fifth Cross	Washington
335	Henry	Williams	12 Moore Street	Boston
403	Ronny	Lee	121 Harrison St.	New York
451	Pat	Thompson	11 Red Road	Paris

DESIG

W_ID	SALARY	BENEFITS	DESIGNATION
102	75000	15000	Manager
105	85000	25000	Director
144	70000	15000	Manager
210	75000	12500	Manager
255	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
400	32000	7500	Salesman

451	28000	7500	Salesman
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- (a) To display W_ID, FIRSTNAME, ADDRESS and CITY of all employees living in NEW YORK from the table WORKERS.
- (b) To display the content of workers table in ascending order of LASTNAME.
- (c) To display the FIRSTNAME, LASTNAME and total salary of all clerks from the tables WORKERS and DESIGN, where total salary is calculated as SALARY + BENEFITS.
- (d) To display the minimum salary among Managers and Clerks from the table DESIG.
- (e) Give the output of following:
 - (i) SELECT FIRSTNAME, SALARY FROM WORKERS, DESIG WHERE DESIGNATION = 'Manager' AND WORKERS.W_ID = DESIG.W_ID
 - (ii) SELECT COUNT (DISTINCT DESIGNATION) FROM DESIG.
 - (iii) SELECT DESIGNATION, SUM (SALARY FROM DESIGNATION GROUP BY DESIGNATION HAVING COUNT (*) <3;
 - (iv) SELECT SUM(BENEFITS) FROM WORKERS WHERE DESIGNATION = 'Salesman';

4. Write SQL commands and output of following on the basis of the table EMPLOYEE:

Name	Emp No	Dept No	Job	Sal	Comm
G. Hussain	2098	10	President	7000	
Pallav	3099	30	Manager	9000	1400
Y.D. Sharma	8001	20	Clerk	8500	
Bhawna	7901	10	President	4520	300
A. Dasgupta	5400	20	Analyst	6580	
P. Arora	3400	10	Clerk	12000	
Col. Singhvi	2100	30	Manager	1200	500
Amit	3100	30	Analyst	3250	
A D'souza	2211	10	Clerk	6900	

- (a) Show sum and average salary for marketing deptt.
- (b) Check all employees have unique names.
- (c) Find all employees whose deptt is same as of 'Amit'.
- (d) Increase the salary of all employees by 10%,

- (e) Find the deptt that is paying max salaries to its employees.
- (f) Display the details of all the employees having salary less than 10000.

5. Write the SQL commands & output on the basis of table **Hospital** :

No	Name	Age	Department	Date of admin	Charge	Sex
1	Arpit	62	Surgery	21/01/06	300	M
2	Zayana	18	ENT	12/12/05	250	F
3	Kareem	22	Orthopaedic	19/02/06	450	M
4	Abhilash	26	Surgery	24/11/06	300	M
5	Dhanya	24	ENT	20/10/06	350	F
6	Siju	23	Cardiology	10/10/06	800	M
7	Ankita	16	ENT	13/04/06	100	F
8	Divya	15	Cardiology	10/11/06	500	F
9	Nidhin	25	Orthopaedic	12/05/06	700	M
10	Hari	28	Surgery	19/03/06	450	M

- (a) To show all information about the patients of cardiology department.
- (b) To list the name of female patients who are in ENT department.
- (c) To list names of all patients with their date of admission in ascending order.
- (d) To count the no of patients with age > 20.
- (e) Give the output of the following SQL commands:
 - (i) Select COUNT(DISTINCT charges) from hospital;
 - (ii) Select MIN(age) from hospital where Sex='M';
 - (iii) Select SUM(charges) from hospital where Sex ='F';
 - (iv) Select avg(charges) from hospital where date of adm> {12/05/06};

BOOLEAN ALGEBRA

- 1 Solve the following $F(a, b, c, d) = \sum(0, 1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 15)$. Obtain the simplified form using K-Map.
- 2 Minimize $F(a, b, c, d) = \sum(1, 2, 3, 11, 12, 14, 15)$ using K-map.
- 3 Given the logic function $F = xyz + yz'w + x'yz$. Minimize it using K- Map.

4 Obtain a simplified form for the following Boolean Expression using K Map and after simplifying draw its circuit diagram.

$$F=m_0+m_1+m_2+m_4+m_5+m_7+m_8+m_9+m_{10}+m_{11}$$

5 Obtain a simplified form for the following Boolean expression using K-Map and draw its circuit diagram.

$$F=M_0.M_1.M_3.M_5.M_8.M_{10}.M_{13}$$

6 Obtain the simplified form of a Boolean Expression using Karnaugh Map

$$F(w,x,y,z)=S(0,1,2,3,4,8,9,10,11)$$

7 Reduce the following Boolean Expression with the help of Karnaugh Map

$$F(U,V,W,Z)=S(0,1,2,3,12,13,14,15)$$

8 Use K Map to simplify the Boolean function

$$F(a,b,c,d)=\sum(1,3,4,5,6,7,9,11,12,13,14,15)$$

9 A combinational circuit has 4 inputs and one output. Output is 1 when

- (a) all the inputs are equal to 1
- (b) none of the inputs are equal to 1
- (c) an odd number of inputs are equal to 1
 - (i) Obtain the truth table
 - (ii) Find the simplified output function in SOP Form
 - (iii) Find the simplified output function in POS Form
 - (iv) Draw the logic diagram

10 (a) There are 4 parallel railway tracks at a place. It is desired to design a logic circuit, which can give a signal when three or more trains pass together at any given time (a) Draw the truth table for the above problem

- (b) Simplify the expression using K – Map
- (c) Draw the circuit diagram

11 Output of 4 input (x,y,z,w) Boolean function F is 1 when

- (a) At least two variable have the truth value 1
- (b) At least three variable have the truth value 1
- (c) Only when the three variable have the truth value 1
- (d) Draw the truth table. Solve it by using K map in Product of Sum terms

12 Minimize the Boolean Expression using $XYZ+XYZ'+XY'Z'+X'Y'Z'+X'YZ$ using Karnaugh Map

- 13 Simplify for the function $F = \pi(0,3,7,8,9,12,13)$
- 14 Draw the truth table for a full adder and then simplify the Sum and Carry by using K-map. After that draw its circuit diagram.
- 15 Give the logic function $F = AB + A'B' + A'B$. Assuming the complements are available. Simplify the function using De Morgan's Theorem. Synthesize F by using NOR gates only.

BIOLOGY

1. Each cadet will find out 15 very short answer types questions from the Chapter 1-5 from NCERT Biology Textbook and write down their answers in a Holiday home work Note Book.

2. Each Cadet will prepare Investigatory Project from the under given Topics on A4 size Paper-

- (a) Some common Genetic disorders
- (b) Conservation of Wild Life
- (c) Drugs and their abuse by Humans
- (d) Test Tube Baby Program

3. WORKSHEET

- (a) What is a clone?
- (b) What are vegetative propagules?
- (c) What are the vegetative propagules in Eichhornia, potato,
- (d) onion, ginger, penicillium, sponge .
- (e) Name the plant which flowers once in 12 yrs.
- (f) Explain embryogenesis in plants
- (g) Explain embryogenesis in animals.
- (h) Dis-advantages of external fertilization.
- (i) Differentiate Zoospore and Zygote.
- (j) Explain why meiosis and embryogenesis are interlinked.
- (k) What is sporulation?
- (l) What do you mean by the term uniparental?
- (m) A moss plant produces a large no. of antherozoids but a few egg cells. Why?
- (n) What is parthenogenesis? Give few examples from animals.
- (o) Amoeba is immortal. Explain.

- (p) What is a fruit, seed and embryo?
- (q) The number of chromosomes in the shoot tip cells of maize plant is 20. What will be the number of chromosomes in the gametes and microspore mother cells of the same plant?
- (r) Explain the events of sexual reproduction.
- (s) What do you mean by seasonal breeders?.
- (t) Name 2 plant groups with diploid plant body.
- (u) Mention a characteristic feature and a function of Zoospores in some algae.
- (v) Mention the site where syngamy takes place in amphibians and reptiles respectively.
- (w) List 2 main pre-fertilisation events.
- (x) Technical term to denote unisexual condition
- (y) Differentiate parthenogenesis and parthenocarpy.
- (z) Name 2 plant groups having haploid body