



GRADE – XII (PCM / B)

WORKSHEET

SESSION 2025-26



SUBJECT - PHYSICS

ASSIGNMENT -1 ELECTRIC CHARGES AND FIELDS

Q1 Define electric dipole moment . Is it a scalar or a vector ? Derive the expression for the electric field of a dipole at a point on the equatorial line of the dipole .

Q2. State Gauss theorem . Using Gauss's law deduce the expression for the electric field due to a uniformly charged spherical conducting shell of radius R at a point (i) outside & (ii) inside the shell . Plot a graph showing variation of electric field as a function of r > R and r < R (r being the distance from the centre of the shell).

Q3 .(a)Define electric flux . Write its S.I . unit .

(b) Using Gauss's law ,prove that the electric field at a point due to a uniformly charged infinite plane sheet is independent of the distance from it .(c) How is the field directed if (i) the sheet is positively charged (ii)negatively charged ?

Q4. (a) Derive an expression for the torque experienced by an electric dipole kept in a uniform electric field . When is this torque maximum.

 $\mathbf{Q5}$.Sketch the electric lines of force of

- (a) a point charge q >0,
- (b) a point charge q < 0,
- (c) an electric dipole or two equal & opposite charges separated by a small distance,
- (d) two equal positive charges placed small distance apart in air,

Q6. What is meant by quantisation of electric charge ?

 $\mathbf{Q7}$.Define dielectric constant of a medium in terms of force between electric charges .

Q8. An infinite line charge produces a field of 9×10^4 N/C at a distance of 4cm. Calculate the linear charge density.

Q9. Two infinite parallel plane thin sheets have uniform charge densities of σ_1 and σ_2 . Determine the electric field at points

- (i) to the left of the sheets
- (ii) between them
- (iii) to the right of the sheets.

 $\mbox{\bf Q10}$. Is the force acting between two point electric charges q_1 and q_2 kept at some distance inair, attractive or repulsive when : (i) $q_1 \ q_2 > 0$ (ii) $q_1 \ q_2 < 0$

Q11.An electric dipole of dipole moment 20μ C is enclosed by closed surface. What is the net electric flux coming out of this surface ?

Q12. 1 C of charge is equal to charge of 'n' number of electrons in magnitude. What is the value of 'n'?

Q13. The distance of the field point , on the equatorial plane of a small electric dipole is halved . By what factor does the electric field due to the dipole change ?

Q14. . Fig . shows some of the electric field lines corresponding to an electric field .The electric field at which point is minimum.



Q15. An electrostatic field line is a continuous curve. That is a field line cannot have sudden breaks. Why not?

Q16. Explain why two Electric field lines never cross each other at any point.

Q17.Three equal charges, each having a magnitude of 2.0×10^{-6} C, are placed at the three corners of a right -angled triangle of sides 3cm,4cm and 5cm.Find the force on the charge at the right- angle corner.

Q18. Three charges ,each equal to q, are placed at the three corners of a square of side ' a' . Find the electric field at the fourth corner.

Q19. A glass rod when rubbed with silk cloth, acquires a charge of 1.6×10^{-13} C. What is the charge on silk cloth ?

Q20. Two charges q and -3q are placed fixed on x-axis separated by distance 'd' .Where should a third charge 2q be placed such that it will not experience any force?

Q21. A point charge causes an electric flux -3 \times 10 $^{-14}$ Nm²/ C to pass through a spherical Gaussian surface .

(a) Calculate the value of the point charge .

(b) If the radius of the Gaussian surface is double , how much flux would pass through the surface ?

Q22. Fill in the blanks:

- (i) Two spheres of equal radii have charges q and 3q. The ratio of their surface charge densities is
- (ii) Net electric field inside the charged spherical shell is_____.
- (iii)Electric flux is a _____quantity and its SI unit is _____
- (iv) The force of repulsion between two positive charges of 1C each, kept 1m apart in vacuum, is

(v)In a uniform electric field, an electric dipole experiences no net_____but a non-zero

ASSIGNMENT 2 (ELECTROSTATIC POTENTIAL & CAPACITANCE)

Q1 .Draw graphs showing the variations of

- (i) Electrostatic potential V with distance 'r' for a charge q
- (ii) Electrostatic field E with distance 'r' for a charge q

Q2 .Show that the electric field at any point is equal to the negative of the potential gradient at thatpoint .

Q3 .What is an equipotential surface ? Give an example .

Q4 .Sketch equipotential surfaces for

- (i) A positive point charge
- (ii) A uniform electric field .

Q5 .Show that the amount of work done in moving a test charge over an equipotential surface is zero

Q6 .Show that the direction of the electric field is normal to the equipotential surface at every point .

Q7.Fill in the blanks:

- (i) The electric potential of a point charge is ______ symmetric.
- (ii) Electric potential is _____quantity while potential gradient is a _____quantity.
- (iii) ______at a point is equal to the negative of the potential gradient at that point.
- (iv) The potential energy of two like charges is_____
- (v) For a constant electric field in the z-direction, equipotential surfaces will be planes parallel to_____.

Q8. How much is the electric potential of a charge at a point at infinity.

Q9.The work done in moving a charge of 3 Coulomb between two points is 6 J. What is the potential difference between the two points ?

Q10. The electric potential at 0.9 m from a point charge is +50 V. What is the magnitude and sign of the charge.

Q11.Derive an expression for the potential at a point along the axial line of a short dipole.

Q12.Derive an expression for the electric potential at a distance 'r' from a point charge 'q'.

Q13.Derive an expression for the potential energy of a dipole rotated in a uniform electric field.

Q14.Deduce expressions for the potential energy of a system of two point charges and

three point charges and hence generalise the result for a system of 'N' point charges.

Q15. Two point charges $+10\mu$ C and -10μ C are separated by a distance of 2.0 cm in air.

Calculate the potential energy of the system.

Q16.Deduce the expression for the capacitance of a parallel plate capacitor when a dielectric slab is inserted between the plates. Assume the slab thickness less than the plate separation. Q17. Two capacitors of equal capacitance when connected in series have net capacitance C_1 and when connected in parallel have net capacitance C_2 . What is the value of C_1/C_2 ?

Q18.Sketch a graph to show how the charge Q acquired by a capacitor of capacitance C varies with increase in potential difference between its plates.

Q19. Why does the electric field inside a dielectric decrease when it is placed in an external electric field ?

Q20. A parallel plate capacitor of capacitance C is charged to a potential V by a battery. Without disconnecting the battery, the distance between the plates is tripled and a dielectric medium of k = 10 is introduced between the plates of the capacitor. Explain giving reasons, how will the following be affected :

(i)capacitance of the capacitor (ii) charge on the capacitor (iii) energy density of the capacitor.

SUBJECT – MATHEMATICS



SUBJECT – CHEMISTRY

QI. Define the terra solution. How many types of solutions are formed? Write briefly about each type with an example.

Q2. Define the following terms:

(i) Mole fraction

(ii) Molality

(iii) Molarity

(iv) Mass percentage

Q3. What role does the molecular interaction play in solution of alcohol in water?

Q4. State Henry's law and mention some of its important applications.

Q5. The depression in freezing point of water observed for the same amount of acetic acid, trichloroacetic acid and trifluoroacetic acid increases in the order given above. Explain briefly.



Acetic acidTrichloroacetic acidTrifluoroacetic acidQ6. Determine the osmotic pressure of a solution prepared by dissolving 25 mg of K2SO4 in2 litre of water at 25°C, assuming that it is completely dissociated. (C.B.S.E. 2013)

Q7. Determine the amount of CaCl2 (i = 2.47) dissolved in 2.5 litre of water such that its osmotic pressure is 0.75 atm at 27°C.

Q8. The air is a mixture of a number of gases. The major components are oxygen and nitrogen with an approximate proportion of 20% is to 79% by volume at 298 K. The water is in equilibrium with air at a pressure of 10 atm. At 298 K if Henry's law constants for oxygen and nitrogen are 3.30 x 107 mm and 6.51 x 107 mm respectively, calculate the composition of these gases in water.

Q9. Henry's law constant for the molality of methane in benzene at 298 K is 4.27 x 105 mm Hg. Calculate the solubility of methane in benzene at 298 K under 760 mm Hg.

Q10. Calculate the depression in the freezing point of water when 10g of CH3CH2CHClCOOH is added to 250g of water. Ka = $1.4 \times 10-3$ Kg = 1.86 K kg mol-1.

Q11. If the solubility product of CuS is 6 x 10-16, calculate the maximum molarity of CuS in aqueous solution.

Q12. A 5% solution (by mass) of cane sugar in water has freezing point of 271 K. Calculate the freezing point of 5% glucose in water if freezing point of pure water is 273.15 K.

Q13. A solution containing 30g of non-volatile solute exactly in 90 g of water has a vapour pressure of 2.8 kPa at 298 K. Further, 18g of water is then added to the solution and the new of vapour pressure becomes 2.9 kPa at 298 K. Calculate

(i) molar mass of the solute.

(ii) vapour pressure of water at 298 K.

Q14. Calculate the mass of a non-volatile solute (molecular mass 40 g mol-1) that should be dissolved in 114 g of octane to reduce its pressure to 80%.

Q15. Heptane and octane form an ideal solution. At 373 K, the vapour pressures of the two liquid components are 105.2 kPa and 46.8 kPa respectively. What will be the vapour pressure of a mixture of 26.0 g of heptane and 35.0 g of octane?

Q16. Concentrated nitric acid used in the laboratory work is 68% nitric acid by mass in aqueous solution. What should be the molarity of such a sample of acid if the density of the solution is 1.504 g mL-1?

SUBJECT - BIOLOGY

Solve the given assignments in separte notebook SEXUAL REPRODUCTION IN FLOWERING PLANTS

Very Short Answer Type Questions

Q.1. What are the component cells of the egg apparatus in an embryo sac?

Q.2. Which part of gynoecium determines the compatible nature of pollen grain?

Q.3. What is common in the function performed by nucellus and cotyledon?

Q.4. Fill in the missing words:Pollen mother cell \rightarrow Pollen tetrad \rightarrow Pollen grain \rightarrow Vegetative cell,____?

Q.5. In the following events, indicate the stages where mitosis and meiosis occur (1,2,3).

Megaspore mother cell \rightarrow (1) \rightarrow Megaspores \rightarrow (2) \rightarrow Embryo sacs \rightarrow (3) \rightarrow Egg

Q.6. Show the direction of the pollen tube from the pollen on the stigma in the embryo sac with the help of a diagram.

Q.7. Which regions of pistil form fruits and seeds?

Q.8. During polyembryony, if one embryo is formed from synergids and the other from nucellus, state the one that is haploid and the one that is diploid.

Q.9. Is it possible that an unfertilized apomictic embryo sac gives rise to a diploid embryo? Give a reason in support of your answer.

Q.10. When a pollen grain is shed at the 3-celled stage, which three cells are found?

Q.11. Define self-incompatibility. How do self-incompatible plants pollinate?

Q.12. Which is a triploid tissue? How is the condition achieved in a fertilized ovule?

Q.13. Does apomixis require fertilization and pollination? Give reasons in support of your answer.

Q.14. Mention the kind of carpel with the help of a diagram.

Q.15. How do aquatic plants undergo pollination?

Q.16. Each pollen grain in the flowering plants produces male gametes. State the function of the male gametes.

Q.17. List out the agents of pollination.

Q.18. What is pollination?

Q.19. What are the stages of post-fertilization in plants?

Q.20. What are the male and female reproductive parts of a flower?

Q.21. What is cross-pollination?

Q.22. Define double fertilization.

Q.23. What are the main layers of a flower?

Q.24. Define Morphogenesis.

Q.25. State the role of endothecium.

Short Answer Type Questions

Q.1. How does a chasmogamous bisexual flower prevent self-pollination?

Q.2. Arrange them sequentially according to how they appear in the artificial hybridization programme.

Rebagging, Selection of parents, Bagging, Dusting the pollen on the stigma, Emasculation, Collection of pollen

Q.3. How do self-incompatibility restrict autogamy? How does pollination occur in such plants?

Q.4. Draw a well Labelled diagram of Monocot Embryo.

Q.5. Explain the term polyembryony. How is it exploited commercially?

Q.6. Is there any difference between apomixis and parthenocarpy? Explain the benefits of each.

Q.7. The zygote divides only after the division of the primary endosperm cell.

Give reasons in support of the statement.

Q.8. Why is it that the generative cell of 2-celled pollen divides in a pollen tube and not of 3-celled pollen?

Q.9. Label the following parts in the diagram: Male gametes, egg cell, polar nuclei, synergid, pollen

tube.

Q.10. Explain the events which occur after the process of fertilization in plants.

Long Answer Type Questions

Q.1. Explain the pollination occurring in the chasmogamous flowers.

Q.2. Describe the structure of the embryo sac of a mature angiosperm. Explain the role of synergids in it.

Q.3. How is it that the embryo sacs of some apomictic species look normal but contain diploid cells?

Q.4. What are the characteristics of wind, water and insect-pollinated flowers?

Q.5. Explain the structure of the pollen.

Q.6. What are the functions of a flower?

CHAPTER-2 HUMAN REPRODUCTION

Q1.

Assignment 2:-

Complete your Biology practical file work.

SUBJECT - INFORMATICS PRACTICES (065)

1. Give the output of following commands :

- (i) mysql>SELECT LEFT ('Swati',4);
- (ii) mysql>SELECT RTRIM ('!!!!Study isimportant!!!!!');
- (iii) mysql>SELECT ROUND(3234.343,1);where, !!!!! denotes blank spaces.

2. Give any two differences between

i. MOD() and AVG() functions in SQL.

ii. POWER() and SUM() SQL functions

iii. count(*) and count() SQL function

3. Consider table Hotel

Hotel_Id	H_Name	Location	Room_type	Price	Star
H001	The Palace	Delhi	Deluxe	4500	5
H002	The Resort	Mumbai	Deluxe	8000	7
H003	Adobe Resort	Dubai	Villa	2750	7
H004	Victoria Hill	London	Duplex	10000	3
H005	The Bee	London	Villa	30000	7

Write the output of the following SQL statements

- i. SELECT COUNT(*) FROM HOTEL;
- ii. SELECT COUNT(DISTINCT STAR) FROM HOTEL;
- iii. SELECT AVG (PRICE) FROM HOTEL;
- iv. SELECT SUM (PRICE) FROM HOTEL;
- v. SELECT MIN(STAR) FROM HOTEL;
- vi. SELECT MAX(PRICE) FROM HOTEL;

4. Write the names of SQL functions to perform the following operations :

- a. Display name of the Month from your date of birth.
- b. Convert email-id to lowercase.
- c. Count the number of characters in your name.

5. Consider a table ITEM with the following data :

S.No.	Itemname	Туре	Stockdate	Price	Discount
1	Eating Paradise	Dining Table	2002-02-19	11500.58	25
2	Royal Tiger	Sofa	2002-02022	31000.67	30
3	Decent	Office Table	2002-01-01	25000.623	30
4	Pink Feather	Baby Cot	2001-01-20	7000.3	20
5	White Lotus	Double Bed	2002-02-23	NULL	25

Write SQL queries using SQL functions to perform the following operations:

- (i) Display the first 3 characters of the Itemname
- (ii) Display the month name from the Stockdate
- (iii) Display the total price of the whole stock. Ans SELECT SUM(Price) FROM ITEM ;
- (iv) Display the average Price of all the stocks
- (v) Display all the Price round off up to 2 decimal places

6. Consider below table Name of the Table: WORKSHOP

Field	Туре		
WorkshopId	integer		
Title	Varchar(50)		
DateWorkshop	Date		
NumSpeakers	Integer		

Table : WORKSHOP

WorkshopId	Title	DateWorkshop	NumSpeakers
1001	Robotics	2020-03-21	3
1002	AI	2020-05-24	4
1003	Humanoids	2020-07-15	3
1004	Block Chain	2020-04-25	5
1005	Cloud	2020-03-03	4

I. a. Identify the attribute best suited to be declared Primary Key

b. Write a command to display details of workshop whose Title ends with letter s.

II. Write SQL command to update/modify the Number of Speakers from 3 to 4 for Humanoids Workshop.

III. Write SQL command to display details of workshops to be conducted in 3rd month (march)

MCQs

1. An a (A) sin	An aggregate function performs a calculation on A) single value (B) multiple values (C) no value			and returns a single value. (D) None of the above		
2. Whi A) avg	ch of the follov B) max	wing is not a built in a C) total	ggregate functio D) cou	on in SQL? nt		
3. Agg A. Col B. Sing C. Agg D. Bot	regate function lection of value gle value gregate value h A & B	is are functions that ta	ke a	as input and retu	rn a single value.	
4. Sele should	ct be used to find	from instructor wher the mean of the salar	e dept name= 'C 'y ?	Comp. Sci.'; Which c	of the following	
A. Mea	an(salary) D. Count(salar	B. Avg(salary	/)	C. Sum	(salary)	
5. All a A. Cou	nggregate funct int(attribute)	ions except igr B. Count(*)	ore null values C. Avg	in their input collec	tion. D. Sum	
6. Whia) Netwb) Objoc) Relatedd) Hier	ch type of data work ect-oriented ttional carchical	base management sys	tem is MySQL?	,		
7. Whia) MySb) SQIc) MySd) Serve	ch is the MySQ SQL server SQL client ver daemon pro	2L instance responsib	le for data proce	essing?		
7.	Which data ty a) Temporal d b) Char/Varch	pe is used to store dat ata type ar	a and time in M	ySQL?		

- c) Text data type
- d) Numeric data type
- 8. Which of the following is not a valid MySQL aggregate function?
 - a) MAX
 - b) COUNT
 - c) ADD
 - d) AVG
- 9. What is the role of "CONSTRAINTS" in defining a table in MySQL?
 - a) Declaring Foreign Key
 - b) Declaring primary key
 - c) Restrictions on columns
 - d) All of the mentioned

SUBJECT – ENGLISH

(1) Write down short question-answers from the text in respect of the following chapters -The Last Lesson

-Lost Spring

-Deep Water

(2) Read the following chapters-My Mother at Sixty-Six-Keeping Quiet

(3) Practise article-writing on one of the following topics-The State of Education Today-Changing Trends in Education

(4) Practise report-writing on one of the following topics

-An incident of chain-snatching took place near your house. You caught the snatcher with the help of a few passers-by. Write a report on this daring act for your school magazine.

-A daylight robbery took place in a bank near your house. As a staff correspondent for Times of India newspaper, write a report on the incident.