

[This question paper contains 4 <sup>(1)</sup> printed pages.]

Your Roll No.....

GC-4



Sr. No. of Question Paper : 2848

Unique Paper Code : 32493902

Name of the Paper : Protein Purification Techniques

Name of the Course : **Biochemistry : SEC for B.Sc.  
(Hons.)**

Semester : IV

Duration : 2 Hours

Maximum Marks : 50

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **all** questions.

1. (a) Explain briefly :

- (i) Ammonium sulphate is commonly used for salting out proteins.
- (ii) Gel filtration chromatography depends on the size and shape of a molecule.
- (iii) Native gel electrophoresis is not used for molecular weight determination of proteins.

P.T.O.

(iv) Proteins are eluted from ion-exchange column by increasing salt concentration.

(v) If a protein is more stable below its isoelectric pH then an anion-exchanger is used for its purification.

(b) Define the following :

(i) Exclusion limit of a gel

(ii) Fold-purification for a protein

(iii) Exchange capacity

(iv) Void volume

(v) Isoelectric pH

(c) Name the ligand used to purify the following using affinity chromatography :

(i) Avidin

(ii) Glycoprotein

(iii) Kinase



(iv) Viral RNA ...

(v) NAD<sup>+</sup> dependent dehydrogenase (10,5,5)

2. (a) Write the role of the following :

(i) Pre cycling in ion-exchange chromatography

(ii) TEMED in SDS-PAGE

(iii) Low temperature in organic solvent precipitation

(iv) Bromophenol blue in sample buffer

(v) Guard columns in HPLC

(vi) Blue dextran in gel filtration chromatography

(b) Differentiate between the following :

(i) Specific and non-specific elution in affinity chromatography

(ii) Anion and cation exchangers

(iii) Stacking gel and separating gel (6,9)

3. Write short notes on the following (**any three**) :

(i) SDS-PAGE electrophoresis

(ii) Affinity chromatography

(iii) Salt fractionation

(iv) HPLC

(5×3=15)

[This question paper contains 4 printed pages.]

2  
17/5/19  
Your Roll No.....

Sr. No. of Question Paper : 2866

GC-4

Unique Paper Code : 32173902

Name of the Paper : Basic Analytical Chemistry

Name of the Course : Chemistry : SEC for Honours

Semester : IV / II

Duration : 2 Hours

Maximum Marks : 37

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** questions in all.
3. Question **one** is compulsory.



1. (a) Describe the following terms (any two):

(i) pH

(ii) Complexometric Titrations

(iii) Retardation factor

(iv) Buffer solution

P.T.O.

(b) Differentiate between (any two) :

(i) Sample standard deviation and population standard deviation

(ii) Accuracy and precision

(iii) Adsorbant and Adsorbate (2+4×2)

2. (a) A mixture of two compounds A & B migrates from the origin to leave two spots with the following characteristics (migration distance X and spot diameter W)

$$X_A = 25 \text{ mm}, W_A = 2.0 \text{ mm};$$

$$X_B = 30 \text{ mm}, W_B = 3.0 \text{ mm}$$

The mobile front was 55.0 mm from the starting line.

(i) Calculate the retardation factor ' $R_f$ '

(ii) Calculate the resolution factor between the two compounds A & B.

(b) Define pure water, mineralised water and distilled water. Discuss the analytical applications in water analysis.

(c) Explain how packing of a column influences the efficiency of a column chromatography? (3×3)

3. (a) Discuss different methods of water purification.
- (b) Give composition of soil and its major nutrients.
- (c) Combination of hydroxide and bicarbonate alkalinity is not recorded in any water sample. Justify it. (3×3)
4. (a) Give the names of electrodes used for pH measurement. Give the diagram of any one electrode.
- (b) How are calcium ions of a soil sample determined in presence of magnesium ion by complexometric titration?
- (c) What is the analytical utility of dissolved oxygen (DO) of water sample and how is it determined? (3×3)
5. (a) Write the structures of M-EDTA complex and M-EBT complex.
- (b) How will you select an indicator for a titration?
- (c) Give the answer of the following computation to the maximum number of significant figures :

$$\frac{\left(\frac{93.5}{28.09} \times 100.0\right) + 32.01}{680}$$



2866

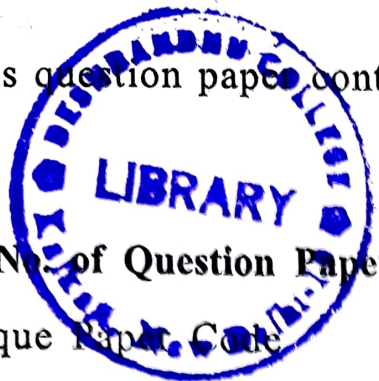
4.

OR

(c) Explain absolute and relative errors. (3x3)

(3)

[This question paper contains 4 printed pages.]



Your Roll No. 17/5117.....

Sr. No. of Question Paper : 2872 GC-4  
Unique Paper Code : 32173908  
Name of the Paper : Green Methods in Chemistry  
Name of the Course : B.Sc. (H) / B.Sc. (P) : SEC  
Semester : IV  
Duration : 2 Hours Maximum Marks : 37

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** questions in all including Question No. 1, which is compulsory.

1. (a) Fill in the blanks :
  - (i) \_\_\_\_\_ is fulfilling the needs of the present generation without compromising the ability of future generations to meet their needs.
  - (ii) \_\_\_\_\_ or VOC have been replaced and were banned in some paints.
  - (iii) Benzene a \_\_\_\_\_ compound is an important industrial solvent used in the production of pharmaceuticals and plastics etc.
  - (iv) A chemical process with an E factor of 1 creates \_\_\_\_\_ waste than a factor of 25.

P.T.O.

(v) Biopolymers exemplify Green Chemistry principle no 10 which is \_\_\_\_\_.

(b) Define Green Chemistry. Is it a new branch of chemistry?

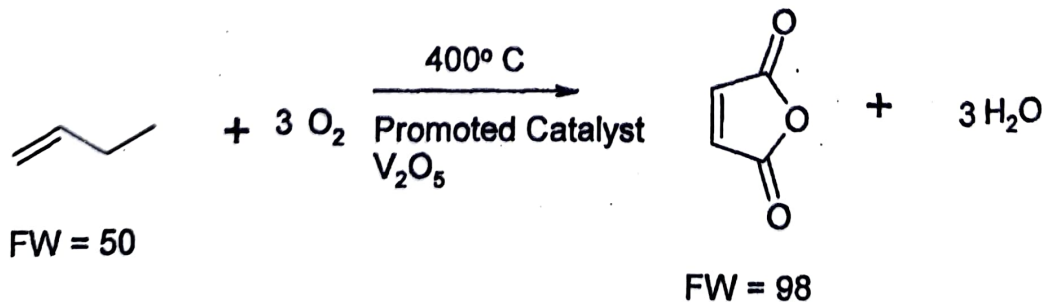
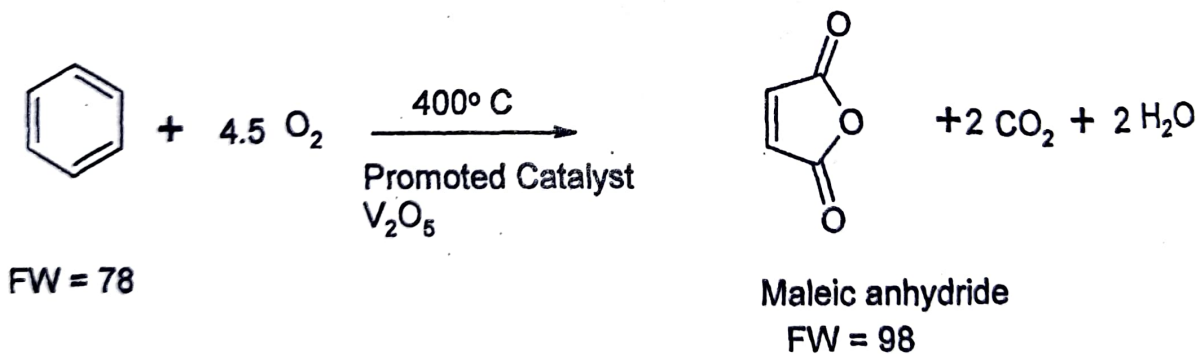
(c) Explain the terms used in the pollution prevention act of 1990 by US Environmental Protection Agency, EPA.  
Risk = function (hazard x exposure)

(d) What is the meaning of life cycle assessment?

(4,3,3,3)

2. (a) In addition to atom economy, what other aspects of synthesis need to be considered before one calls the synthesis Green.

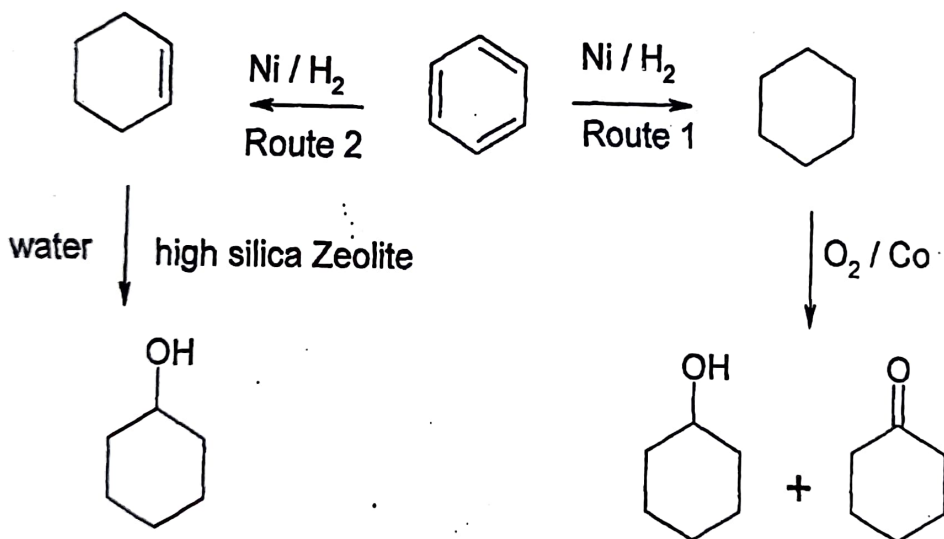
(b) Which is a better process under similar conditions?



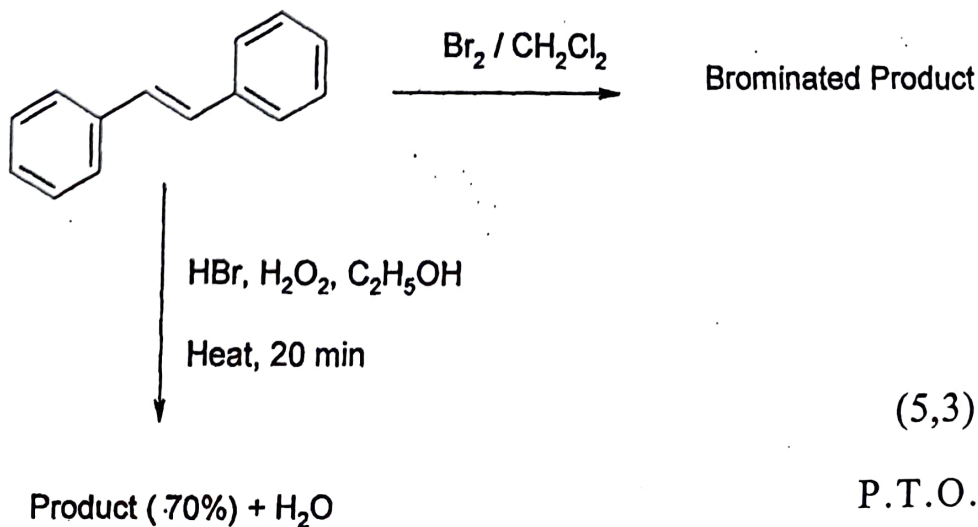
(c) A better solvent methyl-THF or THF and why?

(3,4,1)

3. (a) A reaction that uses a stoichiometric amount of reagent vs. one that uses a catalytic amount of the same reagent. Comment using example.
- (b) What are the disadvantages of thermal heating? Give one energy source which is greener.
- (c) Give name and one valuable application of a photocatalyst. (3,3,2)
4. (a) Which is a better route of synthesis for the production of cyclohexanol? Mention the green chemistry principles used for the route.



- (b) Which is a greener synthesis and why?



(5,3)

P.T.O.

5. Attempt any **two** :

- (a) Give phase diagram of  $\text{CO}_2$ . How is liquid  $\text{CO}_2$  generated in the laboratory? Name the compound extracted from orange peel using liquid  $\text{CO}_2$ .
- (b) Give the chemical reaction for the preparation of biodiesel from waste cooking oil. Name the principles of Green Chemistry involved and a method of characterization of biodiesel.
- (c) Give chemical reactions for solvent free synthesis of azomethine in the laboratory. What are the advantages over the conventional methods? (4,4)

6. Attempt any **two** :

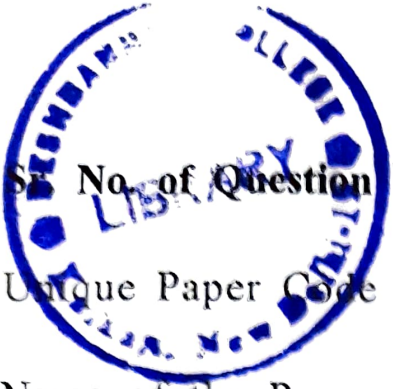
- (a) What are antifolants? What are the advantages of Sea nine211 over TBTO? Give one green chemistry principle involved in this Presidential Green Chemistry award.
- (b) What are Rightfit pigments? What are the advantages over heavy metal and organic pigments? Give the preparation of Rightfit Red.
- (c) Write a note on Green Chemistry and catalyst with emphasis on asymmetric catalyst, biocatalyst and phase transfer catalyst. (4,4)



[This question paper contains 6 printed pages.]

17/5/17

Your Roll No.....



No. of Question Paper : 2917

GC-4

Unique Paper Code : 32223903

Name of the Paper : Electrical Circuits and Network Skills

Name of the Course : **Physics : Skill Enhancement Course for Honours**

Semester : IV

Duration : 3 Hours

Maximum Marks : 50

### Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **All** questions carry equal marks.
3. Attempt **five** questions in all. Question No. 1 is compulsory. You may answer any four questions from Question No. 2 to Question No. 7.
4. Use of Scientific Calculators is allowed.

P.T.O.

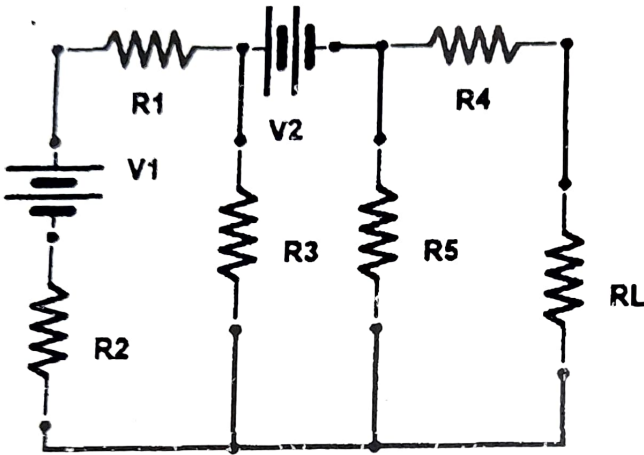
1. Attempt any **Five** :

(2×5)

- (i) What is 'Solder' ? Give its two important properties.
- (ii) The equivalent capacitance of two capacitors in series is 15 Farads and their equivalent capacitance becomes 64 Farads when connected in parallel. Find the capacitances of individual capacitors.
- (iii) The sequences of colour bands on two carbon resistors R1 and R2 are given as :
- R1 : Brown, Green, and Blue
- R2 : Orange, Black, and Green
- Find the ratio of the values of two resistors.
- (iv) Draw the schematic diagram of a battery, a capacitor and a switch in series and discuss the direction of current when switch is open and closed.
- (v) What is the difference between a SPST switch and a SPDT switch ? Draw their electrical symbols.
- (vi) Explain how Maximum Power Transfer Theorem is applied for ac circuits ?

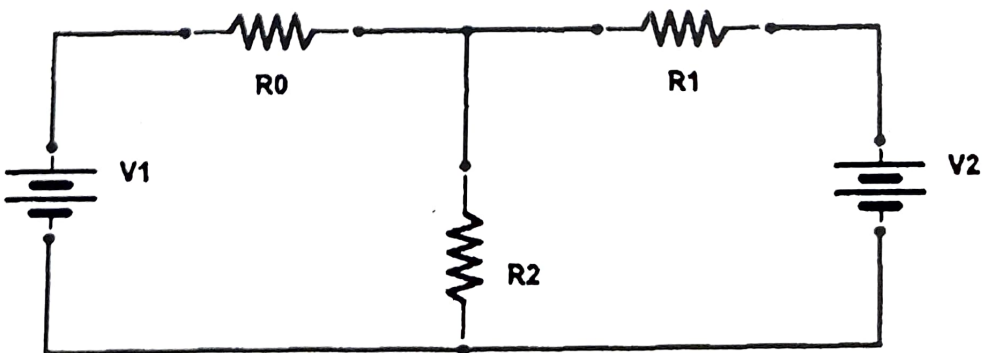
(vii) Draw a block diagram of a dc power supply and waveforms at the output of each block.

2. (a) Find the Thevenin's equivalent resistance of the following circuit : (2)

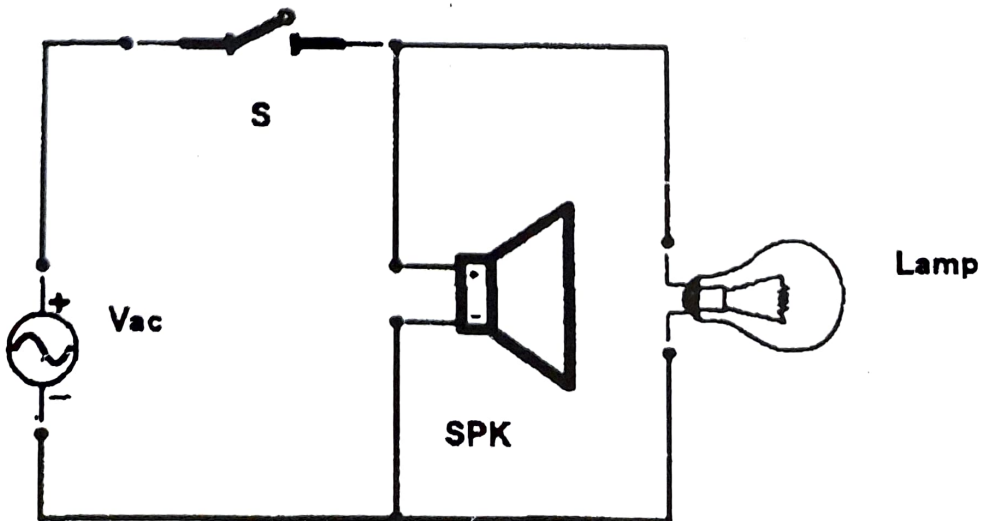


- (b) Determine the value of current in each resistor for the network shown in the figure using Kirchoff's Laws. (5)

$$R_0 = 3\Omega, R_1 = 2\Omega, R_2 = 6\Omega, V_1 = 2V \text{ and } V_2 = 4V$$



- (c) List three differences between a voltmeter and an ammeter. (3)
3. (a) Explain the principle of a transformer. List the various parts of transformer and write the emf equation involved. (5)
- (b) Define Turn Ratio in transformers. Explain step up and step down transformers on the basis of turns ratio. (3)
- (c) A voltage transformer has 1500 turns of wire on its primary coil and its secondary coil has 500 turns. If 240 volts rms is applied on the primary windings, calculate the resulting secondary voltage when no load is connected. (2)
4. (a) List major conventions involved in making a ladder diagram. Draw the ladder diagram of the following circuit : (5)



(b) A series R-L-C circuit has the following data :

$$R = 25\Omega, C = 20 \mu\text{F}, L = 150 \text{ mH}, V = 250 \text{ V}, f = 50 \text{ Hz}$$

Determine the following :

(a) Impedance (b) Phase angle (c) Current (d) Voltage across R, L and C. (5)

5. (a) What are Single-phase and three-phase systems ? Bring out the comparison between Star and Delta Connections. What is Phase reversal ? (7)

(b) Three pure resistances of value  $200 \Omega$  each are connected to 3 phase 440V, 50Hz supply. Calculate the line and phase values of current and voltage in both star and delta connections. (3)

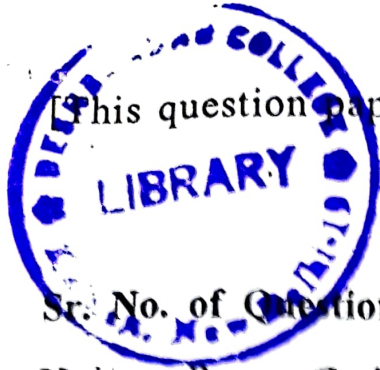
6. (a) Discuss the construction and principle of operation of Three Phase DC Motor. (7)

(b) A three phase 50Hz 4 poles induction motor runs at 1460 RPM. Calculate the synchronous speed, slip and frequency of rotor induced emf. (3)

7. Explain the working of any **two** of the following with suitable diagram : (5,5)



- (a) Single and stranded cables
- (b) Principle of dc generator
- (c) Fuses and circuit breakers



5

[This question paper contains 2 printed pages.]

Your Roll No.....  
17/5117

Sr. No. of Question Paper : 2974 GC-4  
Unique Paper Code : 42173923  
Name of the Paper : Basic Analytical Chemistry  
Name of the Course : Chemistry : SEC for B.Sc. (Prog.)  
Semester : IV  
Duration : 2 Hours Maximum Marks : 37

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Four** questions in all.
3. Question No. 1 is compulsory.
  
1. (a) What is a blank ? (1×7)  
(b) Distinguish between a complexing and a chelating agent.  
(c) Give a suitable example of Anion exchange resin.  
(d) Define  $R_f$  value.  
(e) State Lambert-Beer's Law.  
(f) Give the structure of Ni-(DMG)<sub>2</sub> complex.  
(g) Name one indicator used in complex-metric titrations.
  
2. (a) How can iron be determined Spectrophotometrically in Vitamin/Dietary tablets ?

P.T.O.

- (b) What is determinate error and indeterminate error ?
- (c) Outline the steps commonly employed in an analytical procedure ? (4,3,3)
3. (a) What is sampling ? What is its importance in chemical analysis ?
- (b) Discuss the principles involved in the determination of dissolved oxygen content of water.
- (c) Discuss the Procedure to carry out the analysis of Gasoline. (4,3,3)
4. (a) Distinguish between Accuracy and Precision.
- (b) Describe the principles underlying all Chromatographic processes.
- (c) Calculate the Absorptivity of a Compound with the molecular weight =  $144 \text{ g mol}^{-1}$ , if concentration is  $1 \times 10^{-5} \text{ g/mL}$ . The solution exhibits an Absorbance of 0.400 when optical path is unity. (4,3,3)
5. (a) What do you understand by the total acidity of water sample ? (4,3,3)
- (b) What is hard water and soft water ?
- (c) How many significant figures does each of the following numbers have ?
- (i) 200.06      (ii)  $6.030 \times 10^{-4}$       (iii)  $7.80 \times 10^{10}$

Your Roll No.: .....  
Sl. No. 67 Q. No. 6807A  
Unique Paper Code : 42353404

08/5/18

Name of the Paper : Computer Algebra Systems

Name of the Course : B.Sc (Prog.) / B.Sc. Mathematical Science: SEC

Semester : IV

Duration : 2 Hours

Maximum Marks : 38



HC

Instructions for Candidates :

- a. Using any one of the CAS := **Mathematica/Maple/Maxima/any other** to answer the questions.
- b. Write your Roll No. on the top immediately on receipt of this question paper.
- c. This question paper has **four** questions in all.
- d. **All** questions are compulsory.

Q1. True/False ( Give satisfactory Explanation/Example ) : (8×1=8)

- i. Is this syntax `Table[ f[x], {x, 1, 2, 7, 12, 15} ]` correct?
- ii. Factor command in Mathematica extract irrational roots.
- iii. CAS software gives an additive constant for indefinite integrals.
- iv. With the % command, we can call any output.
- v. The effect of the 'NSolve' command in Mathematica/Maxima is same as the 'Solve' command followed by the 'N' command.
- vi. The block() function is used in software Maxima to provide a new variable name space.
- vii. Maple is created under the trade name Maplesoft.
- viii. The in-built function `N[exper]` in Mathematica/Maxima stands for numerical integration.

Q2. Write a short note on any **four** from the following: (4×2.5=10)

- i. What are the rules for defining a function in any CAS?
- ii. Differentiate between "\*" and "•" in respect of matrices in Maxima/Mathematica.
- iii. What is the difference between the commands Factor and FactorInteger.
- iv. Explain the commands Minors and LinearSolve.
- v. Explain the FindRoot command.
- vi. Describe "Computer Algebra Systems".

Q3. Write the Output of any five from the following: ( $5 \times 2 = 10$ )

- i. `Sum[i^2, {i, 1, 10}]`  
`Product[a[i], {i, 1, n}]`
- ii. `Plot[2-x^2, {x, -2, 2}, Filling -> Axis]`
- iii. `Table[If[i <= j, j-3i, E], {i, -2, 3}, {j, 0, 3}]//Grid`
- iv. `makelist(makelist(i+j, i, 1, 5), j, 1, 5);`  
`makelist (n^2, n, 1, 10, 2);`
- v. `Piecewise[{{x, 0 <= x <= 1}, {-x, -1 < x < 0}}, 1]`
- vi. `Array[Max, {3, 3}]//MatrixForm`  
`Array[Min, {3, 3}]`
- vii. `f(x):=4*x+1; g(x):=-x+4; h(x):=9*x-8;`  
`wxplot2d([f(x), g(x), h(x)], [x, 0, 2]);`
- viii. `solve (x+y=3, [x, y]); solve (x+4, x); solve (x);`

Q4. Attempt any four parts from the following: ( $4 \times 2.5 = 10$ )

- (i) Write commands to define the function  $f(x) = \begin{cases} -1, & x < 0 \\ 1, & x \geq 0 \end{cases}$  and plot it over the interval  $[-3, 3]$ .
- (ii) Write a command to generate a table of first 20 terms of the Fibonacci sequence.
- (iii) Write commands to solve the system of equations  $Ax=b$  where
$$A = \begin{bmatrix} 2 & 3 & -4 \\ 1 & 2 & 3 \\ 1 & -1 & 1 \end{bmatrix} \quad \text{and} \quad b = \begin{bmatrix} 8 \\ 16 \\ 2 \end{bmatrix}.$$
- (iv) Write commands to find the quotient and remainder when the polynomial  $x^4 + 3x^2 - 4$  is divided by  $x^2 - 9$ .
- (v) Write a command to plot the function  $x^3 - 9x + 5$  in the domain  $[-3, 3]$  and superimpose the critical points as large dots.
- (vi) Write a command to find all the zeroes of the function  $\text{Sin}(x)$ .





- (v) The built-in constant  $e$  is represented by.....in Maple.

2. Write the output for the following :

5×1=5

(i)  $i = 1;$

While [ $i \leq 10, i = i + 1; \text{Print}[i]; i++$ ]

(ii)  $A = \{\{1, 0, 2\}, \{2, 3, 0\}, \{1, 2, 1\}\};$

$A^2$

(iii)  $\text{prod}(\text{sqrt}(i), i, 1, 4);$

(iv)  $f(x) := x^3 + \sin(x);$

$\text{diff}(f(x), x);$

(v)  $A = [1, 2, 3; 4, 5, 6; 7, 8, 9];$

$A(2, :) + A(3, :)$

3. Attempt any EIGHT parts from the following :

8×2=16

- (i) Define *mesh()* function in MATLAB/Octave with an example.

- (ii) Write the commands for the following in Maple :

(a) Binomial coefficient  $\binom{7}{2}$

(b) Prime factorization of 654382

- (iii) Define and differentiate a function  $f(x) = x^4 + 3 \sin x - 2$  in Maple.

- (iv) Write a command in Maxima to plot the graph of the function  $h(x, y) = x^4y + \cos(x, y)$ , for  $1 \leq x, y \leq 2$ .

- (v) Write any *two* differences between Mathematica and Maxima.

(vi) Write the commands for the following in Maxima :

(a)  $\sin\left(\frac{\pi}{2}\right) + \cos\left(\frac{3\pi}{2}\right)$

(b) Previous prime number of 2008

(vii) Define  $pnorm()$  and  $qnorm()$  functions in R. If  $pnorm(-1.645) = 0.04998491$  then what is the value of  $qnorm(0.04998491)$  ?

(viii) Write a command in MATLAB/Octave to find :

(a) Eigenvalues and eigenvectors of a matrix A.

(b) Lower and upper triangular parts of matrix A with a permutation matrix P.

(ix) For  $A = [2, 0, 3; 5, 8, -1; 6, 7, 1]$ ; write the output for the following :

(a)  $A([1, 3], [2, 1])$

(b)  $A([1, 2], :) = A([2, 1], :)$

(x) Write commands in R to simulate a random sample of 15 items from a normally distributed data that has mean 30 and standard deviation 9.

4. Attempt any *four* parts from the following : 4×6=24

(i) Write the commands in Maxima for the following :

(a) Find  $M^2$  for  $M = \begin{bmatrix} 1 & 3 \\ 4 & 0 \end{bmatrix}$ .

(b) Find  $x$  if  $x^2 + x = 1$ .

(c) Compute  $7^{20} \bmod 21$ .

(d) Find prime factorization of 281.

- (ii) Let  $f(x) = \frac{x^3 \cos(x)}{x^2 + 1}$ . Write the commands in Maple to find  $f'(x)$ ,  $f''(x)$ ,  $f'(-1)$  and  $f''(0)$ .
- (iii) Explain the following commands in Mathematica with example :
- For loop
  - Do loop
  - Print
  - Module
- (iv) Write a program to solve the following system of equations in MATLAB/Octave :

$$3u + v - t = 10$$

$$u + 4v - 7w + 2t = 15$$

$$-v + w - 6t = -4$$

$$7u - 2v + w + t = 8$$

- (v) Write the commands in R for the following :
- Put the following values into a variable 'score'
- |    |    |    |    |    |
|----|----|----|----|----|
| 30 | 45 | 63 | 72 | 21 |
| 21 | 45 | 22 | 88 | 61 |
| 10 | 36 | 20 | 46 | 55 |
| 21 | 11 | 07 | 54 | 19 |
- Create a box plot of score.
  - Create a stem and leaf plot of score.
  - Create a normal probability plot of score.

9

This question paper contains 3 printed pages]



Roll No. [ ]

S. No. of Question Paper : 6843

Unique Paper Code : 42343408

Name of the Paper : PHP Programming

Name of the Course : B.Sc. Mathematical Sciences/

B.Sc. (Prog.) : SEC

Semester : IV

Duration : 2 Hours

Maximum Marks : 25

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

Attempt any three questions from Questions 2-5.

- 1. (a) Write a function to add two numbers passed as arguments to it. 2
- (b) What is the difference between the following : 2
  - (i) "==" and "==="
  - (ii) "&&" and "and" operators
- (c) What is the output of the following code : 2

```
<?php
    $str = "Hello! My name is Cameron Fox. Coffee?"
    $find = array('/is/', '/coffee/');
    $replace = array('/was/', '/tea/');
    echopreg_replace ($find, $replace, $str);
?>
```

(d) Explain POST method and list *two* advantages. 2

(e) Write PHP statements for the following : 2

(i) to send a query to the database.

(ii) to retrieve the number of rows affected by an

INSERT, DELETE or UPDATE query.

2. (a) Write a PHP program to read an array and sort it using

built in functions. 3

(b) What is the difference between "call by value" and "call

by reference"? 2

3. (a) How are the variables and constants defined in a PHP

program ? Give *one* example for each. 3

(b) Explain the use of **foreach** with example. 2

4. Write PHP code for reading two values from an HTML form

and display it.



5. Explain the following functions with a suitable example for each :

5

- (a) trim()
- (b) ucfirst()
- (c) printf()
- (d) strnatcmp()
- (e) explode()

6. (a) Create a table Student with the following attributes : 3

- (i) Name
- (ii) Roll No.
- (iii) Marks
- (iv) Address

Assume suitable datatypes for the attributes.

- (b) Insert two rows in the Student table using a single insert command with appropriate values. 2

This question paper contains 4 printed pages]



Roll No. 

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S. No. of Question Paper : 7021

Unique Paper Code : 32163404 HC

Name of the Paper : Medicinal Botany

Name of the Course : B.Sc.(Hons.) Botany/B.Sc.(Prog.) : SEC

Semester : IV

Duration : 3 Hours Maximum Marks : 75

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Attempt five questions in all

including Question No. 1, which is compulsory.

Write botanical names wherever applicable.

1. (a) Write suitable answers for the following : 5×1=5

(i) A plant source of Reserpine.

(ii) An Indian System of medicine which has its origin in Greece.

(iii) A plant known in Ayurveda as the Queen of herbs.

(iv) A plant used as a spice in India with multifunctional medicinal properties.

(v) The scientist who first coined the term Ethnobotany.

(b) Match the following : 5×1=5

(i) *Withania somnifera* (a) Memory enhancement

(ii) *Aloe vera* (b) Biopesticide

(iii) *Bacopa monnieri* (c) Skin burns

(iv) *Azadirachta indica* (d) Cardiac ailments

(v) *Digitalis purpurea* (e) Strength and vitality

(c) Define the following (any five) : 5×1=5

(i) Cryopreservation

(ii) Ethnoecology

(iii) Greenhouse

(iv) Herbarium

(v) Traditional medicine

(vi) Anthelmintic Drug.

2. Write short notes on the following (any *five*) :  $5 \times 3 = 15$
- (i) Biosphere Reserves
  - (ii) IUCN Red List Criteria
  - (iii) Plants used for skin diseases
  - (iv) *Asparagus racemosus*
  - (v) Jeevani Drug
  - (vi) Medicinal uses of Turmeric.
3. (a) Discuss the historical aspects, concepts and principles of the Unani system of medicine. Write the ingredients and uses of any polyherbal formulation used in the Unani system of medicine. 7
- (b) What are the threats to biodiversity ? Discuss the various strategies used for conservation of endangered and endemic medicinal plants of India. 8
4. (a) Differentiate between the following (any *two*) :  $2 \times 5 = 10$
- (i) Ayurveda and Siddha system of medicine
  - (ii) Bioprospecting and biopiracy
  - (iii) National Parks and Botanical Gardens.

- (b) Write a short note on the methods used to study ethnobotany. 5
5. Write the botanical name, family, part used, major active constituents and uses for the following (any *three*) :  $3 \times 5 = 15$
- (a) Indian gooseberry
- (b) Periwinkle
- (c) Tulsi
- (d) Ashwagandha.
6. (a) What are the objectives of a nursery ? What is the difference between a temporary and a permanent nursery ? List the important components of a nursery. 5
- (b) What are the applications of ethnobotany in relation to medicinal plants in India ? 5
- (c) Discuss the various asexual methods of propagation of medicinal plants. 5

This question paper contains 3 printed pages]

Roll No.

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S. No. of Question Paper : 7039

Unique Paper Code : 42173923

HC

Name of the Paper : Basic Analytical Chemistry

Name of the Course : B.Sc. (Prog) : SEC

Semester : IV

Duration : 2 Hours

Maximum Marks : 37

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt four questions in all.

Q. No. 1 is compulsory.

1. (a) How will you differentiate between Accuracy and Precision ? Illustrate with a suitable example. 1×7
- (b) How will you determine the pH of soil sample ?
- (c) Write the name and structure of indicator used in complexometric titrations.
- (d) Define stationary and mobile phases in chromatography.
- (e) Why is the  $R_f$  value of  $\text{Co}^{2+}$  ions larger as compared to  $\text{Ni}^{2+}$  ions in Paper chromatography ?

P.T.O.



(f) Give a suitable example of a Cation exchange resin.

(g) What causes hardness of water ?

2. (a) Give the answer of the following operation to the maximum number of significant figures and indicate the key number.

4,3,3

$$(i) \frac{\left(\frac{97.7}{32.42} \times 100.0\right) + 36.04}{687} = 0.491116720$$

$$(ii) \frac{36.63 \times 0.5481 \times 0.05300}{1.1689} \times 100\% = 88.5470578\%$$

(b) Define determinate and indeterminate error and explain it by using *two* suitable examples.

(c) How will you control the pH of acidic or basic soil ?

3. (a) Discuss the various compositions of soil in detail. 4,3,3

(b) Discuss the various sources responsible for water contamination.

(c) Discuss the chemistry involved in determination of dissolved oxygen present in a water sample using Winkler's method.

4. (a) Discuss some applications of Thin Layer Chromatography.

4,3,3

- (b) Discuss the various types of paper chromatography.
- (c) Classify the various types of chromatography based on the mode of their operation.

5. Write short notes on : 4,3,3

- (a) Ion Exchange Chromatography
- (b) Estimation of macro nutrients using Flame Photometry
- (c) Spectrophotometric determination of caffeine and benzoic acid in soft drinks.

This question paper contains 4+1 printed pages]

Roll No.

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S. No. of Question Paper : 7045

Unique Paper Code : 32173908

Name of the Paper : Green Methods in Chemistry

Name of the Course : B.Sc. (H) Chemistry, B.Sc. (P) : SEC

Semester : IV

Duration : 2 Hours

Maximum Marks : 37

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt four questions in all including

Question No. 1, which is compulsory.

1. (a) Fill in the blanks :

(i) The use of solar power is covered with in Green Chemistry principle 6 which is \_\_\_\_\_.

(ii) \_\_\_\_\_ is an excellent green solvent which is also referred as universal solvent.

(iii) \_\_\_\_\_ is an important industrial solvent which is carcinogenic.

(iv) A chemical process with an E factor of 20 creates \_\_\_\_\_ waste than an E factor of 2.

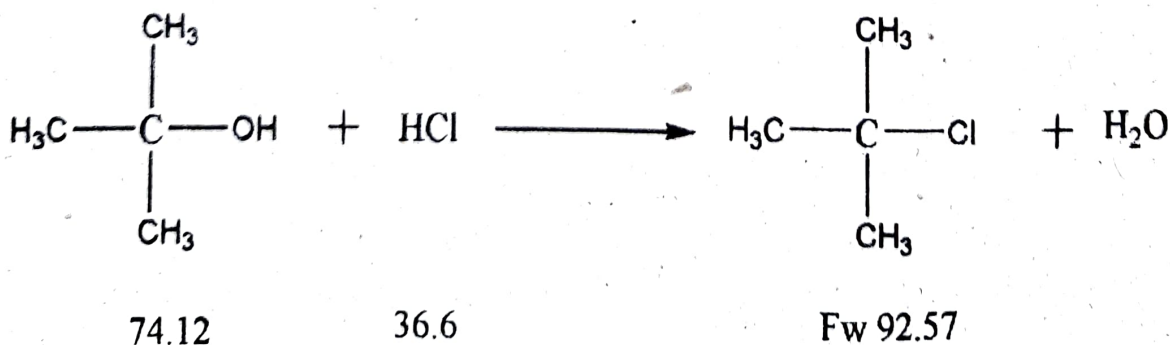
(v) Biocatalyst is very useful in \_\_\_\_\_.

- (b) Define Green Chemistry. How is it related to sustainable chemistry ?
- (c) Explain different terms used in EPA Act (USA) of 1990 of pollution prevention

$$\text{Risk} = (\text{function}) \text{ Hazard} \times \text{Exposure}$$

- (d) How do you explain the terms "cradle to cradle" and "cradle to grave" 4,3,3,3

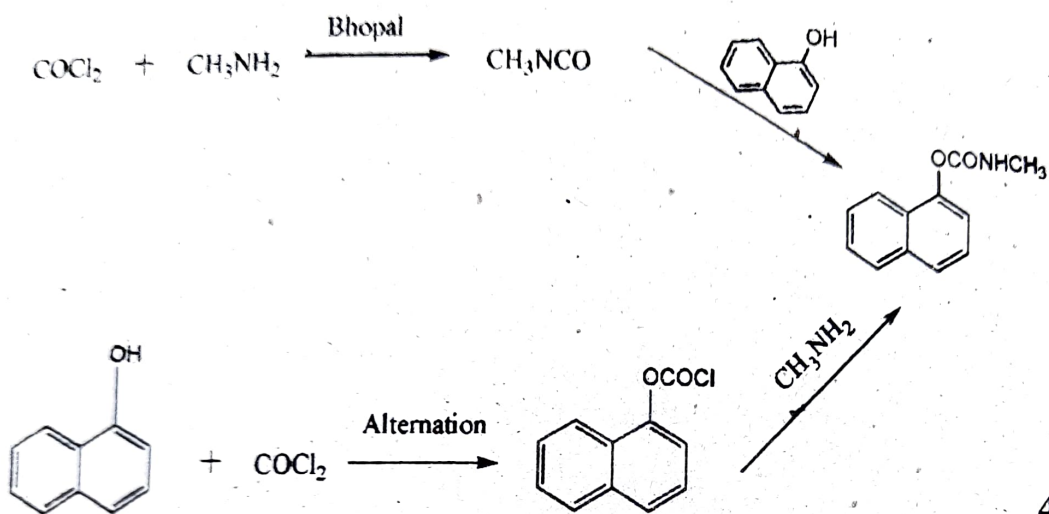
2. (a) What are the *four* aspects of a chemical process that should be a part of Green Chemistry evaluation ?
- (b) Calculate atom economy of a given nucleophilic substitution reaction. Is it an atom economical process ?



- (c) Explain the first *two* words "wherever practicable" in principle 3 of Green Chemistry. 4,3,1
3. (a) What do you understand by the Principle 8 of Green Chemistry that unnecessary derivatizing should be avoided whenever possible ? Also comment "one can avoid protecting groups by using enzymes."
- (b) What is an auxiliary substance (Principle 5) ? Name *two* auxiliary substances used in a reaction.
- (c) How is methyl tetrahydrofuran a green alternative to THF and  $\text{CH}_2\text{Cl}_2$ . 4,3,1
4. (a)  $(\text{CH}_3\text{O})_2\text{CO}$  prepared in first process is classified as toxic but not in the second process although CO is also toxic. Explain :



- (b) Which route to carbaryl is a better route ? Which principle of Green Chemistry is involved in the route ?



4,4

5. Do any two :

- (a) What is the advantage of nature works polylactic acid synthesis ? List at least two of the twelve principles of Green Chemistry that are used for the development. What compound would you expect PLA to degrade to the environment ?
- (b) What are the advantages of using  $\text{CO}_2$  as solvent over other solvents currently used in garment cleaning, precision cleaning and medical device fabrication ?



Which principle of Green Chemistry is used in the design ? What is the role of surfactant for use of  $\text{CO}_2$  ?

(c) What are antifouling agents ? What are the disadvantages of tributyltin compound ? Name the compound used as a new antifouling agent. 4,4

6. Do any two :

(a) What are super critical solvents ? Give the phase diagram of  $\text{CO}_2$ . Which experiments did you conduct for the extraction from liquid  $\text{CO}_2$  ?

(b) How would you synthesize azomethine of p-toluidine and p- or o- vanillin ? Give the advantage of solvent free synthesis over conventional method.

(c) How did you synthesize biodiesel from waste cooking oil in the laboratory ? Name the catalyst and one method of characterization. Which principles of Green Chemistry are used for the synthesis ? 4,4

This question paper contains 2 printed pages.

Roll No. 

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S. No. of Question Paper : 7047

Unique Paper Code : 32173910

HC

Name of the Paper : **Chemistry of cosmetics and perfumes**

Name of the Course : **B.Sc. (H) Chemistry/B.Sc. (Prog.) : SEC**

Semester : **IV**

Duration : **2 Hours**

Maximum Marks : **37**

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Attempt *Three* questions in all.

Question No. **1** is compulsory. Attempt any *two* other questions.

1. (a) Discuss the classification of hair dyes. What is the role of hydrogen peroxide in the process of hair dyeing ?
- (b) (i) Define SPF. What does SPF 50 signify ?
- (ii) Name any *four* essential oils used in cosmetics.
- (iii) What is the role of starch in talcum powder ?
- (iv) Why are hair sprays used ? Name the common fixating agent used in hair sprays.
- (v) Describe the function of borax in preparation of cold cream.

(3, 10)

P.T.O.

2. (a) Write the essential characteristics of a good nail enamel.
- (b) Describe the method for preparation of vanishing cream and mention its important uses.
- (c) List the main ingredients of shampoo and specify the role of Cocamidopropyl betaine (CAPB). (4,4,4)
3. (a) What are the functions of antiperspirants ? Mention the important ingredients present in them.
- (b) Discuss the merits and demerits of a permanent hair dye.
- (c) Name the various methods used in the extraction of essential oils from plant sources. Describe any *one* of them in detail. (4, 4, 4)
4. Write short notes on any THREE of the following :
- (i) Shaving preparations
- (ii) Preparation of lipstick
- (iii) Sunscreen creams (or lotions) and their classification
- (iv) Face powder (4,4,4)

This question paper contains 4 printed pages]

Roll No. 

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S. No. of Question Paper : 7055

Unique Paper Code : 32223903

Name of the Paper : Electrical Circuits and Network Skills

Name of the Course : B.Sc. (Hons.) Physics/B.Sc. (Prog.) : SEC

Semester : IV

Duration : 3 Hours

Maximum Marks : 50

(Write your Roll No. on the top immediately on receipt of this question paper.)

All questions carry equal marks.

Attempt five questions in all.

Question No. 1 is compulsory.

You may answer any four questions from Question

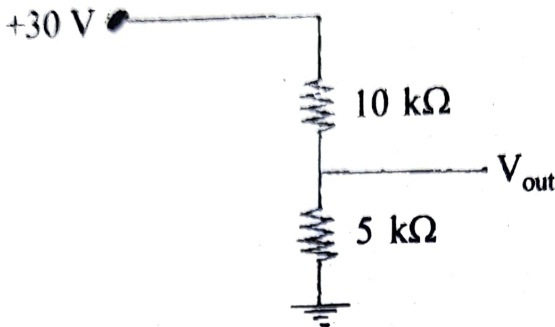
No. 2 to Question No. 7.

Use of scientific calculator is allowed.

1. Attempt any five : 5×2=10

(i) Explain 'Relays and Fuses'.

- (ii) What is an "ideal voltage" source and an "ideal current" source ? How are they different from each other ?
- (iii) Find  $V_{out}$  in the following voltage divider circuit.



- (iv) What is Ohm's Law ? Name some devices that do not obey Ohm's Law.
- (v) What is a low-pass filter ? Draw its circuit diagram and describe the role of each of the components involved.
- (vi) What is the meaning of tolerance in resistors ? Write *two* colors that are often used in color coded resistors to represent tolerance, and what values do they represent ?
- (vii) Draw the symbols of (i) a step down transformer with iron core and (ii) a  $p-n$  junction diode.

2. Write short notes on all of the following :

$5 \times 2 = 10$

- (i) Electric Potential Difference
- (ii) Electromagnetic Induction



(iii) Solar Cells

(iv) Ohmic and Non-Ohmic devices

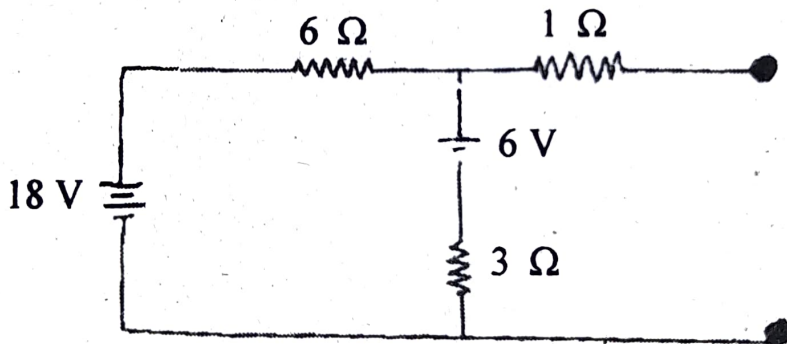
(v) Zener Diode

3. (a) Describe the construction and working of a centre-tapped full wave rectifier. How is it different from a Bridge-rectifier ?

(b) What is ripple factor ? What is the effect of L and  $\pi$  - filters ? 7+3=10

4. (a) State Thevenin's Theorem.

(b) Find out the Thevenin Equivalent of the following circuit : 10



5. (a) Explain the role of an ammeter, a voltmeter, and a galvanometer.

(b) Explain the advantages and disadvantages of a multimeter.

(c) List *two* differences between AC and DC electric circuits.

6+2+2=10

P.T.O.

6. (a) Explain Faraday's Laws of Electromagnetic Induction.
- (b) With proper schematic diagram, explain the construction, principle and working of an ac-motor. 4+6=10
7. (a) Explain with appropriate diagrams, how star and delta connections are made ? When would you prefer which one ? 5
- (b) What is a regulated power supply ? Give a diagram and explain the function of the various components in this diagram. 5

This question paper contains 4+2 printed pages]

Roll No. 

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S. No. of Question Paper : 7056

Unique Paper Code : 32223904

Name of the Paper : Basic Instrumentation Skills

Name of the Course : B.Sc. (Hons.) Physics/B.Sc. (Prog.) :  
SEC

Semester : IV

Duration : 3 Hours

Maximum Marks : 50

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all.

Question No. 1 is compulsory.

1. Attempt any five of the following : 2x5

(a) List any four static characteristics of a measuring system.

(b) Define terms accuracy and precision.

(c) What are the main parts of CRT ?

(d) Briefly explain the importance of sweep generator in CRO.

(e) Define rise time and fall time of a pulse.

(f) On what principle does a Q-meter operate ?

(g) Define clearly what do you mean by current sensitivity and voltage sensitivity of a galvanometer ?

2. (a) Determine the expression for the log error in the calculation of "n" using the formula :

$$n = \frac{2\pi l(m_2 - m_1) L^2}{r^4 (T_1^2 - T_2^2)}$$

Where L, l are lengths,  $m_1$  and  $m_2$  are masses with  $T_1$  and  $T_2$  as time periods. The diameter  $d = 2r$  is also measured.  $T_1$  and  $T_2$  are obtained by timing N oscillations each, giving total times  $t_1$  and  $t_2$  respectively.

Explain the terms in the expression clearly and how they are determined ?

4

(b) What is a backlash error in a measuring instrument ?

What is the fundamental reason for the occurrence of backlash error ? How do you avoid them while performing the experiment ?

3

(c) How many significant figures are there in the following numbers ? What is the most significant digit and the least significant digit in each number.

(i) 975.48

(ii) 84000

(iii) 0.0098

3

3. (a) Explain the working of a digital multimeter with the help of a block diagram. 5

(b) Explain autoranging function in DMM. 2

(c) Compare a DMM with an analog multimeter. 3

4. (a) Explain synchronization and triggering in a CRO. 4

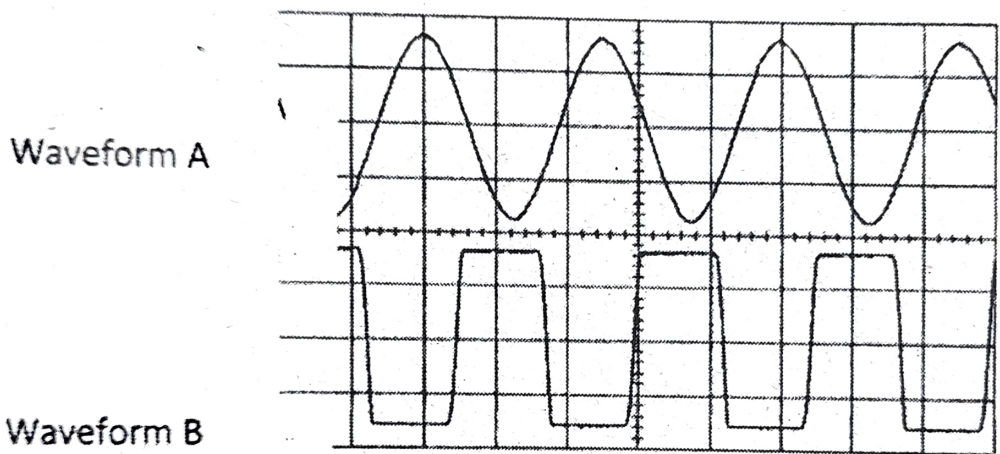
(b) Explain the working of a sawtooth sweep signal as horizontal time base. 3

(c) The graph shown in the waveform on the screen of a CRO with the time base set to 10 ms/cm and the Y attenuated to 5 V/cm in channel 1 and 1 V/cm in channel 2.



- (i) What are the frequencies of waveform A and B connected to channel 1 and 2 respectively ?
- (ii) What are the peak to peak amplitudes of waveforms A and B ?

3

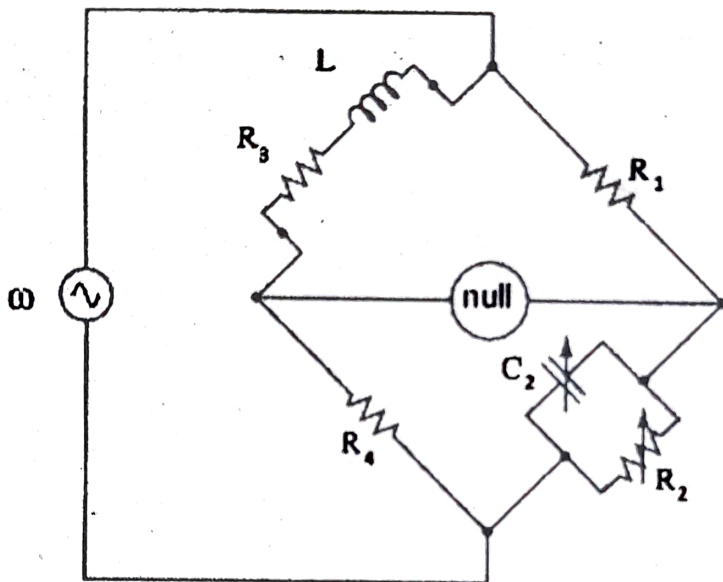


5. (a) What is harmonic distortion ? 2
- (b) Name an instrument to measure distortion factor and its underlying principal of measurement. 4
- (c) Explain the functioning of a pulse generator and mention its applications. 4
6. (a) The following is an arrangement of an AC bridge where an inductance  $L$  can be measured in terms of a standard capacitance  $C$  and resistances.



Write down the condition for the balance of the bridge and find its expression. Is the balance dependant on the frequency of the oscillator ?

5

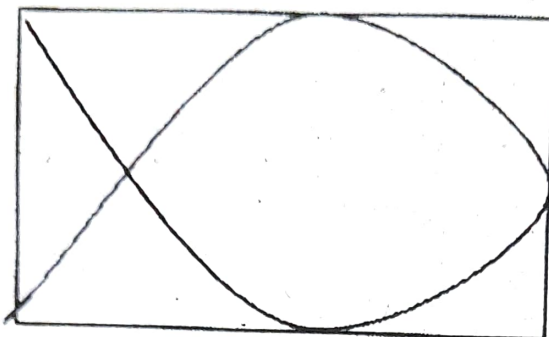


(b) A milliammeter with full scale deflection of 50 mA has a resistance of 15  $\Omega$ . Find the shunt necessary to convert it into a milliammeter having full scale deflection of 1 amp.

5

7. (a) What are the Lissajous figures and how they are displayed on CRO screen ? What is the frequency

ratio between the vertical signal vs the horizontal signal in the following Lissajous figure. 4



- (b) The output of a function generator capable of producing sinusoidal signals from 100 Hz to 100 MHz, is connected to the input of a CRO. The input impedance of the CRO comprises of a  $1\text{M } \Omega$  resistance in parallel with 15 pF capacitance. Tabulate the input impedance of the CRO as the frequency is swept from 100 Hz to 100 MHz in multiples of 10 (100 Hz, 1000 Hz.....). 4
- (c) Draw the block diagram of an AC millivoltmeter. 2

[This question paper contains 4 printed pages.]



Your Roll No. ....

Sr. No. of Question Paper : 7155

Unique Paper Code : 32493901

Name of the Paper : Tools and Techniques in Biochemistry

Name of the Course : B.Sc. (Hons) Biochemistry : SEC

Semester : IV

Duration : 2 Hours

Maximum Marks : 50

Instructions for Candidates

- 1. Write your Roll No. on the top immediately on receipt of this question paper.
- 2. This paper contains **three** questions.
- 3. **All** questions are compulsory.
- 4. All parts of a question should be answered together.
- 5. Use of scientific calculator/log tables may be allowed.

1. (a) State True or False. Justify the answer in both the cases.

(i) Cuvette made of glass is used for UV spectroscopy

(ii) Proteins absorb maximally at 280 nm wavelength of light.

- (iii) Acridine orange is used as an extrinsic fluor for protein.
- (iv) NaOH is generally stored in plastic bottles.
- (v) DNA exhibit hypochromicity upon heating.
- (vi) Beer's law does not hold good if light is polychromatic.
- (vii) Formic acid would be the best buffer at pH 5.0

(b) Define the following (Any 6) :

- (i) Chromophore
- (ii) Fluorescence
- (iii) Absorption maxima
- (iv) Molar extinction coefficient
- (v) Monochromator
- (vi) pK
- (vii) Normality
- (viii) Parts per million

2. (a) Explain the instrumentation of fluorescence spectrophotometer?
- (b) Calculate the specific extinction coefficient of sample whose absorbance is 0.01 for a concentration of  $6 \text{ g dm}^{-3}$ . The path length of the cuvette is 1 cm. Also calculate the molecular mass of the sample if the molar extinction coefficient is 0.2.
- (c) Differentiate between (Any 3) :
- (i) Absorption and fluorescence.
  - (ii) Anionic buffer and cationic buffer.
  - (iii) Virtual labs and wet labs
  - (iv) Stock solution and working solution (4,2,9)
3. (a) Explain the working of pH meter.
- (b) Distinguish between intrinsic and extrinsic fluorescence? Give one example of each and their application in research.
- (c) What is Lambert-Beer's law? Mention its limitations.

7155

4

(d) Write any three safety measurements to be taken while handling strong acids or bases in lab? (5,4,3,3)





[This question paper contains 4 printed pages]

Your Roll No.....

Sr. No. of Question Paper : 7156

Unique Paper Code : 32493902

Name of the Paper : Protein Purification Techniques

Name of the Course : B.Sc. (Hons.) / Bio-Chemistry : SEC

Semester : IV

Duration : 2 Hours

Maximum Marks : 50

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
  2. Attempt all questions.
- 
1. (a) Comment on the following :
    - (i) Cation exchangers are also called acidic exchanger.
    - (ii) During separation of proteins by gel permeation chromatography, higher molecular weight proteins run faster than lower molecular weight proteins.
    - (iii) A spacer arm is interposed between the ligand and the matrix in affinity chromatography.

- (iv) Agarose is preferred over polyacrylamide for DNA electrophoresis.
- (v) Protein and counter ions bind to ion exchanger in reversible manner.
- (vi) If a macromolecule has a strong charge, weak exchanger is preferred for its separation.
- (vii) Ammonium sulphate is commonly used for salting out. (2×7=14)

(b) What will happen if :

- (i) Paper electrophoresis is done at a lower voltage.
- (ii) No guard column is attached in HPLC.
- (iii) Cation exchanger is used for separation of negatively charged groups. (2×3=6)

2. (a) Write the role of the following in electrophoresis :

- (i) SDS
- (ii) TEMED
- (iii) Bis acrylamide
- (iv) Bromo phenol blue
- (v) Glycerol (1×5)

(b) Write the principle and two applications of each of the following techniques (**Any two**)

(i) Gel exclusion chromatography

(ii) Affinity chromatography

(iii) SDS-PAGE electrophoresis (2×5=10)

3. (a) Answer briefly :

(i) How is void volume determined in gel filtration chromatography?

(ii) What is resolving gel? How is the stacking gel different from resolving gel in terms of composition and function?

(iii) Why is a buffer solution used in gel electrophoresis? (3×3=9)

(b) Define the following terms :

(i) Exclusion limit of a gel

(ii) Exchange capacity of an ion-exchanger

(iii) Electrophoretic mobility (1×3=3)

(c) A cation exchanger chromatography was performed to separate a mixture of amino acids. Predict the order of elution (first to last) for each of the following sets of amino acids at pH 4.0 :

(i) Gly, Asp, His

(ii) Arg, Glu, Ala

(3)

(18)

This question paper contains 4 printed pages].

Roll No.

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S. No. of Question Paper : 7165

Unique Paper Code : 32173902 / 42173923 HC

Name of the Paper : Basic Analytical Chemistry

Name of the Course : B.Sc. (H) Chemistry : SEC

B.Sc. (Prog)

Semester : IV

Duration : 2 Hours

Maximum Marks : 37

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt four questions in all.

Question No. 1 is compulsory.

1. (a) Define analytical chemistry. Explain its interdisciplinary application with two suitable examples.

P.T.O.



(b) What is error ? Differentiate between determinate error and indeterminate error with suitable examples.

(c) Define significant figures. How many significant figures does each of the following numbers have ?

(i) 209

(ii) 300.0

(iii) 0.001

(iv) 0.0090.

4+4+2

2. (a) Define partition and adsorption chromatography with *two* examples of each.

(b) List out the different sources responsible for contaminating water.

(c) Define complexometric titration. Write names of *three* metal ion indicators used in complexometric titrations.

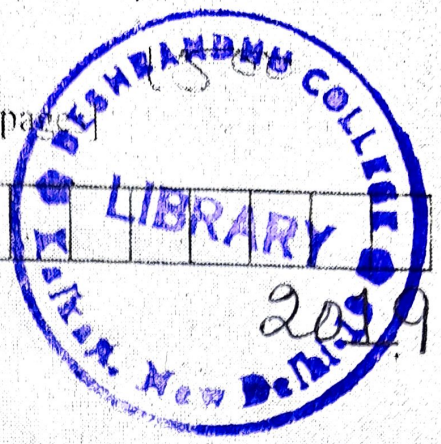


3. (a) Explain the experimental variables on the basis of stationary phase, mobile phase and sample application in thin layer chromatography.
- (b) Discuss the structural change in phenolphthalein and methyl orange in acid-base titrations.
- (c) Give *two* uses of acidic water and alkaline water in day to day life. 3×3
4. (a) The results of an analysis are 36.97 g, compared with the accepted value of 37.06 g. What is the relative error in parts per thousand ?
- (b) What is chelation ? Give *two* examples of chelating agents with their structure.
- (c) Discuss any analytical instrumental technique for any sample analysis. 3×3

5. (a) Discuss the pH of a soil sample and its utility.
- (b) How will you start sampling before analysis of a given soil ?
- (c) Define ion exchange chromatography and ion exchange capacity of an exchanger.

3×3

19



This question paper contains 4 printed pages

Roll No.

Roll No. grid containing the number 19 and the word LIBRARY.

S. No. of Question Paper : 2301

Unique Paper Code : 42353404

IC

Name of the Paper : Computer Algebra Systems

Name of the Course : B.Sc. (Prog.)/B.Sc. Math. Sciences : SEC

Semester : IV

Duration : 2 Hours

Maximum Marks : 38

(Write your Roll No. on the top immediately on receipt of this question paper.)

Using any one of the CAS := Mathematica/Maple/Maxima/Matlab to answer the questions.

This question paper has four questions in all.

All questions are compulsory.

1. True/False (Give satisfactory Explanation/Example) : 8×1=8
  - (i) Does the suffix ".nb" stand for "notebook" ?
  - (ii) In Mathematica, every built-in function name begins with a small letter.
  - (iii) Do the commands  $D[f[x]]$  and  $f'[x]$  provide the same output ?



- (iv) The syntax `NSolve[-1+3x+x^2=0,x,15]` is correct.
- (v) The syntax `MakeList[n^2,n,1,10,2];` is well defined.
- (vi) The output of `Factor[x^2-2]` is  $(x-\sqrt{2})(x+\sqrt{2})$ .
- (vii) `x := RandomInteger[10]; {x,x,x}` will give the same value of `x` in output.
- (viii) Can we plot  $y=4x+1$ ,  $y=-x+4$  and  $y=9x-8$ , for  $0 \leq x \leq 2$  in a single graph ?

2. Attempt any *four* parts from the following : 4×2½=10

- (i) What is the significance of `simpsum` command in the simplification to sums in maxima ?
- (ii) Explain `Reduce` and `Solve` command.
- (iii) Explain the use of 'Manipulate' command.
- (iv) What is the use of command `Direction → 1` in `Limit` command ? Can we change that value 1 with any other integer ?
- (v) Define `Matrix Form` and `Min` command with suitable example.
- (vi) Explain the role of `Aspect Ratio` and `Plot Style` or `Plot` options with syntax.



3. Write the Output of any *five* from the following :  $5 \times 2 = 10$

(i) Plot [Sin[x], {x, 0, 2Pi}, Ticks  $\rightarrow$  {{0, Pi, 2Pi}, {0, 0.5, 1}},  
AxisLabel  $\rightarrow$  {x, y}, PlotLabel  $\rightarrow$  Sin[x]].

(ii) Solve :

$$([2*x+y-3*z=10, x+4*y+2*z=12, -x+y+z=0], [x, y, z]):$$

$$(iii) \quad M = \begin{bmatrix} 2 & 1 & 0 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}, \quad N = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 4 & 1 & 6 \end{bmatrix}$$

M\*N

(iv) A=DiagonalMatrix[{a,b,c},1]// MatrixForm

B=Table[i+j, {i,4}, {j,4}] // MatrixForm

A+B

$$(v) \quad M = \begin{bmatrix} 1 & 3 & 4 \\ -1 & 2 & 3 \\ 0 & 1 & 2 \end{bmatrix}$$

$$M_{[[2]]} = M_{[[2]]} + M_{[[1]]}$$

M // MatrixForm

Transpose[M] // MatrixForm

(vi) Plot[{x, x<sup>2</sup>}, {x, 0, 4}, PlotRange  $\rightarrow$  {0, 5}, PlotStyle  $\rightarrow$   
{Black, Directive[Thick, Dotted, Black]}]



(vii)  $f(x) := x + \sin(x);$

$\text{diff}(f(x), x) = \text{diff}(f(x), x);$

$\text{at}(\text{diff}(f(x), x), x=0) = \text{at}(\text{diff}(f(x), x), x=0);$

(viii)  $\text{wxplot2d}(x^2, [x, 0, 4], [\text{box}, \text{false}]);$

$\text{wxplot3d}([\text{Cos}(t), \text{Sin}(t), a], [t, 0, 2 * \pi], [a, -1, 1]);$

4. Provide the Syntax of any *four* from the following :  $4 \times 2\frac{1}{2} = 10$

(i) Write the syntax for the plotting of unit sphere in any software.

(ii) Give the syntax for finding the 1st derivative and Indefinite integral of the function  $f(x) = x^2 + \cos x$  using any software.

(iii) Write the commands for the solution of the following equations without using solve command.

$$x - 2y = 5 \text{ and } 4x - 3y = 4.$$

(iv) Write the command for  $\lim_{x \rightarrow 0} \frac{\cos x}{x}$  and  $\lim_{x \rightarrow \infty} \frac{\sin x}{x}$ .

(v) Provide the syntax of piecewise command with the help of example.

(vi) Write the syntax for the addition operation for any two matrices of  $3 \times 3$  order in the form of matrices.



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This question paper contains 2 printed pages]

Roll No.

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S. No. of Question Paper : 2303

Unique Paper Code : 42343408

Name of the Paper : PHP Programming

Name of the Course : B.Sc. (P)/B.Sc. Math. Sciences : SEC

Semester : IV

Duration : 2 Hours

Maximum Marks : 25

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

Attempt any three questions from Q. Nos. 2 to 6.

1. (a) Consider the statement :

PHP is a programming language that generates dynamic result for web pages.

Justify.

2

(b) List the main difference between echo and print commands.

2

(c) What is explicit casting ? Explain with the help of a suitable example.

2

(d) Explain, for each...as loop with the help of suitable example.

2

P.T.O.

(e) Give the statements in PHP for the following : 2

(i) To connect to MYSQL from PHP.

(ii) To select the database to be used.

Make your own assumptions for database name, username and password.

2 Explain the following functions giving suitable example of each : 5

(a) Explode()

(b) Strtok()

3. What is a regular expression ? Explain preg\_match() and preg\_replace() functions giving suitable examples of each. 1+4=5

4 (a) Write a PHP script to display a "Hello" message in three different languages selected in drop down list, using switch case statement. 3

(b) What is the scope of local and global variables in a function ? 2

5. (a) Write a function to swap two numbers *a* and *b*. Pass data to function by reference. 3

(b) Explain the purpose of mysql\_fetch\_array() function. 2

6. (a) Differentiate between while and do-while loop, giving suitable example of each. 3

(b) List the main differences between GET and POST methods. 2

This question paper contains 3 printed pages]

Roll No.

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S. No. of Question Paper : 2362

(21)

2019

Unique Paper Code : 32163403

Name of the Paper : Biofertilizers

Name of the Course : B.Sc. (Hons.) Botany/B.Sc. Prog. : SEC

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all.

Question No. 1 is compulsory.

1. (a) Fill in the blanks : 5

(i) ..... is the medium used to grow *Rhizobium*.

(ii) Ericoid mycorrhiza is seen in family .....

(iii) ..... is a plant-based biopesticide.

(iv) Ectomycorrhizal fungi forms ..... sheath on roots of higher plants.

(v) Free living aerobic diazotroph is .....

P.T.O.

- (b) Define any *five* of the following with examples :  $5 \times 2 = 10$
- (i) Axenic culture
  - (ii) Symbiosome
  - (iii) Organic farming
  - (iv) Green manure
  - (v) Pheromone trap
  - (vi) Biofertilizer
  - (vii) Lectins.
2. (a) Write an explanatory note on *Rhizobium* isolation and culturing techniques. 10
- (b) Write a short note on Actinorrhizal symbiosis. 5
3. (a) Comment on the role of cyanobacteria as a biofertilizer. 5
- (b) Comment on benefits of *Azotobacter* as biofertilizer. 5
- (c) Describe biological control. 5
4. (a) Write a short note on nitrogen fixation. 10
- (b) Write characteristic features of *Azospirillum*. 5
5. Write short notes on any *three* of the following :  $5 \times 3 = 15$
- (a) Biocomposting techniques
  - (b) Recycling of biodegradable waste
  - (c) Organic fertilizers
  - (d) Green revolution.



6. Diagrammatically represent the following : 5×3=15
- (a) *Anabaena* filament
  - (b) Cross section of root nodule
  - (c) Graphical representation of composting process.
7. (a) Write a note on ecological benefits of mycorrhiza. 10
- (b) Differentiate between ectomycorrhiza and endomycorrhiza. 5



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[This question paper contains 4 printed pages]

Your Roll No.

: .....

2019

Sl. No. of Q. Paper

: 2380 IC

Unique Paper Code

: 32173902/ 42173923

Name of the Course

: B.Sc.(Hons.) Chemistry /  
B.Sc.(Programme) : SEC

Name of the Paper

: Basic Analytical  
Chemistry

Semester

: IV

**Time : 2 Hours**

**Maximum Marks : 38**

**Instructions for Candidates :**

- Write your Roll No. on the top immediately on receipt of this question paper.
- Attempt **four** questions in all.
- Question **NO.1** is compulsory.
- Use of simple calculator is allowed.

1. (a) Differentiate between :

4×2

- Stationary phase and mobile phase

P.T.O.



- (ii) De-ionized water and distilled water
- (iii) Elute and Eluent
- (iv) Determinate error and indeterminate error

(b) Give the answer of the following to the maximum number of significant figures : 3

$$(2.776 \times 0.0050) - (6.70 \times 10^{-3}) + (0.036 \times 0.0271)$$

2. (a) A sample of haematite was analyzed by eleven students. The values obtained for the percentage of iron were as follows : 22.92, 22.87, 22.75, 22.78, 22.62, 22.73, 22.94, 22.83, 22.79, 22.84, 22.87. Calculate Mean, Median and Standard Deviation for the above data. 3

(b) Distinguish between accuracy and precision using a suitable example. 3

- (c) What do you understand by the term sampling ? What is its importance in chemical analysis ? 3
3. (a) What is known as  $R_f$  values in Paper Chromatography ? Why the  $R_f$  value of  $\text{Co}^{2+}$  ions is larger as compared to  $\text{Ni}^{2+}$  ions in Paper Chromatography ? 3
- (b) Discuss three applications of the Thin Layer Chromatography. 3
- (c) What is a Cation Exchange Resin ? Give a suitable example. 3
4. (a) How the pH of the soil acidic and basic soil is balanced ? Illustrate using suitable examples. 3
- (b) Describe Chelon Effect using suitable example. 3
- (c) Why the combination of hydroxide and bicarbonate ions is not recorded in any alkaline water sample ? 3

2380

5. Write short note on (any **two**) :

4.5 x 2

- (a) Phenolphthalein use in trap cases
- (b) Spectrophotometric determination of caffeine and benzoic acid in soft drinks
- (c) Winkler's method



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This question paper contains 3 printed pages]

Your Roll No. : ..... 2019

Sl. No. of Q. Paper : 2388 IC

Unique Paper Code : 32173910

Name of the Course : **B.Sc.(Hons.) Chemistry /  
B.Sc. (Prog.) : SEC**

Name of the Paper : Chemistry of Cosmetics  
and Perfumes

Semester : IV

**Time : 2 Hours**

**Maximum Marks : 38**

**Instructions for Candidates :**

- Write your Roll No. on the top immediately on receipt of this question paper.
- Attempt **four** questions in all.
- Question **NO.1** is compulsory.
- Attempt any **three** other questions.

- "A product can be a cosmetic or drug or both."  
Explain with examples. 3
  - What is the role of sequestering agents in shampoo? Give an example. 3

P.T.O.



- (c) List the ingredients in the preparation of talcum powder. 2
- (d) What are essential oils ? Give **two** examples. 2
- (e) List the ideal characteristics of a good lipstick. 2
- (f) Mention the role of plasticizer in preparation of hair spray. Give an example of a plasticizer. 2
2. (a) Explain cleansing action of shampoo and give an example of an antidandruff agent. 4
- (b) What are the various categories of hair dye ? Explain them briefly. 4
3. (a) What are antiperspirants and deodorants ? Give the preparation of liquid antiperspirants. 4
- (b) What are sunscreen lotions? Explain the term SPF and give its formula. 4

4. (a) Describe the method for preparation of cold cream and mention the function of various ingredients. 4
- (b) What are various methods developed in the extraction of essential oils from natural sources ? Explain them briefly. 4
5. Write short notes (any **two**):  $2 \times 4 = 8$
- (a) Nail polish and nail remover
- (b) Chemical hair removers
- (c) Artificial flavours



(24)



[This question paper contains 4 printed pages]

Your Roll No. : ..... 2019

Sl. No. of Q. Paper : 2395 IC

Unique Paper Code : 32223902

Name of the Course : B.Sc.(Hons.) Physics/  
B.Sc. (Prog.) : SEC : CBCS

Name of the Paper : Computational Physics  
Skills

Semester : IV

Time : 3 Hours Maximum Marks : 50

**Instructions for Candidates :**

- Write your Roll No. on the top immediately on receipt of this question paper.
- Attempt **ten** questions in **all**.
- Question **NO.1** is compulsory.
- Attempt **three** questions from each **section**.

1. Attempt any **five** questions :  $5 \times 1 = 5$

- Describe the Fortran statement **IMPLICIT DOUBLE** (a-z).
- Draw the flowchart to find the factorial of an integer.

P.T.O.

2395

- (c) Name with syntax, the relational operators in Fortran.
- (d) Write the Fortran syntax for the expression  $\sin^{-1}(x) + x^2e^x$ .
- (e) Write latex code to create title page of a Latex document.
- (f) Write statements to add section and subsection in a Latex document.
- (g) Write the gnuplot statements to write title on a graph.

### **Section - A**

- 2. Write a Fortran program to print table of 7 and 9. 5
- 3. Write a Fortran FUNCTION to calculate factorial of a number. Write a Fortran program using this FUNCTION to evaluate the sum of first 10 terms of series of  $\cos(x)$ . 5
- 4. Write the syntax of two Nested if statements in Fortran. Give an example. 5
- 5. Write a Fortran program to find the sum of all elements of a 3 X 3 matrix. 5

### Section - B

6. Write the statement to use a package in a latex document. Write the name and purpose of any **five** latex packages . 5
7. Write the Latex code to generate the following equations : 5

$$\nabla \cdot \vec{E} = \frac{\rho}{\epsilon_0} \quad \nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

8. Write the output of the following Latex code script. 5

```
\begin{table}[hbt]
```

```
\begin{center}
```

```
\caption{Animal Data}
```

```
\begin{tabular}{|r|c|c|c|}
```

```
\hline
```

```
& runs & hits & errors & \\\
```

```
\hline
```

```
Cardinals & 2 & 2 & 1 & \\\
```

```
Panthers & 4 & 8 & 0 & \\\
```

```
Tigers & 2 & 3 & 2 & \\\
```

```

Braves & 3 & 10 & 3 \\
    \hline
    \end{tabular}
\label{tab:example_tab}
\end{center}
\end{table}

```

9. Explain with example, the labelling of equations, sections etc. and cross referencing them in a Latex document. 5

### Section - C

10. Write the gnuplot statements to plot fifth column of a datafile against its third column with linetype 5 and linewidth 3. 5
11. Write the statements to plot any **two** functions using multiplot command. 5
12. Write gnuplot statement to make 3D plot of  $\cos(x^2) + \sin(y^2)$ . How will you change the viewing angles of this plot? 5
13. Write gnuplot statements to plot the parametric graph defined by 5

$$x(t) = 3\sin(3t) , y(t) = 6\cos(6t) .$$





[This question paper contains 7 printed pages]

**Your Roll No.** : ..... 2019

**Sl. No. of Q. Paper** : 2396 IC

Unique Paper Code : 32223903

Name of the Course : **B.Sc. : (Hons.) Physics /  
B.Sc. (Prog.) : SEC :  
CBCS**

Name of the Paper : Electrical Circuits and  
Network Skills

Semester : IV

**Time : 3 Hours** **Maximum Marks : 50**

**Instructions for Candidates :**

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt **five** questions in **all**. Question **NO.1** is compulsory.
- (c) **All** questions carry equal marks.
- (d) Use of non-programmable scientific calculators is allowed.

P.T.O.

1. Attempt any **five** questions :

2×5

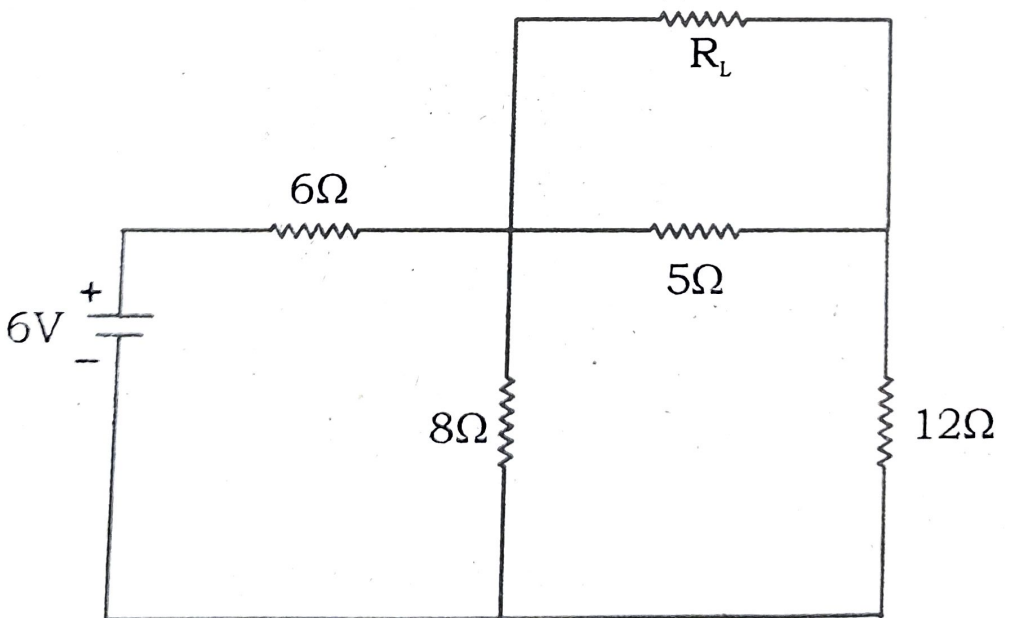
- (a) The equivalent resistance of two resistors in series is  $64\ \Omega$  and their equivalent resistance becomes  $16\ \Omega$  when connected in parallel. Find the resistances of individual resistors.
- (b) Name **one** component each which obey and disobey Ohm's Law.
- (c) What is an electrical fuse ? Write **two** properties of a fuse element.
- (d) A power transmission line feeds at 2300 V to a step down transformer with its primary windings having 4000 turns. What should be the number of turns in the secondary coil in order to get the output power at 230 V ?
- (e) Calculate the total inductance of three inductors of 10mH, 40mH, and 50mH with no mutual inductance, are connected together in :
- (i) series combination
  - (ii) parallel combination



(f) In the context of three phase electrical wiring, discuss Star and Delta Connections.

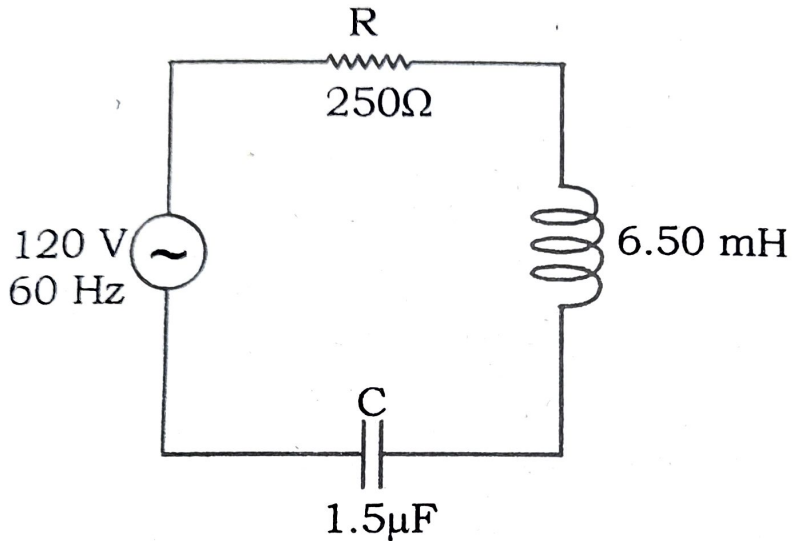
2. (a) Discuss the steps involved for finding the Thevenin's Equivalent Circuit with help of any circuit of your choice. 5

(b) State Maximum Power Transfer Theorem for AC circuits. Find the value of  $R_L$  for the given network below so that the power is maximum. 5



3. (a) Discuss the response of a capacitor in a DC and AC circuit and draw the capacitive reactance against frequency. 5
- (b) Explain the principle of a DC generator with relevant diagrams. 5
4. (a) Draw the electrical symbols of the following : 3
- (i) Tunnel Diode
  - (ii) D Flip Flop
  - (iii) Signal Ground
  - (iv) npn transistor
  - (v) DPDT switch
  - (vi) Connected Wires

- (b) Set up the second order differential equation of charge for the following circuit using Kirchoff's voltage law. 3



- (c) Explain the following colour codes in the electrical wires in INDIA 4

- (a) Red
- (b) Green
- (c) Black
- (d) Blue

5. (a) Draw the block diagram of a regulated DC power supply and explain the function of each block in brief. 5
- (b) A series LCR circuit with  $L = 5 \text{ H}$ ,  $C = 80 \mu\text{F}$ ,  $R = 40 \Omega$  is connected to a  $E = 230 \text{ V}$  supply :
- (i) Determine the source frequency which drives the circuit in resonance.
- (ii) What is the Q factor of the given circuit ?
- (iii) Calculate the impedance of the circuit and the amplitude of the current at resonance. 5
6. (a) Describe the construction of 3 phase AC motor. 5
- (b) Explain how rotating magnetic field is produced in it. 5
7. Write short notes on any **two** : 5,5
- (a) Single phase Induction Motor
- (b) Relay as a protective device

(c) Ladder Diagrams

(d) Superposition Theorem



[This question paper contains 4 printed pages]

Your Roll No. ....

Sl. No. of Q. Paper : 2397 IC

2019

Unique Paper Code : 32223904

Name of the Course : B.Sc.(Hons.) Physics/  
B.Sc. (Prog.) : SEC

Name of the Paper : Basic Instrumentation  
Skills

Semester : IV

**Time : 3 Hours**

**Maximum Marks : 50**

**Instructions for Candidates :**

- Write your Roll No. on the top immediately on receipt of this question paper.
- Attempt any **five** questions in **all**.
- Question **NO.1** is compulsory.

**1.** Attempt any **five** of the following :  $2 \times 5 = 10$

- What are lissajous figures and how they are displayed on the screen of CRO ?



- (b) What do you mean by luminance and persistence in CRO ?
- (c) Calculate  $V_{p-p}$  and  $V_{max}$  of a signal if  $V_{rms}$  value is 4.5V.
- (d) What is (i) random error (ii) limiting error ?
- (e) What do you mean by sensitivity of a digital voltmeter ?
- (f) What is Distortion factor meter ?
- (g) Define rise time and fall time of a pulse.
2. (a) What is loading effect ? Discuss the loading effect of multimeter with the help of example. 6
- (b) Define the terms : 4
- (i) accuracy
- (ii) resolution
- (iii) precision
- (iv) expected value

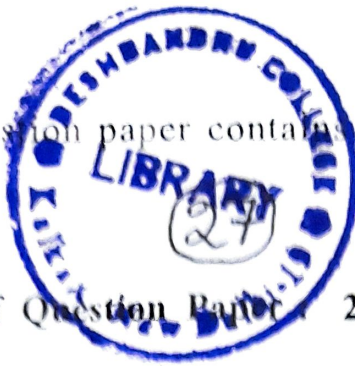


3. Draw the block diagram of CRO and explain the function of each block. 10
4. (a) What are the advantages of dual trace CRO over dual beam CRO for multiple trace ? 4
- (b) What is the function of X-Y mode ? 3
- (c) What is the speciality of storage oscilloscope ? 3
5. (a) Explain the working of pulse generator and mention its applications. 6
- (b) What are the different applications of signal generator ? Give a brief idea of testing. 4
6. (a) Draw the block diagram of Q-meter and explain its working principle. 5
- (b) Explain the working of digital LCR bridge with the help of a block diagram. 5



7. (a) State the advantage of Digital Voltmeter (DVM) over analog meter. 4
- (b) Explain the working of a digital voltmeter using a block diagram. 6

[This question paper contains 4 printed pages.]



Your Roll No.....

Sr. No. of Question Paper : 2428

IC

2019

Unique Paper Code : 42173923/32173902/32173923

Name of the Paper : Basic Analytical Chemistry

Name of the Course : **B.Sc. (Hons.) / B.Sc. (Prog.)**  
**SEC**

Semester : IV

Duration : 2 Hours

Maximum Marks : 38

### Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
  2. Attempt any **Four** questions.
  3. Question No. 1 is compulsory and carries **8** marks. All other questions carry equal marks.
- 
1. (a) Define significant figures.  
(b) Write one suitable example of anion exchange resin.  
(c) Determine pH of  $10^{-3}$  molar HCl solution.

P.T.O.



(d) Give two examples of indicator used in complexometric titration.

(e) What is significance of DO in water?

(f) What is sampling?

(g) Expand the following terms :

(i) EBT

(ii)  $R_f$

(h) Stationary and mobile phase in paper chromatography. (1×8)

2. (a) Define the following :

(i) Blank

(ii) Volumetric analysis

(iii) Indicator

(b) Define determinate and indeterminate errors? Give one example of each.

(c) Calculate the absolute and relative error in % and ppt. (parts per thousand) in the following :

	Measured value	Accepted value	
(i)	3.68 g	1.71 g	
(ii)	55.6 cm	85.0 cm	(4,4,2)

3. (a) Explain Lambert- Beer's law and its importance in spectrophotometric analysis.

A solution of a compound has an absorbance 0.52 at 280 nm in 0.05 cm length cuvette. If absorbance coefficient is  $4.3 \times 10^3 \text{ L mol}^{-1} \text{ cm}^{-1}$ , what is conc. of the solution?

- (b) Give composition of soil and explain the importance of pH in soil analysis.

- (c) Write short note on ion-exchange chromatography, define ion-exchange capacity? (4,3,3)

4. (a) Write basic principal involved in thin layer chromatography (TLC)? Is it better than paper chromatography explain?

- (b) What is alkalinity/acidity of a water sample and how will you determine?

- (c) How the analytical chemistry has interdisciplinary nature? (4,3,3)

5. (a) Write short note on following (**any two**) :

- (i) Steps involved analytical procedure
- (ii) Hardness of water
- (iii) Importance of organic matter in soil

(b) Express the result of the following data using the correct number of significant figures :

(i)  $9.34 \times 0.0034$

(ii)  $(2.30 \times 0.0555)/2.005$

(c) Suggested Application (**any two**) :

- (i) To analyse arson accelerants.
- (ii) To carry out analysis of gasoline.
- (iii) Spectrophotometric determination of Iron in Vitamin/Dietary Tablets. (4,2,4)

[This question paper contains 4 printed pages.]



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Your Roll No.....

2019  
IC

No. of Question Paper : 2461A

Unique Paper Code : 32493902

Name of the Paper : Protein Purification Techniques

Name of the Course : **B.Sc. (Hons) Biochemistry :**  
**SEC**

Semester : IV

Duration : 2 Hours

Maximum Marks : 50

### Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt all **three** questions.
3. Subparts of the question should be attempted together.
4. Log tables and / or scientific calculators may be provided.

1. (a) Explain briefly (**any four**) :

(i) Use of ammonium sulphate for salting out proteins

P.T.O.



- (ii) Void volume in gel permeation chromatography
- (iii) Importance of isoelectric point in ion exchange chromatography
- (iv) The role of bromophenol blue in electrophoresis
- (v) Importance of dialysis in protein purification

(b) Define the following terms :

- (i) Nomogram
- (ii) Spacer arm
- (iii) Theoretical plates
- (iv) Exclusion Limit
- (v) Elution profile
- (vi) Fold purification
- (vii) Flow rate
- (viii) Ligands

(c) Name the group specific ligands commonly used in affinity chromatography for the following :

(i) NADP<sup>+</sup> dependent dehydrogenase

(ii) Immunoglobulins

(iii) Histidine tagged proteins

(iv) Glycoprotein (8,8,4)

2. Differentiate between the following pairs (**Any five**) :

(i) Continuous and discontinuous buffers system in electrophoresis

(ii) Salting in and salting out

(iii) Isocratic and gradient elution

(iv) Agarose and polyacrylamide electrophoresis

(v) Anion and cation exchangers

(vi) Sephadex G-25 and G-100 (3,3,3,3,3)

3. (a) Write principle of the following techniques (**Any two**) :

(i) Gel permeation chromatography

(ii) Precipitation of proteins by organic solvents

(iii) HPLC

(b) Explain how the molecular weight of a protein can be determined using electrophoresis.

(10, 5)



(29)

[This question paper contains 8 printed pages]

**Your Roll No.** : ..... 2019  
**Sl. No. of Q. Paper** : 2496-A IC  
**Unique Paper Code** : 32353401  
**Name of the Course** : **B.Sc. (Hons.)**  
**Mathematics : SEC**  
**Name of the Paper** : Computer Algebra  
Systems and related  
Softwares  
**Semester** : IV  
**Time : 2 Hours** **Maximum Marks : 38**

**Instructions for Candidates :**

- Write your Roll No. on the top immediately on receipt of this question paper.
- This question paper has **six** questions in all.
- All** questions are compulsory.

**Unit - 1 (CAS)**

**Note :** The answers should be written in only **one** of the CAS : Maxima/Mathematica/Maple or any other.

P.T.O.



2496-A

1. Fill in the blanks :

1×5=5

- (a) ..... command is used to find the product of two matrices m, n.
- (b) The function..... is used to find the  $n^{\text{th}}$  prime.
- (c) ..... command is used to find the value of exponential constant up to 20 digits.
- (d) The symbol ..... is used as delayed operator.
- (e) ..... command is used to find the transpose of a matrix.

2. Attempt any **six** parts from the following :

1.5×6

- (a) Write the command to evaluate the expression  $2x^2+x=1$ .
- (b) Write the command to plot the functions  $\text{Sin}(x)$  and  $\text{Cos}(x)$  in the range  $-10 < x < 10$ .
- (c) Write the command to evaluate (i)  $7^{22} \bmod 23$   
(ii)  $\log_{10}(5.65)$ .
- (d) Write the command to create a  $6 \times 6$  sparse matrix with non-zero entries :  
 $(1,2) = 3; (4,3) = 3; (4,5) = 7; (6,1) = 4$

- (e) Write the command to evaluate  $\int_{1/4}^{1/2} \frac{1}{x^2} dx$ .

(f) Write the command to evaluate

$$\sum_{i=1}^{n-1} \left( \frac{1+2i}{n} \right)^2.$$

(g) Write the command to create the matrix

$$A = \begin{bmatrix} 7 & -1 & 4 & 3 \\ -1 & 3 & -2 & 5 \\ 0 & 8 & 0 & 7 \end{bmatrix}.$$

Further, write the commands to obtain its second column and the determinant.

(h) Write the command to obtain a  $2 \times 4$  matrix with random entries within the range of 2 to 10.

3. Attempt any **two** parts from the following :

4×2

(a) For the matrix,

$$A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 4 & -1 \\ 2 & 5 & 3 \end{bmatrix},$$

write commands for :

- (i) diagonalization of the given matrix.
- (ii) finding its inverse.

2496-A

- (b) Write the command to print first 10 prime numbers.
- (c) Write a program to find the gcd of two integers a and b using Euclidean Algorithm and hence find the gcd of 120 and 75.

### Unit-II (Software R)

4. Write **True** or **false** for the following :

1×4

- (a) The data object combining text and numbers is of type 'text'.
- (b) If 'name' is a 10 items vector then name[2:7] shows its second and seventh item.
- (c) The length of the following vector is 5 :  
days = {2, 4, 5, 5, 4, NA} .
- (d) plotpie command is used to draw a pie chart.

5. Attempt any **four** parts from the following :

1.5×4

- (a) (i) Write command to read data from the file "hybrid.csv".

(ii) Using scan function, enter the following data :

Subject = {Eng, Sociology, Science, History}.

(b) For a  $3 \times 3$  matrix

$$A = \begin{bmatrix} 1 & -3 & 2 \\ 7 & 1 & 4 \\ 8 & 3 & 5 \end{bmatrix},$$

write the command to give column and row headings.

(c) For the list,  $m = \{5, 8, 3, 8, 7, 2\}$ , write the output for the following :

(i) `order(m)`,                      (ii) `rank(m)`.

(d) Write the command to convert the following data in integers :

$$M = \{3.5, 1.2, 4.3, 7.1, 8.7\}.$$



(e) For the following data vectors

Length={7, 8, 9, 11.5},

Height={4, 9.5, 3.9, 2.5};

write the command to construct the dataframe 'dimension'.

(f) For the following data object 'fw'

abund	flow
1	7
25	12
15	8
12	19
7	14

write the command to view the first four entries of column 'flow'.

6. Attempt any **two** parts from the following :

3×2

(a) For the vector, Data\_mp = { 3, 2, 1, 5, 5, 3, 5, 8, 7, 6, 9, 1, 9, 5, 8}; write the command to :

(i) find the cumulative sum.

(ii) find the 20%,50%,40% quantiles.

(iii) create the stem and leaf plot for the above vector.

(b) For the following two dimensional data,

data 1	data 2	data 3
23	25	34
23	45	12
21	32	21
21	47	43

write the command to :

(i) display the first and third rows.

(ii) determine the structure of the data object.

(iii) For the above data, draw a bar chart with appropriate labels.

(c) Write the commands in R for the following :

(i) Put the following values into a variable

d :

3, 5, 7, 3, 2, 6, 8, 5, 6, 9, 4, 5, 7, 3, 4.

(ii) Find mean of d.

(iii) Find the largest value in d.

(iv) Find variance of d.