

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper X****Sub. Code: 97065****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Rewrite the following sentences by choosing correct alternatives. **[8]**

- i. Movement of particles or molecules from region of higher concentration to the region of lower concentration is called as
A. Diffusion
B. Plasmolysis
C. exosmosis
D. endosmosis
- ii. Transpiration mainly occurs through _____
A. Leaves
B. Rhizomes
C. Roots
D. Flowers
- iii. In soiltype of water is available to the plants for absorption
A. Capillary
B. Gravitational
C. Hygroscopic
D. Cohesive
- iv. In plants _____ is a water conducting tissue.
A. Companion cells
B. Cambium
C. Phloem
D. Xylem
- v. _____ is a macro element required to the plants.
A. Fe
B. K
C. Mo
D. Zn

- vi. In transpiration are responsible for opening and closing of the stomata.
A. Mesophyll cells
B. Epidermal cells
C. Accessory cells
D. Guard cells
- vii. The study of functioning of the plants under adverse environmental conditions is called as.....
A. Pedology
B. Plant pathology
C. Stress physiology
D. Paleobotany
- viii. _____ provides broad-spectrum resistance throughout the plant to counter related or unrelated pathogens.
A. Systemic acquired resistance (SAR)
B. Plant Defense System (PDS)
C. Pathogenesis Related (PR) proteins
D. None of the above

Q2) Attempt any two of the following. [16]

- a. Define transpiration? Describe the starch-sugar interconversion hypothesis. [8]
- b. What are macronutrients? Give the physiological role and deficiency disorders of Ca and Mg [8]
- c. What is sugar translocation? Explain the ringing experiment. [8]

Q3) Attempt any four of the following. [16]

- a. Physiological importance of water [4]
- b. Deficiency disorders of Fe [4]
- c. Significance of transpiration [4]
- d. Mineral nutrient uptake by carrier concept [4]
- e. Acclimation and adaptation [4]
- f. Plant responds to water stress. [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97065) Botany Paper X Part 3 SEM 5

621195

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper X****Sub. Code: 54899/65837/65973/79689/79936 /79971****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Rewrite the following sentences by choosing correct alternatives**[8]**

- i. The process of complete killing of microbes is called as _____
 - A. Incubation
 - B. Inoculation
 - C. Sterilization
 - D. Quarantine
- ii. _____ discovered process of genetic transformation in bacteria
 - A. F. Griffith
 - B. N. Zinder
 - C. E. Tatum
 - D. J. Lederberg
- iii. The powders or oils can be sterilize in _____
 - A. Autoclave
 - B. Oven
 - C. Freezer
 - D. BOD
- iv. Tikka disease of Groundnut is caused by _____
 - A. *Albugo*
 - B. *Phytoplasma*
 - C. *Cercospora*
 - D. *Xanthomonas*
- v. Blight and blast in plants are the _____ type of symptoms
 - A. Hypoplasia
 - B. Hyperplasia
 - C. Necrosis
 - D. Hypertrophy
- vi. Counter stain used for staining of the Gram negative bacteria is _____

- A. Safranin
- B. Methylene blue
- C. Grams iodine
- D. Crystal violet

vii. The virus mediated bacterial recombination is known as _____

- A. Transduction
- B. Conjugation
- C. Transformation
- D. Recombination

viii. All edible mushrooms are the richest source of _____

- A. Fats
- B. Lipids
- C. Glucose
- D. Vitamins

Q2) Attempt ANY TWO of the following

[16]

- a.** What is Sterilization? Describe the physical sterilizing methods with examples and their uses **[8]**
- b.** Give an account of symptoms, causal organism, disease cycle and control measures of Citrus Canker and white rust of crucifers **[8]**
- c.** Give an account of processes of Transformation in Bacteria **[8]**

Q3) Attempt short notes on ANY FOUR of the following

[16]

- a.** Actinomycetes
- b.** Importance of Edible Mushrooms
- c.** Significance of Bio-pesticides
- d.** Soil borne pathogen
- e.** Grassy shoot Disease of Sugarcane.
- f.** Pure Culture Technique

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरीता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (65837) Botany Paper X Part 3 SEM 5
- 2] (286) B.Sc.(Sem.) (79936) Botany Paper X Part 3 SEM 5
- 3] (286) B.Sc.(Sem.) (79971) Botany Paper X Part 3 SEM 5
- 4] (286) B.Sc.(Sem.) (65973) Botany Paper X Part 3 SEM 0
- 5] (286) B.Sc.(Sem.) (54899) Botany Paper X Part 3 SEM 5
- 6] (2324) B.Sc. (CBCS) (79689) Botany Paper X Part 3 SEM 5

318494

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XII****Sub. Code: 97067****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Rewrite the following sentences by choosing the correct alternative **[8]**

- i. 1. is not a division of Horticulture.
A. Pomology
B. Olericulture
C. Mycology
D. Floriculture
- ii. The process of preserving fruits by using high temperatures is called as.....
A. Freezing
B. Drying
C. Cryopresearvation
D. Chemical preservation
- iii. are commonly used as a cut flowers.
A. Hibiscus
B. Gerbera
C. Sunflower
D. Ocimum
- iv. is the main purpose of a nursery.
A. Selling fruits
B. Growing young plants
C. Harvesting timber
D. Producing medicinal plants
- v. propagation method involves inserting a bud from one plant into another.
A. Grafting
B. Budding
C. Layering
D. Cutting

- vi. is NOT an indoor garden type.
- A. Bonsai
 - B. Rockery
 - C. Dish garden
 - D. Bottle garden
- vii. The famous Brindavan Garden is located at
- A. Delhi
 - B. Mysore
 - C. Mumbai
 - D. Chennai
- viii. is an example of a specialized vegetative structure used in plant propagation.
- A. Ovary
 - B. Bulbs
 - C. Flowers
 - D. Fruits

Q2) Attempt any two of the following**[16]**

- a. Discuss fruit preservation technologies in detail. Explain physical methods of fruit preservation with examples.
- b. Give details on cultivation and management of important pests and diseases of marigold flowers
- c. Define landscape gardening. Explain different types of lawns with examples.

Q3) Attempt any four of the following**[16]**

- a. Floriculture and its significance
- b. Air layering
- c. Terrace gardening
- d. Rockery garden
- e. Role of PGRs in plant propagation
- f. Mughal Garden, Delhi

End Of Question Paper**Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -**

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97067) Botany Paper XII Part 3 SEM 5

97067

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XII****Sub. Code: 54901/65839/79691/79938****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks

Q1) Complete the following sentence by choosing the correct alternatives:**[8]**

- i. Black spot disease of the Rose is caused by _____.
 A. *Plasmopara viticola*
 B. *Sphaerotheca pannosa*
 C. *Diplocarpon rosae*
 D. *Peronospora sparsa*
- ii. A technique of dwarfing trees is called as _____.
 A. grafting
 B. layering
 C. hanging basket
 D. bonsai
- iii. _____ is referred as the father of 'Pomology'.
 A. Charles Dowing
 B. Sir Dalton Hooker
 C. Carl Linnaeus
 D. Theophrastus
- iv. Bermuda grass is commonly used in the preparation of _____.
 A. hedges
 B. edges
 C. lawns
 D. cut greens
- v. _____ is the leading state in India in the floriculture industry.
 A. Maharashtra
 B. Tamil Nadu
 C. Bihar
 D. Rajasthan
- vi. Chrysanthemum is an example of _____.

- A. loose flowers
- B. cut flowers
- C. cut greens
- D. dried flowers

vii. _____ is generally planted as an indoor plant.

- A. *Dieffenbachia*
- B. *Duranta*
- C. *Thuja*
- D. *Gerbera*

viii. Designing of outdoor and public spaces is called _____.

- A. landscaping
- B. indoor gardening
- C. floriculture
- D. hedges

Q2) Attempt the following questions (any two). **[16]**

- a. Explain in brief the cultivation practices and disease management of *Gerbera*. **[8]**
- b. Describe the physical methods of preservation of fruits. **[8]**
- c. What is budding? Describe the methodology of 'T' budding and Patch budding with suitable diagrams. **[8]**

Q3) Write short notes (any four). **[16]**

- a. Nursery
- b. Brindavan garden
- c. Types of Lawns
- d. Packaging and marketing of cut flowers
- e. Vertical Gardening
- f. Air layering

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 2] (2324) B.Sc. (CBCS) (79691) Botany Paper XII Part 3 SEM 5
- 3] (286) B.Sc.(Sem.) (54901) Botany Paper XII Part 3 SEM 5
- 4] (286) B.Sc.(Sem.) (79938) Botany Paper XII Part 3 SEM 5

385853

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Chemistry Paper IX****Sub. Code: 79682/97059****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of scientific calculator and logarithmic table is allowed

Q1) Solve following MCQ.**[8]**

- Which of the following is a Lewis base?
A. NH_3
B. AlCl_3
C. ZnCl_2
D. ZrOCl_2
- Based on Crystal Field Theory assumptions, ----- are treated as point charges.
A. metal ions
B. ligands
C. compounds
D. solvent molecules
- In dimethylaluminium compounds, two aluminum atoms are bridged by methyl groups (CH_3) through ----- bonds.
A. 3c-3e
B. 3c-4e
C. 3c-2e
D. 2c-3e
- Which of the following ligands produces the strongest crystal field splitting (Δ)?
A. Cl^-
B. H_2O
C. Br^-
D. CN^-
- Which catalyst is used in the Contact Process for the industrial production of sulfuric acid (H_2SO_4)?
A. V_2O_5
B. Zn metal

- C. Fe/Mo
- D. zymase

- vi. The metal carbonyl compounds contain at least one ----- bond.
- A. Metal-metal
 - B. Metal-carbon
 - C. Metal-nitrogen
 - D. Metal-oxygen
- vii. Which of the following superconductors is called a 1,2,3 superconductor?
- A. Nb_3Sn
 - B. MgB_2
 - C. $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$
 - D. $\text{LaBa}_2\text{Cu}_3\text{O}_6$
- viii. Which of the following is a hard acid?
- A. NH_3
 - B. Cl^-
 - C. OH^-
 - D. Li^+

Q2) Answer the following (**ANY TWO**). [20]

- a. Draw the molecular orbital (MO) energy level diagrams of the $[\text{CoF}_6]^{3-}$ and $[\text{Co}(\text{NH}_3)_6]^{3+}$ complex ions and explain their color spectra and magnetic properties. [10]
- b. What is catalysis? Discuss the types of catalysis with suitable examples. [10]
- c. What are semiconductors? Discuss the n-types and p-types of semiconductors. [10]

Q3) Answer the following (**ANY THREE**). [12]

- a. Write a brief note on the Lewis acid base concept. [4]
- b. State the basic assumptions of crystal field theory (CFT). [4]
- c. Explain the structure and bonding of the $\text{Ni}(\text{CO})_4$ carbonyl compound. [4]
- d. Describe in short free electron theory. [4]
- e. Discuss any two factors affecting crystal field splitting. [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97059) Chemistry Paper IX Part 3 SEM 5

2] (2324) B.Sc. (CBCS) (79682) Chemistry Paper IX Part 3 SEM 5

368255

Seat No	
------------	--

B.Sc. (Part- III) (Semester – V) (CBCS)
Examination, April– 2025
CHEMISTRY
ORGANIC CHEMISTRY (Paper -X)
Sub. Code : 79683

Day and Date : Wednesday, 16/04/2025

Total Marks :40

Time : 2.30 p.m. to 4.00 p.m.

- Instructions :**
1. All questions are compulsory.
 2. Figures to the right indicate full marks.
 3. Spectroscopic chart is allowed.

Q.1) Select most correct alternatives among those given below and rewrite the sentences. (8)

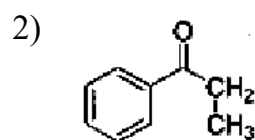
1. According to Woodward-Fieser rule, the base value for the following compound is.....



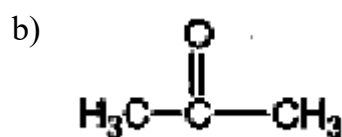
- | | |
|-----------|-----------|
| a) 221 nm | b) 214 nm |
| c) 218 nm | d) 222 nm |
2. The largest peak in the Mass spectrum is called as.....
- | | |
|---------------|---------------|
| a) Weak Peak | b) Sharp Peak |
| c) Broad Peak | d) Base Peak |
3. The $-\text{C} \equiv \text{C}$ -stretching frequency in IR spectrum appears at.....
- | | |
|---------------------------|---------------------------|
| a) 2200 cm^{-1} | b) 2500 cm^{-1} |
| c) 2700 cm^{-1} | d) 2800 cm^{-1} |
4. The number of fundamental modes of vibration of CO_2 is.....
- | | |
|------|------|
| a) 1 | b) 6 |
| c) 4 | d) 5 |
5. The most shielded proton is found in the compound.
- | | |
|---------------------------|-----------------------------|
| a) CH_3OH | b) CH_3COOH |
| c) TMS | d) C_6H_6 |

- Q. 2 Attempt any Two of the following** **(20)**

- 1) $\text{H}_3\text{C}-\text{CH}_2-\text{CHO}$



- a) $\text{CH}_3 \cdot \text{CH}_2 \cdot \text{CH}_2 \cdot \text{CH}_3$



- c) 

- d) $\text{CH}_3 \cdot \text{CH}_2 \cdot \text{CHO}$

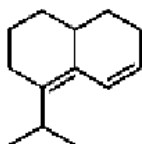
- e) CH_3OCH_3

- 2

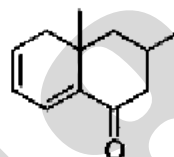
Q. 3) Attempt any Three of the following**(12)**

1. Short note on Hook's law
2. Write note on Mc-Lafferty Rearrangement
3. Explain fundamental modes of vibrations in IR Spectroscopy.
4. a) Calculate $\lambda_{\max}$ values for following compounds

1)



2)



5. Applications of Mass Spectrometry.

SPECTROSCOPIC VALUES**A] Woodward and Fieser rules for Dienes and Enones**

Nature of Dienes	$\lambda_{\max}$
Acyclic and Heteroannular dienes	214nm
Homoannular dienes	253 nm
Addition of each substituents	
-R (alkyl, including part of carbocyclic ring)	+5 nm
- OR (alkoxy)	+6 nm
-Cl, -Br	+5 nm
-OCOR (acyloxy)	-
-CH = CH - additional conjugation	+30 nm
If one double bond is exocyclic to one ring	+5 nm
If exocyclic to two rings simultaneously	+10 nm

B] Rules for α, β unsaturated aldehydes and ketones:

Ketones	$\begin{array}{c} \beta \quad \alpha \\ \text{---C=C---C=O} \\ \quad \quad \end{array}$			
Acyclic or 6-ring cyclic		215 nm		
5-ring cyclic		202 nm		
Aldehydes	$\begin{array}{c} \text{---C=C---C=O} \\ \quad \quad \\ \quad \quad \quad \text{H} \end{array}$	207 nm		
Acid /Ester	$\begin{array}{c} \text{---CH---O---C---R} \\ \quad \quad \quad \\ \quad \quad \quad \text{O} \end{array}$	197 nm		
Extended Conjugation $\text{---C=C---C=C---C=O}$ $ \quad \quad \quad \quad $				
One extra double bond in conjugation		+30nm		
Homodiene component		+ 39 nm		
Addition for :	α	β	γ	δ
-R alkyl(including part of carbocyclic ring)	10	12	18	18
-OR (Alkoxy)	35	30	17	31
-OH (Hydroxy)	35	30	30	50
-SR (Thioether)	-	33	-	-
-Cl (Chloro)	15	12	12	12
- Br (Bromo)	25	30	25	25
-OCOR- (acyloxy)	06	06	06	06
−NH ₂ , −NHR, −NR ₂ (Amino)	-	95	--	-
If one double bond is exocyclic to one ring		+5 nm		
If exocyclic to two rings simultaneously		+10 nm		

CHEMICAL SHIFTS OF PROTONS ' δ ' in ppm

Proton	δ ppm	Proton	δ ppm
$\text{H}_3\text{C}-\text{R}$	0.9	$-\text{C}-\text{CH}_2-\text{C}$	1.4
$\text{H}_3\text{C}-\text{C}=\text{C}$	1.7	$-\text{C}-\text{CH}_2-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{OR}$	2.2
$\text{H}_3\text{C}-\underset{\text{R}}{\underset{\mid}{\text{C}}}=\text{O}$	2-2.7	$-\text{C}-\text{CH}_2-\text{C}=\text{C}$	2.3
$\text{H}_3\text{C}-\text{S}-$	2.1	$-\text{C}-\text{CH}_2-\text{S}-$	2.5
$\text{H}_3\text{C}-\text{Ar}$	2.3	$-\text{C}-\text{CH}_2-\underset{\mid}{\text{N}}-$	2.5
$\text{H}_3\text{C}-\underset{\mid}{\text{N}}-\text{R}$	2.3	$-\text{C}-\text{CH}_2-\text{Ar}$	2.7
$\text{H}_3\text{C}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{Ar}$	2.6	$-\text{C}-\text{CH}_2-\text{OR}$	3.4
$\text{H}_3\text{C}-\underset{\mid}{\text{N}}-\text{Ar}$	3.0	$-\text{C}-\text{CH}_2-\text{I}$	3.2
$\text{H}_3\text{C}-\text{O}-\text{R}$	3.3	$-\text{C}-\text{CH}_2-\text{Br}$	3.5
$\text{H}_3\text{C}-\text{O}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{R}$	3.7	$-\text{C}-\text{CH}_2-\text{Cl}$	3.6
$\text{H}_3\text{C}=\text{O}-\text{Ar}$	3.8	$=\text{C}-\text{CH}_2=\text{OH}$	3.6
$\text{Ar}-\text{H}$	7.3	$-\text{C}-\text{CH}=\text{C}$	1.5
$\text{R}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{H}$	9.0-10.0	$-\text{C}-\text{CH}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{R}$	2.5
$\text{R}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{OH}$	10.5-12	$-\text{C}-\text{CH}-\underset{\mid}{\text{N}}-$	2.8
$\text{R}-\text{OH}$	0.5-4.5	$-\text{C}-\text{CH}-\text{Ar}$	3.0
$\text{Ar}-\text{OH}$	4.5	$-\text{C}-\text{CH}-\text{S}-$	3.2
$-\text{C}-\text{CH}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{Ar}$	3.3		
$-\text{C}-\text{CH}-\text{O}-\text{R}$	3.7		
$-\text{C}-\text{CH}-\text{O}-\text{H}$	3.9		
$-\text{CH}-\text{O}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{R}$	4.8		

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Chemistry Paper XI****Sub. Code: 97061****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of scientific calculator and logarithmic table is allowed

Q1) Choose the most correct alternative for each of the following and rewrite the sentence **[8]**

- i. Solution which obey the Raoult's law at all concentration and temperature are called
 - A. real solution
 - B. binary solution
 - C. ideal solution
 - D. none of these
- ii. The wave character of electron was experimentally verified by
 - A. de-Broglie
 - B. Planck
 - C. Germer
 - D. Heisenberg
- iii. An electrode at which reduction occurs is called as -----
 - A. cathode
 - B. null electrode
 - C. anode
 - D. +ve electrode
- iv. Raman spectroscopy is based on
 - A. absorption frequency
 - B. scattering of light
 - C. transmission of light
 - D. reflection of light
- v. In Nernst equation for the calculation of emf of cell, Q_a represents -----
 - A. Quantum

- B. Einstein
- C. Faraday's constant
- D. Reaction Quotient

- vi. The vapour always contains relatively proportion of the more volatile component than does the liquid phase.
- A. More
 - B. Equal
 - C. Slight
 - D. Less
- vii. The emission of light as result of chemical reaction at ordinary temperature is called as
- A. bioluminescence
 - B. electroluminescence
 - C. chemiluminescence
 - D. phosphorescence
- viii. Heisenberg uncertainty principle says about the impossibility of exact simultaneous determination of
- A. velocity and energy
 - B. position and momentum
 - C. charged density and probability
 - D. position and direction

Q2) Attempt any TWO of the following (Out of Three). [16]

- a. Derive an expression for emf of electrode concentration cell with transference which is reversible to anion. [8]
- b. What is quantum efficiency? What are the reasons for high and low quantum efficiency? [8]
Calculate the energy in joules per mole of photons of wavelengths 800 nm .
(Given :- $h = 6.626 \times 10^{-34}$ Js , $N = 6.023 \times 10^{23}$, $C = 3 \times 10^8$ ms⁻¹)

- c. Discuss vibrational spectra of a diatomic molecule. [8]

Q3) Attempt any FOUR of the following (Out of Six). [16]

- a. What is photoelectric effect? What are its characteristics? [4]
- b. Distinguish between ideal and non-ideal solution. [4]
- c. State and explain the law of photochemical equivalence. [4]

- d. EMF of the cell, $\text{Pt} \mid \text{H}_{2(g,1\text{atm})} \mid \text{H}^+ \mid \text{SCE}$ is 0.426 V at 298K. Find the pH of solution. (Given:- $E_{\text{SCE}} = 0.242 \text{ V}$) [4]
- e. Discuss distillation of solutions with the system having boiling point maximum. [4]
- f. Explain wave particle duality and derive de-Broglie equation. [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97061) Chemistry Paper XI Part 3 SEM 5

Seat No	
------------	--

B.Sc. (Part- III) (Semester – V) (CBCS)

Examination, April– 2025

CHEMISTRY

Physical Chemistry (Paper – XI)

Sub. Code : 79684

Day and Date : Thursday, 17/04/2025

Total Marks :40

Time : 2.30 p.m. to 4.00 p.m.

Instructions :

- 1. All questions are compulsory.**
- 2. Figures to the right indicate full marks.**
- 3. Draw neat labelled diagrams and give equation wherever necessary.**
- 4. Use of scientific calculator and logarithmic table is allowed.**

Q1) A) Choose the most correct alternative for each of the following and rewrite the sentence. (8)

- a) The distillation carried out in a current of steam is known as distillation.

i) Fractional	ii) Flame
iii) Steam	iv) Ordinary
- b) The wave character of electron was experimentally verified by

i) de-Broglie	ii) Plank
iii) Germer	iv) Heisenberg
- c) A potential developed due to contact between two solutions of the same or different electrolytes at the junction is called..... junction potential.

i) solid – liquid	ii) solid - vapour
iii) solid – solid	iv) liquid – liquid
- d) Vibrational sub-levels are denoted by.....

i) J	ii) V
iii) E	iv) n

- e) In Nernst equation for the calculation of emf of cell, F represents
- Quantum
 - Einstein
 - Faraday's constant
 - Reaction Quotient
- f) The solution of lower vapour pressure will boil at..... temperature.
- Higher
 - Lower
 - zero
 - Negative
- g) In photochemistry the term IC means.....
- External conversion
 - Inter system crossing
 - Inter-solution concentration
 - Internal conversion
- h) Heisenberg uncertainty principle says about the impossibility of exact simultaneous determination of
- velocity and energy
 - position and momentum
 - charge density and probability
 - position and direction

Q.2) Attempt any two of the following. (20)

- Derive an expression for emf of chemical cell without transference.
- Describe the various factors affecting quantum efficiency.

A certain system absorbs 3×10^{17} quanta of light per second. On irradiation for 30 min; 0.025 moles of the reactant were found to have reacted. Calculate quantum yield of the process. ($N' = 6.023 \times 10^{23}$).

- What is the origin of rotational spectra? Derive the expression,

$$E_J = \frac{h^2}{8\pi^2 I} J(J+1) \text{ for the rotational energy of a diatomic molecule.}$$

Q. 3) Attempt any three of the following (12)

- Explain wave particle duality and derive de-Broglie equation.
- Distinguish between ideal and non-ideal solution.
- Explain photosensitized reaction with suitable example.
- What are the types of electrodes? Explain any one of them.
- Discuss Triethyl amine - water system.

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Chemistry Paper XII****Sub. Code: 97062****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Select most correct alternative among those given below and rewrite the sentence. **[8]**

- i.chemical compound is used to prepare brine solution.
 - A. KCl
 - B. KOH
 - C. NaCl
 - D. NaOH
- ii.part of sugar industry the most of cane juice is extracted.
 - A. Crusher
 - B. First mill
 - C. Second mill
 - D. Third mill
- iii. A device for measuring a response of photocell is called -----
 - A. conductometer
 - B. voltameter
 - C. thermometer
 - D. galvanometer
- iv. The formula $C_6H_4O_2.C_6H_4(OH)_2$ represents----- in potentiometric titration.
 - A. quinone
 - B. quinhydrone
 - C. hydroquinone
 - D. quinoline
- v. The chromatography type not carried out in a column is-----
 - A. Paper
 - B. EC
 - C. IEC
 - D. HPLC
- vi. For standardisation of a potentiometer, a standard cell having voltage-----

- is generally used.

- A. 1.018 V
- B. 0.018 V
- C. 101.8 V
- D. 2 V

vii. The mobile phase cannot be formed with-----

- A. liquid
- B. gas
- C. soild
- D. liquid bond to solid

viii. ----- is the promotor used in the Haber process.

- A. Ni
- B. Cd
- C. Mo
- D. Fe

Q2) Attempt any **TWO** of the following

[20]

- a. What is potentiometric titration? Explain in detail Acid base titration and redox titration. **[10]**
- b. What is chromatography? Explain steps involved in ion exchange chromatography. Give applications of ion exchange chromatography. **[10]**
- c. Discuss the manufacturing plant and process of ammonia by Haber process **[10]**

Q3) Attempt any **THREE** of the following.

[12]

- a. Classification of chromatography.
- b. Terms involved in colourimetry.
- c. Applications of spectrophotometry.
- d. Applications of chromatography
- e. Good laboratory practices.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

6458688

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2324 B.Sc. (CBCS)****Sub. Name: Chemistry Paper XII****Sub. Code: 79685****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of scientific calculator and logarithmic table is allowed

Q1) Select most correct alternative among those given below and rewrite the sentence. **[8]**

- In gravimetric analysis desiccator unhydrous----- is used.
 - A. CaCl_2
 - B. H_2O
 - C. NaBr
 - D. NaNO_2
- part is not in flame photometry.
 - A. slit
 - B. mirror
 - C. burner
 - D. cloth
- A device for measuring a response of photocell is called -----
 - A. conductometer
 - B. voltameter
 - C. thermometer
 - D. galvanometer
- The formula $\text{C}_6\text{H}_4\text{O}_2$. $\text{C}_6\text{H}_4(\text{OH})_2$ represents----- in potentiometric titration.
 - A. quinone
 - B. quinhydrone
 - C. hydroquinone
 - D. quinoline
- The chromatography type not carried out in a column is-----
 - A. Paper
 - B. EC
 - C. IEC
 - D. HPLC
- For standardisation of a potentiometer, a standard cell having voltage.....

is generally used.

- A. 1.018 V
- B. 0.018 V
- C. 101.8 V
- D. 2 V

vii. The mobile phase cannot be formed with-----

- A. liquid
- B. gas
- C. solid
- D. liquid bond to solid

viii. Particle size of the crystalline precipitate is-----

- A. 0.02 to 0.1 micron
- B. less than 0.02 micron
- C. greater than 1 micron
- D. 0.1 to 1 micron

Q2) Attempt any **TWO** of following **[20]**

- a. What is potentiometric titration? Explain in detail Acid base titration and redox titration . **[10]**
- b. Explain in detail interference and limitation in flame photometry. **[10]**
- c. Differentiate between coprecipitation and post precipitation. Give the advantage and disadvantages of organic precipitant. **[10]**

Q3) Attempt any **THREE** of following **[12]**

- a. Terms involved in colourimetry .
- b. Classification of chromatography.
- c. Good laboratory practices.
- d. Applications of spectrophotometry.
- e. Applications of chromatography.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

667579

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper IX****Sub. Code: 97104****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM****Instructions: 1. All questions are compulsory
2. Figures to the right indicate full marks****Q1) Solve following MCQ.****[8]**

- i. _____ not a valid Layout Manager.
- A. Boarder Layout
 - B. Grid Layout
 - C. Interface Layout
 - D. Flow Layout
- ii. The _____ keyword is used to invoke current class method.
- A. import
 - B. catch
 - C. abstract
 - D. this
- iii. The _____ keyword is not a part of exception handling.
- A. try
 - B. finally
 - C. thrown
 - D. catch
- iv. In Java, a thread can be created by _____ .
- A. Extending the Thread class
 - B. Implementing Runnable interface
 - C. Both of A & B
 - D. None of these
- v. _____ cannot be inherited in java.
- A. Abstract class
 - B. Parent class
 - C. Final class
 - D. Super class
- vi. The _____ method is used for garbage collection.
- A. ~destructor()

- B. free()
- C. delete()
- D. finalize()

vii. First name or origin name of Java_____.

- A. OAK
- B. JDK
- C. SDK
- D. JRE

viii. Java does not support _____ inheritance.

- A. single
- B. multiple
- C. multilevel
- D. hierarchical

Q2) Attempt any **two** of the following:

[16]

- a) What is Inheritance? How to create hierarchical inheritance in Java?
- b) Explain if statement and switch case statement.
- c) Explain the role of try-catch in exception handling.

Q3) Attempt any **four** of the following:

[16]

- a) Explain any four features of Java.
- b) Explain method overloading with suitable example.
- c) How to create thread using thread class? Give Example.
- d) What is the use throw keyword in Java?
- e) Explain the concept of interface
- f) Write a program to demonstrate method overriding.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97104) Computer Science Paper IX Part 3 SEM 5

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper IX****Sub. Code: 65902/79728/79965****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM****Instructions: 1. All questions are compulsory
2. Figures to the right indicate full marks****Q1) Solve following MCQ.****[8]**

- i. Which keyword is used to define a constant variable in Java?
 - A. static
 - B. final
 - C. const
 - D. abstract
- ii. What is the extension of a compiled Java file?
 - A. .java
 - B. .class
 - C. .exe
 - D. .obj
- iii. The process of converting source code into bytecode is done by:
 - A. JIT
 - B. Compiler
 - C. Interpreter
 - D. JVM
- iv. What is the purpose of the this keyword in Java?
 - A. It refers to the current instance of the class
 - B. It refers to the superclass
 - C. It is used to call a static method
 - D. It is used to call the main method
- v. Which of the following is NOT a valid state in the life cycle of a thread?
 - A. New
 - B. Running
 - C. Terminated
 - D. Waiting for execution
- vi. Which keyword is used for exception handling in Java?
 - A. catch

- B. throw
- C. try
- D. finally

vii. Which package is used for creating applets in Java?

- A. java.awt
- B. javax.swing
- C. java.applet
- D. java.util

viii. Which keyword is used to inherit a class in Java?

- A. implements
- B. extends
- C. inherit
- D. super

Q2) Attempt any two.

[16]

- a. Explain branching and looping statements in Java with examples.
- b. Explain how to build an **applet** and embed it in an HTML file with an example.
- c. Describe the different states in the life cycle of a thread.

Q3) Attempt any four

[16]

- a. Explain the concept of polymorphism in Java with suitable example.
- b. What is the difference between implicit and explicit typecasting in Java?
- c. What are the main features of Java?
- d. What are packages? Explain any two Java system packages.
- e. What is Abstract Window Toolkit (AWT)? Explain its features and components in Java.
- f. What is the role of the finally block in exception handling?

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2324) B.Sc. (CBCS) (79728) Computer Science Paper IX Part 3 SEM 5

2] (286) B.Sc.(Sem.) (79965) Computer Science Paper IX Part 3 SEM 5

231334

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper X****Sub. Code: 97105****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

Instructions: 1. All questions are compulsory
2. Drawings must be drawn to the given scale
3. Figures to the right indicate full marks

Q1) Solve following MCQ.**[8]**

- i. Which of the following is not a feature of C#?
- A. Automatic garbage collection
 - B. Platform independence
 - C. Multiple inheritance
 - D. Strongly-typed language
- ii. The .NET component responsible for compiling the MSIL code into native code is:
- A. CLR
 - B. CLS
 - C. CTS
 - D. JIT Compiler
- iii. Which of the following is a reference type in C#?
- A. int
 - B. float
 - C. object
 - D. bool
- iv. Boxing in C# refers to:
- A. Converting a value type to a reference type
 - B. Converting a reference type to a value type
 - C. Type casting between different reference types
 - D. None of the above
- v. Which of the following does not belong to Object-Oriented Programming concepts?
- A. Polymorphism

- B. Encapsulation
- C. Inheritance
- D. DLL and EXE

- vi.** In Windows Forms, which control would you use to display text that cannot be edited by the user?
- A. Button
 - B. Label
 - C. TextBox
 - D. RadioButton
- vii.** The Common Type System (CTS) ensures
- A. Code execution
 - B. Code compilation
 - C. Interoperability between different languages
 - D. Compilation speed improvement
- viii.** Which method is used to close a Windows Form in C#?
- A. End()
 - B. Stop()
 - C. Close()
 - D. Exit()

Q2) Attempt any two. **[16]**

- a.** Explain the architecture of the .NET Framework, detailing the role of CLR, CLS, and MSIL. **[8]**
- b.** Describe exception handling in C# and explain how try, catch, finally, and throw are used with an example. **[8]**
- c.** Discuss the types of inheritance in C#. Provide examples for single, multilevel, and hierarchical inheritance. **[8]**

Q3) Attempt Any Four. **[16]**

- a.** What is the difference between value types and reference types in C#?
- b.** Explain the concept of partial classes in C# with a code example
- c.** Describe how to handle events in Windows Forms using C#.
- d.** What is JIT compilation? Describe its types.
- e.** Define and explain the use of abstract classes in C#.
- f.** Explain type casting in C# with examples of implicit and explicit casting.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97105) Computer Science Paper X Part 3 SEM 5

97105

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper X****Sub. Code: 65903/79729/79966****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Solve following MCQ.**[8]**

- i.** What is the main function of the Common Language Runtime (CLR) in .NET?
 - A. Compiling source code into executable files
 - B. Managing memory, security, and garbage collection
 - C. Storing user credentials for authentication
 - D. Providing a database management system
- ii.** What does MSIL stand for in .NET?
 - A. Microsoft Software Integration Layer
 - B. Managed System Intermediate Language
 - C. Microsoft Intermediate Language
 - D. Multi-System Integration Language
- iii.** What is the purpose of the Common Type System (CTS) in .NET?
 - A. To define how types are declared and used across different .NET languages
 - B. To convert all data types into objects
 - C. To store compiled executable files
 - D. To handle exceptions in C#
- iv.** Which of the following best describes Boxing in C#?
 - A. Converting a value type to a reference type
 - B. Converting a reference type to a value type
 - C. Storing values in an array
 - D. Comparing two objects
- v.** In C#, which access modifier makes a class sealed, preventing inheritance?
 - A. private
 - B. final
 - C. sealed
 - D. internal

- vi. Which of the following statements about abstract classes in C# is true?
- A. Abstract classes can be instantiated directly
 - B. Abstract classes can contain both abstract and non-abstract methods
 - C. Abstract classes cannot have constructors
 - D. Abstract classes must be declared as "static"
- vii. What is the purpose of the Timer control in a Windows Form Application?
- A. To display date and time
 - B. To execute code at specific time intervals
 - C. To store system time
 - D. To handle user input
- viii. Which IDE is commonly used for C# Windows Form Application development?
- A. NetBeans
 - B. Eclipse
 - C. Visual Studio
 - D. IntelliJ IDEA

Q2) Attempt anyTwo

[16]

- a. Explain the architecture of the .NET Framework.
- b. Describe the concepts of Inheritance and Polymorphism in C# with examples.
- c. What are Form Controls in Windows Form Applications? Explain properties and events of TextBox.

Q3) Attempt any four

[16]

- a. What are namespaces in C#? Why are they important?
- b. Differentiate between Value Types and Reference Types in C#.
- c. What are Partial Classes in C#?
- d. Explain Exception Handling in C# with an example.
- e. What are Command Line Arguments in C#? How are they used?
- f. What is the difference between an Abstract Class and an Interface in C#?

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (79966) Computer Science Paper X Part 3 SEM 5
- 2] (286) B.Sc.(Sem.) (65903) Computer Science Paper X Part 3 SEM 5
- 3] (2324) B.Sc. (CBCS) (79729) Computer Science Paper X Part 3 SEM 5

65903

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper XI****Sub. Code: 97106****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Solve following MCQ.**[8]**

- i.** Which command is used to remove files?
 - A. rdir
 - B. remove
 - C. rmdir
 - D. None of the above
- ii.** which of the following command is used to display and create files?
 - A. cat
 - B. lyrix
 - C. cd
 - D. md
- iii.** Identify the command which is used to display the unix version
 - A. uname -t
 - B. uname -r
 - C. uname -u
 - D. uname -l
- iv.** Which is the core of the Linux operating system?
 - A. shell
 - B. kernel
 - C. command
 - D. script
- v.** Which among the following interacts directly with system hardware?
 - A. kernel
 - B. shell
 - C. vi
 - D. None of these
- vi.** 5. What does the 'echo' command do in a shell script?

- A. Displays output to the terminal
- B. Executes a command
- C. Prints the contents of a file
- D. Copies files

vii. Linux Kernel was founded by?

- A. Richard Stallman
- B. Bill Gates
- C. Ben Thomas
- D. Linus Torvalds

viii. which command is used to display the operating system name

- A. os
- B. wc
- C. countw
- D. uname

Q2) [16]

- a. What is Linux? Explain the basic features of the Linux OS. [8]
- b. What are the major differences between Linux and Windows? [8]
- c. Explain Different Types of Shells [8]

Q3) [16]

- a. Explain the basic features of the Linux OS. [4]
- b. Explain all the file permission in Linux with options [4]
- c. What is BASH? [4]
- d. What are two types of Linux User Mode? [4]
- e. Explain Process Management System Calls [4]
- f. What are the process states in Linux? [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97106) Computer Science Paper XI Part 3 SEM 5

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper XI****Sub. Code: 65904/79730/79967****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Solve following MCQ.**[8]**

- i. Each process is uniquely identified by a unique integer is called the _____.
 - A. UID
 - B. PID
 - C. KID
 - D. INIT
- ii. A Process in a Linux is created with the _____ system call.
 - A. exec
 - B. fork
 - C. open
 - D. wait
- iii. The _____ is the shell operator, used to run a process in the background.
 - A. @
 - B. %
 - C. #
 - D. &
- iv. _____ command is used to create a new directory?
 - A. touch
 - B. mkdir
 - C. rmdir
 - D. rm
- v. _____ command is used to list files and directories in the current directory?
 - A. ls
 - B. pwd
 - C. cat
 - D. mkdir

- vi. _____ commands is used to list all running processes in Linux?
- A. ps
 - B. top
 - C. ls
 - D. grep
- vii. In Linux, _____ does the nice command.
- A. Sets the priority of a process
 - B. Kills a process
 - C. Lists processes based on their priority
 - D. Changes the current directory
- viii. _____ of the following will retrieve the value of the variable HOME.
- A. echo HOME
 - B. echo \$HOME
 - C. echo %HOME%
 - D. echo \${HOME}

Q2) Attempt any two of the following. **[16]**

- a. Explain the function of chmod command in linux with example. **[8]**
- b. What is shell and kernel in the context of Linux operating system. **[8]**
- c. How do loops work in shell scripts? **[8]**

Q3) Attempt any Four of the following **[16]**

- a. What does the ps command do in linux? **[4]**
- b. What is the difference between cp and mv command? **[4]**
- c. What does the echo and read command in linux? **[4]**
- d. What are the different ways to run job at background. **[4]**
- e. What are the different uses of command line argument. **[4]**
- f. Write a shell script that check given year leap or not. **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

2] (2324) B.Sc. (CBCS) (79730) Computer Science Paper XI Part 3 SEM 5

3] (286) B.Sc.(Sem.) (79967) Computer Science Paper XI Part 3 SEM 5

591348

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper XII****Sub. Code: 65905/79731/79968****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM****Instructions: 1. All questions are compulsory
2. Figures to the right indicate full marks****Q1) Solve following MCQ.****[8]**

- i. Who developed Python?
 - A. Dennis Ritchie
 - B. Guido van Rossum
 - C. James Gosling
 - D. Bjarne Stroustrup
- ii. Python is a ____ language.
 - A. Compiled
 - B. Assembly
 - C. Interpreted
 - D. Machine
- iii. Which function is used to get input from the user?
 - A. get()
 - B. input()
 - C. enter()
 - D. read()
- iv. What does the print("2" + "3") output?
 - A. 5
 - B. 23
 - C. Error
 - D. None
- v. Which statement is true about indentation in Python?
 - A. Optional
 - B. Fixed at 2 spaces
 - C. Mandatory
 - D. Not required in functions
- vi. Which keyword is used to exit a loop?

- A. quit
- B. break
- C. exit
- D. stop

vii. Which of the following is a valid string?

- A. 'Hello'
- B. "Hello"
- C. ""Hello""
- D. All of the above

viii. Strings in Python are:

- A. Mutable
- B. Immutable
- C. Dynamic
- D. Changeable

Q2) Attempt any Two of Following

[16]

- a. Describe the different types of operators in Python with examples. **[8]**
- b. Explain various string operations supported in Python. **[8]**
- c. Explain various tuple operations with examples. **[8]**

Q3) Write short note (Any Four)

[16]

- a. Features of Python? **[4]**
- b. Explain the use of the input() and print() functions in Python. **[4]**
- c. Explain the syntax of if-else in Python **[4]**
- d. What is the use of the break statement in loops? **[4]**
- e. What is string slicing? Give an example. **[4]**
- f. What is a dictionary in Python? **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2324) B.Sc. (CBCS) (79731) Computer Science Paper XII Part 3 SEM 5

2] (286) B.Sc.(Sem.) (65905) Computer Science Paper XII Part 3 SEM 5

517937

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: English (Compulsory)****Sub. Code: 97048****Day and Date: APRIL ,12-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

Instructions: 1. All questions are compulsory
2. Figures to the right indicate full marks

Q1) Solve following MCQ.**[3]**

- i. Accordingly to Sudha Murty.....is inversely proportional to economic standing.
 - A. writing
 - B. travelling
 - C. conversation
 - D. reading
- ii. The Colour of the Butterfly is
 - A. red
 - B. white
 - C. yellow
 - D. green
- iii. The poem, 'For Your Lanes, My Country', is written by.....
 - A. A. K. Ramanujan
 - B. Arun Kolhatkar
 - C. Dilip Chitre
 - D. Faiz

Q2) Answer the following questions in one word, phrase or sentences each.**[3]**

1. Who went on the pilgrimage in the poem 'Enterprise' ?
2. What did Tom announce one day without warning?
3. What kind of job does William Morris do?

Q3) [10]**a.****[4]****Answer the following questions in 3 to 4 sentences. (2 out of 3)**

1. Why did the narrator burst into a shout of laughter when looked at George's wrathful face ?
2. Why does William Morris observe people whenever he travels?
3. Why is the poet Faiz confused?

- b. [4]

Answer the following questions in 8 to 10 sentences. (1 out of 2)

1. Significance of the title, "Forgetting Our Own History."
2. Poem 'Enterprise' as a social satire.

- c. 1. Give the synonyms of the following word: [2]

ignore

2. Give adverb form of the following word:

graceful

Q4) [16]

- a. Imagine that you are going to attend an interview for the post of an Assistant Professor in a well reputed college. Prepare a mock interview of it. [8]

or

Write a note on Tips and Hints of Interview winning skills.

- b. Your childhood friend has recently gone on a vacation to a beautiful destination. Write an email to him / her asking about his / her travel experience, the places visited, and any special memories. [8]

or

Write a blog on how to improve communication skills.

Q5) Write a well-organized paragraph on "A Visit to a Historical Place." [8]

or

Write a report on a Blood Donation Camp organized by your college.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2324 B.Sc. (CBCS)****Sub. Name: English (Compulsory)****Sub. Code: 107659/79671/96999****Day and Date: APRIL ,12-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

Instructions: 1. All questions are compulsory
2. Figures to the right indicate full marks

Q1) Solve following MCQ.**[3]**

- i. The poem 'Enterprise' describes ajourney towards a specific goal.
 - A. strange
 - B. happy
 - C. metaphorical
 - D. adventurous
- ii. Once or twice, George fell to Tom's promises ofand gave him considerable sums.
 - A. amendment
 - B. blackmail
 - C. visiting Monte Carlo
 - D. live in london
- iii. The American had disposed off the gum.....
 - A. on the carpet
 - B. in wastepaper basket
 - C. underneath the ledge of the corner
 - D. in the tray

Q2) Answer the following questions in one word/ phrase/sentence each.**[3]**

1. In whose memory, according to Sudha Murty, we have to bow our heads?
2. Who didn't bother about the future in the poem 'The Butterfly'?
3. With whom does the poet compare the beauty of his nation in the poem 'For Your Lanes, My Country'?

Q3) [10]**a. Answer the following questions in 3 to 4 sentences each (2 out of 3)****[4]**

1. How was the end of the journey described in the poem "Enterprise" ?
2. What was the cause of George's worry in the story 'The Ant and The Grasshopper'?

3. Who were the incredible women in Indian history referred by Sudha Murty ?

- b. Write short notes on the following in 8 to 10 sentences each (1 out of 2) [4]
1. William Morris
 2. Theme of the poem 'The Butterfly'.

- c. Do as Directed [2]
1. Write the noun form of the following word:
observe
 2. Give the synonym of the following word:
enthusiasm

Q4) [16]

- a. Imagine that you are going to attend an interview for the post of a Sales Manager in a well reputed company. Prepare a mock interview of it. [8]

or

Write a note on different stages of preparation for the interview.

- b. Your best friend has recently moved to a new city for higher studies. Write an email to him/her asking about his / her experience in the new city. [8]

or

Write a blog on the importance of time management for students.

Q5) Write a well-organized paragraph on "The Importance of Sports in Student Life." [8]

or

Write a report about a Cleanliness Drive conducted in your locality.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (2354) B.Sc. CBCS (NEP 2020) (96999) Skill Enhancent Course - V Part 3 SEM 5
- 2] (2324) B.Sc. (CBCS) (79671) English (Compulsory) Part 3 SEM 5
- 3] (2354) B.Sc. CBCS (NEP 2020) (107659) English (Compulsory) Part 3 SEM 5

- 4) A group G having no non-trivial normal subgroup of group G is group.
 - a) a symmetric
 - b) a simple
 - c) non-simple
 - d) an alternative
- 5) An infinite cyclic group has precisely generators.
 - a) one
 - b) two
 - c) three
 - d) infinite
- 6) If characteristic of ring R is n then characteristic of any subring of R is
 - a) 0
 - b) $n-1$
 - c) n
 - d) $x^n = 0$
- 7) An element $0 \neq a$ in a ring R is called zero divisor if there is $0 \neq b \in R$ such that
 - a) $ab = a$
 - b) $ab = 0$
 - c) $ab \neq 0$
 - d) $ab = b$
- 8) Every quotient group of cyclic group is
 - a) cyclic
 - b) symmetric
 - c) neither symmetric nor cyclic
 - d) none of these

Q. 2. Attempt ANY TWO of the following [16]

- 1) If $f: G \rightarrow G'$ is an onto homomorphism with kernel K then show that $\frac{G}{K} \cong G'$
- 2) Prove that order of a cyclic group is equal to the order of its generator.
- 3) If a, n ($n \geq 1$) are any integers such that $\text{g.c.d}(a, n) = 1$, then show that $a^{\phi(n)} \equiv 1 \pmod{n}$.

Q. 3. Attempt ANY FOUR of the following [16]

- 1) Define centre $Z(G)$ of a group. Prove that centre $Z(G)$ of a group G is a subgroup of G .
- 2) Show that subgroup of cyclic group is abelian.
- 3) Prove that a homomorphism $f: G \rightarrow G'$ is one-one if and only if Kernel $\ker f = \{e\}$.

- 4) Prove that division ring R is simple ring.
 - 5) Show that finite integral domain is field.
 - 6) If A and B are two ideals of a ring R , then show that $A+B$ is an ideal of R containing both A and B .
-

Seat	
No.	

SM - 05

Total No. of Pages : 3

B.Sc. (Part III) (Semester – V) (CBCS)

Examination - April 2025

MATHEMATICS

Abstract Algebra (Paper X)

Sub. Code : 79673-P10

Day and Date : Wednesday, 16/04/2025

Total Marks : 40

Time : 2.30 pm. to 4.00 pm.

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q. 1. A) Select the correct alternatives for each of the following. [8]

- a) If G is a group of order 30 then it cannot have a subgroup of order
A) 2 B) 3 C) 5 D) 4
- b) Subtraction is not a binary operation on the set of
A) integers B) natural numbers
C) rational numbers D) real numbers
- c) An isomorphism from a group G to itself is called
A) epimorphism B) monomorphism
C) endomorphism D) automorphism
- d) A one-one homomorphism is called
A) epimorphism B) monomorphism
C) endomorphism D) automorphism

- e) If $f: R \rightarrow R'$ is an onto homomorphism then
- A) $R' \cong \text{Ker} f$ B) $R' \cong \frac{R}{\text{Ker} f}$
- C) $R' \cong \frac{\text{Ker} f}{R}$ D) none of these
- f) A ring R is called a Boolean ring if
- A) $x^2 = x^{-1}$
- B) $x^n = 0$ for some positive integer n
- C) $x^2 = x$
- D) none of these
- g) An element x of a ring R is said to be nilpotent if
- A) $x^2 = 0$ B) $x^2 = e$
- C) $x^n = e$ D) $x^n = 0$, for some positive integer n
- h) Any ring can be imbedded into
- A) ring with zero divisors B) ring without zero
- C) ring with unity D) ring without unity

Q. 2. Attempt any two of the following

[16]

- a) Let G' be the commutator subgroup of a group G , then prove that
 - i) G' is normal in G
 - ii) $\frac{G}{G'}$ is abelian.
- b) Find all the conjugate classes of the quaternion group.
- c) If A, B are two ideals of ring R then prove that $\frac{A+B}{A} \cong \frac{B}{A \cap B}$.

Q. 3. Attempt any four of the following.

[16]

- For $G = S_3$, prove that the commutator group of a group G (i. e. G') = A_3 .
- If A and B are two ideals of ring R , then prove that $A + B$ is an ideal of R containing both A and B .

- c) Prove that a group of order p^2 is abelian.
 - d) Prove that a commutative ring R is an integral domain iff cancellation law holds.
 - e) Prove that a Boolean ring is commutative.
 - f) If R is a commutative ring then prove that an ideal P of R is prime iff $\frac{R}{P}$ is an integral domain.
-

Seat	
No.	

SM - 19

Total No. of Pages : 2

B.Sc. (Part-III) (Semester-V) (CBCS) (NEP 2020)

Examination - April 2025

MATHEMATICS

Integral Transforms (Paper - XII)

Sub. Code : 97052 - P12

Day and Date : Saturday, 19/04/2025

Total Marks : 40

Time : 2.30 pm. to 4.00 pm.

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q. 1. Select the correct alternative for each of the following.

[8]

- 1) The statement that, "If $f(t)$ is a function of class A then Laplace transform of $f(t)$ exists". This is
 a) change of scale property b) second shifting theorem
 c) convolution theorem d) existence theorem
- 2) Laplace transform of Heaviside's unit step function $H\{t\}$ is.....
 a) $\frac{e^{as}}{a}$ b) $\frac{1}{a}$ c) $\frac{1}{s}$ d) $\frac{e^{as}}{s}$
- 3) $\int_0^\infty \frac{\sin at}{t} dt = \dots\dots\dots$
 a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$ c) $\frac{a\pi}{6}$ d) $a\pi$
- 4) $L^{-1} \left\{ \frac{6}{s^4} \right\} = \dots\dots\dots$
 a) t^3 b) t^2 c) t^6 d) $6t^3$
- 5) $L^{-1} \left\{ \frac{1}{\sqrt{s+2}} \right\} = \dots\dots\dots$
 a) $e^{3t} \frac{1}{\sqrt{t}}$ b) $e^{-2t} \frac{1}{\sqrt{\pi t}}$ c) $e^{-2t} \frac{1}{\sqrt{2\pi t}}$ d) $e^{3t} \frac{1}{\sqrt{\pi t}}$

- 6) The circular sin $\theta = \dots\dots$
- a) $\frac{e^{i\theta} - e^{-i\theta}}{2i}$ b) $\frac{e^{i\theta} - e^{-i\theta}}{2}$ c) $\frac{e^{i\theta} + e^{-i\theta}}{2i}$ d) $\frac{e^{i\theta} + e^{-i\theta}}{2}$
- 7) If $f(s)$ is Fourier transform of $F(x)$, then $\dots\dots$ is Fourier transform of $F(ax)$.
- a) $\frac{1}{a} f\left(\frac{s}{a}\right)$ b) $\frac{1}{a} f(s)$ c) $f\left(\frac{s}{a}\right)$ d) $f(as)$
- 8) Laplace transform of k^t is $\dots\dots$
- a) $\frac{1}{s-k}$ b) $\frac{1}{s-2k}$ c) $\frac{1}{s+\log k}$ d) $\frac{1}{s-\log k}$

Q. 2. Attempt any Two.

[16]

- 1) a) If $L\{f(t)\} = f(s)$ then prove that $L\{f'(t)\} = sf(s) - f(0)$
 b) If $f(t) = e^{-2t} \sin 4t$ then find $L\{f'(t)\}$
- 2) Find infinite Fourier sine transform of $e^{-|x|}$, Hence evaluate $\int_0^\infty \frac{x \sin(mx)}{1+x^2} dx$.
- 3) a) State Convolution theorem of inverse Laplace transform
 b) Find inverse Laplace transform of $\frac{3s+1}{(s-1)(s^2+1)}$ by Convolution theorem.

Q. 3. Attempt any Four.

[16]

- 1) Find the Laplace transform of $f(t) = te^{-3t} \sin 3t$
- 2) Obtain Laplace Transform of $\frac{e^{2t} - e^{3t}}{t}$
- 3) Determine the inverse Laplace transform of $\log\left(\frac{s+2}{s+3}\right)$
- 4) Obtain infinite Fourier transform of $f(x) = x^2, |x| < a$
 $= 0, |x| > a$
- 5) Find the infinite inverse Fourier sine transform of $\frac{e^{-as}}{s}$
- 6) Find finite Fourier cosine transform of $f(x) = x^2, 0 < x < 4$.

Seat	
No.	

SM - 07

Total No. of Pages : 3

B.Sc. (Part III) (Semester – V) (CBCS)
Examination – April 2025
MATHEMATICS
DCE-E12: Integral Transforms (Paper-XII)
Sub. Code : 79675-P12

Day and Date : Saturday, 19/04/2025

Total Marks : 40

Time : 2.30 pm. to 4.00 pm.

- Instruction : 1) All questions are compulsory.**
2) Figures to the right indicate full marks.

Q. 1. Select correct alternative for each of the following [08]

- 1) The statement that “If $f(t)$ is of class A then Laplace transform of $f(t)$ exists”, is called
 a) Convolution theorem
 b) second shifting theorem
 c) Existence theorem
 d) first shifting theorem
- 2) Laplace transform of $\int_0^t \cosh at \, dt = \dots\dots\dots$
 a) $\frac{s}{s^2-a^2}$ b) $\frac{1}{(s^2-a^2)}$ c) $\frac{s}{s^2+a^2}$ d) $\frac{1}{s(s^2+a^2)}$
- 3) $L\{k^t\}$ is/does
 a) $\frac{1}{s-\log k}$ b) $\frac{1}{s-2}$ c) $\frac{3}{s-\log 3}$ d) not exist

- 4) The conditions of Existence Theorem of Laplace transform are
- a) necessary b) sufficient but not necessary
- c) necessary and sufficient d) necessary but not sufficient
- 5) Infinite inverse Fourier sin transform of e^{-as} over $0 < s < \infty$ is
where $F(x) = \sqrt{\frac{2}{\pi}} \int_0^\infty f(s) \cdot \sin sx \, ds$
- a) $\sqrt{\frac{2}{\pi}} \cdot \frac{x}{(a^2+x^2)}$ b) $\sqrt{\frac{2}{\pi}} \cdot \frac{x}{(a^2-x^2)}$
- c) $\sqrt{\frac{2}{\pi}} \cdot \frac{1}{(a^2+x^2)}$ d) $\sqrt{\frac{2}{\pi}} \cdot \frac{1}{(a^2-x^2)}$
- 6) $L^{-1} \left\{ \frac{1}{(s-5)^2} \right\} = \dots\dots\dots$
- a) $e^{3t} \cdot t$ b) $e^{5t} \cdot t$ c) $e^{5t} \cdot t^2$ d) $e^t \cdot 3t$
- 7) $L^{-1} \left\{ \frac{3s-7}{s^2-6s+8} \right\} = \dots\dots\dots$
- a) $e^{3t}[3\cosh t - 2\sinh t]$ b) $e^{3t}[3\cosh t + 2\sinh t]$
- c) $e^{3t}[3\cosh t - 2\sin t]$ d) $e^{3t}[3\cosh t + 2\sin t]$
- 8) $L^{-1} \left\{ \frac{s}{(s^2+16)} \right\} = \dots\dots\dots$
- a) $\sin 4t$ b) $\frac{\sin 4t}{4}$ c) $\frac{\sin 4t}{16}$ d) $\cos 4t$

Q. 2. Attempt any Two

[16]

- 1) If $L\{f(t)\} = f(s)$ then prove that $L\left\{\int_0^t f(u)du\right\} = \frac{1}{s}f(s)$.

Hence find Laplace transform of $\int_0^t u \cosh u \, du$.

- 2) By Convolution theorem find inverse Laplace transform of $\frac{1}{(s+3)(s^2+4)}$

- 3) Obtain infinite Fourier transform of $F(x) = 1, |x| < k$
 $= 0, |x| > k$

Where $F\{F(x)\} = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} F(x)e^{isx} dx$ and hence evaluate $\int_0^{\infty} \frac{\sin x}{x} dx$.

Q. 3. Attempt any Four

[16]

- 1) Obtain inverse Laplace transform of $\log \left[\frac{s(s+1)}{s^2+4} \right]$
 - 2) If $f(t) = t^2$, $0 < t < 2$ and $f(t) = f(t+2)$ then find $L\{f(t)\}$.
 - 3) Determine the inverse Laplace transform of $\frac{2s+1}{3s^2-4}$
 - 4) Evaluate $\int_0^\infty e^{-4t} \sin t \, dt$ using Laplace transform.
 - 5) Obtain Fourier transform of $f(x) = \begin{cases} x^2, & |x| < a \\ 0, & |x| > a \end{cases}$
 - 6) Obtain the infinite Fourier sine transform of $f(x) = x^3$ in $(0, \pi)$
-

Seat	
No.	

SM - 18

Total No. of Pages : 3

B.Sc. (Part III) (Semester – V) (CBCS) (NEP)

Examination - April 2025

MATHEMATICS

DSE – E11 : Partial Differential Equations (Paper – XI)

Sub. Code : 97051-P11

Day and Date : Thursday, 17/04/2025

Total Marks : 40

Time : 2.30 pm. to 4.00 pm.

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Use of non-programmable calculators is allowed.

Q. 1. Select the correct alternative for each of the following.

[8]

1) The partial differential equation of the form $Pp + Qq = R$, where P, Q, R are functions of x, y and z is called

A) Charpit's partial differential equation.

B) Jacobi's partial differential equation.

C) Lagrange's partial differential equation.

D) Pfaffian partial differential equation.

2) A complete integral of the partial differential equation $p^2 + q^2 = 1$ is

A) $z = ax + (\sqrt{1 - a^2})y + c$

B) $z = ax + \frac{a}{a-1}y + c$

C) $z = \frac{a}{a-1}x + ay + c$

D) $z = (\sqrt{1 - a^2})x + ay + c$

- 3) A partial differential equation, by eliminating arbitrary function f from $z = f\left(\frac{y}{x}\right)$ is
A) $xp - yq = 0$ B) $xp + yq = 0$
C) $y^2p + x^2q = 0$ D) $y^2p - x^2q = 0$
- 4) A complete integral of the partial differential equation $z = px + qy + pq$ is
A) $z = ax + ay + a^2$ B) $z = ax + by + ab$
C) $\log z = ax + ay + ab$ D) $\log z = ax + ay + a^2$
- 5) A solution of the partial differential equation $(D^3 - 3D^2 D' + 2DD'^2) z = 0$ is
A) $z = f_1(x) + f_2(y + x) + f_3(y + 2x)$ B) $z = f_1(y) + f_2(y - x) + f_3(y - 2x)$
C) $z = f_1(x) + f_2(y - x) + f_3(y - 2x)$ D) $z = f_1(y) + f_2(y + x) + f_3(y + 2x)$
- 6) A solution of the partial differential equation $(D^2 - D'^2) z = 0$ is
A) $z = f_1(y - x) + f_2(y + 2x)$ B) $z = f_1(y - x) + xf_2(y + x)$
C) $z = f_1(y + x) + f_2(y - x)$ D) $z = f_1(y - 2x) + f_2(y + 2x)$
- 7) A solution of the partial differential equation $(D^2 - D'^2 + D - D')z = 0$ is
A) $z = f_1(y + x) + e^{-x} f_2(y - x)$ B) $z = f_1(y + x) + e^x f_2(y - x)$
C) $z = f_1(y - x) + e^{-x} f_2(y - x)$ D) $z = f_1(y - x) + e^x f_2(y - x)$
- 8) A solution of the partial differential equation $(D - D')z = 0$ is
A) $z = \sum Ae^{h(x+y)}$ B) $z = \sum Ae^{hx+h^2y}$
C) $z = \sum Ae^{h^2x+y}$ D) $z = \sum Ae^{h^2(x+y)}$

Q. 2. Attempt any TWO of the following.

[16]

- 1) Explain the method of forming partial differential equation of $f(z, p, q, a, b) = 0$, by eliminating arbitrary constants a and b , where $p = \partial z / \partial x$, $q = \partial z / \partial y$, and hence solve $(x - a)^2 + (y - b)^2 + z^2 = 1$

- 2) Solve the following partial differential equations:
 - i) $r + 2s + t + 2p + 2q + z = 0$
 - ii) $(D^3 - 7DD'^2 - 6D'^3)z = \sin(x + 2y) + e^{2x+y}$
- 3) Explain the Charpit's method of solving the partial differential equation.

Q. 3. Attempt any FOUR of the following.

[16]

- 1) Find the complete integral of partial differential equation
 $p^2 + q^2 = x + y.$
 - 2) Solve the partial differential equation
 $yzp + zxq = xy$
 - 3) Solve the partial differential equation
 $z = px + qy + p^2 + q^2$
 - 4) Solve the homogeneous partial differential equation
 $(D^2 - 2DD' - 15D'^2)z = 12xy.$
 - 5) Solve the partial differential equation
 $2 \frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} - 3 \frac{\partial z}{\partial y} = 5 \cos(3x - 2y)$
 - 6) Solve the partial differential equation
 $(D^3 - 3DD' + D' + 1)z = e^{2x+3y}.$
-

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper IX****Sub. Code: 97054****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks

Q1) Select the correct alternative.**[8]**

i.

The order and degree of the differential equation $\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2 = 8z$ are

- A. 1 and 2
- B. 1 and 1
- C. 0 and 1
- D. 2 and 1

ii.

In Spherical polar coordinate system, the values of scale factors h_1 , h_2 , and h_3 are

- A. 1, r , and $r\sin\theta$
- B. 1, $2r$, and $r\sin\theta$
- C. 1, r , and $r\cos\theta$
- D. 1, $2r$, and $r\cos\theta$

iii.

Theof scalar function gives information about maximum variation of scalar function in a specific direction.

- A. divergence
- B. gradient
- C. laplacian
- D. curl

iv.

The value of angular frequency of circular motion of particle under action of Lorentz force is

- A. $\frac{m}{qB}$

- $\frac{q}{mB}$
 B. $\frac{qE}{mB}$
 $\frac{2}{qB}$
 C. $\frac{2}{m}$
 D. $\frac{qB}{m}$

v.

To solve the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$ by method of separation of variables, we assume the solution in the form $u(x, y, z) = \dots\dots\dots$

- A. $X(x) Y(y) Z(t)$
 B. $X(x) Y(y)$
 C. $X(x) Y(y) Z(z)$
 D. $X(x) Z(z)$

vi. Maxwell has modified the..... to examine its validity for dynamic fields.

- A. Gauss's law
 B. Faraday's law
 C. Coulomb's law
 D. Ampere's law

vii. The Laplace's differential equation is used to study

- A. the electrostatic potential in uniform dielectric.
 B. the magnetic potential in a free space.
 C. the gravitational potential in the regions containing no matter.
 D. all of above.

viii. The second Maxwell's law proves the magnetic field is

- A. solenoidal.
 B. rotational.
 C. irrotational.
 D. steady.

Q2) Attempt any TWO of the following

[16]

a. Derive an expression for divergence of a vector field in orthogonal curvilinear co ordinates. [8]

b. $\frac{\partial^2 u}{\partial x^2} c^2 = \frac{\partial^2 u}{\partial t^2}$ [8]

Solve the equation by method of separation of variables.

- c. State and explain the Maxwell's equations with their physical significance. [8]

Q3) Attempt any FOUR of the following [16]

- a. Derive the relation for curl of vector field in terms of cylindrical coordinates. [4]
- b. Explain the Maxwell's correction in the Ampere's law. [4]
- c. Discuss the motion of charged particle In homogeneous as well as crossed electric and magnetic fields. [4]
- d. Explain linearity and homogeneity of differential equation [4]
- e. Derive the relation for line element in cylindrical coordinate system. [4]
- f. Discuss the motion of charged particle in homogeneous magnetic field. [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97054) Physics Paper IX Part 3 SEM 5

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper IX****Sub. Code: 65802/79677/79924****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks

Q1) Select the correct alternative.**[8]**

i. Every partial differential equation involves at leastindependent variables

- A. 1
- B. 2
- C. 3
- D. 4

ii. The method of separation of variables converts the given partial differential equation into..... differential equation

- A. Partial
- B. Partial ordinary
- C. ordinary
- D. none of these

iii. The Legendre's differential equation has general solution in the form.....

- A. $y = A P_n(x)$
- B. $y = B Q_n(x)$
- C. $y = A P_n(x) + B Q_n(x)$
- D. $y = A P_n(x) - B Q_n(x)$

iv.

For the equation $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = 0$, the point of regular singularity is.....

- A. $x = \infty$
- B. $x = 1$
- C. $x = 0$

- D. $x = 2$
- v. The value of integral $\int_0^{\infty} e^{-x^2} dx$ is.....
- A. π
 B. $\sqrt{\pi}/2$
 C. $\sqrt{\pi}/2\sqrt{2}$
 D. 1
- vi. The value of $\Gamma(1/4)\Gamma(3/4)$ is.....
- A. $\pi\sqrt{2}$
 B. $\frac{\pi}{\sqrt{2}}$
 C. $\sqrt{\pi}/2$
 D. $\pi/2\sqrt{2}$
- vii. The value of $\log(-3)$ is.....
- A. $-3 + i\pi$
 B. $3 + i\frac{\pi}{2}$
 C. $3 + i\pi$
 D. $-3 - i\pi$
- viii. If ω is complex cube root of unity, then $\omega^3 =$
- A. 1
 B. -1
 C. i
 D. 0

Q2) Attempt any TWO of the following.

[16]

- a. Solve the two dimensional Laplace's equation

[8]

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \text{ by method of separation of variables.}$$

- b. Define Bessel's differential equation and solve it by using series solution method.

[8]

- c. State and prove the Cauchy- Riemann conditions for a function to be analytic.

[8]

Q3) Attempt any FOUR of the followings.

a. Solve the wave equation in the form $\frac{\partial^2 u}{\partial x^2} = \frac{1}{c^2} \frac{\partial^2 u}{\partial t^2}$ by method of separation of variables. [4]

b. Define Legendre's Polynomials of first kind and derive first four polynomials. [4]

c. Define error function and show that it is odd function with relation $erf(\infty) = 1$ [4]

d. Derive the relation between beta and gamma functions of the form [4]

$$\beta(m, n) = \frac{\Gamma(m) \Gamma(n)}{\Gamma(m+n)}$$

e. Using Euler's formula prove the De'Moivre's theorem. [4]

f. [4]

$$\int_0^{\infty} e^{-kx} x_{n-1} dx = \frac{\Gamma(n)}{k^n}$$

Define Gamma function and prove that

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (286) B.Sc.(Sem.) (79924) Physics Paper IX Part 3 SEM 5

2] (286) B.Sc.(Sem.) (65802) Physics Paper IX Part 3 SEM 5

3] (2324) B.Sc. (CBCS) (79677) Physics Paper IX Part 3 SEM 5

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper X****Sub. Code: 97055****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks

Q1) Select the correct alternative.**[8]**

- i. Experimental verification of matter waves is given by
 - A. Newton
 - B. Einstein
 - C. Davisson & Germer
 - D. Bragg
- ii. Phase Velocity of matter wave is given by.....
 - A. $V_p = \omega/k$
 - B. $V_p = k/w$
 - C. $V_p = d\omega/dk$
 - D. $V_p = dk/d\omega$
- iii. The probability of finding a particle in a distance dx around a point x is.....
 - A. Ψ
 - B. $\Psi\Psi^* dx$
 - C. $\Psi\Psi^*$
 - D. Ψ^*
- iv. In quantum mechanics, the lowering operator is given by.....
 - A. $L_- = L_x + iL_y$
 - B. $L_- = L_x - iL_y$
 - C. $L_- = L_z + iL_y$
 - D. $L_- = L_z - iL_y$
- v. The condition for anti-symmetric wave function is.....
 - A. $\varepsilon = -1$
 - B. $\varepsilon = +1$
 - C. $\varepsilon = -i$
 - D. $\varepsilon = i$

- vi. In hydrogen atom, energy levels are given by.....
- $E_n = 13.6/n^2$
 - $E_n = -13.6/n$
 - $E_n = 13.6/n$
 - $E_n = -13.6/n^2$
- vii. In terms of the momentum (P) & propagation vector (K), the relation for de Broglie wave is.....
- $P = \hbar k$
 - $P = \hbar/k$
 - $P = \hbar \omega$
 - $P = k/\hbar$
- viii. The principle that all microscopic particles have both wave and particle nature is called the wave particle.....
- Singularity
 - Duality
 - Triality
 - Infinality

Q2) Attempt ANY TWO of the following.

[16]

- Derive Schrodinger's time-independent wave equation for matter wave in one-dimensions. **[8]**
- Obtain the commutation relation for components of L_x, L_y, L_z of the orbital angular momentum. Hence show that L^2 commutes with any one components. **[8]**
- Explain energy eigen values in case of a particle inside the one dimensional rigid box. **[8]**

Q3) Attempt ANY FOUR of the following.

[16]

- Write short note on wave particle duality **[4]**
- State and explain De-Broglie hypothesis of matter waves. **[4]**
- Explain significance of any two quantum numbers. **[4]**
- Derive expression for linear momentum operator. **[4]**
- Explain eigen function & eigen values. **[4]**
- State and explain normalised wave function. **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97055) Physics Paper X Part 3 SEM 5

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper X****Sub. Code: 65803/79678/79925****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of log table and calculator is allowed

Q1) Select the correct alternative:**[8]**

- i. If p is the momentum of a particle and k is the propagation constant of the wave, then de Broglie relation is _____.

A. $p = \hbar k$

B. $p = \frac{\hbar}{k}$

C. $p = \frac{\hbar}{w}$

D. $p = \frac{w}{\hbar}$

- ii. The energy operator $\hat{E}$ is _____.

A. $-i\hbar \frac{\partial}{\partial t}$

B. $+i\hbar \frac{\partial}{\partial t}$

C. $-i\hbar \frac{\partial}{\partial x}$

D. $+i\hbar \frac{\partial}{\partial x}$

- iii. Coefficient of reflection is defined as ratio of _____ to _____ current densities.

- A. incident, transmitted
- B. reflected, transmitted
- C. incident, reflected

D. reflected, incident

iv. The lowering operator is defined as _____.

A. $L_- = L_x + iL_y$

B. $L_- = L_x - iL_y$

C. $L_- = L_z - iL_y$

D. $L_- = L_z + iL_y$

v. The energy of the particle moving in 1-D rigid box is proportional to _____.

A. length

B. reciprocal of square of length

C. reciprocal of length

D. square of length

vi. The relation between phase velocity (u) and particle velocity (v) is given by _____.

A. $u = \frac{h}{mv}$

B. $u = \frac{c^2}{v}$

C. $u = \frac{v}{c^2}$

D. $u = \frac{2c^2}{v}$

vii. The quantity $\psi^*\psi$ is called as _____.

A. probability density

B. probability current density

C. current

D. probability current

viii. The normalization condition of the wave function Ψ is given by _____.

A. $\int_{-\infty}^{\infty} \Psi^* \Psi dV = 0$

B. $\int_{-\infty}^{\infty} \Psi^* \Psi dV = 1$

C. $\int_{-\infty}^{\infty} \Psi^* \Psi dV \leq 1$

D. $\int_{-\infty}^{\infty} \Psi^* \Psi dV \geq 1$

Q2) Attempt any two of the following:

- a. Describe Davisson and Germer experiment to verify the concept of matter waves.
- b. Write the Schrodinger's equation for hydrogen atom and separate into angular and radial parts.
- c. Derive Schrodinger's time dependent wave equation in one dimensional form.

Q3) Attempt any four of the following:

[16]

- a. Write note on potential barrier.
- b. Discuss the concept of wave particle duality.
- c. Prove that $[L_x, L_y] = i\hbar L_z$.
- d. Explain the physical interpretation of wave function (ψ).
- e. Write note on Hamiltonian operator.
- f. Define an operator and explain the concept of parity operator.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (79925) Physics Paper X Part 3 SEM 5
- 2] (286) B.Sc.(Sem.) (65803) Physics Paper X Part 3 SEM 5
- 3] (2324) B.Sc. (CBCS) (79678) Physics Paper X Part 3 SEM 5

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper XI****Sub. Code: 97056****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. No drawing paper, tracing paper or its cutting is to be brought from outside or taken out from examination hall
 5. Use of scientific calculator and logarithmic table is allowed

Q1) Solve following MCQ.**[8]**

- i. _____ constraints are time dependent.
 - A. Holonomic
 - B. Non-Holonomic
 - C. Scleronomous
 - D. Rheonomous
- ii. The Principle of virtual work deals with only the cases of ----
 - A. statics
 - B. dynamics
 - C. mechanics
 - D. Kinematics
- iii. The Laplace equation is represented as -----
 - A. $\nabla \cdot \nabla = 0$
 - B. $\nabla \cdot \nabla = 0$
 - C. $\nabla \times \nabla = 0$
 - D. $\nabla^2 \nabla = 0$
- iv. The shortest distance between two points in a plane is along a-----
 - A. parabola
 - B. curve
 - C. straight line
 - D. normal to plane
- v. In Brachistochrone problem, the path of a particle is-----
 - A. Parabolic
 - B. Circular
 - C. cycloid
 - D. straight line

- vi.** The inertial frame of reference is---- frame of reference.
A. an accelerated
B. a rotating
C. an unaccelerated
D. an oscillating
- vii.** ----- formulated first the classical theory of relativity.
A. Einstein
B. Newton
C. Galileo
D. Rutherford
- viii.** Eulers equation of motion is a statement expressing ----
A. conservation of mass
B. conservation of energy
C. Newtons first law of motion
D. none of above

Q2) Attempt any two of the following **[16]**

- a.** Derive the Lorentz transformation equation on the basis of special theory of relativity. **[8]**
- b.** Deduce Lagrange's equation from D'Alembert's Principle **[8]**
- c.** Derive Lagrange's equation from Hamiltons principle **[8]**

Q3) Attempt any four of the following **[16]**

- a.** Write note on Brachistochrone problem. **[4]**
- b.** State and Explain Eulers theorem **[4]**
- c.** Write note on Atwoods machine. **[4]**
- d.** Derive the Einstein mass-energy relation. **[4]**
- e.** Explain motion of rigid body in space. **[4]**
- f.** Write note on angular momentum and kinetic energy. **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97056) Physics Paper XI Part 3 SEM 5

799712

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper XII****Sub. Code: 97057****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**
 - 4. Use of log table and calculator is allowed**

Q1) Choose the correct alternatives**[8]**

- i. The relation between VCE and IC represented by a straight line is known as a.....
- A. Frequency response
 - B. Frequency curve
 - C. Load-line
 - D. Line-curve
- ii.gate is called as inverter.
- A. OR
 - B. NOT
 - C. AND
 - D. EX-OR
- iii.flip- flop is a refinement of R-S flip-flop.
- A. D
 - B. J-K
 - C. T
 - D. all
- iv. CRT stands for
- A. Cathode Radiation Tube
 - B. Caloric Radiation Tube
 - C. Cathode Ray Tube
 - D. Caloric Ray Tube
- v. In a transistor.....
- A. $I_C = I_E + I_B$
 - B. $I_B = I_C + I_E$
 - C. $I_E = I_C - I_B$
 - D. $I_E = I_C + I_B$

- vi.is an electronic circuit which converts d.c. energy into a.c. energy.
A. Amplifier
B. Oscillator
C. Op-Amp
D. None
- vii. Ideal Op-Amp hasslew rate
A. zero
B. infinite
C. finite
D. large
- viii.is widely used as a Op-Amp.
A. IC 741
B. IC 742
C. IC 743
D. IC 7411

Q2) Attempt any Two of the following **[16]**

- a. Draw a neat block diagram of CRT and describe the functions of various components. **[8]**
- b. Explain with truth table, different types of basic gates. **[8]**
- c. Draw circuit diagram of monostable multivibrator using IC 555. Explain its working and draw the wave forms. Obtain an expression for output pulse width. **[8]**

Q3) Attempt any four of the following **[16]**

- a. How will you draw d. c. load line on the output characteristics of a transistor? **[4]**
- b. Explain Op- Amp as an integrator **[4]**
- c. Describe in brief the uses of CRO. **[4]**
- d. Explain Barkhausen criteria of oscillator **[4]**
- e. Explain IC 555 as Astable multivibrator **[4]**
- f. Explain R-S flip-flop using NOR gates **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97057) Physics Paper XII Part 3 SEM 5

295246

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper XII****Sub. Code: 65805/79680/79927****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**
 - 4. Use of log table and calculator is allowed**

Q1) Select the correct alternatives.**[8]**

- i. For.....gate, output is high when any one of the given inputs is high.
 - A. AND
 - B. OR
 - C. NOR
 - D. NAND
- ii. The binary 0 and 1 represents, respectively.
 - A. low, high
 - B. high, low
 - C. low only
 - D. high only
- iii. For Barkhausen criterion, $A\beta$ value must be.....
 - A. 1
 - B. less than 1
 - C. greater than 1
 - D. 0
- iv. The most commonly used transistor arrangement is.....
 - A. common collector
 - B. common emitter
 - C. common base
 - D. no common terminal
- v. CRT stands for.....
 - A. Cathode Radiation Tube
 - B. Caloric Radiation Tube
 - C. Caloric Rays Tube
 - D. Cathode Ray Tube
- vi. The inner wall of CRT is coated withmaterial.

- A. zinc chloride
- B. phosphor
- C. zinc
- D. fluorescent

vii. Time period of monostable multivibrator is.....

- A. $T = 0.33 RC$
- B. $T = 3RC$
- C. $T = RC$
- D. $T = 1.1 RC$

viii. Differential amplifier can be used as the basic building block for.....

- A. differentiator
- B. op-amp
- C. amplifier
- D. oscillator

Q2) Attempt any two of the following.

[16]

- a. What is a differential amplifier? Explain its different types with suitable diagrams. **[8]**
- b. Discuss the circuit operation of phase-shift oscillator. **[8]**
- c. State and prove De Morgan's theorems. **[8]**

Q3) Attempt any four of the following.

[16]

- a. State all and discuss any two applications of CRO **[4]**
- b. State characteristics of an ideal op-amp. **[4]**
- c. Discuss NAND gate as universal gate. **[4]**
- d. Explain Barkhausen criterion for sustained oscillations. **[4]**
- e. Explain principle of negative feedback. **[4]**
- f. A monostable multivibrator has $R = 120 \text{ k}\Omega$ and the time delay $T = 1000 \text{ ms}$, calculate the value of C. **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (79927) Physics Paper XII Part 3 SEM 5
- 2] (286) B.Sc.(Sem.) (65805) Physics Paper XII Part 3 SEM 5
- 3] (2324) B.Sc. (CBCS) (79680) Physics Paper XII Part 3 SEM 5

995873

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Zoology Paper IX****Sub. Code: 97069****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Select the correct alternative and rewrite the sentence**[8]**

- i.**of the following is an example of a soft epidermal derivative.
 - A. Hair
 - B. Sweat glands
 - C. Nails
 - D. Horns
- ii.**bone is a part of the forelimb in rabbits.
 - A. Femur
 - B. Humerus
 - C. Tibia
 - D. Ilium
- iii.**vertebrate class possesses a muscular structure known as a gizzard for grinding food.
 - A. Mammals
 - B. Reptiles
 - C. Birds
 - D. Amphibians
- iv.** Lungs are the primary respiratory organs in.....
 - A. Mammals
 - B. Amphibians
 - C. Reptiles
 - D. All of the above
- v.**is the primary advantage of a four-chambered heart.
 - A. Reduced oxygen supply
 - B. Improved separation of oxygenated and deoxygenated blood
 - C. Single circulation system
 - D. Reduced blood flow

- vi.** The succession of kidney development in vertebrates progresses as.....
A. Pronephros → Metanephros → Mesonephros
B. Pronephros → Mesonephros → Metanephros
C. Mesonephros → Pronephros → Metanephros
D. Mesonephros → Metanephros → Pronephros
- vii.**class of vertebrates is the optic lobe most prominent.
A. Fishes
B. Amphibians
C. Reptiles
D. Birds
- viii.** In amphibians, sound transmission involves the.....
A. Pinna
B. Tympanum and columella
C. Malleus and cochlea
D. Auditory nerve only

Q2) Attempt any TWO of the following [16]

- a.** Describe hard epidermal derivatives in vertebrates [8]
- b.** Compare the structure of the lung of Amphibia with the structure of the lung of Mammal [8]
- c.** Describe the Evolution of heart in Vertebrates [8]

Q3) Attempt any Four of the following [16]

- a.** Pelvic girdle of Rat [4]
- b.** Crop of Birds [4]
- c.** Gills of Fishes [4]
- d.** Metanephros [4]
- e.** Aortic arches of Reptile [4]
- f.** Atlas vertebra [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97069) Zoology Paper IX Part 3 SEM 5

169783

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Zoology Paper X****Sub. Code: 97070****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Select the correct alternatives and rewrite the sentence**[8]**

- i.** DNA replication takes place during.....
 - A. S - phase
 - B. M - phase
 - C. Prophase
 - D. Metaphase
- ii.** Okazaki fragments are joined by
 - A. Ligase
 - B. Helicase
 - C. Endonuclease
 - D. Primase
- iii.** Ribose nucleic acid does not contain
 - A. Uracil
 - B. Adenine
 - C. Thymine
 - D. Cytosine
- iv.** Transcription process occurs in the
 - A. Nucleus
 - B. Cytoplasm
 - C. Mitochondria
 - D. Ribosomes
- v.** Western blot is the technique for.....blot.
 - A. RNA
 - B. Lipid
 - C. Protein
 - D. DNA
- vi.** In Lac operon, the closely linked structural genes are in..... sequence.

- A. Y, a, z
- B. z, y, a
- C. a, y, z
- D. z, a, y

vii. Restriction endonucleases are.....

- A. Molecular scissors
- B. Vectors
- C. Joining enzymes
- D. Polymerases

viii. The DNA probe is a

- A. Single stranded DNA
- B. Double stranded DNA
- C. Double stranded RNA
- D. None

Q2) Attempt any two of the following

[16]

- a. Describe the structure of Watson and Crick model of DNA.
- b. What is genetic code? Explain properties of genetic code.
- c. What is PCR? Explain steps of polymerase chain reaction.

Q3) Attempt any four of the following.

[16]

- a. Structure of m-RNA
- b. Wobble hypothesis
- c. Restriction enzymes
- d. Plasmids
- e. Application of DNA Finger Printing
- f. Southern blotting

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Zoology Paper XII****Sub. Code: 97072****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 02.30 PM To 04:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Rewrite the sentence by choosing a correct alternative. **[8]**

i. is the primary cause of the eutrophication in freshwater ecosystems.

- A. Industrial effluents
- B. Nutrients from agricultural runoff
- C. Climate change
- D. Domestic sewage

ii. is the basic goal of the wastewater treatment plants.

- A. Removing nutrients
- B. Removing pathogens
- C. Removing heavy metals
- D. Reducing the volume of the water

iii. is an example of the freshwater biome.

- A. Coral reef
- B. Estuary
- C. Ocean
- D. Lake

iv. **Buoyancy in fishes is due to.....**

- A. Air sacs
- B. Swim bladder
- C. Breathing apparatus
- D. Adhesive devices

v. **Coral reefs are formed by the process called.....**

- A. Deposition of sediment
- B. Precipitation of calcium carbonate
- C. Erosion of rocks
- D. Metamorphism of limestone

vi. is a characteristic feature of the young stage of stream.

- A. Steady water flow
- B. Sedimentation
- C. Stagnant water
- D. Rapids

vii. The salinity of Marine water is.....

- A. 3.5%
- B. 2.1%
- C. 1.0%
- D. 1.8%

viii. The neritic zone is a part of

- A. Benthic region
- B. Pelagic region
- C. Oceanic region
- D. Deep Sea

Q2) Long Answer Questions (Attempt any two) [16]

- a. What is water pollution? Explain various sources of water pollution. [8]
- b. Define Limnology. Give details about the Physico-chemical characteristics of Lake water. [8]
- c. Define adaptation. Write in detail about adaptations in hill stream fishes. [8]

Q3) Short Answer Questions (Attempt any four) [16]

- a. Eutrophication
- b. Lake Morphometry
- c. Oceanic pelagic zones
- d. Sulphur cycle
- e. Coral reef
- f. Estuaries

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

134694

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XIII****Sub. Code: 58071/65842/81680/81882****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Rewrite the following sentences by choosing correct alternatives: **[8]**

- i. Glucose is a ----- type of monosaccharide.
A. Tetrose
B. Triose
C. Pentose
D. Hexose
- ii. Sucrose is made up of -----
A. Glucose + Mannose
B. Glucose + Fructose
C. Glucose + Glucose
D. Galactose + Galactose
- iii. ----- is an example of derived lipid.
A. Wax
B. Heparin
C. Oil
D. Steroids
- iv. In plant cells lipids are stored in -----
A. Sphaerosomes
B. Mesosomes
C. Cytosol
D. Lysosomes
- v. ----- is a heterocyclic amino acid.
A. Alanine
B. Lysine
C. Aspartate
D. Proline
- vi. ----- cell organelle is involved in the process of protein synthesis.

- A. Vesicles
- B. Riobosomes
- C. Mitochondria
- D. Chloroplast

vii. Anticodon is located on _____

- A. m-RNA
- B. r-RNA
- C. t-RNA
- D. hn-RNA

viii. In B-DNA ----- number of base pair per turn are present.

- A. 20
- B. 10
- C. 15
- D. 24

Q2) Attempt any two of the following:

[16]

- a. What are carbohydrates? Explain the structure and properties of Monosaccharides. **[8]**
- b. What are lipids? Give brief account of saturated fatty acids. **[8]**
- c. Give brief outline of biosynthesis of Proline amino acid. **[8]**

Q3) Attempt any four of the following:

[16]

- a. Lac Operon.
- b. Stereoisomers.
- c. Types of RNA
- d. Secondary structure of protein.
- e. Conjugated lipids.
- f. Z form of DNA.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 2] (286) B.Sc.(Sem.) (65842) Botany Paper XIII Part 3 SEM 6
- 3] (2324) B.Sc. (CBCS) (81680) Botany Paper XIII Part 3 SEM 6
- 4] (286) B.Sc.(Sem.) (58071) Botany Paper XIII Part 3 SEM 6

857756

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XIII****Sub. Code: 97157****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Complete the following sentence by choosing the correct alternative .

[8]

- i.** Glucose is a sugar.

 - A. Aldohexose
 - B. Ketohexose
 - C. Aldopentose
 - D. Ketotriose
- ii.** is an example of polysaccharide.

 - A. Glucose
 - B. Sucrose
 - C. Starch
 - D. Fructose
- iii.** Lactose sugar contains monosaccharide units.

 - A. Glucose and Fructose
 - B. Glucose and Glucose
 - C. Glucose and Galactose
 - D. Glucose and Sucrose
- iv.** An example of unsaturated fatty acid is

 - A. Palmitic acid
 - B. Linoleic acid
 - C. Stearic acid
 - D. Lauric acid
- v.** Triglycerides which are solid at room temperature and contain more quantity of saturated fatty acids are called.....

 - A. Proteins
 - B. Lipids
 - C. Fats
 - D. Oils

- vi. Hydrolysis of fats by alkali is called
A. Hydration
B. Saponification
C. Reduction
D. Oxidation
- vii. Copying someone else's research work is.....
A. plagiarism
B. cut paste
C. repetition
D. steal
- viii. Primary data can be collected through
A. experiments
B. research reports
C. academic journals
D. published data

Q2) Attempt ANY TWO of the following questions:

[16]

1. What are carbohydrates? Give their classification with suitable example.
2. Explain the properties and examples of saturated fatty acid
3. Define research and explain the types of research.

Q3) Attempt ANY FOUR of the followings:

[16]

1. Fatty acid biosynthesis
2. Starch
3. Significance of carbohydrates
4. Micrometry
5. Literature review
6. Classification of lipid

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरीता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97157) Botany Paper XIII Part 3 SEM 6

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XIV****Sub. Code: 97158****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Rewrite the following sentences by choosing correct alternatives**[8]**

- i. Reduction, removal, and avoidance are the types of
 - A. Carbon credit
 - B. Sterilization
 - C. Green Audit
 - D. All of the above
- ii.is the consumption of a resource faster than it can be replenished.
 - A. Resource depletion
 - B. Carbon credit
 - C. Resource accounting
 - D. Geographic Information Systems
- iii. .In Resource management, GIS stands for.....
 - A. Geographic Information System
 - B. Geographic innovative system
 - C. Graphic invented system
 - D. Geological investigation system
- iv.of medicinal plants is a quality assurance process.
 - A. Authentication
 - B. Identification
 - C. Storage
 - D. Drying
- v. Unintentional adulteration may be due to
 - A. Confusion in vernacular names .
 - B. Lack of knowledge about the authentic plant
 - C. Careless collection
 - D. All of the above
- vi. *Tinospora cordifolia* belongs to family

- A. Poaceae
- B. Solanaceae
- C. Cucurbitaceae
- D. Menispermaceae

vii.is a hair dye plant .

- A. *Tinopsora cordifolia*
- B. *Solanum tuberosa*
- C. *Lawsonia inermis*
- D. *Solanum nigrum*

viii. of the Henna plant used in the production of dyes.

- A. Dried or fresh leaves
- B. Stem
- C. Root
- D. Flowers

Q2) Attempt **any two** of the following

[16]

- a. What are natural resources? Explain the types of natural resources which you have studied. [8]
- b. Give the Medicinal uses of *Phyllanthus emblica* and *Aloe vera*. [8]
- c. Give the applications of *Sapindus laurifolius* and *Senegalia concinna* in herbal cosmetics . [8]

Q3) Attempt any four of the following:

[16]

- a. Application of GIS in Natural Resource Management [4]
- b. Major Forest Products. [4]
- c. Importance of herbal medicines. [4]
- d. Morphological methods of drug evaluation [4]
- e. Applications of *Santalum album* in herbal technology [4]
- f. Uses of *Rosa indica* [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

919656

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XIV****Sub. Code: 58072/65843/81681/81883****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Solve following MCQ.**[8]**

- i. In Bioinformatics BLAST stands for -----
 - A. Basic Local Alignment Search Tool
 - B. Bits Laying Art System Tuning
 - C. Basic Lipid Art System Tool
 - D. Back Laying Art System Tool
- ii. The middle value in the set of observations is referred to as -----
 - A. Mean
 - B. Mode
 - C. Median
 - D. Range
- iii. The botanical name of wheat is -----
 - A. *Solanum*
 - B. *Pisum*
 - C. *Triticum*
 - D. *Sorghum*
- iv. ----- is a branch of bioinformatics
 - A. Genomics
 - B. Transcriptomics
 - C. Proteomics
 - D. All of these
- v. ----- databases are the repository of raw sequenced and annotated data.
 - A. Primary
 - B. Secondary
 - C. Composite
 - D. None of these
- vi. The botanical name of black pepper is -----

- A. *Gossypium arboreum*
- B. *Piper nigrum*
- C. *Thea comelina*
- D. *Solanum nigrum*

vii. The botanical name of soybean is -----

- A. *Arachis hypogea*
- B. *Glycine max*
- C. *Triticum*
- D. *Sorghum*

viii. part of the tea plant used to prepare the beverage.

- A. Root
- B. Stem
- C. Leaves
- D. Inflorescence

Q2) Attempt **any Two** of the following.

[16]

- a. Explain different types of sampling methods in Biostatistics. [8]
- b. Explain in detail the applications of Bioinformatics in molecular phylogeny. [8]
- c. Write in detail about the origin, botanical name, parts used, and economic importance of Gram. [8]

Q3) Write short note

[16]

- a. Write a note on the coefficient of variation
- b. Economic importance of Groundnut
- c. Branches of Bioinformatics
- d. Economic importance of clove
- e. Economic importance of tea
- f. Economic importance of cotton
- g. Write a note on – Mean and Median

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (65843) Botany Paper XIV Part 3 SEM 6
- 2] (2324) B.Sc. (CBCS) (81681) Botany Paper XIV Part 3 SEM 6
- 3] (286) B.Sc.(Sem.) (81883) Botany Paper XIV Part 3 SEM 6
- 4] (286) B.Sc.(Sem.) (58072) Botany Paper XIV Part 3 SEM 6

193819

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XV****Sub. Code: 97159****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Rewrite the following sentences by choosing appropriate alternatives**[8]**

- i. is an example of in-situ conservation
 - A. Zoo
 - B. Botanical Garden
 - C. National Park
 - D. Seed Bank
- ii. is commonly used in traditional medicines.
 - A. Nirgundi (*Vitex negundo*)
 - B. Wheat (*Triticum aestivum*)
 - C. Maize (*Zea mays*)
 - D. Sunflower (*Helianthus annuus*)
- iii. ethical issue is associated with deforestation.
 - A. Loss of biodiversity and ecosystem
 - B. Increased urban land use
 - C. More land use for agriculture
 - D. Increased timber production
- iv. is the major factor that contributes to genetic diversity in plants.
 - A. Natural selection
 - B. Deforestation
 - C. Monoculture farming
 - D. Use of chemical fertilizers
- v. The IUCN stands for
 - A. International Unity for the Concept of Nature
 - B. International Union for the Conservation of Nature
 - C. Integral Unity and Conservation of Nature
 - D. International Union of Complete Nation
- vi. The clearing of forests is referred to as

- A. reforestation
- B. desertification
- C. deforestation
- D. sanitation

- vii. Ethnobotany is the study of
- A. plant classification
 - B. relationship between plants and indigenous cultures
 - C. plant fossils
 - D. genetically modified plants
- viii. is the primary threat to ecological diversity in plants.
- A. Habitat destruction
 - B. Natural pollination
 - C. Seed dispersal
 - D. Photosynthesis

Q2) Attempt **any two** of the following: [16]

- a. 1. Give morphology and uses of any two ethnomedicinal plants from the following [8]
 a. *Plumbago zeylanica* b) *Pongamia pinnata* c) *Tribulus terrestris*
- b. What are the causes of loss to the plant diversity? [8]
- c. What is the role of ethnic groups in conserving plant genetic resources? [8]

Q3) Write short notes on any four of the following [16]

- a. Sacred grooves [4]
- b. Biodiversity act 2002 [4]
- c. NBPGR [4]
- d. Ex situ conservation [4]
- e. Species diversity [4]
- f. BSI [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

883438

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XV****Sub. Code: 58073/65844/81682/81884****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Rewrite the following sentences by choosing appropriate alternatives.

[8]

- i.** Cosmids are used for.....

 - A. Protein synthesis
 - B. Large DNA fragment cloning
 - C. Energy production
 - D. Antibiotic resistance
- ii.** enzyme is used to insert foreign DNA into a plasmid.

 - A. DNA polymerase
 - B. RNA polymerase
 - C. Restriction endonuclease
 - D. Ligase
- iii.** technique is used to separate DNA fragments in RFLP

 - A. PCR
 - B. Southern blotting
 - C. Gel electrophoresis
 - D. Northern blotting
- iv.** is the main purpose of a gene bank.

 - A. To grow genetically modified crops
 - B. To preserve genetic diversity for future use
 - C. To create new species
 - D. To eliminate unwanted genes
- v.**part of the plant is often used for tissue culture

 - A. Wood
 - B. Scale
 - C. Petiole
 - D. Any plant part (explants)
- vi.** RFLP is

- A. Restriction Fragment Light Plate
- B. Restriction Fraction in Length Plate
- C. Restriction Fragment Length Polymorphism
- D. Rate of Fragment in Light Place

vii. The full form of PCR is

- A. Polymerase Chain Reaction
- B. Protein Cloning Reaction
- C. Polypeptide Chain Replication
- D. Polycarbonate Reaction

viii. RAPD is mainly used for.....

- A. DNA fingerprinting
- B. Protein synthesis
- C. mRNA translation
- D. Bacterial culture

Q2) Attempt *any two* of the following:

[16]

- a.** Explain in brief, geological time scale **[8]**
- b.** What are molecular markers? Give any one DNA marker you have studied. **[8]**
- c.** Explain embryogenesis with types involved in it. **[8]**

Q3) Write short notes on any four of the following:

[16]

- a.** Northern blotting **[4]**
- b.** Plasmids **[4]**
- c.** Cybrids **[4]**
- d.** Explain in brief status of Indian biotechnology **[4]**
- e.** YAC **[4]**
- f.** Gene bank **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2324) B.Sc. (CBCS) (81682) Botany Paper XV Part 3 SEM 6

2] (286) B.Sc.(Sem.) (58073) Botany Paper XV Part 3 SEM 6

3] (286) B.Sc.(Sem.) (81884) Botany Paper XV Part 3 SEM 6

4] (286) B.Sc.(Sem.) (65844) Botany Paper XV Part 3 SEM 6

831642

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XVI****Sub. Code: 97160****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Rewrite the following sentences by choosing correct alternatives. **[8]**

- i. Inprocess removing of the male parts of a flower in bud condition to prevent self-pollination.
A. Pollination
B. Fertilization
C. Emasculation
D. Budding
- ii. NCBI stands for.....
A. National Center for Biological Information
B. National Center for Biotechnology Information
C. National Center for Biomedical Imaging
D. National Center for Basic Information
- iii. Data collected directly from the source is known as.....
A. Primary data
B. Secondary data
C. Tertiary data
D. Published data
- iv. A graphical representation of a frequency distribution with rectangles proportional in area to the frequency is called a.....
A. Polygon
B. Histogram
C. Bar chart
D. Pie chart
- v. are measures of central tendency.
A. Mean
B. Mode
C. Median
D. all of above

- vi.is an example of a chemical mutagen.
- A. Ethyl methane sulfonate (EMS)
 - B. Ultraviolet (UV) radiation
 - C. Gamma rays
 - D. X-rays
- vii. Crossing plants of different genotypes to produce offspring with desirable traits from both parents is known as.....
- A. Inbreeding
 - B. Outbreeding
 - C. Hybridization
 - D. Clonal selection
- viii.is an example of qualitative data.
- A. Height of plants
 - B. Weight of seeds
 - C. Colour of seeds
 - D. Number of seeds

Q2) Attempt any two of the following. **[16]**

- a. Describe Pure line selection with its merits and demerits.
- b. Give an account of any two biological databases.
- c. Give an account of measures of central tendency.

Q3) Attempt any four of the following. **[16]**

- a. Applications of Bioinformatics.
- b. Sampling methods.
- c. Gamma Garden
- d. Types of emasculation.
- e. Standard Deviation
- f. Histogram

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97160) Botany Paper XVI Part 3 SEM 6

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Botany Paper XVI****Sub. Code: 58074/65845/81683/81885****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Rewrite the following sentences by choosing correct alternatives **[8]**

- i. In _____ technique, separates compounds based on their differential migration through a stationary and mobile phase.
 - A. Crystallization
 - B. Chromatography
 - C. Distillation
 - D. Sublimation
- ii. _____ common method/s used to detect adulteration in crude drugs.
 - A. Microscopic examination
 - B. Chemical analysis
 - C. Organoleptic evaluation
 - D. All of the above
- iii. In preparation of Face mask _____ is used.
 - A. *Sapindus laurifolius*
 - B. *Acacia concinna*
 - C. *Santalum album*
 - D. *Smilax zeylanica*
- iv. _____ is a rich and common source of Vitamin C.
 - A. Citrus fruits
 - B. Leafy green vegetables
 - C. Dairy products
 - D. Meat
- v. Specialized cells in *Nostoc* that fix atmospheric nitrogen are called as _____.
 - A. Heterocyst
 - B. Akinetes
 - C. Hormogonia
 - D. Rhizoids

- vi. Admixture or substitution of original drug with inferior, defective, harmful substances is known as _____.
- Extraction
 - Purification
 - Adulteration
 - Evaluation
- vii. In _____ classification the crude drugs arranged according to their Morphological nature.
- Sero-taxonomical
 - Morphological
 - Chemical
 - Alphabetical
- viii. _____ is commonly used as green manure.
- Sapindus laurifolius*
 - Cocos nucifera*
 - Mangifera indica*
 - Crotalaria juncea*

Q2) Attempt any two of the following [16]

- Describe the applications of *Acacia concinna* and *Rosa indica* in the herbal cosmetics.
- Describe processes of Identification, authentication, collection, and storage of medicinal plants.
- Define pharmacognosy and give the medicinal uses of Tulsi and Ginger

Q3) Attempt any four of the following [16]

- Medicinal uses of Amla.
- Methods of chemical classification of crude drugs.
- Vermi-composting processes.
- Importance of herbal medicines.
- Role of Blue Green Algae (BGA) as a biofertilizers.
- Properties of Antioxidants.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (65845) Botany Paper XVI Part 3 SEM 6
- 2] (286) B.Sc.(Sem.) (81885) Botany Paper XVI Part 3 SEM 6
- 3] (286) B.Sc.(Sem.) (58074) Botany Paper XVI Part 3 SEM 6
- 4] (2324) B.Sc. (CBCS) (81683) Botany Paper XVI Part 3 SEM 6

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Chemistry Paper XIII****Sub. Code: 97152****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Choose the correct alternative and rewrite the sentence. **[8]**

i. In dissociative mechanism, bond --- is predominant.

- A. breaking
- B. making
- C. partial breaking
- D. not breaking

ii. Haemoglobin and myoglobin are the ---.

- A. protein
- B. carbohydrates
- C. lipids
- D. enzymes

iii. In nuclear reactor heavy water is used as ---.

- A. catalyst
- B. fuel
- C. moderator
- D. control rod

iv. Artificial radioactivity was discovered by ---.

- A. Irene Curie-Joliot and F. Joliot
- B. Hahn and Strassman
- C. Bethe and Weizsacker
- D. Rutherford

v. --- metal is involved in blood clotting.

- A. Ca

- B. Fe
- C. Cd
- D. Pb

vi. Purest form of iron is --- iron.

- A. wrought
- B. pig
- C. stock
- D. red

vii. The nuclear reaction which results by absorbing energy then it is called ---.

- A. kinetic
- B. endoergic
- C. exoergic
- D. thermogenic

viii. Actinons have --- incomplete outermost shells.

- A. two
- B. three
- C. four
- D. five

Q2) Attempt any two of the following.

[16]

- a. What are Lanthanides? Discuss oxidation states of lanthanides. **[8]**
- b. Explain SN2 mechanism with energy profile diagram and example. **[8]**
- c. What is steel? Describe Bessemer process for manufacture of steel. **[8]**

Q3) Answer any four of the following.

[16]

- a. Explain effect of nature of metal on the stability of complexes. **[4]**
- b. Write short note on "Nuclear fission." **[4]**
- c. Explain structure of haemoglobin. **[4]**
- d. Mention methods for the synthesis of transuranic elements and explain in brief neutron capture followed by beta decay method. **[4]**
- e. Explain acid hydrolysis mechanism for cobalt (III) octahedral complexes. **[4]**
- f. What are the roles of Ca^{2+} in biological processes. **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97152) Chemistry Paper XIII Part 3 SEM 6

317234

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Chemistry Paper XIII****Sub. Code: 58066/65830/81674/81876****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Select most correct alternative from those given below and rewrite the sentence. **[8]**

- i. For age determination by tracer technique, - - - - radio isotope is used.
A. C12
B. O16
C. C14
D. N15
- ii. To determine the stellar energy of hot stars carbon -nitrogen cycle was proposed by - - - - .
A. Hans Bethe and C. F. von Weizsacker
B. Bethe and Strassman
C. Hahn and Strassman
D. Hahn and Chadwick
- iii. The general electronic formula of lanthanides is - - - - - .
A. [Xe] 4f x ,5d 2 ,6s 2
B. [Xe] 4f x ,5d 1 ,6s 0
C. [Xe]4f 14 ,5d 1 ,6s 2
D. [Xe]4f x ,5d 1 ,6s 2
- iv. The process of heating steel in an atmosphere of ammonia due to which surface is coated hard iron nitride is known as - - - - - .
A. annealing
B. nitriding
C. hardening
D. tempering
- v. SN 2 mechanism may proceed through - - - - - -arrangement.
A. TBP
B. octahedral wedge
C. square planar
D. octahedral

- vi.** - - - - - metal is involved in blood clotting.
A. Ca
B. Fe
C. Cd
D. Pb
- vii.** Among the following - - - - - acts as a control rod in nuclear reactor.
A. Cd
B. Np
C. U
D. Th
- viii.** The function of haemoglobin is to - - - - -.
A. store O₂
B. transport O₂
C. transport N₂
D. store F₂

Q2) Attempt any TWO of the following [20]

- a.** Explain SN₁ and SN₂ reaction mechanism for inert and labile complexes. [10]
- b.** What are lanthanides? Discuss the separation of lanthanides by ion exchange method. [10]
- c.** Draw a neat sketch of a modern blast furnace and indicate by means of equations, the chemical reactions taking place in its different zones. [10]

Q3) Attempt any THREE of the following [12]

- a.** Mention the factors affecting the stability of complexes. Explain any one in detail. [4]
- b.** Describe use of radio-isotope as tracers in Esterification reaction. [4]
- c.** Explain Heavy ion bombardment method for the synthesis of trans-uranic elements. [4]
- d.** Explain role of Ca⁺⁺ in biological process. [4]
- e.** Use of Trans effect in synthesis of cis-trans isomers of Pt(II) complexes. [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (81876) Chemistry Paper XIII Part 3 SEM 6
- 2] (286) B.Sc.(Sem.) (65830) Chemistry Paper XIII Part 3 SEM 6
- 3] (286) B.Sc.(Sem.) (58066) Chemistry Paper XIII Part 3 SEM 6
- 4] (2324) B.Sc. (CBCS) (81674) Chemistry Paper XIII Part 3 SEM 6

118761

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Chemistry Paper XIV****Sub. Code: 97153****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions:

1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Special Inst.: Chemical equations are to be written wherever necessary.

Q1) Solve following MCQ.**[8]**

- LAH cannot be used in presence of the ----- solvent .
 A. THF
 B. Protic
 C. Dioxin
 D. Ether
- drug given below is an antimalarial drug.
 A. Ethambutol
 B. Proguanil
 C. Isoniazide
 D. benzocaine
- Cyclohexanone on treatment with methylene triphenylphosphorane in presence of ether gives _____.
 A. Methylene Cyclohexane
 B. phenyl Cyclohexene
 C. methyl Cyclohexane
 D. Cyclohexanol
- Antipyretic drugs are the drugs used to _____.
 A. induce sleep
 B. control sleep
 C. lower the blood pressure
 D. lower body temperature
- Detection of O-methyl group of alkaloid is done by _____.
 A. Emde's method
 B. Hoffman's method
 C. Herzig-Meyer method
 D. Ziesel's method

- vi. Addition of HBr to propylene gives _____ as major product.
 A. 1-bromo propane
 B. 2-bromo propane
 C. 1,1-dibromo propane
 D. 1,2-dibromo propane
- vii. Compounds containing carbon-carbon double bond on reacting with osmium tetroxide give _____.
 A. Alcohol
 B. geminal diols
 C. Carboxylic acid
 D. vicinal diols
- viii. Basic unit of Terpenoids is _____.
 A. Isoprene
 B. Isopronol
 C. terpeneol
 D. Isoterpene

Q2) Attempt any two of the following: [16]

- a. 1. What is retrosynthesis? Define the following terms. [8]
 a. Disconnection b. Synthons c. Synthetic equivalent d. FGI
 2. Explain retrosynthesis and synthesis of cyclohexene.
- b. Give the structure of Nicotine on the basis of analytical evidences. [8]
- c. 1. Give the method of preparation of diazomethane and its two applications. [8]
 2. Give the following reactions of acetylene
 a. hydration b. formation of metal acetylides

Q3) Attempt any four of the following [16]

- a. Write a note on Hofmann Bromamide Reaction. [4]
- b. Write a note on Isoprene rule. [4]
- c. Give the synthesis and use of benzocaine. [4]
- d. Explain peroxide effect during addition of HBr to unsymmetrical alkenes. [4]
- e. Write a note qualities of ideal drug. [4]
- f. Give any two methods of preparation of DCC [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97153) Chemistry Paper XIV Part 3 SEM 6

711284

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Chemistry Paper XIV****Sub. Code: 58067/65831/81675/81877****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions:

1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Special Inst.: Write Chemical reactions/ equations wherever necessary

Q1) Solve following MCQ.

[8]

- Conjugated diene reacts with which among the following to form a cyclohexene.
 - A. Phenol
 - B. Hexane
 - C. Tribromo phenol
 - D. Dienophile
- How many π bonds are present in Acetylene?
 - A. 2
 - B. 4
 - C. 1
 - D. 3
- Diels-Alder reaction is a ----- reaction.
 - A. Nucleophilic
 - B. Pericyclic
 - C. Reduction
 - D. Hydration
- Osmic acid oxidizes alkene to -----
 - A. Geminal diol
 - B. Carboxylic acid
 - C. Ketone
 - D. Cis-diols
- Heterolytic fission of chemical bond gives -----
 - A. Carbocation
 - B. Carbanion
 - C. Free radical
 - D. Both a and b

- vi. Addition of water across a double bond is called as -----
 A. Hydroxylation
 B. Hydrogenation
 C. Hydration
 D. Oxidation
- vii. The side chain linked to pyridine in nicotine is -----
 A. Isopropyl
 B. N-ethyl pyrrolidine
 C. Pyrrolidine
 D. N-methyl pyrrolidine
- viii. Anti-malarial drug used as -----
 A. Proguanil
 B. Isoniazide
 C. Phenobarbitone
 D. Benzocaine

Q2) Attempt any **TWO** of the following. [20]

- a. What are the qualities of Ideal drugs? Give the synthesis of following drugs. [10]
 i. Ethambutol
 ii. Benzocaine
- b. i) Give the synthesis and applications of OsO₄. [10]
 ii) What is retrosynthesis? Define the following terms.
 1. Disconnection
 2. Synthon
 3. Synthetic equivalent
 4. Functional group interconversion
- c. i) Explain Hofmann rearrangement with its mechanism. [10]
 ii) Give the synthesis of Citral to support its structure.

Q3) Attempt any **THREE** of the following. [12]

- a. Write a note on ozonolysis of alkenes. [4]
- b. Give the synthesis and uses of Isoniazide. [4]
- c. Explain Hofmann's exhaustive methylation. [4]
- d. Write note on Markovnikov addition. [4]
- e. Explain Wagner-Meerwein rearrangement with its mechanism. [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (81877) Chemistry Paper XIV Part 3 SEM 6
- 2] (286) B.Sc.(Sem.) (65831) Chemistry Paper XIV Part 3 SEM 6
- 3] (2324) B.Sc. (CBCS) (81675) Chemistry Paper XIV Part 3 SEM 6
- 4] (286) B.Sc.(Sem.) (58067) Chemistry Paper XIV Part 3 SEM 6

8480114

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Chemistry Paper XV****Sub. Code: 97154****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Figures to the right indicate full marks
 3. Use of Scientific calculator is allowed

Q1) Select and write the correct alternative for each of the following.**[8]**

- i. **The reduced phase rule for a condensed system is**
 - A. $F' = C - P$
 - B. $F = C - P + 2$
 - C. $F' = C - P + 1$
 - D. $F = C - P + 3$
- ii. **If the crystal presents the same appearance when it is rotated through 90 degrees, then the axis is called the fold axis of symmetry.**
 - A. two
 - B. four
 - C. three
 - D. six
- iii. **In the law of constancy of interfacial angles, the shapes of the crystals of a given compound are, but interfacial angles are**
 - A. different, constant
 - B. same, different
 - C. different, different
 - D. same, constant
- iv. **The sol in which the solid is dispersed in gas is called as**
 - A. emulsion
 - B. aerosol
 - C. solid sol
 - D. gel
- v. **The term fugacity has dimensions of**
 - A. pressure
 - B. length
 - C. temperature
 - D. volume

- vi. **The crystal structure of NaCl is**
A. body-centered cube
B. triclinic
C. hexagonal
D. face centered cube
- vii. **The relationship between free energy change (ΔG) and enthalpy change (ΔH) with temperature is shown by equation.**
A. Gibb's Helmholtz
B. Gibb's duhem
C. Partial Molar Volume
D. All of these
- viii. **The reaction which gives the maximum amount of product is known as reaction.**
A. main
B. major
C. main or major
D. none of these

Q2) Attempt any TWO of the following. [16]

- a. **Derive Bragg's equation. [8]**
- b. **Derive thermodynamically van't Hoff reaction isotherm and mention its importance. [8]**
- c. **Discuss the application of the phase rule to KI-water system. [8]**

Q3) Attempt any FOUR of the following. [16]

- a. **Write a short note on, "Opposing reactions". [4]**
- b. **Write a note on, "Gibb's Helmholtz equation". [4]**
- c. **Describe briefly the Parallel reactions. [4]**
- d. **Calculate the Miller indices of the crystal plane that cuts through the crystal axes at (i) ($\frac{1}{2}$, 1, ∞), (ii) (2, -3, -3). [4]**
- e. **Give any four applications of colloids. [4]**
- f. **Distinguish between True solution and Colloidal solution. [4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97154) Chemistry Paper XV Part 3 SEM 6

4433816

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Chemistry Paper XV****Sub. Code: 58068/65832/81676/81878****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**
 - 4. Use of scientific calculator and logarithmic table is allowed**

Q1) Choose correct alternative and rewrite the sentence.**[8]**

- i. In any crystal there can be -- ---- center of symmetry
 - A. Only one
 - B. many
 - C. two
 - D. same
- ii. ----- are the reciprocals of the Weiss indices
 - A. lattice plans
 - B. space lattice
 - C. lattice sites
 - D. Miller indices
- iii. The term fugacity has the dimensions of -----
 - A. temperature
 - B. volume
 - C. length
 - D. pressure
- iv. At the state of equilibrium, $\Delta G =$ -----
 - A. zero
 - B. positive
 - C. negative
 - D. maximum
- v. The temperature at which three phases remains in equilibrium is known as -- ----
 - A. transition point
 - B. eutectic point
 - C. triple point
 - D. none of these

- vi. Acetic acid-chloroform – water system is ----- component system
- A. 1
 - B. 2
 - C. 3
 - D. 4
- vii. The reaction which gives maximum amount of the products is known as ----- reaction
- A. main
 - B. major
 - C. both A and B
 - D. side
- viii. A homogeneous mixture of two or more chemical components is known as -----
- A. solution
 - B. solvent
 - C. solute
 - D. none of these

Q2) Attempt any TWO of the following **[20]**

- a. State the Phase rule. Discuss its application to KI-Water system **[10]**
- b. Derive Bragg's equation **[10]**
- c. Derive thermodynamically van't Hoff reaction isotherm **[10]**

Q3) Attempt any THREE of the following **[12]**

- a. Explain Wiess indices and Miller indices **[4]**
- b. What is triple point ? Explain with suitable examples **[4]**
- c. Calculate the free energy change accompanying the reaction **[4]**
 $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$ at 443 degree Celsius, if the value of equilibrium constant is 50.62
- d. State and explain distribution law **[4]**
- e. Describe in brief chain reactions **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (58068) Chemistry Paper XV Part 3 SEM 6
- 2] (286) B.Sc.(Sem.) (65832) Chemistry Paper XV Part 3 SEM 6
- 3] (286) B.Sc.(Sem.) (81878) Chemistry Paper XV Part 3 SEM 6
- 4] (2324) B.Sc. (CBCS) (81676) Chemistry Paper XV Part 3 SEM 6

593458

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Chemistry Paper XVI****Sub. Code: 97155****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Select most correct alternative among those given below and rewrite the sentence. **[8]**

- i. The material most commonly used in making prisms in flame photometry is ----

A. glass
B. quartz
C. metal
D. non-metal
- ii. Cleaning action of soap is due to its ----- nature.
A. hydrophilic
B. hydrophobic
C. amphipathic
D. none of these
- iii. In scanning electron microscopy (SEM) electron beam is focused by-----
A. magnetic lenses
B. electronic lenses
C. electric lenses
D. optical lenses
- iv. The detergents suitable for hard water are generally -----
A. anionic
B. cationic
C. nonionic
D. ionic
- v. Monomer used for PVC manufacturing is -----
A. chloroethane
B. polythene
C. styrene
D. formaldehyde

- vi. Some free alkali is present in----- soap.
A. toilet
B. washing
C. shaving
D. none of these
- vii. In simple flame photometer, the monochromator is-----
A. grating
B. slit
C. prism
D. all of these
- viii. Inorganic chemicals added to soap to increase detergent action are called as -----
A. builders
B. antioxidants
C. rosins
D. fixatives

Q2) Attempt any TWO of two following.

[16]

- a. What are fertilizers? Give the classification of fertilizers.
- b. Give the different types of soap. Explain cleaning action of soap.
- c. Define polymerization. Discuss free radical addition polymerization.

Q3) Attempt any FOUR of the following.

[16]

- a. Explain in brief total consumption burner.
- b. Explain the sol-gel method used for the synthesis of nanomaterials.
- c. Give the synthesis and uses of polyvinyl chloride (PVC).
- d. Mention different applications of nanomaterials.
- e. Explain in brief soil moisture by gravimetric method.
- f. Give the applications of flame photometry.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

463352

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Chemistry Paper XVI****Sub. Code: 65833/81677/81879****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Select most correct alternative among those given below and rewrite the sentence. **[8]**

- i. is used as promoter in Haber process
- A. Ni
 - B. Cd
 - C. Mo
 - D. Fe
- ii. The monomer used for PVC manufacturing is, -----
- A. chloroethene
 - B. polythene
 - C. styrene
 - D. formaldehyde
- iii. The scum, clear juice and mud layer are formed in, -----
- A. Juice heater
 - B. Clarifier
 - C. Insoluble impurities
 - D. All of these
- iv. Best quality biodiesel is produced from -----
- A. canola
 - B. olive oil
 - C. soya oil
 - D. all of these
- v. The diesel fuel is rated using the number-----
- A. octane
 - B. cetane
 - C. flash point
 - D. calorific

- vi. Sulphur dioxide is obtained by burning-----
A. Sulphur or pyrites
B. iron
C. coal
D. charcoal
- vii. Polymers that soften on heating and harden on cooling are termed-----
A. rubber
B. elastomer
C. thermosetting
D. thermoplastics
- viii. One nanometer is ----- meter.
A. 10^{-9}
B. 10^{-8}
C. 10^{-7}
D. 10^{-6}

Q2) Attempt any TWO of the following.

[20]

- a. Discuss the manufacturing plant and process of ammonia by Haber process.
- b. Discuss the concentration of juice to syrup in multiple effect evaporator.
- c. Define polymerization. Discuss free radical addition polymerization.

Q3) Attempt any THREE of the following.

[12]

- a. Write note on biodiesel.
- b. Write note on preparation of fermentation medium.
- c. Explain the sol-gel method used for the synthesis of nanomaterials.
- d. Mention different applications of nanomaterials.
- e. Applications of petrochemicals.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (286) B.Sc.(Sem.) (65833) Chemistry Paper XVI Part 3 SEM 6

2] (286) B.Sc.(Sem.) (81879) Chemistry Paper XVI Part 3 SEM 6

913874

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper XIII****Sub. Code: 97187****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM****Instructions: 1. All questions are compulsory
2. Figures to the right indicate full marks****Q1)** Select correct alternative.**[8]**

- i. Which of the following is NOT a component of Java Swing?
 - A. JFrame
 - B. JComponent
 - C. JApplet
 - D. JWindow
- ii. Which JDBC interface is used to execute SQL queries?
 - A. Statement
 - B. Connection
 - C. ResultSet
 - D. DriverManager
- iii. What is the first method called in a servlet's lifecycle?
 - A. doGet()
 - B. doPost()
 - C. init()
 - D. service()
- iv. Which of the following is NOT an implicit object in JSP?
 - A. request
 - B. session
 - C. config
 - D. object
- v. In Swing, which class is used to create a menu bar?
 - A. JMenuBar
 - B. JToolBar
 - C. JMenuItem
 - D. JMenuPanel
- vi. Which method of Statement is used to execute SELECT queries?
 - A. executeQuery()

- B. executeUpdate()
- C. execute()
- D. runQuery()

vii. Which session tracking method does NOT require cookies?

- A. URL rewriting
- B. Hidden form fields
- C. HttpSession
- D. All of the above

viii. The <%! %> tag in JSP is used for:

- A. Declaring methods and variables
- B. Executing expressions
- C. Handling exceptions
- D. Importing Java classes

Q2) Attempt any two

[16]

- a. Explain the Java Swing MVC architecture with an example.
- b. Explain the complete life cycle of a Servlet.
- c. Explain JSP directives and scripting elements.

Q3) Attempt any four.

[16]

- a. Discuss session tracking method Cookie used in Servlet.
- b. Discuss in brief JTextfield and JLabel.
- c. How do you establish a connection to a database using JDBC?
- d. What are the different types of ResultSet in JDBC?
- e. Explain the JSP life cycle.
- f. Differentiate between doGet() and doPost() methods in Servlets.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97187) Computer Science Paper XIII Part 3 SEM 6

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper XIV****Sub. Code: 97188****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Select the correct alternative and rewrite the statement.

[8]

- i. Which namespace is used when we connect our asp.net page to sql server
 - A. System.data.sqlclient
 - B. System.data.sql
 - C. System.sqlserver
 - D. System.url
- ii. _____ is not a member of ADO.NET Command object.
 - A. ExecuteReader
 - B. ExecuteScalar
 - C. ExecuteStream
 - D. Open
- iii. is the full form ASP.
 - A. Access Server Pages
 - B. Active Service Pages
 - C. Active Server Pages
 - D. Access Service Pages
- iv. is the correct use of the web.config file
 - A. To store global information and variable definitions
 - B. To configure the domain server
 - C. To configure to domain client
 - D. Store information about web browser
- v. term is used for pages that depend on the Master page.
 - A. Content Pages
 - B. Master Pages
 - C. Web Pages
 - D. None of the above
- vi. The ASP.NET developed by.....

- A. Google
- B. Oracle
- C. Sun Microsystems
- D. Microsoft

vii.is the extension of the ASP.NET page

- A. .asp
- B. .aspx
- C. .asx
- D. .apx

viii. is the default timeout for a cookie in ASP.Net

- A. 10 Minutes
- B. 20 Minutes
- C. 30 Minutes
- D. 5 Minutes

Q2) Attempt any two of the following.

[16]

- a. Explain ASP.NET web page life cycle in details. **[8]**
- b. Explain client side programming and server side programming. **[8]**
- c. Explain the ADO.NET connected architecture. **[8]**

Q3) Attempt any four of the following.

[16]

- a. Explain the concept of web browser and web server. **[4]**
- b. What is cross page posting? **[4]**
- c. Write short note on Global.asax. **[4]**
- d. What are cookies? **[4]**
- e. Explain TextBox control with its properties. **[4]**
- f. Write down use of ValidationSummary control. **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97188) Computer Science Paper XIV Part 3 SEM 6

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Computer Science Paper XV****Sub. Code: 97189****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Draw neat labelled diagrams wherever necessary
 4. Figures to the right indicate full marks

Q1) Solve following MCQ.**[8]**

- i. Which of the following memory management techniques is used to move processes in and out of physical memory to ensure that each process gets enough space to run?
 - A. Segmentation
 - B. Swapping
 - C. Paging
 - D. Demand Paging
- ii. What does the + symbol do in regular expressions?
 - A. Matches zero or more occurrences of the previous character
 - B. Matches one or more occurrences of the previous character
 - C. Matches zero or one occurrence of the previous character
 - D. Matches the literal + character
- iii. Which of the following is a valid Nano command to save the current file?
 - A. Ctrl + X
 - B. Ctrl + O
 - C. Ctrl + C
 - D. Ctrl + S
- iv. Which of the following is a valid use of the .metacharacter in regular expressions?
 - A. It matches any character except a newline
 - B. It matches a literal dot .
 - C. It matches digits only
 - D. It matches the end of a string
- v. What does the grep command in Linux do?
 - A. Filters content based on a pattern

- B. Combines multiple files
- C. Reads a file and displays its content in reverse
- D. Sorts content in a file

vi. Which BASH command is used to reverse the order of lines in a file?

- A. cat
- B. tac
- C. head
- D. tail

vii. Which command is used in BASH to print the first n lines of a file?

- A. head
- B. tail
- C. cat
- D. sed

viii. Which of the following is the correct way to define an array in BASH?

- A. array = (1 2 3)
- B. array[1] = (1 2 3)
- C. array = [1, 2, 3]
- D. array=(1 2 3)

Q2) Attempt Any Two

[16]

- a. Explain the concept of Memory Management in operating systems. [8]
- b. Explain sed command in linux [8]
- c. Explain the Nano text editor in Linux. [8]

Q3) [16]

- a. What does the tail command do in Linux? [4]
- b. What is the use of the export command in BASH? [4]
- c. How does the grep command help in text searching? [4]
- d. How do you create a new file in Nano editor? [4]
- e. Which key combination is used to save a file in Nano editor? [4]
- f. How does demand paging differ from paging in memory management? [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97189) Computer Science Paper XV Part 3 SEM 6

571737

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Computer Science Paper XVI****Sub. Code: 97190****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM****Instructions: 1. All questions are compulsory
2. Figures to the right indicate full marks****Q1) Solve following MCQ.****[8]**

- i. What is Django?
 - A. A content management system
 - B. A programming language
 - C. A web framework
 - D. A database management system
- ii. Which of the following is the default database used by Django?
 - A. PostgreSQL
 - B. Oracle
 - C. SQLite
 - D. MySQL
- iii. Who developed Django?
 - A. Adrian Holovaty and Simon Willison
 - B. Facebook Developers
 - C. Django Developers Team
 - D. Google
- iv. Which command is used to start a new Django project?
 - A. django createproject
 - B. django-admin startproject
 - C. django new project
 - D. django startproject
- v. How many except statements can a try-except block have?
 - A. Zero
 - B. One
 - C. more than one
 - D. more than zero
- vi. When is the finally block executed?
 - A. when there is no exception

- B. when there is an exception
- C. only if some condition that has been specified is satisfied
- D. always

vii. What is a class in Python?

- A. A function
- B. A blueprint for creating objects
- C. A variable
- D. A method

viii. How do you create an object in Python?

- A. MyClass object = new MyClass()
- B. object = MyClass()
- C. MyClass = object()
- D. new MyClass()

Q2) Explain in detail (Solve any 2)

[16]

- a. Explain Exception Handling in Python in detail
- b. Explain the concept of inheritance with example
- c. Explain in detail the concept of Django with example

[8]

[8]

[8]

Q3) Write short note (Solve any 4)

[16]

- a. Give the difference between Overloading and Overriding
- b. Explain URL Mapping
- c. Explain Django Form Validation
- d. Session and cookies
- e. Explain with example finally block in exception handling
- f. Explain Raising exception

[4]

[4]

[4]

[4]

[4]

[4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97190) Computer Science Paper XVI Part 3 SEM 6

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: English (Compulsory)****Sub. Code: 97146****Day and Date: APRIL ,12-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions: 1. All questions are compulsory
2. Figures to the right indicate full marks

Q1) Choose the appropriate answer and complete the following sentences.**[3]**

- i. Bhaurao is popularly known as
A. Tolstoy
B. Bhau
C. Anna
D. American
- ii. When trodden under, the true nature of grass is revealed.
A. foot
B. stone
C. branch
D. sky
- iii. Granny'sfigure was a huge support for us.
A. great
B. thin
C. old
D. loving

Q2)**[3]****Answer the following questions in one word / phrase / sentence each.**

1. Who opens a pawn shop ?
2. Why does Govind Singh go to X-ray institute?
3. How is Sir Mohan Lal dressed ?

Q3) [10]**a.****[4]****Answer the following questions in 3 to 4 sentences. (2 out of 3)**

1. Why does Govind Singh beg to retire from service?
2. What was Lachmi doing on the platform ?
3. How was the absence of Granny felt by the poetess ?

b. [4]

Write short notes on the following in 8 to 10 sentences. (1 out of 2)

1. Exploitation of the Native Americans described in the poem 'Evolution'.
2. How did Karmveer Bhaurao Patil (Anna) plan his education mission?

c. [2]

Do as Directed:

1. Write synonym of the following word: dismay
2. Write antonym of the following word : aggressive

Q4) [16]

a. **Build up group discussion on any one of the following topics using expressions and interactions common in group discussion. [8]**

**Online Education vs. Traditional Classroom Learning
Or
Online Shopping vs. Local Markets**

b. **Read the passage and make notes using a Flow Chart or a Diagram [8]**

Exercise is essential for maintaining physical and mental well-being. Regular physical activity strengthens muscles, improves heart health, and boosts overall endurance. It also helps regulate weight by burning calories and increasing metabolism.

Beyond physical benefits, exercise plays a vital role in mental health. It releases endorphins, which are known as "feel-good" hormones, helping to reduce stress, anxiety, and depression. Activities such as yoga and meditation further enhance relaxation and mental clarity.

There are various forms of exercise, including aerobic exercises like running and swimming, strength training like weightlifting, and flexibility exercises like stretching. Engaging in a combination of these exercises ensures a well-rounded fitness routine. Experts recommend at least 30 minutes of moderate exercise daily to maintain a healthy lifestyle.

Q5) You happen to be the editor of an English newspaper published from Maharashtra. Write an editorial on "Conservation of Water: A Global Need". [8]

Or

Write a script for radio on "The Role of Books in Modern Education".

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97146) English (Compulsory) Part 3 SEM 6

9719161

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: English (Compulsory)****Sub. Code: 65806/81863/81667****Day and Date: APRIL ,12-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM****Instructions: 1. All questions are compulsory
2. Figures to the right indicate full marks****Q1) Choose the appropriate answer and complete the following sentences [3]**

- i. Buffalo Bill charges the Indians buck a head to enter.
A. 5
B. 12
C. 20
D. 7
- ii. The company offers Govind Singh a pension of Rs..... for his life
A. 16
B. 14
C. 10
D. 12
- iii. The name of Sir Mohan Lal's wife is
A. Laxmi
B. Lachmi
C. Rabati
D. Radha

Q2) Answer the following questions in one word/ phrase / sentence each [3]

1. Who is regarded as the Booker T. Washington of Maharashtra ?
2. How is the grass, according to the poetess Kishwar Naheed?
3. According to the poetess Tejaswini Patil, what could Granny's piercing eyes reach straight?

Q3) [10]**a. Answer the following questions in 3 to 4 sentences each. (2 out of 3) [4]**

1. Why do you think the poet mentions the liquor store?
2. How does Sir Mohan Lal meet his 'Karma'?
3. Where did Barrister P G. Patil visit during his educational tour?

- b. [4]

Answer the following questions in 8 to 10 sentences each. (1 out of 2)

1. Govind Singh
2. The qualities of Granny described in the poem 'The Granny'.

- c. [2]

Do as Directed

1. Give verb form of the following word: Reservation
2. Give synonym of the following word: Sufficient

Q4) [16]

- a. **Build up a group discussion on any one of the following topics using expressions and interactions common in group discussion. [8]**

Use of cell phone among college students

or

Social Media: a boon or a curse

- b. **Read the passage and make notes using a Flow Chart or a Diagram: [8]**

Renewable energy sources, such as solar, wind, and hydroelectric power, are becoming increasingly important in addressing environmental concerns and reducing dependence on fossil fuels. Solar energy harnesses sunlight through photovoltaic cells to generate electricity, while wind energy utilizes turbines to convert wind power into electrical energy. Hydroelectric power, on the other hand, relies on the movement of water to produce electricity.

One of the major advantages of renewable energy is its sustainability. Unlike fossil fuels, these sources do not deplete over time and have a significantly lower impact on the environment. Additionally, renewable energy helps reduce carbon emissions, contributing to a cleaner and healthier planet.

Governments and organizations worldwide are investing in renewable energy projects to combat climate change and ensure energy security. While challenges such as high initial costs and infrastructure development exist, continuous technological advancements are making renewable energy more accessible and efficient.

- Q5) You happen to be the editor of an English newspaper published from Maharashtra. Write an editorial on "The Importance of Financial Literacy Among Youth". [8]**

Or

Write a script for radio on "The Influence of Cinema on Society".

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (286) B.Sc.(Sem.) (81863) English (Compulsory) Part 3 SEM 6
- 2] (286) B.Sc.(Sem.) (65806) English (Compulsory) Part 3 SEM 6
- 3] (2324) B.Sc. (CBCS) (81667) English (Compulsory) Part 3 SEM 6

179613

Seat No	
------------	--

B.Sc. (Part- III) (Semester – VI) (NEP 2020)

Examination, May– 2025

MATHEMATICS (Paper – XIII)

DSE-F9 : Metric Spaces

Sub. Code : 97141

Day and Date : Tuesday, 15/04/2025

Total Marks :40

Time : 10.30 a.m. to 12.00 p.m.

- Instructions :**
- 1. All questions are compulsory.**
 - 2. Figures to the right indicate full marks.**
 - 3. Use of non-programmable calculator is allowed.**

Q.1) Select correct alternative for each of the following. (8)

- a) A subset B of metric space M is said to be dense in M if
 - i) $B = M$
 - ii) $\bar{B} \neq M$
 - iii) $\bar{B} = M$
 - iv) $B \neq M$
- b) A subset B of $\mathbf{R}_d$ is totally bounded if and only if set B
 - i) contains infinite number of points
 - ii) is connected
 - iii) contains only a finite number of points
 - iv) is bounded
- c) The set of real numbers with absolute value metric is a metric space which is usually denoted by
 - i) $\mathbf{R}^\infty$
 - ii) $\mathbf{R}_d$
 - iii) $\mathbf{R}^2$
 - iv) $\mathbf{R}^1$
- d) Let f be a function from a set A into a metric space M . Then the function f is bounded if
 - i) $f(A)$ is bounded subset of M
 - ii) A is bounded subset of M
 - iii) $f(A)$ is closed subset of M
 - iv) A is closed subset of M

- e) Every Cauchy sequence in metric space $\mathbf{R}^2$ is
i) divergent ii) convergent
iii) oscillatory iv) none of these
- f) In any metric space $\langle M, \rho \rangle$ both M and $\emptyset$ are
i) open but not closed ii) closed but not open
iii) neither open nor closed iv) both open and closed.
- g) If T is a contraction mapping on a metric space $\langle M, \rho \rangle$ then
i) T is decreasing ii) T is discontinuous on M
iii) T is continuous on M iv) T is increasing.
- h) The metric space is compact if it is
i) both complete and bounded
ii) both complete and totally bounded
iii) both complete and connected
iv) neither complete nor bounded

Q2) Attempt ANY TWO of the following. (16)

- Define closed set. If E is any subset of metric space M then prove that $\bar{E}$ is closed.
- Define complete metric space. If A is closed subset of complete metric space $\langle M, \rho \rangle$ then prove that $\langle A, \rho \rangle$ is complete.
- Define metric space. Show that a sequence of points in any metric space cannot converge to two distinct limits.

Q3) Attempt ANY FOUR of the following. (16)

- If $M = R^2$ and for $P(x_1, y_1)$ and $Q(x_2, y_2)$ in R^2 , define $\rho(P, Q) = |x_1 - x_2| + |y_1 - y_2|$, then show that $\langle R^2, \rho \rangle$ is a metric space.
- If f is continuous function from a compact metric space M_1 into a metric space M_2 , then show that the range $f(M_1)$ of f is also compact.
- If $T(x) = x^2, (0 \leq x \leq \frac{1}{3})$, then prove that T is a contraction on $[0, \frac{1}{3}]$.
- Prove that any open ball in a metric space is an open set.
- Show that $\mathbf{R}_d$ is a complete metric space.
- Prove that arbitrary intersection of closed sets is closed set.

Seat No	
------------	--

B.Sc. (Part- III) (Semester – VI) (CBCS) (NEP 2020)

Examination, April– 2025

Mathematics

DSE-F10 : Linear Alegra (Paper -XIV)

Sub. Code : 97142

Day and Date : Wednesday, 16/04/2025

Total Marks :40

Time : 10.30 a.m. to 12.00 p.m.

- Instructions :**
- 1. All questions are compulsory.**
 - 2. Figures to the right indicate full marks.**
 - 3. Use of non–programmable calculators is allowed.**

Q.1) Select the correct alternative for each of the following. (8)

- a) A non-zero vector is always
- i) linearly dependent
 - ii) linearly independent
 - iii) both linearly independent and dependent
 - iv) none of these
- b) The number of vectors in any basis of a F.D.V.S. V is called
- i) the rank of V
 - ii) the norm of V
 - iii) the nullity of V
 - iv) the dimension of V
- c) If $\dim V = n$ and $\{\mathbf{w}_1, \mathbf{w}_2, \dots, \mathbf{w}_r\}$ is linearly independent subset of V then.....
- i) $r = n + 2$
 - ii) $r \geq n$
 - iii) $r \leq n$
 - iv) $r = n + 1$
- d) If $T: V \rightarrow W$ is a linear transformation such that rank of $T = 2$ and nullity of $T = 2$ then $\dim V$ is
- i) 4
 - ii) 2
 - iii) 3
 - iv) 1
- e) The norm of vector $\mathbf{u} = (0, 3, 0, 4)$ in the inner product space $\mathbf{R}^4$, with respect to Euclidean inner product is
- i) 5
 - ii) $\sqrt{5}$
 - iii) $\sqrt{7}$
 - iv) 25

- f) In an inner product space V , the inequality $\|u + v\| \leq \|u\| + \|v\|$, $\forall u, v \in V$ is called
- i) Cauchy Schwarz inequality
 - ii) Minkowski inequality
 - iii) Triangle inequality
 - iv) Parallelogram law
- g) If the eigen values of a square matrix A are $3, -2, 2$, then trace of $A = \dots\dots\dots$
- i) 4
 - ii) 17
 - iii) -12
 - iv) 3
- h) If $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$, then characteristic polynomial of matrix A is
- i) $x^2 + 5x - 6$
 - ii) $x^2 - 5$
 - iii) $x^2 - 2x + 6$
 - iv) $x^2 - 5x - 6$

Q. 2) Attempt any Two of the following.

(16)

- a) If $T: V \rightarrow U$ is a linear transformation, then show that

$$\frac{V}{\text{Ker}T} \cong \text{Range } T = T(V).$$

- b) Define a subspace of a vector space. Prove that a non-empty subset W of a vector space $V(F)$ is a subspace of V if and only if $\alpha x + \beta y \in W$ for any $\alpha, \beta \in F$ and $x, y \in W$.

- c) Verify Cayley Hamilton Theorem for the matrix $A = \begin{bmatrix} 4 & 3 & 1 \\ 2 & 1 & -2 \\ 1 & 2 & 1 \end{bmatrix}$

Q.3) Attempt any Four of the following. (16)

- a) Show that the intersection of two subspaces of a vector space V is a subspace of V .
- b) Define the Range of a linear transformation. Prove that the Range of a linear transformation $T: V \rightarrow U$ is a subspace of U .
- c) If V is an inner product space and $\mathbf{x}, \mathbf{y} \in V$, such that $\mathbf{x}$ is orthogonal to $\mathbf{y}$, then show that $\|\mathbf{x} + \mathbf{y}\|^2 = \|\mathbf{x}\|^2 + \|\mathbf{y}\|^2$.
- d) If $\mathbf{u} = (-2, -1, 4, 5)$, $\mathbf{v} = (3, 1, -5, 7)$, $\mathbf{w} = (-6, 2, 1, 1)$ are vectors in Euclidean inner product space $\mathbb{R}^4$, then find $\|4\mathbf{u} - 2\mathbf{v} + \mathbf{w}\|$.
- e) Find eigen values of the matrix $\begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$.
- f) Define $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ by $T(x_1, x_2) = (x_2, x_1)$ Show that T is a linear transformation.
-

Seat No	
------------	--

B.Sc. (Part- III) (Semester – VI) (NEP 2020)
Examination, April– 2025
MATHEMATICS (Optional) (Paper -XV)
DSE -F11: Complex Analysis
Sub. Code : 97143

Day and Date : Thursday, 17/04/2025

Total Marks :40

Time : 10.30 a.m. to 12.00 p.m.

- Instructions :**
1. All questions are compulsory.
 2. Figures to the right indicate full marks.

Q1) Select correct alternative for each of the following. (8)

i) The modulus of a complex number $z = x + iy$ is defined as $|z| = \dots\dots$

- | | |
|-----------------------|-----------------------|
| a) x | b) y |
| c) $\sqrt{x^2 + y^2}$ | d) $\sqrt{x^2 - y^2}$ |

ii) For $f(z) = \frac{z^2+1}{3z^2}$, the point $z = 0$ is of $f(z)$

- | | |
|----------------------|----------------------|
| a) a simple pole | b) a pole of order 2 |
| c) a pole of order 3 | d) zero |

iii) Which of the following functions is not analytic at $z = 0$?

- | | |
|-------------|--------------|
| a) z | b) $\bar{z}$ |
| c) $\sin z$ | d) $\cos z$ |

iv) If $f(z) = \sum_{n=0}^{\infty} a_n (z - z_0)^n + \sum_{n=1}^{\infty} \frac{b_n}{(z - z_0)^n}$ is Laurent series expansion of $f(z)$

then is called as principal part of $f(z)$.

- | | |
|--|--|
| a) $\sum_{n=0}^{\infty} a_n (z - z_0)^n$ | b) $\sum_{n=1}^{\infty} b_n (z - z_0)^n$ |
| c) $\sum_{n=0}^{\infty} \frac{a_n}{(z - z_0)^n}$ | d) $\sum_{n=1}^{\infty} \frac{b_n}{(z - z_0)^n}$ |

v) $\text{Res}_{z=1} \frac{z^3-4}{z^2-1} = \dots\dots\dots$

- | | |
|-------------------|-------|
| a) 0 | b) -3 |
| c) $-\frac{3}{2}$ | d) 3 |

- vi) A sequence of complex numbers $\{z_n\} = \left\{1 + \frac{i}{n^3}\right\}_{n=1}^{\infty}$
- a) converges to 1 b) converges to 0
- c) converges to i d) converges to -1
- vii) Cauchy-Riemann equations in Cartesian form are.....
- a) $u_x = -v_y, u_y = -v_x$ b) $u_x = v_y, u_y = -v_x$
- c) $u_x = -v_y, u_y = v_x$ d) $u_x = v_y, u_y = v_x$
- viii) An arc $z = z(t), a \leq t \leq b$ which does not cross itself except $z(a) = z(b)$ is called
- a) Jordan arc b) Simple arc
- c) Closed arc d) Jordan curve

Q2) Attempt ANY TWO of the following. (16)

- A. Derive Cauchy Riemann equations in polar form.
- B. State Greens theorem. If f is analytic in closed region R and f' is continuous there, then show that $\int_C f(z)dz = 0$, for every closed contour C lying entirely in R .
- C. State and prove Cauchy residue theorem.

Q3) Attempt ANY FOUR of the following. (16)

- A. Show that the function $T(x, y) = e^{-y} \sin x$ is harmonic in every domain of the xy -plane.
- B. Evaluate $\int_1^2 \left(\frac{1}{t} - i\right)^2 dt$.
- C. If $f(z)$ and $\bar{f}(z)$ are analytic in a domain D , then show that $f(z)$ must be constant throughout D .
- D. Find Laurent series expansion in powers of z for the function $f(z) = \frac{z+1}{z-1}$ in a domain $1 < |z| < \infty$.
- E. Evaluate $\int_C \frac{z^3 - 1}{(z-4)(z+1)} dz$ where C is the circle $|z| = 2$ described in counter clockwise direction.
- F. Using Cauchy Residue theorem verify that $\int_0^\infty \frac{dx}{1+x^2} = \frac{\pi}{2}$.

Seat No	
------------	--

B.Sc. (Part- III) (Semester – VI) (CBCS) (NEP-2020)

Examination, April– 2025

MATHEMATICS

Operations Research (Paper – XVI)

Sub. Code : 97144

Day and Date : Saturday, 19/04/2025

Total Marks :40

Time : 10.30 a.m. to 12.00 p.m.

Instructions :

- 1. All questions are compulsory.**
- 2. Figures to the right indicate full marks.**
- 3. Use of non-programmable calculators is allowed.**

Q.1) Select the correct alternative for each of the following and rewrite the sentence: (8)

i) To solve the L.P.P. by using simplex method the new non-negative variable introduce in the objective function with

- (a) positive cost coefficient (b) negative cost coefficient
(c) zero cost coefficient (d) none of these.

ii) The first mathematical technique in the field of O.R. was introduced by American Mathematician George B. Dantzig in

- (a) 1957 (b) 1947
(c) 1948 (d) 1940

iii) For $\geq$ type constraints, we use

- (a) only surplus variables (b) only slack variables
(c) only artificial variables (d) surplus and artificial variables

iv) Values of cell evaluations d_{ij} in transportation problem are calculated for.....

- (a) only unoccupied cells (b) only occupied cells
(c) all cells (d) none of these

v) For getting better solution of the transportation problem, we use

- (a) north-west corner method (b) Least cost entry method
(c) Vogel's method (d) Dominance method

- vi) Operation research approach is
- (a) Multi-disciplinary (b) Scientific
(c) Intuitive (d) All of these
- vii) In Hungarian method, we draw straight lines to cover all the zeros on
- (a) Marked rows and Unmarked columns
(b) Marked rows and Marked columns
(c) Marked columns and Unmarked rows
(d) Unmarked rows and Unmarked columns
- viii) Difference between smallest and second smallest cost for any row or a column in transportation problem is called.....
- (a) allocation (b) penalty
(c) cell evaluation (d) supply

Q.2) Attempt any TWO of the following:

(16)

- A) Solve the following L.P.P by Simplex method.

$$\text{Maximize } Z = 5x_1 + 3x_2$$

$$\text{Subject to } 3x_1 + 5x_2 \leq 15$$

$$6x_1 + 2x_2 \leq 24, \quad x_1, x_2 \geq 0$$

- B) Find the initial solution for following transportation problem (minimization type) using Vogel's approximation method.

	w_1	w_2	w_3	w_4	Supply
F_1	30	25	40	20	100
F_2	29	26	35	40	250
F_3	31	33	37	30	150
Demand	90	160	200	50	

- C) Define an assignment problem. Prove that, in an assignment problem, if we add or subtract a constant to every element of a row or column of the cost matrix $[c_{ij}]$, then an assignment plan that minimizes the total cost for the new cost matrix also minimizes the total cost for the original cost matrix.

Q.3) Attempt any FOUR of the following:

(16)

(A) Define Operational Research. Discuss the scope of O.R. in Industry.

(B) Use the graphical method to solve the following LP problem.

Maximize $z = 6x + 7y$, subject to the constraints

$$2x + 3y \leq 12,$$

$$2x + y \leq 8,$$

$$x, y \geq 0$$

(C) A firm can produce three types of cloth, say: A, B and C. Three kinds of wool are required for it, say: red, green and blue wool. One unit length of type A cloth needs 2 meters of red wool and 3 meters of blue wool; one unit length of type B cloth needs 3 meters of red wool, 2 meters of green wool and 2 meters of blue wool; and one unit of type C cloth needs 5 meters of green wool and 4 meters of blue wool. The firm has only a stock of 8 meters of red wool, 10 meters of green wool and 15 meters of blue wool. It is assumed that the income obtained from one unit length of type A cloth is Rs. 3.00, of type B cloth is Rs. 5.00, and of type C cloth is Rs. 4.00. Formulate L. P. Problem to maximize income with available material.

(D) Find initial basic feasible solution for the following transportation problem using Matrix-minima method

	D_1	D_2	D_3	D_4	Supply
O_1	6	4	1	5	14
O_2	8	9	2	14	16
O_3	4	3	6	2	5
Demand	6	10	15	4	

(E) Solve the following Assignment problem for minimum cost.

	<i>A</i>	<i>B</i>	<i>C</i>
1	24	27	21
2	32	33	30
3	38	40	36
4	30	41	34

(F) Define

- i) Feasible solution.
 - ii) Basic Feasible solution.
 - iii) Optimal solution in terms of transportation problem.
-

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Physics Paper XIII****Sub. Code: 97147****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of scientific calculator and logarithmic table is allowed

Q1) Choose the correct alternatives.**[8]**

i. Nuclear radius is proportional to ...

A. $A^{2/3}$

B. $A^{1/3}$

C. A

D. Z

ii. Protons and neutrons have intrinsic spin equal to ...

A. $\hbar$

B. $2\hbar$

C. $\hbar/2$

D. $\hbar/2\pi$

iii. In particle accelerators ... particles are accelerated

A. positively charged

B. negatively charged

C. charged

D. neutral

iv. The magnetic pole pieces are just below and above the donut tube in ...

A. Cyclotron

B. Betatron

C. Synchrocyclotron

D. Electron-synchrotron

v. The period of revolution of particle in cyclotron is...

A. Independent of velocity of the particle

B. Independent of radius of orbit

C. Independent of velocity of particle and radius of orbit

D. Proportional to the energy of the particle

vi. Gas amplification in ionization chamber is ...

- A. $\sim 10^3$
- B. $\sim 10^8$

- C. less than unity
- D. equal to unity

vii. Electron multiplication is achieved in ...

- A. GM- counter
- B. Photomultiplier tube
- C. Scintillation counter.
- D. Cerenkov detector.

viii. ... force is not interactive.

- A. Gravitational
- B. Electromagnetic
- C. Strong nuclear
- D. Centrifugal

Q2) Attempt any TWO of the following.

[16]

- a. Explain mass defect and binding energy of the nucleus and hence obtain expression for the B.E. per nucleon. Explain Binding energy curve in details. [8]
- b. Explain theory, construction, working and limitations of the cyclotron. Obtain expression for maximum energy obtained from cyclotron. [8]
- c. Explain construction, working and theory of the G-M counter. Hence explain dead time and recovery time of GM counter. [8]

Q3) Attempt any FOUR of the following

[16]

- a. Give classification of elementary particles. [4]
- b. Write note on Quark Model. [4]
- c. Explain construction and working of Wilson cloud chamber. [4]
- d. Write note on Electron synchrotron [4]
- e. Explain the Principle of phase stability [4]
- f. Explain Semiconductor detector [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97147) Physics Paper XIII Part 3 SEM 6

97147

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Physics Paper XIII****Sub. Code: 65807/81668/81864****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of scientific calculator and logarithmic table is allowed

Q1) Solve following MCQ.**[8]**

- i.is used to accelerate the positive ion.
 - A. Betatron
 - B. Synchrotron
 - C. Cyclotron
 - D. None of these
- ii. The nature of track of alpha particle in cloud chamber will be.....
 - A. Thick and Short
 - B. Thin and Long
 - C. Thin and Fuzzy
 - D. Thick and Fuzzy
- iii. Protons and Neutrons together called as.....
 - A. Nucleons
 - B. Electrons
 - C. Hyperons
 - D. Baryons
- iv. Bosons have spin.
 - A. Half
 - B. Zero
 - C. Integral
 - D. None of these
- v. Electron is a
 - A. Baryon
 - B. Hyperon
 - C. Lepton
 - D. Meson
- vi. Radius of the nucleus is directly proportional toof atomic

number.

- A. Square root
- B. Cube root
- C. Square
- D. Cube

vii. **Betatron works on the principle of**

- A. Atomic reactor
- B. Transformer
- C. Micro phone
- D. Oscillator

viii. **Phosphor crystal is used in**

- A. GM Counter
- B. Wilson Cloud Chamber
- C. Scintillation Counter
- D. Bubble Chamber

Q2) Attempt any TWO of the following (Out of Three) [16]

- a. What is binding energy of nucleus ? Explain binding energy curve. [8]
- b. Discuss principle, construction and working of cyclotron. [8]
- c. Give the classification of elementary particles. [8]

Q3) Attempt any FOUR of the following (Out of Six) [16]

- a. Explain the construction and working of photomultiplier tube. [4]
- b. Write a note on shape, size and radius of nucleus. [4]
- c. Discuss weak and strong interactions. [4]
- d. Write a note on principle of phase stability. [4]
- e. Explain avalanche, quenching and dead time in GM tube. [4]
- f. Write a note on synchrotron. [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

2] (2324) B.Sc. (CBCS) (81668) Physics Paper XIII Part 3 SEM 6

3] (286) B.Sc.(Sem.) (81864) Physics Paper XIII Part 3 SEM 6

129935

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper XIV****Sub. Code: 97148****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**
 - 4. Use of Scientific calculator is allowed**

Q1) Solve following MCQ.**[8]**

- i. Packing fraction of ----- unit cells is the same.
 - A. sc and bcc
 - B. bcc and fcc
 - C. fcc and hcp
 - D. hcp and sc
- ii. Regular and periodic arrangements of points in space is called -----
 - A. lattice
 - B. basis
 - C. unit cell
 - D. crystal structure
- iii. The diffraction of X-rays by atoms is similar to ----- of X- rays by crystal planes.
 - A. polarization
 - B. interference
 - C. refraction
 - D. reflection
- iv. In powder method of X-ray diffraction -----
 - A. λ is fixed while both θ and d varies
 - B. λ is fixed and θ varies
 - C. θ is fixed and λ varies
 - D. both θ and λ varies
- v. The value of magnetization which remains even after magnetizing field is reduced to zero is -----
 - A. hysteresis
 - B. retaintivity

- C. coercivity
- D. saturation magnetization

- vi.** The lagging of intensity of magnetization behind the magnetizing field is called as -----
- A. hysteresis
 - B. wall displacement
 - C. spontaneous magnetization
 - D. saturation magnetization
- vii.** The effective number of free electrons is zero for -----
- A. metals
 - B. semiconductors
 - C. metals and semiconductors
 - D. insulators
- viii.** According to Kronig – Penny model width of allowed energy band ----- with increase in energy.
- A. Increases
 - B. decreases
 - C. remains constant
 - D. either increase or decrease

Q2) Attempt any TWO of the following **[16]**

- a.** What are Miller indices? How are they determined? Obtain Miller indices of a plane which intercepts at $4a$, $2b$, $3c$. **[8]**
- b.** Explain classical Langevin's theory of paramagnetism. Obtain an expression for paramagnetic susceptibility. **[8]**
- c.** Explain Hall effect. Obtain an expression for Hall voltage and Hall coefficient. **[8]**

Q3) Attempt any FOUR of the following **[16]**

- a.** Explain the concept of density of state. **[4]**
- b.** Describe Laue method of X ray diffraction. **[4]**
- c.** State and explain Curie law in paramagnetism. **[4]**
- d.** Explain simple cubic crystal structure. Determine packing fraction of simple cubic crystal structure. **[4]**

e. Show that the reciprocal of the reciprocal lattice is the direct lattice.

[4]

f. Derive Bragg's law for X ray diffraction.

[4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97148) Physics Paper XIV Part 3 SEM 6

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Physics Paper XIV****Sub. Code: 65808/81669/81865****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of scientific calculator and logarithmic table is allowed

Q1) Select correct alternative.**[8]**

- i. Number of Bravais lattices in three dimensions are.....
 - A. 5
 - B. 7
 - C. 14
 - D. 10
- ii. Packing fraction of FCC crystal structure is.....
 - A. 0.52
 - B. 0.68
 - C. 0.74
 - D. 1
- iii. Which of the following is not a method of X-ray diffraction?
 - A. Laue method
 - B. Powder method
 - C. Rotating crystal method
 - D. Ewald's method
- iv. Wavelength of X-rays is of the order of.....
 - A. 1 A.U.
 - B. 100 A.U.
 - C. 500 A.U.
 - D. 5000 A.U.
- v. Susceptibility ofmaterials is independent of temperature.
 - A. paramagnetic
 - B. diamagnetic
 - C. ferromagnetic
 - D. ferrimagnetic
- vi. The value of magnetisation which remains even after magnetising field is

reduced to zero is.....

- A. hysteresis
- B. coercivity
- C. retentivity
- D. saturation magnetisation

vii. The effective number of free electrons that is $N_{\text{eff}} = 0$ for.....

- A. metals
- B. metals and semiconductors
- C. semiconductors
- D. insulators

viii. Band gap energy of germanium is.....eV.

- A. 1.12
- B. 0.72
- C. 7
- D. 0.5

Q2) Attempt any TWO of the following **[16]**

- a. Discuss the various types of symmetry elements in cubic crystal. **[8]**
- b. Explain classical Langevin theory of paramagnetism. **[8]**
- c. Define Hall effect. Obtain an expression for Hall voltage and Hall coefficient. **[8]**

Q3) Attempt any FOUR of the following **[16]**

- a. Define coordination number, atomic radius and packing fraction. **[4]**
- b. Define Bragg's law for X-ray diffraction. **[4]**
- c. Write a note on effective mass of an electron. **[4]**
- d. Explain hysteresis in ferromagnetic materials. **[4]**
- e. Explain Laue method of X-ray diffraction. **[4]**
- f. Show that every reciprocal lattice vector is normal to the lattice plane. **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

2] (286) B.Sc.(Sem.) (81865) Physics Paper XIV Part 3 SEM 6

3] (2324) B.Sc. (CBCS) (81669) Physics Paper XIV Part 3 SEM 6

569135

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Physics Paper XV****Sub. Code: 97149****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks

Q1) Select the most correct alternative**[8]**

- i. The transition from nS levels to P -level give rise to a spectral series called

- A. Principal series
- B. Diffuse series
- C. Sharp series
- D. Fundamental series

- ii. Larmor frequency of precession in magnetic field B is -----

- A. $\omega_L = \frac{B}{m}$
- B. $\omega_L = \frac{m}{B}$
- C. $\omega_L = \frac{B e}{m}$
- D. $\omega_L = \frac{h}{B}$

- iii. Pure rotational spectra occur in

- A. UV region
- B. IR region
- C. Microwave region
- D. Radiowave region

- iv. Zero point energy of molecule is

- A. zero
- B. $h\nu_0$
- C. $2h\nu_0$

D. $\frac{1}{2}h\nu_0$

v. To study Raman effect the optical system be made up of



- A.
- B. glass
- C. calcite
- D. quartz

vi. Raman shift corresponds to ----- spectral region

- A. visible
- B. ultra-violet
- C. infra-red
- D. x-ray

vii. About 90% matter in the interstellar medium contains -----

- A. dust
- B. helium
- C. hydrogen
- D. ylem

viii. The surface of the sun having an average temperature of about 6000 degree kelvin is known as

- A. corona
- B. photosphere
- C. sun spot
- D. ionosphere

Q2) Attempt **any two** of the following

[16]

- a. What is normal Zeeman effect? Explain normal Zeeman effect with the help of vector atom model. **[8]**
- b. State and explain any three tests to verify the correctness of cosmological theories. **[8]**
- c. Explain in detail vibration-rotation spectra of a diatomic molecule. Describe how it can be used to estimate bond length. **[8]**

Q3) Attempt any four of the following

[16]

- a. What are the observed salient features of the spectra of alkali atoms? **[4]**
- b. Explain the formation of protostar and the changes that occur till it forms a normal star. **[4]**

- c. Give the classical theory of Raman effect and show that the Raman shift is equal to frequency of vibration of molecule. [4]
- d. Explain electronic spectra of diatomic molecules. [4]
- e. What is Hubble law? Define Hubble constant. How approximate age of universe can be estimated from Hubble law? [4]
- f. What are sun-spots? Give any four prominent features of sun spots [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97149) Physics Paper XV Part 3 SEM 6

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Physics Paper XV****Sub. Code: 59877/65809/81670/81866****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks

Q1) Select the correct alternative.**[8]**

- i. In 'Na' transitions in Principal series are due to.....
 - A. $3S \leftarrow nP$
 - B. $2S \leftarrow nP$
 - C. $3p \leftarrow nS$
 - D. $2P \leftarrow nS$
- ii. In Vibration-rotational transitions, for P – branch.....
 - A. $\Delta v = +1, \Delta j = 0$
 - B. $\Delta v = +1, \Delta j = -1$
 - C. $\Delta v = +1, \Delta j = +1$
 - D. $\Delta v = 0, \Delta j = -1$
- iii. The stars lying between main sequence and red giants are called as.....
 - A. Novae
 - B. Cepheid-variables
 - C. White giants
 - D. Red dwarfs
- iv. Raman shift for Anti-Stoke's line is.....
 - A. Positive
 - B. Negative
 - C. Zero
 - D. Very small
- v. The H-R diagram is graph of.....
 - A. Surface temperature against luminosity
 - B. $\log N$ against $\log I$
 - C. Luminosity against Surface temperature
 - D. Velocity of recession against distance of galaxy
- vi. A star in the process of formation is called as

- A. Protostar
- B. Red giant
- C. White dwarf
- D. Nova

vii. Approximate age of universe is.....

- A. V / H
- B. $1 / H$
- C. H / V
- D. Hubble constant

viii. The doublet separation goes on increasing with.....

- A. Increasing 'l'
- B. Increasing 'Z'
- C. Increasing 'n'
- D. Decreasing 'j'

Q2) Solve any two of the following.

[16]

- a. Describe in short Big Bang theory and Oscillating Universe theory. **[8]**
- b. Give an account of classical theory of Raman effect. **[8]**
- c. Explain anomalous Zeeman effect and derive an expression for Term shift. **[8]**

Q3) Solve any four of the following.

[16]

- a. List prominent features of Sun-spots. **[4]**
- b. Write short note on H – R diagram. **[4]**
- c. Explain Hubble law with it's importance. **[4]**
- d. Write note on Raman lines. **[4]**
- e. Discuss nature of wave function in Hydrogen molecular ion. **[4]**
- f. Write short note on spin-orbit interaction. **[4]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (286) B.Sc.(Sem.) (65809) Physics Paper XV Part 3 SEM 6

2] (2324) B.Sc. (CBCS) (81670) Physics Paper XV Part 3 SEM 6

3] (286) B.Sc.(Sem.) (59877) Physics Paper XV Part 3 SEM 6

4] (286) B.Sc.(Sem.) (81866) Physics Paper XV Part 3 SEM 6

1722891

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper XVI****Sub. Code: 97150****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of scientific calculator and logarithmic table is allowed

Q1) Select the correct alternative.**[8]**

- i. --- is used to adjust the plane of blades normal to the incoming wind when the wind direction changes.
 - A. pitch control
 - B. yaw control
 - C. gear control
 - D. speed control
- ii. The solar spectrum comprises of ... parts of the electromagnetic spectrum.
 - A. Only visible
 - B. Only UV
 - C. UV, Visible and IR
 - D. All
- iii. The solar energy received per unit area per unit time normal to the direction of the sun rays at mean distance between Earth and the sun is ----
 - A. Energy quantum
 - B. solar insolation
 - C. Clarity index
 - D. Solar constant
- iv. Algae in the presence of sunlight and organic waste forms.....
 - A. Biomass
 - B. Carbon dioxide
 - C. Methane
 - D. Ethanol
- v. According to London's equation, the magnetic field inside superconductors varies as, where H_o is the magnetic field at the surface of the superconductor and λ_L is the penetration depth.
 - A. $H(x) = H_o e^{x/\lambda_L}$

- B. $H(x) = H_o e^{-x/\lambda_L}$
- C. $H(x) = H_o e^{\lambda_L/x}$
- D. $H(x) = H_o e^{-\lambda_L/x}$

- vi. The phenomenon of superconductivity was first observed in.....
 - A. lead
 - B. helium
 - C. mercury
 - D. tungsten
- vii. Which of the following processes involves transferring the pattern on a semiconductor wafer?
 - A. Ball milling
 - B. photolithography
 - C. spray deposition
 - D. colloidal synthesis
- viii. A decrease in the size of quantum dots results in.....
 - A. decrease in band gap energy
 - B. increase in band gap energy
 - C. emission of longer wavelengths
 - D. no change in either band gap or emissions

Q2) Attempt any TWO [16]

- a. Prove that the maximum power of the wind turbine is directly proportional to the cube of the incoming wind velocity. [8]
- b. What is superconductivity? Describe Type-I and Type-II superconductors. [8]
- c. Explain the process of ball milling for the synthesis of nanomaterials. Also, state the advantages and disadvantages of it. [8]

Q3) Attempt any FOUR [16]

- a. Write a note on the horizontal axis wind turbine. [4]
- b. Write a note on "essential subsystems in a solar thermal power plant". [4]
- c. Give the merits and limitations of solar PV systems. [4]
- d. Explain briefly the origin of Biomass. [4]
- e. Give the classification of nanomaterials. [4]
- f. Write a note on spintronics. [4]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97150) Physics Paper XVI Part 3 SEM 6

3412688

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Physics Paper XVI****Sub. Code: 81671****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of scientific calculator and logarithmic table is allowed

Q1) Select correct alternative.**[8]**

i. is the unit of energy.

- A. newton
- B. joule
- C. watt
- D. J/kg C

ii. The power of wind turbine is proportional to..... where V is the speed of incoming wind and A is area swept by the blades of the wind turbine.....

- A. V and A
- B. V^2 and A^2
- C. V^3 and A
- D. inversely proportional to V and A

iii. The solar radiation with wavelengths below 300 nm are absorbed by ----- in the earth's atmosphere.

- A. Water
- B. CO_2
- C. Ozone
- D. Hydrogen

iv. Clarity index has unit.....

- A. W/m^2
- B. W/m
- C. J/m^2
- D. No unit

v. Which one of the following is not a biomass resource?

- A. Plastic bags

- B. Algae
- C. animal waste
- D. dried leaves

vi. A quantum dot hasdegrees of freedom.

- A. zero
- B. one
- C. two
- D. three

vii. The idea and concept of Nano was put forth by

- A. Enrico Fermi
- B. Albert Einstein
- C. Max Planck
- D. Richard Feynman

viii. The penetration depth is defined as the distance inside a superconductor where the magnetic field decreases to

- A. zero
- B. $1/e$ times its surface value.
- C. e times its surface value
- D. one

Q2) Attempt any TWO [16]

- a. What is energy? What are the different forms of energy? [8]
- b. With a neat diagram, explain in detail the solar energy spectrum. [8]
- c. Explain with a neat diagram a process of ball milling for the synthesis of nanomaterials. Also state the advantages and disadvantages of it. [8]

Q3) Attempt any FOUR [16]

- a. Write a note on the planning of the wind farm. [4]
- b. Write a note on Solar energy from the satellite station through Microwave to earth station. [4]
- c. Name the different Biomass conversion processes. Discuss in brief anaerobic digestion. [4]
- d. Write a note on quantum confinement. [4]
- e. What is Meissner Effect? [4]

- f. Distinguish between Type-I and Type –II superconductors.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (2324) B.Sc. (CBCS) (81671) Physics Paper XVI Part 3 SEM 6

791646

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Zoology Paper XIII****Sub. Code: 97162****Day and Date: APRIL ,15-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Solve following MCQ.**[8]**

- i. In animals fertilization is take place inside the body
A. Fish & Frog
B. Frog & snake
C. Fish & Man
D. Man & Bird
- ii. Eggs containing moderate quantities of yolk are called as egg
A. Microlecithal
B. Mesolecithal
C. Macrolecithal
D. Alecithal
- iii. . Brain is developed from
A. Ectoderm
B. Mesoderm
C. Endoderm
D. None of above
- iv. Blastopore in frog can be seen in stage
A. Cleavage
B. Morula
C. Blastula
D. Gastrula
- v. In eutherian mammals contain..... placenta
A. Chorio-Allantois
B. Yolk-sac
C. Both of these
D. None of these
- vi. The invagination & involution are examples of.....

- A. Mesoboly
- B. Epiboly
- C. Emboly
- D. Both B & C

vii. Body of chick embryo proper is formed by.....

- A. Area opeca
- B. Nucleus of pender
- C. Latebra
- D. Area pellucida

viii. In human being duration of embryo implantation is..... days

- A. 2 to 8
- B. 4 to 8
- C. 5 to 10
- D. 7 to 14

Q2) Long answer questions (Attempt any TWO of three)

[16]

- a. What is gastrula? Describe the process of gastrulation in chick
- b. What is foetal membrane? Describe the types and function in chick
- c. Describe the fate of three germ layers in the frog

Q3) Short Notes (Attempt any FOUR of six)

[16]

- a. Development of primitive streak in chick
- b. Structure of mature egg of frog
- c. Types of eggs based on distribution of yolk in cytoplasm
- d. Types of cleavages
- e. Significance of placenta
- f. Capacitation of sperm

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97162) Zoology Paper XIII Part 3 SEM 6

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Zoology Paper XIV****Sub. Code: 97163****Day and Date: APRIL ,16-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Select the correct alternative and rewrite the sentence.**[8]**

- i. What is immunology?
 - A. The study of blood cells
 - B. The study of the immune system and its functions
 - C. The study of microorganisms
 - D. The study of genetic disorders
- ii. Which cells are primarily responsible for adaptive immunity?
 - A. Neutrophils
 - B. B and T lymphocytes
 - C. Natural killer (NK) cells
 - D. Eosinophils
- iii. Which of the following is NOT a part of the immune system?
 - A. Lymph node
 - B. Spleen
 - C. Kidney
 - D. Thymus
- iv. The specific part of an antigen that is recognized by an antibody is called:
 - A. Hapten
 - B. Adjuvant
 - C. Epitope
 - D. Cytokine
- v. Which antibody is the first to be produced during an infection?
 - A. IgA
 - B. IgG
 - C. IgE
 - D. IgM

- vi. Hybridoma technology is used to produce:
- A. Polyclonal antibodies
 - B. Monoclonal antibodies
 - C. Cytokines
 - D. Antigens
- vii. Which type of antigen-antibody reaction is commonly used for determining blood type?
- A. Opsonization
 - B. Agglutination
 - C. Neutralization
 - D. Precipitation
- viii. HIV/AIDS leads to immunodeficiency by targeting:
- A. B cells
 - B. Red blood cells
 - C. CD4+ T helper cells
 - D. Natural killer cells

Q2) Attempt any two of the following

[16]

- a. Describe structure, Classes and Functions of Antibodies
- b. Explain in detail cells of immune system with functions
- c. Write basic properties and functions of cytokines

Q3) Attempt any of the four of the following

[16]

- a. Principles of Innate immunity
- b. Haematopoiesis
- c. Types of antibodies with functions
- d. Functions of MHC
- e. Primary lymphoid organs
- f. Autoimmune disorders

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

219129

Seat No.

MAR-APR 2025 SUMMER EXAMINATION**2354 Bachelor of Science****Sub. Name: Zoology Paper XVI****Sub. Code: 97165****Day and Date: APRIL ,19-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

Instructions: 1. All questions are compulsory
2. Draw neat labelled diagrams wherever necessary
3. Figures to the right indicate full marks

Q1) Choose the correct alternatives from the given below and rewrite the sentences **[8]**

- i. The Digestive enzyme present in the mammalian saliva is -----
A. Ptyalin
B. Lipase
C. Gypsin
D. Protease
- ii. The primary site of exchange of gases are-----
A. RBCs
B. Trachea
C. Tissues
D. Alveoli
- iii. Formation of blood cells in the bone marrow is called as-----
A. Haemopoiesis
B. Haemolysis
C. Haemorrhage
D. Haemogenesis
- iv. Smooth muscle occurs in -----
A. Vein
B. Artery
C. Uterus
D. All of the above
- v. Perikaryon of a neuron is also called as-----
A. Cyton
B. Axon
C. Dendron
D. Axon hillock
- vi. The reabsorption of water in the kidney is under the control of -----

hormone

- A. STH
- B. ACTH
- C. LH
- D. ADH

vii. Gastric juice is secreted under the influence of hormone-----

- A. Renin
- B. Enterogatrone
- C. Enterokinase
- D. Gastrin

viii. Insulin is secreted by-----

- A. Alpha cells
- B. Beta cells
- C. Kupffer cells
- D. Gall bladder

Q2) Answer the following questions (Any Two)

[16]

- a. Describe the internal structure of human heart and explain how heart beat is originated and conducted.
- b. Define excretion. Describe the structure of nephron and explain mechanism of urine formation
- c. Describe the structure of Thyroid gland and add note on its hormones with their functions

Q3) Attempt ANY FOUR of the following

[16]

- a. Structure of Neuron
- b. Mechanism of muscle contraction
- c. Absorption of carbohydrates
- d. Mechanism of pulmonary respiration
- e. Composition of blood
- f. Give properties and functions of respiratory pigments.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97165) Zoology Paper XVI Part 3 SEM 6

4208

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****2354 Bachelor of Science****Sub. Name: Zoology Paper XV****Sub. Code: 97164****Day and Date: APRIL ,17-04-2025****Total Marks: 40****Time: 10:30 AM To 12:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Draw neat labelled diagrams wherever necessary**
 - 3. Figures to the right indicate full marks**

Q1) Select the correct answers from the following and rewrite sentences.

[8]

- i.is fertile female of honey bee colony.
 - A. Worker
 - B. Queen
 - C. Drone
 - D. Sterile
- ii. Sting apparatus and wax gland present only in bee.
 - A. Drone
 - B. Worker
 - C. Queen
 - D. Non of the above
- iii. Site of insemination in cow is.....
 - A. Uterine cornua
 - B. Mid-cervix
 - C. Fallopian tube
 - D. Vagina.
- iv. Osmanabadi is famous breed of.....
 - A. Cow
 - B. Buffalo
 - C. Goat
 - D. Sheep
- v. Pearl is secreted by
 - A. Nacreous layer
 - B. Prismatic layer
 - C. Mantle layer
 - D. Shell
- vi. Blue revolution in India is related to.....

- A. Pulse production
- B. Pearl production
- C. Fish production
- D. Oilseed production

vii. Fish belongs to class.....

- A. Annelida
- B. Coelenterata
- C. Arthropoda
- D. Pieces

viii. Rathu is famous breed of.....

- A. Buffalo
- B. Goat
- C. Sheep
- D. Cow

Q2) Attempt any two of following.

[16]

- a. Write importance of apiculture and Describe apiculture with reference to Newton model.
- b. Describe any two indigenous breeds of goat.
- c. Explain in brief phenomenon of pearl formation in pearly oyster by artificial method.

Q3) Write short notes on any four of the following.

[16]

- a. Milk and Milk products.
- b. Indigenous breeds of cow.
- c. Commercial importance of fish farming.
- d. Fresh water prawn culture.
- e. Importance of honey.
- f. Advantages of Artificial insemination in cattle.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (2354) B.Sc. CBCS (NEP 2020) (97164) Zoology Paper XV Part 3 SEM 6