This question paper contains **2** printed pages]

VA—1001—2024

FACULTY OF ALL FACULTIES

All (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ENVIRONMENTAL STUDIES (Compulsory)

पर्यावरण अभ्यास (अनिवार्य)

Paper–V

(Wednesday, 27-11-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw neat and well labelled diagram wherever necessary.

(*i*) **सर्व** प्रश्न सोडवा.

(*ii*) **सर्व** प्रश्नांना समान गुण आहेत.

(*iii*) आवश्यक तेथे सुबक आकृती काढून नावे द्या.

1. Write in detail the effects of modern agriculture. 15

आधुनिक शेतीमुळे होणारे दुष्परिणाम सविस्तर माहिती लिहा.

Or

(किंवा)

(*a*) Describe the importance of Environmental Study. 8

पर्यावरण अभ्यासाचे महत्त्व विशद करा.

(*b*) Describe grassland ecosystem. 7

'गवताळ परिसंस्था' विशद करा.

P.T.O.

2. Write biogeographical classification of India. 15

भारतातील सजीवांचे भौगोलिक परिस्थितीनुसार वर्गीकरण करा.

Or

(किंवा)

(*a*) Describe alternative energy source. 8

पर्यायी ऊर्जा स्रोत वर्णन करा.

(*b*) Discuss the role of an individual in pollution and abatement. 7

प्रदूषण व त्याच्या नियंत्रणात मानवाचा वैयक्तिक वाटा.

3. Write short notes any *two* : 10

(*i*) Desertification

(*ii*) Food web

(*iii*) Noise pollution

(*iv*) Environmental awareness.

खालीलपैकी कोणत्याही **दोन**वर थोडक्यात टिपा लिहा :

(*i*) वाळवंटीकरण

(*ii*) अन्न जाळे

(*iii*) ध्वनी प्रदूषण

(*iv*) पर्यावरण जागृती.

This question paper contains **3** printed pages]

VA—04—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper–XII

(Organic and Inorganic Chemistry)

(Friday, 29-11-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempts *all* questions.

(*ii*) Figures to the right indicate full marks.

1. Solve any *three* of the following : 3×5=15

(*a*) What are chelates ? How are they classified ? Differentiate between metal chelate and metal complex.

(*b*) Give the postulates of Werner's theory of co-ordination compounds.

(*c*) Write a note on anti-arthritis drugs.

(*d*) Write the IUPAC names of the following complexes :

(*i*) $K_4[Cu(CN)_6]$

P.T.O.

(*ii*) $Na_3[Fe(C_2O_4)_3]$

(*iii*) $[Cr(NH_3)_6]^{3+}$

(*iv*) $[CuCl_2(CH_3–NH_2)_2]$

(*v*) $[Pt(NH_3)_6Cl_4]$.

(*e*) Explain the chemotherapeutic action of anti-cancer drug cis-platin.

2. Solve any *three* of the following : 3×5=15

(*a*) How will you prepare pyridine from acetylene and β-picoline ? What is the action of the following reagents on pyridine ?

(*i*) H_2SO_4

(*ii*) Br_2

(*iii*) KOH.

(*b*) Explain molecular orbital picture of furan.

(*c*) What are dyes ? Give the synthesis and uses of the following dyes :

(*i*) Phenolphthalein

(*ii*) Methye orange.

(*d*) Write a short note on antimalarials, antitubercular and transquilizers with a suitable example.

(*e*) Discuss the chemical constitution of nicotine.

3. Solve any *two* of the following : 2×5=10

(*a*) How will you convert ?

(*i*) Acetylene to pyrole

(*ii*) Mucic acid to furan

(*iii*) Sodium succinate to thiophene.

(*b*) Explain synthesis and uses of the following drugs :

(*i*) Sulphanilamide

(*ii*) Sulphadiazine.

(*c*) What are Pesticides ? Define insecticides, fungicides and rodenticides with suitable example.

(*d*) What are fat soluble vitamins ? Give sources and deficiency diseases of Vitamin-D and Vitamin-E.

This question paper contains **2** printed pages]

VA—32—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

BOTANY

Paper–XIII

(Plant Pathology–I)

(Friday, 6-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answers with suitably labelled diagrams wherever necessary.

1. Describe classification of plant diseases on the basis of causal organisms. 15

Or

Write notes on :

(*a*) Dispersal of plant pathogen by air and water. 8

(*b*) Chemical weapons of pathogen. 7

2. Describe symptoms, causal organism, disease cycle and control measures of white rust of Mustard. 15

P.T.O.

Or

Write notes on :

(*a*) Green ear of Bajra. 8

(*b*) Bacterial blight of Pomegranate. 7

3. Attempt any *two* out of four : 10

(*a*) Role of temperature in disease development

(*b*) Koch's postulates

(*c*) Leaf spot turmeric

(*d*) Anthracnose of Mango.

This question paper contains **2** printed pages]

VA—33—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

BOTANY

Paper–XIII

(Systematic Botany–I)

(Friday, 6-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw neat and well labelled diagrams wherever necessary.

1. Describe in detail the Family-Combretaceae. 15

Or

Describe in brief :

(*a*) Role of botanical gardens in plant taxonomy. 8

(*b*) Molecular systematics. 7

2. Describe in detail the Family-Apocynaceae. 15

P.T.O.

Or

Describe in brief :

(*a*) Natural classification with reference to Bentham and Hooker. 8

(*b*) Phylogenetic classification with reference to Thorne. 7

3. Write short notes on any *two* of the following : 10

(*i*) Scope of Angiosperm taxonomy

(*ii*) Use of plant identification keys

(*iii*) Distinguishing features of Family-Cucurbitaceae

(*iv*) Distinguishing features Family-Nyctaginaceae.

This question paper contains **2** printed pages]

VA—321—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

COMPUTER SCIENCE

Paper XIII-A

(Programming in Visual Basic)

(Monday, 23-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Draw suitable diagrams, if necessary.

(*iii*) Assume suitable data, wherever necessary.

1. Explain data types and operators in visual basic. 15

Or

(*a*) What is event driven programming ? Explain. 8

(*b*) Explain for-loop with example in visual basic. 7

2. What is form in VB ? Explain types of forms in VB. 15

P.T.O.

Or

(*a*) Explain ListBox and TextBox control properties. 8

(*b*) Explain how to create menu in Visual Basic. 7

3. Write short notes on the following (any *two*) : 10

(*a*) Variables and constants

(*b*) If-else statement

(*c*) Elements of user interface

(*d*) Label control properties.

This question paper contains **2** printed pages]

VA—34—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

BOTANY

Paper–XIII

(Herbal Technology–I)

(Friday, 6-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Draw a well labelled diagram wherever necessary.

1. Describe briefly structure, types and importance of stomata and trichomes. 15

Or

(*a*) Explain chemical and anatomical constituents and uses of Shatavari. 8

(*b*) Describe organized crude drug. 7

2. Explain morphological, anatomical and chemical constituents of Adulsa. 15

Or

(*a*) Explain Ginger. 8

(*b*) Explain transgenic plants. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*i*) Explain problems of standardization herbs

(*ii*) Drug adultration

(*iii*) Gulvel

(*iv*) Explain importance of MAP of INDIA.

This question paper contains **2** printed pages]

VA—11—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper–XIII

(Physical and Inorganic Chemistry)

(Monday, 2-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of logarithmic table and non-functional calculator is allowed.

1. Answer any *three* of the following : 3×5=15

(*a*) Explain the anions and isopoly acids of M_O^{6+} ions.

(*b*) Discuss polymerisation of W_6^+ cation.

(*c*) Explain 1 : 12 (Tetrahedral heteroatom) polyanions with suitable examples.

(*d*) Explain the structure of $Os(CO)_4$ and CH_2 fragment.

(*e*) Explain $C_o(CO)_4$ organometallic fragment is isolobal with CH_3 fragment and Cl-atom.

P.T.O.

2. Answer any *three* of the following : 3×5=15

(*a*) Derive the relation between total vapour pressure and mole fraction of the component in vapour phase.

(*b*) Derive an expression for Gibbs free energy change of mixing ($\Delta G_{mix.}$) for an ideal solution. Show that for an ideal solution ΔH_{mix} = O.

(*c*) Define diamagnetic substances. Give its examples. Discuss characteristics of diamagnetic substances.

(*d*) Derive an expression for Ilkovic equation.

(*e*) Discuss the application of polarography in the estimation of inorganic and organic substances.

3. Answer any *two* of the following : 2×5=10

(*a*) Explain the construction and working of dropping mercury electrode (DME).

(*b*) Discuss the experimental measurement of magnetic susceptibility.

(*c*) Derive Gibbs-Duhem-Murgules equation and applied it for ideal solution.

(*d*) Derive an expression for chemical potential in ideal and non-ideal solution.

This question paper contains **2** printed pages]

VA—21—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

BOTANY

Paper–XII

(Cell and Molecular Biology)

(Wednesday, 4-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answers with labelled diagrams.

1. Define Mitosis. Describe the phases of mitosis and add a note on its significance. 15

Or

Describe in brief :

(*a*) Ultra structure of prokaryotic cell. 8

(*a*) Types of ribosomes 7

2. What are nucleic acids ? Describe structure of DNA. 15

P.T.O.

Or

Describe in brief :

(*a*) Fine structure of gene 8

(*b*) Amniocentesis 7

3. Write short notes on (any *two*) : 10

(*a*) Zygotene

(*b*) Peroxisomes

(*c*) *r*-RNA

(*d*) Mutagens.

This question paper contains **3** printed pages]

VA—10—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper–XIII

(Physical and Inorganic Chemistry)

(Monday, 02-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of logarithmic table and non-functional calculator is allowed.

1. Answer any *three* of the following : 3×5=15

(*a*) What are organometallic compounds ? Give their classification with examples.

(*b*) (*i*) Write a short note on nomenclature of simple and mixed organometallic compounds with its examples.

(*ii*) Explain transition metal organometallic compound with its example.

(*c*) Give the methods of preparation and properties of organolithium compounds.

P.T.O.

(*d*) What are metal carbonyls ? Give their classification with examples.

(*c*) (*i*) Draw the structure of $Fe_3(CO)_{12}$ and $CO_2(CO)_8$.

(*ii*) Describe polynuclear metal carbonyls with examples.

2. Answer any *three* of the following : 3×5=15

(*a*) Derive the equation for moment of inertia of rigid diatomic rotor.

(*b*) Explain Nernst distribution law when one of solute gets associated.

(*c*) What is third order reaction ? Give characteristics of third order reaction.

(*d*) The fundamental frequency of CO is 2500 cm^{-1}. Calculate force constant of this molecule. The atomic masses are

$12_C = 19.0 \times 10^{-27}$ kg

$16_O = 26.0 \times 10^{-27}$ kg.

(*e*) Explain pure rotational Raman spectra of rigid diatomic molecule.

3. Solve any *two* of the following : 2×5=10

(*a*) Explain effect of isotopic substitution on rotational spectra.

(*b*) Explain $\sigma - \sigma^*$ and $\pi \rightarrow \pi^*$ transition.

(*c*) What are consecutive reactions and opposing reactions ? Explain.

(*d*) Succinic acid was shaken with mixture of water and ether. After the distribution, upon analysis the concentration of acid in two layers was found as follows :

conc. in aqueous layer 0.0252, 0.071, 0.121

(mole lit^{-1})

conc. in ether layer 0.0046, 0.013, 0.022.

(mole. lit^{-1})

Comment on the result. What is molecular state of acid in ether ?

This question paper contains **2** printed pages]

VA—314—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

COMPUTER SCIENCE

Paper XII

(Software Engineering)

(Friday, 20-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Assume suitable data, if necessary.

1. Describe the generic process model and explain the concept of process patterns. 15

Or

(*a*) Explain the changing nature of software. 8

(*b*) Explain software characteristics. 7

2. What is Requirement Engineering ? Discuss the various task involved in it. 15

P.T.O.

Or

(*a*) Explain the design pyramid for web apps. 8

(*b*) What are the user interface design considerations for the mobile app ? 7

3. Write short notes on (any *two*) : 10

(*a*) Key elements of software engineering

(*b*) Incremental model

(*c*) Software Architecture

(*d*) Challenges in mobile app design.

This question paper contains **2** printed pages]

VA—322—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

COMPUTER SCIENCE

Paper XIII-B

(Advanced Java Programming)

(Monday, 23-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Answer suitable data, if necessary.

1. Attempt the following :

(*a*) Explain basics of object oriented programming. 15

Or

(*b*) Write a program in Java using multiple catch statement. 8

(*c*) How to throw our own exception ? Explain with example. 7

P.T.O.

2. Attempt the following :

(*a*) Draw and explain applet life cycle. 15

Or

(*b*) Explain drawing polygon with a suitable example. 8

(*c*) Explain character stream classes. 7

3. Write short notes on (any *two*) : 10

(*a*) Synchronization

(*b*) Run time error

(*c*) Design web page

(*d*) Concept of streams.

This question paper contains **2** printed pages]

VA—93—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Course)

ELECTRONICS

Paper-XII

(Communication Electronics-I)

(Monday, 16-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— Attempt *all* questions.

1. Describe in detail classification of electronic communication system based upon : 15

   (*i*) Direction of communication

   (*ii*) Nature of information signal

   (*iii*) Technique of signal transmission.

   Or

   (*a*) Derive the following power relations for AM wave : 8

   (*i*) Carrier power

   (*ii*) Power in sidebands

   (*iii*) Total power

   (*iv*) Modulation index in terms of P_t and P_c.

   (*b*) Draw the circuit diagram of BJT collector modulator and explain its working. 7

P.T.O.

2. Draw the block diagram of PCM transmitter and receiver and explain their working. 15

Or

(*a*) Discuss the principle of FM generation by direct method. Derive the expression for the equivalent capacitance from Basic reactance modulator using FET. 8

(*b*) Explain in brief frequency spectrum of FM wave and practical band-width of FM. 7

5. Write notes on (any *two*) : 10

(*a*) Varactor diode modulator

(*b*) Sampling process

(*c*) Frequency spectrum of AM wave

(*d*) Need of modulation.

This question paper contains **2** printed pages]

VA—117—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ELECTRONICS

Paper–XIII

(Power Electronics–I)

(Wednesday, 18-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Draw neat and well labelled diagram wherever necessary.

(*iii*) Figure to the right indicate full marks.

1. With the help of a neat diagram, explain the two transistor analogy of an SCR. Also discuss any *two* methods of turning of a thyristor. 15

Or

(*a*) Draw the V-I characteristics of a DIAC and explain its working principles. 8

(*b*) Draw the V-I characteristics of TRIAC and explain its working principle. 7

2. Why SCR's are to be connected in parallel ? What are the problems associated with parallel connections of SCRs ? How are they eliminated ? 15

P.T.O.

Or

(*a*) Explain the basic requirements for successful firing of a thyristor. 8

(*b*) Explain resistance firing circuit with a neat circuit diagram. 7

3. Attempt any *two* of the following : 10

(*a*) Principle of operation of SCR

(*b*) LASCR

(*c*) Pulse transformer in triggering circuits

(*d*) String efficiency.

This question paper contains **2** printed pages]

VA—118—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ELECTRONICS

Paper–XIII

('C' Programming)

(Wednesday, 18-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— Attempt *all* questions.

1. State various operators in 'C' and explain their uses in 'C' programming. 15

Or

(*a*) Discuss with syntax and suitable example 'Switch' statement in 'C'. 8

(*b*) Construct a program in 'C' to find the given no. is odd or even using branching statement. 7

2. Define 'Function' in C. Discuss in detail category of functions based on arguments and return values. 15

Or

(*a*) Discuss in brief structure and union in 'C' 8

(*b*) Describe pointers and arrays in 'C'. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Character set in 'C'

(*b*) Nested loop

(*c*) Array

(*d*) Accessing variables through pointers.

This question paper contains **2** printed pages]

VA—175—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

FISHERY SCIENCE

Paper–XII

(Indian Marine Fisheries)

(Friday, 20-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answers with suitably labelled diagrams wherever necessary.

1. Write in detail Bombay duck fishery. 15

Or

Write notes on :

(*a*) Pomfret fishery 8

(*b*) Seed collection methods of prawn 7

2. Describe in detail culture method of marine prawn. 15

P.T.O.

Or

Write notes on :

(*a*) Pulicat lake 8

(*b*) Chilka lake fishery. 7

3. Write notes on any *two* of the following : 10

(*a*) Economic importance of sardine fishery

(*b*) Economic importance of pearls

(*c*) Chank Fishery

(*d*) Breeding habit of Hilsa-Ilisha.

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VA—234—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New)

FISHERY SCIENCE

Paper-XIII (BII)

(Soil and Water Quality Management in Aquaculture)

(Monday, 23-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Figures on right side indicate full marks.

(*iii*) Draw well labelled diagram wherever necessary.

1. Give a detailed account on physico-chemical properties of soil. 15

Or

Write notes on :

(*a*) Water quality standards 8

(*b*) Productivity of water resources. 7

2. Explain different aquatic weeds and its management. 15

Or

Write notes on :

(*a*) Water quality management in hatcheries. 8

(*b*) Different kinds of biofertilizers. 7

P.T.O.

3. Write short notes on any *two* of the following : 10

(*a*) Sulphur cycle

(*b*) Eutrophication

(*c*) Sewage treatment

(*d*) Ozonization.

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VA—233—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New)

FISHERY SCIENCE

Paper-XIII

(Aquaculture Techniques and Fish Nutrition)

(Monday, 23-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Figures to the right side indicate full marks.

(*iii*) Draw neat and well labelled diagram wherever necessary.

1. Write in detail culture of Indian major carps. 15

Or

Write notes on :

(*a*) General characters of Penacus indicus. 8

(*b*) Water quality for prawn culture. 7

2. Write a detailed account on mill-by-products fish feed ingredients. 15

Or

Write notes on :

(*a*) History of probiotics 8

(*b*) Selection criteria for probiotics. 7

P.T.O.

3. Write short notes on any *two* of the following : 10

(*a*) General characters of seabass

(*b*) Selection of site for prawn culture

(*c*) Oil extractives

(*d*) Significance of probiotics in aquaculture.

This question paper contains **2** printed pages]

VA—177—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

INDUSTRIAL CHEMISTRY

Paper–XII

(Unit Processes in Organic Synthesis)

(Friday, 20-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:*— Use of scientific calculator and log table is allowed.

1. Explain polymerization reaction. Give the classification of polymer on the basis of sources, tacticity and synthesis with suitable example and reactions. 15

Or

(*a*) Explain reduction of nitro compound to amines with reaction mechanism and kinetics. 7

(*b*) Explain kinetics and mechanism of aromatic Nitration and Nitrating agents. 8

2. Explain chlorination reaction with suitable reaction mechanism. 15

P.T.O.

Or

(*a*) Explain synthesis of Nylon 66 polymer with suitable reaction mechanism. 7

(*b*) Explain various sulphonating and sulphating agents of organic synthesis processes. 8

3. Write short notes on (any *two*) : 10

(*a*) DVS calculation

(*b*) Bulk polymerization

(*c*) Buzzy Nitrator

(*d*) Solution polymerization.

This question paper contains **2** printed pages]

VA—237—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New)

INDUSTRIAL CHEMISTRY

Paper-XIII

(Process Equipment and Design Process Instrumentation)

(Monday, 23-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Draw neat and well labelled diagram wherever necessary.

1. Define Agitator. Explain the types of agitator with examples. 15

Or

(*a*) Explain the term Radiation pyrometer and micromanometer. 8

(*b*) Discuss propeller and paddle agitator with neat labelled diagram. 7

2. Explain *four* types of corrosion and explain factors preventing of corrosion. 15

Or

(*a*) Discuss the application of agitator and explain Helical Agitator. 8

(*b*) Explain boudon pressure gauge and U-Tube manometer. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Distillation column

(*b*) Types plates or tray

(*c*) Application of Distillation

(*d*) Liquid filled thermometer.

This question paper contains **2** printed pages]

VA—238—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

INDUSTRIAL CHEMISTRY

Paper-XIII

(Chemical Engineering Thermodynamics)

(Monday, 23-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Use of log table and scientific calculator is allowed.

1. Explain second law of thermodynamics with mathematical expression. 15

Or

(*a*) Explain Joule's experiment with mathematical expression and neat labelled diagram. 8

(*b*) Explain entropy changes of on ideal gas with mathematical expression. 7

2. Explain Ideal gas equation with mathematical expression. 15

Or

(*a*) Explain energy balance of closed system. 8

(*b*) Explain phase rule of reversible process. 7

P.T.O.

3. Write short notes on any *two* : 10

(*a*) Third law of Thermodynamics

(*b*) Standard heat of reactions

(*c*) Standard heat of combustion

(*d*) Enthalpy.

This question paper contains **2** printed pages]

VA—50—2024

FACULTY OF ARTS/SCIENCE

B.A./B.Sc. (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper–XII

(Metric Spaces)

(Monday, 9-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

1. In any metric space (X, d) prove that the intersection of an arbitrary family of closed sets is closed and union of finite number of closed sets is closed. 15

Or

(*a*) Prove that continuous image of a compact set is compact. 8

(*b*) Prove that every compact subset A of a metric space (X, d) is bounded. 7

2. Let (X, d_1) and (Y, d_2) be any two metric spaces and F is a function from X into Y. Then prove that F is continuous at $a \in X$ if and only if, for every sequence $\{a_n\}$ converging to 'a' we have $\lim_{n\to\infty} f(a_n) = F(a)$. 15

P.T.O.

Or

(*a*) Prove that continuous image of connected set is connected. 8

(*b*) Let A be a connected subset of a metric space X, and let B be a subset of X such that $A \subseteq B \subseteq \bar{A}$, then show that B is also connected. 7

3. Attempt any *two* of the following : 5 each

(*a*) Let A and B be any *two* subsets of a metric space (X, *d*), then show that A = $\bar{A}$ if and only if A is closed.

(*b*) If $f(x) = x^2$, $0 \leq x < \frac{1}{3}$, then show that F is contraction mapping on $\left[0, \frac{1}{3}\right]$ with the usual metric *d*.

(*c*) Let A be a non-empty compact subset of a metric space (X, *d*) and let F be a closed subset of X such that $A \cap F = \phi$. Then prove that $d(A, F) > 0$.

(*d*) Discuss the connectedness of a subset.

$D = \left\{(x, y) \mid x \neq 0, y = \sin\left(\frac{1}{x}\right)\right\}$ of Euclidean space $\mathbf{R}^2$.

This question paper contains **2** printed pages]

VA—63—2024

FACULTY OF ARTS AND SCIENCE

B.A./B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

MATHEMATICS

Paper-XIII

(Linear Algebra)

(Wednesday, 11-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Figures to the right indicate full marks.

1. If U and W are two subspaces of a finite dimensional vector space V, then prove that :

$\dim(U + W) = \dim U + \dim W - \dim (U \cap W)$. 15

Or

(*a*) If S is a non-empty subset of a vector space V, then prove that [S] is the smallest subspace of V containing S. 8

(*b*) Prove that,

In a vector space V suppose $\{v_1, v_2, ..., v_n\}$ is an ordered set of vectors with $v_1 \neq 0$. The set is L.D., iff one of the vectors v_2, v_3 ....., v_n say v_k belongs to the span of $v_1, v_2, ..., v_{k-1}$ i.e. $v_k \in [v_1, v_2, ... v_{k-1}]$ for some $k = 2, 3, ..., n$. 7

P.T.O.

2. Let V be an inner product space. Then for arbitrary vectors u and v in V and scalars α, 15

Prove :

(*i*) $||\alpha u|| = |a| \ ||u||$

(*ii*) $|u.v| \leq ||u||.||v||$

(*iii*) $||u + v|| \leq ||u||.||v||$.

Or

(*a*) Prove that every real vector space of dimension p is isomorphic to V_p. 8

(*b*) Let T : U $\rightarrow$ V be a non-singular linear map. Then prove that T^{-1} : V $\rightarrow$ U is a linear, one-one and anto map. 7

3. Attempt any *two* of the following : 5 marks each

(*a*) Check the linear dependence or linear independence of the set :

$\{x, |x|\}$ in $\boldsymbol{e}(-1, 1)$.

(*b*) Let {(1, 1, 1, 1), (1, 2, 1, 2)} be a linearly independent subset of the vector space V_4. Extend it to a basis for V_4.

(*c*) Let T : U $\rightarrow$ V and S : V $\rightarrow$ W be two linear maps. Then prove, if S and T are non-singular, then ST is non-singular and

$$(ST)^{-1} = T^{-1}S^{-1}.$$

(*d*) Let D : $P_3 \rightarrow P_2$ be the differential map D(P) = P^1. Calculate the matrix of D relative to the standard bases {1, x, x^2, x^3} and (1, x, x^2).

This question paper contains **3** printed pages]

VA—78—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper–XIV

(Operation Research)

(Friday, 13-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Explain the major steps for mathematical formulation of linear programming problem and also obtain the rolls of paper having a fixed length and width of 180 cm. are being manufactured by a paper mill. These rolls have to be cut to satisfy the following demand :

Width :	80 cm	45 cm	27 cm
No. of Rolls :	200	120	130

P.T.O.

Obtain the L.P. formulation of the problem to determine the cutting pattern, so that the demand is satisfied and wastage of paper is a minimum. 15

Or

(*a*) Define optimum solution and explain the standard form of linear programming problem. 8

(*b*) Use the graphical method to solve the following LPP : 7

Minimize $Z = -x_1 + 2x_2$

Subject to the constraints :

$$-x_1 + 3x_2 \leq 10,\ x_1 + x_2 \leq 6$$

$$x_1 - x_2 \leq 2 \text{ and } x_1 \geq 0,\ x_2 \geq 0.$$

2. Define basic solution and degenerate solution and obtain all the basic solutions to the following system of linear equation : 15

$$x_1 + 2x_2 + x_3 = 4$$

$$2x_1 + x_2 + 5x_3 = 5$$

Or

(*a*) Prove that a necessary and sufficient condition for the existence of a feasible solution so the general transportation problem is that :

Total supply = Total Demand i.e. 8

$$\sum_{i=1}^{m} a_i = \sum_{j=1}^{n} b_j = \lambda \text{ (say)}$$

(*b*) The following is the cost matrix of assigning 4 clerks to 4 key punching jobs. 7

Find the optimal assignment if clerk 1 cannot be assigned job 1 :

Clerk	**Job**			
	1	2	3	4
1	–	5	2	0
2	4	7	5	6
3	5	8	4	3
4	3	6	6	2

What is the minimum total cost ?

3. Attempt any *two* of the following :

(*a*) Explain the linear programming problem consists of three components. 5

(*b*) Explain major steps LPP by graphical solution method. 5

(*c*) Show that the following system of linear equations has a degenerate solution : 5

$$2x_1 + x_2 - x_3 = 2$$

$$3x_1 + 2x_2 + x_3 = 3$$

(*d*) Explain the complete enumeration method and transportation method of assignment problem. 5

This question paper contains **3** printed pages]

VA—79—2024

FACULTY OF SCIENCE/ARTS

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper–XIV

(Mechanics–I)

(Friday, 13-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of non-scientific/non-programmable calculator is allowed.

1. Find the resultant of two forces when : 15

(*i*) If $\theta = 0$

(*ii*) If $\theta = \pi/2$

(*iii*) If $\theta = \pi$

P.T.O.

and if two forces whose magnitudes are P and $P\sqrt{2}$ act on a particle in directions inclined at an angle of 135° to each other, find the magnitude and direction of the resultant.

Or

(*a*) State and prove polygon of forces. 8

(*b*) If A and B are two smooth pegs in a horizontal line at a distance 5 m apart. Two light enextensible strings CA and CB of lengths 3 m and 4 m respectively attached to pegs. Find the tensions in the strings, when a weight of 10 kg is suspended from C. 7

2. Prove that, the necessary and sufficient condition for a system of forces acting on a particle to be in equilibrium is that the algebraic sum of the resolved parts of the given forces along any three non-coplaner directions must separately vanish and if D, E, F are the middle points of the sides BC, CA and AB respectively of a ΔABC. Three forces represented by $\overline{AD}$, $\frac{2}{3}\overline{BE}$ and $\frac{1}{3}\overline{CF}$ act at a point inside the ΔABC. Prove that their resultant is represented by $\frac{1}{2}\overline{AC}$ and its line of action divides BC in the ratio 2 : 1. 15

Or

(*a*) Prove that the necessary and sufficient condition that a given system of forces acting upon a rigid body is in equilibrium is that the force-sum and moment-sum must separately vanish. 8

(*b*) A force $\overline{F}$ of magnitude 8 units acts at a point P(2, 3, 4) along with line 7

$$\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}.$$

Find the moment of the force $\overline{F}$ about x-axis.

3. Attempt any *two* of the following : 10

(*a*) Find the magnitude and direction of the resultant of any number of coplanar forces acting at a point.

(*b*) Prove that, if the three forces acting on a particle are in equilibrium, they can be represented both in magnitude and direction by the sides of any triangle, taken in order and drawn parallel to the given forces.

(*c*) Prove that, the sum of the vector moment of a system of forces acting on a particle about any point equals to the vector moment of their resultant about the same point.

(*d*) Find the vector moment of a force $\overline{F} = \overline{i} + 2\overline{j} + 3\overline{k}$ acting at a point (–1, 2, 3) about the origin.

This question paper contains **3** printed pages]

VA—80—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper XIV

(Numerical Analysis)

(Friday, 13-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of non-scientific/non-programmable calculator is allowed.

1. Derive the Newton-Gregory formula for backward interpolation and estimate the population for the year 1975 from the following data : 15

Year x	**Population** y **(in lakhs)**
1941	46
1951	67
1961	83
1971	95
1981	102

P.T.O.

Or

(*a*) Prove that the *n*th divided differences of a polynomial of the *n*th degree are constant. 8

(*b*) Given $\log_{10} 654 = 2.8156$, $\log_{10} 658 = 2.8182$, $\log_{10} 659 = 2.8189$, $\log_{10} 661 = 2.8202$, find $\log_{10} 656$. 7

2. Derive the Gauss's central difference forward interpolation formula for equal intervals and hence find the value of y when $x = 3.75$ from the following table : 15

x	y_x
2.5	24.145
3.0	22.043
3.5	20.225
4.0	18.644
4.5	17.262
5.0	16.047

Or

(*a*) Explain Euler's modified method for the solution of equations of first order. 8

(*b*) Apply Simpson's rule to estimate the value of the integral $\int_1^2 \frac{dx}{x}$, by dividing the interval (1, 2) into 4 equal parts. 7

3. Attempt any *two* of the following : 5 each

(*i*) Evaluate : $\frac{\Delta^2 x^3}{\mathrm{E}x^2}$, interval of differencing being n.

(*ii*) Find the third divided difference with arguments 2, 4, 9, 10 of the function $f(x) = x^3 - 2x$.

(*iii*) Prove that :

$$\sqrt{1+\delta^2\mu^2} = 1+\frac{1}{2}\delta^2 .$$

(*iv*) Calculate by Trapezoidal rule an approximate value of $\int_{-3}^{+3} x^4 dx$, by taking seven equidistant ordinates.

This question paper contains **2** printed pages]

VA—92—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MICROBIOLOGY

Paper-XII

(Microbial Genetics)

(Monday, 16-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Represent your answer with suitable diagram wherever necessary.

1. Explain in detail mechanism of DNA seplication with reference to initiation and elongation. 15

Or

Write notes on :

(*a*) Griffith experiment. 8

(*b*) *E.coli* as a model genetic organism. 7

2. What is recombination ? Explain in detail steps involved in homologous recombination. 15

Or

Write notes on :

(*a*) Abortive transduction. 8

(*b*) Hfr–strain. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Avery et al. experiment

(*b*) DNA polymerase enzyme

(*c*) Transposition

(*d*) Discovery of transduction.

This question paper contains **2** printed pages]

VA—115—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MICROBIOLOGY

Paper–XIII

(Microbial Metabolism)

(Wedneday, 18-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Represent your answers with suitable diagrams wherever necessary.

1. Explain in detail classification of enzymes according to IUB system with suitbale examples. 15

Or

Write notes on :

(*a*) ATP as cell currency 8

(*b*) β-oxidation of fatty acid. 7

2. Explain in detail RETC in bacteria. 15

P.T.O.

Or

Write notes on :

(*a*) Heterolactic fermentation 8

(*b*) Ethanol fermentation by yeast. 7

3. Write short notes on (any *two*) : 10

(*a*) Physicochemical properties of enzymes

(*b*) Substrate level phosphorylation

(*c*) ED Pathway

(*d*) Acetone-butanol fermentation.

This question paper contains **2** printed pages]

VA—22—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

PHYSICS

Paper–XII

(Quantum Mechanics)

(Wednesday, 4-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) All symbols have their usual meaning.

(*iv*) Given : $h = 6.63 \times 10^{-34}$ J–s, $m = 9.1 \times 10^{-31}$ kg.

1. State and explain uncertainty principle and give any *two* applications. 15

Or

(*a*) Derive Schrodinger's equation in steady state form. 8

(*b*) Write a note on Eigen value and Eigen functions. 7

2. Derive an expression for energy of a particle in three-dimensional box. 15

P.T.O.

Or

(*a*) Derive Schrodinger's wave equation for hydrogen atom in spherical polar co-ordinate system. 8

(*b*) Explain orbital quantum number. 7

3. Write short notes on (any *two*) : 10

(*a*) Photoelectric effect

(*b*) Operators

(*c*) The particle in a box wave function

(*d*) Total quantum number.

This question paper contains **2** printed pages]

VA—35—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

PHYSICS

Paper–XIII

(Solid State Physics)

(Friday, 6-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— Attempt *all* questions.

1. Describe the formation of metallic and covalent bond. Also write down their physical properties. 15

Or

(*a*) Explain the assumptions of classical theory of Lattice Heat Capacity and derive equation for specific heat. 8

(*b*) Considering the following expression for specific heat from Einstein's theory : $C_v = 3NK_B\left(\frac{\hbar w_0}{K_B T}\right)\frac{e^{\frac{\hbar w_0}{KT}}}{\left(e^{\frac{\hbar w_0}{KT}-1}\right)^2}$.

Derive expressions for the behaviour of specific heat of high and low temperature. 7

P.T.O.

2. Derive an expression for the energy of electron, i.e. $E_n = \frac{n^2h^2}{8mL^2}$ by using Sommerfield model. 15

Or

(*a*) Determine packing factor of HCP crystal. 8

(*b*) Describe rotation symmetry operation. 7

3. Write notes on any *two* : 10

(*i*) Rotating crystal method

(*ii*) Point group and space group

(*iii*) Limitations of Debye model

(*iv*) Outstanding properties of metals.

This question paper contains **2** printed pages]

VA—36—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

PHYSICS

Paper–XIII

(Astrophysics)

(Firday, 6-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) All questions carry equal marks.

1. Define Kepler's laws of planetary motion and obtain an expression for Kepler's second law of planetary motion. 15

Or

(*a*) Explain celestial and equatorial coordinate system. 8

(*b*) Write a short note on stellar parallax method. 7

2. Obtain an expression for Planck's law and Wien's displacement law of Black body radiation. 15

P.T.O.

Or

(*a*) Define sunspots and explain sunspot cycle. 8

(*b*) Discuss and explain Solar neutrino puzzle. 7

3. Write short notes on any *two* (each of 5 marks) : 10

(*a*) Solar limb darkening

(*b*) Radiant flux and Luminosity

(*c*) Solar eclipses

(*d*) Hour angle and mean solar time.

This question paper contains **2** printed pages]

VA—51—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCSE/New Pattern)

ZOOLOGY

Paper–XII

(Ecology and Zoogeography)

(Monday, 9-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answer with suitably labelled diagrams wherever necessary.

1. Describe in detail the pond ecosystem. 15

Or

Write notes on :

(*a*) Population growth form 8

(*b*) Commensalism 7

2. Describe in detail the sources, effects and control of air pollution. 15

P.T.O.

Or

(*a*) Aquatic adaptations. 8

(*b*) Aims and necessity of wildlife conservation. 7

3. Write notes on any *two* of the following : 10

(*a*) Food chain

(*b*) Competition

(*c*) Fossil fuels

(*d*) Oriental realm.

This question paper contains **2** printed pages]

VA—67—2024

FACULTY OF SCIENCE & TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ZOOLOGY

Paper-XIII

[Applied Zoology-D (Environmental Biology-I)]

(Wednesday, 11-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Illustrate your answers with suitable labelled diagram wherever necessary.

1. Describe the concept and structural components of an ecosystem. 15

Or

(*a*) Physico-chemical properties of water. 8

(*b*) Soil profile and process of soil formation. 7

2. What is Biodiversity ? Describe role of biodiversity. 15

Or

(*a*) Importance of wildlife. 8

(*b*) Causes of wildlife depletion. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Hydrological cycle

(*b*) Food chain

(*c*) Ex-situ conservation

(*d*) Management of wildlife.

This question paper contains **2** printed pages]

VA—64—2024

FACULTY OF SCIENCE & TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

ZOOLOGY

Paper-XIII

(Applied Zoology-A Pisciculture)

(Wednesday, 11-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Illustrate your answers with suitable and labelled diagrams wherever necessary.

1. Describe in detail Layout of Fish form with suitable diagrammatic presentation. 15

Or

(*a*) Give an account on induced breeding by Hypophysation. 8

(*b*) Give an accunt on Sardine fishery. 7

2. Give an account of Inland Fishing Crafts and Gears used in India. 15

Or

(*a*) Give an account on causes of spoilage of fishes. 8

(*b*) Give an account on Fish Oil and Fish Meal. 7

P.T.O.

3. Write short notes on any *two* of the following : 10

(*a*) Types of ponds

(*b*) Labeo *rohita*

(*c*) Argulosis

(*d*) Chilling and Freezing.

This question paper contains **2** printed pages]

VA—65—2024

FACULTY OF SCIENCE & TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

ZOOLOGY

Paper-XIII

(Applied Zoology-B)

[Applied Parasitology-I (Parasitic Protozoa and Platyhelminthes)]

(Wednesday, 11-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw the diagrams wherever necessary.

1. Describe the morphology, life-cycle and pathogenicity of Giardia intestinalis. 15

Or

(*a*) Explain the morphology and pathogenicity of *sarcocystic cruzi*. 8

(*b*) Describe the life-cycle of *Trypanosoma gambiense*. 7

2. Give an account of the morphology, life-cycle and pathogenicity of *Gastrodiscoides hominis*. 15

Or

(*a*) Describe the larval forms in cestodes. 8

(*b*) Give an account of morphological parasitic adaptations in cestodes. 7

P.T.O.

3. Attempt any *two* of the following : 10

(*a*) Host Specificity

(*b*) Pathogenicity of *Plasmadium vivax*.

(*c*) Cercaria larva

(*d*) Morphology of *Taenia saginata*.

This question paper contains **2** printed pages]

VA—66—2024

FACULTY OF SCIENCE & TECHNOLOGY

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ZOOLOGY

Paper-XIII

(Applied Zoology-C)

(Entomology-I)

(Wednesday, 11-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Illustrate your answers with suitable labelled diagram wherever necessary.

1. Describe methods of collection, preservation and study of insect. 15

Or

(*a*) Describe respiratory system of Cockroach. 8

(*b*) Describe central nervous system of Cockroach. 7

2. Describe order Diptera with a suitable example. 15

Or

(*a*) Describe effect of food and humidity on insect life. 8

(*b*) Describe hormonal control of metamorphosis in Insect. 7

P.T.O.

3. Solve any *two* of the following : 10

(*a*) Medical entomology

(*b*) Ametabolus insect

(*c*) Dragon fly

(*d*) Sense organ of Cockroach.

This question paper contains **2** printed pages]

VA—06—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

BOTANY

Paper–XIV

(Genetics and Plant Breeding)

(Saturday, 30-11-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Draw neat and well labelled diagrams wherever necessary.

1. What are supplementary genes ? Explain supplementary gene interaction with suitable example. 15

Or

Explain in brief :

(*a*) Complete linkage in Drosophila. 8

(*b*) Sex-linked inheritance with reference to colourblindness in man. 7

P.T.O.

2. What is pureline selection ? Describe process, merits and demerits of pure line selection. 15

Or

Describe in brief :

(*a*) Plant introduction and acclimatization. 8

(*b*) Applications of Mutational breeding. 7

3. Write short notes on (any *two*) : 10

(*a*) Back cross and test cross

(*b*) Turner's syndrome

(*c*) Methods of emasculation

(*d*) C.M.S.

This question paper contains **2** printed pages]

VA—14—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

BOTANY

Paper–XV

(Plant Pathology–II)

(Tuesday, 3-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw well labelled diagrams wherever necessary.

1. Describe pre-existing and post-infectional biochemical defense mechanism in plants. 15

Or

Write notes on :

(*a*) Seedborne pathogens 8

(*b*) Disease forecasting 7

P.T.O.

2. Describe symptoms, causal organism disease cycle and control measures of Downy mildew of grapes. 15

Or

Write notes on :

(*a*) Rust of Jowar. 8

(*b*) Loose smut of wheat 7

3. Write short notes on (any *two*) : 10

(*a*) Blotter paper method

(*b*) Cuticle

(*c*) Cuscuta

(*d*) Papaya mosaic.

This question paper contains **2** printed pages]

VA—16—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

BOTANY

Paper–XV

(Herbal Technology–II)

(Tuesday, 3-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw neat and well labelled diagrams wherever necessary.

1. Explain working and application of fluorescence microscope. 15

Or

(*a*) Application of flame photometry 8

(*b*) Principle and working of laminar air flow. 7

2. Describe preparation and therapeutic uses of triphala churna. 15

P.T.O.

Or

(*a*) Occurrence and chemistry of flavonoids. 8

(*b*) Write in brief antitumour component from Vinca plant. 7

3. Attempt any *two* out of four : 10

(*a*) Application of dark field microscope.

(*b*) Principle of calorimeter.

(*c*) Therapeutic uses of gooti

(*d*) Uses of morphin.

This question paper contains **2** printed pages]

VA—15—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

BOTANY

Paper–XV

(Systematic Botany-II)

(Tuesday, 3-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Draw neat and well labelled diagrams wherever necessary.

1. Explain in detail general characters of family Cannaceae with floral formula and floral diagram. 15

Or

Explain in brief :

(*a*) Role of palynology in relation to taxonomy. 8

(*b*) Pollen grains of grasses. 7

P.T.O.

2. Explain in detail general characters of family Arecaceae with floral formula and floral diagram. 15

Or

Explain in brief :

(*a*) Gnetalean theory of origin of Angiosperms. 8

(*b*) Bennettitalean theory of origin of Angiosperms. 7

3. Write short notes on any *two* of the following : 10

(*a*) Economic importance of Zingiberaceae.

(*b*) Floral characters of Cyperaceae.

(*c*) Biological species concept.

(*d*) Time of origin of Angiosperms.

This question paper contains **3** printed pages]

VA—01—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper–XIV

(Organic and Inorganic Chemistry)

(Tuesday, 26-11-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Answer any *three* of the following : 3×5=15

(*a*) What are the limitations of valence bond theory ?

(*b*) Explain the following factors affecting the magnitude of crystal field splitting :

(*i*) Nature of ligand

(*ii*) Size of *d*-orbital.

(*c*) Explain spilitting of *d*-orbitals in octaheadral complexes.

P.T.O.

(*d*) Calculate the spectroscopic ground state term symbol for d^3 and d^5 configuration.

(*e*) Write different types of electronic transition involved in metal complex.

2. Answer any *three* of the following : 3×5=15

(*a*) Define and explain :

(*i*) Chromophore

(*ii*) Auxochrome.

(*b*) Explain shielding and deshielding effect with suitable example.

(*c*) Define copolymer. Explain free radical addition polymerization reaction with mechanism.

(*d*) Explain Steven's rearrangement with mechanism.

(*e*) An organic compound with molecular formula C_2H_7N gave the following spectral data :

UV : Transparent above λ_{max} 210 nm

IR : 3530, 2975 cm^{-1}

PMR (SPPM) : δ1.0 (*t*, 3H, J = 6 Hz)

: δ 2.5 (9, 2H, J = 6 Hz)

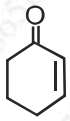
: δ 2.0 (5, 2H)

Deduce the structure of compound.

3. Answer any *two* of the following : 2×5=10

(*a*) Define Scissoring and Rocking vibrations. Calculate λ_{max} of :

(*i*) 

(*ii*) 

(*b*) Give the advantages of TM_5.

(*c*) Give synthesis and uses of :

(*i*) Nylon 6, 10

(*ii*) Polyurethanes

(*d*) Deduce the structure of compound based on the following PMR spectral data :

Molecular formula : C_8H_8O

PMR (δ_{ppm}) : δ 2.33 (5, 3H)

δ 7.1 (m, 5H)

This question paper contains **2** printed pages]

VA—03—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper–XV

(Physical and Inorganic Chemistry)

(Thursday, 28-11-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Use of logarithmic table and non-scientific calculator is allowed.

1. Answer any *three* of the following : 3×5=15

(*a*) Explain the role of Fe^{+2}, Cu^{+2}, CO^{+2} in biological system.

(*b*) Write a note on nitrogen fixation.

(*c*) Describe 'three centered two electron bond' in diborane.

(*d*) What are Metalloborane ? Give any preparation of it.

(*e*) What is Wade rule ? Calculate the total number of electrons in $B_{12}H_{12}^{-2}$.

P.T.O.

2. Answer any *three* of the following : 3×5=15

(*a*) Explain Nernst theory of electrode potential.

(*b*) Give application of emf measurement in determination of pH by using glass electrode.

(*c*) Explain variation of chemical potential with pressure.

(*d*) The equilibrium constant of reaction triples on raising the temperature from 27°C to 37°C. Calculate $\Delta H°$ for the reaction.

($R = 8.314\ JK^{-1}\ mol^{-1}$)

(*e*) Obtain the relationship between freezing point depression of a solution containing non-volatile non-electroyte and its molar mass.

3. Answer any *two* of the following : 2×5=10

(*a*) Explain construction and working of calomel electrode.

(*b*) Derive expression for variation of free energy with temperature and pressure.

(*c*) Derive Clausius-Clayperon equation.

(*d*) The normal boiling point of ethyl acetate is 77.06°C. A solution of 50 g of a non-volatile solute in 150 g of ethyl acetate boils at 84.27°C. Evaluate the molar mass of solute if K_b for ethyl acetate is 2.77°C kg mol^{-1}.

This question paper contains **3** printed pages]

VA—01—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper–XIV

(Organic and Inorganic Chemistry)

(Tuesday, 26-11-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Answer any *three* of the following : 3×5=15

(*a*) What are the limitations of valence bond theory ?

(*b*) Explain the following factors affecting the magnitude of crystal field splitting :

(*i*) Nature of ligand

(*ii*) Size of *d*-orbital.

(*c*) Explain spilitting of *d*-orbitals in octaheadral complexes.

P.T.O.

(*d*) Calculate the spectroscopic ground state term symbol for d^3 and d^5 configuration.

(*e*) Write different types of electronic transition involved in metal complex.

2. Answer any *three* of the following : 3×5=15

(*a*) Define and explain :

(*i*) Chromophore

(*ii*) Auxochrome.

(*b*) Explain shielding and deshielding effect with suitable example.

(*c*) Define copolymer. Explain free radical addition polymerization reaction with mechanism.

(*d*) Explain Steven's rearrangement with mechanism.

(*e*) An organic compound with molecular formula C_2H_7N gave the following spectral data :

UV : Transparent above λ_{max} 210 nm

IR : 3530, 2975 cm^{-1}

PMR (SPPM) : δ1.0 (*t*, 3H, J = 6 Hz)

: δ 2.5 (9, 2H, J = 6 Hz)

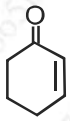
: δ 2.0 (5, 2H)

Deduce the structure of compound.

3. Answer any *two* of the following : 2×5=10

(*a*) Define Scissoring and Rocking vibrations. Calculate λ_{max} of :

(*i*) 

(*ii*) 

(*b*) Give the advantages of TM_5.

(*c*) Give synthesis and uses of :

(*i*) Nylon 6, 10

(*ii*) Polyurethanes

(*d*) Deduce the structure of compound based on the following PMR spectral data :

Molecular formula : C_8H_8O

PMR (δ_{ppm}) : δ 2.33 (5, 3H)

δ 7.1 (m, 5H)

This question paper contains **2** printed pages]

VA—311—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

COMPUTER SCIENCE

Paper XIV

(Software Testing)

(Tuesday, 17-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Assume suitable data, if necessary.

1. (*a*) Explain unit testing and integration testing in detail. 15

Or

(*b*) What is software quality assurance ? Explain SQA tasks. 8

(*c*) Describe McCall's quality factors. 7

2. (*a*) Discuss the internal and external views of testing and explain black box testing. 15

P.T.O.

Or

(*b*) What is web app testing ? Discuss the errors within a web app environment. 8

(*c*) Describe the testing strategies of mobile apps. 7

3. Write short notes on (any *two*) : 10

(*a*) ISO 9000 quality standards

(*b*) Verification and validation

(*c*) Control structure testing

(*d*) Gesture testing.

This question paper contains **2** printed pages]

VA—318—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper-XV

(Data Mining)

(Thursday, 19-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory and have internal choices.

(*ii*) Draw well labelled diagrams wherever necessary.

1. Explain steps for data mining. What are various tools for data mining ? Explain in detail. 15

Or

(*a*) Explain various applications of data warehousing and data mining. 8

(*b*) Explain frequent pattern association and correlation. 7

P.T.O.

2. What are mining association rules ? What is classification ? Explain classification by decision and tree induction. 15

Or

(*a*) Explain clustering methods. 8

(*b*) Explain hierarchical method. 7

3. Solve any *two* : 10

(*a*) Performance considerations

(*b*) Difference between Prediction and Classification

(*c*) Apriori Algorithm

(*d*) Cluster Analysis.

This question paper contains **2** printed pages]

VA—317—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

COMPUTER SCIENCE

Paper XV-A

(Relational Database Management Systems)

(Thursday, 19-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. What is DBMS ? Explain application and purpose of database systems. 15

Or

(*a*) Explain database and application architecture. 7

(*b*) What is Key ? Explain the types of keys in detail. 8

2. What is Normal Form ? Explain the types of Normal Forms with example. 15

P.T.O.

Or

(*a*) Explain the basic structure of SQL queries. 7

(*b*) Explain the concept of views in detail. 8

3. Write short notes on (any *two*) : 10

(*a*) Joints

(*b*) DDL (Data Definition Language)

(*c*) Database Schemas

(*d*) Functional Dependencies.

This question paper contains **2** printed pages]

VA—73—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New)

ELECTRONICS

Paper-XIV

(Communication Electronics-II)

(Thursday, 12-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Represent your answers with suitable diagram wherever necessary.

1. Draw the block diagrams of tuned radio frequency and superheterodyne radio receivers and explain their working. 15

Or

(*a*) Derive Radar range equation. 8

(*b*) Explain the working of basic pulsed radar with the help of block diagram. 7

2. Discuss in detail : 15

(*a*) Cellular systems

(*b*) Historical perspective of mobile communication.

P.T.O.

Or

(*a*) Describe different types of optical fiber. 8

(*b*) What is dispersion ? Derive an expression for intermodal dispersion. 7

3. Write notes on (any *two*) : 10

(*a*) Image frequency and its rejection

(*b*) Properties and applications of microwave

(*c*) 3G system.

(*d*) Total Internal Reflection.

This question paper contains **2** printed pages]

VA—87—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ELECTRONICS

Paper-XV

(Power Electronics-II)

(Saturday, 14-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Illustrate your answer with labelled diagrams wherever necessary.

1. Explain half controlled bridge rectifier with RL load in symmetric configuration. 15

Or

(*a*) Explain illumination control circuit using DIAC and TRIAC. 8

(*b*) Explain OFF at dark circuit. 7

P.T.O.

2. How choppers are classified ? Explain basic chopper operation in detail. 15

Or

(*a*) Explain working of basic series inverter. 8

(*b*) Explain parallel inverter in detail. 7

3. Write short notes on any *two* of the following : 10

(*a*) Pulse width modulation control

(*b*) Remote temperature control circuit

(*c*) Current limit control

(*d*) Modified series inverter.

This question paper contains **2** printed pages]

VA—88—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS Pattern)

ELECTRONICS

Paper-XV

(Electronic Instrumentation)

(Saturday, 14-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Illustrate your answers with suitably labelled diagrams wherever necessary.

1. State types of strain guages. Explain in detail resistance wire guage and derive the equation for guage factor. 15

Or

(*a*) Define error in measurement and discuss types of static error. 8

(*b*) State performance characteristics of the instrument and discuss dynamic characteristics. 7

2. With neat circuit diagram explain working principle of instrumentation amplifier in detail. 15

Or

(*a*) Explain construction and working of capacitive transducer. 8

(*b*) Explain construction and principle of working of thermocouple. 7

P.T.O.

3. Write short notes on any *two* : 10

(*a*) Sources of errors.

(*b*) Differential output transducer

(*c*) Photovoltaic cell

(*d*) Digital tachometer.

This question paper contains **2** printed pages]

VA—103—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

FISHERY SCIENCE

Paper-XIV

(Ornamental Fish Production and Management)

(Tuesday, 17-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) *All* questions are compulsory.

(2) Marks of each question are written on right hand side of the respective question.

(3) Illustrate answers with suitable and well labelled diagrams wherever necessary.

1. Describe the care and maintenance of an aquarium in detail. 15

Or

Write notes on :

(*a*) General characters, food and feeding habits of Gold Fish. 8

(*b*) Setting of an aquarium. 7

2. Describe in detail causative agent, symptoms treatment and control measures of white spot disease in fishes. 15

P.T.O.

Or

Write notes on :

(*a*) Breeding and reproduction of Zebra danio. 8

(*b*) Transportation of ornamental fishes. 7

3. Write short notes on any *two* of the following : 10

(*a*) Sexual dimorphism in sword-tail fish

(*b*) Symptoms of finrot disease.

(*c*) Benefits of ornamental fish keeping hobby

(*d*) Food for aquarium fishes.

This question paper contains **2** printed pages]

VA—142—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

FISHERY SCIENCE

Paper–XV

(Fisheries Economics, Co-operative and Marketing Management)

(Thursday, 19-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Marks of each question are written on right hand side of the respective question.

(*iii*) Illustrate your answers with suitable and well labelled diagrams, wherever necessary.

1. Explain demand in detail. 15

Or

Write notes on :

(*a*) Distribution channels in fish marketing. 8

(*b*) Facilitating function in marketing. 7

P.T.O.

2. Explain in detail, the structure of fisherman co-operative society. 15

Or

Write notes on :

(*a*) Role of remote sensing in fisheries. 8

(*b*) Fish Farmers Development Agency (FFDA) 7

3. Write short notes on any *two* of the following : 10

(*a*) Traditional fish market

(*b*) Cost

(*c*) Principles of cooperative society

(*d*) EEZ.

This question paper contains **2** printed pages]

VA—143—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

FISHERY SCIENCE

Paper–XV

(Nutrition and Feed Technology)

(Thursday, 19-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Marks of each question are written on right hand side of the respective question.

(*iii*) Illustrate answers with suitable and well labelled diagrams, wherever necessary.

1. Explain the structure, classification and properties of carbohydrates. 15

Or

Write notes on :

(*a*) Physiology of digestion in Shrimps. 8

(*b*) Factors affecting digestibility. 7

P.T.O.

2. Explain the process of feed formulation in detail. 15

Or

Write notes on :

(*a*) Importance of natural food for fishes. 8

(*b*) Probiotics. 7

3. Write short notes on any *two* of the following : 10

(*a*) Accretion

(*b*) Fatty acids

(*c*) Feed methods in aquaculture

(*d*) Growth stimulants in feed.

This question paper contains **2** printed pages]

VA—105—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

INDUSTRIAL CHEMISTRY

Paper-XIV

(Unit process in Inorganic Synthesis Drug, Dyes and Industrial Safety)

(Tuesday, 17-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— Use of scientific calculator and log table is allowed.

1. Define Drug. Explain the two sulfa drug and aspirin, parcetamol. 15

Or

(*a*) Explain CO_2 gas extinguisher in detail. 7

(*b*) Explain and discuss synthesis applications of polypropylene and polyethylene. 8

2. Explain classification of dyes according to their modes based on chemical constitutions. 15

Or

(*a*) Discuss industrial manufacturing process of nitric acid with flow diagram. 8

(*b*) Explain personal protective equipment for industrial safety. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Sulfanilamide

(*b*) Dry chemical powder from type extinguisher

(*c*) Butadine styrene co-polymer.

(*d*) Manufacturing process of sulphuric acid.

This question paper contains **2** printed pages]

VA—146—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

INDUSTRIAL CHEMISTRY

Paper–XV

(Spectroscopy and Chromatography and Plant Utilities)

(Thursday, 19-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* Use of log tables and scientific calculator is allowed.

1. Explain construction and working of ultraviolet spectrophotometer with neat labelled diagram. 15

Or

(*i*) Explain Woodward Fischer rule for UV spectroscopy. 7

(*ii*) Explain theory of electronic transition of UV spectroscopy. 8

2. Explain formation of steam at constant pressure with neat labelled diagram. 15

Or

(*a*) Explain molecular transition of infrared spectrometer. 8

(*b*) Explain McLafferty rearrangement of mass spectroscopy. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Nuclear overhouser effect

(*b*) Lambert's law

(*c*) Beer's law

(*d*) Hooke's law.

This question paper contains **2** printed pages]

VA—147—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

INDUSTRIAL CHEMISTRY

Paper–XV

(Plant Design and Economics for Chemical Engineers Chemistry)

(Thursday, 19-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* Solve *all* questions.

1. Explain balance sheet for industry. 15

Or

(*a*) Describe practical consideration in design for industry. 8

(*b*) Explain cost estimation. 7

2. With neat labelled diagram explain in detail flow diagram. 15

Or

(*a*) What are the factors affecting investment and production cost ? 8

(*b*) Describe maintaining accounting record. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Cost estimation

(*b*) Present worth and discount

(*c*) GST

(*d*) Profitibility standards.

This question paper contains **3** printed pages]

VA—78—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper–XIV

(Operation Research)

(Friday, 13-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Explain the major steps for mathematical formulation of linear programming problem and also obtain the rolls of paper having a fixed length and width of 180 cm. are being manufactured by a paper mill. These rolls have to be cut to satisfy the following demand :

Width :	80 cm	45 cm	27 cm
No. of Rolls :	200	120	130

P.T.O.

Obtain the L.P. formulation of the problem to determine the cutting pattern, so that the demand is satisfied and wastage of paper is a minimum. 15

Or

(*a*) Define optimum solution and explain the standard form of linear programming problem. 8

(*b*) Use the graphical method to solve the following LPP : 7

Minimize $Z = -x_1 + 2x_2$

Subject to the constraints :

$$-x_1 + 3x_2 \leq 10,\ x_1 + x_2 \leq 6$$

$$x_1 - x_2 \leq 2 \text{ and } x_1 \geq 0,\ x_2 \geq 0.$$

2. Define basic solution and degenerate solution and obtain all the basic solutions to the following system of linear equation : 15

$$x_1 + 2x_2 + x_3 = 4$$

$$2x_1 + x_2 + 5x_3 = 5$$

Or

(*a*) Prove that a necessary and sufficient condition for the existence of a feasible solution so the general transportation problem is that :

Total supply = Total Demand i.e. 8

$$\sum_{i=1}^{m} a_i = \sum_{j=1}^{n} b_j = \lambda \text{ (say)}$$

(*b*) The following is the cost matrix of assigning 4 clerks to 4 key punching jobs. 7

Find the optimal assignment if clerk 1 cannot be assigned job 1 :

Clerk	**Job**			
	1	2	3	4
1	–	5	2	0
2	4	7	5	6
3	5	8	4	3
4	3	6	6	2

What is the minimum total cost ?

3. Attempt any *two* of the following :

(*a*) Explain the linear programming problem consists of three components. 5

(*b*) Explain major steps LPP by graphical solution method. 5

(*c*) Show that the following system of linear equations has a degenerate solution : 5

$$2x_1 + x_2 - x_3 = 2$$

$$3x_1 + 2x_2 + x_3 = 3$$

(*d*) Explain the complete enumeration method and transportation method of assignment problem. 5

This question paper contains **3** printed pages]

VA—26—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper–XV

(Complex Analysis)

(Thursday, 5-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Discuss the process to find the nth roots of complex number. Determine the nth roots of unity. 15

Or

(*a*) Suppose that, $f(z) = u(x, y) + iv(x, y)$ and that $f'(z)$ exists at a point $z_0 = x_0 + iy_0$. Then prove that the first order partial derivatives of u and v must exist at (x_0, y_0) and satisfy the Cauchy-Riemann equations. Also prove that $f'(z_0) = u_x + iv_x$; where these partial derivatives are to be evaluated at (x_0, y_0). 8

(*b*) (*i*) Find the principal value of $(-i)^i$. 7

(*ii*) Find the principal branch of $z^{2/3}$.

P.T.O.

2. Suppose that a function $f(z)$ is analytic throughout a disk $|z - z_0| < R_0$ centered at z_0 and with radius R_0. Then prove that $f(z)$ has the power series representation $f(z) = \sum_{n=0}^{\infty} a_n (z - z_0)^n$; where $a_n = \frac{f^n(z_0)}{n!}, n = 0, 1, 2, \ldots\ldots$ 15

Or

(*a*) Let C denote a contour of length L and suppose that a function $f(z)$ is piecewise continuous on C. If M is a non-negative constant such that $|f(z)| \leq M$ for all points z on C at which $f(z)$ is defined, then prove that :

$$\left| \int_C f(z)dz \right| \leq ML$$

Hence show that $\left| \int_C \frac{z+4}{z^3 - 1} dz \right| \leq \frac{6\pi}{7}$; where C is the arc of the circle $|z| = 2$ from 2 to $z = 2i$ that lies in the first quadrant. 8

(*b*) Evaluate the integral $I = \int_C \bar{z}\, dz$; where C is the right hand half of the circle $|z| = 2$ from $z = -2i$ to $z = 2i$. 7

3. Attempt any *two* of the following : 10

(*a*) Show that, a limit of a function $f(z)$ (if exists) at a point z_0 is unique

(*b*) Show that $u(x, y) = 2x - x^3 + 3xy^2$ is harmonic in some domain and find harmonic conjugate $v(x, y)$.

(*c*) Evaluate :

$$I = \int_0^{1+i} z^2 dz.$$

(*d*) Let z_0 be any point interior to a positively oriented simple closed contour C. For $f(z) = 1$, prove that :

(*i*) $$\int_C \frac{dz}{z - z_0} = 2\pi i$$

(*ii*) $$\int_C \frac{dz}{(z - z_0)^{n+1}} = 0.$$

This question paper contains **2** printed pages]

VA—41—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper–XVI

(Integral Transforms)

(Saturday, 7-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. If L[$f(t)$] = F(s), then prove that L $\left[\frac{1}{t} f(t)\right] = \int_8^\infty F(s)\,ds$ and hence find the Laplace transform of $f(t) = \int_0^t \frac{\sin t}{t}\,dt$.

Or

(*a*) Find the inverse Laplace transform of $\frac{s^2 + s + 2}{s^{3/2}}$ 8

(*b*) Find the inverse Laplace transform of $\frac{s}{s^2 + 4s + 13}$ 7

P.T.O.

2. (*a*) Using Laplace transforms, find the solution of the initial value problem :

$$y'' - 4y' + 4y = 64 \sin 2t$$

$$y(0) = 0,\ y'(0) = 1$$ 8

(*b*) Solve the initial value problem. 7

$$2y'' + 5y' + 2y = e^{-2t}$$

$$y(0) = 1,\ y'(0) = 1$$

Using the Laplace transforms.

Or

Prove the Fourier Integral Theorem.

$$f(x) = \frac{1}{\pi}\int_0^{\infty}\int_{-\infty}^{\infty} f(t) \cdot \cos u(t - x)\, dtdu$$ 15

3. Attempt any *two* : 5 marks each

(*a*) Find the Laplace Transform of $t \sin at$.

(*b*) Find inverse Laplace transform of $\frac{s^2 + 3}{s\,(s^2 + 9)}$.

(*c*) Using the Laplace transforms, find the solution of the initial value problem :

$$y'' + 25y = 10 \cos 5t$$

$$y(0) = 2,\ y'(0) = 0$$

(*d*) If $F_1(s)$ and $F_2(s)$ are Fourier transforms of $f_1(x)$ and $f_2(x)$ respectively, then prove that

$$F\ [af_1(x) + bf_2(x)] = aF_1(s) + bF_2(s)$$

This question paper contains **3** printed pages]

VA—56—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper XVII-A

(Topology)

(Tuesday, 10-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) All symbols carry their usual meanings.

(*iv*) Attempt either A or B for question 1 and 2.

1. (A) Attempt the following :

(*i*) Define discrete topology. If X is any set, show that the collection of all one-point subsets of X is a basis for the discrete topology on X. 10

(*ii*) Let X be a set, let β be a basis for a topology λ on X. Then prove that λ equals the collection of all unions of elements of β. 5

P.T.O.

Or

(*b*) Attempt the following :

(*i*) Define the product topology on X × Y. If β is a basis for the topology of X and **C** is a basis for the topology of Y, then show that the collection :

$$D = \{\beta \times c : \beta \in \beta \text{ and } c \in \mathbf{C}$$

is a basis for the topology of X × Y. 7

(*ii*) Let X be an ordered set in the order topology; let Y be a subset of X that is convex in X. Then prove that the order topology on Y is the same as the topology Y inherits as a subspace of X. 8

2. (*a*) Attempt the following :

(*i*) Let Y be a subspace of X. Then show that a set A is closed in Y iff it equals the intersection of a closed set of X with Y. 7

(*ii*) Define Hausdorff space. Hence show that the product of two Hausdorff spaces is a Hausdorff space. 8

Or

(*b*) Attempt the following :

(*i*) Let $f : A \to X \times Y$ be given by the equation $f(a) = (f_1(a), f_2(a))$. Then prove that f is continuous if and only if the functions $f_1 : A \to X$ and $f_2 : A \to Y$ are continuous. 8

(*ii*) If the sets C and D form a separation of X and if Y is a connected subspace of X, then show that Y lies entirely within either C or D. 7

3. Attempt any *two* of the following : 5 each

(*i*) Provide any *five* topologies on the set X = {*a*, *b*, *c*} which are distinct.

(*ii*) Show that the collection :

$$S = \{\pi_1^{-1}(U) / U \text{ open in } X\} \cup \{\pi_2^{-1}(V) / V \text{ is open in } Y\}$$

is a subbasis for the product topology on X × Y.

(*iii*) Let X be a topological space, then prove that finite union of closed sets are closed.

(*iv*) Show that the interval (0, 1] is not compact.

This question paper contains **2** printed pages]

VA—57—2024

FACULTY OF ARTS/SCIENCE

B.A./B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper–XVII

(Mechanics–II)

(Tuesday, 10-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Find the tangential and normal components of velocity and acceleration. 15

Or

(*a*) Discuss the conservation of Linear momentum. 8

(*b*) A particle of mass m moving with velocity $\overline{v}$ picks up a mass m at rest. Find the velocity of the combined mass, the kinetic energy of the combined mass and the loss in K.E. 7

2. Discuss the motion of a projectile and derive an equation of its trajectory. 15

P.T.O.

Or

(*a*) Prove the necessary and sufficient condition for a force F to be conservative is that the line integral over a closed path C in a conservative field is zero that is : 8

$$\int_C \vec{F} \cdot d\vec{r} = 0.$$

(*b*) Prove that in a conservative field of force, the sum of kinetic energy and potential energy of a particle at every point is constant. 7

3. Attempt any *two* of the following : 10

(*i*) Prove that the acceleration of a point moving in a plane curve with uniform speed is $\rho\Psi^2$

(*ii*) Prove that the sum of the work done by any number of force is equal to the work done by their resultant

(*iii*) Show that the velocity of a particle increases from $\vec{v_1}$ to $\vec{v_2}$, then the gain in the K.E. is half the scalar product of impulse and the sum of $\vec{v_1}$ and $\vec{v_2}$

(*iv*) A man can throw a cricket ball upto 160 metres and no more. With what speed, in metre per sec, must it be thrown ?

Take g = 980 cm/sec^2.

This question paper contains **2** printed pages]

VA—58—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MATHEMATICS

Paper–XVII

(Elementary Number Theory)

(Tuesday, 10-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Prove that the linear Diophantine equation $ax + by = c$ has a solution if and only if $d|c$ where $d = gcd\ (a, b)$. If x_0, y_0 is any particular solution of this equation, then all other solutions are given by $x = x_0 + \left(\frac{b}{d}\right)t, y = y_0 - \left(\frac{a}{d}\right)t$ where t is any arbitrary integer. 15

Or

(*a*) If $a = qb + r$, $k > 0$, then prove that $gcd\ (a, b) = gcd(b, r)$ and $gcd(ka, kb) = kgcd(a, b)$. 8

P.T.O.

(*b*) By using Mathematical induction establish the result : 7

$$1^2 + 2^2 + 3^2 + \ldots\ldots\ldots\ldots + n^2 = \frac{n(2n+1)(n+1)}{6}$$

2. Let $n_1, n_2, \ldots\ldots, n_r$ be positive integers such that $gcd\ (n_i, n_j) = 1$ for $i \neq j$. Prove that the system of linear congruences $x \equiv a_1 \pmod{n_1}$, $x \equiv a_2 \pmod{n_2}$, ..., $x \equiv a_r \pmod{n_r}$ has a simultaneous solutions which is unique modulo integers $n_1, n_2 \ldots\ldots\ldots n_r$. 15

Or

(*a*) If all the $n > 2$, terms of the arithmetic progression $p, p + d, p + 2d$, ... $p + (n-1)\,d$ are prime numbers, show that the common difference d is divisible by every prime $q < n$. 8

(*b*) Find the remainder obtained upon dividing the sum : 7

1! + 2! + 3! + ... + 99! + 100! By 12

3. Attempt any *two* of the following : 10

(*a*) For integers a, b, c if $a \mid b$ and $a \mid c$, then prove that $a \mid (bx + cy)$ for arbitrary integers x and y

(*b*) Show that the number $\sqrt{2}$ is irrational

(*c*) Show that 41 divides $2^{20} - 1$

(*d*) Show that $2^{340} \equiv 1 \pmod{341}$.

This question paper contains **2** printed pages]

VA—72—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

MICROBIOLOGY

Paper-XIV

(Molecular Biology)

(Thursday, 12-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) *All* questions are compulsory.

(2) Represent your answers with suitable diagram wherever necessary.

1. What is genetic code ? Describe various characteristics of genetic code. 15

Or

(*a*) Chemical mutagenic agents. 8

(*b*) Nucleotide excision repair. 7

2. Explain in detail trp operon. 15

Or

(*a*) Expression of human insulin gene in *E.coli*. 8

(*b*) Write methods used for gene transfer. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Restriction endonuclease

(*b*) Transcriptional translation cycle in *E.coli*.

(*c*) DNA damage by UV-rays.

(*d*) Colony hybridisation.

This question paper contains **2** printed pages]

VA—85—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New)

MICROBIOLOGY

Paper-XV

(Industrial Microbiology)

(Saturday, 14-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Represent your answers with suitable diagrams wherever necessary.

1. What is Screening ? Describe in detail primary screening techniques. 15

Or

Write notes on :

(*a*) Continuous fermenter. 8

(*b*) Scope and development of Industrial Microbiology. 7

2. Explain in detail fermentative production of citric acid. 15

Or

Write notes on :

(*a*) Ion exchange adsorption method in downstream processing. 8

(*b*) Coagulation and floculation. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Tubular fermenter

(*b*) Lyophilization

(*c*) Cell disruption

(*d*) Legume inoculants.

This question paper contains **2** printed pages]

VA—07—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

PHYSICS

Paper–XIV

(Atomic, Molecular and Nuclear Physics)

(Saturday, 30-11-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) The symbols carry usual meaning unless and otherwise stated.

1. Explain normal Zeeman effect. Obtain an expression for Zeeman shift. 15

Or

(*a*) Explain theory of pure rotational spectra. 8

(*b*) What is Raman effect ? Give its experimental study. 7

2. State conservation laws and obtain an expression for Q-value of nuclear reaction. 15

P.T.O.

Or

(*a*) With a neat well labelled diagram explain construction and working of Van de Graff generator. 8

(*b*) Explain construction and working of cyclotron. 7

3. Write short notes on (any *two*) : 10

(*a*) j-j coupling

(*b*) Regions of electromagnetic spectra

(*c*) Betatron

(*d*) Thermo-nuclear reactor.

This question paper contains **2** printed pages]

VA—17—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

PHYSICS

Paper–XV

(Digital and Communication Electronics)

(Tuesday, 3-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of non-programmable calculator is allowed.

1. Define gate. Discuss basic gates with their logic symbols, boolean equations and truth tables. 15

Or

(*x*) Convert the following : 8

(*a*) $(598)_{10} = (?)_2$

(*b*) $(4AB)_{16} = (?)_{10}$

(*c*) $(1101011)_2 = (?)_8$

(*d*) $(451)_8 = (?)_2$.

P.T.O.

(*y*) Plot K-map and find out reduced Boolean expression for

$f(ABCD) = \sum M(0, 1, 4, 5, 11, 14, 15)$. 7

2. Define modulation. Obtain an expression for amplitude modulated voltage in terms of modulation index and explain frequency spectrum of A.M. wave. 15

Or

(*x*) Draw block diagram of superheterodyne radio receiver and explain function of each block. 8

(*y*) Discuss linear diode detector with a neat diagram. 7

3. Write short notes on (any *two*) : 10

(*a*) XS-3 code

(*b*) Half Adder

(*c*) TRF receiver

(*d*) Power in A.M.

This question paper contains **2** printed pages]

VA—18—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

PHYSICS

Paper–XV

(Fibre Optic Communication)

(Tuesday, 3-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Use of non-programmable calculator and log table is allowed.

1. Describe in detail : 15

(*i*) Snell's law

(*ii*) Total internal reflection.

Or

(*a*) Describe in brief modes in graded index fibre. 8

A graded index fibre has a core with a parabolic refractive index profile which has a diameter of 50 μm. The fibre has a numerical aperture of 0.2. Estimate the total number of guided modes propagating on the fibre when it is operating at a wavelength of 1 μm.

P.T.O.

(*b*) Write down expressions for index variation of graded index fibre. Describe the ray transmission in the graded index fibres. 7

2. Describe with the aid of simple ray diagrams : 15

(*i*) The multimode step index fibre

(*ii*) The single mode step index fibre and compare the advantages and disadvantages of these two fibres for use as an optical channel.

Or

(*a*) Derive an expression for the cut-off wavelength. 8

(*b*) Estimate the maximum core diameter for an optical fibre with relative refractive index difference (1.5%) and core refractive index (1.48) which is operating at wavelength of 0.85 μm. Further estimate the new maximum core diameter for single mode operation when the relative refractive index difference is reduced by a factor of 10. 7

3. Write notes on any *two* : 10

(*a*) Advantages of single mode fibre

(*b*) Intermodal dispersion in the multimode graded index fibre.

(*c*) Acceptance angle

(*d*) Normalized frequency.

This question paper contains **2** printed pages]

VA—27—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ZOOLOGY

Paper–XIV

(Ethology, Biometry and Bioinformatics)

(Thursday, 5-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answers with suitable labelled diagrams wherever necessary.

1. Describe social behaviour in insects Honeybee. 15

Or

(*a*) Describe protective and aggresive mimicry. 8

(*b*) Describe chemical communication. 7

2. Describe computer and their applications in Biology. 15

Or

(*a*) Describe Mean and Mode with its merits and demerits. 8

(*b*) Describe polygon frequency curve. 7

P.T.O.

3. Attempt any *two* of the following : 10

(*a*) Reasoning acquired animal behavior

(*b*) Tactile communication

(*c*) Geographical classification

(*d*) World Wide Web.

This question paper contains **2** printed pages]

VA—43—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ZOOLOGY

Paper–XV

(Applied Zoology : Applied Parasitology–II)

(Parasitic Nematodes and Arthropods)

(Saturday, 7-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answers with suitable labelled diagrams, wherever necessary.

1. Describe morphology, life cycle, pathogenicity, diagnosis and treatment of *Wuchereria bancrofti*. 15

Or

(*a*) Give the morphology and treatment of *Tylenchulus* (citrus Nematode) 8

(*b*) Explain life cycle of *Heterodera* (cyst Nematode) 7

2. Explain morphology, role as vectors of human diseases and control measures of housefly. 15

P.T.O.

Or

(*a*) Describe chemical control of Insects. 8

(*b*) Give morphology and pathogenicity of Anopleura (Head louse) 7

3. Attempt any *two* out of four : 10

(*a*) Autoinfection and Retroinfection.

(*b*) Pathogenicity and treatment of *Meloidogyne* (Root Knot Nematode)

(*c*) Morphology of Bed Bug.

(*d*) Control measures of mosquitoes.

This question paper contains **2** printed pages]

VA—42—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ZOOLOGY

Paper–XV(A)

(Applied Zoology : Aquaculture)

(Saturday, 7-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Illustrate your answers with suitably labelled diagrams wherever necessary.

1. Explain in detail polyculture. 15

Or

(*a*) Pen culture 8

(*b*) Domestic Sewage 7

2. Explain freshwater prawn culture. 15

Or

(*a*) Control of Aquatic weeds. 8

(*b*) Chemical properties of water. 7

P.T.O.

3. Attempt any *two* of the following : 10

(*a*) Monoculture

(*b*) Agricultural Sewage

(*c*) Role of Larvivorous Fishers in relation to public health.

(*d*) Ministry of Agriculture.

This question paper contains **2** printed pages]

VA—45—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ZOOLOGY

Paper–XV

(Applied Zoology and Env. Biology-II)

(Saturday, 7-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Draw neat labelled diagram wherever necessary.

1. Explain assessment and monitoring of water pollution. 15

Or

(*a*) Explain sources and effects of carbon dioxide and carbon monoxide as pollutant. 8

(*b*) Chlorofluorocarbon (CFC_s) 7

2. Explain sources, effects and control of noise pollution. 15

P.T.O.

Or

(*a*) The Air (Prevention and Control of Pollution) Act 1981. 8

(*b*) Water resources : Infiltration and wells. 7

3. Attempt any *two* : 10

(*a*) Biodegradable pollutants

(*b*) Photochemical Smog

(*c*) Effects of Noise pollution

(*d*) Sedimentation tank.

This question paper contains **2** printed pages]

VA—44—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

ZOOLOGY

Paper–XV

(Applied Zoology-C : Entomology-II)

(Saturday, 7-12-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempts *all* questions.

(*ii*) Illustrate your answers with suitable labelled diagrams wherever necessary.

1. Describe classification, bionomics and control measures of pyrilla. 15

Or

(*a*) Explain structure, bionomics and control of mosquito. 8

(*b*) Describe monkey as non-insect animal pest. 7

2. Describe in detail lac culture. 15

P.T.O.

Or

(*a*) Explain chemical control of insect pest. 8

(*b*) Explain safe handling of pesticides. 7

3. Attempt any *two* of the following : 10

(*a*) Cotton boll worm

(*b*) Housefly as pest

(*c*) Silk—economics importance

(*d*) Attractant and Repellants.