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

JA—21—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

BOTANY

Paper XII

(Cell and Molecular Biology)

(Monday, 13-4-2026) **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 diagrams wherever necessary.

1. What is Meiosis ? Describe prophase I of Meiosis I. 15

Or

Describe in brief :

(*a*) Ultrastructure of prokaryotic cell 8

(*b*) Types of Lysosomes. 7

P.T.O.

2. Describe in detail Watson and Crick model of DNA. 15

Or

Describe in brief :

(*a*) Fine structure of gene 8

(*b*) Lac operon. 7

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

(*a*) Chromosomal puffs

(*b*) Lampbrush chromosome

(*c*) *t*-RNA

(*d*) Mutagens.

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

JA—34—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

BOTANY

Paper XIII

(Herbal Technology—I)

(Thursday, 16-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(2) Draw a well labelled diagram wherever necessary..

1. Describe Siddha is an Indian system of medicine. 15

Or

(*a*) Explain importance of MAP. 8

(*b*) Describe in brief Ayurveda medicine system. 7

2. Explain morphological and chemical classification of crude plant drugs. 15

P.T.O.

Or

(*a*) Write a note on organized crude drugs. 8

(*b*) Describe factors affecting the cultivation of drug plants. 7

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

(*a*) Biological drug evaluation

(*b*) Microscopic drug evaluation

(*c*) Unani medicine system

(*d*) Uses of Behda.

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

JA—04—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

CHEMISTRY

Paper-XII

(Organic and Inorganic Chemistry)

(Monday, 6-4-2026) **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. Solve any *three* of the following : 3×5=15

(*a*) Give the IUPAC names of the following compounds :

(*i*) $[Pt(NH_3)_6]Cl_4$

(*ii*) $[Fe(CO)_5]$

(*iii*) $[Ni(DMG)_2]$

(*iv*) $[Co(NH_3)_5(NC_5)]Cl_2$

(*v*) $[Cr(NH_3)_4(ONO)Cl]NO_3$.

P.T.O.

(*b*) Define structural isomerism. Explain ionization isomerism with suitable example.

(*c*) Define effective Atomic Number. Calculate the EAN of the following complexes :

(*i*) $[Ni(CO)_4]$

(*ii*) $[Cu(CN)_4]^{3-}$

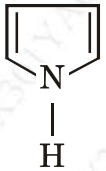
(*d*) Define imaging agents. Explain heart imaging and brain imaging agents.

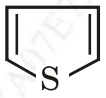
(*e*) Define cancer. Give the treatment on it.

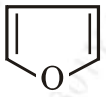
2. Solve any *three* of the following : 3×5=15

(*a*) Predict the product(s) of the following reactions :

(*i*)  $+ HNO_3 \xrightarrow[\text{Anhydride}]{\text{Acetic}} ?$

(*ii*)  $+ CHCl_3 + 3\ KOH \longrightarrow ?$

(*iii*)  $+ HgCl_2 \xrightarrow{CH_3COONa} ?$

(*iv*)  $+ CO + HCl \xrightarrow{AlCl_5} ?$

(*v*) $2HC \equiv CH + NH_3 \xrightarrow{\Delta} ?$

(*b*) Give the synthesis and uses of the following drug(s) :

(*i*) Aspirin

(*ii*) Paracetamol.

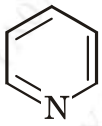
(*c*) Explain Armstrong's theory and its limitations.

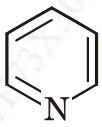
(*d*) Discuss the chemical constitution of Ephedrine.

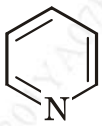
(*e*) Define pesticides. Give the classification of pesticides.

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

(*a*) Explain the aromatic character of pyridine. Predict the products from following :

(*i*)  $+ HNO_3 + \text{Conc. } H_2SO_4 \xrightarrow{\Delta} ?$

(*ii*)  $\xrightarrow[HgSO_4,\ 230^oC]{SO_3,\ H_2SO_4} ?$

(*iii*)  $+ NaNH_2 \xrightarrow[\text{N,N-Dimethylaniline}]{\Delta} ?$

(*b*) Give the synthesis and uses of :

(*i*) Methyl orange

(*ii*) Congo red.

(*c*) What are water soluble vitamins ? Write structure, source and deficiency disease of Vit. A and Vit. K.

(*d*) What are Heterocyclic Compounds ? How are they classified ?

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

JA—11—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

CHEMISTRY

Paper XIII

(Physical and Inorganic Chemistry)

(Friday, 10-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Use logarithmic table and non-programmable calculator is allowed.

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

(*a*) Explain polymerization of CrO_4^{2-}.

(*b*) Draw the structure of W^{6+} octahedral heteropoly anion.

(*c*) Explain the structure of isopoly acids of Mo^{6+}.

(*d*) Draw and explain the structure of $Os(CO)_4$.

(*e*) Define isolobal fragments and explain CH_2 fragment.

P.T.O.

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

(*a*) Derive an expression for vapour pressure in terms of mole fraction of the component in vapour phase.

(*b*) Describe temperature dependence of vapour pressure of a solution.

(*c*) Write a short note on paramagnetic, diamagnetic and ferromagnetic substances.

(*d*) Give construction and working of dropping mercury electrode with a neat labelled diagram.

(*e*) Derive an expression for determination of Half-wave potential.

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

(*a*) Derive an expression for chemical potential for non-ideal solution.

(*b*) Show that if two pure liquids are mixed together in any proportion to give ideal solution, there is no change in enthalpy.

(*c*) Define magnetic susceptibility, specific susceptibility and give their units.

(*d*) Discuss the application of Polarography in :

(*i*) Estimation of Inorganic and Organic Substance

(*ii*) Analysis of mixtures.

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

JA—10—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

CHEMISTRY

Paper XIII

(Physical and Inorganic Chemistry)

(Friday, 10-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(2) Figures to the right indicate full marks.

(3) Use of logarithmic table and calculator is allowed.

1. Answer any *three* of the following : 15

(*a*) Define organometallic compound and explain how are they classified.

(*b*) Give preparations and properties of ferrocene.

(*c*) Explain the structures of organolithium and give any *two* preparations of organolithium.

(*d*) What is mononuclear metal carbonyl ? Draw the structure of $Ir(CO)_{12}$ and $Fe_3(CO)_{12}$.

(*e*) Give preparations and properties of Nickel tetracarbonyls.

P.T.O.

2. Attempt any *three* of the following : 15

(*a*) Explain effect of isotopic substitution for diatomic rigid rotator with diagram.

(*b*) The vibrational frequency of a diatomic molecule is 8.069×10^{13} sec^{-1} and its reduced mass is 1.14×10^{-23} g. Calculate its force constant.

(*c*) Describe Experimental Raman Spectroscopy.

(*d*) Integrate rate expression for third order reaction ($a = b = c$).

(*e*) State distribution law and give limitations of Nernst distribution law.

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

(*a*) The following results were obtained for the distribution of an organic solute between water and chloroform :

Water (C_1)	0.0160	0.0237
Chloroform (C_2)	0.338	0.753

Determine molecular state of the solute in chloroform.

(*b*) Discuss kinetics of dimerization of Anthracene.

(*c*) State and explain Franck-Condon principle.

(*d*) What is bond energy ? Give qualitative relation between force constant and bond energy.

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

JA—314—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper XII

(Software Engineering)

(Saturday, 2-5-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Assume suitable data if necessary.

1. What is Software Engineering ? Explain changing nature of software and discuss software myths. 15

Or

(*a*) Explain design within context of software engineering. 8

(*b*) Explain requirement analysis. 7

P.T.O.

2. What is agility ? Discuss agility principles and explain extreme programming. 15

Or

(*a*) Explain the quality factors for web app. design. 8

(*b*) Discuss the best practices for mobile app. design. 7

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

(*a*) Software engineering practice

(*b*) Spiral model

(*c*) The design process

(*d*) Design goals for web app.

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

JA—322—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper XIII

(Advanced Java Programming)

(Tuesday, 5-5-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(2) Figures to the right indicate full marks.

Attempt the following questions :

1. How to create thread in Java ? Explain life cycle of thread. 15

Or

(*a*) Write a program in Java using multiple catch statement. 7

(*b*) What is an Exception ? Explain try and catch statement with example. 8

P.T.O.

2. What is Applet ? Explain how to design a web page using Applet. 15

Or

(*a*) Explain Byte stream classes. 7

(*b*) Write a program in Java to draw line and rectangles. 8

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

(*a*) Synchronization

(*b*) Runtime Error

(*c*) Applet tag

(*d*) Random Access file.

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

JA—321—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper XIII

(Programming in Visual Basic)

(Tuesday, 5-5-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(2) Figures to the right indicate full marks.

(3) Assume suitable data, if necessary.

1. Explain do-loop and for-loop statements in visual basic with examples. 15

Or

(*a*) What are the elements of user interface ? Explain. 8

(*b*) Explain in detail event driven programming. 7

P.T.O.

2. Explain concept of designing menu structure with example. 15

Or

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

(*b*) Explain use of Visual Data Manager in V.B. 7

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

(*a*) IDE

(*b*) Data types in VB

(*c*) Form types in VB

(*d*) Label control properties.

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

JA—93—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ELECTRONICS

Paper XII

(Communication Electronics—I)

(Monday, 27-4-2026) **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 diagrams wherever necessary.

1. Describe the classification of the electronic communication systems based on : 15

(*i*) direction of communication

(*ii*) nature of information signal

(*iii*) technique of signal transmission.

P.T.O.

Or

(*a*) Describe the property of a tuned circuit in terms of generation of high level modulation. Explain the working of collector modulator circuit. 8

(*b*) Explain the working of simple diode detector. 7

2. Define frequency modulation, modulation index (for FM) and deviation ratio. Derive expression for FM wave. 15

Or

(*a*) Describe the process of generation and detection of pulse amplitude modulation. 8

(*b*) Explain the working of PCM transmitter. 7

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

(*a*) Need of modulation

(*b*) Frequency spectrum of AM wave

(*c*) Band width of FM wave

(*d*) Sampling process.

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

JA—118—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ELECTRONICS

Paper XIII

(C Programming)

(Wednesday, 29-4-2026) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Figures to the right indicate full marks.

1. What are 'C' operators ? State various types of 'C' operators and explain in detail. 15

Or

(*a*) What are looping statements in 'C' ? Explain for loop with suitable example. 8

(*b*) Give syntax of if-else statement and explain it with suitable example. 7

P.T.O.

2. Define Array. State its types and explain in detail declaration and initialization of arrays. 15

Or

(*a*) Define pointer variable and explain declaring and initializing of pointer variable. 8

(*b*) With syntax explain declaration of structure in 'C'. 7

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

(*a*) Simple Input/Output statements in 'C'

(*b*) Goto statement

(*c*) Functions

(*d*) Union.

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

JA—117—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ELECTRONICS

Paper XIII

(Power Electronics—I)

(Wednesday, 29-4-2026) **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 diagram wherever necessary.

1. Explain working of SCR on the basis of two transistor analogy. Derive an expression for the anode current and discuss the turn on mechanism. 15

Or

(*a*) Explain with neat structural diagram the operation of IGBT. 8

(*b*) Explain working of MOSFET with neat diagram. 7

P.T.O.

2. Why are SCR's connected in parallel ? Which are the different methods to ensure proper current sharing ? 15

Or

(*a*) Draw and explain resistance capacitance firing circuit. 8

(*b*) How is UJT used in SCR triggering ? 7

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

(*a*) Derating

(*b*) Thermal triggering

(*c*) V-I characteristics of LASCR

(*d*) Holding current of SCR.

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

1001—2026

FACULTY OF ALL

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

APRIL/MAY, 2026

(New Course)

ENVIRONMENTAL STUDIES (Compulsory)

पर्यावरण अभ्यास (अनिवार्य)

(Friday, 24-4-2026) **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 suitable labelled diagram wherever necessary.

(1) **सर्व** प्रश्न सोडवा.

(2) जिथे आवश्यक असेल, तिथे तुमच्या उत्तरांचे योग्य आणि नामांकित आकृत्यांचा सहाय्याने स्पष्टीकरण द्या.

1. Describe in detail, uses and overexploitation of forest resources. 15

वनसंपदेचा उपयोग आणि त्याचा अतिवापर यावर सविस्तर माहिती लिहा.

Or

(किंवा)

(*a*) Explain in detail Biogeographic classification of India. 8

(*b*) Describe the causes of air pollution. 7

(अ) भारतीय जैवभौगोलिक वर्गीकरण यावर सविस्तर माहिती द्या.

(ब) हवा प्रदूषणाची कारणे विशद करा.

P.T.O.

2. What is pollution ? Explain the causes and effects of pollution. 15

प्रदूषण म्हणजे काय ? प्रदूषणाची कारणे व परिणाम स्पष्ट करा.

Or

(किंवा)

(*a*) Noise pollution and its effects. 8

(*b*) Deforestation and its effects. 7

(अ) ध्वनी प्रदूषण व त्याचे परिणाम.

(ब) जंगलतोड व त्याचे परिणाम.

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

(*a*) In-situ conservation

(*b*) Flood

(*c*) Salinity

(*d*) Water pollution.

खालीलपैकी कोणत्याही **दोन**वर टिपा लिहा :

(अ) स्वस्थानी संवर्धन

(ब) महापूर

(क) क्षारता

(ड) जल प्रदूषण.

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

JA—175—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

FISHERY SCIENCE

Paper XII

(Indian Marine Fisheries)

(Saturday, 2-5-2026) **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 suitable labelled diagrams wherever necessary.

1. Write in detail Sardine fishery. 15

Or

Write notes on the following :

(*a*) Hilsa fishery 8

(*b*) Chank fishery. 7

P.T.O.

2. What is Pearl ? Explain in detail culture of Pearl oyster. 15

Or

Write notes on the following :

(*a*) Chilka lake 8

(*b*) Kolleru lake. 7

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

(*a*) Maturity and spanning periodicity of Mackral

(*b*) Food and feeding habits of *H. neherus*

(*c*) Sexual dimorphisum in prawns.

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

JA—234—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

FISHERY SCIENCE

Paper XIII

(Soil and Water Quality Management in Aquaculture)

(Tuesday, 5-5-2026) **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.

(3) Draw labelled sketch wherever necessary.

1. Explain in detail Physico-chemical properties of soil. 15

Or

Write notes on :

(*a*) Water quality standards 8

(*b*) Soil monitoring management. 7

P.T.O.

2. Explain water quality management in Hatcheries. 15

Or

Write notes on :

(*a*) Biofertilizers 8

(*b*) Sewage treatment water for pond fertilization. 7

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

(*a*) Aquatic microorganisms role in Nitrogen cycle

(*b*) Eutrophication

(*c*) Fertilizers

(*d*) Waste water treatment.

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

JA—233—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

FISHERY SCIENCE

Paper XIII

(Aquaculture Techniques and Fish Nutrition)

(Tuesday, 5-5-2026) **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.

(3) Draw labelled sketch wherever necessary.

1. Write detailed account on Air-breathing fish culture in India. 15

Or

Write notes on :

(*a*) Food, feeding and reproduction of prawn 8

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

P.T.O.

2. Give brief account on fish feed ingredients as the milk by-products. 15

Or

Write notes on :

(*a*) Composition and dosage of probiotics 8

(*b*) Potentials of probiotics. 7

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

(*a*) Labeo rohita

(*b*) General characters of *P. indicus*

(*c*) Oil extractives

(*d*) Significance of probiotics.

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

JA—238—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

INDUSTRIAL CHEMISTRY

Paper XIII

(Chemical Engineering Thermodynamics)

(Tuesday, 5-5-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Scientific calculator and log table allowed.

1. Explain heat capacities of coexisting phases and heats of phase transitions. 15

Or

(*a*) Solve problems on : 8

One kilogram of air is heated reversibly at constant pressure from an initial state of 300 K and 1 bar until its volume triples. Calculate

P.T.O.

W, Q, ΔU and ΔH for the process. Assume air obeys the relation $PV/T = 83.14$ bar cm^3 mol^{-2} K^{-1} and $C_P = 29$ J mol^{-1} K^{-1}.

(*b*) Solve problems on : 7

A heat engine receives 500 BTU of heat per cycle from a reservoir at 540°F and rejects heat to sink at 40°F in a hypothetical amount of :

(*i*) 375 BTU per cycle

(*ii*) 250 BTU per cycle and

(*iii*) 150 BTU per cycle.

Which of these respective cases represent a reversible cycle, an irreversible cycle and an impossible cycle ?

2. Explain Nernst equation of thermodynamics with mathematical expression. 15

Or

(*a*) Solve problems on : 8

One mole of the van der Waals gas at 300 K and 10 atm pressure isothermally exponded to 510 atm. What would be the enthalpy change for the process. The Joule thomson coefficient is given.

(*b*) Solve problems on : 7

A ideal gas (CPM = 29.1 JK^{-1} mol^{-1}) is expanded reversibly and adiabatically from a volume of 1.43 dm^3 at a pressure of 303975 P and temperature 298 K until the volume is 2.86 dm^3. Calculate :

(*i*) The final temperature and pressure of gas.

(*ii*) *q*, W, ΔE and ΔH for the process.

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

(*a*) Carnot cycle

(*b*) Gibbs free energy

(*c*) Clausius-Clapeyron equation

(*d*) Joule-Thomson porous plug experiment.

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

JA—237—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

INDUSTRIAL CHEMISTRY

Paper XIII

(Process Equipment Design, Process Instrumentation)

(Tuesday, 5-5-2026) **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. Explain design and construction features of column internals. 15

Or

(*a*) Explain paddle agitator with suitable diagram. 7

(*b*) Explain Baffling. 8

2. Explain factors preventing to corrosions. 15

P.T.O.

Or

(*a*) Explain design consideration of reaction vessel. 7

(*b*) Write note on filled-bulb and glass-stem thermometer. 8

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

(*a*) Fractional distillation

(*b*) Material and construction of reaction vessel

(*c*) Turbine agitator

(*d*) Pyrometer.

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

JA—50—2026

FACULTY OF ARTS/SCIENCE

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

APRIL/MAY, 2026

MATHEMATICS

Paper-XII

(Metric Spaces)

(Saturday, 18-4-2026) **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 : 15

(*i*) The union of an arbitrary family of open sets is open.

(*ii*) The intersection of finite number of open sets is open.

Or

(*a*) Prove that every closed subset of a compact metric space is compact. 8

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

P.T.O.

2. Let Y be a subset of a metric space (X, d), then prove that the following are equivalent : 15

(i) Y is connected.

(ii) Y cannot be expressed as disjoint union of two non-empty closed sets in Y.

Or

(a) Let (X, d_1) and (Y, d_2) be two metric spaces. Then prove that $f : X \to Y$ is continuous if and only if $f^{-1}(G)$ is open in X whenever G is open in Y. 8

(b) Show that $f : (X, d_1) \to (Y, d_2)$ is continuous if and only if $f(\bar{A}) \subseteq \overline{f(A)}$, for every $A \subseteq X$. 7

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

(a) Prove that every open sphere is neighbourhood of each of its points.

(b) Prove that every convergent sequence is Cauchy sequence.

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

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

JA—63—2026

FACULTY OF ARTS AND SCIENCE

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

APRIL/MAY, 2026

MATHEMATICS

Paper-XIII

(Linear Algebra)

(Tuesday, 21-4-2026) **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*) Illustrate your answer with suitable labelled diagrams wherever necessary.

1. State and prove the Rank Nullity Theorem. Also, verify the above theorem for a linear map $T : V_4 \to V_3$ defined by : 15

$T(e_1) = (1, 1, 1)$, $T(e_2) = (1, -1, 1)$

$T(e_3) = (1, 0, 0)$, $T(e_4) = (1, 0, 1)$

P.T.O.

Or

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

(*b*) In a vector space V suppose $\{v_1, v_2, ..., v_n\}$ is an ordered set of vectors with $v_1 \neq 0$. Show that the set is linearly dependent if and only if one of the vectors $v_2, v_3, ..., v_n$, say v_k belongs to the span of $v_1, v_2, ..., v_{k-1}$. 7

2. Let V be an inner product space then for arbitrary vectors u and v in V and scalar α, prove that : 15

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

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

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

Or

(*a*) Let T : U $\rightarrow$ V be a non-singular linear map. Then show that T^{-1} : V $\rightarrow$ U is a linear, one-one and onto map. 8

(*b*) Prove that every real vector space of dimension P is isomorphic to V_p. 7

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

(*a*) Check the linear dependence or linear independence of the set $\{e^x, e^{2x}\}$ in $e^{(\infty)}(-\infty, \infty)$.

(*b*) Let T : U $\rightarrow$ V be a linear map. Then prove that :

(*i*) $T(O_U) = O_V$

(*ii*) $T(-u) = -T(u)$.

(*c*) Let T : U $\rightarrow$ V and S : V $\rightarrow$ W be two linear maps. Then show that, if S and T are non-singular, then ST is non-singular and $(ST)^{-1} = T^{-1}.S^{-1}$.

(*d*) Find all eigenvalues of

$$A = \begin{bmatrix} 1 & -1 & 2 \\ 0 & 1 & 0 \\ 1 & 2 & 1 \end{bmatrix}.$$

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

JA—79—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

MATHEMATICS

Paper-XIV

(Mechanics-I)

(Thursday, 23-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(*ii*) Attempt either A or B for Q. No. **1** and Q. No. **2**.

(*iii*) Use suitable data if required.

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

1. (A) Find the resultant when : 15

(*i*) If P = Q

(*ii*) If Q = 0

(*iii*) If Q = $\pi/2$

and find the resultant of two forces whose magnitudes are 8 kg and 7 kg respectively at an angle 60°.

P.T.O.

(B) Attempt the following :

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

(*b*) A particle is placed at the centre O of the circle inscribed in a ΔABC. Forces $\vec{P}, \vec{Q}, \vec{R}$ acting along $\overrightarrow{OA}, \overrightarrow{OB}$ and $\overrightarrow{OC}$ respectively are in equilibrium. Prove that $P : Q : R = \cos\frac{A}{2} : \cos\frac{B}{2} : \cos\frac{C}{2}$. 7

2. (A) Prove that the sum of the vector moment of forces acting on a particle about any point equal to the vector moment of their resultant about the same point. And if three forces of magnitude P, Q and R acting on a particle are in equilibrium and angle between P and Q is double the angle between P and R then show that : 15

$$R^2 = Q\,(Q - P)$$

(B) Attempt the following

(*i*) Prove that, two couples acting in one plane upon a rigid body. whose moments are equal and opposite, balance each other, when the forces constituting the couple are not parallel. 8

(*ii*) D, E, F are the middle points of the sides BC, CA and AB respectively of a triangle ΔABC. Three forces represented by $\overrightarrow{AD}, \frac{2}{3}\overrightarrow{BE}$, and $\frac{1}{3}\overrightarrow{CF}$ act at a point inside the ΔABC, then prove that their resultant is represented by $\frac{1}{2}\overrightarrow{AC}$ and its line of action divide BC in the ratio 2 : 1. 7

3. Attempt any *two* of the following (**5** each) : 10

(*a*) Two forces whose magnitudes are P and $P\sqrt{2}$ act on a particle in the direction inclined at an angle of 135° to each other; find the magnitude and direction of the resultant.

(*b*) Prove that triangle law of forces if the three forces acting on a particle be represented in magnitude and direction by the three sides of a triangle, taken in order, then the forces are in equilibrium.

(*c*) A force $\vec{F}$ of magnitude 10 kgwt. act at a point P(2, 3, 4) along the line $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-5}{5}$. Find the moment of force $\vec{F}$ about Z-axis.

(*d*) Prove that the condition of equilibrium of forces acting on a rigid body in Cartesian form.

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

JA—80—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

MATHEMATICS

Paper-XIV

(Numerical Analysis)

(Thursday, 23-4-2026) **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. Prove that, the nth differences of a rational integral function (Polynomial) of the nth degree are constant when the values of the independent variable are at equal intervals. Also, if $f(x) = e^{ax}$, a being constant. Show that $f(0)$ and its leading differences form a geometrical progression. 15

Or

(*i*) Prove the Lagrange's interpolation formula for unequal intervals. 8

P.T.O.

(*ii*) Estimate the missing term in the following table : 7

x	y
16	39
18	85
20	—
22	151
24	264
26	388

2. Prove the Simpson's one-third rule as an approximate quadrature formula.

Find the approximate value of $\int_0^5 \frac{dx}{x}$, if $h = 1$ in Simpson's one-third rule. 15

Or

(*i*) Prove the Bessel's interpolation formula. 8

(*ii*) Interpolate by means of Gauss's backward formula the population for the year 1936, given the following table : 7

Year	**Population ('000)**
1901	12
1911	15
1921	20
1931	27
1941	39
1951	52

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

(*i*) Evaluate :

$$\frac{\Delta^2 x^3}{\mathrm{E}x^2}$$

(*ii*) Prove the Newton's formula for unequal intervals.

(*iii*) From the following data, find $f'(10)$:

x :	3	5	11	27	34
$f(x)$:	– 13	23	899	17315	35606

(*iv*) Given,

$$\frac{dy}{dx} = \frac{y - x}{y + x}$$

with the boundary condition $y = 1$ for $x = 0$, find approximately for $x = 0.1$ by Euler's method (five steps).

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JA—78—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

MATHEMATICS

Paper-XIV

(Operation Research)

(Thursday, 23-4-2026) **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 in solution of a linear programming problem by graphical method. A company makes two kinds of leather belts, 'A' is a high quality belt and 'B' is of lower quality. The respective profits are ₹ 4.00 and ₹ 3.00 per belt. Each belt of type A requires twice as much time as belt of type B, and if all belts were of type B, the company could make 1000 belts per day. The supply of leather is sufficient for only 800 belts per day. Belt A requires a fancy buckle and only 400 buckles per day are available. There are only 700 buckles a day available for Belt B. Determine the optimum mix. 15

Or

(*a*) Three grades of coal A, B and C contain ash and phosphorus as impurities. In particular industrial process a fuel obtained by blending the above grades containing not more than 25% ash and 0.03% phosphorus is required. The maximum demand of the fuel is 100 tons. Percentage impurities and costs of the various grades of coal are shown below. Assuming that there is an unlimited supply of each grade of coal and there is no loss in blending, formulate blending problem to minimise the cost. 8

Coal Grade	**% ash**	**% phosphorus**	**Cost per ton in ₹**
A	30	0.02	240
B	20	0.04	300
C	35	0.03	280

(*b*) Discuss any *three* basic assumptions necessary for all linear programming problems. 7

2. Prove that a basic feasible solution to an L.P.P. must correspond to an extreme point of the set of all feasible solutions and conversely. 15

Or

(*a*) Explain the following solution methods of an assignment problem : 8

(1) Complete enumeration method

(2) Transportation method

(3) Simplex method.

(*b*) What is assignment problem ? Given below is an assignment problem, write it as transporation problem : 7

	A_1	A_2	A_3
R_1	1	2	3
R_2	4	5	1
R_3	2	1	4

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

(*a*) Prove that the number of basic (decision) variables of general transportation problem at any stage of feasible solution must be $m + n - 1$.

(*b*) Let $x_1 = 2$, $x_2 = 4$ and $x_3 = 1$ be a feasible solution to the system of equations :

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

$$x_1 + 4x_2 = 18$$

Reduce the given feasible solution to basic feasible solution.

(*c*) Use graphical method to solve the following L.P.P. :

Max. $Z = 2x_1 + 3x_2$

Subjected to constraints :

$$x_1 + x_2 \leq 30$$

$$x_1 - x_2 \geq 0$$

$$x_2 \geq 3$$

$0 \leq x_1 \leq 20$ and $0 \leq x_2 \leq 12$.

(*d*) Explain the procedure for mathematical formulation of linear programming problem.

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

JA—92—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

MICROBIOLOGY

Paper XII

(Microbial Genetics)

(Monday, 27-4-2026) **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 if necessary.

1. Describe in detail Avery et al., experiment as evidence for DNA as a genetic material. 15

Or

Write notes on :

(*a*) Replication in *E.coli* 8

(*b*) Initiation of prokaryotic DNA replication. 7

P.T.O.

2. What is transformation ? Explain in detail mechanism of transformation in bacteria. 15

Or

Write notes on :

(*a*) Transposable elements in prokaryotes 8

(*b*) Holliday model. 7

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

(*a*) Structure of prokaryotic chromosome

(*b*) Progressive polymerases

(*c*) Branch migration in homologous recombination

(*d*) Properties of F-plasmid.

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

JA—116—2026

FACULTY OF SCIENCE

B.Sc. (Fifth Semester) EXAMINATION

APRIL/MAY, 2026

(CBCS/New Pattern)

MICROBIOLOGY

Paper XIII

(Nitrogen Metabolism)

(Wednesday, 29-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw a well labelled diagram wherever necessary.

1. Define Nitrogen Fixation. Describe in detail mechanism of Nitrogen Fixation. 15

Or

Write notes on :

(*a*) Oxidation of Nitrite 8

(*b*) Denitrification process. 7

P.T.O.

2. Describe in detail Purine Biosynthesis. 15

Or

Write notes on :

(*a*) Biosynthesis of pyruvate and oxaloacetic acid family amino acids. 8

(*b*) Biosynthesis of α-ketoglutarate family amino acid. 7

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

(*a*) Properties of Nitrogenase enzyme

(*b*) Anamox reactions

(*c*) Salvage pathway

(*d*) Histidine Biosynthesis.

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

JA—115—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

MICROBIOLOGY

Paper XIII

(Microbial Metabolism)

(Wednesday, 29-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw well labelled diagrams wherever necessary.

1. Define enzymes. Describe in detail the mechanism of enzyme action. 15

Or

Write notes on :

(*a*) ED pathway 8

(*b*) HMP pathway. 7

P.T.O.

2. Describe the basic concept of respiration, fermentation and photosynthesis with examples. 15

Or

Write notes on :

(*a*) Heterolactic fermentation 8

(*b*) Mixed acid fermentation. 7

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

(*a*) Pathway of succinic acid fermentation

(*b*) Biochemical structure of TCA cycle

(*c*) Preparatory phase of EMP pathway

(*d*) Enzyme inhibition.

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

JA—22—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

PHYSICS

Paper XII

(Quantum Mechanics)

(Monday, 13-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(2) *All* symbols have their own usual meaning.

(3) (*a*) Charge of electron $e = 1.6 \times 10^{-19}$ C.

(*b*) Mass of electron $m = 9.1 \times 10^{-31}$ kg.

(*c*) Planck's constant $h = 6.6205 \times 10^{-34}$ Js.

1. State and explain Heisenberg's uncertainty principle with any *one* application. 15

Or

(*a*) What is probability current ? Explain it. 8

(*b*) Explain quantum mechanical operators. 7

P.T.O.

2. Give the Schrodinger's wave equation for Hydrogen atom in spherical polar form and separate it in to R, θ and ϕ part. 15

Or

(*a*) Draw well labelled energy diagram for Harmonic oscillator and explain it. 8

(*b*) Describe the particle in one-dimensional box wave function. 7

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

(*a*) Wave function (ψ)

(*b*) Calculate the energy of particle for n = 1, 2 and 3 in a box of width 2 Å.

(*c*) Expectation values

(*d*) Total quantum number.

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

JA—36—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New)

PHYSICS

Paper XIII

(Astrophysics)

(Thursday, 16-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(2) Figures to the right indicate full marks.

1. What do you mean by the terrestrial and Jovian planets ? Explain the structure, composition and atmospheres of terrestrial planets. 15

Or

(*a*) Define the Astronomial Distance, Astronomical Unit (AU), light year and parsec. 8

(*b*) Explain the equatorial co-ordinate systems. 7

2. Explain photosphere, chromosphere and corona of the Sun. 15

P.T.O.

Or

(*a*) Derive an expression for the distance modulus relation. 8

(*b*) How do the atmospheric effect of absorption and seeing impact astronomical observation ? 7

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

(*a*) Stellar parallax

(*b*) Earth's orbit and spin

(*c*) Apparent and absolute magnitudes

(*d*) Solar limb darkening.

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

JA—35—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New)

PHYSICS

Paper XIII

(Solid State Physics)

(Thursday, 16-4-2026) **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. Derive expression for energy of electron revolving in a specific orbit, $E_n = \frac{n^2h^2}{8mL^2}$ by using Mommerfeld's model. 15

Or

(*a*) Explain the formation of Covalent bond. 8

(*b*) Describe Lanu's method of crystal structure determination. 7

P.T.O.

2. Derive the expression for total energy of harmonic oscillators of crystal as

$$E = 9\,NKT\left(\frac{T}{\theta_D}\right)^3 \int_0^{\frac{\theta_D}{T}} \frac{x^3}{e^x - 1}\,dx$$

by using Debye's approximation. 15

Or

(*a*) Describe crystal system and Bravais lattices in three-dimension. 8

(*b*) Explain in brief symmetry operations. 7

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

(*a*) Translation vectors

(*b*) Bragg's law

(*c*) Limitation of Debye's model

(*d*) Outstanding properties of metals.

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

JA—51—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ZOOLOGY

Paper XII

(Ecology and Zoogeography)

(Saturday, 18-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw diagrams wherever necessary.

1. What are the basic components of any ecosystem ? Explain in detail the pond ecosystem. 15

Or

Explain the following :

(*a*) Ecological pyramids 8

(*b*) Sulphur cycle. 7

2. What is Pollution ? Explain in detail the sources, effects and control measures of Air Pollution. 15

P.T.O.

Or

Explain the following :

(*a*) Fossil Fuels 8

(*b*) Australian Realm. 7

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

(*a*) Atmosphere

(*b*) Predation

(*c*) Necessity of wildlife conservation

(*d*) Desert Adaptations.

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

JA—33—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

BOTANY

Paper XIII

(Systematic Botany—I)

(Thursday, 16-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) *All* questions carry equal marks.

(3) Draw neat and well labelled diagrams wherever necessary.

1. Give an outline of artificial classification of Angiosperms with reference to Linnaeus. 15

Or

Describe in brief :

(*i*) General characters of Caesalpiniaceae. 8

(*ii*) Distinguishing features and economic importance of Malvaceae. 7

P.T.O.

2. Describe in detail general characters of Verbenaceae with floral formula and diagram. 15

Or

Describe in brief :

(*i*) Role of Botanical gardens in taxonomy 8

(*ii*) Molecular systematics. 7

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

(*i*) Merits and demerits of Thorne's system of classification

(*ii*) Importance of herbarium

(*iii*) Distinguishing features of Combretaceae

(*iv*) Systematic position and economic importance of Rubiaceae.

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

JA—32—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New)

BOTANY

Paper XIII

(Plant Pathology—I)

(Thursday, 16-4-2026) **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 diagrams wherever necessary.

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

Or

Write on :

(*a*) Entry of pathogens by wounds and buds. 8

(*b*) Causal organism and control measures of whip smnt of sugarcane. 7

2. Describe symptoms, causal organisms, disease cycle and control measures of Red rot of sugarcane. 15

P.T.O.

Or

Write on :

(*a*) Leaf spot of Turmeric 8

(*b*) Dispersal of pathogens by insects and animals. 7

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

(*a*) Importance of plant pathology

(*b*) Role of moisture in disease development

(*c*) Symptoms of grain smut of Jowar

(*d*) Brown leaf spot of Rice.

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

JA—06—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

BOTANY

Paper XIV

(Genetics and Plant Breeding)

(Thursday, 9-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw neat and well labelled diagrams wherever necessary.

1. What is complementary gene interaction ? Describe it with suitable example. 15

Or

Write short notes on :

(*a*) Coupling and repulsion hypothesis. 8

(*b*) Allopolyploidy with reference to Raphanobrassica. 7

P.T.O.

2. What is mass selection ? Describe process, merits and demerits of mass selection. 15

Or

Explain in brief :

(*a*) Plant introduction and acclimatization. 8

(*b*) Objectives of mutational breeding. 7

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

(*a*) Sex determination in insects

(*b*) Down's syndrome

(*c*) Merits and demerits of clonal selection

(*d*) CMS.

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

JA—15—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New)

BOTANY

Paper XV

(Systematic Botany—II)

(Wednesday, 8-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw neat and well labelled diagrams wherever necessary.

1. Describe in detail general characters of family Musaceae with floral formula and floral diagram. 15

Or

Describe in brief :

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

(*b*) Pollen grain of *Hibiscus*. 7

P.T.O.

2. Describe in detail general characters of family Commelinaceae with floral formula and floral diagram. 15

Or

Describe in brief :

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

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

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

(*a*) Economic importance of Orchidaceae

(*b*) Economic importance of Arecaceae

(*c*) Brief history of ICN

(*d*) Place of origin of Angiosperms.

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

JA—16—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

BOTANY

Paper XV

(Herbal Technology—II)

(Wednesday, 8-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) *All* questions carry equal marks.

(3) Draw neat and well labelled diagrams wherever necessary.

1. Explain working and application of transmission electron microscope. 15

Or

(*a*) Write in brief light source and monochromator of UV-spectroscopy. 8

(*b*) Advantages and disadvantages of TLC. 7

P.T.O.

2. Explain preparation and therapeutic uses of Arjunarishta. 15

Or

(*a*) Write a note on Reserpine.

(*b*) Chemistry of lycopene.

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

(*a*) Uses of cardiotonic active compound from Digitalis

(*b*) Tablet and ointment in herbal formulation

(*c*) Application of HPLC

(*d*) Working of CO_2 incubator.

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

JA—14—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New)

BOTANY

Paper XV

(Plant Pathology—II)

(Wednesday, 8-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw well labelled diagrams wherever necessary.

1. What is seedborne pathogen ? Describe detection methods of pathogens. 15

Or

Write notes on :

(*a*) Copper fungicides 8

(*b*) Exclusion. 7

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

P.T.O.

Or

Write notes on :

(*a*) Rust of Jowar 8

(*b*) Symptoms and causal organism of loose smut of wheat. 7

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

(*a*) Solar treatment

(*b*) Abscission layer

(*c*) Cuscuta

(*d*) Grassy shoot of sugarcane.

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

JA—02—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

CHEMISTRY

Paper XIV

(Organic and Inorganic Chemistry)

(Tuesday, 7-4-2026) **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. Answer any *three* of the following : 3×5=15

(*a*) Give the classification of polymer on the basis of origin.

(*b*) Explain homoatomic with example.

(*c*) Give preparation and properties of Fluorocarbons.

(*d*) Define and explain nanoparticles.

(*e*) Write applications of nanoparticles.

P.T.O.

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

(*a*) Give brief account on zeolites.

(*b*) Write the bi-products of alcohol industry.

(*c*) Write the process of scouring used in textile industry.

(*d*) Describe refining of raw sugar.

(*e*) Give the synthesis and uses of Monochrotophos.

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

(*a*) Write the biocatalytic reactions.

(*b*) What are the nitrogenous fertilizers ?

(*c*) How will you synthesize phenol and benzoquinone by using different zeolites ?

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

JA—01—2026

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Sixth Semester) EXAMINATION

APRIL/MAY, 2026

(CBCS/New Pattern)

CHEMISTRY

Paper-XIV

(Organic and Inorganic Chemistry)

(Tuesday, 7-4-2026) **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*) Write the postulates of valence bond theory of coordination compounds.

(*b*) Define CFSE. Calculate CFSE of d^3 and d^6 configuration in strong ligand field octahedral complex.

(*c*) Explain the effect of nature of ligand, size of *d*-orbital on magnitude of crystal field splitting.

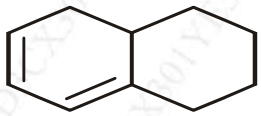
(*d*) Write a note on selection rule for electronic spectra.

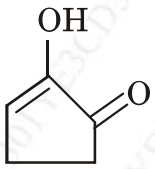
(*e*) Describe electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

P.T.O.

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

(*a*) Define the terms chromophore and auxochrome. Calculate the λ_{max} of :

(*i*) 

(*ii*) 

(*b*) Predict the number of PMR signals of :

(*i*) Methanol

(*ii*) Ethylamine

(*iii*) Acetaldehyde

(*iv*) Ethyl acetate

(*v*) Benzoic acid

(*c*) What is condensation polymerisation ? Give the synthesis of Bakelite.

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

Molecular formula : C_8H_8O

PMR (δ ppm) 2.5, 3H, s 7.3-8.2, 5H, m.

(*e*) Explain the photo-fries rearrangement with mechanism.

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

(*a*) What is vibration in a molecule ? Explain in detail types of molecular vibrations.

(*b*) What do you mean by shielding and deshielding of a proton ? Give its examples.

(*c*) Give the synthesis and uses of the following polymers :

(*i*) Nylon-6, 10

(*ii*) Polyurethanes.

(*d*) An organic compound having MF C_3H_8O gave the following spectral data :

UV : Transparent above λ_{max} 210 nm.

IR : 3380, 2875, 2830, 1425, 1050 cm^{-1}.

PMR data :

δ (ppm)	1.3, 3H, t
	2.5, 2H, Sextet
	3.5, 2H, t
	4.3, 1H, s

Deduce the structure and name of organic compound.

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

JA—03—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

CHEMISTRY

Paper XV

(Physical and Inorganic Chemistry)

(Saturday, 4-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

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

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

(*a*) Discuss the structure of haemoglobin.

(*b*) Explain biological nitrogen fixation.

(*c*) Diborane is an electron deficient compound, explain.

(*d*) Give any *two* preparations of Metalloboranes.

(*e*) Describe closocarborane with suitable example.

P.T.O.

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

(*a*) Define :

(*i*) Standard electrode potential

(*ii*) EMF of Cell.

(*b*) Calculate the electrode potential of a copper wire dipped in a 0.1 M $CuSO_4$ solution at 25°C. The standard electrode potential of copper is 0.34 volt.

(*c*) Derive Gibbs-Duhem equation.

(*d*) Define Gibbs free energy. Give relationship between G and A.

(*e*) Differentiate between isotonic, hypertonic and hypotonic solutions in terms of osmotic pressure.

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

(*a*) Explain construction and working of SHE.

(*b*) What is the definition of a partial molar property ? Explain the concept of chemical potential.

(*c*) Derive Van't Hoff's isotherm.

(*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 **2** printed pages]

JA—311—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper XIV

(Software Testing)

(Tuesday, 28-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Assume suitable data, if necessary.

1. What is Software Testing ? Describe the strategic approach to software testing. 15

Or

(*a*) What is Software Quality ? Explain elements of software quality assurance. 8

(*b*) Discuss the formal technical reviews. 7

P.T.O.

2. Discuss internal and external views of testing and explain basis path testing. 15

Or

(*a*) What is webapp testing ? Discuss the errors within a webapp environment. 8

(*b*) What is mobile app testing ? Discuss the testing guidelines for mobile apps. 7

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

(*a*) McCall's Quality Factors

(*b*) Validation Testing

(*c*) Control Structure Testing

(*d*) Testing Strategies of Mobile Apps.

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

JA—317—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper XV

(Relational Database Management System)

(Thursday, 30-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw suitable diagrams wherever necessary.

(3) Assume suitable data, if necessary.

1. What is Database ? Explain structure of relational database. 15

Or

(*a*) What are the applications of database ? 8

(*b*) Explain in brief database users. 7

P.T.O.

2. What is functional dependencies ? Explain in detail. 15

Or

(*a*) Describe in brief SQL. 8

(*b*) Explain database schema. 7

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

(*a*) Keys

(*b*) Views

(*c*) Data Definition Language

(*d*) Join Expression.

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

JA—318—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper XV

(Data Mining)

(Thursday, 30-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Assume your own data.

(3) Figures to the right indicate full marks.

1. Define Data Mining and Data Warehousing. Discuss various steps of Data Mining. 15

Or

(*a*) Explain different Applications of Data Warehousing. 8

(*b*) Explain performance considerations. 7

P.T.O.

2. What is Cluster Analysis ? Explain categorization of major clustering methods. 15

Or

(*a*) Explain classification by Decision Tree Induction. 8

(*b*) Explain Association and Correlations. 7

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

(*a*) Data Mining algorithm

(*b*) Tools for Data Warehousing

(*c*) Association Rules

(*d*) Data Mining Applications.

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

JA—73—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ELECTRONICS

Paper XIV

(Communication Electronics-II)

(Wednesday, 22-4-2026) **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. Explain in detail : 15

(*i*) Fibre losses

(*ii*) Total internal reflection

(*iii*) Light propagation through an optical fibre.

Or

(*a*) Draw the block diagram of basic pulsed radar and explain its working. 8

(*b*) Describe basic principle of Radar system. 7

P.T.O.

2. Describe in detail : 15

(*i*) Historical perspective of mobile communication

(*ii*) 4G system.

Or

(*a*) Write a note on moving target indication. 8

(*b*) Describe CW Doppler radar. 7

3. Write notes on any *two* : 10

(*i*) Acceptance angle and numerical aperture

(*ii*) 3G system

(*iii*) Properties and applications of microwaves

(*iv*) Characteristics of radio receiver.

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

JA—87—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

ELECTRONICS

Paper XV

(Power Electronics—II)

(Saturday, 25-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw neat and well labelled diagrams wherever necessary.

(3) Figures to the right indicate full marks.

1. With the help of neat circuit diagram and associated waveforms explain single phase full wave mid-point converter (M-2 connection) with resistive load and derive an expression for : 15

(*i*) Average load voltage

(*ii*) Average load current

(*iii*) RMS load voltage.

P.T.O.

Or

(*a*) Draw neat and well labelled circuit diagram of illumination control circuit and explain its working. 8

(*b*) With the help of neat circuit diagram, explain OFF at dark circuit. 7

2. What are inverters ? How are they classified ? With neat circuit diagram and associated waveforms explain modified series inverter. 15

Or

(*a*) With the circuit diagram and output voltage waveforms, explain the working of step-down chopper. 8

(*b*) Explain Time Ratio Control (TRC) strategy used for chopper. 7

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

(*a*) Pube Width Modulation (PWM) Control

(*b*) Automatic water level indicator

(*c*) Classification of choppers

(*d*) Basic series inverter.

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

JA—88—2026

FACULTY OF SCIENCE

B.Sc. (Sixth Semester) EXAMINATION

APRIL/MAY, 2026

(CBCS/New Pattern)

ELECTRONICS

Paper XV-B

(Electronic Instrumentation)

(Saturday, 25-4-2026) **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. Explain in detail about the construction and working principle of LVDT. List the advantages of LVDT. 15

Or

(*a*) Explain types of measurement errors in detail. 8

(*b*) Describe types of performance characteristics in detail. 7

P.T.O.

2. Explain the construction and working of Resistance Temperature Detector transducer with its advantages and disadvantages. 15

Or

(*a*) Explain Instrumentation amplifier. 8

(*b*) Describe briefly about Digital pH meter, with its block diagram. 7

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

(*a*) What are the selection criteria of transducer ?

(*b*) Discuss standard and international standards.

(*c*) Describe Piezo-electric transducer.

(*d*) Explain sample and hold circuit.

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

JA—103—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

FISHERY SCIENCE

Paper XIV

(Ornamental Fish Production and Management)

(Tuesday, 28-4-2026) **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 questions.

(3) Wherever necessary, illustrate your answers with suitable and well labelled diagrams.

1. Describe care and maintenance of an Aquarium in detail. 15

Or

Write notes on :

(*a*) Setting of aquarium 8

(*b*) General characters, food and feeding habits of sword tail fish. 7

P.T.O.

2. What is Argulosis ? Describe its causative agent, symptoms, treatment and control measures. 15

Or

Write notes on :

(*a*) Transportation of ornamental fishes 8

(*b*) Breeding and reproduction in Mollies. 7

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

(*a*) Symptoms of white spot disease

(*b*) Sexual dimorphism in sword tail fish

(*c*) Benefits of ornamental fish keeping

(*d*) Aquarium aerators.

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

JA—143—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

FISHERY SCIENCE

Paper XV

(Nutrition and Feed Technology)

(Thursday, 30-4-2026) **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 questions.

(3) Wherever necessary, illustrate answers with suitable and labelled diagrams.

1. Explain structure, classification and properties of lipids. 15

Or

Write notes on :

(*a*) Factors affecting digestibility in fishes. 8

(*b*) Accretion. 7

P.T.O.

2. Explain the process of commercial feed manufacture. 15

Or

Write notes on :

(*a*) Nutritional value of live feed for fishes. 8

(*b*) Probiotics. 7

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

(*a*) Binder

(*b*) Feed economics

(*c*) Role of vitamins

(*d*) Nutrient deficiency.

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

JA—142—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

FISHERY SCIENCE

Paper XV

(Fishery Economics, Co-operatives and Marketing Management)

(Thursday, 30-4-2026) **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.

(3) Draw labelled sketch wherever necessary.

1. Explain in brief the account on Demand in Fishery Economics. 15

Or

Write notes on :

(*a*) Types of distribution channel 8

(*b*) Price structure and problems in fish marketing. 7

P.T.O.

2. Write in detail organs of co-operatives. 15

Or

Write notes on :

(*a*) Role of Remote Sensing 8

(*b*) FSI. 7

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

(*a*) Supply

(*b*) Traditional fish market

(*c*) Functions of Fishermen Co-operative Society

(*d*) FFDA.

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

JA—105—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

INDUSTRIAL CHEMISTRY

Paper XIV

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

(Wednesday, 01-04-2026) **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. Explain with flow diagram manufacturing process of Ammonia. 15

Or

(*a*) Explain manufacturing process of Antibiotics drugs. 7

(*b*) Explain manufacturing process of Orange II Dye. 8

P.T.O.

2. Explain classification of Dyes based on application. 15

Or

(*a*) Explain personal protective equipments for Industrial Safety. 7

(*b*) Write a note on fire and explosion causes in industry. 8

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

(*a*) Phenol formaldehyde resin

(*b*) Classification of diseases

(*c*) Method of Dying

(*d*) Dry chemical powder type extinguisher.

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

JA—146—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

INDUSTRIAL CHEMISTRY

Paper XV

(Spectroscopy, Chromatography and Plant Utilities)

(Thursday, 2-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

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

1. Explain UV spectroscopy and give the construction and working of UV spectrophotometer with a neat labelled diagram. 15

Or

(*a*) Solve the problems the wave number of stretching vibrations of carbon-carbon double bond. Given the force constant. ($K = 10 \times 10^5$ dyne cm^{-1}) 8

(*b*) Explain theory of molecular vibrations with respect to IR. 7

P.T.O.

2. Explain Electromagnetic spectrum with neat labelled diagram. 15

Or

(*a*) Explain theory of Electronic Transition of U.V. Spectroscopy. 8

(*b*) Softening of water by limesoda process. 7

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

(*a*) Lambert-Beer Law

(*b*) Boiler

(*c*) McLaferty Rearrangement

(*d*) Hooke's law.

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

JA—147—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

INDUSTRIAL CHEMISTRY

Paper XV

(Plant Design and Economics for Chemical Engineering)

(Thursday, 2-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Solve *all* questions.

(2) Figures to the right indicate full marks.

1. Explain Design Project Procedure. 15

Or

(*a*) Discuss preservation and control of Mechanical, Electrical and Chemical hazards. 7

(*b*) Explain and draw plant layout. 8

P.T.O.

2. Describe the total manufacturing cost. 15

Or

(*a*) Discuss in detail about the sinking fund method. 7

(*b*) Discuss rate of return on Initial Investment. 8

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

(*a*) Single unit method

(*b*) Composite account

(*c*) Compound interest

(*d*) Surtax.

This question paper contains **4** printed pages]

JA—26—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

MATHEMATICS

Paper-XV

(Complex Analysis)

(Wednesday, 15-04-2026) **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. 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 they must satisfy the Cauchy-Riemann equations

$$u_x = v_y \text{ and } u_y = -v_x$$

Also prove $f'(z_0)$ can be written as $f'(z_0) = u_x + iv_x$ where u_x and v_x are partial derivatives, to be evaluated at (x_0, y_0). 15

P.T.O.

Or

(*a*) Suppose that, $f(z) = u(x, y) + iv(x, y)$, $z = x + iy$ and $z_0 = x_0 + iy_0$, if $\lim_{z \to z_0} f(z) = w_0$ where $w_0 = u_0 + iv_0$ then prove that :

$$\lim_{(x,y)\to(x_0,y_0)} u(x, y) = u_0$$

$$\lim_{(x,y)\to(x_0,y_0)} v(x, y) = v_0$$

Also show that, when a limit of a function $f(z)$ exists at a point z_0 then it is unique. 8

(*b*) Determine the *n*th roots of unity. 7

2. Let *f* be an analytic function everywhere inside and on a simple closed contour C, taken in the positive sense. The Cauchy integral formula : 15

$$f(z) = \frac{1}{2\pi i} \int_C \frac{f(s)}{s - z}\, ds$$

where z is interior to C and S denotes points on C. Then prove that $f(z)$ can be differentiated formally with respect to z under the integral sign and is given as :

$$f'(z) = \frac{1}{2\pi i} \int_C \frac{f(s)}{(s - z)^2}\, ds$$

Let C be the positively oriented unit circle $|z| = 1$ and $f(z) = \exp(2z)$ then find the value of

$$\int_C \frac{f(z)}{z^4}\, dz$$

Or

(*a*) Suppose that the functions $w(t) = u(t) + iv(t)$ and $W(t) = U(t) + iV(t)$ are continuous on the interval $a \le t \le b$. If $W'(t) = w(t)$ when $a \le t \le b$, $U'(t) = u(t)$ and $V'(t) = v(t)$. Then prove that : 8

$$\int_a^b w(t)\,dt = W(b) - W(a).$$

Hence find the value of the integral $\int_0^{\pi/4} e^{it}\,dt$.

(*b*) If $w(t)$ is a piecewise continuous complex valued function defined on an interval $a \le t \le b$, then prove that : 7

$$\left|\int_a^b w(t)\,dt\right| \le \int_a^b |w(t)|\,dt$$

3. Attempt any *two* of the following :

(*a*) If a function $f(z)$ is continuous and non-zero at a point z_0 then prove that $f(z) \neq 0$ throughout some neighbourhood of that point. 5

(*b*) If a function $f(z) = u(x, y) + iv(x, y)$ is analytic in a domain D then its component functions u and v are harmonic in D. 5

P.T.O.

(*c*) Show that : 5

$$(1 + i)^i = \exp\left(-\frac{\pi}{4} + 2n\pi\right)\exp\left(\frac{i \log 2}{2}\right)$$

$$n = 0, \pm 1, \pm 2, ...$$

(*d*) Prove that, the absolute convergence of a series of a complex numbers implies the convergence of that series. 5

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

JA—41—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS Pattern)

MATHEMATICS

Paper-XVI

(Integral Transforms)

(Friday, 17-4-2026) **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, 15

$$L(f^n(t)) = s^n L[f(t)] - s^{n-1} f(0) - s^{n-2} f'(0) - s^{n-3} f''(0) - .... - f^{n-1}(0)$$

Also find Laplace transform of $t^2 \cos at$.

Or

(*a*) Find the inverse Laplace transform of 8

$$\frac{S + 4}{S(S-1)(S^2+4)}$$

P.T.O.

(*b*) Find the Laplace inverse of 7

$$\frac{S^2}{(S^2 + a^2)(S^2 + b^2)}.$$

2. Using Laplace transform technique solve the following initial value problem : 15

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = 5 \sin t.$$

Or

Prove that,

$$f(x) = \frac{1}{2\pi} \int_{-\infty}^{\infty} e^{-iux}\, dx \int_{-\infty}^{\infty} f(t) e^{-iut}\, dt.$$

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

(*a*) Find the Laplace transform of $t^2 u(t - 3)$.

(*b*) Find the 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 $y'' + 25y = 10 \cos 5t$, where $y(0) = 2, y'(0) = 0$.

(*d*) If F(*s*) is a complex Fourier transform of $f(x)$ then,

$$F\{f(ax)\} = \frac{1}{a} F\left(\frac{s}{a}\right)$$

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

JA—57—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

MATHEMATICS

Paper-XVII (B)

(Mechanics-II)

(Monday, 20-4-2026) **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 expression for velocity and acceleration in terms of vector derivatives. 15

Or

(*a*) Prove that in a conservative field of force, the sum of kinetic energy and potential energy of a particle at every point is constant. 8

P.T.O.

(*b*) A particle of mass m moving with velocity $\bar{v}$ 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. Explain the principle of angular momentum and also write the unit of magnitude of angular momentum. 15

Or

(*a*) Show that for a given velocity of projection there are for a given horizontal range, in general, two directions of projection which are equally inclined to the direction of maximum range. 8

(*b*) A particle projected at an angle of elevation $\sin^{-1} 4/5$ and its range of the horizontal plane is 4 miles, find the velocity of projection and velocity at the highest point of its path. 7

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

(*i*) Find the tangential and normal components of acceleration of a particle moving along the curve $x = a(\theta + \sin \theta)$, $y = a(1 - \cos \theta)$ at $\theta = \frac{\pi}{2}$ where $\frac{d\theta}{dt}$ is constant.

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

(*iii*) A bullet, moving at the rate of v cm/sec. is fired into a block of wood and penetrates into it a thickness of d cm. If the block of wood would have been $d/2$ cms, find the velocity with which the bullet would have emerged through the block.

(*iv*) Prove the relation :

$$t_1.t_2 = \frac{2R}{g}.$$

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

JA—58—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

MATHEMATICS

Paper-XVII

(Elementary Number Theory)

(Monday, 20-4-2026) **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 for integers a, b, c : 15

(*i*) If $\frac{a}{b}$ and $\frac{b}{c}$ then $\frac{a}{c}$

(*ii*) If $\frac{a}{b}$ and $\frac{a}{c}$ then $\frac{a}{(bx + cy)}$ for arbitrary integers x and y.

Also, by using mathematical induction establish the result

if $a_1 = 1, a_2 = 3, a_n = a_{n-1} + a_{n-2}, n \geq 3$ then $a_n \leq \left(\frac{7}{4}\right)^n$.

P.T.O.

Or

(*a*) Prove that the number $\sqrt{2}$ is irrational. 8

(*b*) Prove that if p_n is the nth prime number then $p_n \leq 2^{2^{n-1}}$. 7

2. Prove that : 15

(*i*) If all the $n > 2$ terms of the arithmetic progression

$$p, p + d, p + 2d, \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots p + (n-1)d$$

are prime numbers, then the common difference d is divisible by every prime $q < n$.

(*ii*) For arbitrary integers a and b, $a \equiv b \pmod{n}$ if and only if a and b leave the same non-negative remainder when divided by n.

Or

(*a*) Prove that the system of linear congruence 8

$$ax + by \equiv r \pmod{n}$$
$$cx + dy \equiv s \pmod{n}$$

has a unique solution modulo n whenever $gcd\ (ad - bc,\ n) = 1$.

(*b*) Let p be a prime and suppose that $p \not\chi\ a$. Prove that $a^{p-1} \equiv 1 \pmod{p}$. 7

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

(*a*) Use Euclidean Algorithm to obtain integers x and y satisfying gcd (56, 72) = $56x + 72y$.

(*b*) Determine all solutions of $172x + 20y = 1000$.

(*c*) Show that there are an infinite number of primes of the form $4n + 3$.

(*d*) Solve $18x \equiv 30 \pmod{42}$.

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

JA—56—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

MATHEMATICS

Paper-XVII

(Topology)

(Monday, 20-4-2026) **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 meanings.

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

1. (A) Attempt the following :

(*i*) Let X be a set. Let λ_f be the collection of all subsets U of X such that X—U either is finite or all of X. Then show that λ_f is a topology on X. 7

P.T.O.

(*ii*) Let β and β' be bases for the topologies λ and λ', respectively on X, then show that the following are equivalent : 8

(1) λ' is finer than λ.

(2) For each $x \in X$ and each basis element B of β containing x, there is a basis element B' of β' such that $x \in B' \subset B$.

Or

(B) Attempt the following :

(*i*) Define projection maps. Also prove that projection maps are open maps. 8

(*ii*) Define open set in a subspace topology. Let Y be a subspace of X. If U is open in Y and Y is open in X, then show that U is open in X. 7

2. (A) Let X and Y be topological spaces. Let $f : X \to Y$. Then show that the following are equivalents : 15

(1) f is continuous.

(2) For every subset A of X one has $f(\bar{A}) \subseteq \overline{f(A)}$.

(3) For every closed set B of Y, the set $f^{-1}(B)$ is closed in X.

(4) For each $x \in X$ and each neighbourhood V of $f(x)$, there is a neighbourhood U of X such that $f(U) \subset V$.

Or

(B) Attempt the following :

(*i*) Let A be a connected subspace of X. If $A \subset B \subset \bar{A}$, then prove that B is also connected. 8

(*ii*) Let $X = A \cup B$, where A and B are closed in X. Let $f : A \to Y$ and $g : B \to Y$ be continuous. If $f(x) = g(x)$ for every $x \in A \cap B$. Then show that f and g combine to give a continuous function $h : X \to Y$, defined by setting $h(x) = f(x)$ if $x \in A$ and $h(x) = g(x)$ if $x \in B$. 7

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

(*i*) If $X = \{a, b, c\}$. Let $\lambda_1 = \{\varphi, X, \{a\}, \{a,b\}\}$ and $\lambda_2 = \{\varphi, X, \{a\}, \{b,c\}\}$, find the smallest topology containing λ_1 and λ_2 and largest topology contained in λ_1 and λ_2.

(*ii*) If A is subspace of X and B is a subspace of Y, then show that the product topology on A × B is the same as the topology A × B inherits as a subspace of X × Y.

(*iii*) If X is a Housdorff space, then show that a sequence of point of X converges to at most one point of X.

(*iv*) Define a compact space. Hence if $X = \{0\} \cup \left\{\frac{1}{n} / n \in Z+\right\}$ is subspace of R, then it is compact.

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

JA—72—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(New/CBCS Pattern)

MICROBIOLOGY

Paper XIV

(Molecular Biology)

(Wednesday, 22-4-2026) **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. Define Mutation. What are the types of mutation ? Write mechanism of spontaneous mutation. 15

Or

(*a*) Characteristics of genetic code. 8

(*b*) Structure of RNA polymerase. 7

P.T.O.

2. Explain in detail lac operon. 15

Or

(*a*) Vector as a tool in moleclar cloning. 8

(*b*) Explain various methods of gene transfer. 7

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

(*a*) Structure of Ribosome

(*b*) NER

(*c*) Attenuation

(*d*) pBR-322.

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

JA—86—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

MICROBIOLOGY

Paper XV

(Pharmaceutical Microbiology)

(Saturday, 25-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(2) Draw a diagram if necessary.

1. Explain the role of microbiologist in laboratory management and design. 15

Or

Write notes on :

(*a*) Assessing risk and antimicrobial agents 8

(*b*) Pharmacopeia and microbiological tests. 7

P.T.O.

2. Describe the laboratory evaluation of antimicrobial agents. 15

Or

Write notes on :

(*a*) Riboflavin fermentation 8

(*b*) Human immunoglobulin manufacture and quality control. 7

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

(*a*) Microbiological tests useful for pharmaceutical sector

(*b*) Bioburden determination : total microbial count

(*c*) Chemical disinfectant

(*d*) Immune sera production.

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

JA—85—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

MICROBIOLOGY

Paper XV

(Industrial Microbiology)

(Saturday, 25-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw well labelled diagrams wherever necessary.

1. What is secondary screening ? Describe in detail secondary screening for industrially important microorganisms. 15

Or

Write notes on :

(*a*) Role of microbiologist in industrial microbiology 8

(*b*) Horton sphere. 7

P.T.O.

2. What is downstream processing ? Describe different methods used for extraction of insoluble (solid) fermentation product. 15

Or

Write notes on :

(*a*) Production of Thuricide 8

(*b*) Wine production. 7

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

(*a*) Antifoam agents

(*b*) Crowded plate technique

(*c*) Crystallization

(*d*) Uses of amylase.

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

JA—07—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

PHYSICS

Paper XIV

(Atomic, Molecular and Nuclear Physics)

(Thursday, 9-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(2) Figures to the right indicate full marks.

(3) *All* symbols have their usual meanings.

1. Explain the vector atom model of the atom and the different quantum numbers associated with it. 15

Or

(*a*) Write a note on regions of Electromagnetic spectra. 8

(*b*) Explain Raman effect in detail. 7

P.T.O.

2. Explain chain reaction with schematic representation. Explain Neutron cycle. 15

Or

(*a*) Explain construction and working principle of Van-de Graff Generator. 8

(*b*) Write a note on cyclotron. 7

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

(*a*) J-J coupling

(*b*) Theory of pure rotational spectra

(*c*) Betatron

(*d*) Nuclear fission of fission products.

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

JA—18—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New)

PHYSICS

Paper XV

(Fibre Optic Communication)

(Wednesday, 8-4-2026) **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. Describe various types of optical fibres and their transmission ray characteristics. An optical fibre has a numerical aperture of 0.20 and cladding refractive index of 1.59. Determine : 15

(*i*) Acceptance angle for fibre in water when has refractive index of 1.33.

(*ii*) The critical angle at core cladding interface.

Or

(*a*) Derive an expression for the acceptance angle and numerical aperture. 8

(*b*) Describe the phenomenon of Total Internal Reflection. 7

P.T.O.

2. Describe in brief about intermodal dispersion. Derive expression for : 15

(*i*) Intermodal dispersion in multimode step index fibre.

(*ii*) Intermodal dispersion in multimode graded index fibre.

Or

(*a*) Derive expression for cutoff wavelength. 7

(*b*) Estimate the maximum core diameter for an optical fibre with relative refractive index difference 1.5% and core refractive index as 1.48, core diameter is 80 μm and fibre is operating at a wavelength of 0.85 μm in a single mode operation.

Also estimate the new maximum core diameter for single mode operation when the relative index difference is reduced by a factor of 10. 8

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

(*i*) Advantages and disadvantages of single mode operation

(*ii*) Mode volume of in graded index fibre

(*iii*) Difference between skew and meridional rays

(*iv*) Normalized frequency.

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

JA—17—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS/New Pattern)

PHYSICS

Paper XV

(Digital and Communication Electronics)

(Wednesday, 8-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(2) Figures to the right indicate full marks.

(3) Use of non-programmable calculator is allowed.

1. Explain octal and hexadecimal number systems. Convert $(100)_{10}$ into binary, octal and hexadecimal equivalents. 15

Or

(*x*) Reduce the following logic expression and draw its logic diagram : 8

$$Y = \bar{A}BC + AB\bar{C} + ABC.$$

(*y*) Discuss SOP form of Boolean expression : 7

$$Y = (A + BC)\ (B + \bar{C}A).$$

P.T.O.

2. Define amplitude modulation. Obtain an expression for modulated voltage in terms of modulation index and draw its waveforms. 15

Or

(*x*) Draw block diagram of tunned radio frequency (TRF) receiver and explain function of each block. 8

(*y*) Explain in detail A.M. receiver. 7

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

(*a*) Universal properties of NOR gates

(*b*) BCD code

(*c*) Power in A.M.

(*d*) Basic communication system.

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

JA—65—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ZOOLOGY

Paper XIII

(Applied Zoology)

(Applied Parasitology—I)

(Parasitic Protozoa and Platyhelminthes)

(Tuesday, 21-4-2026) **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 *Trichomonas vaginalis.* 15

Or

(*a*) Explain the morphology and pathogenicity of *Eimeria tenella.* 8

(*b*) Describe the life-cycle of *Plasmodium Vivax* in mosquito. 7

P.T.O.

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

Or

(*a*) Describe the life-cycle of *Taenia solium*. 8

(*b*) Explain the general organization in Cestodes. 7

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

(*a*) Host and Vector

(*b*) Morphology of *Balantidium coli*

(*c*) Redia larva

(*d*) Cysticercus larva.

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

JA—66—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ZOOLOGY

Paper XIII(C)

(Applied Zoology— Entomology-I)

(Tuesday, 21-4-2026) **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 Digestive system of cockroach. 15

Or

(*a*) Define Entomology and add a note on Agricultural entomology. 8

(*b*) Describe various methods of insect collection. 7

P.T.O.

2. Describe the salient features of order Thysanura with suitable example. 15

Or

(*a*) Describe Ametabolus and Holometabolus types of metamorphosis. 8

(*b*) Describe effect of light and temperature on insect life. 7

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

(*a*) Insect Killing Jar

(*b*) Autonomus nervous system of cockroach

(*c*) Butterfly and Moths

(*d*) Effect of food on insect life.

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

JA—67—2026

FACULTY OF SCIENCE

B.Sc. (Fifth Semester) EXAMINATION

APRIL/MAY, 2026

(CBCS/New Pattern)

ZOOLOGY

Paper XIII

(Applied Zoology—D)

(Environmental Biology—I)

(Tuesday, 21-4-2026) **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 physiochemical properties of water. 15

Or

(*a*) Structural components of ecosystem 8

(*b*) Food web. 7

P.T.O.

2. Describe in detail aims and necessity of wildlife conservation. 15

Or

(*a*) Describe Biodiversity conservation. 8

(*b*) Importance of Biodiversity. 7

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

(*a*) Process of soil formation

(*b*) Energy flow in Ecosystem

(*c*) Habitat degradation and its loss

(*d*) Causes of wildlife depletion.

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

JA—64—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ZOOLOGY

Paper XIII

(Applied Zoology—Pisciculture)

(Tuesday, 21-4-2026) **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 preparation and management of rearing pond. 15

Or

(*a*) Give an account of induced breeding by hypophysation. 8

(*b*) Give an account of Bombay duck fishery. 7

P.T.O.

2. Describe in detail the fishing gears. 15

Or

(*a*) Give an account on methods of fish preservation. 8

(*b*) Give an account on Environmental Fish Diseases. 7

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

(*a*) Topography

(*b*) Transportation of fish seed

(*c*) Masula boat

(*d*) Salting.

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

JA—27—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ZOOLOGY

Paper XIV

(Ethology, Biometry and Bioinformatics)

(Wednesday, 15-4-2026) **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 diagrams wherever necessary.

1. Describe acquired animal behaviour Imprinting, Conditioning and Habituation with examples. 15

Or

(*a*) Describe Protective and Aggresive colouration. 8

(*b*) Describe Auditory Comunication. 7

2. Describe Broad Applications of Bioinformatics. 15

P.T.O.

Or

(*a*) Describe types of classification of chronological and quantitative data. 8

(*b*) Describe Histogram with examples. 7

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

(*a*) Taxis

(*b*) Tactile Communication

(*c*) Mean

(*d*) PubMed.

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

JA—43—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ZOOLOGY

Paper XV

(Applied Zoology—B, Applied Parasitology—II)

(Parasitic Nematodes and Arthropods)

(Friday, 17-4-2026) **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 diagrams wherever necessary.

1. Describe Morphology, life cycle, pathogenicity, diagnosis and treatment of *Ancylostoma duodenale*. 15

Or

(*a*) Explain morphology and pathogenicity of citrus nematode. 8

(*b*) Describe life cycle of *Heterodera* (Cyst nematode). 7

P.T.O.

2. Explain morphology, life cycle, diseases and control measures of *Cimex lecturalius* (Bed Bug). 15

Or

(*a*) Describe Biological control of insects. 8

(*b*) Illustrate morphology of *Siphonaptera* (Flea). 7

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

(*a*) Microfilaria larva

(*b*) Mites

(*c*) General organization of plant nematodes

(*d*) Malaria.

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

JA—44—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ZOOLOGY

Paper XV

[Applied Zoology-C (Entomology—II)]

(Friday, 17-4-2026) **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 diagrams wherever necessary.

1. Describe classification, bionomics and control measures of lemon butterfly. 15

Or

(*a*) Explain structure bionomics, control measures of mosquito. 8

(*b*) Explain structure and control measures of Bed Bug. 7

P.T.O.

2. Describe in detail lac culture. 15

Or

(*a*) Explain physical control of Insect Pest. 8

(*b*) Explain IPM of insect pest. 7

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

(*a*) Midge fly

(*b*) Rat flea

(*c*) Silk

(*d*) Contact poison.

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

JA—45—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New)

ZOOLOGY

Paper XV

[Applied Zoology—D (Environmental Biology—II)]

(Friday, 17-4-2026) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Draw neat & well labelled diagram wherever necessary.

1. Explain the sources and effects of Lead and Mercury pollution. 15

Or

(*a*) Sources and effects of sulphate compounds as air pollutant. 8

(*b*) Sources, effects and control measures of air pollution. 7

P.T.O.

2. Explain sources, effects and control of soild waste pollution. 15

Or

(*a*) The Water (Prevention and Control of Pollution) Act, 1974. 8

(*b*) The Environment (Protection) Act, 1986. 7

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

(*a*) Non-biodegradable pollutant

(*b*) Domestic waste

(*c*) Acid rain

(*d*) Aerobic treatment.

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

JA—42—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(CBCS/New Pattern)

ZOOLOGY

Paper XV

[Applied Zoology-A (Aquaculture)]

(Friday, 17-4-2026) **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 diagrams wherever necessary.

1. What is Integrated Fish Farming ? Explain Cattle cum Fish farming. 15

Or

(*a*) Cage culture 8

(*b*) Industrial Effluents and Aquaculture. 7

P.T.O.

2. Explain types of Aquatic weed and their control. 15

Or

(*a*) Mussel culture 8

(*b*) Ministry of Agriculture. 7

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

(*a*) Scope and importance Aquaculture

(*b*) Composition of Sewage

(*c*) Physical properties of water

(*d*) Fish species for Mariculture.