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

AA—1002—2025

FACULTY OF ALL

B.A./B.Com./B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020 Pattern)

INDIAN KNOWLEDGE SYSTEM

Paper–IKS-1101

(Wednesday, 2-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions carry equal marks.

(*ii*) Question no. **1** is compulsory.

(*iii*) Solve any *three* of the remaining five questions (Q. Nos. **2** to **6**).

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

(*i*) **सर्व** प्रश्नाना समान गुण आहेत.

(*ii*) प्रश्न क्र. **1** अनिवार्य आहे.

(*iii*) उर्वरित **5** प्रश्नापैकी कोणतेही **3** प्रश्न सोडवा (प्र. क्र. **2** ते **6**).

(*iv*) उजवीकडील अंक पूर्ण गुण दर्शवितात.

P.T.O.

1. Solve the following questions (2.5 marks each) : 10

   (*a*) What is the Indian Knowledge System ?

   (*b*) Describe in detail the nature of Buddhist philosophy, its four Noble Truths and the Eightfold Path.

   (*c*) What is the significance of city planning in ancient Indian architecture ?

   (*d*) What is the importance of the contributions of Sushruta Samhita and Vagbhata ?

   खालील प्रश्न सोडवा (प्रत्येकी 2.5 गुण) :

   (*a*) भारतीय ज्ञान प्रणाली म्हणजे काय ?

   (*b*) बौद्ध दर्शनाचे स्वरूप, त्याचे चार आर्यसत्ये आणि अष्टांगिक मार्ग यांचे सविस्तर वर्णन करा.

   (*c*) प्राचीन भारतीय स्थापत्यकलेतील शहर नियोजनाचे महत्व काय आहे ?

   (*d*) सुश्रुत संहिता आणि वाग्भट यांच्या योगदानाचे महत्व काय आहे ?

2. What is the significance of the Gurukula system, and how did it operate within the context of ancient Indian education ? 10

   गुरुकुल पद्धतीचे महत्त्व काय आहे आणि ती प्राचीन भारतीय शिक्षण पद्धतीत कशी कार्यरत होती ?

3. What is the concept of Nāstika systems ? Provide a detailed introduction to Jainism, including its nature, concepts and scriptures, as one of the Nāstika systems. 10

   नास्तिक प्रणाली म्हणजे काय ? जैन धर्म या नास्तिक प्रणालींचे स्वरूप, संकल्पना आणि साहित्याचा सविस्तर परिचय द्या.

4. What is the concept of Indian Economics ? 10

   भारतीय अर्थशास्त्राची संकल्पना काय आहे ?

5. How was the metal industry in ancient India ? 10

प्राचीन भारतातील धातू उद्योग कसा होता ?

6. Solve the following questions (2.5 marks each) : 10

(*a*) What were the features of the ancient Indian education system ?

(*b*) What does 'Apoorva' mean, and what is its significance ?

(*c*) Provide a detailed description of the concept and tradition of ancient Indian music.

(*d*) How did the historical development of astronomy unfold in India ?

खालील प्रश्न सोडवा (प्रत्येकी **2.5** गुण) :

(*a*) भारतीय प्राचीन शिक्षण पद्धतीची वैशिष्ट्ये कोणती होती ?

(*b*) अपूर्वा म्हणजे काय आणि त्याचे महत्त्व काय आहे ?

(*c*) प्राचीन भारतीय संगीताची संकल्पना आणि परंपरा याबद्दल सविस्तर वर्णन करा.

(*d*) भारतामध्ये खगोलशास्त्राचा ऐतिहासिक विकास कसा झाला ?

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

AA—01—2025

FACULTY OF HUMANITIES/SCIENCE AND TECHNOLOGY AND COMMERCE AND MANAGEMENT

B.A./B.Sc./B.Com. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020)

ENGLISH (Comp.)

Paper–I(HENGAEC-1101)

(Developing Spoken Communication)

(Friday, 4-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Attempt any *three* questions from Q. Nos. **2** to **5**.

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

1. Write short notes on : 10

(*i*) Types of communication

(*ii*) Imperative sentences

(*iii*) Tips for proposing vote of thanks

(*iv*) Telephonic conversation.

P.T.O.

2. Explain, how verbal communication differs from nonverbal communication. 10

3. Illustrate the usage of exclamations in English language by giving suitable examples. 10

4. Draft a Welcome Speech for the College Annual Function. 10

5. Ramesh calls up Rohan to convince him to go to college trip. Draft the conversation. 10

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

AA—09—2025

FACULTY OF HUMANITIES

B.A./B.Sc./B.Com. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020)

HINDI (MIL)

Paper–I–HHINMIL-1101

(साहित्य कलश और व्यावहारिक हिंदी, भाग-1)

(Monday, 7-4-2025) **Time : 10.00 a.m. to 12.00 Noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) **पहला** प्रश्न अनिवार्य है।

(*ii*) प्रश्न क्रमांक **2** से **6** में से किन्हीं **तीन** प्रश्नों के उत्तर लिखिए।

(*iii*) **सभी** प्रश्नों के समान अंक हैं।

1. निम्नलिखित में से किन्हीं **दो** पर टिप्पणियाँ लिखिए : 10

(अ) 'ब्लॉग' की उपयोगिता

(ब) दूरदर्शन के विज्ञापन की विशेषताएँ

(क) 'पंच परमेश्वर' कहानी का समझू साहू।

(ड) 'जो बीत गई सो बात गई' कविता का आशय।

P.T.O.

2. 'चीफ़ की दावत' कहानी की कथावस्तु लिखिए। 10

3. 'गीत फरोश' कविता की संवेदना को स्पष्ट कीजिए। 10

4. ब्लॉग के स्वरूप पर प्रकाश डालिए। 10

5. आकाशवाणी के विज्ञापन की विशेषताएँ लिखिए। 10

6. 'उर्फ सैम' कहानी की कथावस्तु लिखिए। 10

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

AA—10—2025

FACULTY OF HUMANITIES

B.A./B.Sc./B.Com. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

MARATHI (MIL)

Paper–AECMAR-1101

(गद्य, पद्य व उपयोजित मराठी-I)

(Monday, 7-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) **पहिला** प्रश्न सोडविणे अनिवार्य आहे.

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

1. टिपा लिहा (कोणत्याही **दोन**) : 10

(अ) 'काळ्या तोंडाची' या कथेतील चंपी

(ब) 'युगायुगाची गुलामी चाल' मधील स्त्री

(क) कार्यालयीन पत्रलेखनाचे घटक

(ड) इतिवृत्ताचे स्वरूप.

P.T.O.

(पुढील प्रश्न क्रमांक **2** ते प्रश्न क्रमांक **6** या मधील कोणतेही **तीन** प्रश्न सोडवा) : 30

2. 'पुरुषांकडून स्त्रियांवर होणाऱ्या अन्यायाचे विवेचन' ताराबाई शिंदे यांनी कसे केले आहे ते लिहा.

3. 'भुरा' या नायकाच्या जीवन संघर्षाचे चित्रण शरद बावीस्कर यांनी कसे केले आहे ते स्पष्ट करा.

4. प्रेमाचा उत्कट आविष्कार 'अंदाज आरशाचा' या गझलेतून कसा उमटला आहे. ते लिहा.

5. दुष्काळी परिस्थितीमुळे होरपळलेल्या गावाचे चित्रण रवी कोरडे यांनी कसे केले आहे ?

6. कार्यालयीन पत्रलेखन करतांना कोणत्या बाबीची काळजी घेतली पाहिजे ते लिहा.

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

NEPSA—2011—2025

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

BOTANY

Paper SBOTCT-1101

(Viruses, Bacteria and Algae—I)

(Saturday, 12-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Question No. **1** is compulsory.

(2) Of the remaining, attempt any *three* questions.

(3) Draw neat and labelled diagram wherever required.

1. Write brief notes on the following : 10

   (*a*) General characters of viruses

   (*b*) Forms of Bacteria

   (*c*) Structure of Nostoc filament

   (*d*) Algae as food.

2. Describe ultrastructure of TMV. 10

P.T.O.

3. Describe the process of conjugation in Bacteria. 10

4. Give an account of general characters of algae. Enlist classes of algae as per F.E. Fritch. 10

5. Give systematic position, occurrence and thallus structure of Chara. 10

6. Write brief notes on the following : 10

(*a*) Classification of viruses on the basis of host

(*b*) Little leaf of Brinjal

(*c*) Reproduction in Nostoc

(*d*) Thallus structure of Oedogonium.

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

NEPSA—5071—2025

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

BIOTECHNOLOGY (Vocational)

SBTVCT-1101

(Fundamental Cell Biology-I)

(Tuesday, 22-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) From the remaining questions, attempt any *three* questions.

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

1. Write short notes on : 10

(*a*) Cell theory

(*b*) Mitochondria

(*c*) Prophase-I

(*d*) Plasmodesmata

2. Describe in detail basic techniques in Cell Biology. 10

3. Explain in brief structure and function of chloroplast. 10

P.T.O.

4. Explain in detail different phases of mitosis. 10

5. Describe in brief architectural hierarchy, organisation and function of DNA. 10

6. Write short notes on : 10

(*a*) History of Cell Biology

(*b*) Microtubules

(*c*) Apoptosis

(*d*) Cyclic Amp Pathway

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

NEPSA—1011—2025

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020 Pattern)

CHEMISTRY

Paper I (SCHECT-1101)

(Organic Chemistry and Inorganic Chemistry)

(Wednesday, 9-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) *All* questions carry equal marks.

(2) Question No. **1** is compulsory.

(3) Solve any *three* of the remaining five questions (Q. No. **2** to Q. No. **6**).

(4) Figures to the right indicate full marks.

1. Solve the following questions (**2.5** marks each) : 10

(*a*) Explain addition reaction with suitable example.

P.T.O.

(*b*) What is aromatic compound ? Explain the structure of Naphthalene with the help of Huckel rule.

(*c*) How will you prepare ethylene glycol from 1, 2-dibromoethane ? What is the action of ethylene glycol with $Pb(OAC)_4$?

(*d*) Define the terms :

(*i*) Covalent radius

(*ii*) Ionic radius.

2. Solve the following : 10

(*a*) Explain resonance effect with suitable example.

(*b*) Define carbocation. Explain the structure and stability of carbocation.

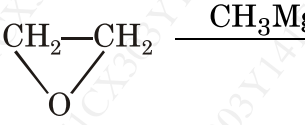
3. Solve the following : 10

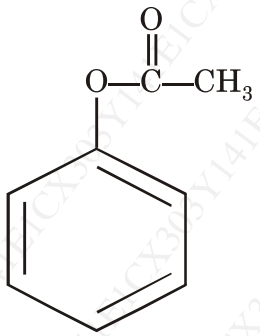
(*a*) What are phenols ? Give its classification.

(*b*) Predict the product :

(*i*) $CH_2 = CH_2 + \frac{1}{2}O_2 \xrightarrow{Ag} ?$

(*ii*) $CH_2 = CH_2 \xrightarrow{CH_3COOOH} ?$

(*iii*)  $\xrightarrow{CH_3MgBr} ?$

(*iv*)  $\xrightarrow{AlCl_3}$?

(*v*) $CH_2(OH)-CH(OH)-CH_2(OH) + 3CH_3-C(=O)-Cl \longrightarrow$?

4. Solve the following : 10

(*a*) Write the general characteristics of *s*-block elements.

(*b*) Define electron affinity. Explain the factor affecting electron affinity.

5. Solve the following : 10

(*a*) Explain the nitration of benzene with mechanism.

(*b*) Define ionization energy. Discuss variation of ionization energy along a period and in a group.

6. Solve the following questions (**2.5** marks each) : 10

(*a*) Write a note on Heterolytic Fission.

(*b*) Write a note on Kekule structure of benzene.

(*c*) Explain ring opening reaction of propylene oxide in acidic medium.

(*d*) Write down the applications of electronegativity.

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

NEPSA—4011—2025

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020 Pattern)

COMPUTER SCIENCE

Paper SCSCCT-1101

(Fundamentals of Computer Science—I)

(Saturday, 19-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Question No. **1** is compulsory.

(2) Solve any *three* questions from Q. No. **2** to Q. No. **6**.

(3) Assume suitable data if necessary.

1. Solve the following questions : 10

(*a*) What is Computer ? Explain the concept of algorithm.

(*b*) Explain types of monitor.

(*c*) Explain Gray code.

(*d*) What is Window ? Explain its features.

P.T.O.

2. Answer the following : 10

(*a*) Draw and explain the block diagram of computer.

(*b*) What is flowchart ? Explain its symbols.

3. Solve the following : 10

(*a*) Explain any *two* input devices.

(*b*) Explain voice recognition devices.

4. Solve the following : 10

(*a*) Explain octal and hexadecimal number systems.

(*b*) Explain ASCII codes.

5. Solve the following : 10

(*a*) Explain any *five* external DOS commands.

(*b*) What is operating system ? Explain its functions.

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

(*a*) Memory

(*b*) Plotter

(*c*) BCD code

(*d*) Types of Software.

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

NEPSA—5141—2025

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020 Pattern)

ELECTRONICS

Paper SELECT-1101

(Fundamentals of Analog and Digital Electronics-I)

(Tuesday, 22-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) *All* questions carry equal marks.

(2) Question No. **1** is compulsory.

(3) Solve any *three* of the remaining five questions (Q. No. **2** to Q. No. **6**).

(4) Figures to the right indicate full marks.

1. Solve the following questions : 10

(*a*) Explain Kirchhoff's voltage law with suitable example.

(*b*) State maximum power transfer theorem.

(*c*) Convert $(1101)_2 = (?)_{10}$.

(*d*) Define OR gate. Give its symbol and truth table.

P.T.O.

2. (*a*) Discuss voltage divider in series circuits. 5

(*b*) With neat circuit diagram explain shorts in parallel circuit. 5

3. (*a*) State and explain superposition theorem. 5

(*b*) How to thevenize any given circuit ? 5

4. (*a*) Solve the following : 5

(*i*) $(101011)_2 = (?)_{16}$

(*ii*) $(62)_8 = (?)_2$

(*b*) Solve the following : 5

(*i*) $(1101)_2 + (1010)_2$

(*ii*) $(1110)_2 - (0101)_2$.

5. (*a*) State and explain DeMorgan's second theorem. 5

(*b*) Explain universal property of NAND gate. 5

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

(*a*) Proportional voltage formula for series circuit

(*b*) Norton's theorem

(*c*) BCD to binary conversion

(*d*) EX-OR gate.

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

NEPSA—4021—2025

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

FISHERY SCIENCE

Paper SFSCCT-1101

(Fish Pond Construction and Management—I)

(Saturday, 19-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) *All* questions carry equal marks.

(2) Question No. **1** is compulsory.

(3) Solve any *three* questions of the remaining five questions (Q. No. **2** to Q. No. **6**)

(4) Draw well labelled diagrams wherever necessary.

1. Write short notes on the following : 10

(*a*) Topography

(*b*) Drying and ploughing of ponds

(*c*) Types of pH

(*d*) Fertilization of stocking pond.

P.T.O.

2. Write notes on : 10

(*a*) Water quality for fish farming

(*b*) Eradication of aquatic weeds by using chemical treatment.

3. Write notes on : 10

(*a*) Effect of low oxygen on fish production

(*b*) Preparation of nursary pond.

4. Write notes on : 10

(*a*) Qualities of fish seed

(*b*) Food and feeding habits of major carps.

5. Write notes on Common treatment of fish disease control. 10

6. Write short notes on the following : 10

(*a*) Hatching pits

(*b*) Liming of ponds

(*c*) Types of fish seeds

(*d*) Biological method of aquatic weed control.

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

NEPSA—4031—2025

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020 Pattern)

INDUSTRIAL CHEMISTRY

Paper SICHCP-1101

(Fluid Mechanics & Lubricant—I)

(Saturday, 19-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) *All* questions carry equal marks.

(2) Question No. **1** is compulsory.

(3) Solve any *three* of the remaining five questions (Q. No. **2** to Q. No. **6**)

(4) Figures to the right indicate full marks.

(5) Scientific calculator and log table are allowed.

1. Solve the following questions : 2.5 marks each

(*a*) Explain carbon free radical intermediates with suitable example.

(*b*) Explain classification of fluids.

P.T.O.

(*c*) Explain disadvantages of centrifugal pump.

(*d*) Explain flash point of lubricant.

2. What are types of Distillation ? Describe *one* of them in detail. 10

3. Explain construction and working of manometer and solve the given problem :

A manometer is used to measure the pressure drop across the orifice liquid (A) is mercury (density 13590 kg/m^3) and liquid (B) flowing through the orifice and filling the manometer leads is brine (density 1260 kg/m^3) when the pressure at the tap are equal the level of mercury in the manometer is 0.9 m below the orifice tap under operating condition. The guage pressure at the upstream tap is 0.14 bar. The pressure at the downstream tap is 250 mm Hg below the atmospheric. What is the reading of manometer ? 10

4. Explain construction and working of Reciprocating pump with a neat labelled diagram. 10

5. Explain effect of temperature on viscosity of lubricating oil by Redwood viscometer. 10

6. Solve the following questions : 10

(*a*) Explain homogeneous and non-homogeneous reaction with suitable example.

(*b*) Write a short note on inclined manometer.

(*c*) Diaphragm pumps with neat labelled diagram.

(*d*) Write a short note on lubricant.

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

NEPSA—3011—2025

FACULTY OF SCIENCE AND TECHNOLOGY

B.A./B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020 Pattern)

MATHEMATICS

Paper SMATCT-1101

(Topics in Algebra-I)

(Wednesday, 16-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) *All* questions carry equal marks.

(2) Question No. **1** is compulsory.

(3) Solve any *three* of the remaining five questions (Q. No. **2** to Q. No. **6**).

(4) Figures to the right indicate full marks.

1. Solve the following : 10

(*a*) Define equivalence relation on non-empty set.

(*b*) Define onto-function.

P.T.O.

(*c*) State elementary column operations.

(*d*) Define characteristic root of the matrix.

2. Solve the following : 10

(*a*) For any sets A, B and C, prove that : 6

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C).$$

(*b*) Let : 4

$$A = \{1, 2, 3\} \text{ and } B = \{a, b\},$$

find A × B & B × A. Is A × B = B × A ?

3. Solve the following : 10

(*a*) Let $f : \mathbf{R} \to \mathbf{R}$, defined by $f(x) = x^3$. Show that f is one-one. 6

(*b*) Let $f, g : \mathbf{R} \to \mathbf{R}$, defined by $f(x) = x^3 + 2$ and $g(x) = \sqrt[3]{x}$. Find $f \circ g$ and $g \circ f$. Is $f \circ g = g \circ f$? 4

4. Solve the following : 10

(*a*) Prove that, the elementary operations do not alter the rank of a matrix. 6

(*b*) Find rank of the matrix : 4

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

5. Solve the following : 10

(*a*) State and prove Cayley-Hamilton theorem. 6

(*b*) Solve the equations : 4

$$x + 2y + 3z + 4t = 0$$

$$8x + 5y + z + 4t = 0$$

$$5x + 6y + 8z + t = 0$$

$$8x + 3y + 7z + 2t = 0.$$

6. Solve any *two* : 10

(*a*) Let A and B be subsets of universal set □ , then prove that :

$$(A \cup B)^C = A^C \cap B^C.$$

(*b*) Reduced to a row reduced echelon form, the matrix :

$$A = \begin{bmatrix} 0 & 1 & 3 & -1 & 3 & 1 \\ 0 & 1 & 3 & 0 & 2 & 3 \\ 0 & 2 & 6 & 1 & 3 & 9 \\ 0 & 4 & 12 & -2 & 10 & 7 \end{bmatrix}.$$

Also find rank of A.

(*c*) Let X be a non-empty set and '~' an equivalence relation on X. Let $x, y \in X$, then prove that exactly one of the following is true :

(*i*) $[x] \cap [y] = \phi$

(*ii*) $[x] = [y]$.

(*d*) A system AX = B of n non-homogenous equation in n unknowns has a unique solution provided A is non-singular, i.e. $e(A) = n$.

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

NEPSA—5231—2025

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020 Pattern)

MICROBIOLOGY

Paper I (SMICCT-1101)

(Basic Microbiology)

(Tuesday, 22-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Question No. **1** is compulsory.

(2) Out of remaining five questions (Q. No. **2** to Q. No. **6**) answer any *three* questions.

(3) *All* questions carry equal marks.

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

1. Define the following terms with suitable examples : 10

(*a*) Microorganisms

P.T.O.

(*b*) Resolving power

(*c*) Acidic stain

(*d*) Flagella.

2. Explain in detail distribution of microorganisms in nature. 10

3. What is electron microscope ? Explain in detail transmission electron microscope (TEM). 10

4. Explain in detail principle, mechanism, procedure and observations of negative staining. 10

5. Explain in detail structure, chemical composition and functions of capsule and slime layer. 10

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

(*a*) Louis Pasteur

(*b*) Objective of compound microscope

(*c*) PHB staining

(*d*) Pilli.

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

NEPSA—2021—2025

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

PHYSICS

Paper SPHYCT-1101

(Fundamentals of Physics—I)

(Saturday, 12-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) *All* questions carry equal marks.

(2) Question No. **1** is compulsory.

(3) Solve any *three* of the remaining five questions (Q. No. **2** to Q. No. **6**)

(4) Figures to the right indicate full marks.

1. Solve the following questions (compulsory) (each **2.5** marks) : 10

(*a*) Define gravitational field.

(*b*) What is fluid ? List its properties.

(*c*) Which are the types of sound waves ?

(*d*) What is a semiconductor ?

P.T.O.

2. (*a*) Explain the motion of a particle in a central force field. 10

(*b*) State and explain Kepler's laws of planetary motion.

3. (*a*) Describe Pascal's principle and its applications. 10

(*b*) Explain Archimedes principle and Buoyancy force.

4. (*a*) Describe the method to determine velocity of sound in water with suitable diagram. 10

(*b*) Derive Newton's formula to measure velocity of sound.

5. (*a*) What is Zener diode ? Explain working of Zener diode in reverse biased condition. 10

(*b*) Describe photodiode and its operation.

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

(*a*) Gravitational potential

(*b*) Viscosity

(*c*) Intensity of sound

(*d*) N type semiconductor.

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

NEPSA—3021—2025

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020 Pattern)

ZOOLOGY

Paper SZOOCT-1101

(Biodiversity of Non-chordates-I)

(Wednesday, 16-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Question No. **1** is compulsory.

(2) Out of the remaining five questions (Q. No. **2** to Q. No. **6**) answer any *three* questions.

(3) *All* questions carry equal marks.

(4) Illustrate your answers with suitable labelled diagrams, wherever necessary.

1. Answer each of the following : 10

(*a*) Describe the general characteristics of non-chordates.

P.T.O.

(*b*) Explain the Polymorphism in Hydrozoa.

(*c*) Explain the general characters of Phylum Annelida.

(*d*) Give an account of the Economic importance of Mollusca.

2. Describe in detail the canal system of Sycon and explain the circulation of water in Sycon. 10

3. Give an account of the structure, life cycle and pathogenicity of *Taenia solium*. 10

4. Describe the Digestive system of Cockroach. 10

5. Give an account of the external morphology of Star fish. 10

6. Answer each of the following : 10

(*a*) Give a brief account of locomotion in Protozoa.

(*b*) Give an account of *Ascaris lumbricoides*.

(*c*) Give an account of Metamorphosis in insects.

(*d*) Describe the larval forms in Echinoderms.

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

AA—1003—2025

FACULTY OF ALL

B.A./B.Com./B.Sc. (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020 Pattern)

VALUE EDUCATION

(VECCOI-1151))

(Constitution of India–I)

(Thursday, 3-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Students are required to solve a total of **4** questions.

(*iii*) Students are required to solve any *three* of the remaining five questions (Q. Nos. **2** to **6**).

(*i*) प्रश्न क्रमांक **एक** अनिवार्य आहे.

(*ii*) एकूण **4** प्रश्न सोडविणे आवश्यक आहे.

(*iii*) प्रश्न क्रमांक **2** ते **6** पैकी कोणतेही **तीन** प्रश्न सोडवा.

1. Write short notes on (All) (2.5 marks each) : 10

(*a*) Explain the sources of Indian Constitution

(*b*) Discuss the Directive Principles of State Policy

(*c*) Comment on Judicial activism

(*d*) Explain the utility of Rajya Sabha.

P.T.O.

थोडक्यात टिपा लिहा (सर्व) (प्रत्येकी 2.5 गुण) :

(*a*) भारतीय राज्यघटनेची उगमस्थाने स्पष्ट करा

(*b*) मार्गदर्शक तत्वांची चर्चा करा

(*c*) न्यायिक सक्रियतेवर भाष्य करा

(*d*) राज्यसभेची उपयुक्तता स्पष्ट करा.

2. State the salient features of the Indian Constitution. 10

भारतीय राज्यघटनेची ठळक वैशिष्ट्ये स्पष्ट करा.

3. Explain in detail the Fundamental Rights. 10

मूलभूत अधिकाराचे सविस्तर विवेचन करा.

4. Explain the powers and functions of Indian President. 10

भारताच्या राष्ट्रपतीचे अधिकार व कार्य स्पष्ट करा.

5. Explain the structure and powers of Lok Sabha. 10

लोकसभेची रचना आणि अधिकार स्पष्ट करा.

6. Elucidate the administrative relations between the Centre and State. 10

केंद्र आणि राज्य यांच्यातील प्रशासकीय संबंधाचे विवेचन करा.

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

AA—16—2025

FACULTY OF HUMANITIES/SCI. AND TECHNOLOGY AND COMMERCE AND MANAGEMENT

B.A./B.Com./B.Sc. (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020)

ENGLISH (Compulsory)

Paper–II (HENGAEC-1151)

(Developing Written Communication)

(Tuesday, 8-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Attempt any *three* questions from Question Nos. **2** to **5**.

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

1. Write short notes on : 10

(*i*) Purpose of a paragraph

(*ii*) Expanding Vocabulary

(*iii*) Types of resumes

(*iv*) Features of circulars.

P.T.O.

2. Explain the principles of clear writing in detail. 10

3. What are the essential components of essay writing ? Discuss each component in detail. 10

4. Write a job application for the post of Marketing Coordinator at Infosys, Pune. 10

5. Prepare the meeting agenda of the “Marketing Team Strategy Session” including the introduction, review of the previous quarter, upcoming campaign, budget allocation and next steps. 10

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

AA—02—2025

FACULTY OF HUMANITIES

B.A./B.Com./B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

HINDI (MIL)

Paper HHINMIL-1151

(साहित्य कलश और व्यावहारिक हिंदी : भाग-II)

(Saturday, 5-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) **पहला** प्रश्न अनिवार्य है।

(2) प्रश्न क्रमांक **2** से प्रश्न क्रमांक **6** में से किन्हीं **तीन** प्रश्नों के उत्तर लिखिए।

(3) **सभी** प्रश्नों के अंक समान हैं।

1. निम्नलिखित में से किन्हीं **दो** पर टिप्पणियाँ लिखिए : 10

(अ) 'कृत्रिम मेधा' की उपयोगिता।

(ब) 'बाशिंदा' कहानी का करेला झा।

(क) वाक् से पाठ प्रणाली।

(ड) 'फर्क नहीं पड़ता' कविता का आशय।

P.T.O.

2. 'वसीयतनामा' कहानी की कथावस्तु लिखिए। 10

3. 'कदम मिलाकर चलना होगा' कविता में व्यक्त संदेश स्पष्ट कीजिए। 10

4. 'कृत्रिम मेधा' का अर्थ स्पष्ट करते हुए उसके महत्व को विशद कीजिए। 10

5. 'मुंबई काण्ड' कहानी में व्यक्त मानवीय मूल्यों का विश्लेषण कीजिए। 10

6. 'अपने घर की तलाश' कविता की मूल संवेदना पर प्रकाश डालिए। 10

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

AA—03—2025

FACULTY OF HUMANITIES

B.A./B.Sc./B.Com. (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

(NEP-2020)

MARATHI (MIL)

Paper–AECMAR-1151

(मराठी साहित्य आणि व्यावहारिक मराठी–II)

(Saturday, 5-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) **पहिला** प्रश्न सोडविणे अनिवार्य आहे.

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

1. टिपा लिहा (कोणत्याही **दोन**) : 10

(अ) 'वाटा-पळवाटा' मधील सतीश

(ब) हायकू

(क) बातमी मूल्ये

(ड) जाहिरातीचा मसुदा.

P.T.O.

पुढील प्रश्न क्रमांक **2** ते **6** यामधील कोणतेही **तीन** प्रश्न सोडवा : 30

2. 'रोमराज्य' या पाठातून लेखिकेने 'रोम' शहराचे वर्णन कसे केले ते तुमच्या शब्दात लिहा.

3. पंडित जवाहरलाल नेहरू यांनी आपल्या पत्रातून इंदूस कोणता संदेश दिला ते लिहा.

4. कवी केशवकुमार यांनी 'प्रेमाचा गुलकंद' या कवितेतून एकतर्फी प्रेमाचे चित्रण कसे केले ते सांगा.

5. 'आम्ही तुफानातील दिवे' या कवितेचा आशय स्पष्ट करा.

6. आकाशवाणीवरील जाहिरातीच्या स्वरूपाविषयी चर्चा करा.

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

NEPSA—2012—2025

FACULTY OF SCIENCE

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

BOTANY

(SBOTCT-1151)

(Fungi, Lichens and Mycorrhiza-II)

(Tuesday, 15-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Q. No. **1** is compulsory.

(*ii*) Of the remaining attempt any *three* questions.

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

1. Write brief notes on the following : 10

   (*a*) Occurrence of eurotium.

   (*b*) Systematic position of Agaricus.

   (*c*) What are Lichens ?

   (*d*) Nature of association in mycorrhiza.

2. Describe structure of mycelium and asexual reproduction in Albugo. 10

3. Explain in detail structure of basidiocarp with well labelled diagram. 10

4. Give an account on types of Lichen. 10

5. Give general characters and classification of Mycorrhiza. 10

6. Write in brief : 10

(*a*) Fungal Nutrition

(*b*) Leaf spot of Tomato

(*c*) Role of Lichen in soil formation

(*d*) Economic importance of Mycorrhiza.

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

NEPSA—5072—2025

FACULTY OF SCIENCE

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

BIOTECHNOLOGY (Vocational)

Paper–II–SBTVCT–1151

(Basics of Genetics)

(Wednesday, 23-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) From the remaining attempt any *three* questions.

1. Write short notes on : 10

(*a*) Linkage

(*b*) Lethal alleles

(*c*) Modern gene concept

(*d*) Transformation.

P.T.O.

2. Describe in detail chromosome structure and its function. 10

3. Explain in brief multiple alleles. 10

4. What is mutuation ? Describe in detail spontaneous mutation. 10

5. Explain in brief conjugation process in bacteria. 10

6. Write short notes on : 10

   (*a*) Sex determination

   (*b*) Complementation test

   (*c*) UV light

   (*d*) Transposable elements.

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

NEPSA—1012—2025

FACULTY OF SCIENCE

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

CHEMISTRY

(SCHECT-1151)

(Physical and Inorganic Chemistry-II)

(Friday, 11-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Q. No. **1** is compulsory.

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

(*iii*) Solve any *three* of the remaining five questions.

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

1. Solve the following questions (**2.5** marks each) : 4×2.5=10

(*a*) Explain Hund's rule of maximum multiplicity.

(*b*) Calculate Root Mean Square (RMS) velocity of CO_2 molecule at 373 K. ($R = 8.314\ JK^{-1}\ mol^{-1}$)

(*c*) Give the difference between adsorption and absorption.

(*d*) What are noble gases ? Give their position in periodic table.

2. Slve the following questions : 10

(*a*) State the postulates of kinetic theory of gases.

(*b*) Derive van der Waals equation.

3. Solve the following questions : 10

(*a*) Discuss the factors affecting adsorption.

(*b*) Explain Tyndall effect and Brownian movement.

4. Solve the following questions : 10

(*a*) Define oxidation, reduction, oxidizing agent and reducing agent with example according to classical concept.

(*b*) Give any *two* methods of preparation of XeF_2 and explain its structure.

5. Solve the following questions : 10

(*a*) Derive an expression for the radius of *n*th Bohr's orbit of H-atom.

(*b*) Give the rules for assigning oxidation number.

6. Solve the following questions (**2.5** marks each) : 10

(*a*) Calculate the energy of an electron in first Bohr's orbit of H-atom.

(*b*) Derive the relationship between root mean square velocity and average velocity.

(*c*) Explain Hardy-Schulze rule.

(*d*) Give the uses of noble gases.

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

NEPSA—4012—2025

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

COMPUTER SCIENCE

(SCSCCT-1151)

(Programming in C Language-II)

(Monday, 21-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Q. No. **1** is compulsory.

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

(*iii*) Solve any *three* of the remaining five questions (Q. Nos. **2** to **6**).

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

1. Solve the following questions : 10

(*a*) What is flowchart ? Explain.

(*b*) Explain Arithmetic operators in C.

(*c*) Explain while loop in C.

(*d*) Explain structure in C.

2. Solve the following questions : 10

(*a*) Explain the history of C programming.

(*b*) What is Algorithm ? Explain.

3. Solve the following questions : 10

(*a*) Explain data types in C.

(*b*) Explain C Tokens.

4. Solve the following questions : 10

(*a*) Explain If-else statement in C.

(*b*) Write a program to print even numbers between 1 to 10.

5. Solve the following questions : 10

(*a*) What is recursion ? Explain with example.

(*b*) What is union ? Explain with example.

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

(*a*) Compilers and interpreters

(*b*) Console Input/output statements

(*c*) Arrays

(*d*) Function.

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

NEPSA—5142—2025

FACULTY OF SCIENCE

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

ELECTRONICS

Paper-(SELECT-1151)

(Electronic Devices and Digital Logic Circuits)

(Wednesday, 23-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) All questions carry equal marks.

(*ii*) Q. No. **1** is compulsory.

(*iii*) Solve any *three* questions of the remaining five questions (Q. Nos. **2** to **6**).

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

1. Solve the following questions : 10

(*a*) Why LED emits lights ?

(*b*) Explain FR biasing of transistor.

(*c*) Draw the circuit diagram of full adder using two half adders.

(*d*) Explain the 1-bit memory cell.

2. (*a*) Explain V-I characteristics of the P-N junction diode. 10

(*b*) Explain how the zener diode works as the voltage regulator.

3. (*a*) Explain the base and collector curves of the bipolar transistor. 10

(*b*) Explain the characteristics of the unijunction transistor (UJT).

4. (*a*) Draw the block diagram of the 4 : 1 multiplexer and explain its works with the help of a truth table. 10

(*b*) Explain BCD to the decimal decoder.

5. (*a*) Explain J-K flip-flop. 10

(*b*) Convert J-K flip-flop into a D-type flip-flop.

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

(*a*) Photodiode

(*b*) Relation between α_{dc} and β_{dc} of the transistor.

(*c*) Priority encoder

(*d*) Race around condition in J-K flip-flop.

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

NEPSA—4022—2025

FACULTY OF SCIENCE

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

FISHERY SCIENCE

(SFSCCT-1151)

(Fresh Water Fish Culture System)

(Monday, 21-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Q. No. **1** is compulsory.

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

(*iii*) Solve any *three* questions of the remaining five questions (Q. Nos. **2** to **6**).

(*iv*) Draw a well labelled diagrams wherever necessary.

1. Write notes on the following : 10

(*a*) Fresh water fish Labeo robita.

(*b*) Synthetic hormones used for induced breeding.

(*c*) Biofloc culture.

(*d*) Importance of aquaculture.

2. Write notes on : 10

(*a*) Identification of male and female brooders of Indian major carps.

(*b*) Food and feeding habits of major carps.

3. Write notes on : 10

(*a*) Qualities of culturable fishes.

(*b*) Water quality for fish farming.

4. Write notes on : 10

(*a*) Preparation of pituitary gland suspension.

(*b*) Semi-intensive fish culture.

5. Write notes on : 10

(*a*) Cage culture

(*b*) Intensive fish farming.

6. Write short notes on the following : 10

(*a*) Catla catla

(*b*) Preservation of pituitary gland

(*c*) Extensive fish culture

(*d*) Cirrhina mrigala.

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

NEPSA—4032—2025

FACULTY OF SCIENCE

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

INDUSTRIAL CHEMISTRY

(Heat Transfer, Fuels and Water Analysis-II)

(Monday, 21-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions carry equal marks.

(*ii*) Q. No. **1** is compulsory.

(*iii*) Solve any *three* of the remaining five questions (Q. No. **2** to Q. No. **6**).

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

(*v*) Scientific calculator and log table are allowed.

1. Solve the following questions : 4×2.5=10

(*a*) Explain insulation with suitable example.

(*b*) Explain Kirchhoff's law of radiation.

(*c*) Explain natural gas and LPG.

(*d*) Explain permanent hardness of water.

2. A furnace is constructed with 225 mm thick of fire brick, 120 mm of insulating brick and 225 mm of the building brick. The inside temperature is 1200K (927°C) and the outside temperature is 330 K (57°C). Find the head loss per unit area and the temperature of the junction of the fire brick and insulating brick.

K for the fire brick = 1.4 W/(m.K)

K for the insulating brick = 0.2 W/(m.K)

K for the building brick = 0.7 W/(m.K)

3. Explain planck's law of radiation and solve the example :

Calculate the net radiant interchange per square meter for very large planes at temperature of 703 K (430°C) and 513 K (260°C) respectively. Assume that the emissitivity of a hot and cold planes are 0.85 and 0.75 respectively.

4. Explain proximate analysis of coal. 10

5. Explain chemical and physical examination of water. 10

6. Solve the following : 4×2.5=10

(*a*) Solve the example :

Calculate the rate of heat loss Q through a wall of red brick (K = 0.70 W/(m.K)) 5 m in length, 4 m in height and 250 mm in thickness. if the wall surface are maintained a 373 K (100°C) and 303 K (30°C) respectively.

(*b*) Write a note on calorific value.

(*c*) Write a note on L.M.T.D.

(*d*) Write the important requirement of insulating material.

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

NEPSA—3012—2025

FACULTY OF SCIENCE & TECHNOLOGY

B.Sc. (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

(NEP 2020 Pattern)

MATHEMATICS

Paper SMATCT1151

(Analytical Geometry)

(Thursday, 17-4-2025) **Time : 10.00 a.m. to 12.00 Noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are carry equal marks.

(*ii*) Question no. **1** is compulsory.

(*iii*) Solve any *three* of the remaining *five* questions (Q. No. **2** to Q. No. **6**).

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

1. Solve the following (**2.5** marks each) : 10

(*a*) If l, m, n are direction cosines of a line, then prove that $-l, -m, -n$ are also the direction cosines of that line.

(*b*) Write unsymmetrical form of equations of line and explain the terms involved.

(*c*) If $l_1, m_1, n_1; l_2, m_2, n_2; l_3, m_3, n_3$ are direction cosines of 3 mutually perpendicular lines, then write any **3** relations between these direction cosines.

(*d*) Write the characteristics of equation of a sphere.

P.T.O.

2. (*a*) Prove that every equation of first degree in x, y, z represents a plane. 6

(*b*) Find the angle between the pair of planes $3x - 4y + 5z = 0$ and $2x - y - 2z = 5$. 4

3. (*a*) Prove that the length of perpendicular from a point (x_1, y_1, z_1) to a line $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$ is square root of $(x_1 - \alpha)^2 + (y_1 - \beta)^2 + (z_1 - \gamma)^2 - [/(x_1 - \alpha) + m(y_1 - \beta) + n(z_1 - \gamma)]^2$. 6

(*b*) Obtain the symmetrical form the equations of the line $x - 2y + 3z = 4$, $2x - 3y + 4z = 5$. 4

4. (*a*) If the directions of the axes are changed without changing the origin, so that l_1, m_1, n_1; l_2, m_2, n_2; l_3, m_3, n_3 are the respective direction cosines of new axes OX', OY', OZ', then prove that the relation between the original co-ordinates (x, y, z) and new co-ordinates (x', y', z') of a point P are given by $x = l_1x' + l_2y' + l_3z'$, $y = m_1x' + m_2y' + m_3z'$, $z = n_1x' + n_2y' + n_3z'$. 6

(*b*) Find the equation of the plane $2x + 3y + 4z = 7$ referred to the point $(2, -3, 4)$ as origin, directions of the axes remaining the same. 4

5. (*a*) Prove that the locus of intersection of a sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ and a line $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$ is a pair of two points $(\alpha + lr_1, \beta + mr_1, \gamma + nr_1)$ and $(\alpha + lr_2, \beta + mr_2, \gamma + nr_2)$. 6

(*b*) Find the equation to the sphere through four points $(4, -1, 2)$, $(0, -2, 3)$, $(1, -5, -1)$, $(2, 0, 1)$. 4

6. Answer any *two* of the following (**5** marks each) : 10

(*a*) Show that the origin and the point (2, –4, 3) lie on different sides of the plane $x + 3y - 5z + 7 = 0$.

(*b*) Show that the line $\frac{1}{3}(x-2) = \frac{1}{4}(y-3) = \frac{1}{5}(z-4)$ is parallel to the plane $2x + y - 2z = 3$.

(*c*) If the origin O is changed to O'(f, g, h) without changing the directions of the co-ordinate axes, then prove that the relation between the original co-ordinates (x, y, z) and new co-ordinates (x', y', z') of a point P are given by $x = x' + f$, $y = y' + g$, $z = z' + h$.

(*d*) Find the equation of tangent plane to the sphere $3(x^2 + y^2 + z^2) - 2x - 3y - 4z - 22 = 0$ at the point (1, 2, 3).

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

NEPSA—5232—2025

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

MICROBIOLOGY

(SMICCT1151)

(Microbial Physiology)

(Wednesday, 23-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Q. No. **1** is compulsory.

(*ii*) Of the remaining attempt any *three* questions.

(*iii*) Draw neat and labelled diagrams wherever required.

1. Write brief notes on the following : 10

   (*a*) Pasteurization

   (*b*) Differential media

   (*c*) Generation time

   (*d*) Significance of Ca-dipicolinate (DPA).

2. Describe in detail ideal properties of disinfectant. 10

3. Explain in detail nutritional categories of bacteria on the basis of carbon and energy source. 10

4. Define growth and explain different phases of bacterial growth curve. 10

5. Define sporulation. Explain in detail stages of sporulation in Bacillus. 10

6. Write brief notes on the following any *two* : 10

(*a*) Tyndallization

(*b*) Growth factors

(*c*) Direct microscopic count

(*d*) Significance of soluble proteins (SASP).

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

NEPSA—2022—2025

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

PHYSICS

(SPHYCT-1151)

(Fundamentals of Physics-II)

(Tuesday, 15-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Q. No. **1** is compulsory.

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

(*iii*) Solve any *three* of the remaining five questions (Q. Nos. **2** to **6**).

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

1. Solve the following questions (compulsory) (**2.5** marks each) : 10

(*a*) Types of camera lenses and their use.

(*b*) Define self-inductance and write its units.

(*c*) Write the formula for resistances connected in series and parallel combination.

(*d*) Any *two* differences between solid, liquid and gaseous states of matter.

2. (*a*) Describe Huygens eyepiece and find the equivalent focal length of field lens and eye lens combination. 5

(*b*) Explain constant deviation spectrometer. 5

3. (*a*) Derive formula for self-inductance of a coil. 5

(*b*) Derive formula for self-inductance of a solenoid. 5

4. (*a*) State Thevenin's theorem and write steps to Thevenize a circuit. 5

(*b*) Describe Kirchhoff's voltage law and current law with suitable diagram. 5

5. (*a*) Derive Charle's law and show that $V \propto T$. 5

(*b*) What is kinetic model ? Write the postulates of kinetic theory of gases. 5

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

(*a*) Objective and eyepiece

(*b*) Mutual induction and inductance

(*c*) Concept of R, L and C elements

(*d*) Derive ideal gas equation PV = RT.

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

NEPSA—3022—2025

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2025

ZOOLOGY

(SZOOCT-1151)

(Biodiversity of Chordates)

(Thursday, 17-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Q. No. **1** is compulsory.

(*ii*) Out of remaining **5** questions (Q. Nos. **2** to **6**) answer any **3** questions.

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

(*iv*) Illustrate your answers with suitable labelled diagrams, wherever necessary.

1. Answer each of the following : 10

(*a*) General characters of chordates.

(*b*) Structure of Gill of Scoliodon.

(*c*) Non-poisonous snake.

(*d*) Medulla oblongata of Rat.

2. Describe general characters of Urochordates. 10

Or

Write notes on :

(*a*) General characters of Agnatha.

(*b*) General characters of Cyclostomata.

P.T.O.

3. Describe respiratory system of Scoliodon. 10

Or

Write notes on :

(*a*) Aestivation in frog.

(*b*) Parental care in Amphibia.

4. Describe flight adaptation in Birds. 10

Or

Write notes on :

(*a*) General characters of Aves.

(*b*) General characters of Reptiles.

5. Describe external characters of Rat. 10

Or

Write notes on :

(*a*) Spinal cord of Rat.

(*b*) Hind-brain of Rat.

6. Answer each of the following : 10

(*a*) Ancestry of chordates

(*b*) Economic importance of fishes

(*c*) Longitudinal migration in Birds

(*d*) Structure of eye of Rat.