

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

HA—24—2026

FACULTY OF HUMANITIES

B.A. (NEP) (Third Semester) EXAMINATION

APRIL/MAY, 2026

COMPULSORY ENGLISH

HENGAC-1201

(Comprehension and Grammar-I)

(Tuesday, 7-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

(iii) *Solve any two questions from Q. 2 to Q. 5.*

1. Attempt the following short notes :

10

(a) Ratnam

(b) Teacher Samuel

(c) Central Idea in The Road Not Taken

(d) Helping Verbs

P.T.O.

2. Discuss Mr. Ratnam's Trick to test the honesty of his new salesman in your own words. 10
3. 'Background Casually' is a close self-analysis of the person who feels himself in an alien world'. Discuss. 10
4. Describe Swami Vivekananda's boat journey in your own words. 10
5. Discuss simple present, simple past and simple future tense with suitable examples. 10

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HA—03—2026

FACULTY OF ARTS

B.A. (NEP) (Third Semester) EXAMINATION

APRIL/MAY, 2026

MARATHI (MIL)

Paper III (AECMAR-1201)

(मराठी साहित्य)

(Saturday, 4-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) प्रश्न क्रमांक 2 ते प्रश्न क्र. 5 यापैकी कोणतेही दोन प्रश्न सोडवा.

(iii) सर्व प्रश्नांना समान गुण आहेत.

1. पुढील टिपा थोडक्यात लिहा :

10

(i) 'नवा शिपाई' मधील समतेचा विचार

(ii) 'मेखमारो' मधील रखमाजी

(iii) यशोधरा

(iv) लोकशाहीचे भवितव्य.

P.T.O.

2. प्रज्ञा दया पवार यांनी सावित्रीबाईंच्या विचार आणि कार्याचे महत्व कशाप्रकारे सांगितले आहे, ते लिहा. 10
3. 'मरीआईचा गाडा' ही कथा वैज्ञानिक दृष्टिकोन रुजविणारी आहे' स्पष्ट करा. 10
4. म. जोतीराव फुले यांच्या बहुआयामी व्यक्तिमत्त्वाचे भावचित्र 'मनातले जोतीराव' या लेखाधारे विशद करा. 10
5. शहीद भगतसिंहांचे वडिलांना लिहिलेल्या पत्रातील विचार थोडक्यात लिहा. 10

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HA—02—2026

FACULTY OF HUMANITIES

B.A. (NEP) (Third Semester) EXAMINATION

APRIL/MAY, 2026

HINDI (MIL)

Paper-III-HHINMIL-1201 (AEC)

(गद्य विविधा भाग-1)

(Saturday, 4-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

N.B. :— (i) प्रश्न क्रमांक 1 अनिवार्य है ।

(ii) प्रश्न क्रमांक 2 से 5 में से किन्हीं दो प्रश्नों के उत्तर लिखिए ।

(iii) सभी प्रश्नों के अंक समान हैं ।

1. टिप्पणियाँ लिखिए (प्रति टिप्पणी 2½ अंक) :

10

(अ) 'प्रेमचंद' का जीवन परिचय ।

(ब) सोशल मीडिया का महत्व

(क) निबंध विधा का परिचय

(ड) 'कच्चे धागे' कहानी का उद्देश्य ।

P.T.O.

(2)

निम्नलिखित में से किन्हीं दो प्रश्नों के दीर्घोत्तरी उत्तर लिखिए :

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NEPJA—2010—301—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

BOTANY

SBOTCT-1201

(Taxonomy of Angiosperms)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Of the remaining, attempt any *two* questions.

(iii) Draw neat and labelled diagram wherever required.

- | | |
|---|----|
| 1. Write brief notes on the following : | 10 |
| (a) Aims of plant taxonomy. | 2½ |
| (b) Morphological concept of species | 2½ |
| (c) Hypogynous flower | 2½ |
| (d) Floral diagram of Fabaceae | 2½ |

P.T.O.

2. Define Herbarium and explain in detail technique in preparation of Herbarium. 10
3. Describe in detail Engler and Prantl's system of classification with merits and demerits. 10
4. What is placentation and explain types of placentation. 10
5. Explain in detail vegetative and reproductive characters of family Solanaceae. Add a note on its economic importance. 10

This question paper contains 2 printed pages]

NEPJA—2010—302—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

BOTANY

SBOTCT-1202

(Cell Biology)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Of the remaining, attempt any *two* questions.

(iii) Draw neat and labelled diagram wherever required.

1. Write brief notes on the following :

10

(a) Draw neat and labelled diagram of prokaryotic cell

(b) Karyotype

(c) Define cell cycle and draw diagram of cell cycle

(d) Nucleotide

P.T.O.

WT

(2)

NEPJA—2010—302—2026

- | | | |
|----|---|----|
| 2. | Describe ultrastructure and functions of nucleus. | 10 |
| 3. | Explain structure of typical chromosome. | 10 |
| 4. | Define meiosis and describe Meiosis-II. | 10 |
| 5. | Explain structure and fuctions of <i>m</i> RNA. | 10 |

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

NEPJA—2010—303—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

BOTANY

SBOTMT-1201

(Diversity of Cryptogams)

(Wednesday, 15-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Of the remaining, attempt any *two* questions.

(iii) Draw neat and labelled diagram wherever required.

- | | |
|---|----|
| 1. Write brief notes on the following : | 10 |
| (a) Internal strcuture of Riccia. | 2½ |
| (b) Economic importance of Bryophytes | 2½ |
| (c) L.S. of strobilus/cone of Equisetum | 2½ |
| (d) Graphic Life Cycle of Marsilea | 2½ |

P.T.O.

WT

(2)

NEPJA—2010—303—2026

2. Give an account of general characters of Bryophytes. Explain the classification of Bryophytes as per N.S. Parihar. 10
3. Give an account of L.S. of Funaria Sporophyte. 10
4. Describe in detail internal structure of Equisetum stem. 10
5. Describe sexual reproduction in Masilea. 10

This question paper contains 3 printed pages]

NEPJA—1010-301—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

CHEMISTRY

SCHECT-1201

(Organic and Inorganic Chemistry)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. Nos. 2 to 5).

(iv) Figures to the right indicate full marks.

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

(a) What are aromatic carbonyl compounds ? Explain the reaction of benzaldehyde with phenyl hydrazine.

(b) Define carboxylic acids. Give preparation of carboxylic acid from Grignard reagent and alkyl cyanide.

(c) What are organozinc compounds ? How will you obtain the following from diethyl zinc :

(i) Ethane

(ii) 2-butanol.

P.T.O.

(d) Define the following terms :

(i) Qualitative analysis

(ii) Acidic Radical.

2. Solve the following questions :

5×2=10

(a) Explain Perkin reaction with mechanism.

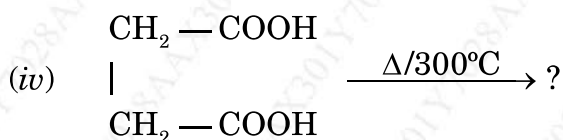
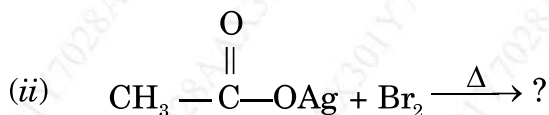
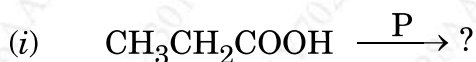
(b) Explain with mechanism Clemmensen reduction.

3. Solve the following questions :

5×2=10

(a) How phthalic acid is prepared from o-xylene and naphthalene ? What is the action of PCl_5 and $\text{C}_2\text{H}_5\text{OH}$ on it ?

(b) Predict the product :



4. Solve the following questions : 5×2=10

(a) What are organometallic compounds ? How will you prepare ethanol, ethanoic acid and acetonitrile from CH_3MgBr ?

(b) (i) Write a note on use of solubility product.

(ii) How will you prepare :

(1) Ethanol

(2) 1-Propanol from CH_3Li .

5. Solve the following questions : 5×2=10

(a) How the group IIIA and IIIB separate in the analysis of basic radicals ?

(b) What is Arrhenius concept of acids and bases ? Explain with example.

This question paper contains 2 printed pages]

NEPJA—1010-302—2026

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Semester) EXAMINATION

APRIL/MAY, 2026

(NEP-2020)

CHEMISTRY

SCHECT-1202

(Physical and Inorganic Chemistry)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. Nos. 2 to 5).

(iv) Figures to the right indicate full marks.

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

1. Solve the following questions :

4×2.5=10

(a) Define entropy. Show entropy is a state function.

(b) Write a note on catalytic poisoning.

(c) Define covalent and ionic bond with example.

(d) Calculate de-Broglie's wavelength of electron moving with a velocity of 2.188×10^6 m/s. (Mass of electron = 9.1×10^{-31} kg) ($h = 6.6 \times 10^{-34}$ Js)

P.T.O.

2. Solve the following questions : 10
- (a) Write a note on Carnot cycle.
 - (b) Discuss entropy change in fusion of solid and vaporisation of liquid.
3. Solve the following questions : 10
- (a) What are characteristics of catalytic reactions ?
 - (b) Explain homogeneous and heterogeneous catalysis with example.
4. Solve the following questions : 10
- (a) State and explain Compton effect.
 - (b) (i) What is Heisenberg's uncertainty principle ?
(ii) Write postulates of VSEPR theory.
5. Solve the following questions : 10
- (a) Define Lattice energy. How will you calculate lattice energy using Born-Haber cycle ?
 - (b) Explain formation of PCl_5 on the basis of hybridization.

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

NEPJA—1010-303—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

CHEMISTRY

SCHEMT-1201

[Basic Chemistry-I (Physical and Inorganic Chemistry)]

(Wednesday, 15-04-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. Nos. 2 to 5).

(iv) Figures to the right indicate full marks.

1. Solve the following questions :

4×2.5=10

(a) Define catalyst. Give its types with example.

(b) Define pH and pOH with example.

(c) Write a short note on water pollution.

(d) What is the difference between precision and accuracy ?

P.T.O.

2. Solve the following questions : 10
- (a) Explain types of catalysis with example.
 - (b) Define and explain promoters with example.
3. Solve the following questions : 10
- (a) Explain ionic equilibrium with example.
 - (b) What is salt hydrolysis ? Explain it with suitable example.
4. Solve the following questions : 10
- (a) Write the short note on soil pollution.
 - (b) Give the main sources of water pollution.
5. Solve the following questions : 10
- (a) What is the t-test ? Give its application.
 - (b) Define the terms :
 - (i) Mean
 - (ii) Median
 - (iii) Standard deviation
 - (iv) Coefficient of variation.

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

NEPJA—4010-301—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

COMPUTER SCIENCE

(Data Structure Using C)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Q. No. 2 to Q. No. 5.

1. Attempt the following :

4×2.5=10

(a) Define data structure.

(b) What is searching ?

P.T.O.

- (c) Define queue. 5
- (d) What is tree ? 5
2. (a) Describe the classification of data structure. 5
- (b) What is array ? Explain representation of array. 5
3. (a) Explain components of linked list. 5
- (b) Explain advantages of linked list. 5
4. (a) Explain operations of queue. 5
- (b) Explain PUSH and POP operations. 5
5. (a) Explain Binary Search Tree. 5
- (b) What is representation of graph ? Explain. 5

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

NEPJA—4010-302—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP Pattern)

COMPUTER SCIENCE

SCSCCT-1202

(Programming in C++)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Q. No. 2 to Q. No. 5.

(iii) Draw neat and labelled diagrams wherever necessary.

1. Attempt the following :

4×2.5=10

(a) Explain the applications of OOPs.

P.T.O.

- (b) What are the keywords in C++ ?
- (c) What is function ? Explain.
- (d) What is destructor ? Explain.
2. Attempt the following : 10
- (a) What are the basic concepts of OOPs ? Explain. 5
- (b) Explain in detail structure of C++ program with example. 5
3. Attempt the following : 10
- (a) Explain switch statement in C++. 5
- (b) Differentiate between while and dowhile loop in C++. 5
4. Attempt the following : 10
- (a) Explain in detail inline function in C++. 5
- (b) What is call by value ? Explain with example. 5
5. Attempt the following : 10
- (a) What is Class ? Explain defining member functions of class. 5
- (b) Explain the concept of inheritance in C++. 5

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

NEPJA—4010-303—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

COMPUTER SCIENCE

(Programming Logic Concepts)

(Wednesday, 15-04-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Q. No. 2 to Q. No. 5.

1. Attempt the following :

4×2.5=10

- (a) What is flowchart ?
- (b) Explain linear search method.
- (c) How to calculate factorial of number ?
- (d) Explain the concept of sorting.

P.T.O.

2. (a) Explain the concept of problem solving aspects. 5
- (b) Explain implementation of algorithm with example. 5
3. (a) Write an algorithm for exchanging the values of two variables. 5
- (b) Write an algorithm for summation of set of numbers. 5
4. (a) Write an algorithm for generating prime numbers between 1 to N. 5
- (b) Write an algorithm to find maximum number in a set. 5
5. (a) Explain binary search method. 5
- (b) Explain selection sort technique. 5

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NEPJA—5140—301—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP 2020 Pattern)

ELECTRONICS

SELECT-1201

(Amplifiers)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. No. 2 to Q. No. 5).

(iv) Figures to the right indicate full marks.

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

(a) Define DC load line and Q-point for transistor.

(b) What are h-parameters ? List the four h-parameters.

(c) Explain the concept of virtual ground.

(d) Draw the circuit diagram of an OP-amp used as a subtractor.

P.T.O.

2. (a) Explain how will you get maximum undistorted output in amplifier.
(b) Explain fixed bias method with neat circuit diagram. 10
3. (a) Explain transconductance model with neat diagram.
(b) Draw circuit diagram of CE amplifier and explain its working. 10
4. (a) Explain characteristics of an ideal OP-Amp.
(b) Draw the block diagrams of OP-Amp and explain the function of each block. 10
5. (a) Explain the working of an Op-Amp as a adder.
(b) Draw the circuit diagram of OP-Amp as Schmitt's trigger and explain. 10

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

NEPJA—5140—302—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

ELECTRONICS

SELECT-1202

(Microprocessor and its Applications)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. No. 2 to Q. No. 5).

(iv) Figures to the right indicate full marks.

1. Attempt the following questions : 10

(a) State features of Intel 8085 microprocessor.

(b) Explain the term Instruction cycle.

(c) What do you mean by delay ? Explain it.

(d) State operating modes of IC 8255.

P.T.O.

2. (a) Define Microprocessor and explain register group in the architecture of 8085 microprocessor. 5
- (b) Draw the functional pin diagram of microprocessor 8085. 5
3. (a) Explain instruction format according to word size with suitable example. 5
- (b) Give the meaning of the following instructions : 5
- (i) MOV A, M
- (ii) ADI, 05
- (iii) Imp addr
- (iv) INR B
- (v) CMA
4. (a) Write an assembly language program to add two 8-bit numbers sum 8-bit. 5
- (b) Write an assembly language program for block transfer. 5
5. Draw the block diagram of IC 8255 and explain each block in detail. 10

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

NEPJA—5140—303—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP Pattern)

ELECTRONICS

SELEMT-1201

(Sequential Logic Circuits)

(Wednesday, 15-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

(iii) Solve any *two* of the remaining four questions (Q. No. **2** to Q. No. **5**).

(iv) Figures to the right indicate full marks.

1. Solve the following questions compulsory :

2.5×4=10

(a) What are Don't care conditions ?

(b) What is counter ?

(c) What is shift register ? Mention its types.

(d) What is DAC ?

P.T.O.

2. (a) Explain the concept of minterm and maxterm in logical equations. 5
- (b) Minimize the following Boolean Expressions using K-Map : 5
- (i) $F(A, B, C, D) = \sum m(0, 1, 2, 5, 13, 15)$
- (ii) $F(A, B, C) = \sum m(0, 2, 3, 5)$
3. (a) Explain the working of 3-bit Asynchronous counter. 5
- (b) Explain the working of IC7490 as a decade counter. 5
4. (a) Explain Serial-In-Parallel-Out shift register. 5
- (b) Explain Ring Counter. 5
5. (a) Explain R-2R ladder type DAC. 5
- (b) Explain counter type DAC. 5

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NEPJA—4020-301—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

FISHERY SCIENCE

SIFSCT-1201

(Freshwater Fish Breeding Technique and Hatcheries Management)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* from question numbers 2 to 5.

1. Write short notes on the following :

4×2.5=10

(a) Artificial fertilization by dry steering method

(b) Feeding habits of fishes

(c) Types of natural food of fishes

(d) General identification of male and female brooder fish.

P.T.O.

WT

(2)

NEPJA—4020-301—2026

2. Describe wet bundh for fish culture. 10
3. Write in detail about structure and working of chinese circular hatchery. 10
4. Give a detailed account of water qualities used for freshwater fish farming. 10
5. Describe induced breeding of Channa Murrel. 10

This question paper contains 2 printed pages]

NEPJA—4020-302—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

FISHERY SCIENCE

SFISCT-1202

(Aquatic Ecology)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* questions of the remaining four questions
(Q. Nos. 2 to 5).

(iv) Draw well labelled diagrams wherever necessary.

1. Solve the following questions compulsory (Each question 2.5 marks) : 4×2.5=10

- (a) Physico-chemical characteristics of river ecosystem
- (b) Biotic factor of lake ecosystem
- (c) Zonation of Sea
- (d) Water cycle.

P.T.O.

WT

(2)

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2. Write notes on : 10
- (a) Flora and Fauna of river
 - (b) Types of classification of lake.
3. Write notes on : 10
- (a) Food web and food chain
 - (b) Nitrogen cycle.
4. Write notes on : 10
- (a) Zonation of river
 - (b) Flora and fauna of lake.
5. Write notes on : 10
- (a) Physico-chemical properties of marine ecosystem
 - (b) Oxygen cycle.

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

NEPJA—4020-303—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

FISHERY SCIENCE

SFISMT-1201

(Culture of Shellfishes)

(Wednesday, 15-04-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* of the remaining four questions (Q. Nos. 2 to 5).

(iii) *All* questions carry equal marks.

(iv) Wherever necessary, illustrate the answers with suitable and well labelled diagrams.

1. Answer each of the following questions :

4×2.5=10

(a) Food and feeding habits of giant freshwater prawn

(b) X-organ

P.T.O.

WT

(2)

NEPJA—4020-303—2026

- (c) Pearl formation
- (d) Morphology of mud crab.
- 2. Describe the life cycle of giant freshwater prawn. 10
- 3. Explain the pond culture of Tiger Shrimp. 10
- 4. Explain the larval stages in mud crab. 10
- 5. Explain the pearl culture. 10

This question paper contains 3 printed pages]

NEPJA-4030—301—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

INDUSTRIAL CHEMISTRY

Paper—SICHCT-1201

(Unit Operation—I)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

(iii) Solve any *two* from Q. No. 2 to Q. No. 5.

1. Solve the following questions :

10

(i) Define mass transfer.

(ii) Define Dalton's law of distillation.

(iii) Define distribution coefficient

(iv) Define supersaturation.

P.T.O.

2. Solve the questions : 10

(i) Discuss the importance of mass transfer operations in chemical and industrial processes.

(ii) Classify mass transfer operations with suitable examples from industry.

3. Solve the following questions : 10

(i) Explain simple distillation with neat labelled diagram.

(ii) Explain material balance of Binary mixture with mathematical expression with respect to distillation.

4. Solve the following example (problems) : 10

(i) Picric acid is to be extracted with benzene from its solution. If the aqueous solution contains 0.2 mol of picric acid 1 litre, calculate the volume of benzene with 1 litre of the solution must be extracted in order to form a benzene solution containing 0.02 mol of picric acid per litre (Neglect the difference between the volume of the solution and that of pure solvent). Also calculate the percent recovery of picric acid from the aqueous solution $K = \text{distribution coefficient } C_E/C_R = 0.505$.

Where C_E = concentration of picric acid in benzene mol per litre of solution.

C_R = Concentration of picric acid in water, mol per litre of solution.

- (ii) A solution of picric acid in benzene contains 30 grams of picric acid per litre. 1 litre of this solution is to be shaken with water at 291 K (18°C) to reduce the picric acid concentration to 4 g/l in benzene phases. Calculate the quantity of water needed.

Molecular weight of picric acid is 229 and the distribution coefficient K is given by $K_{CE/CR} = 0.548$

C_R = Concentration of picric acid in water mol/lit

C_E = Concentration of picric acid in benzene mol/lit.

5. (i) Explain construction and working of Draft Tube Baffle crystallizer with neat labelled diagram. 5
- (ii) Explain the construction and working of vacuum crystallizer with neat labelled diagram. 5

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

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FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

INDUSTRIAL CHEMISTRY

Paper–SICHCT-1202

(Chemical Reaction Engineering–I)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

(iii) Solve any *two* from Q. No. **2** to Q. No. **5**.

- | | | |
|-------|-----------------------------------|-----|
| 1. | Solve the following : | 10 |
| (i) | Explain chemical kinetics. | 2.5 |
| (ii) | Explain order of reaction. | 2.5 |
| (iii) | Explain Ostwald isolation method. | 2.5 |
| (iv) | Explain fixed bed reactor. | 2.5 |

P.T.O.

2. Solve the following : 10
- (i) Explain the classification of reaction with respect to chemical kinetics. 5
- (ii) Solve the problems on : 5
- A certain reaction has a rate given by
- $$-r_A = 0.005 C_A^2 \text{ mol/(cm}^3 \cdot \text{min)}$$
- If the concentration is expressed in mol/lit and time in hours, what would be the value and units of rate constant ?
3. Solve the following : 10
- (i) Explain temperature dependency from Arrhenius law. 5
- (ii) Solve the problems on : 5
- The pyrolysis of Ethane proceeds with an activation energy of about 75000 cal. How much faster is the decomposition at 650°C than at 500°C ?
4. Solve the following : 10
- (i) Explain constant volume Batch Reactor. 5
- (ii) Explain Irreversible unimolecular-Type first order reaction with mathematical expression. 5
5. Solve the following : 10
- (i) Explain Batch Reactor with neat labelled diagram. 5
- (ii) Explain constant flow stirred tank reactor with neat labelled diagram. 5

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

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FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

INDUSTRIAL CHEMISTRY

Paper—SICHMT-1201

(Industrial Process—I)

(Wednesday, 15-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* from Q. No. 2 to Q. No. 5.

1. Solve the following questions : 10

(i) What are the main uses and applications of sulphur and sulphuric acid ?

(ii) Name the raw materials required for cement manufacture and their sources.

(iii) Draw a simple flow sheet for the manufacture of sugar.

(iv) List any *four* utilities commonly required in a chemical process plant.

P.T.O.

2. Solve the following : 10
- (i) Discuss the history and properties of Soda ash and Caustic Soda.
 - (ii) Explain the physical and chemical properties of Sulphur and Sulphuric acids.
3. Solve the following : 10
- (i) Explain in detail the raw materials and methods of production of ethyl alcohol.
 - (ii) State the raw materials used in the manufacture of Soda ash and explain the importance of utilities in plant operation.
4. Solve the following : 10
- (i) Describe the manufacturing process of cement with a neat flow sheet.
 - (ii) Explain the contact process for manufacturing sulphuric acid with a labelled flow diagram.
5. Solve the following : 10
- (i) Outline the material balance for the manufacture of sugar.
 - (ii) Discuss the layout and plant utilities required for a caustic soda plant.

This question paper contains 2 printed pages]

NEPJA—3010-301—2026

FACULTY OF ARTS/SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

MATHEMATICS

SMATCT-1201

(Real Analysis-I)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Attempt any *two* of the remaining four questions (Q. No. 2 to Q. No. 5).

(iv) Figures to the right indicate full marks.

1. Attempt the following :

4×2.5=10

(a) Define upper and lower bounds for a set.

(b) If S and T are subsets of R, then show that $(S \cap T)' \subseteq S' \cap T'$.

P.T.O.

- (c) Define limit inferior and limit superior of a sequence $\{S_n\}$.
- (d) State the Cauchy's general principle of convergence.
2. Prove that the set of rational numbers is not order-complete. 10
3. Answer the following questions :
- (a) Prove that the interior of an open set is open. 5
- (b) Prove that the intersection of an arbitrary family of closed sets is closed. 5
4. Answer the following questions :
- (a) Prove that every convergent sequence is bounded. 5
- (b) If $a_n = (-1)^n \left(1 + \frac{1}{n}\right)$, $n \in \mathbb{N}$, then find $\overline{\lim} a_n$. 5
5. Answer the following questions : 10
- If $\{a_n\}, \{b_n\}$ are two sequences such that $\lim a_n = a$, $\lim b_n = b$, then prove that :
- (a) $\lim (a_n \pm b_n) = \lim a_n \pm \lim b_n = a \pm b$
- (b) $\lim (a_n \cdot b_n) = (\lim a_n)(\lim b_n) = ab$.

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FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP Pattern)

MATHEMATICS

SMATCT-1202

(Group Theory)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

(iii) *Attempt any two of the remaining four questions (Q. No. 2 to Q. No. 5).*

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

1. Attempt the following :

4×2.5=10

(a) Prove that in a group G there is only one identity element.

P.T.O.

- (b) If $\sigma = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 4 & 3 & 5 & 1 \end{bmatrix}$ and $\nu = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 1 & 2 & 3 \end{bmatrix}$ are two permutations, then find out $\sigma\nu$ and $\nu\sigma$.
- (c) If H be a subgroup of G and let a and b belong to G , then prove that $aH = H$ if and only if $a \in H$.
- (d) Let G be a group and $Z(G)$ be the center of G . If $\frac{G}{Z(G)}$ is cyclic, then prove that G is abelian.
2. Prove that every permutation of a finite set can be written as a cycle or as a product of disjoint cycles. 10
3. Attempt the following questions : 5,5
- (a) If G be a group and H a non-empty subset of G , then prove that H is a subgroup of G if ab^{-1} is in H whenever a and b are in H .
- (b) Prove that center of a group G is a subgroup of G .
4. State and prove Cayley's theorem. 10
5. If ϕ be a homomorphism from a group G to a group $\bar{G}$ and let H be a subgroup of G , then prove that : 10
- (i) $\phi(H) = \{\phi(h) \mid h \in H\}$ is a subgroup of $\bar{G}$.
- (ii) If H is cyclic, then $\phi(H)$ is cyclic.
- (iii) If H is Abelian, then $\phi(H)$ is Abelian.
- (iv) If H is normal in G , then $\phi(H)$ is normal in $\phi(G)$.

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NEPJA—3010—303—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

MATHEMATICS (DSM-I)

(Fundamentals of Sequence and Group Theory)

(Wednesday, 15-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. No. 2 to Q. No. 5).

(iv) Figures to the right indicate full marks.

1. Solve the following (2.5 marks each) :

10

(a) Define ordered field

(b) Define convergence of sequence

(c) Define order of group

(d) State fundamental theorem of cyclic group.

P.T.O.

2. Solve the following : 10

- (a) Prove that every open interval $]a, b[$ contains a rational number.
- (b) Prove that the greatest member of a set, if it exist, is the supremum of the set.

3. Solve the following : 10

- (a) Prove that every convergent sequence is bounded
- (b) If $a_n = \sin \frac{n\pi}{2} + \frac{(-1)^n}{n}$, $n \in \mathbb{N}$,
then show that,
 $\lim a_n = -1$ and $\overline{\lim} a_n = 1$.

4. Solve the following : 10

- (a) If G is a group, then show that the right and left cancellation law hold.
- (b) Let H be a non empty finite subset of a group G . If H is closed under the operation of G , then prove that H is a sub-group of G .

5. Solve the following : 10

- (a) If $|a| = 30$, then find $\langle a^{26} \rangle$, $\langle a^{17} \rangle$ and $\langle a^{18} \rangle$.
- (b) Prove that for $n > 1$, A_n has order $\frac{n\lambda}{2}$.

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FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

MICROBIOLOGY

Paper– SMICCT-1201

(Applied Microbiology)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

N.B. :— (i) *First* question is compulsory.

(ii) Solve any *two* questions from question nos. 2 to 5.

(iii) Draw well labelled diagram wherever necessary.

1. Write down answers of the following questions : 10

(a) Droplets as a source of infection

(b) Definition and composition of sewage

(c) Human and animal activities as a source of microorganisms in water

(d) Challenges of bioremediation techniques.

P.T.O.

2. Write in detail the physical methods to control airborne microbes. 10
3. Describe the microbial examination of water by MPN. 10
4. Write the sewage treatment with reference to trickling filter. 10
5. Explain in detail the scope of bioremediation in Environmental Microbiology. 10

This question paper contains 2 printed pages]

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FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

MICROBIOLOGY

Paper—SMICCT-1202

(Immunology)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* questions from Question nos. 2 to 5.

(iii) Illustrate your answer with suitable diagrams.

1. Write brief notes on the following : 10

(a) Primary organs of Immune system

(b) Classes of immunoglobulin

(c) Reagents of Coomb's test

(d) Cell mediated immune response.

P.T.O.

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(2)

NEPJA-5230—302—2026

2. Define Hypersensitivity. Explain in detail classification of hypersensitivity with suitable examples. 10
3. What are serological reactions ? Explain precipitation and flocculation reaction with its mechanism. 10
4. What are complements ? Write on components of complement. 10
5. Define Infection. Explain in detail sources of infection. 10

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FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

MICROBIOLOGY

SMICMT-1201

(Fundamental Microbial Techniques)

(Wednesday, 15-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Q. No. 2 to Q. No. 5.

(iii) Draw neat and labelled diagram wherever required.

1. Write brief notes on the following : 10
 - (a) Basic stain
 - (b) Mordant
 - (c) Principle of Flagella staining
 - (d) Principle of Fluorescence staining.

P.T.O.

2. Take a detailed account on classification of staining techniques. 10
3. Explain in detail Gram's staining with respect to principle, procedure and importance. 10
4. Describe in detail Schaeffer-Fulton method of endospore staining with respect to principle, procedure and importance. 10
5. Explain in detail role of staining in microbial identification and research. 10

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FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP 2020)

PHYSICS

(Mathematical Methods and Applications in Electricity and Magnetism-I)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) First question is compulsory.

(iii) Solve any *two* from Q. No. 2 to Q. No. 5.

1. Attempt *all* four questions (2.5 marks each) :

10

(a) If, $Z_1 = 2 + 2i$ and $Z_2 = 3 + 2i$, then find $Z_1 \times Z_2$.

(b) State and define divergence of a vector field.

(c) Find current and voltage when ac passing through pure inductance.

(d) Define magnetic field and magnetic flux.

P.T.O.

2. Explain graphical representation of multiplication of complex numbers. 10
3. Explain curl of a vector field and its physical significance. 10
4. Explain L-C-R circuit in parallel and obtain resonance condition. 10
5. (a) Explain motion of a charged particle in a uniform magnetic field. 10
(b) Derive an expression for torque on a current loop.

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

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FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP 2020)

PHYSICS

SPHYCT-1202

(Wave and Oscillations)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

(iii) *Solve any two of the remaining four questions (Q. No. 2 to Q. No. 5)*

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

1. Solve the following questions (Compulsory) : 10

(a) Write down general equation of simple harmonic wave.

(b) Define stationary waves

(c) Define damped vibrations

(d) Explain piezoelectric effect.

P.T.O.

2. (a) Derive an expression of energy of Plane Progressive Wave
- (b) Derive relation between wave velocity and particle velocity. 10
3. Explain in detail analytical treatment of stationary waves in an open end organ pipe. 10
4. (a) Derive differential equation for undamped vibrations.
- (b) Explain phenomenon of resonance with suitable examples. 10
5. Explain Magnetostriction oscillator for the production of ultrasonic waves in detail. 10

This question paper contains 2 printed pages]

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FACULTY OF SCIENCE

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

APRIL/MAY, 2026

PHYSICS

SPHYMT-1201

(General Prop. of Matter)

(Wednesday, 15-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. No. 2 to Q. No. 5)

1. Solve the following questions :

10

(a) What is gravitation ?

(b) Define surfaces tension with its units.

(c) Coefficient of viscosity.

(d) What are different elastic constants ?

P.T.O.

2. (a) Explain the interchangeability of center of suspension and center of oscillations. 5
- (b) Explain Kater's reversible pendulum. 5
3. (a) Derive the expression for excess pressure acting on a spherical drop. 5
- (b) Explain the Jaeger's method to determine the surface tension. 5
4. (a) Explain the coefficient of viscosity with its units and dimensions. 5
- (b) Derive Poiseuille's equation for the flow of liquid through a tube. 5
5. (a) Derive an expression for twisting couple acting on a solid cylinder or a wire. 5
- (b) Explain cantilever when weight of the beam is ineffective. 5

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FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

ZOOLOGY

(Animal Physiology)

(Thursday, 9-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

N.B. :— (i) Q. No. 1 is compulsory.

(ii) Solve any *two* questions out of Q. No. 2 to Q. No. 5.

(iii) **10** marks for each question.

1. Write short notes on the following :

10

(a) Transport of O₂

(b) Functions of Blood

(c) Structure of Synapse

(d) Structure of Adrenal gland

P.T.O.

WT

(2)

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2. Describe sources and deficiency diseases of fat soluble vitamins. 10
3. Describe structure of human heart. 10
4. Describe structure and functions of cardiac muscles. 10
5. Describe hormones of anterior pituitary gland. 10

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2

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FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

ZOOLOGY

SZOOCT-1202

(Biochemistry)

(Saturday, 11-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* questions out of Q. No. **2** to Q. No. **5**.

(iii) **10** marks for each question.

1. Write short notes on the following :

10

(a) Polysaccharide

(b) Effect of Substrate concentration on enzyme

(c) Glycogenolysis

(d) Ketolysis

P.T.O.

WT

(2)

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2. Explain in detail classification of carbohydrates. 10
3. What is enzyme ? Explain in detail lock and key model and induced fit theory. 10
4. Explain in detail Kreb's cycle. 10
5. Describe in detail transamination and deamination. 10

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NEPJA—3020—303—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

ZOOLOGY

SZOOMT-1201

(Developmental Biology)

(Wednesday, 15-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

N.B. :— (i) Q. No. 1 is compulsory.

(ii) Solve any *two* questions out of Q. No. 2 to Q. No. 5.

(iii) **10** marks for each question.

1. Write short notes on the following :

10

(a) Microlecithal Egg

(b) Frog embryo third cleavage

(c) Diffuse placenta

(d) IVF

P.T.O.

WT

(2)

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2. Describe spermatogenesis in mammals. 10
3. Describe Gametes of Frog. 10
4. Structure and functions of Amnion Chorion. 10
5. Write a note on role of stem cells in human health. 10

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HA—1004—2026

FACULTY OF ARTS/COMMERCE/SCIENCE

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

APRIL/MAY, 2026

VALUE EDUCATION

VECEVS-1251

(Environmental Studies)

(Compulsory)

(Thursday, 2-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

सर्व प्रश्नांना समान गुण आहेत.

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

प्रश्न क्रमांक 1 अनिवार्य आहे.

(iii) *Solve any two questions from Q. No. 2 to Q. No. 5.*

प्रश्न क्र. 2 ते प्रश्न क्र. 5 कोणतेही दोन प्रश्न सोडवा.

1. *Write short notes on the following (2.5 marks each) :*

10

खालील प्रश्नांवर थोडक्यात टिपा लिहा (प्रत्येकी 2.5 गुण) :

(a) *Flood*

पूर

(b) *Soil erosion*

जमिनीची धूप

P.T.O.

- (c) Food web
अन्नजाळे
- (d) Deforestation.
जंगलतोड.
2. Explain the renewable and non-renewable resources with suitable examples. 10
क्षयक्षम व अक्षयक्षम साधनसंपत्ती म्हणजे काय ? उदाहरणासह स्पष्ट करा.
3. Define environment. Discuss the need for public awareness in environmental protection. 10
पर्यावरणाची व्याख्या लिहा. पर्यावरणाच्या संरक्षणात जनजागृतीची गरज यावर चर्चा करा.
4. What is water pollution ? Describe the causes and effects of water pollution. 10
जल प्रदूषण म्हणजे काय ? जल प्रदूषणाची कारणे व परिणाम विशद करा.
5. Discuss in detail energy flow in ecosystem. 10
परिसंस्थेतील उर्जाप्रवाह याची सविस्तर चर्चा करा.

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

HA—16—2026

FACULTY OF HUMANITIES

B.A. (NEP) (Fourth Semester) EXAMINATION

APRIL/MAY, 2026

ENGLISH (Compl.)

(Comprehension and Grammar-II)

(Monday, 6-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

(iii) *Solve any two questions from Question Nos. 2 to 5.*

1. Write short notes on :

10

(a) Character sketch of Ali

(b) The quarrel between Malasha and Akoulya

(c) Concept of equality in 'The Mountain and the Squirrel'.

(d) Uses of 'would'.

P.T.O.

2. Discuss the theme of loneliness and grief in the story 'Letter' by Dhumketu. 10
3. Justify the title 'Little Girls Wiser than Men'. 10
4. 'There will come soft Rains' describe the dangers of technology obsessed society. Discuss. 10
5. Explain with suitable examples the uses of modal auxiliaries 'can', 'could', 'may' and 'might'. 10

This question paper contains 2 printed pages]

HA—27—2026

FACULTY OF ARTS/COMMERCE/SCIENCE

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

APRIL/MAY, 2026

MARATHI (MIL)

(AECMAR-1251)

(मराठी भाषिक उपयोजन-IV)

(Wednesday, 8-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) प्रश्न क्रमांक 2 ते प्रश्न क्रमांक 5 पैकी कोणतेही दोन प्रश्न सोडवा.

(iii) सर्व प्रश्नांना समान गुण आहेत.

1. पुढील टिपा थोडक्यात लिहा :

10

(i) सूत्रसंचालनाचे स्वरूप

(ii) चरित्रात्मक मुलाखत

(iii) टिप्पणी लेखन—संकल्पना

(iv) रोजनिशी लेखनाची भाषा.

P.T.O.

WT

(2)

HA—27—2026

2. प्रभावी सूत्रसंचालकाचे गुणविशेष सविस्तर लिहा. 10
3. मुलाखत म्हणजे काय ते सांगून मुलाखतीला सामोरे जाताना कोणती काळजी घ्यावी ते स्पष्ट करा. 10
4. टिप्पणी लेखनाचे महत्व विशद करा. 10
5. रोजनिशी लेखनाचे विशेष स्पष्ट करा. 10

HA—27—2026

2

This question paper contains 2 printed pages]

HA—26—2026

FACULTY OF HUMANITIES

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

APRIL/MAY, 2026

HINDI (MIL)

Paper-IV—HHINMIL-1251

(गद्य विविधा भाग-2)

(Wednesday, 8-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

N.B. :— (i) प्रश्न क्रमांक 1 अनिवार्य है।

(ii) प्रश्न क्रमांक 2 से 5 में से किन्हीं दो प्रश्नों के उत्तर लिखिए।

(iii) सभी प्रश्नों के अंक समान हैं।

1. टिप्पणियाँ लिखिए (प्रति टिप्पणी 2½ अंक) :

10

(अ) राकेश अचल का व्यक्तित्व कृतित्व

(ब) रेडियो नाटक विधा का परिचय

(क) 'पत्थरबाबू' कहानी का उद्देश्य

(ड) 'अठतल्ले से गिर गए खेत बाबु' कहानी का रतन

P.T.O.

निम्नलिखित में से किन्हीं दो (2) प्रश्नों के दीर्घोत्तरीय उत्तर लिखिए :

2. 'सिन्दबाद की अन्तिम यात्रा' की मूल संवेदना स्पष्ट कीजिए। 10
3. 'संस्कृति का स्वरूप' लेख का आशय प्रस्तुत कीजिए। 10
4. 'सूर्यास्त के पहले' रेडियो नाटक में मानवीय संवेदना को बताइए। 10
5. 'पत्थरबाज' कहानी में असलम का चरित्र-चित्रण कीजिए। 10

This question paper contains 2 printed pages]

NEPJA—2010—401—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

BOTANY

SBOTCT-1251

(Bryophytes and Pteridophytes)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Of the remaining, attempt any *two* questions.

(iii) Draw neat and labelled diagram wherever required.

1. Write brief notes on the following :

10

(a) Describe general characters of Bryophytes

(b) Vegetative reproduction in Anthoceros

(c) Systematic position and occurrence of Lycopodium

(d) Marsilea sporocarp

P.T.O.

2. Describe external and internal structure of *Riccia* thallus. 10
3. Describe in detail L.S. of *Funaria* capsule. 10
4. Describe in brief general characters of Pteridophytes. 10
5. Describe heterospory and seed habitats in Pteridophytes. 10

This question paper contains 2 printed pages]

NEPJA—2010—402—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

BOTANY

SBOTCT-1252

(Genetics and Plant Breeding)

(Monday, 13-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Of the remaining, attempt any *two* questions.

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

1. Write brief notes on the following :

10

(a) Monohybrid Cross

(b) Types of Linkage

(c) Deletions

(d) Objectives of plant breeding

P.T.O.

WT

(2)

NEPJA—2010—402—2026

2. Describe any *two* Mendel's laws of inheritance. 10
3. What is crossing over. Describe mechanism of crossing over. 10
4. What is aneuploidy. Describe different types of aneuploidy. 10
5. What is mass selection. Describe procedure, merits and demerits of mass selection. 10

This question paper contains 2 printed pages]

NEPJA—2010—403—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

BOTANY

SBOTMT-1251

(Diversity of Phanerogams)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

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

1. Write brief notes on the following :

10

(a) General characters of gymnosperms

(b) Dwarf shoot of Pinus

(c) Corolla

(d) Structure of Typical Stamen.

P.T.O.

WT

(2)

NEPJA—2010—403—2026

2. Describe the T.S. of Cycas leaflet. 10
3. Define secondary growth. Describe the secondary structures of Pinus stem. 10
4. Define compound leaf. Describe the types of compound leaf. 10
5. What is simple fruit ? Describe the different forms of simple fruit. 10

This question paper contains 3 printed pages]

NEPJA—1010-401—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

CHEMISTRY

SCHECT-1251

(Organic and Inorganic Chemistry)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. No. 2 to 5).

(iv) Figures to the right indicate full marks.

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

(a) Explain the molecular orbital structure and aromaticity of furan.

(b) Give any *two* methods for the preparation of Diazomethane.

(c) Write down the application of BF_3 in the formation of acids and diketones with suitable example.

(d) Give the general characteristics of s-block elements.

P.T.O.

2. Solve the following questions : 10

(a) How will you prepare Pyrrole from :

(i) 1,4-Dicarbonyl compound,

(ii) Fiest-Benary synthesis.

(b) Explain the nitration of pyridine with mechanism.

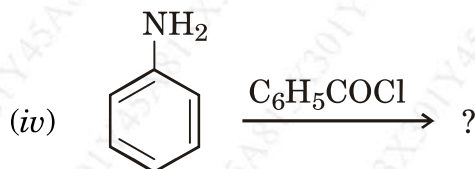
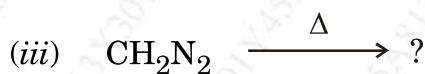
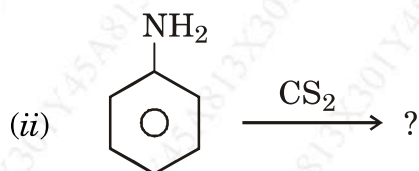
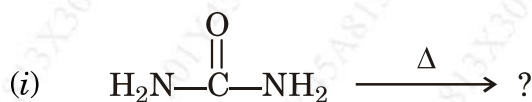
3. Solve the following questions : 10

(a) Write down the preparation of :

(i) Nitrobenzene from benzene,

(ii) *m*-Dinitrobenzene from Nitrobenzene.

(b) Predict the product :



4. Solve the following questions : 10

- (a) (1) Explain the action of OsO_4 on :
- (i) Maleic acid;
- (ii) Phenanthrene.
- (2) Write any *two* methods for the preparation of ozone.
- (b) (1) Explain allylic hydroxylation reaction of SeO_2 .
- (2) Explain variation in M.P. and B.P. in *p*-block elements.

5. Solve the following questions : 10

- (a) Explain diagonal relationship between Li and Mg.
- (b) Explain variation in acidic and basic character of hydroxides of *p*-block elements.

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

NEPJA—1010-402—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

CHEMISTRY

SCHECT-1252

(Physical and Inorganic Chemistry)

(Monday, 13-04-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

(iii) Solve any *two* of the remaining four questions (Q. No. 2 to 5).

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

1. Solve the following questions :

4×2.5=10

(a) Define order and molecularity of chemical reaction.

(b) Define the terms :

(i) Conductance

(ii) Equivalent conductance.

(c) State and explain Kohlrausch's law.

(d) Write a short note on fullerene.

P.T.O.

2. Answer the following questions : 10
- (a) Derive equation for rate constant of first order chemical reaction.
 - (b) Calculate rate constant of first order reaction if the concentration of reactant changes from 4 M to 2M in 5 min.
3. Answer the following questions : 10
- (a) Define specific conductance and give effect of dilution and temperature on it.
 - (b) Calculate molar conductance of 0.1 M aqueous solution of salt at 25°C. The specific conductance of solution is $1.20 \times 10^{-2} \text{ Sm}^{-1}$.
4. Answer the following questions : 10
- (a) Explain the conductometric titration :
 - (i) Strong acid and strong base
 - (ii) Precipitation titration.
 - (b) (i) Write the application of Kohlrausch's law for determination of degree of dissociation of weak electrolytes.
 - (ii) Define Pseudo-Halogen. Give preparation of oxycynogen (OCN)₂.
5. Answer the following questions : 10
- (a) Explain the structure and hybridisation of XY₃ type of interhalogen compounds.
 - (b) What are Zeolites ? Give any *two* applications of zeolites.

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

NEPJA—1010-403—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

CHEMISTRY

SCHEMT-1251

(Basic Chemistry-II)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* questions of the remaining questions (Q. Nos. 2 to 5).

1. Solve the following questions :

(a) Define aldoses and ketoses with suitable example.

(b) Define medicinal drug with suitable examples.

(c) Define Lewis concept of acid and base with suitable example.

(d) Define protic and aprotic solvents with example.

P.T.O.

2. (a) Write the secondary structure of proteins.
(b) Write the chemical constitution of RNA.
3. (a) Write the general characteristics of ideal drug.
(b) Write the precautions measure in Disposal of medicines.
4. (a) Explain Arrhenius concept of acids and bases with examples.
(b) Explain relative strength of acids and bases.
5. (a) Write the advantages and disadvantages of ammonia as solvent.
(b) Give the solvolysis, precipitation reactions as liquid SO_2 as solvent.

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

NEPJA—4010-401—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

COMPUTER SCIENCE

SCSCCT-1251

(Programming in Java)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Q. No. 2 to Q. No. 5.

(iii) Draw neat and labelled diagrams, wherever necessary.

1. Attempt the following :

4×2.5=10

(a) What is Java virtual machine ?

(b) What are the data types in Java ?

P.T.O.

- (c) What is constructor ?
- (d) What is Java API package ?
2. Attempt the following :
- (a) What are the features of Java ? Explain. 5
- (b) Differentiate between Java and C++. 5
3. Attempt the following :
- (a) Explain Java program structure with example. 5
- (b) Write a program in Java to find the largest of three numbers using if-else statements. 5
4. Attempt the following :
- (a) What is class ? Explain defining class with example. 5
- (b) What is method overloading ? Explain. 5
5. Attempt the following :
- (a) Explain in detail, how system packages can be imported and used in Java programs. 5
- (b) Describe the process of adding class to a package. 5

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

NEPJA—4010-402—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

COMPUTER SCIENCE

[Relational Database Management System (RDBMS)]

(Monday, 13-04-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Q. No. 2 to Q. No. 5.

1. Attempt the following : 4×2.5=10

- (a) Enlist advantages of DBMS.
- (b) Define primary key.
- (c) Explain the term normalization.
- (d) Explain CREATE TABLE command with an example.

P.T.O.

- | | | | |
|----|-----|--|---|
| 2. | (a) | Describe the architecture of DBMS. | 5 |
| | (b) | Discuss user responsibilities of DBA. | 5 |
| 3. | (a) | Explain relational model. | 5 |
| | (b) | Explain E-R diagram with a suitable example. | 5 |
| 4. | (a) | Explain 1NF (First Normal Form). | 5 |
| | (b) | Explain the concept of functional dependency. | 5 |
| 5. | (a) | Explain data types in SQL. | 5 |
| | (b) | Explain any <i>two</i> basic SQL functions with example. | 5 |

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

NEPJA-4010—403—2026

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (General) (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2026

(NEP Pattern)

COMPUTER SCIENCE

Paper—SDSCMT-1251

(Web Technology)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from question nos. 2 to 5.

1. Attempt the following : 10
 - (a) What is Web Browser ? Explain.
 - (b) What is HTML ? Explain.
 - (c) What is CSS ? Explain.
 - (d) Describe if-statement in JavaScript.
2. Attempt the following : 10
 - (a) Describe in brief evolution of WWW. 5
 - (b) Explain client-server architecture. 5

P.T.O.

3. Attempt the following : 10
 - (a) Explain list tag in HTML with example. 5
 - (b) Describe image tag in HTML with example. 5
4. Attempt the following : 10
 - (a) Describe the concept of CSS selectors. 5
 - (b) Explain basic syntax of CSS. 5
5. Attempt the following : 10
 - (a) Explain data types in JavaScript. 5
 - (b) Describe if-else statement in JavaScript with example. 5

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

NEPJA—5140—401—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP Pattern)

ELECTRONICS

SELECT-1251

(Oscillators and Multivibrators)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

- N.B. :—** (i) All questions are carry equal marks.
(ii) Question No. 1 is compulsory.
(iii) Solve any *two* of the remaining four questions (Q. No. 2 to Q. No. 5).
(iv) Figures to the right indicate full marks.

1. Solve the following questions compulsory : 10
- (a) What are advantages of negative feedback ?
(b) What is Barkhausen Criterion ?
(c) How the transistor works as a switch ?
(d) Give the types of time base circuits.

P.T.O.

2. (a) Explain the concept of positive and negative feedback. 5
- (b) Describe the decreased distortion. 5
3. (a) Give the requirement of an oscillator. 5
- (b) Draw the circuit diagram of Hartley oscillator and give the expression for frequency. 5
4. (a) With suitable circuit diagram explain the working of transistorized astable multivibrator. 5
- (b) Explain the Monostable multivibrator in detail. 5
5. (a) Describe the methods of generating time base waveforms. 5
- (b) Explain sweep circuit using a transistor switch. 5

This question paper contains 2 printed pages]

NEPJA—5140—402—2026
FACULTY OF SCIENCE & TECHNOLOGY
B.Sc. (Fourth Semester) EXAMINATION
APRIL/MAY, 2026
(NEP Pattern)
ELECTRONICS
SELECT-1252

(Introduction to Microcontroller Intel-8051)

(Monday, 13-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. No. 2 to Q. No. 5).

(iv) Figures to the right indicate full marks.

1. (a) State any four features of the 8051 microcontroller. 10
- (b) List different types of memory in 8051.
- (c) What is the use of program counter in 8051.
- (d) Write ALP to add two 8 bit number.

P.T.O.

2. (a) Draw block diagram of 8051 and label the main compoenets. 5
- (b) Explain the pin configuration of 8051. 5
3. (a) Classify the 8051 instruction set. 5
- (b) Explain direct and immediate addressing modes with examples. 5
4. (a) Write an ALP to subtract two 8 bit numbers. 5
- (b) Write a program to find larger of two numbers. 5
5. (a) Explain the functions of Accumlator and B Register. 5
- (b) Describe timers of 8051 in short. 5

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

NEPJA—5140—403—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP 2020)

ELECTRONICS

SELEMT-1251

(Fundamentals of Microprocessor 8085)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. No. 2 to Q. No. 5).

(iv) Figures to the right indicate full marks.

1. Attempt the following :

2.5×4=10

(a) What is EEPROM ? How is different from EPROM ?

(b) Write the features of Intel 8085.

(c) Define Instruction cycle and T-state.

(d) Write an ALP to subtract two 8-bit numbers.

P.T.O.

2. (a) Explain in detail the classification of memories. 5
- (b) Describe the structure and working of SRAM and DRAM. 5
3. Draw and explain the block diagram of Intel 8085 microprocessor. Explain each block. 10
4. (a) Explain different addressing modes of 8085. 5
- (b) Enlist classification of instructions and write in detail any *two*. 5
5. (a) Write an ALP for addition of two 8 bit numbers 5
- (b) Write an ALP to find 1's complement of 8 bit numbers with flowchart. 5

This question paper contains 2 printed pages]

NEPJA—4020-401—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

FISHERY SCIENCE

SFISCT-1251

(Fish Spoilage, Preservation and Quality Issues)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* of the remaining four questions (Q. Nos. 2 to 5).

(iii) *All* questions carry equal marks.

(iv) Wherever necessary, illustrate the answers with suitable and well labelled diagrams.

1. Answer each of the following questions :

4×2.5=10

(a) Rigor mortis in fishes

(b) Benefits of fish processing

P.T.O.

- (c) Smoking of fishes
- (d) Quality issues in minced fish meat.
2. Explain the causes of spoilage in fish. 10
3. Describe the process of fish processing. 10
4. Explain the principles of fish preservation. 10
5. Explain the denaturation of fish due to freezing. 10

This question paper contains 2 printed pages]

NEPJA—4020-402—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

FISHERY SCIENCE

SFISCT-1252

(Fish Products and Byproducts Technology)

(Monday, 13-04-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* of the remaining four questions (Q. Nos. 2 to 5).

(iii) All questions carry equal marks.

(iv) Wherever necessary, illustrate the answers with suitable and well labelled diagrams.

1. Answer each of the following questions :

4×2.5=10

(a) Composition of fish oil

(b) Uses of fish meal

P.T.O.

- (c) Applications of chitosan
- (d) Fish flour.
2. Explain methods of fish oil extraction. 10
3. Explain the preparation of fish meal. 10
4. Explain the process of preparation of chitin and chitosan. 10
5. Explain the preparation and uses of fish protein concentrate and fish manure. 10

This question paper contains 2 printed pages]

NEPJA—4020-403—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

FISHERY SCIENCE

SFISMT-1251

(Preparation of Value Added Products)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* of the remaining four questions (Q. Nos. 2 to 5).

(iii) *All* questions carry equal marks.

(iv) Wherever necessary, illustrate the answers with suitable and well labelled diagrams.

1. Answer each of the following questions :

4×2.5=10

(a) Fish cutlets

(b) Fish protein concentrate

P.T.O.

- (c) Metal containers
 - (d) Modified atmospheric packaging (MAP).
2. Describe the process of fish pickle preparation. 10
 3. Explain the process of preparation of fish wafers. 10
 4. Explain the functions of packaging. 10
 5. Explain vacuum packaging. 10

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

NEPJA—4030-401—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

INDUSTRIAL CHEMISTRY

SICHCT-1251

(Unit Operation-II)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Q. No. 2 to Q. No. 5.

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

1. Solve the following questions :

10

(i) Explain capacity of evaporator.

(ii) Define relative humidity.

(iii) Define molar concentration.

(iv) Define volatility.

P.T.O.

2. Solve the following : 10

- (i) Explain jacketed pan evaporator with neat labelled diagram.
- (ii) Explain construction and working of horizontal tube evaporator with neat labelled diagram.

3. Solve the following : 10

- (i) Explain construction and working of Drum Dryer with neat labelled diagram.
- (ii) Explain construction and working of Tunnel Dryer with neat labelled diagram.

4. Solve the following : 10

- (i) Explain Ficks low diffusion with mathematical expression.
- (ii) Explain the following theory of diffusion :

Penetration Theory

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

NEPJA—4030-402—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

INDUSTRIAL CHEMISTRY

SICHCT-1252

(Chemical Reaction Engineering-II)

(Monday, 13-04-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Q. No. 2 to Q. No. 5.

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

1. Solve the following questions :

10

(i) Explain batch reactor.

(ii) Explain advantages of tank reactor.

(iii) Explain space velocity.

(iv) Explain RTD function.

P.T.O.

2. Solve the following : 10
- (i) Explain fixed bed reactor with neat labelled diagram.
 - (ii) Explain material balance over an element of volume of reactor with mathematical expression.
3. Solve the following : 10
- (i) Explain plug flow reactor in parallel.
 - (ii) Explain autocatalytic reaction.
4. Solve the following : 10
- (i) Explain determining the best system for given conversion.
 - (ii) Explain equal size CSTR in series.
5. Solve the following : 10
- (i) Explain step input experiment with mathematical expression.
 - (ii) Explain RTD in plug flow reactor.

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

NEPJA—4030-403—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

INDUSTRIAL CHEMISTRY

SICHMT-1251

(Industrial Process-II)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Q. No. 2 to Q. No. 5.

(iii) Draw neat and labelled diagram wherever necessary.

1. Write brief notes on the following : 4×2.5=10

(a) Give difference between Soap and Detergent.

(b) What are the starting material for industrial acetic acid synthesis ?

(c) Mention *two* methods of essential oil extraction.

(d) What is the significance of plant layout in nitric acid manufacturing ?

P.T.O.

2. Solve the following : 10
- (a) Discuss the Ostwald process of Nitric acid production with reaction.
 - (b) Explain historic and modern method of Acetic acid production.
3. Solve the following questions : 10
- (a) Describe the Saponification process for soap manufacture including raw material and chemical reaction.
 - (b) Explain the step in the production of synthetic detergents and list raw material used.
4. Solve the following : 10
- (a) Describe mechanical and solvent extraction method for edible oil with flow chart.
 - (b) Explain steam distillation and cold pressing method of essential oil extraction.
5. Solve the following : 10
- (a) Describe the layout design consideration for an essential oil's extraction plant.
 - (b) Discuss the importance of utilities and their management in soap manufacturing plant.

This question paper contains 3 printed pages]

NEPJA—3010—401—2026

FACULTY OF ARTS AND SCIENCE

B.A./B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2026

MATHEMATICS

SMATCT-1251

(Real Analysis-II)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* questions of the remaining four questions (Q. No. 2 to Q. No. 5).

(iv) Figures to the right indicate full marks.

1. Answer the following questions (2.5 marks each) :

10

(a) Show that the series $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \dots$ is not convergent.

(b) Write the statement of second type comparison test.

(c) Write the two infinite series. One is convergent and other is divergent.

(d) Define Alternating series with suitable example.

P.T.O.

2. Attempt the following : 10

(a) Prove that the positive term geometric series $1 + r + r^2 + \dots$ converges

for $r < 1$ and diverges to $+\infty$ for $r \geq 1$.

(b) Show that the series :

$$\frac{1.2}{3^2 \cdot 4^2} + \frac{3.4}{5^2 \cdot 6^2} + \frac{5.6}{7^2 \cdot 8^2} \dots \text{ is convergent.}$$

3. Attempt the following : 10

(a) State and prove D'Alembert's ratio test.

(b) If $u_n > 0$ and $\sum u_n$ is convergent with the sum S, then prove that :

$$\frac{u_n}{u_1 + u_2 + u_3 + \dots + u_n} < \frac{2u_n}{S}, \text{ when } n \text{ is sufficient large.}$$

4. Attempt the following : 10

(a) If $\sum u_n$ is positive term series such that $\lim_{n \rightarrow \infty} \left(n \log \frac{u_n}{u_{n+1}} \right) = l$,

then the series converges for $l > 1$ and diverges for $l < 1$.

(b) Show that for any fixed value of x , the series $\sum_{n=1}^{\infty} \frac{\sin nx}{n^2}$ is convergent.

5. Attempt the following :

10

- (a) Prove that every absolutely convergent series is convergent.
- (b) Show that the series :

$$\sum \frac{3.6.9. 3n}{7.10.13 (3n + 4)} x^n, x > 0$$

converges for $x \leq 1$ and diverges for $x > 1$.

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

NEPJA—3010—402—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

MATHEMATICS

SMATCT-1252

(Ring Theory)

(Monday, 13-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Question No. 1 is compulsory.

(iii) Solve any *two* of the remaining four questions (Q. No. 2 to Q. No. 5).

(iv) Figures to the right indicate full marks.

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

(a) Let a, b belong to a ring R . Then show that :

(i) $a.0 = 0.a = 0$

(ii) $a(-b) = (-a)b = -(ab)$.

(b) Define prime ideal of a commutative ring R with suitable example.

P.T.O.

- (c) State the first isomorphism theorem for rings.
- (d) Define the terms :
- (i) Leading coefficient of polynomial
 - (ii) Degree of polynomial.
2. Define field with *one* example. Prove that a finite integral domain is a field. 10
3. Let R be a commutative ring with unity and let A be an ideal of R . Then prove that, R/A is a field if and only if A is maximal ideal of commutative ring R . 10
4. Let ϕ be a ring homomorphism from a ring R to a ring S . Then prove the following : 10
- (a) ϕ is an isomorphism if and only if ϕ is onto and $\ker\phi$
- $$= \{x \in R / \phi(x) = 0\}$$
- $$= \{0\}$$
- (b) If ϕ is an isomorphism from R onto S , then prove that ϕ^{-1} is also an isomorphism from S onto R .
5. Let $f(x) = 4x^3 + 2x^2 + x + 3$ and $g(x) = 3x^4 + 3x^3 + 3x^2 + x + 4$, 10
- where $f(x), g(x) \in \mathbb{Z}_5[x]$
- Then compute, $f(x) + g(x)$ and $f(x).g(x)$

This question paper contains 3 printed pages]

NEPJA—3010—403—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

MATHEMATICS

SMATMT-1251

(Introduction to Infinite Series and Ring Theory)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

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

1. Attempt the following (2.5 marks each) :

10

(a) Test the convergence of the series $\sum \frac{1}{n^{1+\frac{1}{n}}}$.

(b) Define geometric series.

(c) Define integral domain.

(d) Define prime ideal.

P.T.O.

2. Attempt the following :

5

- (a) If $\sum u_n$ and $\sum v_n$ are two positive term series and $\exists$ a positive integer m such that :

$$\frac{u_n}{u_{n+1}} \geq \frac{v_n}{v_{n+1}} \quad \forall n \geq m, \text{ then show that :}$$

- (i) $\sum u_n$ is convergent if $\sum v_n$ is convergent
- (ii) $\sum v_n$ is divergent if $\sum u_n$ is divergent.
- (b) Show that the series :

$$1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots \text{ is convergent.} \quad 5$$

3. Attempt the following :

- (a) If $\sum u_n$ is a positive term series, such that $\lim_{n \rightarrow \infty} (u_n)^{\frac{1}{2}} = l$, then show that the series converges if $l < 1$ and diverges if $l > 1$. 5

- (b) Show that the series : 5

$$\sum \frac{3.6.9.12 \dots (3n)}{7.10.13 \dots (3n+4)} x^n, \quad x > 0 \text{ is convergent if } x < 1 \text{ and divergent if } x > 1.$$

4. Attempt the following : 10
- (a) Prove that the characteristic of an integral domain is zero or prime.
- (b) Let $Q[\sqrt{2}] = \{a + b\sqrt{2} / a, b \in Q\}$, prove that $Q[\sqrt{2}]$ is a ring.
5. Attempt the following : 10
- (a) Let R be a commutative ring with unity and let A be an ideal of R , then show that R/A is a field if and only if A is maximal.
- (b) If A and B are ideals of a ring, show that the sum of A and B , $A + B = \{a + b / a \in A, b \in B\}$ is an ideal.

This question paper contains 2 printed pages]

NEPJA-5230—401—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

MICROBIOLOGY

Paper– SMICCT-1251

(Food and Soil Microbiology)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* questions from questions nos. 2 to 5.

(iii) Draw a well labelled diagram wherever necessary.

1. Write down the following questions : 10

(a) Single cell protein

(b) Pasteurization

(c) Nitrification

(d) Mutualism.

P.T.O.

2. Describe in detail types of food spoilage. 10
3. Explain the Microbiological examination of milk with reference to MBRT. 10
4. Draw a well labelled diagram of sulfur cycle. Explain the oxidation of sulfur compounds. 10
5. Explain plant-microbe interaction Rhizosphere. 10

This question paper contains 2 printed pages]

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FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

MICROBIOLOGY

Paper– SMICCT-1252

(Medical Microbiology)

(Monday, 13-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from the remaining Q. Nos. 2 to 5.

(iii) Illustrate your answer with suitable diagram.

1. Write short notes on the following :

2.5×4=10

(i) Toxins of Staphylococci

(ii) Location of antigens in *S. typhi*

(iii) Clinical features of SARS

(iv) Oral Thrush.

P.T.O.

2. Explain pathogenesis of urinary tract infection caused by *E.coli*. Add a note on its prophylaxis and treatment. 10
3. What is Pulmonary Tuberculosis ? Write on etiology and pathogenesis of Pulmonary Tuberculosis. 10
4. What is AIDS ? Explain pathogenesis and laboratory diagnosis of AIDS. 10
5. What is Malaria ? Describe pathogenesis of Malaria and add a note on its control measures. 10

This question paper contains 2 printed pages]

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FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP-2020)

MICROBIOLOGY

Paper– SMICMT-1251

(Applied Microbial Techniques)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* questions from Question nos. 2 to 5.

(iii) Draw neat and labelled diagram wherever necessary.

1. Write brief notes on : 10
 - (a) Aseptic technique
 - (b) Natural media
 - (c) Isolation of bacteria
 - (d) Preservation on slants.

P.T.O.

WT

(2)

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2. Explain in detail sterilization by autoclave. 10
3. Write in detail preparation of nutrient agar. 10
4. Explain in detail streak plate technique for isolation of bacteria. 10
5. Write in detail maintenance of pure culture. 10

This question paper contains 2 printed pages]

NEPJA—2020—401—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

PHYSICS

(Mathematical Methods and Application in Electricity and Magnetism-II)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Non-programmable calculators are allowed.

(iii) Figures to the right indicate full marks.

(iv) Symbols have their usual meaning.

1. Attempt *all* of the following :

10

(a) Define partial differentiation

(b) Define Dirichlet's condition

(c) Define Intensity of Magnetization (I)

(d) Define Biot and Savart Law.

P.T.O.

2. Attempt any *two* questions of the following :

- (a) Explain total differentiation and chain rule. 10
- (b) Determination of Fourier coefficients a_0 , a_n and b_n in Fourier series. 10
- (c) Explain I-H curve by magnetometer method. 10
- (d) Explain Magnetic field due to thin straight wire. 10

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

NEPJA—2020—402—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

PHYSICS

SPHYCT-1252

(Optics and Laser)

(Monday, 13-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Attempt any *two* from question no. 2 to question no. 5.

(iii) *All* questions carry equal marks.

(iv) Figures to the right indicate full marks.

1. Solve the following questions (Each question of **2.5** marks) : 10

(a) Define concept of constructive interference

(b) State Brewster's law

(c) Define Spontaneous emission

(d) Properties of LASER

P.T.O.

2. Describe Fraunhofer diffraction due to single slit. 10
3. (a) State and explain Malus law. 5
(b) Describe Huygen's explanation of double refraction in uniaxial crystal. 5
4. (a) Explain stimulated emission and absorption. 5
(b) Explain Lasing action. 5
5. Describe briefly Ruby laser. 10

This question paper contains 2 printed pages]

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FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

PHYSICS

SPHYMT-1251

(Physics for Chemist and Biologist)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* questions out of remaining (Q. No. 2 to Q. No. 5).

(iii) Figures to the right indicate full marks.

(iv) *All* questions carry equal marks.

1. Solve the following : 2.5×4=10

(a) Define and explain photoelectric effect with neat labelled diagram.

(b) Explain the phenomenon of refraction at concave spherical surface with neat labelled diagram.

(c) Explain difference between simple and compound microscope.

(d) Explain third law of thermodynamics.

P.T.O.

2. Explain the reflection of light on the basis of wave theory of light with suitable ray diagram. 10
3. Obtain an expression for refraction at single concave spherical surface. 10
4. Explain the simple microscope as magnifier with proper ray diagram. 10
5. Explain the application of first law of thermodynamics in adiabatic process. 10

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

NEPJA—3020—401—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020)

ZOOLOGY

(Cell Biology and Genetics)

(Friday, 10-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* questions out of Q. No. **2** to Q. No. **5**.

(iii) **10** marks for each question.

1. Write short notes on the following :

10

(a) Structure of Endoplasmic reticulum

(b) Lethal genes

(c) Polyploidy

(d) Hemophilia

P.T.O.

WT

(2)

NEPJA—3020—401—2026

2. Describe the structure and functions of plasma membrane. 10
3. Explain the Mendel's law of segregation. 10
4. What is mutation ? Explain deletion and duplication. 10
5. Give an account on Human Pedigree analysis with symbols. 10

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

NEPJA—3020—402—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020 Pattern)

ZOOLOGY

(Evolutionary Biology and Genetic Engineering)

(Monday, 13-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* questions out of question no. 2 to question no. 5.

(iii) **10** marks per each questions.

1. Write short notes on the following :

10

(a) Artificial selection

(b) Biological species concept

(c) Lysing enzymes

(d) Genomic Libraries

P.T.O.

WT

(2)

NEPJA—3020—402—2026

2. Explain theory of Lamarckism. 10
3. Describe the concept of Mass extinctions and give the causes and role of mass extinctions. 10
4. Explain the structure and functions of RNA. 10
5. Explain polymerase chain reaction (PCR). 10

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

NEPJA—3020—403—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

(NEP 2020 Pattern)

ZOOLOGY

SZOOMT-1251

(Cell Biology)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—30

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

(ii) Solve any *two* questions out of question no. **2** to question no. **5**.

(iii) **10** marks per each questions

1. Write short notes on the following :

10

(a) Electron Microscope Principle

(b) Micellar Model

(c) 80s Ribosomes

(d) Significance of Meiosis

P.T.O.

WT

(2)

NEPJA—3020—403—2026

2. Describe in details structure of Eukaryotic cell. 10
3. Discuss in details structure and functions of endoplasmic reticulum. 10
4. Explain in detailed structure and functions of lysosomes 10
5. Explain in detail cell cycle and its regulations. 10