Total No. of Printed Pages:01

SUBJECT CODE NO:-CA-02-2025

FACULTY OF SCIENCE AND TECHNOLOGY

EXAMINATION WINTER 2025

B.A/B.Com/B.Sc (NEP) (SEM-III)

English-Compulsory-(Compulsory English)

Comprehension & Grammar-I

[Time: 2:00 Hours] **[Max.Marks:30]**

"Please check whether you have got the right question paper."

N.B. 1) Solve all Questions.
2) Question 1 is Compulsory
3) Solve any Two questions from Q.2 to Q.5

Q.1 Attempt the following short notes: **10**
a) Agarwal
b) Swami's fabricated tales
c) Choices and perplexity in The Road Not Taken.
d) Different forms of 'Tobe'

Q2 How does Dilip Chitre bring out the bitter sense of loneliness and generation gap in the poem Father Returning Home? **10**

Q3 Write in your own words the complexities of the parent-child relationship in the short story 'Father's Help.' **10**

Q4 Discuss The Road Not Taken as a metaphor of decision-making and cover its consequences in life. **10**

Q5 Write a detailed note on main verbs. **10**

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

CA—17—2025

FACULTY OF HUMANITIES

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

NOVEMBER/DECEMBER, 2025

HINDI (MIL)

Paper HHINMIL-1201

(गद्य विविधा विभाग-I)

(Saturday, 15-11-2025) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—30

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

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

(3) **सभी** प्रश्नों के अंक समान हैं।

1. टिप्पणियाँ लिखिए (प्रति टिप्पणी **2½** अंक) : 10

(अ) नुक्कड़ नाटक विधा का परिचय

(ब) 'भारत का मुकुट' निबंध का आशय

(क) सोशल मीडिया

(ड) उषा प्रियंवदा का जीवन-परिचय।

P.T.O.

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

2. मॉरीशस में भारतीय संस्कृति, सभ्यता और परंपराओं के गहरे जुड़ाव और संरक्षण को 'लघु भारत मॉरीशस का संस्कृति-प्रेम' यात्रा-वृत्तान्त में हुआ है, स्पष्ट कीजिए। 10

3. 'पूस की एक और रात' कहानी का उद्देश्य लिखिए। 10

4. 'प्रसाद के नाम पत्र' की मूल संवेदना स्पष्ट कीजिए। 10

5. 'और वो सुघरका....' संस्मरण का आशय लिखिए। 10

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

CA—18—2025

FACULTY OF ARTS/COMMERCE/SCIENCE

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

NOVEMBER/DECEMBER, 2025

MARATHI (MIL)

Paper AECMAR-1201

(मराठी साहित्य—III)

(Saturday, 15-11-2025) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—30

N.B. :— (1) प्रश्न **पहिला** अनिवार्य आहे.

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

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

1. पुढील टिपा थोडक्यात लिहा : 10

(*i*) क्रांतीदर्शी सावित्रीमाय

(*ii*) 'मरीआईचा गाडा' मधील सटवाजी

(*iii*) महात्मा फुले आणि बहुजन शिक्षणाचा ध्यास

(*iv*) शहीद भगतसिंह यांची तत्त्वनिष्ठा.

P.T.O.

2. 'केशवसुतांची 'नवा शिपाई' ही कविता मानवतावादाची पेरणी करणारी आहे.' विशद करा. 10

3. भास्कर चंदनशिव यांच्या 'मेखमारो' या कथेतील संघर्ष तुमच्या शब्दांत लिहा. 10

4. 'आसन्नमरण काळी राणी' या ललित लेखातील त्याग आणि भोग यांच्यातील अंतर्विरोध स्पष्ट करा. 10

5. 'लोकांसाठी चालणारे राज्य हवे!' या भाषणातून डॉ. बाबासाहेब आंबेडकर यांनी कोणते विचार मांडले आहेत, ते लिहा. 10

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

NEPGA—2010—301—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

(NEP Pattern)

BOTANY

Paper–SBOTCT-1201

(Taxonomy of Angiosperms)

(Tuesday, 18-11-2025) **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*) Binomial nomenclature. 2½

(*b*) Artificial classification. 2½

(*c*) Function of root. 2½

(*d*) Inflorescence of Lamiaceae. 2½

P.T.O.

2. Explain in detail types and use of keys in plant identification. 10

3. Describe in detail Bentham and Hooker's system of classification of Angiosperms. Add a note on its merits and demerits. 10

4. Define fruit and explain in detail simple fruit. 10

5. Write in detail vegetative and floral characters of Malvaceae. Add a note on its economic importance. 10

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

NEPGA—2010—302—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

(NEP 2020 Pattern)

BOTANY

Paper–SBOTCT-1202

(Cell Biology)

(Thursday, 20-11-2025) **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*) Functions of Endoplasmic reticulum.

(*b*) Types of chromosomes (based on position of centromere)

(*c*) Metaphase of mitosis.

(*d*) Draw neat and labelled diagram of double helical structure of DNA.

P.T.O.

2. Describe ultrastructure and functions of Golgi complex. 10

3. Define giant chromosomes. Describe structure of lampbrush chromosomes. 10

4. Define meiosis. Describe Prophase-I of Meiosis-I. 10

5. Explain structure and functions of tRNA. 10

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

NEPGA—2010—303—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

(NEP 2020 Pattern)

BOTANY

Paper–SBOTMT-1201

(Diversity of Cryptogams)

(Saturday, 22-11-2025) **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 diagram wherever required.

1. Write brief notes on the following : 10

(*a*) Graphic life cycle of Riccia. 2½

(*b*) Structure of Antheridium in Funaria. 2½

(*c*) Structure of Equisetum cone. 2½

(*d*) Economic importance of Pteridophytes. 2½

P.T.O.

2. Describe external and internal structure of Riccia thallus. 10

3. Describe sexual reproduction in Funaria. 10

4. Give an account of systematic position, occurrence and external features of Equisetum sporophyte. 10

5. Describe T.S. of Marsilea petiole. 10

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

NEPGA—1010—301—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

(NEP Pattern)

CHEMISTRY

Paper–SCHECT–1201

(Organic and Inorganic Chemistry)

(Tuesday, 18-11-2025) **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 : 4×2.5=10

(*a*) Write a note on structure of carbonyl group

(*b*) How will you prepare crotonic acid from ethyl acetoacetate ?

P.T.O.

(*c*) What are organolithium compounds ? How will you obtain the following compounds from methyl lithium ?

(*i*) Methane

(*ii*) Ethanol

(*d*) Define the following terms :

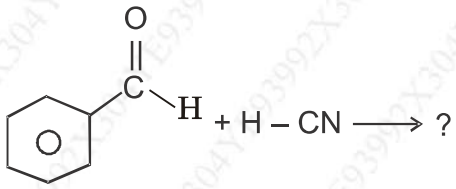
(*i*) Macro-qualitative analysis.

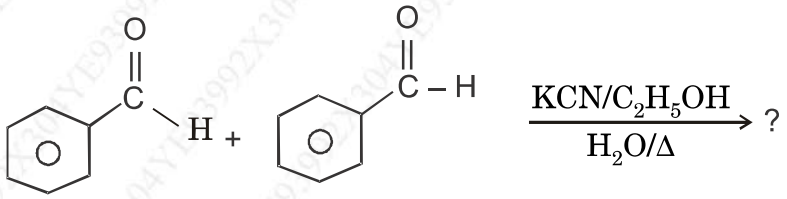
(*ii*) Basic radical.

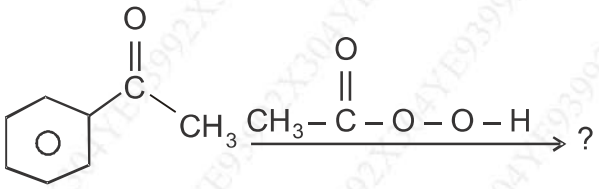
2. Solve the following : 2×5=10

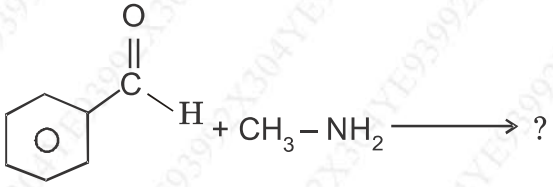
(*a*) Explain Mannich reaction with mechanism.

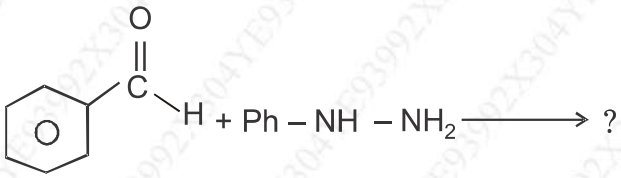
(*b*) Predict the product :

(*i*) 

(*ii*) 

(*iii*) 

(*iv*) 

(*v*) 

3. Solve the following : 2×5=10

(*a*) Describe the acidity of carboxylic acid. Give effect of substituents on acidic strength of carboxylic acid.

(*b*) How will you prepare succinic acid from ethylene dibromide and maleic acid ? Explain effect of heat and reaction of ammonia on succinic acid.

4. Solve the following : 2×5=10

(*a*) What are organozinc compounds ? Write the preparation of diethyl zinc from ethyl iodide. How will you obtain the following compounds from diethyl zinc ?

(*i*) Ethane

(*ii*) 2-butanol.

P.T.O.

(*b*) (*i*) How will you prepare the following compounds from methyl magnesium bromide ?

(*i*) Ethanol

(*ii*) Ethanoic acid.

(*ii*) Write a note on common ion effect.

5. Solve the following : 2×5=10

(*a*) What is solubility product ? Explain its role in the separation of III A and III B group radicals.

(*b*) What is HSAB principle ? Discuss its limitations.

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

NEPGA—1010—302—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

(NEP-2020)

CHEMISTRY

Paper–SCHECT-1202

(Physical and Inorganic Chemistry)

(Thursday, 20-11-2025) **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 **1** is compulsory.

(*iii*) Solve any *two* of the remaining four questions.

(*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 photoelectric effect. Write Einestein's photoelectric equation and mention terms involved in it.

P.T.O.

(*b*) Give limitations of valence bond theory.

(*c*) Define autocatalysis and enzyme catalysis with example.

(*d*) Carnot engine operates between 500K and 300K. Calculate its percent efficiency.

2. Solve the following : 2×5=10

(*a*) Derive an expression of Entropy change for an ideal gas as a function of volume and temperature.

(*b*) What is need for second law of thermodynamics ? Give any *two* statements of second law of thermodynamics.

3. Solve the following : 2×5=10

(*a*) Explain Acid-base catalysis with examples.

(*b*) Give characteristics of catalytic reactions.

4. Solve the following : 2×5=10

(*a*) (*i*) Distinguish between Sigma(σ) and Pi(π) bonds.

(*ii*) Calculate de-Broglie's wavelength of a body of mass 0.1 kg moving with velocity 100 m/s (h = 6.626 × 10^{-34} Js).

(*b*) State and explain Compton effect.

5. Solve the following : 2×5=10

(*a*) Explain formation of SF_6 on the basis of hybridization.

(*b*) What is hydrogen bonding ? Explain its types with examples.

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

NEPGA—5140—301—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

(NEP 2020 Pattern)

ELECTRONICS

Paper–SELECT-1201

(Amplifiers)

(Tuesday, 18-11-2025) **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*) Q. 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*) What is the stability factor ? Give stability factor for CB and CE circuits.

(*b*) Draw the CE amplifier *h*-parameter equivalent circuit for a BJT.

(*c*) Explain input offset voltage.

(*d*) Draw the circuit diagram of an op-amp used as an adder.

P.T.O.

2. (*a*) Explain voltage divider bias with neat diagram. 10

(*b*) Explain DC load line and Q-point with suitable diagram.

3. (*a*) Explain an equivalent circuit for BJT transconductance model with neat diagram. 10

(*b*) Draw neat circuit diagram of CB-amplifier. Derive an expression for voltage gain.

4. (*a*) Explain characteristics of an ideal OP-Amp. 10

(*b*) Explain OP-Amp as investing amplifier.

5. (*a*) Explain the working of an OP-Amp as an integrator. 10

(*b*) Draw the circuit diagram of OP-Amp as substrator and explain.

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

NEPGA—5140—302—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

ELECTRONICS

Paper–SELECT-1202

(Microprocessor and its Application)

(Thursday, 20-11-2025) **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. Attempt the following questions : 10

(*a*) State the interrupt signals of microprocessor 8085.

(*b*) Give the meaning of the following instructions :

(*i*) MUI A, 05

(*ii*) SUB A, B.

P.T.O.

(*c*) What will be the content of accumulator after execution of the following instructions ?

MUI A, 06

MUI B, 05

ADD A, B.

(*d*) Enlist ports of IC 8255 and give their uses.

2. Draw the block diagram of Microprocessor 8085 and explain each block in short. 10

3. What are addressing modes of 8085 ? Explain with suitable examples. 10

4. (*a*) Write an assembly language program to subtract two 8-bit numbers. 5

(*b*) Write an assembly language program to make complement of an 8-bit number. 5

5. Draw the functional pin diagram of IC 8255 and explain in brief. 10

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

NEPGA—5140—303—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

ELECTRONICS

SELEMT-1201

(Sequential Logic Circuits)

(Saturday, 22-11-2025) **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*) Draw neat and well-labelled diagram wherever necessary.

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

1. Solve the following : 10

(*a*) What do you mean by minterm ? Explain with an example.

(*b*) What are counters ? Explain modulus of counter.

(*c*) What are shift registers ? Explain with the help of block diagram.

(*d*) Monotonicity of DAC.

P.T.O.

2. (*a*) Minimize the following equation using K-map : 5

$F(A, B, C, D) = \sum m(1, 3, 7, 11, 15), + d(0, 2, 5)$.

(*b*) Convert the following expression into its standard SOP form : 5

$Y = A + BC + ABC$.

3. With the help of neat logic diagram, truth table and output waveforms, explain 2-bit asynchronous counter. 10

4. Explain the operation of Serial In-Parallel Out (SIPO) shift register in detail. 10

5. Draw the block diagram of successive approximasion type ADC and explain it in detail. 10

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

NEPGA—4030—302—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

(NEP Pattern)

INDUSTRIAL CHEMISTRY

Paper-SICCT-1202

(Chemical Reaction Engineering-I)

(Thursday, 20-11-2025) **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*) Q. No. **1** is compulsory.

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

1. Solve the following questions : 10

(*i*) Explain elementary reaction. 2.5

(*ii*) Explain temperature-dependent term of rate equation. 2.5

(*iii*) Explain disadvantages of constant flow stirred tank reactor. 2.5

(*iv*) Explain fixed-bed reactor. 2.5

P.T.O.

2. Solve the following : 10

(*i*) Explain activation energy significance. 5

(*ii*) Explain classification and reaction with respect to chemical kinetics. 5

3. Solve the following : 10

(*i*) Explain temperature dependency from the collision theory. 5

(*ii*) Explain Activation Energy significane. 5

4. Solve the following : 10

(*i*) Show that the decomposition of N_2O_5 at 67°C is a first order reaction. Calculate the value of the rate constants. 5

Data :

Time in Min	**CN_2O_5 mo/l**
0	0.16
1	0.113
2	0.08
3	0.056
4	0.040

(*ii*) Solve the problem : 5

The half life period of first order reaction is 240 seconds. Calculate the rate constant in seconds and minutes.

5. Solve the following : 10

(*i*) Explain Batch reactor with neat labelled diagram. 5

(*ii*) Explain continuous reactor with neat labelled diagram. 5

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

NEPGA—4030—303—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

INDUSTRIAL CHEMISTRY

Paper-SICMT-1201

(Industrial Process-I)

(Saturday, 22-11-2025) **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*) Q. No. **1** is compulsory.

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

1. Solve the following questions : 10

(*i*) Define sulphuric acid and state its main physical properties.

(*ii*) List the raw materials required for the manufacture of sugar.

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

(*iv*) State the utilities required in a soda ash manufacturing plant.

P.T.O.

2. Solve the following : 10

(*i*) Explain the history and industrial importance of cement and lime.

(*ii*) Discuss the physical and chemical properties of sugar and ethyl alcohol.

3. Solve the following : 10

(*i*) Describe in detail the raw materials and method of production of sulphuric acid.

(*ii*) List the impurities present in lime and their effects on quality. Explain the importance of plant layout in the chemical process industry.

4. Solve the following : 10

(*i*) Explain the manufacturing process of caustic soda with a neat flow sheet.

(*ii*) Describe the manufacturing process of sugar and ethyl alcohol with the help of a flow diagram.

5. Solve the following : 10

(*i*) Prepare an outline of material balance for the manufacture of cement.

(*ii*) Explain the utilities and services required for the operation of a sulphuric acid plant.

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

NEPGA—3010—301—2025

FACULTY OF ARTS AND SCIENCE

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

NOVEMBER/DECEMBER, 2025

(NEP 2020)

MATHEMATICS

Paper–SMATCT-1201

(Real Analysis-I)

(Tuesday, 18-11-2025) **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 (each 2.5 marks) : 10

(*a*) Define an open and closed intervals.

(*b*) Define countable and uncountable sets.

P.T.O.

(*c*) Find the limit point of the sequence $\{S_n\} = (-1)^n$; $n \in \mathbf{N}$.

(*d*) Define monotonic decreasing and increasing sequences.

2. Answer the following questions : 10

(*a*) Show that $\sqrt{8}$ is not a rational number. 5

(*b*) The real number field is Archimedean *ie* if a and b are any two positive real numbers, then prove that there exists a positive integer n such that $na > b$. 5

3. Answer the following questions : 10

(*a*) Prove that, the intersection of any finite number of open set is an open set. 5

(*b*) Prove that, the set of rational numbers in [0, 1] is countable. 5

4. Answer the following questions : 10

(*a*) Show that, a sequence cannot converges to more than one limit. 5

(*b*) Show that $\lim_{n\to\infty} \frac{3 + 2\sqrt{n}}{\sqrt{n}} = 2$. 5

5. Answer the following questions : 10

(*a*) Show that the sequence $\{S_n\}$, where $S_n = \frac{1}{1!} + \frac{1}{2!} + \ldots\ldots\ldots + \frac{1}{n!}$; $\forall n \in \mathbf{N}$ is convergent. 5

(*b*) If $\{a_n\}$, $\{b_n\}$ and $\{c_n\}$ are three sequences such that : 5

(*i*) $a_n \leq b_n \leq c_n$; $\forall\, n$, and

(*ii*) $\lim a_n = \lim c_n = l$,

then prove that $\lim b_n = l$.

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

NEPGA—3010—302—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

(NEP Pattern)

MATHEMATICS

Paper–SMATCT-1202

(Group Theory)

(Thursday, 20-11-2025) **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 : 10

(*a*) Define a group.

P.T.O.

(*b*) Find the order of the following permutations :

(*i*) (124) (35)

(*ii*) (124) (3578).

(*c*) If $\phi : G \to \bar{G}$ is an isomorphism, then prove that ϕ carries the identity of G to the identity of $\bar{G}$.

(*d*) If $\mathbf{R}^*$ is the set of non-zero real numbers, then find the kernel of a homomorphism ϕ. : $\mathbf{R}^* \to \mathbf{R}^*$ defined by $\phi(x) = |x|$.

2. Attempt the following : 10

(*a*) Show that in any group G, there is only one identity element.

(*b*) Prove that the center of a group G is a subgroup of G.

3. Attempt the following : 10

(*a*) Define cyclic group. Find the generators of a cyclic group U(10) of all positive integers less than 10 and relatively prime to 10 under multiplication modulo 10.

(*b*) If S_3 denotes the set of all one-to-one functions from {1, 2, 3} to itself, then show that S_3 is a non-Abelian group under function composition.

4. Attempt the following : 10

(*a*) Let G be a group and $a \in G$. Then prove that the function

$\phi_a : G \to G$ defined by $\phi_a(x) = axa^{-1}$; $x \in G$

is an automorphism of G.

(*b*) If G is a finite group and H is a subgroup of G, then prove that |H| divides |G|. Moreover, show that the number of left (right) cosets of H in G is |G|/|H|.

5. Attempt the following : 10

(*a*) Define :

(*i*) Normal subgroup

(*ii*) Factor group.

(*b*) Define group homomorphism. If ϕ is a homomorphism from a group G to a group $\bar{G}$ and $g \in G$, then prove that :

$$\phi(g^n) = [\phi(g)]^n.$$

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

NEPGA—3010—303—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

MATHEMATICS (DMS-I)

SMATMT-1201

(Foundamentals of Sequence and Group Theory)

(Saturday, 22-11-2025) **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 open interval.

(*b*) Define Bounded sequence.

(*c*) Define Group.

(*d*) Let $\alpha = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$ and

$\beta = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{bmatrix}$. Compute $\alpha\beta$.

P.T.O.

2. Solve the following : 10

(*a*) Prove that the real number field is Archimedean.

(*b*) Prove that the greatest member of a set if it exists in the supremum of the set.

3. Solve the following : 10

(*a*) Prove that a sequence cannot converge to more than one limit point.

(*b*) If $a_n = \sin \frac{n\pi}{2} + \frac{(-1)^n}{n}$, $n \in \mathrm{N}$, then show that :

$$\underline{\lim}\, a_n = -1 \text{ and } \overline{\lim}\, a_n = 1.$$

4. Solve the following : 10

(*a*) Show that the set of all 2×2 matrices

$\mathrm{G} = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} \mid a, b, c, d \text{ are real} \right\}$ is a group under ccomponentwise addition.

(*b*) Prove that the center of a group G is a subgroup of G.

5. Solve the following : 10

(*a*) Prove that : Let a be an element of order n in a group and k be a positive integer, then $<a^k> = \left\langle a^{\gcd(n, k)} \right\rangle$ and $|a^k| = \frac{n}{gcd(n, k)}$

(*b*) Prove that every permutation in S_n; $n > 1$ is a product of 2-cycles.

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

NEPGA—5230—302—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

(NEP 2020 Pattern)

MICROBIOLOGY

Paper–SMICCT-1202

(Immunology)

(Thursday, 20-11-2025) **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 question (Q. No. **2** to Q. No. **5**).

(*iii*) Illustrate your answer with well labelled diagram.

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

(*a*) Normal microflora of skin

(*b*) Attributes of antigen

(*c*) Serological reactions

(*d*) Clonal selection theory.

P.T.O.

2. Define Immune response. Write on types of immune response and add a note on primary and secondary immune response. 10

3. Explain in detail on principle and applications of ELISA. 10

4. What are antibodies ? Explain basic structure of immunoglobulin as per poster-et-al. 10

5. Define infection. Write on different types of infection. 10

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

NEPGA—5230—301—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

MICROBIOLOGY

Paper–SMICCT-1201

(Applied Microbiology)

(Tuesday, 18-11-2025) **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 **2** questions from question No. **2** to **5**.

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

1. Write down the answers : 10

(*a*) Droplet nuclei as source of infection

(*b*) Significance of bioremediation

(*c*) Coliform bacteria

(*d*) BOD

P.T.O.

2. Write in detail the chemical methods to control air brone microorganisms. 10

3. Describe the different methods of water purification. 10

4. Write in detail the final chemical sewage treatment. 10

5. Write in detail the challenges and drawbacks of bioremediation technique. 10

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

NEPGA—5230—303—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

(NEP 2020 Pattern)

MICROBIOLOGY

(SMICMT-1201)

(Fundamental Microbial Techniques)

(Saturday, 22-11-2025) **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 No. **2** to Q. No. **5**.

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

1. Write brief notes on the following : 10

(*a*) Types of stains

(*b*) Gram's staining

(*c*) Principle of cell wall staining

(*d*) Applications of fluorescence staining

P.T.O.

2. Define stain. Explain the procedure of smear preparation and heat fixation. 10

3. Describe negative staining with respect to principle, procedure, observation and significance. 10

4. Explain Manvel's method of capsule staining with respect to procedure, observation and importance. 10

5. Explain in detail fluorescence staining. 10

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

NEPGA—2020—301—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

(NEP Pattern)

PHYSICS

Paper-I-SPHYCT-1201

(Mathematical Methods and Applications in Electricity and Magnetism)

(Tuesday, 18-11-2025) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—30

N.B. *:—* (*i*) Each question carries equal marks.

(*ii*) First question is compulsory.

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

1. Attempt *all* four questions (2.5 mark each) : 10

(*a*) If $Z_1 = 3 + 2i$ and $Z_2 = 4 + 3i$, find $Z_1 + Z_2$ and $Z_1 - Z_2$.

(*b*) State and define gradient of scalar field.

(*c*) Explain the concept of 'j-operator'.

(*d*) Define magnetic flux.

P.T.O.

2. Explain the graphical representation of quotient (Division) of the complex number. 10

3. Define divergence of vector field and explain its physical significance. 10

4. Explain L-C-R circuit in series and find the resonance frequency. 10

5. Derive an expression for torque on current loop in a magnetic field. 10

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

NEPGA—2020—302—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

PHYSICS

Paper–SPHYCT-1202

(Waves and Oscillations)

(Thursday, 20-11-2025) **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 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 nodes in stationary waves.

(*c*) Define undamped vibrations.

(*d*) Define reverberation time.

P.T.O.

2. (*a*) Derive the relation between the wave velocity and particle velocity. 10

(*b*) Derive differential equation of wave motion.

3. Derive an expression for analytical treatment of stationary waves in closed end organ pipe. 10

4. (*a*) Define damped vibrations. Derive differential equation for damped vibrations.

(*b*) Explain phase of resonance. 10

5. What are conditions for good acoustical designs of an auditorium ? 10

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

NEPGA—2020—303—2025

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2025

PHYSICS

Paper–SPHYMT-1201

(General Properties of Matter)

(Saturday, 22-11-2025) **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 number **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*) Define compound pendulum.

(*b*) Define molecular forces.

(*c*) What is critical velocity ?

(*d*) Define Hooke's law.

P.T.O.

2.	(*a*)	Explain the experiment with the bar pendulum.	5
	(*b*)	Explain Bessel's contribution for computed time.	5
3.	(*a*)	Explain surface tension with units and dimensions.	5
	(*b*)	Explain Ferguson method for determination of surface tension.	5
4.	(*a*)	Explain Reynold's number with its significance.	5
	(*b*)	Explain experimental determination of coefficient of viscosity by Poisseulli's method.	5
5.	(*a*)	Derive an expression for torsional pendulum.	5
	(*b*)	Explain bending of beam.	5

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

NEPGA—3020—301—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

ZOOLOGY

(SZOOCT-1201)

(Animal Physiology)

(Tuesday, 18-11-2025) **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 Q. No. **2** to Q. No. **5**.

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

1. Write short notes on the following : 10

(*a*) Kinds of respirations

(*b*) E.C.G.

(*c*) Structure of smooth muscle

(*d*) T.S. of ovaries

P.T.O.

2.	Describe respiratory system in man.	10
3.	Describe working of Human Heart.	10
4.	Describe Ultra structure of Skeletal muscles.	10
5.	Describe structure and functions of Thyroid gland.	10

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

NEPGA—3020—302—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2025

ZOOLOGY

Paper–SZOOCT-1202

(Biochemistry)

(Thursday, 20-11-2025) **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 Q. No. **2** to Q. No. **5**.

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

1. Write short notes on the following : 10

(*a*) Monosaccharides

(*c*) Effect of temperature on enzymes

(*c*) Glycogenesis

(*d*) Ketosis

P.T.O.

2. Describe in detail classification of lipids. 10

3. Explain in detail electrochemical properties of water. 10

4. Explain in detail Glycolysis. 10

5. Describe in detail β-oxidation pathway. 10