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NEPSA—2021—2025

FACULTY OF SCIENCE

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

APRIL/MAY, 2025

PHYSICS

Paper SPHYCT-1101

(Fundamentals of Physics—I)

(Saturday, 12-4-2025)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

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

(2) Question No. 1 is compulsory.

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

(4) Figures to the right indicate full marks.

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

(a) Define gravitational field.

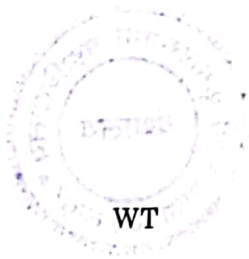
(b) What is fluid ? List its properties.

(c) Which are the types of sound waves ?

(d) What is a semiconductor ?

P.T.O.

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2. (a) Explain the motion of a particle in a central force field. 10
(b) State and explain Kepler's laws of planetary motion.
3. (a) Describe Pascal's principle and its applications. 10
(b) Explain Archimedes principle and Buoyancy force.
4. (a) Describe the method to determine velocity of sound in water with suitable diagram. 10
(b) Derive Newton's formula to measure velocity of sound.
5. (a) What is Zener diode ? Explain working of Zener diode in reverse biased condition. 10
(b) Describe photodiode and its operation.
6. Write short notes on any *two* : 10
 - (a) Gravitational potential
 - (b) Viscosity
 - (c) Intensity of sound
 - (d) N type semiconductor.



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NEPSA—4011—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2025

(NEP-2020 Pattern)

COMPUTER SCIENCE

Paper SCSCCT-1101

(Fundamentals of Computer Science—I)

(Saturday, 19-4-2025)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

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

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

(3) Assume suitable data if necessary.

1. Solve the following questions :

10

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

(b) Explain types of monitor.

(c) Explain Gray code.

(d) What is Window ? Explain its features.

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2. Answer the following : 10
- (a) Draw and explain the block diagram of computer.
 - (b) What is flowchart ? Explain its symbols.
3. Solve the following : 10
- (a) Explain any *two* input devices.
 - (b) Explain voice recognition devices.
4. Solve the following : 10
- (a) Explain octal and hexadecimal number systems.
 - (b) Explain ASCII codes.
5. Solve the following : 10
- (a) Explain any *five* external DOS commands.
 - (b) What is operating system ? Explain its functions.
6. Write short notes on (any *two*) : 10
- (a) Memory
 - (b) Plotter
 - (c) BCD code
 - (d) Types of Software.



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NEPSA—2011—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2025

BOTANY

Paper SBOTCT-1101

(Viruses, Bacteria and Algae—I)

(Saturday, 12-4-2025)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

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

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

(3) Draw neat and labelled diagram wherever required.

1. Write brief notes on the following : 10
 - (a) General characters of viruses
 - (b) Forms of Bacteria
 - (c) Structure of Nostoc filament
 - (d) Algae as food.
2. Describe ultrastructure of TMV. 10

P.T.O.

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3. Describe the process of conjugation in Bacteria. 10
4. Give an account of general characters of algae. Enlist classes of algae as per F.E. Fritch. 10
5. Give systematic position, occurrence and thallus structure of Chara. 10
6. Write brief notes on the following : 10
 - (a) Classification of viruses on the basis of host
 - (b) Little leaf of Brinjal
 - (c) Reproduction in Nostoc
 - (d) Thallus structure of Oedogonium.



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NEPSA—3021—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2025

(NEP-2020 Pattern)

ZOOLOGY

Paper SZOOCT-1101

(Biodiversity of Non-chordates-I)

(Wednesday, 16-4-2025)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

- N.B. :—** (1) Question No. 1 is compulsory.
- (2) Out of the remaining five questions (Q. No. 2 to Q. No. 6) answer any *three* questions.
- (3) *All* questions carry equal marks.
- (4) Illustrate your answers with suitable labelled diagrams, wherever necessary.

1. Answer each of the following : 10

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

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- (b) Explain the Polymorphism in Hydrozoa.
- (c) Explain the general characters of Phylum Annelida.
- (d) Give an account of the Economic importance of Mollusca.
2. Describe in detail the canal system of Sycon and explain the circulation of water in Sycon. 10
3. Give an account of the structure, life cycle and pathogenicity of *Taenia solium*. 10
4. Describe the Digestive system of Cockroach. 10
5. Give an account of the external morphology of Star fish. 10
6. Answer each of the following : 10
- (a) Give a brief account of locomotion in Protozoa.
- (b) Give an account of *Ascaris lumbricoides*.
- (c) Give an account of Metamorphosis in insects.
- (d) Describe the larval forms in Echinoderms.



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SA—71—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2025

ZOOLOGY

Paper II

(Biodiversity of Chordates)

(Wednesday, 23-4-2025)

Time : 10.00 a.m. to 12.00 noon

Time—Two Hours

Maximum Marks—40

Note :— (i) Attempt *all* questions..

(ii) Illustrate your answers with suitable diagram wherever necessary.

1. Describe nervous system of scoliodon. 15

Or

(a) General character of cephalochordata. 8

(b) Salient feature of chordata. 7

2. Describe in detail digestive system of Rat. 15

Or

(a) General character of Aves. 8

(b) Poisonous and non-poisonous snakes. 7

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

10

- (a) Agnatha
- (b) Economic importances of fishes
- (c) Biting mechanism in snake
- (d) Ear of Rat.

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NEPSA—1011—2025

FACULTY OF SCIENCE

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

APRIL/MAY, 2025

(NEP-2020 Pattern)

CHEMISTRY

Paper I (SCHECT-1101)

(Organic Chemistry and Inorganic Chemistry)

(Wednesday, 9-4-2025)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

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

(2) Question No. 1 is compulsory.

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

(4) Figures to the right indicate full marks.

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

10

(a) Explain addition reaction with suitable example.

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- (b) What is aromatic compound ? Explain the structure of Naphthalene with the help of Huckel rule.
- (c) How will you prepare ethylene glycol from 1, 2-dibromoethane ? What is the action of ethylene glycol with $\text{Pb}(\text{OAc})_4$?
- (d) Define the terms :
- (i) Covalent radius
 - (ii) Ionic radius.

2. Solve the following :

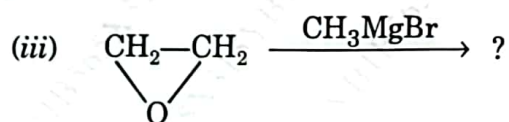
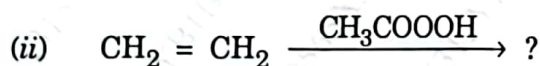
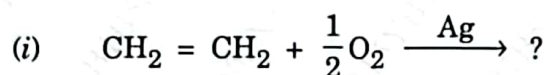
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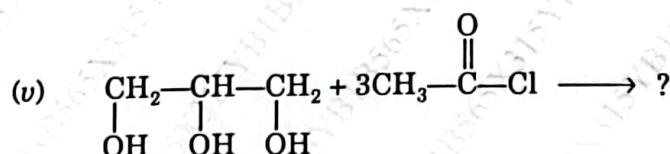
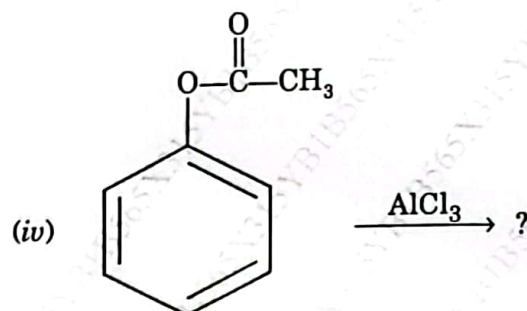
- (a) Explain resonance effect with suitable example.
- (b) Define carbocation. Explain the structure and stability of carbocation.

3. Solve the following :

10

- (a) What are phenols ? Give its classification.
- (b) Predict the product :





4. Solve the following :

10

- (a) Write the general characteristics of s-block elements.
- (b) Define electron affinity. Explain the factor affecting electron affinity.

5. Solve the following :

10

- (a) Explain the nitration of benzene with mechanism.
- (b) Define ionization energy. Discuss variation of ionization energy along a period and in a group.

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

10

- (a) Write a note on Heterolytic Fission.
- (b) Write a note on Kekule structure of benzene.
- (c) Explain ring opening reaction of propylene oxide in acidic medium.
- (d) Write down the applications of electronegativity.



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NEPSA—3011—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2025

(NEP-2020 Pattern)

MATHEMATICS

Paper SMATCT-1101

(Topics in Algebra-I)

(Wednesday, 16-4-2025)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

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

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

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

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

1. Solve the following :

10

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

(b) Define onto-function.

P.T.O.

X315Y49E764X315Y49E764X315Y49E764X315Y49E764

- (c) State elementary column operations.
- (d) Define characteristic root of the matrix.
2. Solve the following : 10
- (a) For any sets A, B and C, prove that : 6
- $$A \cup (B \cap C) = (A \cup B) \cap (A \cup C).$$
- (b) Let : 4
- $$A = \{1, 2, 3\} \text{ and } B = \{a, b\},$$
- find $A \times B$ & $B \times A$. Is $A \times B = B \times A$?
3. Solve the following : 10
- (a) Let $f : \mathbf{R} \rightarrow \mathbf{R}$, defined by $f(x) = x^3$. Show that f is one-one. 6
- (b) Let $f, g : \mathbf{R} \rightarrow \mathbf{R}$, defined by $f(x) = x^3 + 2$ and $g(x) = \sqrt[3]{x}$. Find $f \circ g$ and $g \circ f$. Is $f \circ g = g \circ f$? 4
4. Solve the following : 10
- (a) Prove that, the elementary operations do not alter the rank of a matrix. 6
- (b) Find rank of the matrix : 4
- $$A = \begin{bmatrix} 0 & -1 & 2 \\ 4 & 3 & 1 \\ 4 & 2 & 3 \end{bmatrix}.$$
5. Solve the following : 10
- (a) State and prove Cayley-Hamilton theorem. 6



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(b) Solve the equations :

4

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

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

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

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

6. Solve any two :

10

(a) Let A and B be subsets of universal set $\square$, then prove that :

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

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

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

Also find rank of A.

(c) Let X be a non-empty set and ' $\sim$ ' an equivalence relation on X.

Let $x, y \in X$, then prove that exactly one of the following is true :

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

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

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

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