21BSC6C15ZOL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
ZOOLOGY
DSC 16 : Environmental Biology, Wildlife Management and Conservations

Time : 2 Hours Max. Marks : 60

Instructions : *1) Answer **all** Sections.*
*2) Draw diagrams **wherever** necessary.*

SECTION – A

I. Answer **all** the following sub-questions, **each** sub-question carries **one** mark. **(10×1=10)**

1) a) Define food web.
b) Give an example for non-biodegradable pollutant.
c) What is exsitu conservation ?
d) List any two national parks of Karnataka.
e) Define commensalism.
f) Expand DDT.
g) What are fossil fuels ?
h) State Gause's principle.
i) Mention any one example of man-made ecosystem.
j) What is climate change ?

SECTION – B

II. Answer **any four** of the following questions, **each** question carries **five** marks. **(4×5=20)**

2) Explain the types of food chains.
3) Give an account on wildlife of Indian desert.
4) Describe briefly about insitu methods of conservation.
5) List the causes and effects of water pollution.
6) Briefly explain about classification of wetlands.
7) Explain mutualism with suitable examples.

P.T.O.

SECTION – C

III. Answer **any three** of the following questions, **each** question carries **ten** marks. **(3×10=30)**

8) What is air pollution ? Explain the sources, effects and prevention measures of air pollution.

9) Describe the aquatic adaptations in animals with examples.

10) Give a detailed account on wildlife threats.

11) Explain in detail about biomagnification and bioremediation.

12) Write a note on :
   a) Wildlife Protection Act, 1972
   b) Ozone layer depletion.

21BSC6C15CHL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
DSC 16 : ADVANCED ORGANIC CHEMISTRY AND THERMAL METHODS

Time : 2 Hours Max. Marks : 60

***Instruction** : Answer **all** Sections.*

SECTION – A

Answer the following sub-questions. **Each** sub-question carries **one** mark. **(10×1=10)**

1. a) What is ipso attack ?
   b) Write Goldberg reaction.
   c) Give the Michael reaction.
   d) Define chemoselectivity.
   e) Write Wagner-Meerwein rearrangement.
   f) What is peptide bond ?
   g) Define subgroups.
   h) What are reducible representations ?
   i) Define thermogravimetry.
   j) What are potentiometric titrations ?

SECTION – B

Answer **any four** of the following questions. **(4×5=20)**

2. Explain the arenium ion mechanism. **5**

3. Discuss the hydrogenation of double and triple bond with an example. **5**

4. Give the mechanism of Pinacole Pinacolone rearrangement. **5**

5 Write great orthogonality theorem and give its applications. **5**

P.T.O.

6. Discuss the basic principle and instrumentation of TGA. 5

7. Explain the protection of amino group by BOC-Z and Fmoc. 5

SECTION – C

Answer **any three** of the following questions. **(3×10=30)**

8. a) Discuss the SNAr and benzyne mechanism. 6

   b) Write the following reactions. 4

      i) Diazonium coupling

      ii) Schiemann reaction.

9. a) Explain the addition of Grignard reagent to carbonyl compounds. 6

   b) Give the mechanism of E_1 and E_2. 4

10. a) Give the mechanism of Beckmann rearrangement. 6

    b) Discuss the cleavage of peptide bond by chemical and enzymatic method. 4

11. a) Write a note on symmetry elements and symmetry operations. 6

    b) Write a note on applications of group theory to quantum mechanics. 4

12. a) Explain the principle of potentiometric and conductometric titrations. 6

    b) Discuss the techniques used for the determination of pKa values. 4

21BSC6C15MAL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
MATHEMATICS
DSC 16 : Numerical Analysis

Time : 2 Hours Max. Marks : 60

***Instruction** : Answer **all** Sections.*

SECTION – A

Answer the following sub-questions, **each** sub-question carries **one** mark. **(10×1=10)**

1. a) Round off the third digit in the number 0.4444.
   b) Can absolute error be negative ?
   c) Define an algebraic equation.
   d) Write the Secant method formula to find the real root of non-linear equation.
   e) What is the main purpose of Gauss Elimination method ?
   f) Is Jacobi method direct or iterative ?
   g) $\nabla f(x) =$ _____
   h) Show that $E = 1 + \Delta$.
   i) Define numerical integration.
   j) Does accuracy increase when step size 'h' decreases ?

SECTION – B

Answer **any four** of the following questions. **Each** question carries **5** marks. **(4×5=20)**

2. Approximate values of $\frac{2}{3}$ and $\frac{1}{7}$ correct to 4 decimal places are 0.6667 and 0.1429 respectively. Find the possible relative error and absolute error in sum of approximate values.

3. Find the root of the equation $\tan x = x$ near $x = 4.5$, correct to four decimal places by Newton-Raphson method.

P.T.O.

10. a) Solve $x + y + z = 1$, $4x + 3y - z = 6$, $3x + 5y + 3z = 4$ by Gauss Jorden method. **5**

b) Solve : **5**

$45x + 2y + 3z = 58$

$-3x + 22y + 2z = 47$

$5x + y + 20z = 60$ by Gauss-Seidal method.

11. a) Estimate f(9) by using Lagrange's interpolation formula given that **6**

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

b) Estimate f(4.2) from the table. **4**

x	0	2	4	6
f(x)	2	10	66	218

12. a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using **5**

i) Simpson's $\frac{3}{8}$ rule.

ii) Weddle's rule.

b) Evaluate $\int_4^{5.2} \log x.dx$ by using **5**

i) Trapezoidal rule

ii) Simpson's $\frac{1}{3}$ rule.

21BSC6C15PHL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
PHYSICS
DSC 15 : Electronics Instrumentation and Sensors

Time : 2 Hours Max. Marks : 60

Instruction : *Use of non-programmable scientific calculator is* ***allowed.***

SECTION – A

1. Answer **all** questions. **Each** question carries **one** mark. **(10×1=10)**
   a) What do you mean by three phase power ?
   b) Define line frequency.
   c) In CRO why control grid is kept at negative potential ?
   d) What should be the value of resistance in an ideal ammeter ?
   e) What is signal generator ?
   f) Define a filter.
   g) What is modulation ?
   h) What is the use of phase sensitive detection ?
   i) What is transducer ?
   j) What is thermistor ?

SECTION – B

Answer **any four** of the following questions. **Each** question carries **5** marks. **(4×5=20)**

2. Write a note on π- section filter.
3. Write a note on ac voltmeters using rectifiers.
4. With a neat diagram explain the working of AF sine wave and square wave generator.

P.T.O.

5. Give the structure and working of LED.

6. What are the advantages and disadvantages of digital transmission over analog transmission ?

7. Explain capacitive transducers.

SECTION – C

Answer **any three** of the following questions. **Each** question carries **ten** marks. **(3×10=30)**

8. a) With a neat diagram explain the working of bridge wave rectifier. **7**

   b) In a bridge wave rectifier if a capacitor of 1000 μF is used as a filter. Calculate the ripple factor assuming R_L = 100 Ω and frequency is 50 Hz. **3**

9. With the help of T-network explain fundamental theorem of filters. **10**

10. a) Explain R-2R ladder converter. **5**

    b) Explain the working principle of phase sensitive detection. **5**

11. a) With a neat diagram, explain the working of LVDT. **6**

    b) Write the principle and working of photovoltaic cell. **4**

12. a) Give the block diagram of CRO and explain the working of deflection plates. **6**

    b) Write a note on piezoelectric transducer. **4**

21BSC6C13MAL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
MATHEMATICS
DSC-5 : Linear Algebra

Time : 2 Hours Max. Marks : 60

***Instruction** : Answer **all** Sections.*

SECTION – A

Answer the following sub-questions. **Each** sub-question carries **one** mark. **(10×1=10)**

1. a) Define linear space.
   b) Define basis of a vector space.
   c) Find the standard matrix of $T : R^2 \to R^2$ given by $T(x, y) = (x, -y)$.
   d) State Rank Nullity theorem.
   e) Define isomorphism of a vector space.
   f) Define order of automorphism.
   g) Define invertible transformation.
   h) Write one property of minimal polynomial.
   i) Define Euclidean inner product in a vector space.
   j) Show that the vectors $\alpha = (1, 2, 4)$ and $\beta = (2, 1, -1)$ are orthogonal.

SECTION – B

Answer **any four** of the following questions. **Each** question carries **five** marks. **(4×5=20)**

2. Express the vector (3, 5, 2) as a linear combination of the vectors (1, 1, 0), (2, 3, 0), (0, 0, 1) of $V_3(R)$.
3. Construct the addition table for $V_2(Z_2)$ and list all its subspaces.
4. Diagonalize the matrix $A = \begin{bmatrix} 4 & 2 \\ 3 & 3 \end{bmatrix}$.

P.T.O.

11.a) Determine the relationship between the minimal and characteristic polynomials of the linear transformation $T : R^3 \to R^3$ defined by

$$T\left(\begin{bmatrix} x \\ y \\ z \end{bmatrix}\right) = \begin{bmatrix} x + 2y \\ 3x + 4y \\ z \end{bmatrix}.$$

b) Consider the linear transformation $T : R^2 \to R^2$ defined by

$$T\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{pmatrix} x + 2y \\ 2x + 4y \end{pmatrix}.$$

Determine whether T is singular or not.

12. a) State and prove Cauchy-Schwarz inequality.

b) Consider the space of continuous functions C [0, 1] with the norm $\|f\|_1 = \int_0^1 |f(x)|\, dx$. Verify that this is a valid norm.

21BSC6C13ZOL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
ZOOLOGY
DSC 5 : Evolutionary and Developmental Biology

Time : 2 Hours Max. Marks : 60

Instructions : *1) Answer **all** the Sections.*
*2) Draw diagrams **wherever** necessary.*

SECTION – A

Answer **any ten** of the following sub-questions. **(10×1=10)**

1. a) Who proposed the theory of natural selection ?
   b) Define adaptive radiation.
   c) What is microevolution ?
   d) Write the Hardy-Weinberg equation.
   e) What is homeobox genes ?
   f) What are homologous organs ?
   g) What are fossils ?
   h) What is the geological time-scale ?
   i) Define fertilization.
   j) What is polyspermy ?
   k) Define parthenogenesis.
   l) What are the three germ layers ?

SECTION – B

Answer **any four** of the following questions. **(4×5=20)**

2. What is IVF ? Outline its main steps.
3. List the five major mass extinctions. Which one caused dinosaur extinction ?
4. How do fossils provide evidence for evolution ?

P.T.O.

5. Explain vestigial organs as evidence of evolution.
6. List three sexually transmitted diseases and mention its symptoms.
7. Describe neurulation in the frog embryo.

SECTION – C

Answer **any three** of the following questions. **(3×10=30)**

8. Explain Lamarck's theory of inheritance of acquired characters.
9. Explain the process of allopatric and sympatric speciation with examples.
10. Describe the spermatogenesis and oogenesis with neat labelled diagrams.
11. Discuss the causative agents, symptoms and prevention of AIDS and syphilis.
12. Describe the development of the frog embryo from zygote to gastrula.

21BSC6C15BOTL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
BOTANY
DSC 15 : Plant Physiology and Biochemistry

Time : 2 Hours Max. Marks : 60

Instructions : *a) Answer **all** the Sections.*
*b) **Draw** diagrams **wherever** necessary.*

SECTION – A

I. Answer **all** the following sub-questions. **(10×1=10)**

1) a) Define diffusion.

b) What is transpiration ?

c) What is photosynthesis ?

d) Expand DHAP.

e) What is senescence ?

f) Name the gaseous plant hormone.

g) Expand PCD.

h) Define photoperiodism.

i) What is enzyme ?

j) What is peptide bond ?

SECTION – B

II. Answer **any four** of the following questions. **(4×5=20)**

2) Write a note on absorption of water by plants.

3) Write brief note on photosynthetic pigments.

4) Describe the physiological role of gibberllins.

P.T.O.

5) Describe the photoperiodism and write its significance.

6) What are amino acids ? Write a note on classification and significance of amino acids.

7) Write the difference between C_3 and C_4 plants.

SECTION – C

III. Answer **any three** of the following questions. **(3×10=30)**

8) What is glycolysis ? Describe the glycolytic pathway with schematic representation.

9) Write a note on types of
   a) Transpiration
   b) Membranes
   c) Solutions.

10) Write a note on enzyme classification and add brief note on Key and Lock model of enzyme action.

11) Explain plant movements with classification and examples.

12) Define plant growth regulators. Add a detailed note on classification and their functions.

21BSC6C13CHL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
CHEMISTRY
DSC 14 : Advanced Inorganic and Physical Chemistry

Time : 2 Hours | Max. Marks : 60

Instruction : *Answer* ***all*** *Sections.*

SECTION – A

Answer the following sub-questions. **Each** sub-question carries **one** mark. **(10×1=10)**

1. a) Define stepwise stability constant. **1**
   b) What is thermodynamic stability of metal complexes ? **1**
   c) What is spectrochemical series ? **1**
   d) What is Nephelauxetic effect ? **1**
   e) Define term symbol. **1**
   f) Define paramagnetism. **1**
   g) What is chemical potential ? **1**
   h) What is partial molar volumes ? **1**
   i) What is ionic atmosphere ? **1**
   j) Define electrocatalysis. **1**

SECTION – B

Answer **any four** of the following questions. **Each** question carries **five** marks. **(4×5=20)**

2. Explain the determination of binary formation constant by polarographic method. **5**

3. Write the salient features of crystal field theory. **5**

4. Explain the magnetic properties of octahedral complexes on the basis of crystal field theory. **5**

P.T.O.

5. Write a note on Tanabo-Sugano diagram. **5**

6. Write a note on excess thermodynamic function for Gibb's free energy. **5**

7. Explain Debye-Huckel theory for the problem of activity coefficient. **5**

SECTION – C

Answer **any three** of the following questions. **Each** question carries **ten** marks. **(3×10=30)**

8. a) Explain the factors affecting the stability of metal complexes with reference to nature of the metal ion and ligand. **6**

   b) Explain the structure and bonding in hydrides of transition metal ion complexes. **4**

9. a) Draw the crystal field splitting diagram in tetragonal and square planar geometry. **6**

   b) Explain the factors affecting Crystal Field Stabilization Energy (CFSE). **4**

10. a) Explain the determination of magnetic susceptibility of complexes by Gouy's method. **6**

    b) Write a note on Orgel diagram. **4**

11. a) Derive the phase rule from the concept of chemical potential. **6**

    b) Explain the determination of activity coefficient by solubility method. **4**

12. a) Derive Butler-Volmer equation. **6**

    b) Write a note on concentration overpotential. **4**

21BSC6C13PHL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
PHYSICS
DSC – 13 : Elements of Condensed Matter and Nuclear Physics

Time : 2 Hours | Max. Marks : 60

Instructions : *i) Answer **all** the Sections.*
*ii) Non-programmed scientific calculators are **allowed**.*

SECTION – A

Answer **all** the following questions. **(10×1=10)**

1. a) Define space lattice.
   b) What are Miller indices ?
   c) State Bragg's law.
   d) Define magnetic susceptibility.
   e) What is dielectric constant ?
   f) What is binding energy of a nucleus ?
   g) Define parity.
   h) What happens to the atomic number when a beta particle is emitted ?
   i) Define Compton scattering.
   j) What is cyclotron ?

SECTION – B

Answer **any four** of the following questions. **(4×5=20)**

2. Derive the relation for inter-planar spacing in cubic crystals.
3. Explain Einstein's theory of specific heat.
4. Explain Meissner effect in superconductors.
5. Explain in brief nuclear mass, radius, charge and density of the nucleus.
6. What is half-life of a radioactive element and derive the expression for it ?
7. Explain gamma ray interaction through pair production.

P.T.O.

SECTION – C

Answer **any three** of the following questions. **(3×10=30)**

8. a) Explain the classical free electron theory of metals.

   b) Calculate the interplanar spacing of a crystal if X-rays of wavelength 1.5 Å are diffracted at an angle 30° for first order. **(7+3)**

9. a) Discuss the classification of magnetic materials.

   b) Explain Hysteresis curve. **(6+4)**

10. a) Explain Gamow's theory of alpha decay.

    b) Explain Geiger-Nuttal law. **(6+4)**

11. a) Explain construction and working of GM counter.

    b) Explain Scintillation detector. **(6+4)**

12. a) Explain synchrotron with diagram.

    b) Explain Piezoelectric effect. **(5+5)**

21BSC6C13BOTL

VI Semester B.Sc. (NEP) Degree Examination, June/July 2026
BOTANY
DSC 13 : Cell Biology

Time : 2 Hours | Max. Marks : 60

***Instruction** : Draw the diagram **wherever** is necessary.*

PART – A

I. Answer **all** the following questions. **(10×1=10)**

1) a) Who discovered the cell and in which year ?

b) Name any two component of Glycocalyx.

c) What is the function of Ca-Calmodulin pump ?

d) Define exocytosis.

e) Name the marker enzyme of lysosomes.

f) What is TOM/TIM complex stands for ?

g) What is the nuclear lamina composed of ?

h) Name the four stages of eukaryotic cell cycle.

i) What is checkpoint in cell cycle ?

j) What is microtome ? Give its uses.

PART – B

II. Answer **any four** of the following. **(4×5=20)**

2) Differentiate between primary and secondary cell wall and add note on their distribution.

3) Explain the TOM/TIM system of protein transport into mitochondria.

4) Describe the structure and functions of the nucleolus.

5) Describe the principle of differential centrifugation. Add note on its application.

P.T.O.

6) What are cell cycle checkpoints ? Explain the role of protein kinase in cell cycle.

7) Write a brief account on structure and functions of the cytoskeleton.

PART – C

III. Answer **any three** of the following. **(3×10=30)**

8) Describe the following :

a) Give an account on chemical composition and functions of the cell wall in prokaryotic and eukaryotic cell. **7**

b) Write a short note on cell-cell junction. **3**

9) a) Explain the targeting and insertion of protein into the endoplasmic reticulum. **6**

b) Describe the protein glycosylation and sorting in golgi apparatus. **4**

10) a) Describe the structure of the nuclear pore complex and transport across the nuclear membrane. **6**

b) Explain the process apoptosis or programmed cell death. **4**

11) a) Describe the stages of mitosis with neat labelled diagram. **6**

b) Write a short note on flow sorting cytometry. **4**

12) a) Describe the discovery of cell and cell theory. **5**

b) Describe the principle and application of Schiff's reagent for aldehyde detection. **5**
