BIOLOGY EDUCATION

New Syllabus

Level: Class XI (Education)

Full Marks: 75
Pass Marks: 27

Course Contents

Unit I: Introduction to Biology — **Teaching hours: 5**

- Nature and Scope
- Branches of Biology and its relationships with other branches of Science
- General Concepts of Life processes: Nutrition (Autotrophic and Heterotrophic) Growth, Reproduction
- Human responsibility for the protection of earth and conservation of diverse life forms

Unit II: Cell Biology-I — **Teaching hours: 10**

- Prokaryotes, Eukaryotes
- Structures of plant and animal cell, Cell inclusions and Cell organelles,
- Plant tissues and their function,
- Animal tissues and their function

Unit III: Cell Biology-II — **Teaching hours: 10**

- Protoplasm, its physical and chemical nature
- General structure and roles of Carbohydrate, Protein, Amino Acids, Nucleic Acids, and Lipids.
- The Chromosome

Unit IV: Continuity of Life — **Teaching hours: 5**

- Mitosis, Meiosis and their significance
- Laws of inheritance (Mendalism), Mono-hybrid cross,
- Mutation and its significance
- Concepts of Hybrid and Hybridization, Significance of hybrid seeds for crop production.

Unit V: Evolution — **Teaching hours: 4**

Theories of origin of life

- Biochemical concept of evolution,
- Different views on organic evolution

Unit VI: Biodiversity — **Teaching hours: 30**

Study of one type form belonging to each group of the Five Kingdoms:
Monera, Protista, Plantae, Fungi, and Animalia.

- Monera: Structure and function and economic importance of Nostoc
- Protista Habitat, habit structure reproduction and life cycle of Plasmodium vivax
- Plantae:
  Lower Plants: Morphology, Structure and reproduction of Spirogyra, Marchantia, Dryopteris, Pinus,.
- Angiosperms: Monocotyledonous and Dicotyledonous plants, Morphology, Classification, and Economic importance of selected families: Cruciferae, Leguminosae, Solahaceae, Compositae, and Graminae.
  Garden flowers, Scientific, Common English and Nepali names of the garden flowering plants commonly available in the garden / homes.
  Mycota: Morphology, Structure and reproduction and economic importance of Mucor, Yeast, mushroom, Puccinia.
  Virus: general concept and economic importance (Crop diseases and Health).
  Animalia: General characters and classification of the Phyla: Porifera, Coelenterata, Platyhelminthes, Nemathelminthes, Annelida, Mollusca, Arthropoda, Echinodermata and Chordata.

Unit VII: Sociobiology **Teaching hours: 25**

- Human Biology
  Nutrition, respiration, Blood Circulation,
  Reproduction, Nervous system, Endocrine glands
- Human Welfare:
  i) Socially Significant Diseases: Alcoholism, Smoking, Drug-abuse and AIDs
  ii) Communicable Diseases: Typhoid, Tuberculosis, Ascariasis
  iii) Non-communicable Diseases: Cancer

Unit VIII: Plants of Economic Importance **Teaching hours: 15**

Economic plants, their ecological distribution in Nepal, rural and commercial importance

- Medicinal Plants: Aconitum spp., Rauwolfia serpentine, Adhatoda vasaka, Swertia chirayta, Asparagus racemosus.
- Fiber Yielding Plants: Jute, Cotton, and Simal
- Timber Plants: Sakhuwa / Agrath (Shorea robusta), Sisoo (Dalbergia sisso), Deodar (Cedrus deodara), Karma (Adina cordifolia), Champ (Michelia champaca).
- Vegetables: Common vegetable in local condition
- Cereals: Rice, Maize, Wheat, Millet
- Cash Crops: Sugarcane, Brassica campestris var toria and sarson, Soybean and Spices (Anis, Coriander, Cumin, Cloves, Cardamom)
- Beverage: Tea, Coffee
- Fruits: Common cultivated and wild fruits at the local level.

Unit IX: Animals of Economic Importance **Teaching hours: 05**

Importance of the following animals in human life:
Domestic animals, earthworm, Silkworm, Honey bee.

Unit X: Plant Physiology **Teaching hours: 16**

- Water Relation (Absorption of Water, Ascent of sap, Evapo- Transpiration, Osmosis)
- Metabolism (Photosynthesis I Respiration, Mineral Nutrition, -
  Introduction to Biological Nitrogen Fixation (by algae and legumes), and its significance in agriculture
- Growth (Concept of growth and differentiation)
- Plant Propagation (Clone, Seed, Graft)
- Flowering (Short-day, Long day and Day Neutral Plants)

Unit XI: Ecology **Teaching hours:15**

- Community, Succession, Adaptation (concept)
- Ecosystem, Food Chain, Trophic Levels, Interactions of biotic and abiotic factors.
- Structural and functional aspects of Pond and Forest Ecosystems
- Productivity, Ecological Pyramids
- Bio-Geo-Chemical Cycles: Carbon and Nitrogen

Unit XII: Environment & Conservation **Teaching hours:10**

- Ecological Imbalance and human survival (conceptual)
- Pollution and Pollutants of air, water, soil and food and their control measures.
- Green House Gases, Climate Change.
- In-situ and Ex-situ Conservation of animals and their significance.
- National Parks of Nepal (area, location, and significance) Environmental governance in Nepal (introductory)

PRACTICAL

Full Marks: 25
Teaching hours: 2 periods / Week

This list of practical activities for class eleven (science education) includes those experiments which are to be demonstrated and those which the students themselves are to do. The two categories have not however been separated.

Objectives:

After completing the practical course students will have skill in:

1. developing skills of making careful observations, collecting data and analyzing the results of activity experiments;
2. developing the abilities to interpret the results of the activity/experiments and understand implications of the results;
3. developing skills of setting up appropriate apparatus for activity/experiments and
4. Identifying the process and physiology of human and natural environment.

List of activities /experiments:

1. Study of compound microscope.
2. Study of museum specimens and slides
   - A. i) Types of bacterial cells
     ii) Spirogyra filaments
     iiii) Mucor: Culture, mycelium and sporangium, yeast cells and mushroom, puccinia, lichen. Nostoc, Marchantia, Dryopteris, Pinus, Cycas.
   - B. Amoeba, Paramecium, Plasmodium, Sycon, Hyedra, Tapeworm, Fasciola, Ascaris, Earthworm, Leech, Prawn, Crab, Cockroach, butterfly, Moth, Spider, Scorpin, Centipede, Millipede, Fish (Carp), Frog, Toad, Wall lizard, Turtle, Pigeon, Parrot, Bat and Squirrel.
3. Study of different types of mitotic and meotic cell divisions through permanent slides.
4. Preparation of temporary slides and their study
   - a. i) Onion scales
     ii) Geranium or Zebrina or any other suitable leaf.
   - b. Squamous epithelial cells of human cheek.
5. Description of following plants in semi-technical terms with their floral diagrams and formulae, identification of at least one plant from each of the following families and economical importance: (a) Cruciferae, (b) Papilionaceae, (c) Solanaceae, (d) Compositae and (e) Gramineae.
6. i) Study of fresh water ecosystem using an aquarium or pond showing a food chain
   ii) Pollution.
7. Study of histological structures through permanent slides of rabbit: skin, esophagus, stomach, intestine, rectum, liver, pancreas, lumg, kidney, testis, and ovary.
8. Dissection of animal (any mammal) so as to expose its:
   - a. General anatomy,
   - b. Alimentary canal,
   - c. Arterial and venous system
   - d. Reproductive organs
   - e. Central nervous system (brain)
9. i) Demonstrate the action of saliva on starch.
   ii) Detect the presence of starch in a given solution.
   iii) Detect the presence of sugar in Urine.
   iv) Detect the presence of protein in a given solution (hen's albumen).
   v) Determine
      a) The human blood pressure with sphygmomartometer
      b) Blood groups in man.
10. i) Experiment on Osmosis.
    ii) Experiment oh ascent of sap.

iii) Study on:
a) Unequal transpiration from two surfaces of dorsiventral leaf.
b) Rate of transpiration by Ganongs Potometer.
c) Chlorophyll is essential for Photosynthesis.
d) Carbon dioxide is essential for Photosynthesis.
e) Evolution of oxygen during Photosynthesis.
iv) Experiment on aerobic and anaerobic respiration.
v) Observation of different types of animal tissues on permanent slides: Squamous, Columnar, Areolar, Adipose, Hyalive and Bone.

11. Anatomy of the following materials: -
Preparation of T.S. of dicot stem, leaf and root and of monocot stems, leaf and roots.
12. Study of bones of rabbit (complete).
13. Field Study: Collection, identification of plants and animals and their preservation from the local area and maintain a record.

Question Answer

Teaching / Instructional Materials :
Teaching materials could be either of the following or in combination or more than the mentioned ones for all above course units.
Charts, Models, Improvised apparatus, Over Head Projector, Power Point, Specimen etc.

Evaluation Scheme:
Out of the total coverage Theory portion will cover 75% and rest 25% will be covered by practical.
In theory portion Questions will be of three groups
Long questions each carrying 10 marks 2 to be attempted out of 4 choices. Short questions each carrying 5 marks 5 to be attempted out of 7 choices. Very short questions each carrying 2 marks 15 to be attempted out of 20 choices.

Theory 75

Unit	Course	Very Short (2)*15		Short (5)*5		Long (10)*2	
		To be attempted	Choices	To be attempted	Choices	To be attempted	Choices
Unit I	Introduction to Biology	15	1	5	2	2	1
Unit II	Cell Biology-I		2				1
Unit III	Cell Biology-II		2				
Unit IV	Continuity of Life		1				1
Unit V	Evolution		1		1		
Unit VI	Biodiversity		3		1		1
Unit VII	Sociobiology		2		1		
Unit VIII	Animals of Economic Importance		2				1
Unit IX	Plant Physiology		2		1		
Unit X	Ecology		2		1		
unit XI	Environment & Conservation		2				
	Total	15	20	5	7	2	4

Practical Marks

1) Experiment (Dissection or description' of experiment) - 10
2) Spotting or Activity, item preparation - 8
3) Oral / Viva - 3
4) Note book - 4

□□□

MODEL QUESTION
[HSEB EXAMINATION 2069 (2012)]

Time: 3 hrs | Full Marks: 75 | Pass Marks: 27

Group 'A'

Attempted any FIFTEEN questions: **15x2=30**

1. Write any four characteristics of living things. **[From Unit I]**
2. What are the different types of animal tissues? **[From Unit II]**
3. Write types of lipids with one example of each. **[From Unit III]**
4. What is cell division? **[From Unit IV]**
5. Define cell cycle. **[From Unit II]**
6. Write the importance of hybridization. **[From Unit IV]**
7. Give any four evidences to support that organisms are originated from organic evolution. **[From Unit V]**
8. What are the ways of conserving biodiversity in Nepal? **[From Unit I]**
9. Describe key characteristics of mammals. **[From Unit VI]**
10. Draw a well labelled diagram of Yeast cell (No description required). **[From Unit VI]**
11. Write in brief the mode of nutrition in human being. **[From Unit VII]**
12. Describe the prevention and control of Ascariasis. **[From Unit VII]**
13. List any four timber plants of Nepal. **[From Unit VIII]**
14. What are the advantages of domestic animals? **[From Unit IX]**
15. Write different factors affecting the rate of respiration. **[From Unit X]**
16. What is parthenogenesis? Write its significance. **[From Unit IV]**
17. What is succession? **[From Unit XI]**
18. Define community with examples. **[From Unit XI]**
19. How ozone layer is depleting? How can we minimize the ozone layer depletion process? **[From Unit XII]**
20. List any four endangered animal species of Nepal. **[From Unit IV]**

Group 'B'

Attempt any FIVE questions. **5x5=25**

21. Draw a well labeled diagram of plant cell. Write any four differences in between prokaryotic and eukaryotic cell. **[From Unit II]**
22. Explain the Mendel's law of inheritance. **[From Unit IV]**
23. Describe the structure and reproduction of Spirogyra. **[From Unit VI]**
24. What is circulatory system? Draw a well labeled diagram of human heart. **[From Unit VII]**
25. Discuss the importance of plants. **[From Unit VIII]**
26. How does the absorption of water take place in plants? Describe the factors affecting absorption of water. **[From Unit X]**
27. Write the major sources of water pollution. How can we control water pollution? **[From Unit XII]**

Group 'C'

Attempt any TWO questions. **2x10=20**

28. What is mitosis? Describe its different stages with well labelled diagram and give its significance. **[From Unit IV]**
29. Classify the animal kingdom with two examples each and describe the general characters of, phylum porifera with examples. **[From Unit VI]**
30. Why alcoholism is taken as the socially significant disease in Nepal? Describe the causes and effects of alcoholism. **[From Unit VII]**
31. Explain carbon cycle occurring in nature. Give brief introduction about ecological pyramids. **[From Unit XI]**

1 Introduction to Biology

Q. No. 1 (2070)
Describe the importance of zoology in brief.

Q. No. 8 (2069)
What are the ways of conserving biodiversity in Nepal?

Q. No. 1 (2069)
Write any four characteristics of living things.

Q. No. 21 (2068)
Describe the scope of Biology Education.

Q. No. 1 (2068)
How do you describe the importance of Botany?

❑❑❑

2 Cell Biology- I

Q. No. 29 (2070)
Define tissues. Explain the types of animal tissues with their functions.

Q. No. 22 (2070)
Describe the structure of animal cell with diagram.

Q. No. 2 (2070)
What are the chemical components of protoplasm?

Q. No. 5 (2069)
Define cell cycle.

Q. No. 21 (2069)
Draw a well labelled diagram of plant cell. Write any four differences in between prokaryotic and eukaryotic cell.

Q. No. 2 (2069)
What are the different types of animal tissues?

Q. No. 29 (2068)
Define tissues. Describe the types of plant tissues with their functions.

Q. No. 2 (2068)
Write the functions of mitrochondria.

❑❑❑

3 Cell Biology - II

Q. No. 3 (2069)
Write types of lipids with one example of each.

Q. No. 9 (2068)
Indicate the sources of fat soluble vitamins.

Q. No. 3 (2068)
What is lipid? Write its role in the cell?

❑❑❑

4 Continuity of Life

Q. No. 23 (2070)
Differentiate the monohybrid and dihybrid cross in inheriting the characters.

Q. No. 4 (2070)
What is monohybrid cross? Write briefly.

Q. No. 3 (2070)
Write the significance of mitosis cell division.

Q. No. 28 (2069)
What is mitosis? Describe its different stages with well labeled diagram and give its significance.

Q. No. 22 (2069)
Explain the Mendel's law of inheritance.

Q. No. 20 (2069)
List any four endangered animal species of. Nepal.

Q. No. 16 (2069)
What is parthenogenesis? Write its significance.

Q.N. 6 (2069)
Write the importance of hybridization.

Q. No. 4 (2069)
What is cell division?

Q. No. 23 (2068)
How do you define Mendalism? Why Mendal selected the pea plant for his experiment? Write the biological importance of Mendalism.

Q. No. 22 (2068)
What is meiotic cell-division? Write different stages of meiotic cell division with diagrams.

Q. No. 4 (2068)
What is dihybrid cross? Write briefly.

□□□

5 | Evolution

Q. No. 5 (2070)
Write the theory of "Origin of Species".

Q. No. 7 (2069)
Give any four evidences to support that organisms are originated from organic evolution.

Q. No. 5 (2068)
"Survival of the fittest." Explain this statement with examples.

□□□

6 | Biodiversity

Q. No. 28 (2070)
Classify the phylum Tracheophyta with general characters and examples up to the class only.

Q. No. 24 (2070)
Write habit, habitat, structure and economic importance of spirogyra.

Q. No. 8 (2070)
What is alternation of generation?

Q. No. 7 (2070)
Compare monocotyledons and dicotyledons plants in brief.

Q. No. 6 (2070)
How does binomial system of nomenclature help in plant classification?

Q. No. 29 (2069)
Classify the animal kingdom with two examples each and describe the general characters of phylum porifera with examples.

Q. No. 23 (2069)
Describe the structure and reproduction of Spirogyra.

Q. No. 10 (2069)
Draw a well labelled diagram of Yeast cell (No description required)

Q. No. 9 (2069)
Describe key characteristics of mammals.

Q. No. 28 (2068)
Classify the phylum chordata with general characteristics features and examples up to the class only.

Q. No. 24 (2068)
Write briefly the structure, function and economic importance of Nostoc.

Q. No. 8 (2068)
State the salient features of the red algae.

Q. No. 7 (2068)
List four important characters of phylum protozoa.

Q. No. 6 (2068)
Give a short account of virus.

❑❑❑

7 | Sociobiology

Q. No. 25 (2070)
Why the young people attracted towards drugs? Write briefly the drug abuse in Nepal.

Q. No. 13 (2070)
State the role of enzyme in human digestion.

Q. No. 10 (2070)
Write prevention methods of AIDS in brief.

Q. No. 9 (2070)
Why do we need balance diet?

Q. No. 30 (2069)
Why alcoholism is taken as the socially significant disease in Nepal? Describe the causes and effects of alcoholism.

Q. No. 24 (2069)
What is circulatory system? Draw a well labelled diagram of human heart.

Q. No. 12 (2069)
Describe the prevention and control of Ascariasis.

Q. No. 11 (2069)
Write in brief the mode of nutrition in human being.

Q. No. 25 (2068)
Explain AIDS, and write down the symptoms and preventive measures.

Q. No. 11 (2068)
What are the symptoms of tuberculosis?

Q. No. 10 (2068)
How does smoking affect the human health?

❑❑❑

8 | Plants of Economics Importance

Q. No. 26 (2070)
Write economic importances of the following (any TWO):
a) Mustard

Q. No. 12 (2070)
Write short note on coffee.

Q. No. 11 (2070)
Why the jute is considered as a cash crop? Write down its uses.

Q. No. 25 (2069)
Discuss the importance of plants.

Q. No. 13 (2069)
List any four timber plants of Nepal.

Q. No. 12 (2068)
Write the distribution and economic importance of sisoo (Dalbergia sisso).

❑❑❑

9 | Animals of Economics Importance

Q. No. 14 (2069)
What are the advantages of domestic animals?

❑❑❑

10 | Plant Physiology

Q. No. 30 (2070)
Describe the mechanism of photosynthesis and its required factors.

Q. No. 26 (2070)
Write economic importance of the following. (Any two)
a. Silk worm b. Honeybee

Q. No. 17 (2070)
Write down the advantages of vegetative propagation.

Q. No. 16 (2070)
What is metabolism?

Q. No. 15 (2070)
Write short account of theory of Osmosis.

Q. No. 14 (2070)
Define auxin. Write down its functions.

Q. No. 26 (2069)
How does the absorption of water take place in plants? Describe the factors affecting absorption of water.

Q. No. 15 (2069)
Write different factors affecting the rate of respiration.

Q. No. 30 (2068)
What is transpiration? Describe the factors which affect the rate of transpiration in plant. How can you measure the rate of transpiration by using Ganong's potometer?

Q. No. 26 (2068)
What is absorption? How plants absorb water?

Q. No. 17 (2068)
Why vegetative propagation is considered to be important in plant propagation?

Q. No. 15 (2068)
Compare aerobic respiration with anaerobic respiration.

Q. No. 14 (2068)
Define auxin. Write its role in plants in brief.

Q. No. 13 (2068)
Write short note on: Hormone. ❑❑❑

11 | Ecology

Q. No. 31 (2070)
What is ecosystem? Describe the pond's ecosystem with diagram.

Q. No. 27 (2070)
What is ecosystem? Describe forest ecosystem.

Q. No. 20 (2070)
What is nitrogen cycle? Give diagram.

Q. No. 18 (2070)
How the developmental activities influencing for ecological imbalance?

Q. No. 31(2069)
Explain carbon cycle occurring in nature. Give brief introduction about ecological pyramids.

Q. No. 18 (2069)
Define community with examples.

Q. No. 17 (2069)
What is succession?

Q. No. 31 (2068)
What is Bio-Geo-chemical cycle? Describe the Nitrogen-cycle with diagram.

Q. No. 27 (2068)
What is ecosystem? Write briefly the components of ecosystem.

Q. No.18 (2068)
What do you mean by biotic component in Ecosystem?

Q. No.16 (2068)
How does Nitrogen fixation help in agriculture?

❑❑❑

12 | Environment And Conservation

Q. No. 21 (2070)
How the man can fulfill his responsibility for protection of earth?

Q. No. 19 (2070)
List out the effects of climate change.

Q. No. 27 (2069)
Write the major sources of water pollution. How can we control water pollution?

Q. No.19 (2069)
How ozone layer is depleting? How can we minimize the ozone layer depletion process?

Q. No. 20 (2068)
What are the important flora and fauna found in Chitawan National Park?

Q. No. 19 (2068)
What do you suggest to reduce water pollution?

❑❑❑