Curriculum
for
Conversion Program

(On one year technician to two years technician certificate in Agriculture/Livestock)

Council for Technical Education and Vocational Training

Curriculum Development Division

Sanothimi, Bhaktapur.

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Aim

- To convert the one-year TCL agriculture/livestock graduates into two years technician certificate to make them eligible for B. Tech. Ed. program.

Objectives

- To impart skils and knowledge in related vocational areas through world of work experience
- To provide skills & knowledge of foundation subjects/core subjects
- To convert graduates of one year technician certificate holders into graduates of two year technician certificate holders.

Course description

This course consists of two parts. The first part consists of skills related to respective vocational areas through world of work experience and the second part provides basic skill and knowledge on foundation subjects such as English, Nepali, Physics, Mathematics, Chemistry, Botany and Zoology.

Course structure

Part I World of work experience

A. Work experience (Agriculture group)

Part I	**World of Work experience (Agriculture group)**		
S.N.	Areas	Nature	Marks
1.	Extension and Community Development	P	40
2.	Farm Management and Marketing	P	40
3.	Principles and Practices of Food Crop Production	P	40
4.	Principles and Practices of Fruit Crop Production	P	40
5.	Plant Protection	P	40
6.	Principles and Practices of Industrial Crop Production	P	40
7.	Vegetable and Medicinal Plant Production	P	40
8.	Floriculture and Nursery Management	P	40
9.	Soil and Soil Fertility Management	P	40
10.	Seed Production Technology	P	40
11.	Post- Harvest Technology	P	40
12.	Report Writing	P	60
	TOTAL:		**500**

B.World of work experience (Livestock group)

Part I	**World of Work experience (Livestock group)**		
S.N.	Areas	Nature	Marks
1.	Extension and Community Development	P	40
2.	Farm Management and Marketing	P	40
3.	Introductory Animal Husbandry	P	40
4.	Large Ruminants Production and Management	P	40
5.	Small Ruminants, Swine and Poultry Production	P	40
6.	Animal Nutrition and Fodder Production	P	40
7.	Dairy and Dairy Products	P	40
8.	Aquaculture	P	40
9.	Animal Health l	P	40
10.	Animal Health lI	P	40
11.	Veterinary Laboratory Techniques	P	40
12.	Report Writing	P	60
	TOTAL:		**500**

Part II Foundation subjects

Part II	Foundation subjects										
S.No	Subject	Nature		Weekly hrs	Distribution of Marks						Total Marks
					Theory			Practical			
		T	P		Internal	Final	Time (hrs)	Internal	Final	Time (hrs)	
1	English	2	-	2	10	40	1.5	-	-	-	50
2	Nepali	2	-	2	10	40	1.5	-	-	-	50
3	Physics	3	1	4	15	60	3	15	10	3	100
4	Chemistry	5	2	7	15	60	3	15	10	3	100
5	Zoology	5	2	7	15	60	3	15	10	3	100
6	Botany	5	2	7	15	60	3	15	10	3	100
7	Mathematics	4	-	4	10	40	1.5	-	-		50
	TOTAL:	**25**	**8**	**33**	**90**	**360**		**60**	**40**		**550**

Duration

The duration of this program will be of **one** year. The full marks of the first part will be of 500 and the duration will be counted as of six months. The full marks of the second part will be of 500 and the duration will be of six months.

Pattern of attendance

- The attendance of the first part of this program will be as per the rules and regulations of the related employer agencies.
- Students enrolled in the second part of this program are full time or regular students and they are required to maintain at least 90 percent attendance in each class.

Target group

Graduates having passed one year Technician Certificate course in the field of Agriculture/Livestock plus atleast of 2 years job experience as JT in the related field.

Entry criteria

One year tecnnician certificate plus 2 years job experience in the related field.

Group size

Forty (40) students in theory class
Ten (10) in practical classes

Certificate

Students successifully completing the requirements of this curricular program will be awarded the certificate of **"Two years Technician Certificate in Agriculture/Livestock".**

Student's evaluation

Evaluation scheme for

Part I : World of work experience

S.N.	Evaluated by	Evaluation %age
1.	Supervisor (Immediate SMS)	50%
2.	Division/Unit/Section head (Office- Incharge)	25%
3.	Review Committee (DG/DOA/DOL)	25 %
	TOTAL :	**100%**
The employee should get atleast 60% marks in the evaluation of world of work experience.		

Note:

- **For wage employed:** the evaluation of world of work experience will be carried out by the related government authorities/GOs/INGOs/other formal institutions.
- **For self employed:** The evaluation of world of work experience will be carried out by the related local level government authority (DLSO/DADO).

Part II : Foundation subjects

Types of Evaluation	Marks	
	Theory	**Practical**
External	80%	40%
Internal	20%	60%
TOTAL :	**100%**	**100%**

- Students are required to secure 40% marks in theory and practical examinations separately to pass each subject.
- Students are also required to secure 40% marks in each subject in their internal assessment inorder to appear in the final examination.

Grading system

The grading will be based on the total marks obtained by the graduates as follows:

1 Distinction : 80 % and above
2 Fist division : 65 % and above
3 Second division : 50% and above
4 Pass or third division : 40% and above

Part I World of Work Experience (Agriculture Group)

Areas:

1. Extension and Community Development
2. Farm Management and Marketing
3. Principles and Practices of Food Crop Production
4. Principles and Practices of Fruit Crop Production
5. Plant Protection
6. Principles and Practices of Industrial Crop Production
7. Vegetable and Medicinal Plant Production
8. Floriculture and Nursery Management
9. Soil and Soil Fertility Management
10. Seed Production Technology
11. Post- Harvest Technology
12. Report Writing

Part I Details of World of Work Experience (Agriculture Group)

Area 1: Extension and Community Development

World of Work experience on:

1. Identification and prioritization of farmers' problem
2. Use of RRA and PRA techniques as informal methods of information collection
3. Practices on development of visual aids such as posters, charts, pamphlets, flash cards and graphs
4. writing report of the visit of result demonstration and farmer's field trial
5. Conduct method and result demonstration
6. Visit DOA, DLSO and related stakeholders in the district to understand existing extension practices
7. Preparation of individual farm production plan for farm family
8. Preparation of training programs covering lesson planning and modes of delivery on the topic related to livestock and agriculture development
9. Conduct case study of a farmer group formed by DADO

Area 2: Farm Management and Marketing

World of Work experience on:

1. Review of terminologies used in FM
2. Calculation of average and marginal products
3. Calculation of AC, MC, AFC and AVC
4. Calculation of profit maximizing level of output
5. Preparation of Balance Sheet of a farm
6. Preparation of income statement of a farm
7. Preparation of budget sheet for major crops
8. Preparation of budget sheet for minor crops
9. Preparation of simple farm inventory of a farm
10. Preparation of cropping scheme
11. Development of a farm work-plan (6 w- approach)
12. Preparation of product record charts
13. Discussion with farmers for way of risk management
14. Calculation of simple and compound interest
15. Calculation of depreciation of capital
16. Writing report of visit on real credit organization
17. Study of retail price of major agriculture commodities from near by market
18. Study of wholesale price of major agriculture commodities from near by market
19. Identification of marketing channels
20. Writing report of visit on private agro-vets and agriculture farms/enterprises (livestock/poultry farm, vegetable farms, nursery etc.)

Area 3: Principle and Practices of Food Crop Production

1. Identification of plants and seeds of common food crops (Rice, wheat, maize, millet, barley and pulses)
2. Identification major insect pests and diseases of common crops
3. Major technical interventions on:
    a. Seed and Variety selection
    b. Land and seed bed preparation
    c. Fertilization and Manuring (IPNS)

d. Seed sowing and Transplanting
e. Weed Management
f. Critical Crop Growth Stages
g. Irrigation and Drainage Methods
h. Management of major insect pests and diseases (ICM, IPM)
i. Harvesting, Threshing and Storage
j. Marketing

Area 4: Principles and Practices of Fruit Crop Production

World of Work experience on:

1. Identification of fruit and plantation crops
2. Identification and use of horticultural tools and equipment
3. Lay-out of orchards and tea garden
4. Digging and filling of pits and planting of fruit saplings
5. Training and pruning of fruit and plantation
6. Fertilizing and manuring fruit trees
7. Preparation and application of Bordeaux mixture/ paste
8. Preparation of different concentrations of PGR and application
9. Practices of cutting, layering and grafting

Area 5: Plant Protection

World of Work experience on:

1. Identification and uses of common plant protection equipment and tools
2. General features of insects
3. Growth and development of insects
4. Other insects like pests (other orthopoda)
5. Identification of insects feeding habits/ mouth parts of insects
6. Identification of common insects pests
7. Collection and preservation of insect pests
8. Identification, collection and preservation of insects damaged crop parts
9. Identification of disease symptoms
10. Collection and preservation of diseased materials
11. Common pesticides available in Nepal and their label, meaning and use
12. Formulation and dilution of pesticides
13. Preparation and application of Bordeaux Mixture
14. Study and calibration of sprayers
15. Foliar application of pesticides
16. Soil application of pesticides
17. Seed treatment by pesticides
18. Post-harvest treatment by pesticides
19. Tree-wound treatment by pesticides
20. Use of common botanical materials as pesticides
21. Rodents control methods
22. Precaution and safe use of pesticides, and their safe disposal
23. Writing report of field visit on identification of the plant disease and insect damage
24. Indigenous knowledge system on insect pest control
25. Indigenous knowledge system on plant diseases control
26. Survey of eco-friendly plant protection measures

Area 6: Principle and Practices of Industrial Crop Production

World of Work experience on:

1. Identification of plants and seeds of common food crops (Sugarcane, Tobacco, Cotton, Jute, Oilseed)
2. Identification major insect pests and diseases of common crops
3. Major technical interventions on:
    a. Seed and Variety selection
    b. Land and seed bed preparation
    c. Fertilization and manuring (IPNS)
    d. Seed sowing and transplanting
    e. Weed management
    f. Critical crop growth stages
    g. Irrigation and drainage methods
    h. Management of major insect pests and diseases (ICM, IPM)
    i. Harvesting, threshing and storage
    j. Marketing
4. Special field operations
    a. Tobacco- de-suckering, priming and curing
    b. Jute- jute extraction
    c. Sugarcane- propping, wrapping, various types of planting materials
5. Processing techniques used for major industrial crops

Area 7: Vegetable and Medicinal Plant Production

World of Work experience on:

1. Identify vegetables and vegetable seeds
2. Identify spices and their seeds
3. Perform germination test for vegetable seeds
4. Prepare and maintain vegetable nursery
5. Prepare land for transplanting vegetables
6. Develop a yearly calendar of kitchen gardening
7. Identify major insect pests and diseases of major vegetables
8. Identify nature of damage of important insect pests and diseases
9. Spray insecticide and fungicides for insect and disease control
10. Perform cultural operation (mulching, manuring, training, earthing up etc.)
11. Prepare hotbed and plastic tunnel for off-season production
12. Keep records of inputs and sale and calculate cost and profit of vegetables

Area 8: Floriculture and Nursery Management

World of Work experience on:

1. Identification of ornamental plants: annuals, biennials, perennials, shrubs, trees and climbers.
2. Preparation of nursery beds
3. Preparation of media and soil mixture including for container grown plants
4. Collection of seeds for propagation
5. Seed treatment for breaking dormancy
6. Sowing seeds and transplanting seedlings
7. Potting and repotting
8. Perform training and pruning of ornament plants

9. Preparation of lawn
10. Preparation of landscape designs for residential and public building, and park.
11. Flower arrangement
12. Preparing of cuttings
13. Preparing air layers
14. Grafting and budding
15. Care and maintaining of nursery plants

Area 9: Soil and Soil Fertility Management

World of Work experience on:

1. Concepts of soil
2. Physical properties of soil
3. Chemical properties of soil
4. Soil profiles
5. Soil classification
6. Soil nutrients
7. Determination of bulk density and particle density
8. Determination of soil texture and consistency
9. Identification of major soil forming rocks and minerals
10. Determination of soil PH
11. Determination of organic matter of soil
12. Estimation of available Nitrogen, Phosphorous and Potassium
13. Identification and handing of major soil lab equipments
14. Handling and management of soil kit box
15. Identification of nutrient deficiency symptoms of major plants
16. Principles and use of Integrated Plant Nutrient Management System (IPNS)
17. Green manuring, composting and crop residues management
18. Terrance management

Area 10: Seed Production Technology

World of Work experience on:

1. Major agronomical and horticultural seeds in Nepal
2. Climatic requirement
3. Classification of major agronomical and horticultural crops
4. Crop classification based on pollination methods
5. Isolation disttance
6. Seed zoning
7. Seed production techniques
8. Rogueing
9. Nutrient management for seed production
10. Harvesting
11. Seed Processing (drying, cleaning, grading and packaging)
12. Seed Storage
13. Seed marketing
14. Seed quality control and seed certification

Area 11: Post-harvest Technology

World of Work experience on:

1. Estimation of post harvest lost in cereals, fruit and vegetables
2. Identification of maturity indices of major fruits, vegetables and major cut flowers
3. Harvesting shorting grading and packing of major fruits, vegetables and cut flowers
4. Study the equipment and tools used in preservation and processing
5. Ripening of banana
6. Use of solar dryer for drying fruits and vegetables
7. Preparation of jam, jelly, ketchup, juice, squash and pickles
8. Storage techniques for cereals, fruits and vegetable crops (zero energy, solar storage rustic storage and metal been)
9. Preparation of green coffee.
10. Writing of report on visit to cellar and cold storages
11. Writing of report on visit to distillation/ processing units of medicinal plants
12. Writing of report on visit to spice or herbal processing plant.
13. Prepare *Sutho*

Area 12: Report Writing

1. Writing technical report in recent format.

Part I: World of Work Experience (Livestock Group)

Areas:

1. Extension and Community Development
2. Farm Management and Marketing
3. Introductory Animal Husbandry
4. Large Ruminants Production and Management
5. Small Ruminants, Swine and Poultry Production
6. Animal Nutrition and Fodder Production
7. Dairy and Dairy Products
8. Aquaculture
9. Animal Health l
10. Animal Health lI
11. Veterinary Laboratory Techniques
12. Report Writing

Details of World of Work Experience (Livestock Group)

Area 1: Extension and Community Development

World of Work experience on:

1. Identification and prioritization of farmers' problem
2. Use of RRA and PRA techniques as informal methods of information collection
3. Development of visual aids such as posters, charts, pamphlets, flash cards and graphs
4. Writing reports on visit of mil cooperatives, chilling center, stature house and livestock farm.
5. Conduct method and result demonstration
6. Writing reports on visit of DOA, DLSO and related stakeholders in the district to understand existing extension practices
7. Preparation of individual farm production plan for farm family
8. Preparation of training programs covering lesson planning and modes of delivery on the topic related to livestock and agriculture development
9. Conduct case study of credit delivery/micro credit/group formation accountancy formed by DLSO

Area 2: Farm Management and Marketing

World of Work experience on:

1. Review of terminologies used in FM
2. Calculation of average and marginal products
3. Calculation of AC, MC, AFC and AVC
4. Calculation of profit maximizing level of output
5. Preparation of balance sheet of a farm
6. Preparation of income statement of a farm
7. Preparation of budget sheet for meat and meat products plus dairy products.
8. Preparation of simple farm inventory of a farm
9. Preparation of livestock farming scheme
10. Development of a farm work-plan (6 w- approach)
11. Preparation of product record charts
12. Discussion with farmers for way of risk management
13. Calculation of simple and compound interest
14. Calculation of depreciation of capital
15. writing reports of visit on real credit organization
16. Study of retail price of major agriculture and livestock commodities from near by market
17. Study of wholesale price of major agriculture and livestock commodities from near by market
18. Identification of marketing channels
19. Visit to private agro-vets and agriculture farms/enterprises (livestock/poultry farm, vegetable farms, nursery etc.)
20. Writing reports of visit on DADO, DLSO and COs
21. Following biosecurity.
22. Study of dairy cooperatiove and their marketing.

Area 3: Introduction to Animal Husbandry

World of Work experience on:

1. Identification of common breeds of cattle, buffalo, goat, sheep, and poultry birds
2. Record keeping practices for farm animals
3. Judging animals for selection using different scoring methods

4. Identification of common grasses and forage legumes
5. Feed formulation using thumb's rules
6. Practical study on digestive system of ruminants to understand nutrition.
7. Practical study on digestive system of non-ruminants to understand nutrition.
8. Practical study on reproductive systems of male and female animals and poultry birds
9. Identification of farm animals and poultry birds
10. Treating animals against external and internal parasites and worms
11. Writing reports of visit on DLSO to observe and experience about Artificial Insemination (AI) practices.

Area 4: Large Ruminants Production and Management

World of Work experience on:

1. Identification of common breeds of cattle and buffalo
2. Study on digestive system of ruminants
3. Determination of age in animals
4. Study on reproductive systems of male and female ruminants
5. Identification of large ruminants (tagging, tattoing, branding)
6. Treating large ruminants against external and internal parasites and worms
7. Practice on routine farm operations: weighing, debudding and dehorning
8. Record keeping practices for farm animals
9. Judging animals for selection using different scoring methods
10. Performing methods of castration, handling and casting.

Area 5: Small Ruminants, Swine and Poultry Production

World of Work experience on:

1. Breed identification of goats, sheep, swine, and poultry birds
2. Study of the external body parts of goats and sheep, swine and poultry birds
3. Conduct routine farm operations including numbering, weighing, debudding, catration, dipping and dusting for sheep and goat
4. Shearing sheep
5. Determination of age of sheep and goat.
1. Estimation of body weight of sheep and goat
6. Detect heat symptoms in sheep, goats and swine
7. Castratration of piglets
8. Selection of broody hens
9. Selection of hatching eggs
10. Prepare facilities for rearing chicks
11. Formulate poultry rations for different age and category
12. Study on brood management
13. Develop vaccination plan for broilers and layers
14. Debeaking poultry birds and clip of wing feathers
15. Culling of poultry birds
16. Maintain farm records of production and management activities for small ruminants, swine, and poultry production.

Area 6: Animal Nutrition and Fodder Production

World of Work experience on:

1. Identification of common grasses, forage legumes, and fodder trees
2. Identification of common feed ingredients for farm animals and poultry birds
3. Feed formulation for different age groups and species of farm animals and poultry birds

4. Cultivation practices of common annual and perennial grasses and legumes
5. Preparation of seasonal calendar of different cereal fodder and legumes considering sowing and harvesting time to supply green fodder all the year round
6. Dry matter and yield estimation of seasonal fodder/legumes and pastures
7. Writing reports of visit on fodder tree nursery
8. Writing reports of visit on DLSO or any fodder nursery to observe and experience about fodder/forage production activities.
6. Prepare/maintain a herbarium of common fodder/forage/legumes and fodder trees
7. Application of newer livestock technology in Nepalese technological context.

Area 7: Dairy and Dairy Products

World of Work experience on:

1. Study of commonly used dairy equipment
2. Milk animal using hygienic techniques
    a. Prepare animal
    b. Prepare stables
    c. Prepare equipment
    d. Prevent transmission of milk carried diseases
    e. Prevent mastitis
    f. Practice hand milking
3. Sampling of milk
4. Estimation of fat by Gerber's method
5. Estimation of specific gravity, SNF and total solid
6. Perform quality control tests for milk and milk products
    a. Organolaptic test
    b. Clot on boiling
    c. Alcohol test
    d. MBR (Methylene blue reduction) test
    e. Standard plate count
7. Identification of different dairy products produced in Nepal
8. Study of cream separator and method of cream separation
9. Standardization of milk and milk products
10. Preparation of curd, khuwa, cheese, butter, ice cream, and ghee.
11. Visit and observe nearby dairy processing plant

Area 8: Aquaculture

World of Work experience on:

1. Identify external and internal body parts of fish
2. Identify common fish species
3. Plan a fish pond
4. Lay-out fish pond
5. Handle fish culture equipment safely
6. Take out the pituitary gland of fish
7. Preserve pituitary gland
8. Apply pituitary gland for induced breeding of fish
9. Make use of water filtering structures/drainage devices
10. Make bamboo cage
11. Make bamboo gates for paddy fish culture
12. Carryout fish culture practices

13. Manage fish pond
14. Maintain water level of fish pond
15. Fertilize/manure fish pond
16. Feed fish
17. Identify/control aquatic weeds
18. Collect/identify/control common parasites of fish
19. Identify/treat/control common diseases of fish
20. Prevent from water bloom
21. Protect pond from predators/flood/erosion
22. Carryout activities related to fish breeding
23. Handle fingerlings
24. Measure fish growth
25. Carryout pond mud analysis
26. Harvest fish
27. Market fish
28. Keep record of necessary data

Area 9: Animal Health l

World of Work experience on:

1. Identification of healthy and sick animals
2. Clinical examination of patients
    a. History taking and general appearance
    b. Physical examination: temperature, pulse, respiration, palpation, percussion and auscultation
    c. Examination of animal movement
    d. Rectal examination
    e. Examination of different body parts
3. Prescription writing methods
4. Identification of common veterinary medicines
5. Calculation of dosage of drugs
6. Preparation of tincture iodine and lugol's iodine
7. Preparation of common ointments
8. Route of administration of drugs
9. Sterilization of glassware and media
10. Examination of faecal samples
11. Routine examination of urine
12. Blood collection and preparation of smears
13. Disinfections of shades and buildings
14. Examination of wound and its treatment
15. Management of fracture in animals

Area 10: Animal Health ll

World of Work experience on:

1. Identification of common internal parasites of cattle and buffalo
2. Identification of common internal parasites of sheep and goat
3. Identification of internal/external parasites of poultry
4. Identification of internal/external parasites of livestock
5. Collection and preservation of parasites
6. Draw the life cycle of the common parasites of farm animals
7. Vaccination practices in livestock

8. Vaccination practices in poultry
9. Practice of rectal examination
10. Practice of AI
11. Diagnosis of pregnancy
12. Doagnose of dystocia

Area 11: Veterinary Laboratory Techniques

World of Work experience on:

1. Identification of common veterinary laboratory equipment
2. Handling and use of microscope
3. Preparation and cleaning of glassware
4. Method of sterilization
5. Use of antiseptics
6. Use of disinfectants
7. Morphological identification of trematodes
8. Morphological identification of nematodes
9. Morphological identification of cestodes
10. Identification of parasite eggs by faecal examination
11. Identification of external parasites
12. Identification of mange mites by skin scrapping test
13. Collection of blood samples
14. Preparation of blood smear
15. Total count of RBC
16. Total count of WBC
17. Differential count of WBC
18. Hemoglobin estimation
19. Preparation of blood serum
20. Identification of blood protozoa
21. Routine examination of urine
22. Preparation of bacteriological media
23. Method of inoculation of samples
24. Gram's staining method for identification of bacteria
25. Antibiotic sensitivity test
26. Preparation of CMT reagent and examination of milk
27. Practice of media preparation
28. Cultural examination of milk
29. Examination of milk by California Mastitis test
30. Post-mortem examination of livestock
31. Post-mortem examination of poultry

Area 12: Report Writing

1. Writing technical report in recent format.

Part II Foundation Subjects

Subjects

1. English
2. Nepali
3. Physics
4. Chemistry
5. Zoology
6. Botany
7. Mathematics

1. English

Total Class: 39 hrs. **Full Marks: 50**
Pass Marks: 20

Course objectives

General objectives

This course aims at developing in the students the abilities and skills required in the use of English for academic and communicative purposes. This course trains students in the substantial, functional and notional areas of English language uses, enabling them to see the relationship between structure and meaning of language in use. The course also prepares students for extensive reading and writing, with a sound backing up of the different genres, leading to the sensitivity, involvement, understanding and insight into the different aspects of life.

Specific objectives

The course has aimed at developing the following specific objectives.

- Expressing experiences achievements, habits and routines in appropriate forms.
- Describing appearances shapes, sizes structures with appropriate qualifications
- Expressing events in the past, places
- Expressing appropriate mental and emotional reactions to persons, places, events and phenomena
- Reporting what others have said and producing reports and news
- Deducing, explaining and evidencing logically
- Expressing advantages and disadvantages of a product/technique
- Directing, sequencing and instructing processes
- Understanding and interpreting literary texts for knowledge, pleasure, analysis and evaluation.

Unit One: Core English

Theme/ Topic	Focused Structures	Focused Vocabulary	Functions	Reading	Writing
Experiences and Achievements	-The present Perfect -The past Simple -Have You Ever….? ..'be' used + V- ing -Used to+ v -It's the first time I've ever… -Superlatives….ever perfect.	-Words related to jobs, places, responsibilities, experiences and achievements	Asking about experience/ achievements and responding to queries	Related readings	Job application Letters
Appearance	-Look/ look like/ look as though-as if.. - Structures with 'seem' - Guessing ages	-Facial features -Physical characteristics -Look/ seem/ feel/ smell/ hear/ taste -Ages	- Describing persons	Related readings	Writing etiquettes

Past Events	- Past simple - Past perfect - Past continuous - Non- defining relative clause - Events in sequence and interrupted events	-Narratives - Events/ accidents	- Narrating past events	Related readings	Writing narratives
Attitudes and reaction	-If there is one thing (t hat)…… -The thing…be… -I hate/object to/like/….the way…	- Verbs, adjectives and nouns for expressing attitude	-Talking about people and things -Judging character -Reacting to past experience	Related readings	Attitudes and reaction
Reporting and News	-Reported speech -Reporting for 'thought 'and opinion -Reporting in passage	-Common language in newspaper -Verbs for reporting different meaning	Sharing reports and news	Related readings	Newspaper articles; Reporting conversations
Advantages and Disadvantages	-Conditional structures -Advice and suggestion structures	-Effect verbs -Advantages/ disadvantages - Advising	Expressing advantages and disadvantages	Related readings	Advantages and disadvantages
Processes	-Causative structure -Structure with 'when' -Passive structures -The right order	-Change of state -Process	-Giving instructions	Related readings	Writing general/ technical processes
Deductions and Explanations	-Conditional structures -Significance structures	-Modals and infinitives - Conclusions, - Explanations/evidence	Arguments and Explanations	Related readings	Deducing and explaining phenomena

Unit Two: Extensive Reading and Writing

A: Poetry

1. The grandmother, Ray your Bear
2. The Lamentation of the old Pensioner, W.B. Yeats

B: **Short Story**

1. About Love, Anton Chekhov
2. A Story, Dylan Thomas
3. The Tell-tale Heart, Edger Allan Poe
4. Hansel and Gretel, Jacob and Wilhelm Grimm

C: Essay

1. Two long-term problems,; Too many people; Too few trees, Moti Nissani
2. Hurried Trip to Avoid a Bad Star, M. Lilla and Bishop Berry
3. I have a Dream, Martin Luther King, Jr.
4. Women's Business, Ilene Kantrov

D: Play

1. Purgatory, W. B .Yeats

Evaluation Scheme

This paper carries 50 marks, which will be divided as follows:-

Core English: 60%

Extensive Reading and writing: 40%

In terms of language skills, the course is divided as follows.

i. Reading skills : 35%
ii. Writing skills : 35%
iii. Grammar and usage :30%

Time Planning

1. Introduction to the course : 2 Teaching hours
2. Core English 8x3 : 24 Teaching hours
3. Extensive Reading : 15 Teaching hours

Total: 41 Teaching hours

Specification Grid

a. Reading passage/s (unseen)
b. Structural conversions (guided)
c. Comprehension questions (from unit two)
   - At the level of understanding
   - At the level of Interpretation and interferences
d. Free writing: Essays, letters, Arguments and so on

Prescribed Texts

1. Doff, Adrian , Christopher Johes, Keth Mitchell, Meanings into words (Upper Intermediate, Student's Book, Cambridge University Press, 1984.)
2. Doff, Adrian , Christopher Johes, Keth Mitchell, Meanings into words (Upper Intermediate, Work Book, Cambridge University Press,1984.)
3. The Heritage of words : Ekta Books , Kathmandu, 1996

२. अनिवार्य नेपाली

कक्षा भारः ३९ घण्टा **कूल पूर्णाङ्क : ५०**
उत्तीर्णाङ्क : २०

परिचय र उद्देश्यः यो पाठ्यांश कृषि र पशु विज्ञान जे.टी. तहमा अध्ययन गर्ने विद्यार्थीहरूमा नेपाली भाषासम्बन्धी आधारभूत क्षमताको विकासको लागि राखिएको हो । यो पाठ्यांश पूरा गरेपछि विद्यार्थीहरू निम्नलिखित कुरामा सक्षम हुनेछन् :

१. स्तरअनुरूप सम्बद्ध विषयक्षेत्रमा प्रयोग हुने कथ्य र लेख्य नेपाली भाषासम्बन्धी बोध र अभिव्यक्ति क्षमता बढाउन ।
२. सम्बद्ध विषयक्षेत्रका पुस्तक, पत्रिका, लेख आदि सामग्री पढी स्तरीय भाषामा व्याख्या, विवेचना गर्ने क्षमता वृद्धि गर्न ।
३. सम्बद्ध व्यवहारिक सन्दर्भका अनुच्छेद, चिठी, सूचना, विज्ञापन, विबन्ध, टिप्पणी आदि प्रयोगमा देखिएका भाषिक त्रुटिहरूप्रति सचेत भई तिनको निराकरणतर्फ उन्मुख हुन ।
४. वर्णविन्यास र वाक्यतत्वसम्बन्धी स्तरीय भाषामा भाव अभिव्यक्त गर्ने क्षमता प्राप्त गर्न ।

खण्ड क व्याकरण खण्ड **पूर्णाङ्क :२५**

एकाइ १ नेपाली वर्ण र वर्णविन्यास **अङ्कभार : ५**
कक्षाभार : ५ घण्टा

(क) नेपाली वर्णहरूको पहिचान
  अ) नेपाली स्वर र व्यञ्जन वर्णहरूको परिचय र वर्गीकरण (उच्चारण स्थानका आधारमा)
  आ) नेपाली अक्षरहरूको संरचना
(ख) वर्ण र वर्ण विन्यास
  अ) ह्रस्व-दीर्घ सम्बन्धी नियम,
  आ) हलन्त सम्बन्धी नियम,
  इ) ब/व/ओ, ए/य, ऋ/रि, छे/क्ष, ग्यँ/ज्ञ को प्रयोग,
  ई) स,श,ष को प्रयोग,
  उ) शिरविन्दु, चन्द्रविन्दु, र पञ्चमवर्णहरू (ङ, ञ, ण, न, म) को प्रयोग,
  ऊ) पदयोग र पदवियोगसम्बन्धी ज्ञान र अभ्यास,
  ए) लेख्य चिह्नको प्रयोग ।

एकाइ २ शब्दवर्ग **अङ्कभारः २.५**
कक्षाभार ३ घण्टा

(क) नाम, सर्वनाम, विशेषण, क्रियापद, क्रियायोगी, नामयोगी, संयोजक, विस्मयादिबोधक र निपातजस्ता शब्दवर्ग वा पदकोटिहरूको सोदाहरण परिचय र अभ्यास ।

एकाइ ३ शब्दनिर्माण **अङ्कभारः ५**
कक्षाभार ३ घण्टा

(क) शब्दनिर्माण र व्युत्पादनको परिचय
  अ) उपसर्गद्वारा शब्द निर्माण

अ, अन, कु, वे, बे, बद, वि

प्र, परा, अप, सम् , अनु, वि, अधि, अति, उत्, प्रति, परि, उप, सु, निर् , दुस् , दुर्

(ख) प्रत्ययद्वारा शब्दनिर्माण

निम्नलिखित कृत प्रत्ययद्वारा शब्द निर्माण

नु, ने, एको, तो/दो, एर, ई, न, आइ, ओट, आवट, अत, ओ, आउ, आहा,

अक्कड, अन्त, उवा, इलो, अक, अन, इत, त ता, ति, य, तव्य, अनीय

निम्नलिखित तद्धित प्रत्ययद्वारा शब्दनिर्माण

ली, आली, आलु, आहा, इया, इयार, इलो, औली, यौली, ए, एली, ले, आइ, याइँ/आइँ, पन/पना,

इक, इत, ई, ईय, ईन, क, तम, ता, त्व, मय, मान्, वान्, य

(ग) समासद्वारा शब्दनिर्माण

समासको चिनारी, प्रकार र समास विग्रहका प्रक्रिया

एकाइ ४ वाक्यतत्व र वाक्यान्तरण **अङ्कभारः १२.५**

कक्षाभार ११घण्टा

(क) क्रियाको परिचय

प्रेरणार्थक क्रिया

(ख) काल र पक्ष

अ) कालको परिचय

आ) काल र पक्षमा फरक

इ) पक्षका प्रकार

(ग) भाव र अर्थ

अ) भाव र अर्थको परिचय

आ) सामान्यार्थ, विध्यर्थ (आज्ञार्थ/इच्छार्थ) सम्भावनार्थ, सङ्केतार्थ

(घ) वाच्य

अ) वाच्यको परिचय र प्रकार

आ) वाच्य परिवर्तन

(ङ) करण/अकरण

(च) सङ्गति

अ) लिङ्ग, वचन, पुरुष र आदरको परिचय

आ) लिङ्ग, वचन, पुरुष र आदरको आधारमा वाक्य परिवर्तन

खण्ड ख बोध र अभिव्यक्ति **पूर्णाङ्क : २५**

कक्षाभार : १८ घण्टा

एकाइ ५ भाषा

ज्ञान विज्ञान (वातावरण, जनसंख्या आदि) प्रविधि र विशेषगरी कृषि तथा पशुचिकित्सा एवं पशुस्वास्थ्य क्षेत्रका (दृष्टांश तथा अदृष्टांश) सामग्रीको बोध गर्नाका साथै त्यस्तै सामग्रीमा आधारित बोधात्मक र भाषिक प्रश्नहरूको मर्म बुझी छिटो छरितो उत्तर दिने अभ्यास ।

(क) भाषाको प्रयोजनपरक भेदको परिचय अङ्कभारः ५

(ख) पत्ररचना कक्षाभार ४ घण्टा

पत्रलेखनका विभिन्न ढांचा एवं तरिकाको ज्ञान र अभ्यासः वैयक्तिकपत्र, कार्यालयीयपत्र, सूचना, निमन्त्रणापत्र र विज्ञापनको रचनासम्बन्धी ज्ञान र लेखनको अभ्यास ।

(ग) निबन्ध/टिप्पणी/प्रतिवेदन

अङ्कभार: ६
कक्षाभार ३ घण्टा

क) निबन्ध लेखन :

निबन्ध लेखनको सामान्य ढाँचा र तरिकाको ज्ञान एवं अभ्यास: विभिन्न समसामयिक विषय र शीर्षकमा केन्द्रित रही तत्सम्बन्धी विषयबस्तुलाई क्रमबद्ध र व्यवस्थित ढङ्गले विस्तृत रूपमा गद्यात्मक अभिव्यक्ति गर्दै वस्तुपरक, आत्मपरक, भावपरक र विचारपरक निबन्ध लेख्ने अभ्यास ।

ख) टिप्पणी लेखन :

कुनै समसामयीक वा विशेष महत्वपूर्ण समस्या वा विषयलाई लिएर केही अनुच्छेदको प्रयोग गरी मझौला (न छोटो न लामो) आकारको गद्यात्मक अभिव्यक्ति दिई टिप्पणी लेख्ने तरिकाको ज्ञान एवं अभ्यास ।

ग) प्रतिवेदन लेखन :

आफुले देखे सुनेको, भोगेको, अनुभव गरेको र अध्ययन गरेको कुनै सन्दर्भ (घटना, सभा-समारोह, चाडपर्व, यात्रा, समस्या वा अन्य) विषयका कुरा तत्सम्बन्धी आफ्ना अनुभव, विचार आदिको समावेश गरी लेखिने गद्यात्मक लामो अभिव्यक्तिस्वरूप प्रतिवेदन (वर्णन, विवरण वा रिपोर्ट) लेख्ने तरीकाको ज्ञान र अभ्यास ।

एकाइ ६ कृति समीक्षा

अङ्कभार: १०
कक्षाभार ११ घण्टा

(घ) कृति समीक्षा

निम्नलिखित कृतिबारे समीक्षा लेख्ने अभ्यास :

कविता:

लेखनाथ पौड्याल	नैतिक दृष्टान्त
लक्ष्मीप्रसाद देवकाटा	वन
गोपालप्रसाद रिमाल	परिवर्तन
भुपि शेरचन	मेरो देश

कथा:

गुरुप्रसाद मैनाली	छिमेकी
विश्वेश्वरप्रसाद कोइराला	सिपाही
इन्द्रबहादुर राई	रातभरि हुरी चल्यो

निबन्ध:

श्यामप्रसाद शर्मा	आइमाई साथी
भैरव अर्याल	महापुरुषको संगत

कृति समीक्षाका आधारहरू विधा र कृतिहरू निम्नलिखित अनुसार हुन्छन्: शीर्षक, विषयवस्तु,, मूलभाव र विचार, कथानक, पात्र, परिवेश, छन्द, लय, दृश्यविधान, संवाद आदि ।

यो तह अर्न्तगत अनिवार्य नेपाली पत्रको शिक्षण गर्दा शिक्षकहरूले निम्नलिखित कुराहरूमा विशेष ध्यान दिई विद्यार्थीहरूलाई सम्बन्धित शैक्षिक तह अनुरूप नेपाली भाषासम्बन्धी भाषिक सीपहरू प्राप्त गर्न सक्षम बनाउने ।

१. त्रुटिका क्षेत्र पहिल्याई निराकरणात्मक उपाय अंगाल्ने, यस काममा वर्णविन्यास र वाक्य गठनमा विशेष ध्यान दिने ।
२. विद्यार्थीहरूमा पठनशीलता बढाउनका निम्ति तोकिएको पाठ्यपुस्तकका अतिरिक्त रोचक र ज्ञानप्रद सामग्री, लेख-रचना, पुस्तक आदिको सूची बनाई उत्प्रेरित गर्न

३. व्याकरणका विभिन्न पाठ्यवस्तुको शिक्षणका क्रममा संज्ञान पक्ष र त्यसको प्रयोगात्मक अभ्यासका बीचमा समन्वय स्थापित गर्ने र आगमनात्मक पद्धतिको समेत प्रयोग गर्ने । श्रव्य-दृश्य सामग्रीमा आधारित प्रदर्शनात्मक विधि र व्याख्यानात्मक विधिसंग कक्षा छलफल र प्रश्नोत्तर विधिलाई पनि उपयुक्त अनुपातमा प्रयोग गर्ने ।

४. प्रयोजनपरक नेपालीको शिक्षण गर्दा संज्ञानात्मक पक्षलाई कम मात्रामा प्रयोग गरी कृषि र पशुचिकित्सा एवं पशुस्वास्थ्य क्षेत्रका विषयमा नेपाली भाषाको प्रयोगका नमूना संकलनगरी कक्षाकार्यका रूपमा त्यसका विशिष्टताको पहिचानमा जोड दिने ।

५. बोध र अभिव्यक्तिसम्बन्धी पाठ्यवस्तुको शिक्षण गर्दा संज्ञानात्मक पक्षलाई न्युनतम रूपमा प्रयोग गरी अभ्यास पक्षमा जोड दिने, विभिन्न अभिव्यक्तिको अभ्यासका क्रममा शुद्ध र स्तरीय मौलिक अभिव्यक्ति पक्षमा पनि ध्यान दिने ।

६. कृति समीक्षासम्बन्धी पाठ्यवस्तुको शिक्षणगर्दा लेखकसम्बन्धी नदिई नहुने अति सङ्क्षिप्त चिनारीमात्र दिई मुख्य रुपमा कृतिपरक अध्ययन र निर्धारित विभिन्न कोणमा आधारित विवेचना गर्ने वस्तुगत कृतिसमीक्षा पद्धतिमा नै जोड दिई अभ्यास समेत गराउने ।

७. समय समयमा सम्बन्धित पाठ्यवस्तुको शिक्षणलाई प्रभावकारी पार्न मद्धत पुऱ्याउने गरी गोष्ठी विधि पुस्तकालयीय अध्ययन विधिको पनि प्रयोग गर्ने, साथै साहित्यिक र बौद्धिक अतिरिक्त क्रियाकलापका माध्यमलाई पनि प्रयोग गर्ने, यसै क्रममा पाठ्यविषयसंग सम्बन्धित तुल्याई विशिष्ट विद्वान, लेखक आदिको व्याख्यान, प्रवचन आदिको आयोजनालाई पनि सहायक शैक्षिक विधिका रूपमा प्रयोग गर्ने ।

८. समय समयमा सम्बन्धित पाठ्य विषयमा आधारित प्रश्न दिई गृहकार्य गराई सुधारात्मक टिप्पणी गरिदिने । वर्णाविन्यास, शब्दनिर्माण, शब्दवर्ग (पदकोटि) आदिका पठनपाठनका क्रममा नेपाली शब्दकोशको प्रयोग गर्ने बानी बसाल्ने ।

मूल्याङ्कन योजना :

अवधारणा :

यस तहको मुल्याङ्कन हाल प्रचलित मूल्याङ्कन पद्धतिअनुसार लिखित परीक्षाका माध्यमबाट गरिने छ । शैक्षिक सस्थाहरूले आफ्ना हिसाबले शैक्षिक स्तर उठाउन आन्तरिक परीक्षालाई पनि मुल्याङ्कनको माध्यम बनाउनेछन् ।

प्रश्नहरू ज्ञानपरक मात्र नभई सीप र प्रयोगपरक पनि हुनेछन् । यस्तो मूल्याङ्कनद्वारा विद्यार्थीहरूको भाषिक प्रयोग व्याकरण, बोध र अभिव्यक्तिसम्बन्धी स्तरीयता एवं अभ्यासात्मक र सीपपरक क्षमतामा जोड दिइने छ ।

प्रयोग :

यसको मूल्याङ्कन प्रक्रियाको उपयोग तल प्रस्तुत गरेको प्रश्न योजना अनुसार लामो उत्तरात्मक र संङ्क्षिप्त उत्तरात्मक प्रश्नहरू सोधी औपचारिक परीक्षाका माध्यमबाट गरिनेछ ।

पुस्तक तथा सहायक पुस्तकहरू

१. मोहनराज शर्मा — **शब्दरचना र बर्णविन्यास, वाक्यतत्व र अभिव्यक्ति** (नयां संस्करणँ, काठमाण्डौ बुक सेन्टर, काठमाण्डौ ।

२. कृष्णप्रसाद पराजुली — **नेपाली अध्ययन तथा अभिव्यक्ति,** रत्नपुतक भण्डार काठमाण्डौ ।

४. हेमनाथ पौडेल — **अनिवार्य नेपाली व्याकरण बोध र अभिव्यक्ति**, पैरवी प्रकाशन, काठमाण्डौ ।

५. मुरलीधर घिमिरे — **अनिवार्य नेपाली,** हजुरको पुस्तक संसार, काठमाण्डौ

गोरखापत्र (सत्रावधिका, सम्पादकीय, टिप्पणी लेखहरु), गोरखापत्र सस्थान काठमाण्डौ ।

नमूना प्रश्न

सबै प्रश्नहरूको उत्तर अनिवार्य छ । मौलिक तथा सिर्जनात्मक उत्तरलाई बढी प्राथमिकता दिइनेछ ।

प्रश्न १ तलको प्रश्नको उत्तर लेख्नुहोस् । (०.५×४=२)

स्थानका आधारमा तलका वर्णहरू पहिचान गर्नुहोस् ।

क, प, त, ह

वा

तलका शब्दहरूको अक्षर संरचना पहिचान गर्नुहोस् ।

विद्यालय, घर , नेपाल, काठ

प्रश्न २ शुद्ध पारी पुनर्लेखन गर्नुहोस् । (०.५×६=३)

यउटा परिचित ले बोलाए भैँ पछीबाट हकार्यो । मैले फर्केर हेरे

प्रश्न ३ रेखाङ्कित शब्दहरूको शब्दवर्ग पहिल्याउनुहोस् । (०.५×५=२.५)

राती ठूलो पानी पर्नाले बेस्सरी बाढी आयो ।

प्रश्न ४ कोष्ठकमा दिएका धातु सङ्केत र तत्सम्बन्धी सङ्केतका अनुसार रूप खाली ठाउँमा लेखी तलका वाक्यहरू सार्नुहोस् । (०.५×५=२.५)

क. उसको घरमा पहुनाहरू.....। (आउः अभ्यस्त भूत)

ख. बुबाले मलाई किताब.....। (दि : सामान्य भूत)

ग. साथीहरूले समाचार .....। (ल्याउः सामान्य भविष्यत्)

घ. दाजुले भाइलाई.....। (बोलाउ : पूर्ण वर्तमान)

ङ. सरिता पुस्तक.....। (पढ् : अपूर्ण भविष्यत्)

प्रश्न ५ (क) तलका उपसर्ग र प्रत्यय लगाई एक-एक ओटा शब्दनिर्माण गर्नुहोस्। (०.५×३=३)

उपसर्गहरूः प्र, बे, सम्

प्रत्ययहरूः आलु, ईय, त्व

(ख) समास भए विग्रह र विग्रह भए समास गर्नुहोस् । (०.५×४=२)

चरिनङ्ग्रे, दोबाटो, आमा र बुबा, घरलाई भाँडुवा

प्रश्न ६ कोष्ठकमा दिएका सङ्केतका आधारमा वाक्य परिवर्तन गर्नुहोस् । (१×१०=१०)

क. मैले हिसाब सिकेँ । (प्रेरणार्थक)

ख. मेरी छोरी पढ्छे । (बहुवचन)

ग. तिमीहरू पढ्दैनौ अनि पास हुन्नौ । (करण)

घ. राम भोलि पोखरा जान्छ । (सम्भावना)

ङ. श्यामले झोलामा किताब राख्यो । (उच्च आदरार्थी)

च. मैले बाटामा सीतालाई देखेँ । (कर्मवाच्य)

छ. उसले मलाई बोलायो । (बहुवचन)

ज. हामीले नेपाली पढ्यौँ । (तृतीय पुरुष)

झ. ईश्वरले हाम्रो रक्षा ..... । (गर्:इच्छार्थ)

ञ) तपाईं घर .....। (जा : आज्ञार्थ)

प्रश्न ७ भाषिक प्रयोजनपरक भेदअन्तर्गत कृषि भाषाको चर्चा गर्नुहोस् । (५)

प्रश्न ८ तपाईंको गाउँमा आवश्यक कृषि सामग्री उपलब्ध गराइपाऊँ भनी कृषि मन्त्रालयलाई एउटा निवेदन लेख्नुहोस् । (४)

प्रश्न ९ कुनै एक विषयमा निबन्ध लेख्नुहोस् । (६)

क. कृषिप्रधान देश नेपाल

ख. व्यवहारिक शिक्षा

वा

एकदिने कृषिसम्बन्धी गोष्ठीको बारेमा एउटा प्रतिवेदन तयार पार्नुहोस् ।

प्रश्न १० कुनै एकको सप्रसङ्ग व्याख्या गनुहोस् । (५)

क. कुनै कवितांश

ख. कुनै कवितांश

प्रश्न ११ तलका कुनै दुई प्रश्नहरूको उत्तर लेख्नुहोस् । (५)

क) कथाबाट

ख) निबन्धबाट

ग) कथा वा निबन्धबाट

विशिष्टीकरण तालिका

विषय : अनिवार्य नेपाली **पूर्णाङ्क : ५०**

एकाइ	क्षेत्र (पढाइ र लेखाइ)	विधा/ परीक्षणीय पक्ष	विशिष्टीकरण	जम्मा प्रश्न संख्या	उत्तर दिनुपर्ने संख्या	अङ्क भार	स्पष्टीकरण
१	नेपाली वर्ण र वर्णविन्यास	वर्णको पहिचान	नेपाली स्वर र व्यञ्जन वर्णहरू	१	कुनै १	२	कुनै ४ वटा वर्ण ०.५ अङ्कका दरले स्थानका आधारमा पहिचान गर्न दिने र वैकल्पिक उत्तरका रूपमा सोही अङ्कका निम्ति ४ वटा शब्दहरूको अक्षर संरचना पहिचान गर्न दिने ।
		अक्षर संरचना		१			
		वर्णविन्यास		१	१	३	एउटा शब्दमा एउटामात्र अशुद्धि पर्नेगरी ०.५ अङ्कका दरले ह्रस्वदीर्घ, पदयोग, पदवियोग र लेख्य चिन्ह अशुद्धि भएको गद्यांश दिई शुद्ध गर्न लगाउने ।
२	शब्दवर्ग			१	१	२.५	पाँचओटा विभिन्न शब्दवर्गका शब्द रेखाङ्कन गरी ०.५ अङ्कका दरले शब्दवर्ग छुट्याउन लगाउने । (शब्दवर्ग छुट्याउँदा नाम, सर्वनाम, विशेषण, क्रिया, नामयोगी, संयोजक, विस्मयादिबोधक र निपात नै लेख्नुपर्ने)
३	शब्दनिर्माण	उपसर्गद्वारा शब्दनिर्माण		१	१	३	०.५ अङ्कका दरले तीनओटा उपसर्ग र तीनओटा प्रत्यय सोधी छओटा शब्दनिर्माण गर्न लगाउने
		प्रत्ययद्वारा शब्दनिर्माण					
		समासद्वारा शब्दनिर्माण		१	१	२	०.५ अङ्कका दरले समासबाट दुईओटा र विग्रहबाट दुईओटा प्रश्न सोधी समास वा विग्रह गर्न लगाउने ।
४	वाक्य, वाक्यतत्व र वाक्यान्तरण	काल र पक्ष		१	१	२.५	०.५ अङ्कका दरले धातु संकेतका आधारमा पाँचवटा वाक्य निर्माण गर्न लगाउने ।
		क्रियाको परिचय	प्रेरणार्थक क्रिया	१	१	१०	एक अङ्कको दरले प्रेरणार्थक क्रियाको सहायताद्वारा प्रेरणार्थक वाक्य बनाउन लगाउने र सोही अङ्कको दरले लिङ्ग, वचन, पुरुष, आदर, वाच्य, भाव, करण, अकरण मा वाक्य निर्माण तथा वाक्यान्तरण गर्न लगाउने ।
		भाव र अर्थ					
		वाच्य	कर्तृवाच्य, कर्मवाच्य, भाववाच्य				
		सङ्गति	लिङ्ग, वचन पुरुष, आदर				
		करण/ अकरण					
५	बोध र अभिव्यक्ति	भाषा	भाषाको परिचय र प्रयोजनपरक भेद	१	१	५	भाषाको प्रयोजनपरक भेदको परिचय र भेदभित्रबाट ५ अङ्कको एउटा प्रश्न सोध्ने ।

		पत्र रचना		१	१	४	४ अङ्कका लागि कार्यालयीय,वैयक्तिक,निमन्त्रणापत्र वा सूचना मध्ये कुनै एक सोध्ने ।
		निबन्ध टिप्पणी प्रातिवेदन	विविध विषयसँग सम्बन्धित	१ कुनै १	कुनै १	६	६ अङ्कका लागि विविध विषयसँग सम्बन्धित निबन्ध र वैकल्पिक उत्तरका रूपमा टिप्पणी वा प्रतिवेदन लेखन सोध्ने ।
६	कृति समीक्षा	कविता खण्ड	पठ्यक्रममा समाविष्ट कविताहरू	१	१	५	दुईवटा सप्रसङ्ग व्याख्या सोधी कुनै एकको उत्तर ५ अङ्कका लागि सोध्ने ।
		कथा खण्ड	पठ्यक्रममा समाविष्ट कथाहरू	१	कुनै १	५	पठ्यक्रममा समाविष्ट कथाहरू वा निबन्धहरूमध्येबाट ५ अङ्कका लागि कुनै एक सङ्क्षिप्त उत्तर लेख्न प्रश्न सोध्ने ।
		निबन्ध खण्ड	पठ्यक्रममा समाविष्ट निबन्धहरू	१			

3. Physics

Total Class: 78 hrs. **Full Marks: 100**
(Theory: 60; Practical: 18 hrs) (Theory – 75; Practical - 25)

General objectives:
After the successful completion of this course, students should be able to gain sufficient basic knowledge and skill in physics.

Specific Objectives:

1. Students can define, explain the theory and solve numerical problems of Mechanics, Heat, Optics, Static Electricity, Electricity and Magnetism and Modern Physics.
2. Students can do some derivations as given in the following topics.
3. Students can do the basic practicals of physics.

Unit 1. Mechanics (17 hrs.)

1.1 Measurements (2 hrs.)

- Define physical quantity
- State type of physical quantity
- Define SI units
- Define dimension and discuss dimensions of fundamental and derived physical quantities.
- Explain use of dimensional equation
- to convert one system of unit in to another system of unit.

1.2 Scalars and vector (1 hr)

- Define scalars and vectors with examples.
- Explain graphical representation of vectors
- Explain rectangular resolution of vectors.

1.3 Laws of motion and friction (2 hrs.)

- State laws of motion
- Define inertia and force.
- Derive F= ma. , Discuss units of force
- Define linear momentum
- State principle of conservation of linear momentum
- Solve related numerical problems.

1.4 Work, energy and power. (2 hrs.)

- Define work, energy and power and express their units.
- Define gravitational potential energy and kinetic energy. Derive their formula.
- State the principle of conservation of energy.
- Solve related numerical problems.

1.5 Simple harmonic motion (2 hrs.)

- Define simple harmonic motion.
- Define amplitude, frequency, time period and phase.
- Define simple pendulum.
- Explain characteristica of SHM.

1.6 Gravitation (3 hrs.)

- State Newton's law of gravitation.
- Show $g= GM / r^2$, $g= 4/3\ \pi G\rho r$
- Show variation of g with altitude, depth and latitude.
- Define gravitational potential energy and escape velocity.

- Explain Weightlessness.
- Solve related numerical problems.

1.7 Hydrostatics (3 hrs.)

- Define specific gravity and density.
- Describe principle and use of hydrometer to determine specific gravity of liquid.
- Define standard atmospheric pressure.
- Calculate liquid pressure at a point in liquid.
- State and explain Pascal's law of transmission of liquid pressure.
- State and explain Archmedes' principle.
- Explain rotary pump and lift pump
- Solve related numerical problems.

1.8 Viscosity and surface tension (2 hrs.)

- Define viscosity.
- Define and explain surface tension.
- Explain Adhesive force and cohesive force.
- Explain phenomenon of capillarity (no derivation of formula).
- Explain formula why small liquid drops are spherical?
- Solve related numerical problems.

Unit 2. Heat (13 hrs.).

2.1. Heat and temperature (2 hrs.).

- Give concept of heat and temperature.
- Explain principle of thermometer.
- Describe clinical thermometer, maximum and minimum thremomerer.
- Explain temperature scales and their relation.
- Solve related numerical problems.

2.2. Thermal expansion (3 hrs.).

- Define coefficients of linear expansion, superficial and cubical expansion and establish their relation.
- Explain thermostat principle.
- Explain real and apparent expansion of liquid.
- Explain change in density with temperature.
- Anomalous expansion of water and its significance in nature.
- Solve related numerical problem.

2.3. Calorimetry and change of phase (3 hrs.)

- Define heat capacity, specific heat capacity and water equivalent.
- Describe method of mixture to find specific heat capacity of solid.
- Define latent heat, latent heat of fusion of ice, latent heat of steam.
- Effect of pressure on melting and boiling point.
- Solve related numerical problems.

2.4. Gas (3 hrs.)

- State and explain Boyle's law and Charle's law
- Define absolute temperature and absolute Zero.
- Derive equation of state.
- Find value of R.
- State and explain Dalton's law of partial pressure.
- Explain internal energy of gas.
- State and explain first law of thermodynamics.

- Solve related numerical problems.

2.5. Hygrometry (2 hrs.).

- Explain saturated and unsaturated vapour.
- Define triple point.
- Define dew point, absolute humidity and relativity humidity.
- Determination of relative humidity by wet and dry bulb hygrometer.
- Explain Air conditioning.

Unit 3. Optics (8 hrs.).

3.1. Reflection at plane and spherical surfaces (3 hrs.)

- State laws of reflection
- State and prove law of rotation of light.
- State lateral inversion.
- Distinguish between real and virtual images.
- Derive size of plane mirror required to form full image of a person.

3.2 Refraction of light (3 hrs.).

- State laws of refraction of light.
- Define refractive index of medium.
- Define real depth and apparent depth and establish relation between them.
- Define lateral shift and derive formula for it.
- Define critical angle
- Define total internal reflection.
- State conditions for total internal reflection.
- Define prism.
- Define angle of minimum deviation and angle of prism.
- Explain $\mu = \sin (A+dm)/2 \ / \sin A/2$.
- Explain converging and diverging lens; sign convension.
- Define principal axis and principal focus of lens.
- Explain$(1/v+1/u) =1/f$ for lens (no derivation)
- Define power of lens give $P= 1/f$
- Solve related numerical problems.

3.3 Dispersion of light (1 hr.)

- Define dispersion of light.
- Define spectra, (emersion spectra and absorption spectra) and origin of spectra.

3.4 Optical instrument (2 hrs.).

- Explain defects of vision- Myopia and Hypermetropia..
- Describe astronomical telescope in normal adjustment.
- Simple microscope- Ray diagram

Unit 4. Statistical electricity (5 hrs.).

4.1 Fundamental electrostatic phenomena (2 hrs.).

- Define conductors and insulators.
- Explain modern theory of electrification.
- Describe construction and working of gold leaf electroscope.
- Explain electrostatic induction.
- Define surface density of charge.
- Explain atmospheric electricity.

4.2 Electric field and potential (3 hrs.).

- State and explain Coulomb's law of electrostatics.
- Define electric field and electric field intensity.
- Define electric flux and electric flux density.

- Show electric flux from a point change.
- Find electric intensity due to charge plane conductor.
- Define electric potential and derive its formula.
- Solve related numerical problems.

Unit 5. Electricity and magnetism (10 hrs.).

5.1 Current electricity (3 hrs.)

- Define electric current, electromotive force, potential difference and resistance.
- State and verify Ohm's law.
- Define resistance and resistivity.
- Explain series and parallel combination of resistances and derive the relations.
- State Kirchoff's laws of electricity.
- Define electrolysis, electrolyte, electrodes and ions.
- State Fareday's laws of electrolysis.
- Define wheat stone bridge and find condition for balanced state
- Solve related numerical problem.

5.2 Magnetic properties of materials (2 hrs.).

- Definition of magnetic poles, pole strength, magnetic moment, magnetic field, magnetic axis, lines of force, magnetic meridian, neutral point, intensity of magnetization, magnetizing field.
- Find magnetic field due to a bar magnet in end on position and broad-side on position.

5.3 Magnetic effect of current and electromagnetison (3 hrs.).

- Explain Oersted's discovery, direction of current and field.
- Find force on moving charge.
- Explain theory and principle of moving coil galvanometer.
- Define electromagnetic induction..
- State & explain Faraday's laws of electromagnetic induction.
- Principle and working of a.c. generator.

5.4 A.C. Circuits (2 hrs.).

- Distinguish between a.c. and d.c.
- Define rms current.
- Define reactance.
- Discuss circuits containing R, L & C only.
- Solve related numerical problems.

Unit 6. Modern Physics. (7 hrs.).

6.1 Electrons (1)

- Explain particle nature of electricity and basic unit of charge.
- Define cathode rays and explain their important properties.

6.2 Semiconductors (2 hrs.)

- Explain conduction electron & valence electron
- Explain conductors, insulators and semiconductor on the basis of band diagram and electrical conductivity.
- Explain effect of temperature on conductivity of semiconductor
- Explain intrinsic semiconductor
- Explain doping process and its effect on electrical conductivity
- Explain extrinsic semiconductor (N type and P types.)
- Explain P-N junction diode and its characteristics

6.3 Quantisation of energy (2 hrs.)

- State quantum theory of radiation
- Define photon, work function, threshold frequency, threshold wavelength and stopping

potential.

- State and define photoelectric equation.
- State postulates of Bohr's theory of hydrogen atom.
- Define ionization potential and excitation potential.
- Solve related numerical problems.

6.4 X-rays. **(2 hrs.)**

- Define X-rays.
- State their important properties.
- Explain important uses of X-rays.
- Explain energy = ch/λ for X-rays.
- Solve related numerical problems.

Practical. **(18 hrs.)**

1. Find volume of given tube by using vernier calipers.
2. Find area of cross-section of given tube by using micrometer screw gauge.
3. Find thickness of given test plate by using spherometer.
4. Verify Archimede's principle.
5. Determine specific gravity of milk by Nicholson's hydrometer.
6. Determine melting point of wax.
7. Determine relative humidity by wet and dry bulb hygrometer.
8. Determine specific heat capacity of solid by method of mixture.
9. Find latent heat of ice.
10. Verify laws of reflection of light.
11. Find focal length of convex lens by u-v method.
12. Find refractive index of prism.
13. Study lateral shift of given glass slab and find its thickness.
14. Locate neutral points of a bar magnet and find magnetic moment of magnet.
15. Verify ohm's law by ammeter and voltmeter.
16. Find resistivity of wire using Meter Bridge.
17. Revision **(2 hrs.)**

Text Books:

- Pradhan, J.M. and S.K. Gupta. A text book of physics Part I and II, Surya Publications, Jalandhar.
- Shrestha, V.K. Numerical examples in physics Vol. I and II Ratna Pustak Bhandar, Nepal.
- Shrestha, U.P. Certificate level physics practical guide. Ratna Pustak Bhandar, Nepal.

4. Chemistry

Total Class: 137 hrs **Full Marks: 100**
(Theory: 98; Practical: 39 hrs) (Theory – 75; Practical - 25)
Pass marks: 40

General objectives: This course is designed to give fundamental concepts of chemistry. After the successful completion of the course the students will be able to learn the basic knowledge and skill of organic and inorganic chemistry adequate for pursuing higher-level study.

Specific Objectives:

1. Students can classify 33 (atomic no. 1-20 and some selected) elements and write their physical properties, chemical properties with some basic reaction.
2. Students define some laws, models and definitions like atomic model, Charle's Law, Boyle's Law, Dulong's and Petit's Law and Farady's Law and others.
3. Students can classify the organic compounds according to the IUPAC rule and give physical and chemical properties of some compounds as given below.
4. Students can explain some chemicals like acids, fertilizers and metallurgy of some metals.
5. Students can do basic practical of chemistry.

Unit 1. Symbol formula and chemical change **(4 hrs)**

- Symbol, formula and their significances
- Physical and chemical change, chemical equation and their significance and limitation.
- Types of chemical equation (synthesis, analysis, simple displacement, double decomposition)

Unit 2. Atomic structure **(5** hrs**)**

- The sub atomic particles, electrons protons and neutrons, Rutherford atomic model (no experimental description).
- Bohr's atomic model, shell and sub shell.
- Atomic number, mass number, distribution of electrons up to atomic number 20 and of Cu, Fe, Zn, Ag, Au, Pb, Sn, Ge, Br, I, Ni, Co, Hg.
- Quantum numbers.

Unit 3. Valency **(5** hrs**)**

- Electronic theory of valency, Lewis symbol, valence electrons
- Electrovalent bond and its formation with example.
- Covalent bond and its formation with example.
- Coordinate covalent bond, electron not structure of H_2SO_4, Cl_2, NH_3, $CaCO_3$ and CH_4.

Unit 4. Periodic table **(3 hrs)**

- Mendeleef's periodic law, characteristics of groups and periods in the periodic table.
- Advantage and anomalies of periodic table.
- Modern periodic law and long form of periodic table.

Unit 5. Acid base and salt **(4 hrs)**

- Classical definition, Arrhenius concept.

- Bronsted concept, conjugate acid base pair, amphiprotic substance.
- Lewis concept, pH and pH scale.
- Common ion effect and solubility product.

Unit 6. States of matter **(6 hrs)**

- Gaseous state, Boyle's law.
- Charle's law, absolute Zero
- Combined gas equation, ideal gas equation.
- Solution, dilute and concentrated solution, saturated, unsaturated and super saturated solution.
- Solubility, effect of temperature on solubility.
- Numerical problems.

Unit 7. Equivalent and atomic weight **(2 hrs)**

- Definition, determination of atomic weight by Dulong and Petit's law.
- Determination of equivalent. weight by H_2 displacement method, relationship between atomic weight, equivalent weight and vapour density.

Unit 8. Acidimetry and alkalimetry **(3 hrs)**

- Definition, indicator, end point standard solution, normal and molar solution.
- Volumetric equation, expression of strength of solution in normality, molarity, gm/liter and percentage.
- Related numerical problems.

Unit 9. Electrochemistry **(4 hrs)**

- Electrolytes, non-electrolytes, electrolysis.
- Faraday's laws of electrolysis
- Electrolysis of water and Copper sulphate.

Unit 10. Non-metals **(9 hrs)**

- Hydrogen- physical properties, reaction with O_2, Na, Ca, X_2, N_2, vegetable oil, uses, heavy water, isotopes of hydrogen.
- Oxygen-physical properties, reaction with C, Ag, Na, H_2, SO_2, NH_3, N_2 , uses.
- Carbondioxide: physical properties, reaction with Na, Mg, H_2O, lime water, carbon, iron, and uses.
- Ammonia: manufacture by haber's process.(principle with diagrammatic sketch.)
- Ammonia: Physical properties, chemical properties with H_2O, O_2, Na, AgCl, $CuSO_4$, nessler's reagent and uses.
- General characteristics of halogens

Unit 11. Acids and fertilizers **(10** hrs**)**

- Nitric Acid: Ostwald process. (Principle with diagrammatic sketch.)
- Physical properties, acidic character, action with carbon, sulphur, H2S, SO2.
- Action with FeSO4, Mg, Zn, copper, ring test.
- Nitrogen cycle and acid rain
- NPK fertilizer, characteristics, natural and artificial fertilizer, examples and need of NPK fertilizers.
- Pesticide insecticide, rodenticide herbicide, fungicide and their examples.
- Sulphuric acid: contact process (no description)
- Physical properties, dehydrating action with Zn, Cu, salts, oxidising agents.
- Hydrochloric acid: physical properties, acidic nature, action with ammonia, silver

nitrate, salts and uses.

Unit 12. Metals (9hrs)

- Distinction between metals and non-metals
- Ores and materials, occurrence of metals.
- General metallurgy of metals. (crushing and dressing)
- Calcination and roasting, reduction with carbon.
- Purification (distillation and electro refining)
- Sodium: physical properties, action with air, water, non-metals NH_3.
- Physical properties of copper, action with H_2SO_4, HNO_3, and short notes on bluevitrol.
- Zinc, physical properties, action with HCl, HNO_3, H_2SO_4, water, air and alkali, galvanization.
- Iron : physical properties action with HCl, HNO_3 , H_2SO_4, water, halogen, rusting.

Unit 13. Organic compounds (classification and nomenclature) (10 hrs)

- Classification, functional group, homologous series
- Differences between inorganic organic compounds
- Comparative study of aliphatic and aromatic compounds.
- IUPAC nomenclature of organic compound up to five carbon atoms with single functional groups based upon-.
  Alkane, Alkene, alkyne, Halo alkane, carboxylic acid, Aldehyde, ketone,
- Isomerism (chain, position, functional, metamerism)

Unit 14. Alkane, alkene and alkyne (5 hrs)

- Saturated and unsaturated compounds
- Lab preparation of methane, physical properties, chlorination, oxidation and pyrolysis, green house effect.
- Lab preparation of ethane, physical properties addition of hydrogen, halogen, unsymmetrical reagents.
- Lab preparation of acetylene, physical properties, catalytic hydrogenation, halogenation, formation of silver & copper acetylide, ozonolysis.

Unit 15. Alkyl halides (2 hrs)

- Lab preparation of chloroform
- Physical properties oxidation, hydrolysis, carbylamine reaction, dehalogenation, reimer- tiemann reaction

Unit 16. Alcohol (3)

- Definition, distinction between 1^0, 2^0 and 3^0 alcohol. (victor meyer's method)
- Fermentation
- Physical properties, action with Na, RCOOH, H_2SO_4 , oxidation.

Unit 17. Aldehydes and ketones (4 hrs)

- Preparation from alcohol, Grignard's reagent, calcium salts.
- Five similar and dissimilar reaction of acetone, with acetaldehyde.
- Action with RMgX, H_2NOH, 2,4- DNP, tollens reagent, fehling's solution.
- Aldol condensation, cannizzaro's reaction, uses.

Unit 18. Carboxylic acid (2 hrs)

- Lab preparation of HCOOH

- Physical properties , esterification, as an acid , NH_3 , PCl_5 uses.

Unit 19. Benzene **(2** hrs**)**

- Lab method, physical properties.
- Nitration, sulphonation, halogenation and Friedel craft's reaction.

Unit 20. Nitrobenzene **(2 hrs)**

- Lab preparation
- Physical properties, reduction reaction uses.

Unit 21. Phenol **(3** hrs**)**

- Preparation from benzene diazonium chloride and sodium benzene sulphonate.
- Physical properties, Action with Na, Zn, NH_3,
- Benzenediazonium chloride, Kolbe's reaction.

Practical **(39 hrs)**

1. Introduce laboratory rules and safety precautions. 1
2. Study Bunsen burners and fit up wash bottles. 1
3. Separate soluble substances from insoluble ingredients by filtration. 1
4. Obtain volatile substances from the mixture by sublimation. 1
5. Perform simple distillation to obtain pure water and to test purity. 1
6. Perform dry tests for acid radicals (chloride, carbonate, nitrate, sulphate) 2
7. Perform wet tests for acid radicals. (chloride, carbonate, nitrate, sulphate) 2
8. Perform dry and wet tests for basic radicals (Pb^{++}, Cu^{++}, Fe^{++}, Fe^{+++}, Al^{+++}, Ni^{++}, Zn^{++}, NH_4^+) 8
9. Perform complete salt analysis for simple salts. (Pb^{++}, Cu^{++}, Fe^{+++}, Al^{+++}, Ni^{++}, Zn^{++}, NH_4^+) 7
10. Prepare decinormal solution of Na_2Co_3 and H_2SO_4. 2
11. Find out the strength dil alkali with the help of standard acid solution (for Na_2CO_3) 1
12. Find out the strength of dil acid with the help of standard alkali. 1
13. Determine the strength of bench acid with the help of a standard dil acid. 1
14. Detect the elements present in an organic compound. 1
15. Identify different organic compound. (Ethanol, Carboxylic acid, aldehyde, ketone) 3
16. Prepare oxygen, hydrogen, ammonia and carbon dioxide gases and study the properties. 4
17. Revision 2

Text Books:

- A text book of Chemistry - by J.S. Jha and S.K. Guglani.
- Foundation of Chemistry (Vol I, II & III) - by M.K Sthapit and R.R. Pradhananga

5. Zoology

Total Class: 137 hrs. **Full Marks: 100**
(Theory: 98; Practical: 39 hrs) (Theory – 75; Practical - 25)
Pass Marks: 40

General objectives: This course covers introductory general zoology including elementary cell biology, bio-diversity and evolution of life, genetics and environmental science. After completion of this course students will be able to gain basic knowledge and develop skills of zoology.

Specific Objectives:

1. Students can classify animals up to class and gan give their characteristics.
2. Students can explain the theories of evolution
3. Students can define and describe the Mendel's Law and genetics.
4. Students can explain ecology and environment and can give information of National Parks and Wild Life Reserves of Nepal.
5. Students can perform some basic practical of zoology.

Unit 1. Introduction to biological science **(5 hrs.)**

- Nature and scope of biology. (1)
- Branches and relation between other sciences. (1)
- General approach to understand life process. (1)
- Life components – inorganic (water, gases, minerals) and organic components (carbohydrates, proteins, lipids, and nucleic acids) (2)

Unit 2.Cell biology **(12 hrs.)**

- The cell is a unit of life. (1)
- Structure of prokaryotic and eukaryotic cells. (1)
- Cell organelles (inclusion) and functions. (2)
- Cell divisions: Mitosis and Meiosis (4)
- Gametogenesis (1)
- Different types of animal tissues: epithelial, connective, nervous (general introduction) (3)

Unit 3. Evolution of life **(10 hrs.).**

- Meaning of evolution, history of evolutionary ideas of organic evolution (1)
- Evidences of evolution, morphological, anatomical and paleontological(general introduction). (4)
- Lamarkism. (2)
- Darwinism. (2)
- Neo-Darwinism (1)

Unit 4. Biodiversity **(40 Hrs.)**

- Concept of taxonomy
  - Classification (definition, artificial and natural) (1)
  - Binominal nomenclature (1)
  - Classification of non-chordate and chordate. (1)
- Protozoa (Characters and classification up to classes. (1)
  - *Paramecium* (Habit, habitat, structure, reproduction and significance. (3)
  - *Plasmodium vivax* (habit, habitat, structure, reproduction, pathogenicity and control) (2)
- Animalia: general characters and classification up to classes with suitable, examples of the following phyla- porifera, coelenterata, platyhelminthes, nemathelminthes,

annelida, mollusca, arthropoda, echinodermata and chordata. (10)

- Morphology and lifecycle of liverfluke and large round worm (3)
- Earthworm– Systematic position, habit, habitat, external features, digestive, nervous and reproductive system. (4)
- Lifecycle and economic importance of honey bee and silkworm. (3)
- Frog systematic position, habit, habitat, external features, digestive, respiratory and reproductive system. (6)
- External feature, digestive and reproductive system of mammal (rabbit) (5)

Unit 5. Genetics (6 hrs.)

- Heredity and variations (1)
- Mendel's laws (2)
- Concept of genes, mutation (2)
- Structure of DNA (1)

Unit 6. Ecology and environment (25 hrs.)

- Concept of ecology. (1)
- Abiotic and biotic factors and their relationship. (2)
- Trophic levels, food chain, ecological pyramid and the thermodynamics in the energy flow. 2)
- Pond ecosystem. (1)
- Grassland ecosystem. (1)
- Concept of community & succession. (1)
- Bio-chemical cycles.
  - Carbon and nitrogen (2)
  - Ecological imbalances and its consequences
  - Green house effects, depletion of O_3 layer and acid rain. (3)
  - Environmental pollution– air, water and soil, sources of pollutants, their effect and control measures. (2)
  - Effect of pesticides on pollution. (1)
- Animal adaptations – Aquatic and terrestrial (2)
- Conservation- wildlife
  - National park and wildlife reserve of Nepal. (4)
  - Endangered species in Nepal and causes of extinction. (2)
- Forest conservation, important of aforestation and deforestation. (1)

Practical : (39 hrs.)

1. Study and use of compound microscope. 1
2. Study of museum specimen and slides; (Paramecium, plasmodium, sycon, hydra, tape worm, liverfluke, roundworm, leach, earthworm, prawn, crab cockroach, butterfly, spider, scorpion, pila octopus, star fish, carp fishes, frog, toad, wall-lizard, cobra and krait, pigeon, bat and rat.) . 1
3. Preparation of temporary slide and their study; . 1
4. Setae and ovary of earthworm.
5. Study of freshwater ecosystem using an aquarium or pond showing food chain. 2
6. Study of adaptational features of a fish, frog, wall lizard, bird and bat. 2
7. Comparative study of histological structure through permanent slide of frog: skin, stomach, liver, kidney, testes and ovary. 3
8. Observation of different animal tissues an permanent slide (Squamous, columner, cuboidal, adipose, hyaline, bone and nerve cell.) 3
9. Dissection of an earthworm so as to expose their general anatomy, alimentary canal, nervous and reproductive system. 4

10. Dissection of a frog to study general anatomy, alimentary canal, circulatory and reproductive system. 3
11. Dissection of a mammal so as to expose its general anatomy, alimentary, circulatory, and reproductive system (Rat or Rabbit) 3
12. Collection and identification of different animal types from the local area and their preservation 1 week.
13. Study of the bones of rabbit. 3
14. Revision 2

References

- Agrawal, S., Biology Part I and II
- Verma, P.S & Panday, B.P,
- Bidyarth, R.D., A text book of Zoology
- NCRT Class XI and XII and
- Majupuria, T.C., Concept of Zoology/ Biology/ Modern approach to zoology.
- Verma, P.S. Invertabrate and vertebrate zoology.

6. Botany

Total Class: 137 hrs. **Full Marks: 100**
(Theory: 98; Practical: 39 hrs) (Theory – 75; Practical - 25)
Pass marks: 40

General objectives. Upon the successful completion of this course, the students will be able to gain basic knowledge and skill that will be adequate for understanding different discipline of botany**.**

Specific Objectives:

1. Students can describe the structure of cell, tissues, and the vegetative and reproductive parts of plants.
2. Students can describe life processes and ecological factors.
3. Students can perform basic practicals of botany.

Unit 1. Introduction (5 hrs.)

- Differences between plants and animals 1
- Sub divisions of botany 1
- Importance of plants/ scope of botany 1
- Classification of plants 2

Unit 2. Cytology (10 hrs.**)**

- Basic components of living cell. 1
- Prokaryotic and eukaryotic cell. 1
- Structure and functions of different cell organelles. 4
- Cell division :- amitosis, mitosis, significance of mitosis. 2
- Meiosis and its significance. 2

Unit 3. Tissues (8 hrs.)

- Meristematic tissues. 1
- Permanent tissues. 1
- Tissue systems in plants (epidermal, ground, vascular) 2 .
- Comparative account of anatomy of roots, stems and leaves of dicots and monocots. 4 .

Unit 4. Life processes (physiology) (11 hrs.)

- Diffusion and Osmosis 1
- Absorption and translocation of water (Ascent of sap) 1
- Transpiration (Definition, types, significance of, factors affecting) 2
- Photosynthesis (Light & dark reaction, factors affecting) 2
- Respiration (Aerobic, anaerobic) 2
- Photoperiodism and vernalization (introduction) 1
- Concept of plant movement (Tropism, Nastre movement, taxes) 2

Unit 5. Morphology (14 hrs.)

- Study of different parts of a flowering plant. 2
- Roots – characteristic, structure, function and modification. 2 .
- Stem – characteristic, structure, function and modification. 2 .
- Leaves – characteristic, structure, function and modification. 4 .
- Inflorescence 1
- Fruits 2
- Morphology of seeds 1

Unit 6. Taxonomy (12 hrs.**)**

- Principles of classification. 1

- Classification systems (artificial, natural, phylogenetic) 2
- Taxonomy and economic importance of cruciferae, malvacae, leguminosae, compositae, solanaceae, liliaceae, gramineae. 9 .

Unit 7. Reproduction in plants (9 hrs.)

- Methods of vegetative propagation in plant 2
- Microsporogenesis / megasporogenesis. 3
- Pollination 1
- Fertilization 1
- Development of seeds/ fruits. 2

Unit 8. Diversity of plant life (21 hrs.**)**

- Viruses (introduction)
- Bacteria (Morphology, reproduction, economic importance) 3 .
- Algae (Spirogyra, nostoc: life cycle, economic importance) 4
- Fungi (lifecycle of mucor, yeast; economic importance of fungi) 3 .
- Lichens – (morphology, types, economic importance) 2
- Bryophytes (Marchantia and moss: structure, life cycle) 4 .
- Pteridophytes – Fern (life cycle) 2
- Gymnosperm – general characteristics. 1
- Angiosperms – general characteristics. 1

Unit 9. Ecology (5 hrs.)

- Definition 1
- Concept of ecosystem: biotic and abiotic components. 2
- Environmental pollution – causes and consequences. 2

Unit 10. Genetics (8 hrs.)

- Heredity and variations 1
- Mendel's laws. 2
- Concept of genes, mutation 3
- Structure of DNA and its function 2 .

Practical **(39 hrs.)**

1. Handling of a compound microscope 1
2. Prepare slides of plant cell: Onion scale, epidermal peelings of leaves, spirogyra 3
3. Study of different stages of mitosis and meiosis division. 3
4. Demonstrate the process of 5
    a. Osmosis (potato osmoscope, egg membrane)
    b. Respiration (evolution of CO_2.)
    c. Photosynthesis (evolution of O_2, Moll's experiment)
    d. Transpiration (potometer method)
5. Study different types of roots, stems, leaves, inflorescence, and fruits.5
6. Study of one member belonging to cruciferae malvaceae, leguminosae, solanacae, compositae and liliaceae. 6
7. Study of museum specimens and slides. 6
    a. bacteria
    b. fungi (mucar and yeast)
    c. algae (nostoc, spirogyra)
    d. lichens.
    e. bryoplytes (marchantia, moss)
    f. pteridophytes (fern)
    g. gymnosperm (pinus)
8. Study of embryological slides: 3

a. T.S. of anther
b. L.S. of ovule
c. L.S. of dicot, monocot embryo.

9. Prepare temporary slides of T.S. of dicot and monocot stem. 2
10. Prepare herbarium of plants. 3
11. Revision 2

Text Book

- Dutta, A.C. A Class Book of Botany. Oxford university press.
- Bhattarai, T and D. Pant (1999). Practical Botany for I. Sc and 10+2 level. Bhundipuran praksashan, Kathmandu.
- Bhatia,. Modern Approach to Botany. Surya Publication, Delhi.
- Ranjitkar, H.D. A Hand Book of Practical Botany.

7. Mathematics

Total Class: 78 hrs. Full Marks: 50
Pass mark: 20

Unit 1: Set theory and real number system. (9 hrs)

S.No.	Specification of Content of Unit	Teaching Hours	Evaluating Questions.
1.1	Concept of sets, their representation • By Description • By Listing • Set Builder	2	• Define a set • Give an example of a set & express it in 3 diff. ways. • Identify singleton or null or finite or infinite set
1.2	Type of sets • Finite and infinite sets • Null set • Singleton set		i) A= {1,2,3.....} ii) B= {hight mountain of the world } iii) C= {Whole umbers between 2 and 3}
1.3	Universal Set		• Write down universal set of A={ factors of 4 }
1.4	Relation between sets • Subsets • Equal Sets • Intersecting sets • Disjoint sets	2	also from all possible subsets of A. • Identify which of the pairs are eual, disjoint or interecting.
1.5	Cardinality of a set		A= { 2,4,6... }, B= set of even numbers.
1.6	Operation on sets • Union • Intersection • Difference • Complement	2	• If A={ Whole numbers less than 10 } and B={factors of 30 }, find A∪B , A-B, A∩B
1.7	Cardinal Relation between sets and their uses in verbal problem. $n(A \cup B)= n(A)+n(B)-n(A \cap B)$ $n(A-B) = n(A)-n(A \cap B)$ (Proofs not necessary)	1	• In a class of 40 students, 16 like math, 18 like science and 7 like both. How many like neither.
1.8	Concept of real number and its classification showing relation between each other • Rational and irrational • Integer and fraction • Positive and negative integer	2	• Rewrite $-4 \leq x \leq -1$ using absolute volue sign • Rewrite $1x+11 \angle 5$ without using absolute value sing
1.9	Number line		
1.10	Absolute value of a real number		

Unit 2: Relation and functions (7 hrs)

2.1	Ordered pairs	1	• If (x+y,1)= (9, y-x) find x and y .
2.2	Cartesian product of two sets with examples		• If A= {1,2} and B= {a,b} find A×B and B× A
2.3	Relation with examples. • domain of relation • range of relation • Inverse of relation	2	• Find domain, range & inverse relation of R= {(1,2),(2,3} (0,1)(4,5) (6,7)}
2.4	Introduction of function and its representation in table, graph, machine, ordered pair, mapping diagram.	3	• Define a function with an example. • If f:A⟶ B defined by f(x) = 2x+1 and A={0,1,2,3,4}, find range also.
2.5	domain, co domain and range of a function		represent it in table, graph, ordered pair and mapping diagram.
2.6	Some algebraic functions with example • Constant➔ linear • Quadratic		
2.7	Inverse of function	1	• Find the inverse function of f(x) = 3x-2.

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Unit 3: Calculus (17hrs)

3.1	Idea of limit		• What do you mean by limit of a function
3.2	Limit of a function and (algebraic function and simple trigonometric function)	3	• evaluate : Lim $x \longrightarrow 2 \quad \frac{x^2-4}{x-2}$
3.3	fundamental theorems on limit (statement only)		• Lim $x \longrightarrow 0 \quad \frac{Tanbx}{x}$
3.4	Introduction to differentiation		• From first principle, find the derivatives of
3.5	Derivation of simple algebraic functions only from first principle or big definition		i) $y=3x^2$ ii) $y= 4x$ iii) $y = 5$ iv) $y =x^3 + 2x$
3.6	Techniques of differentiation • Sum rule • Product rule • Quotient rule • Power rule • Chain rule • Difference rule	4	• Use appropriate rule to find the derivatives of i) $y=3x^2 -5x + 4$ ii) $y= (3x^4 +5) (2x-1)$ iii) $y= \frac{x}{x2+1}$ iv) $y= (2x+2)^{10}$
3.7	derivative at point mentioned		• Find $\frac{dy}{dx}$ of $y = 3x^2 - 2x+5$ at x=2.
3.8	Higher order derivatives. [to find f(x) and f" (x) of the given functions f(x)]	2	• Find f'(x) and f" (x) of $f(x) = 3x^3 - 4x^2+3x-9$ also find their values at x=1.

3.9	maxima and minima of simple algebraic functions	2	• find the maximum and minimum values of $f(x) = x^3-6x^2+3$
3.10	Interaction as the inverse process of differentiation of simple algebraic functions only. (Substitution and" by parts" are not necessary	3	• Find the indefinite integral of i) $\int 7x^{\frac{3}{2}}\,dx$ ii) $\int (2x^3-4x-8)dx$
3.11	Definite integral of a function in given interval	3	Evaluate a) $\int_1^3 (2x^2+1)dx$ b) $\int_{-1}^5 (x+1)^2\,dx$

Unit 4: Coordinate Geometry (15 hrs)

4.1	Cartesian coordinates		Find the distance between
4.2	Coordinates of a point	2	(1,2) and (5,0)
4.3	Distance between two points		prove that (8,-3), (5-,1) and (-1,3) lie on a line
4.4	Section formula • Internal ad vision • external division • Mid point formula	2	• Find the mid point of line segment joining (-1,8) and (7,2) • Find the coordinates of a point that divides line segment joining (5,-3) and (3,-5) internally and externally in the ratio of 1:2
4.5	Area of triangle and quadrilateral	1	• Find the area of triangle with vertices (3,4), (2,-1) and (4,6)
4.6	locus and its equation (related to distance formula)	2	• Find the quationsof the locus of a point moving at equidistant from (1,2) and (3,4)
4.7	eq^{n} of straight line in three standard forms • Slope intercepts form • Double intercept from • Normal form	4	• Find the eu^{n}s of lines i) Cutting an intercepts 3 from positive Y axis and having slope2 ii) Cutting off an intercepts 2 and 3 form axes.
4.8	Reduction of Ax+by+C=0 in three standard forms.		iii) Length of perpendicular from origin on the line is 5 and inclination to x-axis is $30^{0.}$
4.9	eq^{n} of lines in special cases. • Point slope form • Two points form		Reduce $\sqrt{3}$ x+y = 2 in three standard forms.
4.10	Point of intersection of two straight lines.	2	Find the point of intersection of 2x+y=4 and x-y=-1
4.11	Condition for concurrency of three straight lines		• Prove that the three lines x+2y=0, 3x-4y-10=0 and 5x+3y-7=0
4.12	Angle between two lines • Condition of parallelism • condition of perpendicularity	2	• Find angle between the lines x-3y-6=0 and y=2x+5.

Units 5 : Algebra **(15hrs)**

5.1	Sequence and series • Arithmetic sequence • Geometric sequence • Harmonic Sequence	3	• Find AM,GM and HM between 4 and 16. • If $a^x=b^y=c^z$ and a,b,c are in GP, then prove that x,y,z are in H.P
5.2	Means of Ap, GP and HP		
5.3	Relation between AM,GM and Hm		
5.4	The basic principle of counting	3	• In how many different ways can letters of a word "BUSINESS" be arranged?
5.5	Permutation		
5.6	Combination		
5.7	Quadratic equation		• Determine the nature of roots $x^2-9x+9=0$
5.8	Derivation of roots of quadratic equation		• From a quadratic equation whose roots are -2 and 3.
5.9	Nature of roots of a quadratic equation	4	
5.10	Relation between roots and coefficients of a quadratic equation		• Find the quadratic equation whose roots are reciprocal of the roots of $x^2-x+7=0$
5.11	Formation of quadratic equation with given roots		
5.12	Binomail theorem (Statement only without proof) • general term • Middle term	2	• use binomial theorem to expand $(2x+y)^8$ • Find the term independent of x in an expanxion of $(x^2+\frac{1}{x})^{12}$
5.13	Logarithms		• Using four figure log table,
5.14	laws of Logarithms		
5.15	Common logarithm	3	i) 20.67×1.734 ii) 100.21×91.43 × 2.37
5.16	Characteristic & Mantissa using logarithmic table		iii)

Unit: 6 Trigonometry **(15hrs)**

6.1	Measurement of an angle • Sexagesimal system • Centesimal system • Radian (circular) measure	1	• Convert the following angles in the stated measure. i) 60^0 [radian measure] ii) $\left(3\frac{\lambda}{4}\right)^c$ [centesimal Measure]
6.2	• Conversion of one measure to angle and their relations	2	iii) $30^0 45\,'\,39''$ [centesimal Measure] • prove that : i) SinA.Sec A.Cot A=1 ii) $\frac{1-\cos\alpha}{\sin\alpha}=\frac{\sin\alpha}{1+\cos\alpha}$
6.3	Trigometric ratios of an angle and their relations	4	
6.4	Expression of all trigonometric ratio interims of any one of them		• express all trigonometrically • ratios in interms of $\sin\theta$
6.5	Value of trigonometric ratio of standard angles (geometrical proof are not necessary)	3	• Evaluate : i) $\sin30^0\times\text{Tan}45^0\times\tan60^0$ • Evaluate : ii) $\text{Sin}37^0\cos23+\cos37^0\sin23^0$
6.6	Formula for for compound angle (geometrical proofs are not necessary)		ii) $\frac{Tan100\ +Tan35^0}{1-Tan10^0.Tan35^0}$ • prove that $\text{Tan}25^0.\text{Tan}20^0+\text{Tan}25^0+\text{Tan}20^0=1$
6.7	Transformation formula • Product into sum or difference s • Sum or difference into product	3	• Prove That i) $\frac{Cos40^0+Cos60^0}{Sin40^0+Sin60^0}=Cot50^0$ ii) $8\sin20^0\,\text{Sin}\,40^0\text{Sin}\,80^0=\sqrt{3}$
6..8	Height and distance	2	

Specification Grid

S. No	Topics	Short Question (2 Marks each)			Long question (4 Marks each)			Total
		Knowledge	***Skill***	***Sub Total***	***Knowledge***	***Skill***	***Sub Total***	
1	Set theory and number system (8%)	1	1	4				4
2	Relation and function (8%)					1	4	4
3	Calculus (24%)		2	4		2	8	12
4	Coordinate geometry (20%)	1		2		2	8	10
5	Algebra (20%)	1	2	6		1	4	10
6	Trigonometry (20%)	1		2		2	8	10
	Grand Total	**4**	**5**	**18**		**8**	**32**	**50**

Appendices

Part I: World of Work Experience

A. Agriculture Group

B. Livestock Group

Performance Evaluation Sheet
Part I: World of Work Experience (Agriculture Group)

Name of the employee:

Position:

Date of employment:

S. N.	Areas/Performance	Evaluation by Supervisor (50%)		Evaluation by Division/Unit/Section Head (25%)		Evaluation by Reviw Committee (25 %%)		Total	
		Full marks	Marks Obtained	Full marks	Marks Obtained	Full marks	Marks Obtained	Full Marks	Marks Obtained
1.	**Extension and Community Development**								
1.	Identification and prioritization of farmers' problem								
2.	Use of RRA and PRA techniques as informal methods of information collection								
3.	Practices on development of visual aids such as posters, charts, pamphlets, flash cards and graphs								
4.	Visit result demonstration and farmer's field trial								
5.	Conduct method and result demonstration								
6.	Visit DOA, DLSO and related stakeholders in the district to understand existing extension practices								
7.	Preparation of individual farm production plan for farm family								
8.	Preparation of training programs covering lesson planning and modes of delivery on the topic related to livestock and agriculture development								
9.	Conduct case study of a farmer group formed by DADO								
	Sub Total								
2.	**Farm Management and Marketing**								
1.	Review of terminologies used in FM								
2.	Calculation of average and marginal products								
3.	Calculation of AC, MC, AFC and AVC								
4.	Calculation of profit maximizing level of output								
5.	Preparation of Balance Sheet of a farm								
6.	Preparation of income statement of a farm								
7.	Preparation of budget sheet for major crops								

8.	Preparation of budget sheet for minor crops								
9.	Preparation of simple farm inventory of a farm								
10.	Preparation of cropping scheme								
11.	Development of a farm work-plan (6 w- approach)								
12.	Preparation of product record charts								
13.	Discussion with farmers for way of risk management								
14.	Calculation of simple and compound interest								
15.	Calculation of depreciation of capital								
16.	Visit to real credit organization								
17.	Study of retail price of major agriculture commodities from near by market								
18.	Study of wholesale price of major agriculture commodities from near by market								
19.	Identification of marketing channels								
20.	Visit to private agro-vets and agriculture farms/enterprises (livestock/poultry farm, vegetable farms, nursery etc.)								
	Sub Total								
3.	**Principle and Practices of Food Crop Production**								
1.	Identification of plants and seeds of common food crops (Rice, wheat, maize, millet, barley and pulses)								
2.	Identification major insect pests and diseases of common crops								
3.	Major technical interventions on:								
4.	Seed and variety selection								
5.	Land and seed bed preparation								
6.	Fertilization and manuring (IPNS)								
7.	Seed sowing and transplanting								
8.	Weed management								
9.	Critical crop growth stages								
10.	Irrigation and drainage methods								
11.	Management of major insect pests and diseases (ICM, IPM)								
12.	Harvesting, threshing and storage								
13.	Marketing								
	Sub Total								
4.	**Principles and Practice of Fruit Crop Production**								

1.	Identification of fruit and plantation crops								
2.	Identification of horticultural tools and equipment								
3.	Lay-out of orchards and tea garden								
4.	Digging and filling of pits and planting of fruit saplings								
5.	Training and pruning of fruit and plantation								
6.	Fertilizing and manuring fruit trees								
7.	Preparation and application of Bordeaux Mixture/ paste								
8.	Preparation of different concentrations of PGR and application								
9.	Practices of cutting, layering and grafting								
10.	Study the equipment and tools used for preservation								
11.	Ripening of banana								
12.	Dehydration of vegetables and fruits								
13.	Preparation of jam, jelly, ketchup, juice, squash and pickles								
14.	Preparation of green coffee.								
	Sub Total								
5.	**Plant Protection**								
1.	Identification and uses of common plant protection equipment and tools								
2.	General features of insects								
3.	Growth and development of insects								
4.	Other insects like pests (other orthopoda)								
5.	Identification of insects feeding habits/ mouth parts of insects								
6.	Identification of common insects pests								
7.	Collection and preservation of insect pests								
8.	Identification, collection and preservation of insects damaged crop parts								
9.	Identification of disease symptoms								
10.	Collection and preservation of diseased materials								
11.	Common pesticides available in Nepal and their label, meaning and use								
12.	Formulation and dilution of pesticides								
13.	Preparation and application of Bordeaux mixture								

14.	Study and calibration of sprayers								
15.	Foliar application of pesticides								
16.	Soil application of pesticides								
17.	Seed treatment by pesticides								
18.	Post-harvest treatment by pesticides								
19.	Tree-wound treatment by pesticides								
20.	Use of common botanical materials as pesticides								
21.	Rodents control methods								
22.	Precaution and safe use of pesticides, and their safe disposal								
23.	Field visit to identify the plant disease and insect damage								
24.	Indigenous knowledge system on insect pest control								
25.	Indigenous knowledge system on plant diseases control								
26.	Survey of eco-friendly plant protection measures								
	Sub Total								
6.	**Principle and Practices of Industrial Crop Production**								
1.	Identification of plants and seeds of common food crops (Sugarcane, Tobacco, Cotton, Jute, Oilseed)								
2.	Identification major insect pests and diseases of common crops								
3.	Major technical interventions on:								
4.	Seed and Variety selection								
5.	Land and seed bed preparation								
6.	Fertilization and Manuring (IPNS)								
7.	Seed sowing and transplanting								
8.	Weed management								
9.	Critical Crop Growth Stages								
10.	Irrigation and Drainage Methods								
11.	Management of major insect pests and diseases (ICM, IPM)								
12.	Harvesting, threshing and storage								
13.	Marketing								
14.	Special field operations								
15.	Tobacco- de-suckering, priming and curing								
16.	Jute- jute extraction								
17.	Sugarcane- propping, wrapping, various types of planting materials								
18.	Processing techniques used for major industrial crops								
	Sub Total								

7.	**Vegetable and Medicinal Plant Production**								
1.	Identify vegetables and vegetable seeds								
2.	Identify spices and their seeds								
3.	Perform germination test for vegetable seeds								
4.	Prepare and maintain vegetable nursery								
5.	Prepare land for transplanting vegetables								
6.	Develop yearly a calendar of kitchen gardening								
7.	Identify major insect pests and diseases of major vegetables								
8.	Identify nature of damage of important insect pests and diseases								
9.	Spray insecticide and fungicides for insect and disease control								
10.	Perform cultural operation (mulching, manuring, training, earth up etc.)								
11.	Harvest and prepare vegetables for marketing								
12.	Prepare *Sutho*								
13.	Prepare hotbed and plastic tunnel for off-season production								
14.	Keep records of inputs and sale and calculate cost and profit of vegetables								
15.	Visit to spice or herbal processing plant.								
	Sub Total								
8.	**Floriculture and Nursery management**								
1.	Identification of ornamental plants: annuals, shrubs and trees								
2.	Preparation of nursery and annual beds								
3.	Preparation of media and soil mixture for container grown plants								
4.	Collection of seeds for propagation								
5.	Seed treatment for breaking dormancy								
6.	Sowing seeds and transplanting seedlings								
7.	Preparation of potting mixture								
8.	Perform training and pruning of ornament plants								
9.	Preparation of lawn								
10.	Preparation of landscape designs for residential and public building, and park.								

11.	Flower arrangement								
12.	Preparing cuttings								
13.	Preparing soil and air layers								
14.	Grafting and budding								
15.	Care and maintaining of nursery plants								
16.	Preparation of plastic tunnels and hotbed								
17.	Packaging, handling and marketing of nursery plants								
	Sub Total								
9.	**Soil and Soil Fertility management**								
1.	Concepts of Soil								
2.	Physical Properties of Soil								
3.	Chemical Properties of Soil								
4.	Soil profiles								
5.	Soil classification								
6.	Soil nutrients								
7.	Determination of bulk density and particle density								
8.	Determination of soil texture and consistency								
9.	Identification of major soil forming rocks and minerals								
10.	Determination of soil PH								
11.	Determination of organic matter of soil								
12.	Estimation of available Nitrogen, Phosphorous and Potassium								
13.	Identification and Handing of major soil lab equipments								
14.	Handling and Management of soil kit box								
15.	Identification of nutrient deficiency symptoms of major plants								
16.	Principles and use of Integrated Plant Nutrient Management System (IPNS)								
17.	Green Manuring, Composting and crop residues management								
18.	Terrance management								
	Sub Total								
10.	**Seed Production Technology**								
1.	Major agronomical and Horticultural Seeds in Nepal								
2.	Climatic Requirement								
3.	Classification of major agronomical and horticultural crops								
4.	Crop classification based on pollination methods								
5.	Isolation disttance								
6.	Seed zoning								
7.	Seed production techniques								
8.	Roughing								

9.	Nutrient management for seed production								
10.	Harvestion								
11.	Seed processing (Drying, cleaning, grading and packaging)								
12.	Seed storage								
13.	Seed marketing								
14.	Seed quality control and seed certification								
	Sub Total								
11.	**Post –harvest Technology**								
1.	Estimation of post harvest lost in cereals, fruit and vegetables								
2.	Identification of maturity indices of major fruits, vegetables and major cut flowers								
3.	Harvesting shorting grading and packing of major fruits, vegetables and cut flowers								
4.	Study the equipment and tools used in preservation and processing								
5.	Ripening of banana								
6.	Use of solar dryer for drying fruits and vegetables								
7.	Preparation of jam, jelly, ketchup, juice, squash and pickles								
8.	Storage techniques for cereals, fruits and Vegetable crops (zero energy, solar storage rustic storage and metal been)								
9.	Preparation of green coffee.								
10.	Visit to cellar and cold storages								
11.	Visit to distillation/ processing units of medicinal plants								
12.	Visit to spice or herbal processing plant.								
13.	Prepare *Sutho*								
	Sub Total								
12.	**Report Writing**								
	TOTAL :	**500**							

Supervisor	Division/Unit/Section Head		Review Committee	
Name :	Name :	Name :	Name :	Name :
Position :	Position :	Position :	Position :	Position :
Signature :	Signature :	Signature :	Signature :	Signature:
Date :	Date :	Date :	Date :	Date :

Performance Evaluation Sheet
Part I: World of Work Experience (Livestock Group)

Name of the employee:
Position:
Date of employment:

S. N.	Areas/Performance	Evaluation by Supervisor (50%)		Evaluation by Division/Unit/Section Head (25%)		Evaluation by Reviw Committee (25 %%)		Total	
		Full marks	Marks Obtained	Full marks	Marks Obtained	Full marks	Marks Obtained	Full Marks	Marks Obtained
1.	**Extension and Community Development**								
1.	Identification and prioritization of farmers' problem								
2.	Use of RRA and PRA techniques as informal methods of information collection								
3.	Development of visual aids such as posters, charts, pamphlets, flash cards and graphs								
4.	Writing reports on visit of mil cooperatives, chilling center, stature house and livestock farm.								
5.	Conduct method and result demonstration								
6.	Writing reports on visit of DOA, DLSO and related stakeholders in the district to understand existing extension practices								
7.	Preparation of individual farm production plan for farm family								
8.	Preparation of training programs covering lesson planning and modes of delivery on the topic related to livestock and agriculture development								
9.	Conduct case study of credit delivery/micro credit/group formation accountancy formed by DLSO								
	Sub Total								
2.	**Farm Management and Marketing**								

1.	Review of terminologies used in FM								
2.	Calculation of average and marginal products								
3.	Calculation of AC, MC, AFC and AVC								
4.	Calculation of profit maximizing level of output								
5.	Preparation of Balance Sheet of a farm								
6.	Preparation of income statement of a farm								
7.	Preparation of budget sheet for meat and meat products plus dairy products.								
8.	Preparation of simple farm inventory of a farm								
9.	Preparation of livestock farming scheme								
10.	Development of a farm work-plan (6 w-approach)								
11.	Preparation of product record charts								
12.	Discussion with farmers for way of risk management								
13.	Calculation of simple and compound interest								
14.	Calculation of depreciation of capital								
15.	writing reports of visit on real credit organization								
16.	Study of retail price of major agriculture and livestock commodities from near by market								
17.	Study of wholesale price of major agriculture commodities from near by market								
18.	Identification of marketing channels								
19.	Visit to private agro-vets and agriculture farms/enterprises (livestock/poultry farm, vegetable farms, nursery etc.)								
20.	Writing reports of visit on DADO, DLSO and COs								
21.	Following biosecurity.								
22.	Study of dairy cooperatiove and their marketing.								

	Sub Total								
3.	**Introductory Animal Husbandry**								
1.	Identification of common breeds of cattle, buffalo, goat, sheep, and poultry birds								
2.	Record keeping practices for farm animals								
3.	Judging animals for selection using different scoring methods								
4.	Identification of common grasses and forage legumes								
5.	Feed formulation using thumb's rules								
6.	Practical study on digestive system of ruminants to understand nutrition.								
7.	Practical study on digestive system of non-ruminants to understand nutrition.								
8.	Practical study on reproductive systems of male and female animals and poultry birds								
9.	Identification of farm animals and poultry birds								
10.	Treating animals against external and internal parasites and worms								
11.	Writing reports of visit on DLSO to observe and experience about Artificial Insemination practices.								
	Sub Total								
4.	**Large Ruminants Production and Management**								
1.	Identification of common breeds of cattle and buffalo								
2.	Study on digestive system of ruminants								
3.	Determination of age in animals								
4.	Study on reproductive systems of male and female ruminants								
5.	Identification of large ruminants (tagging, tattoing, branding)								

6.	Treating large ruminants against external and internal parasites and worms								
7.	Practice on routine farm operations: weighing, debudding and dehorning								
8.	Record keeping practices for farm animals								
9.	Judging animals for selection using different scoring methods								
10.	Performing methods of castration, handling and casting.								
	Sub Total								
5.	**Small Ruminants, Swine and Poultry Production**								
1.	Breed identification of goats, sheep, swine, and poultry birds								
2.	Study of the external body parts of goats and sheep, swine and poultry birds								
3.	Conduct routine farm operations including numbering, weighing, debudding, catration, dipping and dusting for sheep and goat								
4.	Shearing sheep								
5.	Determination of age of sheep and goat.								
6.	Estimation of body weight of sheep and goat								
7.	Detect heat symptoms in sheep, goats and swine								
8.	Castratration of piglets								
9.	Selection of broody hens								
10.	Selection of hatching eggs								
11.	Prepare facilities for rearing chicks								
12.	Formulate poultry rations for different age and category								
13.	Study on brood management								
14.	Develop vaccination plan for broilers and layers								

15.	Debeaking poultry birds and clip of wing feathers								
16.	Culling of poultry birds								
17.	Maintain farm records of production and management activities for small ruminants, swine, and poultry production.								
	Sub Total								
6.	**Animal Nutrition and Fodder Production**								
1.	Identification of common grasses, forage legumes, and fodder trees								
2.	Identification of common feed ingredients for farm animals and poultry birds								
3.	Feed formulation for different age groups and species of farm animals and poultry birds								
4.	Cultivation practices of common annual and perennial grasses and legumes								
5.	Preparation of seasonal calendar of different cereal fodder and legumes considering sowing and harvesting time to supply green fodder all the year round								
6.	Dry matter and yield estimation of seasonal fodder/legumes and pastures								
7.	Writing reports of visit on fodder tree nursery								
	Sub Total								
7.	**Dairy and Dairy Products**								
1.	Study of commonly used dairy equipment								
2.	Milk animal using hygienic techniques								
3.	Prepare animal								
4.	Prepare stables								
5.	Prepare equipment								
6.	Prevent transmission of milk carried diseases								
7.	Prevent mastitis								
8.	Practice hand milking								
9.	Sampling of milk								

10.	Estimation of fat by Gerber's method								
11.	Estimation of specific gravity, SNF and Total solid								
12.	Perform quality control tests for milk and milk products								
13.	Organolaptic test								
14.	Clot on boiling								
15.	Alcohol test								
16.	MBR (Methylene blue reduction) test								
17.	Standard plate count								
18.	Identification of different dairy products produced in Nepal								
19.	Study of cream separator and method of cream separation								
20.	Standardization of milk and milk products								
21.	Preparation of curd, khuwa, cheese, butter, ice cream, and ghee.								
22.	Visit and observe nearby dairy processing plant								
	Sub Total								
8.	**Aquaculture**								
1.	Identify external and internal body parts of fish								
2.	Identify common fish species								
3.	Plan a fish pond								
4.	Lay-out fish pond								
5.	Handle fish culture equipment safely								
6.	Take out the pituitary gland of fish								
7.	Preserve pituitary gland								
8.	Apply pituitary gland for induced breeding of fish								
9.	Make use of water filtering structures/drainage devices								
10.	Make bamboo cage								
11.	Make bamboo gates for paddy fish culture								
12.	Carryout fish culture practices								
13.	Manage fish pond								
14.	Maintain water level of fish pond								
15.	Fertilize/manure fish pond								

16.	Feed fish								
17.	Identify/control aquatic weeds								
18.	Collect/identify/control common parasites of fish								
19.	Identify/treat/control common diseases of fish								
20.	Prevent from water bloom								
21.	Protect pond from predators/flood/erosion								
22.	Carryout activities related to fish breeding								
23.	Handle fingerlings								
24.	Measure fish growth								
25.	Carryout pond mud analysis								
26.	Harvest fish								
27.	Market fish								
28.	Keep record of necessary data								
	Sub Total								
9.	**Animal Health l**								
1.	Identification of healthy and sick animals								
2.	Clinical examination of patients								
3.	History taking and general appearance								
4.	Physical examination: temperature, pulse, respiration, palpation, percussion and auscultation								
5.	Examination of animal movement								
6.	Rectal examination								
7.	Examination of different body parts								
8.	Prescription writing methods								
9.	Identification of common veterinary medicines								
10.	Calculation of dosage of drugs								
11.	Preparation of tincture iodine and Lugol’s iodine								
12.	Preparation of common ointments								
13.	Route of administration of drugs								
14.	Sterilization of glassware and media								
15.	Examination of faecal samples								

16.	Routine examination of urine								
17.	Blood collection and preparation of smears								
18.	Disinfections of shades and buildings								
19.	Examination of wound and its treatment								
20.	Management of fracture in animals								
	Sub Total								
10.	**Animal Health II**								
1.	Identification of common internal parasites of cattle and buffalo								
2.	Identification of common internal parasites of sheep and goat								
3.	Identification of internal/external parasites of poultry								
4.	Identification of internal/external parasites of livestock								
5.	Collection and preservation of parasites								
6.	Draw the life cycle of the common parasites of farm animals								
7.	Vaccination practices in livestock								
8.	Vaccination practices in poultry								
9.	Practice of rectal examination								
10.	Practice of AI								
11.	Diagnosis of pregnancy								
12.	Doagnose of dystocia								
	Sub Total								
11.	**Veterinary Laboratory Techniques**								
1.	Identification of common veterinary laboratory equipment								
2.	Handling and use of microscope								
3.	Preparation and cleaning of glassware								
4.	Method of sterilization								
5.	Use of antiseptics								
6.	Use of disinfectants								
7.	Morphological identification of trematodes								
8.	Morphological identification of nematodes								

9.	Morphological identification of cestodes								
10.	Identification of parasite eggs by faecal examination								
11.	Identification of external parasites								
12.	Identification of mange mites by skin scrapping test								
13.	Collection of blood samples								
14.	Preparation of blood smear								
15.	Total count of RBC								
16.	Total count of WBC								
17.	Differential count of WBC								
18.	Hemoglobin estimation								
19.	Preparation of blood serum								
20.	Identification of blood protozoa								
21.	Routine examination of urine								
22.	Preparation of bacteriological media								
23.	Method of inoculation of samples								
24.	Gram's staining method for identification of bacteria								
25.	Antibiotic sensitivity test								
26.	Preparation of CMT reagent and examination of milk								
27.	Practice of media preparation								
28.	Cultural examination of milk								
29.	Examination of milk by California Mastitis Test								
30.	Post-mortem examination of livestock								
31.	Post-mortem examination of poultry								
	Sub Total								
12.	**Report Writing**								
	TOTAL :	**500**							

Supervisor	Division/Unit/Section Head		Review Committee	
Name :	Name :	Name :	Name :	Name :
Position :	Position :	Position :	Position :	Position :
Signature :	Signature :	Signature :	Signature :	Signature:
Date :	Date :	Date :	Date :	Date :