नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत
# एग्री इन्जिनियरीङ्ग उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत एग्री इन्जिनियरीङ्ग उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ। भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।
उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

## लिखित परीक्षाका आधारहरू

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धित विषयमा भएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धित विषयमा समस्या समाधान | १० | विषयगत लामो उत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूने छ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।

(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।

(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२) शैक्षिक योग्यता-पुर्णाङ्क ३० (३) अनूसन्धानात्मककृति-पुर्णाङ्क ५

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# Syllabus for Senior Technical Officer (T-7)

**Open and internal competition examination**

## Sub Faculty - Agricultural Engineering

### Details of Syllabus

**1.0 Soil and water Engineering**

**1.1 Irrigation Water Measurement Methods**

- Weirs
- Parshal flume
- Cut throat flumes
- Orifices and meter gates
- Tracer method
- Velocity area method

**1.2 Water conveyance and control**

- Open channel
- Design of open channel
- Channel linings
- Drop structures and spill ways
- Water control and diversion structures
- Channel crossing structures
- Pipe flow
- Design of pipe conveyance system
- Structures for underground pipe conveyance system

**1.3 Land Development**

- Land leveling- grading design methods
- Estimation of earthwork quantities
- Leveling- grading procedures
- Equipment for land grading and field layout
- Laser leveling

**1.4 Soil-Plant and Water relationships and irrigation requirements**

- Types of soil and Soil water
- Movements of soil water
- Soil moisture tension
- Measurement of soil moisture
- Plant water relationship
- Evaporation, transpiration and consumptive use
- Evapotranspiration (ET) estimation methods
- Water requirements
- Irrigation efficiency
- Irrigation scheduling and water management of major crops viz. rice, wheat, maize, sugarcane etc.

**1.5 Water Application Methods and its design**

- Border irrigation
- CheckBasin irrigation

- Furrow Irrigation
- Sprinkler Irrigation
- Drip Irrigation

**1.6 Agricultural Drainage**

- Surface drainage system
- Subsurface drainage system
- Design of surface and subsurface drainage

**1.7 Ground water and Irrigation Wells**

- Ground water and aquifers
- Hydraulics of wells
- Design of wells
- Wells construction procedures
- Testing of wells

**1.8 Irrigation Pumps**

- Indigenous water lifting devices
- Positive displacement pumps
- Centrifugal Pumps
- Vertical Turbine Pumps
- Submersible Pumps
- Propeller and mixed flow pumps
- Selection of pumps
- Power requirement, efficiency and economics of irrigation pumping system

**1.9 Engineering Hydrology**

- Hydrological cycle
- Measurement and analysis of precipitation
- Measurement, estimation and analysis of runoff
- Storm hydrograph
- Unit hydrograph

**1.10 Soil and water conservation**

- Water erosion (Raindrop erosion, Sheet erosion, Rill erosion, Gully erosion, Stream channel erosion)
- Soil losses and its measurement
- Erosion control measures (agricultural, engineering, bioengineering methods)
- Terrace and vegetated waterway and farm pond design
- Conservation structures
- Watershed management

**2.0 Farm Power and Machinery**

- Farm Power and Energy
- Human power
- Animal Power
- Mechanical power
- Electrical power
- Solar and wind power
- Energy from agricultural residue and animal waste

**2.1 Internal combustion engines**

- Petrol and diesel engines
- Engine Parts
- Principle of operation
- Engine systems ( air cleaning, fuel, lubricating, ignition, cooling, governing system)
- Performance and characteristics of diesel engine

**2.2 Farm Tractor and its operation and maintenance**

- Farm tractor types
- Parts and components of farm tractor (engine systems, clutch, power transmission, differentials, final drive, power take off, tractor draw bar and traction devices, steering mechanism, hydraulic system, starting mechanism)
- Tractor repair and maintenance
- Farm tractor selection and economics on operation of farm tractor

**2.3 Tillage and tillage implements**

- Tillage requirements and draft power requirement
- Tillage implements
- Traditional animal drawn plough, Mold board plough, Disc plough, Chisel plough, Rotovator, Harrows etc.
- Minimum and zero tillage implements
- Testing and selection of tillage implements
- Operation and maintenance of tillage implements

**2.4 Seeding, harvesting and threshing machinery**

- Sowing methods of major crops
- Seed drill and its components
- Planters and its components
- Rice transplanters
- Vertical conveyor reaper and its components
- Combine harvestor
- Type of threshers
- Multi-crop thresher
- Winnowing machine
- Operation and maintenance of seeding, harvesting and threshing machinery
- Testing of seeding, harvesting and threshing machinery

**2.5 Mechanical weeding and chemical application equipment**

- Manual and power weeders
- Sprayers (its types, components, nozzle types, application)
- Dusters
- Operation and maintenance of Mechanical weeding and chemical application equipment
- Testing of Mechanical weeding and chemical application equipment

**3.0 Post Harvest Engineering**

**3.1 Grain Drying**

- Grain drying needs
- Grain drying methods
- Grain drying theory (thin layer and deep layer drying)
- Mechanical dryers (batch and continuous type)
- Energy requirement in drying
- Efficiency of dryers (fuel, thermal and drying efficiency)

**3.2 Rice Processing**

- Traditional rice milling
- Rice hulling, shelling and polishing
- Rice parboiling and Beaten rice making
- Equipment used in rice processing
- Testing of rice processing equipment

**3.3 Processing of wheat, maize, legumes and oilseed**

- Milling, Hulling, Oil expelling
- Hulling, grinding and oil expelling equipment
- Testing of hulling, milling and oil expelling equipment.

**3.4 Processing and preservation of foods and seeds**

- Cold storage
- Refrigeration in food processing industries, Ice making
- Seed processing equipment and storage
- Cellar storage
- Dairy machinery (Heaters and coolers, Pasteurization and pasturizers, Can washers, Cream separators, Butter churns, Steam boilers)

**4.0 Farm structures**

**4.1 Design of structure and building material**

- Design of RCC structure (beam, slab, foundation and column)
- Design of steel and wooden structure (truss, beam and column)
- Building materials ( concrete, cement, lime, sand, bitumin, surkhi, mud, brick, stone, timber, Mild steel, GI sheet, etc.)
- Quality test of building materials

**4.2 Planning of farm stead and farm residence and design**

- Planning of farmstead
- Farm residence, Water supply and sanitation, Farm road, Fencing etc.
- Design of estimate of above structures

**4.3 Animal Shelters**

- Diary barn (housing requirements, stanchion barn, loose housing barn, barn equipment and accessories, milking barn, pen barn )
- Poultry housing ( housing requirement, type of poultry house, brooder house, poultry equipment and accessories)
- Sheep and goat housing (types, housing requirements, construction material, layout, equipment and accessories in goat and sheep housing etc.)

- Swine housing (types, housing requirements, construction materials, layout, equipment and accessories in swine housing)

**4.4 Storage Structures**

- Animal fodder storage structure
- Animal feed storage structure
- Food grain storage structure (Indigenous storage structure, Bag storage structure, grain bins, modern godowns)
- Grain Pressure theories and design of grain bins
- Farm machinery storage structure and farm workshop.

**4.5 Design and management of electric system in the farm**

- Power transmission and distribution
- House wiring and its components
- Transformer
- AC motor (single phase and poly phase)
- AC motor starters
- Selection of electric motors
- Care and maintenance of electric equipment

**5.0 Statistics**

- Frequency, mean, median, mode, standard deviation, standard error, normal distribution, sampling theory, test of hypothesis, confidence interval
- Randomized complete block design
- Analysis of variance
- Regression and correlation (linear regression and correlation, multiple linear regression and correlation)

**6.0 General**

- Nepal agriculture research council establishment, objective role and activities
- Agricultural perspective plan ( APP)
- Irrigation Policy
- Agricultural and irrigation in recent five year plan
- Status of agricultural mechanization
- Irrigation situation In Nepal
- Agricultural engineering related Institutions in Nepal

-END-

नेपाल कृषि अनूसन्धान परिषद्

पदपुर्ति समिति

# बरिष्ठ प्राविधिक अधिकृत, टि.७

## एग्री एक्सटेन्सन, एग्री इकोनोमिक्स एण्ड मार्केटिङ्गकोपाठ्यक्रम

बरिष्ठ प्राविधिक अधिकृत एग्री एक्सटेन्सन, एग्री इकोनोमिक्स एण्ड मार्केटिङ्ग उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।यस पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

### लिखित परीक्षाका आधारहरू

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धित विषयमा भएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धित विषयमा समस्या समाधान | १० | विषयगत लामो उत्तर | १ | १० |
| ४ | नेपालकृषिअनूसन्धानपरिषद्संगसम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूने छ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।

(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।

(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५(२) शैक्षिक योग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मक कृति-पुर्णाङ्क ५

नेपाल कृषि अनूसन्धान परिषद्
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## Syllabus for Senior Technical Officer (T-7)
**Open and internal competition examination**

## Sub Faculty - Agri-Extension, Agri-Economic & Marketing

**1. General**

a) Role of agriculture in Nepalese economy
b) Structural characteristics of Nepalese Agriculture
c) HMG's long-term and periodic plans and policies on agricultural development
d) Problems and prospects of agricultural development in Nepal.

**2. General Economics**

a) Theory of Consumer Behavior
   - Marginal Utility Analysis
   - Indifference Curve Analysis
   - Revealed Preference
b) Elasticity of Demand and Supply
c) Income and Substitution Effects
d) Classification of Markets and their critical Appraisal
e) Price Determination in Different Market conditions
f) Production function and Principles of Production
g) Cost: Concept and Types
h) Welfare Economics: Concept of Consumer's surplus, Producer's surplus and Pareto Optimality

**3. Agricultural Economics**

a) Characteristics of farming as a business
b) Tools of Farm Management Analysis
   - Farm Planning
   - Farm Budgeting
c) Farm Business Analysis
   - Farm Records and Accounts
   - Farm Inventory: Valuation and Depreciation Techniques
d) Cost and Return Analysis of Different Crops

**4. Agricultural Marketing**

a) Role of Ag. marketing in economic and agricultural development
b) Problems and prospects of agricultural marketing in Nepal.
c) Input and output marketing system
d) Agricultural Marketing Research: Concept and Role
e) Marketing Information System in Nepal
f) Group and cooperative Marketing in Nepal
g) Development and Management of Agricultural Market Centers in Nepal.
h) Agricultural Marketing and Price Policies in Nepal
i) Global and Regional organizations for Marketing and Trade (WTO, SAFTA)

**5. Statistics**

a) Measures of Central Tendency : Mean, Median, Mode, Harmonic Mean, Geometric Mean
b) Measures of Dispersion: Variance, mean and standard deviation.
c) Probability: normal distribution, standard sampling error, test of hypothesis
d) Correlation analysis
e) Simple linear regression
f) Simple and Weighted index numbers
g) Sampling Techniques
h) Determination of Sample size

**6. Agribusiness**

a) Concept and role in agricultural development
b) Grading, packaging, standardization: present situation in Nepal
c) Export Marketing of Nepalese agricultural produce

**7. Agricultural Planning**

a) Concept of planning, project, project cycle, programming and budgeting
b) Project Analysis
   - Financial and Economic Aspects
   - Measures of Project Worth
c) Concept and Methods of Monitoring and Evaluation
d) Market-oriented production planning
e) Pocket-package strategy
f) Devolution of planning to local bodies
g) Environmental consideration in agricultural project preparation

**8. Agricultural Research Institutions in Nepal**

a) Role of NARC in Technology Generation
b) NARC-Present status and future prospects
c) NARDF
d) NGOs and INGOs

**9. Socio-economic Research**

a) Need and Importance
b) Project Concept Note and Proposal Writing
c) Farmers Participatory Research
d) Assessing the Impact of New Technology

**10. Public Resource Allocation and Organizational Development in Nepal**

a) Trend in resource allocation for agricultural development in general and agricultural research in particular.
b) Role of Foreign Aid in Agricultural Development: Issues and Prospects
c) Organizational Development in Agriculture.

नेपाल कृषि अनूसन्धान परिषद्
# पदपुर्ति समिति

## पाठ्यक्रमकोअङ्कभारबरिष्ठप्राविधिक अधिकृत
## एग्रोनोमि प्लाण्ट ब्रिडिङ्ग एण्ड जेनेटिक्स उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत एग्रोनोमि प्लाण्ट ब्रिडिङ्ग एण्ड जेनेटिक्स उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।
उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनूपर्नेछ ।

### लिखित परीक्षाका आधारहरू

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धितविषयमा भएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत<br>छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धित विषयमा समस्या समाधान | १० | विषयगतलामो उत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूनेछ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।

(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।

(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२) शैक्षिक योग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मक कृति-पुर्णाङ्क ५

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# Syllabus for Technical Officer (T-7)

**Open and internal competition examination**

## Sub Faculty - Agronomy, Plant Breeding and Genetics

### A. Agronomy

### A.1 Crop Production

Rice, wheat, maize, fingermillet, barley, buckwheat, lentil, soybean, pigeon pea, rapeseed and sugarcane in relation to.

1.1 Introduction
1.2 Origin (major crops)
1.3 Popular recommended varieties.
1.4 Cultural Practices-land preparation, seed treatment, seed rate, planting method /time, interculture, harvesting, drying, cleaning, and storage.
1.5 Weed and weed control
1.6 Manuring and fertilization-recommended dose, method of application, time of application.
1.7 Water management-time and frequency of water application, irrigation methods, water requirement, drainage.
1.8 Economics of major crop productions (rice, maize, wheat, sugarcane, lentil, rapeseed).
1.9 Plant protection measures- causal agent, symptoms and control measures.
1.10 IPM and its importance.

### A-2 Tillage.

2.1 Objectives of tillage.
2.2 Modern concepts of tillage, (zero tillage, minimum tillage) resource conservation technologies.
2.3 Use of Farm implements to minimize the cost of production.

### A-3 Weed management

3.1 Loss caused by weeds.
3.2 Weed classification based on morphology.
3.3 Common weeds in major field crops.
3.4 Weed control measures: cultural, biological and chemical.
3.5 Herbicides - classification of herbicides, herbicide formulation.

### A4 Climate and crop production:

4.1 Temperature (maximum and minimum)
4.2 Solar radiation
4.3 Sunlight
4.4 Precipitation (rainfall)
4.5 Relative humidity
4.6 Wind x its velocity
4.7 Climate of Nepal-climatic zones
4.8 Importance of climate in crop production.

### A5 Soil and nutrient management

5.1 Soil definition, soil and sub-soil.

5.2 Soil texture, soil structure, soil bulk density.
5.3 Soil of Nepal and classification.
5.4 Essential plant nutrients and their sources,
5.5 Role of essential nutrients.
5.6 Deficiency symptoms due to the lack of major and minornutrients.
5.7 Forms of nutrient (element) utilized by plants.
5.8 Loss of plant nutrient from soil .
5.9 Chemical fertilizer, composition and chemical formula.
5.10 Soil pH, its significance, liming.
5.11 Soil organic matter, its importance, nutrient content of animal dung:
5.12 Recommended dose of nutrients, method of application and time of application.
5.13 Soil organisms, functions of soil orgnisms, notes on ammoni fication, nitrification, denitrification, nitrogen fixation,
5.14 Green manures -Green anuring crops, green leaf manuring and constraints of green manuring.
5.15 The farming systems, its concept and scope, Outreach research and on-farm trials.

**A6 Seed production:**

1. Principle and practice of seed production.
2. Seed certification and its importance.
3. Seed storage for further use.

**A7 Statistics:**

7.1 Mean, variance, standard deviation, standard error, normal distribution, t-tests.
7.2 Tests of significance.
7.3 Randomized complete block design, layout, randomization, analysis of variance, data interpretation.
7.4 Split-plot design- randomization, analysis of variance, interaction of factors.
7.5 Simple/multiple-linear regression and correlation.

**B Plant Breeding**

B1 Definition, importance, history and achievement of plant breeding.
B2. Center of origin of cultivated plants.
B3. Heredity, qualitative and quantitative characters.
B4. Breeding self-pollinated crops.
4.1 Pure-line selection
4.2 Mass selection
4.3 Hybridization
4.3.1 Pedigree Method of plant Breeding.
4.3.2 Bulk-Method of plant Breeding.
4.3.3 Back-cross Method
4.3.4 Choice of parents, Growing of Generation Lines, F1, F2, F3, F4, F5, F6 and selections.
4.3.5 The determination of populations in F2

**B5. Breeding cross-pollinated crops.**

5.1- Mass selection.
5.2- Progeny selection.
5.3- Simple Recurrent selection.

5.4- Recurrent selection for general combining ability.
5.5- Recurrent selection for specific combining Ability.
5.6- Incompatibility/Male sterility.

**B6. Inbreeding Depression, Hybrid varieties.**

**B7. The dominance and over dominance theory of heterosis.**

**B8. Polyploidy in plant breeding .**

**B9. Mutation breeding.**

**B10. Principles and Practices of seed production.**

10.1 Production of Breeder seed and foundation seed of Major crops.

**C. Genetics.**

C1 Cell division with particular reference to meiosis.
C2 Gregor Mendel-His life and contribution.
C3 Mendelian Principle of segregation.
C4 Mendelian Principle of Independent Assortment.
C5 Epistasis and additivity.
C6 Linkage and crossing over.
C7 Hardy-Weinberg law-what way it helps in breeding cross-pollinated crops.
C8 Probability and statistical testing (Chi-square, Binomial Distributions and Normal Distributions).

**D. GENERAL**

D1- Nepal Agriculture Research Council: Establishment, objectives, role and activities.
D2- General Knowledge on by-laws, Executive Board ;and NARC Council.
D3- Major crop commodity Program, establishment, and activities.
D4- Disciplinary Divisions and their roles in research.
D5- Importance given to Agriculture in APP and 10th 5 year plan.
D6- Constraints for agricultural research; a road map to the improvement and sustainability of agriculture research.

- END -

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# पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत
# इण्टोमोलोजि उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत इण्टोमोलोजि उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।

उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

## लिखित परीक्षाका आधारहरू

**भाग-एक**

| क्र. सं. | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत बहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धित विषयमा भएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धित विषयमा समस्या समाधान | १० | विषयगत लामो उत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूने छ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।
(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।
(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।
(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।
(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२)शैक्षिक योग्यर्ता-पुर्णाङ्क ३० (३)अनूसन्धानात्मक कृर्ति-पुर्णाङ्क ५

नेपाल कृषि अनूसन्धान परिषद्
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# Syllabus for Senior Technical Officer (T-7)

**Open and internal competition examination**

## Sub Faculty - Entomology

**1. Introductory Entomology**

1.1 Role entomology in agriculture
1.2 Scope of entomological research in agriculture
1.3 Insects and their relatives
1.4 General structure of a typical insect
1.5 General metamorphosis and life cycle of Lepidoptera, Coleoptera and Hemiptera
1.6 Pest insects and beneficial insects
1.7 IPM experience in Nepal
1.8 IPM : role of GO, NGO and public

**2. External morphology of insects**

2.1 Body wall and exoskeleton
2.2 Head, appendages of a head, mouth parts, principal types of mouth parts
2.3 Thorax, thoracic segment, legs, and wings
2.4 Abdomen, appendages, processes, and external genitalia

**3. Internal anatomy and physiology of insects**

3.1 Digestive system: alimentary canal, digestion and absorption.
3.2 Respiratory system: tracheae, tracheoles and respiration.
3.3 Circulatory system: blood and its circulation.
3.4 Excretion system: malpighian tubules and rectum; regulation of dissolved salts and water.
3.5 Nervous system: central, visceral and peripheral nervous systems.
3.6 Reproductive system: male reproductive system, female reproductive system, types of reproduction and metamorphosis of insects.
3.7 Muscular system: cephalic, thoracic abdominal and flight muscles, metabolism and degeneration of muscles.
3.8 Endocrine system: neurosecretory cells, hormones and pheromones.
3.9 Sense organs and perceptions

**4. Insect toxicology**

4.1 Chemical classification and development of synthetic insecticides
4.2 Different formulations
4.3 Toxicological parameters
4.4 Acute oral toxicity, chronic oral toxicity, dermal toxicity, inhalation toxicity, biomagnification, maximum residue limit, hazards, average daily intake.
4.5 Labeling, packing, storage and disposal
4.6 Impact of insecticide misuse
4.7 Mode of action of organophosphates and carbamates in target organism
4.8 Bioassay of insecticide in laboratory
4.9 Methods of diluting insecticide to a recommendation level
4.10 Safe use of insecticides
4.11 Application equipments
4.12 Sprayer calibration

**5. Insect Ecology**

5.1 Trophic relationship
5.2 Population estimates
5.3 Coexistence and competition
5.4 Community and distribution

**6. Biological Control**

6.1 Natural and biological control
6.2 Biological characteristics of parasitoids, predators and pathogens and their role in nature
6.3 Quarantine handling of entomophagus insects
6.4 Culture of entomophagus insects and their insect hosts
6.5 Insectary facilities and equipments
6.6 Methods of colonisation, recovery and evalution of natural enemies
6.7 Biological control of insects as a component of IPM

**7. Host Plant Resistance**

7.1 Resistance mechanisms
7.2 Biotypes and their expression of persistence
7.3 Plant resistance in pest management

**8. Apiculture and Sericulture**

8.1 Significance of honeybees in agriculture
8.2 Different species of honeybees, their identification, life cycle and division of labour in the colony
8.3 Management of apiary
8.4 Modern beekeeping
8.5 Types of silkworms, their nature and life cycle
8.6 Management of Bombax mori, food materials and silk production
8.7 Silkworm diseases and their management

**9. Economic Entomology**

9.1 Important insect pests of cereals, oilseeds and grain legumes, their identification, damage symptoms, life cycle and management.
9.2 Important insect pests of potato, vegetables and fruit trees, their identification, damage symptoms, life cycle and management.
9.3 Important insect pests of sugarcane, cotton, jute, tea, coffee and cardamom, their identification, damage symptoms, life cycle and management.
9.4 Important insect pests of stored grains, their identification, damage symptoms, life cycle and management.

**10. Project Concept Note Preparation and Entomological Research methodology**

10.1 Preparation of project concept note
10.2 Research methodology
10.2.1 Insect laboratory and rearing equipments
10.2.2 Green house and insect rearing equipments
10.2.3 Experimental Designs in field and laboratory
10.2.4 Observation techniques
10.2.5 mortality correction
10.2.6 Bioassay

10.3 Use of statistics

10.3.1 Descriptive statistics, Chi-square test, Student t-test

10.3.2 Transformation of data: square root transformation, logarithmic transformation and angular (arc sine) transformation.

10.3.3 Analysis of variation

10.3.4 Mean separation: LSD and Duncan's Multiple Range Test

10.3.5 Probit analysis

10.3.6 Non-parametric analyses

- END -

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# पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत ओलरीकल्चर उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत ओलरीकल्चर उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।
उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

## लिखित परीक्षाका आधारहरू

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धित विषयमा भएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत<br>छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धित विषयमा समस्या समाधान | १० | विषयगत लामो उत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूनेछ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।
(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।
(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।
(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।
(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२)शैक्षिक योग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मक कृति-पुर्णाङ्क ५

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# Syllabus for Senior Technical Officer (T-7)

**Open and internal competition examination**

## Sub Faculty - Olericulture

**1. General**

1.1. History, impact and importance of horticultural research and development plans and programs in Nepal.
1.2. Major constraints limiting production of horticultural crops in Nepal.
1.3. History, objective, role and activities of Nepal Agricultural Research Council (NARC)
1.4. Nutritional, economical and environmental value of horticultural crops.
1.5. Classification of horticultural plants.

**2. Vegetable Production**

Production practices of following vegetables relating to location, altitude, aspect, soil, climate, seed, open pollinated & hybrid cultivar, sowing and transplanting time, spacing, irrigation, drainage, manure, fertilizer micro-nutrients, mulching, harvesting time, inter-cropping, mix-cropping and relay-cropping on production, productivity and quality of fresh vegetables.

2.1 Potato, sweet potato, yam, colocasia.
2.2 Tomato, brinjal, hot chilly, sweet pepper.
2.3 Cauliflower, cabbage, Chinese cabbage and broccoli
2.4 Bean, pea, cowpea, broad bean and vegetable soybean.
2.5 Radish, turnip and carrot
2.6 Onion and garlic
2.7 Cucumber, bottle gourd, sponge ground, bitter gourd, pointed gourd, ride gourd, snake gourd, pumpkin and squash.
2.8 Broad leaf mustard, Swiss chard, cress, spinach, fenugreek, coriander, and lettuce
2.9 Ginger, cardamom.
2.10 Asparagus, artichoke

**3. Off-season Vegetables Production**

3.1 Present status, constraints and potentiality
3.2 Utilization of diverse agro-climatic zones for off-season vegetables production
3.3 Suitable crops, varieties and month for off-season production.
3.4 Protected cultivation:- Green house, lath house, plastic tunnel, hot beds, cold frame, etc.
3.5 Improved cultural and management technologies and practices for off-season production.
3.6 Cost and benefits of off-season vegetable production.

**4. Seed Production Technology**

4.1 Present status of vegetables seed production and marketing in Nepal.
4.2. High value with low volume vegetables crops and their production zones of the country.

4.3. Effects of location, aspects, altitude, temperature, light, daylight, spacing irrigation, manures, fertilizers, micro nutrients, hormone, direct seeding, stickling-transplanting, seeding and planting time on seed yield and seed quality.
4.4 Pollination, fertilization, seed development, dormancy and germination.
4.5 Technique of quality control in seed production.
4.6 Seed production methods for open pollinated and hybrid cultivars.
4.7 Existing vegetable seed production zones of Nepal.
4.8 Major problems and weakness of vegetable seed research, vegetable seed production and marketing in Nepal.
4.9 Pre-basic, basic improved/certified seed production in potato and ginger.
4.10 Breeder, nucleus and foundation seed production in vegetable.

**5. Post-harvest technology of vegetables**

5.1. Post harvest physiology- respiration, transpiration and ethylene production.
5.2 Method of harvesting, cleaning, grading, and packaging.
5.3 Post harvest handling, transportation and marketing.
5.4 Consumer's acceptability and quality evaluation of vegetables.
5.5 Processing and preservation of vegetables, potato, ginger and cardamom.

**6. Modern Technology of vegetable Production**

6.1 Tissue culture
6.2. Use of plant growth gerulators in vegetables.
6.3. Drip and other micro irrigation.
6.4. Plastic tunnel, plastic house and plastic mulching.
6.5. Micro-nutrient, multi-nutrient, liquid fertilizers and bio-fertilizers.
6.6. Latest recommended superior hybrid and superior open pollinated cultivars used by Nepali farmers.
6.7. Integrated disease and pest management. (including biological, cultural, pheromone traps, etc.)
6.8. Integrated soil and plant nutrient management.
6.9. True potato seed.
6.10. Disease free seed potato production

**7. Indigenous Technology**

Local and wild edible vegetable, species, cultivars and their usefulness.
Indigenous practices of vegetable cultivation.
Indigenous methods of disease and pest control and preventive measure.
Indigenous methods of soil fertility improvement and management.
Indigenous methods and management of water conservation and utilization.

**8. Varietal Improvement**

8.1 Germpalsm collection, evaluation, conservation utilization.
8.2 Selfing, crossing, evaluation and selection of off-springs.
8.3 Heritability and segregation.
8.4 Genotypic and segregation.
8.5 Mode of pollination.
8.6 Hybridization techniques.
8.7 Variety maintenance of self-pollinated and cross-pollinated crops.

**9. Research Methods and Management**

9.1 Research needs in vegetable, potato and ginger.
9.2 Steps in research project proposal preparation.
9.3 Design of experiment
9.4 Implementation of research activities.
9.5 Laboratory research.
9.6 On-station research.
9.7 On farm research
9.8 Outreach research.
9.9 Farmer's participatory research.
9.10 Collaborative research.
9.11 Multi-partnership research.
9.12 Data base preparation.
9.13 Data analysis, technical report writing and presentation.

**10. Biological Statistics**

10.1 Need of biological statistics for research and researcher.
10.2 Probability, frequency, mean, median, mode, standard deviation, standard error, normal distribution, sampling theory, test of hypothesis, and confidence interval, T-test, F-Test and Chi-square test.
10.3 Estimate of error: - Replication and randomization.
10.4 Control error: - Blocking, proper plot technique and data analysis.
10.5 Control randomized design: - Randomization, layout and analysis of variance.
10.6 Randomized complete block design: - Layout, randomization, analysis of variance.
10.7 Two or more factorial experiment-randomization, layout, analysis of variance and interaction.
10.8 Split plot design: - Randomization, analysis of variance and interaction of factors.
10.9 Comparison:- Pair comparison by Least Signingicants Different (LSD) and Duncan's Multiple Range Test (DMRT)
10.10 Regression and correlation:- Simple linear regression and correction, multiple-linear regression and correction.

- END -

नेपाल कृषि अनूसन्धान परिषद्
# पदपुर्ति समिति

## पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत
## पोमोलोजी उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत पोमोलोजी उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।
उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

**<u>लिखित परीक्षाका आधारहरू</u>**

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धित विषयमा भएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत<br>छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धित विषयमा समस्या समाधान | १० | विषयगतलामोउत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रमबमोजिमलिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूने छ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।

(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।

(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

१) अन्तरबार्ता-पुर्णाङ्क १५ (२)शैक्षिक योग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मककृति-पुर्णाङ्क ५

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

**Syllabus for Senior Technical Officer (T-7)**
**Open and internal competition examination**
# Sub Faculty - Horticulture (Pomology)

## Details of Syllabus

1. Fundamentals of Fruit Production
   a. Importance of fruit production in Nepal
   b. Opportunity of fruits in Nepal
   c. Climate of Nepal
      1. Temparature
      2. Humidity
      3. Pressure
      4. Rainfall
      5. Sunshine hou4s
      6. Soil temperature
      7. Weather observation
      8. Climatic zones and their features in Nepal
   d. Soils of Nepal
      1. Soils of Nepal and their classification
   e. Land resources
      1. Physiographic distribution of Nepal
      2. Land systems, land use and land capability
   f. Orchard establishment including site selection, lay out and planting of fruit plants
   g. Nursery management
      1. Propagating structure
      2. Media
      3. Fertilizers
      4. Soil mixtures
      5. Stratification of fruit seeds
      6. Nursery bed preparation
      7. Planting of grafted plants in the beds
   h. Propagation
      1. Sexual propagation
         Production of genetically pure seeds
         Techniques of seed production and handling
         Principles of propagation by seeds
         Techniques of propagation by seeds

2. Asexual Propagation
   General aspects of Asexual propagation –importance of asexual propagation, Reasons, production and maintenance of true to type clones, influence of scions in root stocks and influence of root stock on scions
   Different types of rootstocks
   Different types of scions and their methods of collection and preservation for latter use
   Different types of vegetative propagation
   Cuttings
   Grafting
   Budding

Layering
Propagation by Specialised stems and roots
Micro propagation

3. Tissue culture
   a. Cultural practices
   b. Training and pruning of the fruit trees
      1. Importance of pruning
      2. Different methods of pruning
      3. Effects of pruning on plant growth
   c. Problems of Fruiting
   d. Plant hormones in fruit crops
   e. Mango malformation
   f. Citrus decline
   g. Post harvest technology

4. Study on major fruit crops like mango, banana, litchi, guava, papaya, aonla, apple, pear, peach, plum, walnut, pecan nut, almond, apricot, cherry, persimmon, avocado, grapes and citrus fruits on the following aspects:
   a. Introduction, origin and distribution
   b. Taxonomy, Morphology and growth stages of plants
   c. Climate and soil
   d. Cultivars
   e. Propagation
   f. Planting
   g. Cultural practices
   h. Weed control
   i. Manures and fertilizers
   j. Pests and diseases
   k. Harvesting and marketing

5. Statistics
   a. Mean, median, mode, standard deviation, standard error, frequency, probability, distribution, sampling theory, test of hypothesis, confidence interval
   b. Estimate of error- replication and randomisation
   c. Layout designs
   d. Comparison
   e. Regression and correlation

6. Weed and weed control
   a. Classification of weeds and their distributions
   b. Importance of weed control in fruit production
   c. Common weeds of fruit orchard
   d. Methods of weed control in fruit orchard

7. Soils and fertilizers
   a. Soil moisture
   b. Surface tension
   c. Water holding capacity

d. Water movement in soil
e. Essential plant nutrients
f. Functions and deficiency
g. Forms of nutrients utilized by plants
h. Chemical fertilizers- composition, classification and their uses
i. Process of absorption of nutrients by plant
j. Determination of nutrient requirements of the soils
k. Response of N.P.K. in major fruit crops
l. Soil pH
m. Liming and liming materials
n. Organic matters
o. C: N ratio
p. Recommended doses of nutrients, time and methods of application
q. Green manuring
r. Farm yard manure and compost
s. Compost preparation

8. Plant Breeding
   a. Definition and importance of plant breeding
   b. Genotypes and phenotypes
   c. Germplasm collection, evaluation and utilisation

9. Photosynthesis, respiration and transpiration

10. General
    a. Planning, monitoring and evaluation
    b. Research project proposal preparation
    c. Motivation and development
    d. How to be a successful scientist in Nepalese condition
    e. Report writing
    f. Leadership
    g. Linkage of research, extension and training
    h. NARC, its establishment, objectives and activities
    i. Ninth and tenth plan in relation to agriculture
    j. Main constraints for agricultural research and development in Nepal

-END-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत
# प्लाण्ट प्याथोलोजी उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत प्लाण्ट प्याथोलोजी उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षकको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।

उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

## लिखित परीक्षाका आधारहरू

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धित विषयमा भएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत छोटोछोटोउत्तर | १ | ५ |
| ३ | सम्बन्धित विषयमा समस्या समाधान | १० | विषयगतलामोउत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूने छ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।

(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।

(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२)शैक्षिक योग्यता-पुर्णाङ्क ३० (३) अनूसन्धानात्मक कृति-पुर्णाङ्क ५

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# Syllabus for Senior Technical Officer (T-7)

**Open and internal competition examination**

## Sub Faculty - Plant Pathology

**1. Introduction:**

Plant pathology and Plant diseases- definition, causes, symptoms and classification of plant diseases, importance and history of plant pathology, effects of plant diseases on host growth and reproduction, factors affecting disease developments, disease triangle, damages and losses caused by plant diseases, disease cycle, and plant pathological terminologies.

**2. Mycology:**

General characteristics of pathogenic fungi, useful and harmful fungi, nutrition, reproduction, dispersal, survival (over-summering/ over-wintering) of fungi, infection process and mechanisms, taxonomy and classification of fungi, life cycle of some representative fungal diseases like –late blight of potato, club root disease of crucifers, downy mildew and powdery mildew of cereals, vegetables, and fruit crops, loose smut of wheat, black/stem rust of wheat. *Fusarium* wilt of tomato, and common bunt of wheat.

**3. Bacteriology:**

General characteristics of plant pathogenic bacteria, nutrition, reproduction, infection process, survival, spread, ecology and classification of pathogenic bacteria, predisposing factors of disease causing bacteria, general symptoms and identification of diseases caused by bacteria, and life cycles of some representative bacterial diseases such as - fire blight of apple, soft rot of vegetable, common scab of potato, black rot of cabbage, wilt of tomato and cucurbits, crown gall of apple, and citrus canker.

**4. Nematology:**

General characteristics, isolation and extraction, multiplication, nutrition, reproduction, morphology, anatomy of plant pathogenic nematodes, classification and identification of some diseases caused by nematodes and life cycles of Root-knot of vegetable crops, soybean and potato cyst nematode, white tip of rice, ear cockle of wheat.

**5. Virology:**

Introduction and characteristics of virus and virus like organisms, structure, morphology, chemical compositions, multiplication, transmission classification and grouping of plant viruses, identification of plant viruses and virus like diseases- Tobacco mosaic virus, cucumber mosaic virus, Potato virus Y, Bean yellow mosaic virus, Rice tungro virus, barley yellow dwarf virus, Tomato leaf curl virus, Citrus tristeza, Maize streak virus, and Cauliflower mosaic virus.

**6. Diseases and characteristics of diseases caused by parasitic plants. Striga,** *Cuscuta* and *orobanche*

**7. Diseases caused by non-pathogenic factors:**

Deficiency diseases caused by nutrition, environmental factors like temperature, oxygen, light, ozone, sulphur dioxide, etc. For example Khaira disease of rice, boron

deficiency of cauliflower, black tip of mango, black head of potato, sunscald of pepper, Chlorosis in fruit leaf.

**8. Plant disease diagnosis:**
Diagnosis technique and methods- Koch's postulate and other methods.

**9. Plant disease management:**
Principles of plant disease management- exclusion, avoidance, protection, eradication and immunization.

**10. Control methods:**
Regulatory methods, Physical methods, Cultural methods, Host resistance (types of resistance, nature of resistance, tolerance, advantages of host resistance in the disease control), Biological methods, Chemical methods- (types/groups of pesticides, major pesticides and their formulations, methods of evaluation, modes of action, methods of application, factors affecting pesticide performance, toxicity, pesticide resistance, seed treatment, sprayers and spraying techniques, fumigation, injection, safe storage and handling, precautions and antidotes), and Integrated disease management.

**11. Distribution, losses, symptoms, causal organisms, predisposing factors in the disease development and management and control of the following diseases of major crop plants of Nepal:**

11.1. **Rice**- Blast, bacterial leaf blight (BLB), sheath blight, brown leaf spot, false smut, foot rot, tungro virus, Khaira disease.

11.2. **Wheat**- Leaf rust, yellow rust, foliar blight, loose smut, common bunt, Karnal bunt, powdery mildew.

11.3. **Maize**- *Turcicum* blight, Southern leaf blight, banded leaf and sheath blight, ear rot, cob rot, stalk rot, downy mildew, common smut and head smut.

11.4 **Vegetables-**Bacterial wilt of potato and tomato, late and early blight of potato and tomato, wart of potato, soft rot and brown rot of potato, root-knot nematode of solanaceous crops , leaf curl of tomato and pepper, Phytophthora blight of pepper, back rot of cabbage, club root of crucifer, white rust of crucifer, Alternaria leaf spots of broad leaf mustard, damping off crucifers, downy mildew of cauliflower and cabbage, Turnip mosaic virus of broad leaf mustard, Phomopsis blight and foot rot of brinjal, Cucumber Mosaic Virus in pepper and cucurbits, bacterial wilts of cucurbits, purple blotch of onion, downy mildew of onion, powdery mildew and rust of pea.

11.5 **Legumes**- Wilt, Stemphyllium blight and root rot of lentil Botrytis gray mold, root rot and wilt of chickpea, bean yellow mosaic, anthracnose and rust of bean, wilt and sterility mosaic of arhar, Bacterial blight of bean, bacterial pustule and frog eye spot of soybean, mung-bean yellow mosaic virus.

11.6 **Fruits**- Citrus greening, apple scab, citrus canker, powdery mildews, downy mildew, papery bark of apple, citrus gummosis, *Fusarium* wilt of banana, mango malformation, peach leaf curl. Citrus decline, and Guava wilt.

11.7 **Oilsed crops**- *Alternaria* leaf spot and *Sclerotinia* blight of tori, Striga in tori, downy mildew of crucifers, white rust crucifers leaf spots of groundnut

11.8 **Cash crops**- Tobacco mosaic virus, charcoal rot of jute, yellow mosaic of jute, red rot of sugarcane, stem gall of coriander, Orobanche in tobacco, angular leaf

spot cotton, wilt of cotton, rhizome rot of ginger, leaf spot of turmeric, coffee rust.

11.9 **Finger-millet**- Blast, *Cercospora* leaf spot, sheath blight.

10.10. **Barley**- Yellow rust, barley stripe, covered smut, powdery mildew.

11.11 **Seed pathology**: Seed borne diseases and their significance, seed health testing of fungi, bacteria, nematodes and viruses.

**12. Laboratory technique**:

- General knowledge of laboratory equipments- Microscopes, laminar floor hood, incubators, oven, autoclave, refrigeratror and freezer, centrifuge, other machineries and glasswares.
- Different types of media and their preparation.
- Isolation, purification and maintenance of culture of different plant pathogens.
- Laboratory processes- Cleaning, sterilization, staining, preserving, fixing, and histopathological studies and other disease diagnosis techniques.

**13. Field techniques:**

Field survey, collection of disease specimens, methods of disease recording, disease specimen preservation, and cataloguing, field lay-out and design of experiments.

**14. Mushroom:**

Types of cultivated mushroom, cultivation techniques and methods of cultivation of Agaricus and Pleurotus mushroom species.

**15. Mycorrhiza:** Mycorrhiza and their uses in plant pathology.

**16. Statistics and experimentation:**

Experimental designs, tests and hypotheses, mean separation, data transformation, and data analyses by using common statistical packages, drawing conclusion and inferences based on analysis of the data.

**17. Project formulation and report writing:**

Project formulation based on NARC format, and technical and scientific report writing.

**18. Nepal Agricultural Research Council (NARC) in General:**

General knowledge of NARC, its organization, roles, objectives, mandates, importance, linkages with other organizations, major research activities, major types of researches conducted, recent agricultural statistics, APP related to NARC and agriculture development in Nepal.

**19. Computer knowledge:** Basic knowledge applicable to plant pathology.

-END-

नेपाल कृषि अनूसन्धान परिषद्
# पदपुर्ति समिति

## पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत
## स्वायल साइन्स उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत स्वायल साइन्स उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।

उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

### <u>लिखित परीक्षाका आधारहरू</u>

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धितविषयमाभएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत<br>छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धित विषयमा समस्या समाधान | १० | विषयगत लामो उत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूनेछ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।

(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।

(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२)शैक्षिक योग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मक कृति-पुर्णाङ्क ५

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

**Syllabus for Senior Technical Officer (T-7)**
**Open and internal competition examination**

# Sub Faculty - Soil Science

**1. Basic soil science**

a. Rocks and minerals, their classification and source of soil parent materials, Weathering and soil formation, Soil profiles and soil horizon
b. Soil-definition, soil structure, soil texture, bulk density, particle density porosity, soil colour and soil aggregates
c. Soil moisture-classification, field capacity wilting points, soil moisture measurement, Soil moisture retention curve, Infiltration and permeability.
d. Soil reaction- definition, numerical calculation of pH, its importance, lime and gypsum requirements,
e. Soil amelioration, lands reclamation
f. Soil organic matter- its role in crop production, humus and soil fertility)

**2. Soil fertility**

a. Basic soil-plant relationship-Plant roots and soil relations, Soil fertility and productivity,
b. Nutrient elements and their classification (primary, secondary and micronutrients),
c. Primary elements N, P and K and their function in plants, their deficiencies symptoms
d. Secondary elements and their importance
e. Soil fertility rating in Nepalese condition
f. Basic soil-plant relationships- ion exchange in soil (cations and anions), base saturation, effective CEC, exchangeable cations and their importance in soil fertility,
g. Soil organic matter management in soil fertility maintenance-stubble management, FYM, green manure, different types of green manure plants and their nutrient content in Nepal
h. Fertilisers –fertilisers containing nitrogen, phosphorus and potassium,

**3. Soil Conservation and Watershed Management**

a. Soil degradation- physical, chemical and mechanical degradation, Land use and Land capability classification (arable land, grass land, pasture and forest including recreation), criteria for classification,
b. Introduction to watershed management, The problem of watershed management in Nepal (imbalance due to anthropogenic pressure, restoring the balance, protect-preserve-improve),
c. Planning for watershed management-cropping system, farming system, improving farming practices, Restoration of soil fertility for sustainable production
d. Sloping agricultural land technology (SALT)- Importance in Nepalese condition, economics of slope cultivation, problem of slopping land cultivation in Nepal, soil and fertility losses, restoration of soil in slopes (hedge row cultivation, inclusion of fruit trees, leguminous trees in slopes and soil conservation used in Nepal)

**4. Bio-fertilisers and Organic Farming**

a. Organic Sources of plant nutrients, Role of organic matter in crop production, Soil organisms, Farm yard manure, Poultry manure, Compost Green manure,
b. Biological nitrogen fixation, Organisms associated with nitrogen fixation (Rhyzobium bacteria, Free living bacteria, Azospirillum, Blue green algae, Azolla, Other micro-organisms) Concept of organic farming, Integrated plant nutrient management system (IPNMS).
c. Losses- nitrification, denitrification, volatilisation, leaching, fixation,

**5. Soil survey, and soil classification**

a. Soils morphology and soil survey, methods used in soil survey
b. Soil classification and soils found in Nepal
c. Preparation of soil survey reports
d. Supplemental Procedures -collection and preparation of samples, general laboratory procedures, physical properties of soils, some chemical properties of soil, soil salinity alkalinity and its reclamation

**6. General**

a. Soil fertility problem of Nepal, Role of soil scientists in tackling soil problems
b. Soil productivity and crop production in Nepal. Measures to increase crop production from soil fertility points
c. Nepal Agriculture Research Council addressing soil fertility problems in Nepal.

-END-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत
## भेटेरीनरी उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत भेटेरीनरी उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगितादूईभागमाहूनेछ। भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षकको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।

उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

### लिखित परीक्षाका आधारहरू

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धित विषयमा भएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धित विषयमा समस्या समाधान | १० | विषयगत लामो उत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूनेछ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।

(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।

(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२)शैक्षिक योग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मककृति-पुर्णाङ्क ५

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# Syllabus for Senior Technical Officer (T-7)

**Open and internal competition examination**

## Sub Faculty - Veterinary

**I Basic Subjects**

**Anatomy and Histology:**

- Classification of bones, gross structure of different bones and cartilages, functional osteology
- Arthrology – structural and functional anatomy of joints
- Myology – structure and functions of various muscles
- Anatomy of central and peripheral nervous system, autonomic nervous system and meninges
- Gross structure of circulatory organs – heart, aorta and venacava, arteries, veins, spleen, lymph nodes
- Gross structure of visceral organs – organs of digestive, respiratory, reproductive, urinary and endocrine systems
- Anatomy of special sense organs
- Histology: cell structure and organelles, histological techniques
- Microscopic structure of the organs of digestive, respiratory, urinary, reproductive, nervous, cardiovascular, sense organs, endocrine glands, lymphoid organs, bone marrow and blood.

**Embryology:**

- General embryology, embryonic and fetal development of the organs of digestive, respiratory, urogenital, cardiovascular, nervous and locomotary organs.Description of embryo developmental stages in chick model.

**Animal Physiology:**

- Introduction to physiological chemistry, enzymes and coenzymes and their classification, metabolism of carbohydrates, proteins, fat, nucleic acid, DNA synthesis, metabolism of macro and micro minerals, vitamins and their functions.
- Biochemistry of carbohydrates, proteins, lipids, vitamins, nucleic acid; structure of DNA and RNA.Synthesis of proteins and other biomolecules.
- Biochemistry of blood, plasma, hemoglobin, lymph, soft tissues and bones.Blood coagulation process.
- Biochemistry of respiration, acid base balance, renal function, stress and shock. Liver function and detoxification
- Biochemistry of hormones
- Physiology of locomotor system – muscle contraction and its mechanism. Electrical changes in skeletal and cardiac muscle, rhythmic excitation, heart beat, electrocardiogram.
- Physiology of circulation: cardiac cycle and hemo-dynamics, neural and chemical control of blood vessels, blood pressure, cardiac output, its variation and regulation, fluid and electrolyte balance, functions of blood.
- Mechanism and chemistry of respiration, exchanges of gases in lungs and tissues, law of solubility of gases, regulation of respiration, respiratory reflexes, hypoxia, role of respiration in acid base balance, respiration in birds.

- Physiology of digestion, absorption and excretion in ruminants, mono-gastric animals and birds.
- Nervous system: function of neurons and nerve fibers, synapse, transmission of nerve impulse, cutaneous receptor organs, spinal cord and reflex actions, function of brain stem and cerebellum, cerebral hemispheres. Conditioned reflexes, autonomic nervous functions: general arrangement and chemical transmission.
- Functions of sense organs, Physiological mechanism for vision, hearing, olfaction, touch and taste.
- Reproduction and endocrine functions: reproductive organs and their functions in male and female animals. Mammary gland function and mechanism of lactation in females.
- Physiology of growth. Environmental and climatic physiology of domestic animals. Acclimatization and adaptation.
- Recent advances in physiological effects of production functions in high yielding animals

**Molecular Biology and Biotechnology**

- History of molecular biology, basic principle of biosynthesis, genome, gene sequencing, polymerase chain reaction.
- Biotechnology: basic principles, tools applicable in veterinary science – Reproduction, embryo transfer technology, in vitro fertilization, pregnancy diagnosis, transgenic animals, disease diagnosis, hybridoma, monoclonal antibody production, DNA probes, Fermentation, vaccine production, cell culture and microscopic manipulation

**II Applied Para-clinical Subjects**

**Veterinary Pharmacology and Toxicology**

- Introduction to pharmacology, history, scope and its development.
- Pharmaco-dynamics, drugs metabolism, action and excretion
- Drugs acting on autonomic nervous system-adrenergic antagonists, adrenoceptors blockers, adrenergic neuron blockers, cholenergic antagonist and blockers, ganglionic stimulants and blockers, Pharmacology of anesthetic agents – local and general
- Transmittors of CNS, analeptics and other CNS stimulants
- Principles of chemotherapy; sulfonamides.
- Antibiotics and antibacterial agents – history, development, chemistry, action and resistance; antifungal agents
- Principles of drug activity: pharmacokinetics –absorption, distribution, biotransformation and excretion of drugs, pharmacodynamics- concept of drug and receptors, dose-response relationship, terms related to drug activity and factors modifying the drug effect and dosage.
- History and theories of general anaesthesia; volatile, gaseous, intravenous and dissociative anaesthetics, hypnotics and sedatives, tranquilizers, analgesics
- Antipyratics, analgesics, and anti inflammatory agents
- Peripheral and central muscle relaxants
- Histamine and antihistaminic agents; prostaglandins, angiotensin and bradykinin
- Drugs acting on circulatory system: chemistry, action and therapeutic uses
- Drugs acting on digestive tract

- Drugs acting on respiratory system
- Drugs acting on endocrine system- adrenocorticosteroid, sex hormones, insulin and other hypoglycemic agents, thyroid hormones
- Drugs acting on skin and mucus membranes
- \Anthelmintics, antiprotozoal, antiviral and anticancer agents
- Antiseptics and disinfectants
- Hormones –hormone stimulating and inhibiting drugs, antagonists, hypoglycaemic agents, prostaglandins, oxytocin, anabolics, growth promoters and corticosteroids
- Commonly used herbal drugs in veterinary medicine
- General toxicology: scope, source of poisoning, mode of action of poisons, factors modifying toxicity and line of treatment of poisoned cases
- Toxicity caused by metals and non metals-arsenic, lead, mercury, copper, selenium, phosphorus, nitrates, nitrite, common salt and flurosis
- Plant toxicity due to various poisonous plants
- Toxicity caused by commonly used drugs, mycotoxins, bacterial toxins and others
- Toxicity caused by agrochemicals, insecticides, herbicides and rodenticides
- Venoms, bites and stings
- Environmental toxicity- toxicity caused by air, water, food additives and preservatives
- Current research trends and advances in drug development

**Veterinary Parasitology:**

- History and development of veterinary parasitology,
- Parasitological techniques
- Etiology, lifecycle, transmission, epidemiology, pathogenesis, symptoms, diagnosis, treatment, prevention and control, and economic significance of the following diseases of cattle, buffalo, sheep, goat, pigs, poultry, pet animals and wild life species with regard to:
  - Nematodal diseases
  - Liver fluke
  - Other tape worm infections and infestations
  - Protozoal diseases
  - Diseases due to arthropods
  - Parasitic diseases (both protozoal and helminthic) of zoonotic significance
- Arthropods as vectors of various infectious diseases
- Immunity to parasitic diseases, vaccines and vaccination against parasitic diseases
- Recent advances in the study of veterinary parasitic diseases in Nepal and abroad.

**Veterinary Microbiology and Immunology:**

- Introduction to bacteriology, history, scope and development. Physiology of microorganisms including metabolism. Classification and characteristics of pathogenic bacteria. Bacteriological techniques and methods.
- Introduction to mycology,
- The classification of animal viruses: DNA and RNA viruses; unclassified viruses
- Etiology, transmission, symptoms, pathogenesis, diagnosis, laboratory investigation, treatment, prevention, control and economic importance of
  - Bacterial diseases of cattle, buffalo, pigs, goats, sheep, pet animals and wildlife species.

- Fungal diseases of domestic animals and birds.
- Viral diseases of cattle, buffalo, pigs, goats, sheep, pet animals and wildlife species
- Diseases associated with bacterial toxins and antitoxins
- Diseases associated with fungal toxins
- Rickettsial diseases
- Bacterial, viral and fungal diseases of zoonotic significance

- Methods used in virological studies
- Isolation, characterization, banking of causative agent and referral diagnosis of diseases of microbial origin
- Mastitis: economic significance, causes, symptoms, pathogenesis, treatment, prevention and control
- General characteristics of viruses and viral diseases, bacteriophage
- Introduction to immunology: inflammation as an immune response
- Immunochemistry: antigens and antigenic determinants, structure and types of antibodies, immuno-modulation – principles and practices
- Organs of the immune system, ontogeny, immune response – humoral and cell mediated immune response, vaccine and vaccination, the detection and measurement of antigen and antibodies. Resistance to bacteria, viruses, parasites, tumors. Hypersensitivity, autoimmunity, drugs and agents that affect (potentiate and suppress) the immune response, Immune-deficient diseases of livestock and poultry.
- Recent developments in veterinary microbiology and immunology, genetic intervention for disease resistance

**Veterinary Pathology**

- Introduction to veterinary pathology, History, scope and development.
- Methods and techniques in pathological studies, Post-mortem examination technique and disease specific lesions and findings, histo-pathological studies and disease specific microscopic lesions, hematology,
- Sample collection, processing, preservation, transport and dispatch.
- General and systemic pathology with reference to infectious and noninfectious diseases of domestic animals and poultry
- Introduction to special pathology and systemic pathology.
- Oncology: tumors and cancers
- Present trends in disease diagnosis, molecular probes.

**Veterinary Epidemiology**

- Introduction epidemiology. Host, disease factor and environment; Ecological concept of disease. Disease surveillance.
- Type of epidemiological studies - case control, cohort studies, retrospective, cross sectional and perspective studies, disease forecasting.
- Disease process and its spread, pattern of disease distribution in the community,
- Investigation of disease epidemics
- Laws regulating animal diseases in Nepal and international laws related to disease regulations: handling, import and export of biologicals, animal products and the animals
- OIE categorizations of communicable diseases
- Computer in data analysis

- Current advances in veterinary epidemiology

**III. Applied Subjects on Veterinary Clinical Research**

**Veterinary Ethics and Jurisprudence**

- Legal duties of veterinarians, forensic and state medicine, laws, common offences against animals and laws related to those offences, legal points and examination of live and dead animals in criminal cases, mischief, killing, maiming and poisoning, cruelty to animals and bestiality.
- Current laws in veterinary practices, Veterinary ethics and code of conduct, common offences against animals, forensic veterinary investigation and practice, public health laws.
- National and international regulation on import and export of livestock, livestock products and biologicals.
- Adulteration in livestock products, their detection and legal action

**Veterinary Medicine (Preventive and Therapeutic)**

- History and scope of medicine, concept of animal disease, health and disease concept, etiological agents, infection and immunity
- Clinical examination and diagnosis of diseases in the sick animals
- General and systemic states, hyperthermia, hypothermia, fever, toxemia, septicemia, shock and dehydration
- Definition, etiology, clinical symptoms, pathogenesis, clinical pathology, diagnosis, treatment, prevention and control of the diseases of digestive, respiratory, cardiovascular and lymphatic, uro-genital, nervous, sense organs, skin, musculo-skeletal systems of cattle, buffaloes, horses, pigs, sheep, goats and pet animals.
- Diseases of new born animals
- Definition, etiology, clinical symptoms, pathogenesis, clinical biochemistry, clinical pathology, diagnosis, treatment, prevention and control of metabolic diseases (like: milk fever, ketosis, lactation tetany, downer cow syndrome, hypomagnesaemia) and nutritional deficiency diseases in domestic animals, pets and poultry.
- Incidence, etiology, epidemiology, transmission, clinical symptoms, pathogenesis, clinical biochemistry, clinical pathology, diagnosis, treatment, prevention and control of diseases caused by bacteria, viruses, chlamydia, rickettsia, protozoa, parasites and fungi in domestic animals, pets and poultry.
- Definition, etiology, clinical symptoms, pathogenesis, clinical biochemistry, clinical pathology, diagnosis, treatment, prevention and control of diseases caused by physical and chemical agents.
- Diseases caused by allergy
- Diseases caused by undesirable inherited characters and unknown etiologies
- Health management and health record keeping in a herd/flock.
- Recent advances in research in veterinary medicine and new technologies in diagnosis, treatment and control of major diseases.
- Emerging diseases of livestock and poultry.

**Reproduction and Reproductive Diseases**

- Male and female reproductive system, organs and their development. Reproductive cycle of cattle, buffalo, sheep, goat, pig, poultry, pet animals and wild life species.

- Hormones of reproduction and their functions, application for reproductive management
- Infectious and non-infectious reproductive diseases of male and female animals: etiology, pathogenesis, symptoms, treatment, prevention and control. Eutocia and dystocia in females.
- Role of nutrition in reproduction, deficiency related reproductive problems.
- Introduction to assisted reproductive technologies: artificial insemination and embryo transfer, semen collection, evaluation, processing and preservation, sperm pathology and associated diseases.
- Diseases transferable through semen and embryo
- Major reproductive disorders in cattle, buffalo, sheep, goat, pigs and poultry in Nepal.
- Current research focus in reproduction and reproductive diseases in Nepal and abroad.

**Surgery and Radiology**

- History and development of veterinary surgery, general surgical principles.
- Pre-operative and post-operative considerations, asepsis and antisepsis.
- Introduction to anesthesiology. Various anesthetics, their properties and applications
- Introduction to Radiology, its application in disease diagnosis and operations.
- Introduction to ultrasound imaging, importance, principles and application in veterinary practice.
- Major and minor operations: hemostasis, operation procedures, complications and their prevention
- Surgical infections, their prevention and management
- Fractures: types, complications and treatment. Healing of bones.
- Regional clinical surgery in relation to various conditions demanding surgical intervention

**Research Methodology and Statistics:**

- Introduction to Statistics:
- Probability, frequency, mean, median, mode, standard deviation, standard error, normal distribution, sampling theory, test of hypothesis, confidence intervals
- Students t test, Chi-square test, F test
- Estimate of error- replication and randomization
- Randomized complete block design-layout, randomization, analysis of variance
- Two factorial experiment- randomization, layout and analysis of variance, interaction
- Comparison - pair comparison by least significant difference, group comparison-between groups, comparison within group, ANOVA.
- Regression and correlation - simple linear and non linear, multiple linear and non linear; correlation
- Importance and use of statistics in bio-sciences research
- Introduction to sociology and veterinary extension

**Laboratory Techniques for Disease Investigation**

- Specimens for disease investigation: collection, preservation, packing, storage, dispatching and processing
- Preparation of reagents, media, sterilization procedures
- Recording, organization and storage, processing and analysis of laboratory generated data.
- Different techniques used for disease diagnosis and investigation
  - Histopathological techniques
  - Microbiological (bacteriological and virological) techniques
  - Serological techniques
  - Parasitological techniques
  - Cell and tissue culture
  - Biochemical techniques
  - Molecular techniques
  - Standardization of drugs, vaccines and reagents.
- Laboratory safety measures
- Introduction to biosecurity
- First aid treatment in laboratory accidents
- Laboratory equipment preparation and operation procedure
- Care and management of laboratory animals

**V. General:**

- Inception of Nepal agricultural Research Council. Its mandate, goals, objectives and organizational set up. NARC Act 2048 B.S.
- Livestock sector in APP – brief introduction and projection
- Research prioritization and approach
- Current research programs and activities on livestock commodities
- Recent five-year plans and agriculture in general and livestock sector in particular – priority focuses and achievements in terms of income generation and poverty alleviation.
- Recent Livestock statistics of Nepal – productivity status and contribution to AGDP from various species in terms of milk meat, draught power, wool and eggs
- Import and export situation of livestock and livestock products in Nepal.
- Major constraints on livestock production, marketing and expansion of livestock based industries

-END-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत एनिमल न्युट्रिशन एण्ड फिडिङ्ग उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत एनिमल न्युट्रिशन एण्ड फिडिङ्ग उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।
उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

## लिखित परीक्षाका आधारहरू

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धितविषयमाभएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत<br>छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धितविषयमा समस्या समाधान | १० | विषयगतलामा] उत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूनेछ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।
(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।
(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।
(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।
(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२)शैक्षिकयोग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मककृति-पुर्णाङ्क ५

## Syllabus for Senior Technical Officer (T-7)
**Open and internal competition examination**

## Sub Faculty - Animal Nutrition and Feeding

**1. Introduction**

1.1 Nutrition and its importance in livestock and avian production system in Nepal.

1.2 Gastrointestinal tract and nutrition. Anatomy and function of the gastrointestinal tract, the role of digestive juices. Rumen metabolism, rumen fermentation, blood and nutrition. Fecal and urinary excretion.

1.3 Measurement of feed and nutrient utilization. Nutrient requirements of animals. Growth trials, digestion trials; conventional methods, indicator method, digestibility by difference, associative effects. Apparent vs. true digestibility, balance trials and purified diets. Estimation of nutrients requirements of animals, sequence of events in nutrient deficiency and establishing specific nutrient requirements.

**2. Nutrient metabolism**

2.1 Water – functions, absorption, sources of water, water losses, water requirements and water quality in relation to animal nutrition.

2.2 Protein and amino acid – functions, metabolism, absorption, synthesis, requirements, deficiency symptoms, use of non-protein nitrogen in ruminant animals, amino acid antagonism and toxicity and measures of nutritive value of protein.

2.3 Lipids – Structure, functions, absorption, metabolism, deficiency symptoms of lipid in farm animals.

2.4 Carbohydrate – Classification, structure, functions, metabolism, absorption, abnormal carbohydrate metabolism and utilization of plant fiber in farm animals.

2.5 Sources, functions, deficiency symptoms and toxicity of minerals and vitamins in farm animals.

**3. Feeding standard and productive functions**

3.1 Terminology used in feeding standard

3.2 Maintenance requirements

3.3 Nutrients requirement for growth and fattening.

3.4 Nutrients requirements for working animals.

3.5 Nutrients requirements for reproduction.

3.6 Nutrients requirements for lactating animals.

**4. Feed stuffs for animals**

4.1 Classification of feed stuffs – roughages, hay, silages, concentrates (energy sources), protein concentrates, mineral supplements, vitamin supplements and non – nutritive feed additives.

4.2 Pasture and grazed forages.

4.3 Harvested dry roughages and artificially dried forage.

4.4 Harvested high – moisture roughages :- soilage and silage

4.5 High energy feed stuffs – cereal grain, milling by products, liquid energy sources, other high-carbohydrate feed stuffs, fats and oils.

4.6 Protein concentrates – protein supplement of animal origin, plant protein concentrates and non-protein nitrogen compounds.
4.7 Minerals and vitamin supplements.

**5. Animal feed preparation and processing**

5.1 Grain processing – cold processing, hot processing, feed processing for ruminants and non-ruminant animals.
5.2 Roughage processing for ruminants – chopping, pelleting, blending, cubed roughages and chemical treatments.

**6. Feed formulation**

6.1 Information needed for feed formulation
6.2 Mechanics of diet formulation – Pearson's square, simultaneous equations.
6.3 Mathematical programming – least cost vs. maximum profit formulation, formulating premixes and supplements.

**7. Laboratory procedure in animal nutrition**

7.1 Layout of analytical laboratory
7.2 Chemicals, reagents, glassware, equipment, appliances and animal shed facilities needed for animal nutrition research.
7.3 Preparation of chemicals and reagents, solution, equivalent weight, normality, molality, preparation of indicators, storing and preservation of standard solutions. Cleaning and drying of glassware and general precaution needed in animal nutrition laboratory
7.4 Sampling collection and processing of feeds and biological materials for analysis.
7.5 Sampling of dry roughages, green forages, silage, hay, concentrate, residue (left over after feeding), faeces, urine and milk.
7.6 Processing and preservation of dried samples, wet samples, urine and milk for laboratory analysis.

**8. Statistical procedures for animal nutrition research**

8.1 Completely randomized design (CRD)
8.2 Completely randomized block design (CRBD)
8.3 Latin square design
8.4 Analysis of variances
8.5 Analysis of covariance
8.6 Regression and correlation analysis
8.7 Frequency distribution

**9. General**

9.1 Nepal Agricultural Research Council; establishment, objective, role and activities.
9.2 Main constraints, issues, production situation of livestock products in relation to animal nutrition research in Nepal.

-END-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

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## पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत
## एल पि पि एम उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत एनिमल न्युट्रिशन एण्ड फिडिङ्ग उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।
उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

**<u>लिखित परीक्षाका आधारहरू</u>**

**भाग-एक**

| क्र.सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धितविषयमाभएका प्रविधिहरूको नवीनतम ज्ञान | ५ | विषयगत छोटोछोटो उत्तर | १ | ५ |
| ३ | सम्बन्धितविषयमा समस्या समाधान | १० | विषयगतलामा] उत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूनेछ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।
(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।
(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।
(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।
(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२) शैक्षिकयोग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मककृति-पुर्णाङ्क ५

# Syllabus for Senior Technical Officer (T-7)

**Open and internal competition examination**

## Sub Faculty - Livestock Products, Production and Management

**1 General**

1.1 Production and productivity of different breeds of livestock , swine and avian in Nepalese condition.
1.2 Status of per-capita consumption and production of livestock and poultry products in Nepalese diet.
1.3 Role of Livestock Scientist for improving the socio-economic status of rural Nepalese people.
1.4 Structure, objectives and activities of NARC council and NARC executive Board

**2 Livestock Production and Management**

2.1 Livestock Production system in Nepal
2.2 Cattle, Yak and Chauries
2.3 Buffaloes
2.4 Sheep and goat
2.5 Pig, poultry and rabbits
2.6 Design of housing and shed construction for different species of livestock and birds
2.7 Integration of crop, livestock, forestry, horticulture and fisheries for improving the efficiencies of agricultural production system in Nepal
2.8 Site selection and housing floor requirement for different stages farm animals
2.9 Different methods of animal identification and record keeping system in Livestock farm
2.10 Disposal of animal waste and their management
2.11 Castration, dehorning, grooming, dipping, shearing of sheep and rabbit and de-beaking of poultry
2.12 Care and management of sick animal, isolation, segregation, and quarantine
2.13 Incubation and hatching of eggs

**3 Dairy animal (Buffalo and Cattle ) keeping and their management**

3.1 Dairy record keeping
3.2 Breeding better dairy animal
3.3 Reproduction and lactation
3.4 Dairy herd management
3.5 Feeding dairy animal

**4 Poultry Production and management**

4.1 Incubation and hatchery management
4.2 Brooding and Rearing
4.3 Poultry housing and equipment
4.4 Poultry feeding and management

4.5 Poultry breeding and management
4.6 Poultry Diseases and their preventive measures
4.7 Marketing of eggs and poultry

**5 Goat Production and management**

5.1 Goat production and their important in Nepal
5.2 Goat breeding
5.3 Goat nutrition
5.4 Housing and management
5.5 Goat Diseases and their preventive measure
5.6 Goat marketing

**6 Sheep Production and management**

6.1 System of sheep production in Nepal
6.2 Breeds and breeding of sheep in Nepal
6.3 Sheep grazing system in Nepal
6.4 Shearing wool and wool production
6.5 Diseases and parasite of sheep and their preventive measures
6.6 Sheep and wool marketing

**7 Pig Production and management**

7.1 Pig housing and waste management
7.2 Pig nutrition and feeding
7.3 Pig Breeds and breeding in Nepal
7.4 Pig diseases and parasites and their preventive measures

**8 Pasture, fodder and fodder tree production**

8.1 Pasture species suitable to different ecology ie mountain, hills and Tarai
8.2 Forage species for different seasons and suitable to hills, mountain and tarai
8.3 Fodder tees for Hills, Mountain and Tarai
8.4 Plant physiology, plant nutrient management
8.5 Plant introduction, evaluation and utilization
8.6 Conservation of forages, crop by-product and their utilization
8.7 Agronomic and other management practices of fodder trees and forage crop
8.8 Nursery management

**9 Dairy Technology**

9.1 Theory of milk secretion
9.2 Composition of milk of farm animals
9.3 Factors affecting the milk composition of milk and its quality
9.4 Pasteurization and homogenization of milk, packing and distribution of milk
9.5 Sanitization of dairy plant utensils and equipments
9.6 Testing of fluids quality
9.7 Diversified dairy products, ice cream, cheese, and dairy based sweets production

**10 Basic statistics**

10.1 Simple Experimental Design and data analysis

-END-

## पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत
## पाश्चर फोरेज एण्ड एग्रो फरेष्ट्रि उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत पाश्चर फोरेज एण्ड एग्रो फरेष्ट्रि उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षाको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।
उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनूपर्नेछ ।

**<u>लिखित परीक्षाका आधारहरू</u>**

**भाग-एक**

| क्र. सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धितविषयमाभएकाप्रविधिहरूकोनवीनतम ज्ञान | ५ | विषयगत छोटोछोटोउत्तर | १ | ५ |
| ३ | सम्बन्धितविषयमा समस्या समाधान | १० | विषयगतलामोउत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूनेछ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।

(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।

(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

(१) अन्तरवार्ता-पुर्णाङ्क १५ (२)शैक्षिकयोग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मककृति-पुर्णाङ्क ५

# Syllabus for Senior Technical Officer (T-7)

**Open and internal competition examination**

## Sub Faculty - Pasture /Forage and Agro-forestry

**1.0 General**

1.1 Livestock population and their distribution in Nepal.
1.2 Production and productivity of livestock in Nepal.
1.3 Ruminant's digestive , productive and reproductive systems.
1.4 Classification of feeds .
1.5 Proximate analysis of feeds.
1.6 Types of grassland and its distribution.
1.7 General knowledge about NARC.

**2.0 Forage Physiology**

2.1 Photosynthesis and respiration.
2.2 Seed development, seed dormancy , germination and other physiological processes associated with seed production and storage of economically important pasture/ forage and fodder tree seeds.

**3.0 Forage Breeding**

3.1 Principles of breeding
3.2 Breeding and improvement objectives
3.3 Breeding methods
3.4 Forage and pasture crop evolution.

**4.0 Forage Agronomy**

4.1 Plant introduction, evaluation and utilization.
4.2 Fertilization and liming
4.3 Cutting management
4.4 Irrigation management
4.5 Factors affecting crop adaptation, production, utilization and conservation.
4.6 Cropping systems, crop rotation , inter-cropping , mixed cropping , multiple cropping and mixed farming systems.
4.7 Marginal land utilization for pasture, forage and fodder trees.

**5.0 Production Technology**

5.1 Production technology of forage crops
5.2 Production technology of temperate species
5.3 Production technology of fodder trees

**6.0 Grazing and Range Management.**

6.1 Grazing practices
6.2 Stocking rate and grazing pressure
6.3 Fodder and feed from trees and shrubs , grassland productivity and carrying capacity, productivity influencing factors.

**7.0 Herbage quality and Nutritive value.**

7.1 Nutritive value , digestibility and forage intake.
7.2 Feeding value of grass, legume and its products
7.3 Forage quality i.e. cell wall contents, cell contents, digestibility, total digestible nutrients and metabolizable energy.

**8.0 Agro-forestry.**

8.1 Scope and advantage.
8.2 Classification of agro-forestry systems.
8.3 Management of trees in agroforestry systems
8.4 Economics of agroforestry systems

**9.0 Forage Conservation.**

9.1 Principles of conservation
9.2 Silage making
9.3 Hay making

**10.0 Forage Toxicology**

10.1 Antiquality constraints and disorders

**11.0 Foragediseases and their control.**

11.10 Diseases of pasture/forage and fodder trees , seed borne , soil borne and air borne diseases.
11.11 Biological control and cultural control measures of pasture/forage and fodder tree pathogens.

**12.0 Forage insect's management and their control.**

12.1 Principles of insect- pest control, physical and mechanical control, cultural control , biological control , chemical control and host plant resistance.
12.2 Toxicity of insecticides, precaution in the use of insecticides, insecticide-application equipment.

**13.0 Statistics.**

13.1 Experimental designs and data analysis ( parametric and non- parametric ).

**-END-**

# पाठ्यक्रमको अङ्क भार, बरिष्ठ प्राविधिक अधिकृत फिसरीज उपसमुह टि.७

बरिष्ठ प्राविधिक अधिकृत फिसरीज उपसमुह टि.७ स्तरको आन्तरिक प्रतियोगिता दूई भागमा हूनेछ । भाग पहिलोमा लिखित परीक्षा र भाग दूईमा अन्तरबार्ता । लिखित परीक्षा देहाय अनूसार विषयहरूमा आधारित हूनेछ । आन्तरिक प्रतियोगितात्मक परीक्षको लागि भने पुर्णाङ्क ५० र समय १ घण्टाको हूनेछ ।

उक्त पदको लागि न्युनतम योग्यता सम्बन्धित कृषि विषयमा स्नातक उपाधि प्राप्त गरेको हूनू पर्नेछ ।

**लिखित परीक्षाका आधारहरू**

**भाग-एक**

| क्र. सं | विषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या | अङ्कभार |
|---|---|---|---|---|---|
| | | आन्तरिक | | आन्तरिक | आन्तरिक |
| १ | सम्बन्धित विषयको आधारभुत ज्ञान | २५ | वस्तूगत वहूउत्तर<br>वस्तूगत छोटोउत्तर | १५<br>५ | १५<br>१० |
| २ | सम्बन्धितविषयमाभएकाप्रविधिहरूकोनवीनतम ज्ञान | ५ | विषयगत छोटोछोटोउत्तर | १ | ५ |
| ३ | सम्बन्धितविषयमा समस्या समाधान | १० | विषयगतलामोउत्तर | १ | १० |
| ४ | नेपाल कृषि अनूसन्धान परिषद्सँग सम्बन्धित विषयको ज्ञान | १० | विषयगत उत्तर | १ | १० |

**द्रष्टव्य:**

(१) स्वीकृत पाठ्यक्रम बमोजिम लिइने लिखित परीक्षाको उतिर्णाङ्क ५० प्रतिशत हूनेछ । पदपुर्ति समितिको कार्यविधि २०६१ बमोजिम लिखित परीक्षाबाट छनौट हूने उमेद्वारहरूलाई भाग दूईको अन्तरबार्तामा सामेल गराइने छ । आन्तरिक प्रतियोगिताको लागि अन्तरबार्ताको पुर्णाङ्क १५, शैक्षिक योग्यताको अङ्क ३०, कृति ५ अङ्कको हूनेछ । अन्तबार्तामा सफल हून ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

(२) वस्तूगत र बिषयगतको उत्तर पूस्तिका भिन्दाभिन्दै हून सक्नेछ । परीक्षा समाप्त भएपछि प्रश्नपत्र र उत्तरपूस्तिका दूवै फिर्ता गर्नू पर्नेछ ।

(३) पाठ्यक्रममा समावेश भएका सबै पाठ्यांशहरूबाट यथासंभव प्रश्न सोधिने छ ।

(४) पाठ्यक्रममा जेसूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

(५) पाठ्यक्रम मिति २०६० बैशाखपछि प्रकाशित विज्ञापनदेखि लागु हूनेछ ।

**भाग-दूई**

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

(१) अन्तरबार्ता-पुर्णाङ्क १५ (२)शैक्षिकयोग्यता-पुर्णाङ्क ३० (३)अनूसन्धानात्मककृति-पुर्णाङ्क ५

# Syllabus for Senior Technical Officer (T-7)

**Open and internal competition examination**

## Sub Faculty - Fishery

**1. Fish Biology:**

1.1 General biology of cultivable fishes
1.2 Main characteristics of cultivable fishes-
Major carps,
Common carp,
Chinese carps,
Tilapia species and
Rainbow trout

**2. Fish Culture:**

2.1 Monoculture
2.1 Polyculture- extensive, semi intensive, intensive
2.3 Raceway culture-
2.4 Rice fish culture- site selection, water resource and management, soil type, design and size of paddy field, construction of trench and dike, fish species and stocking, fertilizer, feeding and harvesting
2.5 Cage fish culture- Principals of cage fish culture types of cages, materials for cage construction
2.6 Pen culture/ enclosure
2.7 Integrated fish farming- integration with ducks, integration with horticulture, and integration with livestock
2.8 Pond management- Drying, liming, fertilization(inorganic and organic fertilizer), water management.
2.9 Economics of fish culture- production cost, fixed costs, variable costs, returns

**3. Pond construction:**

3.1 Principles of site selection for pond fish construction
3.2 Design and pond construction
3.3 Types of pond- design and construction, nursing and rearing pond, production pond, and brood fishpond

**4. Fish breeding:**

4.1 Brood fish management
4.2 Selection of broods for breeding
4.3 Natural breeding, Semi artificial breeding and artificial/induced breeding of cultivable fishes
4.4 Types of hormones- Pituitary gland, Human Chorionic Gonadotropins(HCG), Leutinizing releasing hormone analogue(LRH-A), Ovaprim

**5. Hatchery management:**

5.1 Operation of hatcheries- spawning, fertilization, incubation, and hatching for warm water and coldwater fishes, and larvae nursing

**6. Water quality and plankton:**

6.1 Temperature, dissolved oxygen, carbon dioxide, pH, light, turbidity, plankton-zooplankton and phytoplankton.

**7. Fish disease:**

7.1 General symptom of infectious disease, causes
7.2 Fish parasites
7.3 Controlling measures and treatment of parasitic disease, fungal disease bacterial disease and Epizootic Ulcerative Syndrome (EUS) disease
7.4 Fish kill- mass mortality of fishes by oxygen deficiency, gas bubble disease and prevention measure
7.5 Predatory aquatic insects- major aquatic insects and their control

**8. Aquatic weeds-** types of common aquatic weeds, control of weeds

**9. Biostatistics:**

9.1 Populations, samples from populations, random sampling, means, probability, standard deviation, analysis of variance, simple linear regression.

**10. Ornamental fishes:**

10.1 Varieties of common gold fish,egg layers and live bearers

**11. Fish nutrition:**

11.1 Formulation and preparation of fish feed

**12. Main objectives of NARC, present status and role of Fisheries Research Centers and units under NARC**

**-END-**

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# प्राविधिक अधिकृत, टि. ६ कृषि विज्ञान तथा पशू विज्ञानतर्फ संपुर्ण उप-समुहहरुको खूल्ला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको लागि

## परीक्षा योजना (Examination Schedule)

### (क) खूल्ला प्रतियोगिता तर्फ:

| Part | Subject | Full Marks | Pass Marks | No. Questions and Weightage | Time Allowed |
|---|---|---|---|---|---|
| I | Agricultural Research and Development | 100 | 40 | 12 x 5 =60 (Short answer)<br>4 x 10 =40 (Long answer) | 2.00 Hrs |
| II | Technical Subject (Related Subgroup) | 100 | 40 | 50 x 2 =100 (Objective, Multiple Choice) | 45 Minutes |

### द्वितीय चरण: (Second Phase)

| Paper | Subject | | Full Marks | | | Time Allowed |
|---|---|---|---|---|---|---|
| Interview | | | 30 | | Oral | |

### (ख) आन्तरिक प्रतियोगिता तर्फ:

| Paper | Subject | Full Marks | Pass Marks | No. Questions and Weightage | Time Allowed |
|---|---|---|---|---|---|
| | Technical Subject (Related Subgroup) | 100 | 40 | 50 x 2 =100 (Objective, Multiple Choice) | 45 Minutes |

### द्वितीय चरण: (Second Phase)

| Paper | Subject | | Full Marks | | | Time Allowed |
|---|---|---|---|---|---|---|
| Interview | | | 20 | | Oral | |

**द्रष्टव्य:**

१. लिखित परिक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दूवै हून सक्नेछ ।
२. प्रथम पत्र तथा द्वितीय पत्रको परीक्षा छूट्टा छूट्टै प्रश्नपत्रबाट एकैदिन वा फरक फरक दिनमा लिन सकिनेछ ।
३. पाठ्यक्रममा भएका यथासंभव सवै पाठ्याशंहरुबाट प्रश्न सोधिनेछन् ।
४. लिखित परीक्षामा छनौट भएकालाई मात्र अन्तरवार्तामा समावेश गराइनेछ ।
५. यस पाठ्यक्रममा जे सूकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन, नियमहरु, परीक्षाको मितिभन्दा ३ महिना अगाडी (संशोधन भएका संशोधित भई हटाईएका वा थप गरी शंसोधित भई कायम रहेका) लाई यस पाठ्यक्रममा परेको संझनू पर्दछ ।

# Written Exam Syllabus for Technical Officer T-6

## Part I: For all Sub-Group

**Part I: Agricultural Research and Development:**

1. Present constitution of Nepal: Food, agriculture and natural resources related.

2. National Agricultural policies and plans: National Agriculture Policy-2061, Agricultural biodiversity policy-2063, Climate change policy 2067, Agriculture Development Strategy (ADS), Long term seed vision and agriculture in current development plan.

3. NARC Act, NARC bylaws, Structure and responsibilities of Nepal Agricultural Research Council (NARC) and National Agricultural Research and Development Fund.

4. International Agricultural Research Organizations – CGIAR and IARCS: CIAT, CIMMYT, CIP, ICRISAT, ICARDA, World Fish, ICRAP, IFPRI, IITA, ILRI, Bioversity, IRRI, IWMI, AVRDC, ICIMOD, IFDC, IFAD, FAO.

5. Geography and Agro-climate condition of Nepal

6. History of Agriculture Development in Nepal.

7. Agriculture Extension System in Nepal.

8. Global warming, Climate Change and its effects in Agriculture.

9. Major functions of agriculture research, extension and education in Nepal.

10 Agriculture research and development: History, achievements, constraints and scope.

11. Agricultural statistics: production, productivity, import/export trend of major agricultural commodities.

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# Syllabus for Technical Officer (T-6)

**Open and internal competition examination**

## Sub Faculty - Agricultural Engineering:

**Part II: Details of Syllabus**

### 1.0 Soil and water Engineering

#### 1.1 Irrigation Water Measurement Methods

- Weirs
- Parshal flume
- Cut throat flumes
- Orifices and meter gates
- Tracer method
- Velocity area method

#### 1.2 Water conveyance and control

- Open channel
- Design of open channel
- Channel linings
- Drop structures and spill ways
- Water control and diversion structures
- Pipe flow
- Design of pipe conveyance system

#### 1.3 Land Development

- Land leveling- grading design methods
- Estimation of earthwork quantities
- Leveling- grading procedures
- Equipment for land grading and field layout

#### 1.4 Soil-Plant and Water relationships and irrigation requirements

- Soil water
- Movements of soil water
- Soil moisture tension
- Measurement of soil moisture
- Plant water relationship
- Evaporation, transpiration and consumptive use
- Evapotranspiration (ET) estimation methods
- Water requirements
- Irrigation efficiency

#### 1.5 Water Application Methods

- Border irrigation
- CheckBasin irrigation
- Furrow Irrigation
- Sprinkler Irrigation
- Drip Irrigation

**1.6 Agricultural Drainage**

- Surface drainage system
- Subsurface drainage system
- Type of drainage system

**1.7 Ground water and Irrigation Wells**

- Ground water and aquifers
- Hydraulics of wells
- Design of wells
- Wells construction procedures

**1.8 Irrigation Pumps**

- Indigenous water lifting devices
- Positive displacement pumps
- Centrifugal Pumps
- Vertical Turbine Pumps
- Submersible Pumps
- Propeller and mixed flow pumps
- Selection of pumps

**1.9 Engineering Hydrology**

- Hydrological cycle
- Measurement and analysis of precipitation
- Measurement, estimation and analysis of runoff
- Storm hydrograph

**1.10 Water erosion and control measures**

- Water erosion (Raindrop erosion, Sheet erosion, Rill erosion, Gully erosion, Stream channel erosion)
- Soil losses and its measurement
- Erosion control measures (agricultural, engineering, bioengineering methods)
- Conservation structures
- Watershed management

**2.0 Farm Power and Machinery**

**2.1 Farm Power and Energy**

- Human power
- Animal Power
- Mechanical power
- Electrical power
- Solar and wind power
- Energy from agricultural residue and animal waste

**2.2 Internal combustion engines**

- Petrol and diesel engines
- Engine Parts
- Principle of operation
- Engine systems ( air cleaning, fuel, lubricating, ignition, cooling, governing system)

**2.3 Farm Tractor and its operation and maintenance**

- Farm tractor types
- Parts and components of farm tractor (engine systems, clutch, power transmission, differentials, final drive, power take off, tractor draw bar and traction devices, steering mechanism, hydraulic system, starting mechanism)
- Tractor repair and maintenance

**2.4 Tillage and tillage implements**

- Tillage requirements and draft power requirement
- Tillage implements
- Traditional animal drawn plough
- Mold board plough
- Disc plough
- Chisel plough
- Rotovator
- Harrows
- Minimum and zero tillage implements
- Testing and selection of tillage implements
- Operation and maintenance of tillage implements

**2.5 Seeding, harvesting and threshing machinery**

- Sowing methods of major crops
- Seed drill and its components
- Planters and its components
- Rice transplanters
- Vertical conveyor reaper and its components
- Combine harvestor
- Type of threshers
- Rice thresher
- Multi-crop thresher
- Winnowing machine
- Operation and maintenance of seeding, harvesting and threshing machinery

**2.6 Mechanical weeding and chemical application equipment**

- Manual weeders
- Power weeders
- Sprayers (its types, components, nozzle types, application)
- Dusters
- Operation and maintenance of Mechanical weeding and chemical application equipment
- Testing of Mechanical weeding and chemical application equipment

**3.0 Post Harvest Engineering**

**2.7 Grain Drying**

- Grain drying needs
- Grain drying methods
- Grain drying theory (thin layer and deep layer drying)
- Mechanical dryers (batch and continuos type)

**2.8 Rice Processing**

- Traditional rice milling
- Rice hulling, shelling and polishing
- Rice parboiling
- Beaten rice making
- Equipment used in rice processing

Pro**cessing of wheat, maize, legumes and oilseed**

- Milling
- Hulling
- Oil expelling
- Hulling, grinding and oil expelling equipment

**2.9 Processing and preservation of foods and seeds**

- Cold storage
- Refrigeration in food processing industries
- Ice making
- Seed processing equipment and storage
- Cellar storage
- Dairy machinery (Heaters and coolers, Pasteurization and pasturizers, Can washers, Cream separators, Butter churns, Steam boilers)

**3.0 Farm structures**

**3.1 Design of structure and building material**

- Design of RCC structure (beam, slab, foundation and column)
- Design of steel and wooden structure (truss, beam and column)
- Building materials ( concrete, cement, lime, sand, bitumin, surkhi, mud, brick, stone, timber, Mild steel, GI sheet, etc.)

**3.2 Planning of farm stead and farm residence**

- Planning of farmstead
- Farm residence
- Water supply and sanitation
- Farm road
- Farm Fencing

**3.3 Animal Shelters**

- Diary barn (housing requirements, stanchion barn, loose housing barn, barn equipment and accessories, milking barn, pen barn )
- Poultry housing ( housing requirement, type of poultry house, brooder house, poultry equipment and accessories)
- Sheep and goat housing (types, housing requirements, construction material, layout, equipment and accessories in goat and sheep housing etc.)
- Swine housing (types, housing requirements, construction materials, layout, equipment and accessories in swine housing)

### 3.4 Storage Structures

- Fodder storage structure
- Feed storage structure
- Food grain storage structure (Indigenous storage structure, Bag storage structure, grain bins, modern godowns)
- Farm machinery storage structure and farm workshop.

### 3.5 Electricity on the Farm

- Electric circuit
- Power transmission and distribution
- House wiring and its components
- AC motor (single phase and poly phase)
- AC motor starters
- Selection of electric motors
- Care and maintenance of electric equipment

## 4.0 Statistics

- Frequency, mean, median, mode, standard deviation, standard error, normal distribution, sampling theory, test of hypothesis, confidence interval
- Randomized complete block design
- Analysis of variance
- Regression and correlation ( simple linear regression and correlation)

## 5.0 General

- Nepal agriculture research council establishment, objective role and activities
- Agricultural perspective plan ( APP)
- Irrigation Policy
- Agriculture and irrigation in recent five year plan
- Status of agricultural mechanization
- Irrigation situation In Nepal
- Agricultural engineering related Institutions in Nepal

-END-

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## Sub-Faculty: Agri Extension, Agri Economics & Marketing

**PART- II**

**1. General**

a) HMG's long-term and periodic plans and policies on agricultural development
b) Master plans for Horticulture, Livestock, fisheries and Marketing Development
c) Structural characteristics of Nepalese agriculture
d) Role of agriculture in poverty alleviation and economic development of Nepal
e) Problems and prospects of agricultural development in Nepal

**2. General Economics**

a) Consumer's preference Theory
b) Demand curves and Engel curves
c) Income and substitution effects.
d) Price, income and cross elasticity's of demand
e) Classification of market and their critical appraisal
f) Price determination in different market conditions
g) Production function and principles of production
h) Cost: concept and types
i) Concept of opportunity cost, equilibrium, shadow prices and comparative and competitive advantages.

**3. Agriculture Economics**

a) Farm budgets
b) Cost and return analysis of different crops
c) Farm Plan
d) Farming System in Nepal

**4. Agricultural Marketing**

a) Its concept and role in economic and agricultural development
b) Structure and characters
c) Problems and prospects
d) Input and output marketing systems
e) Agricultural marketing research-- concept and role
f) Marketing information system in Nepal
g) Co- operative marketing system in Nepal
h) Food Security issues in Nepal
i) Development and management of agricultural market centers.
j) Agricultural marketing and price policies in Nepal.
k) Regional and global organizations for marketing (SAFTA, WTO with emphasis on AoA)

**5. Statistics**

a) Measures of central tendency- Mean, Median, Mode
b) Measures of dispersion- quartile deviation, range, variance, mean and standard variation.
c) Probability: normal distribution, standard sampling error and test of hypothesis, estimate of error
d) Correlation and regression- simple linear regression and correction
e) Simple & weighted index number

**6. Agribusiness**

a) Concept and role in agricultural development
b) Grading, packaging, standardization, situation and problems
c) Export marketing of agricultural produce

**7. Agricultural Planning**

a) Concept of planning, project, project cycle, programming and budgeting
b) Methods of conducting feasibility study ( BCR, NPV, IRR,)
c) Project analysis methods
d) Concept and methods of monitoring and evaluation
e) Concept and use of log frame
f) Participatory planning, monitoring and evaluation
g) Market -led agriculture development
h) Pocket package strategy and projectlization
i) Devolution of planning to local bodies
j) Environmental consideration in agricultural planning.

**8. Research Institutions**

a) Role of NARC in technology development
b) NARC- present status and future prospects
c) NARDF
d) NGos and INGos

**9. Socio-Economic Research**

a) Need and importance
b) PCN and proposal writing
c) Research methodology
d) Report Writing

**10. Agricultural Finance and Organization**

a) Agricultural Finance: Role, Structure and Weaknesses
b) Role of Foreign Aid in agricultural development-Issues and prospects
c) Organizational development in agriculture.

-END-

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# Syllabus for Technical Officer (T-6)

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## Sub Faculty - Agronomy, Plant Breeding and Genetics

**PART: II**

**A. Agronomy**

**A1: Crop Production**

Rice, wheat, maize, finger millet, lentil, soybean, rapeseed and sugarcane with respect to

1.1 Popular recommended varieties
1.2 Development of low cost technology. Cultural practices -Seed treatment if any, planting time, seed rate, interculture, harvest, cleaning and storage.
1.3 Weed and weed control.
1.4 Manuring and fertilization
1.5 Water management
1.6 Plant protection measures-important diseases and insects ofindividual crops and their control measures.
1.7 IPM and its important.

**A2 Tillage**

2.1 Objectives and significance
2.2 Concept of zero tillage, minimum and optimum tillage.

**A3 Weed and weed control.**

3.1 What a weed is? Its importance in crop production and types.
3.2 Common weeds in rice, wheat, maize and their control.
3.3 Important weedicides used in Nepal in controlling weeds.
3.4 Quality seed production and its safe storage for its further use in coming season.

**A4 Climate and weather**

4.1 Temperature, rainfall, humidity, sunshine hours, evaporation etc.
4.2 Climate of Nepal -climatic zones.

**A5 Soil and fertilizer**

5.1 Soil, definition, soil texture soil structure.
5.2 Essential plant nutrients and their sources.
5.3 Chemical fertilizer and % of nutrient content.
5.4 N, P and K response to major crops
5.5 Soil pH and its influence on the availability of other nutrients.
5.6 Soil organic matter and its importance.
5.7 Soil organisms, and their functions, notes on ammonification,nitrification, denitrification, nitrogen fixation.
5.8 Green manuring crops, their effect on grain yields and constraints associated with green-manuring.
5.9 The farming system's, its concept and scope.
5.10 Compost/F-YM use.
5.11 Outreach research and on-farm trials.

**A6 Statistics:**

6.1 Mean, standard deviation, standard error, variance, t-test
6.2 Tests of significance.

6.3 Randomized complete block design, layout, randomization, analysis of variance, Data interpretation.
6.4 Simple linear regression and correlation.

**B. Plant Breeding**

**B1 Importance and scope**

1.1 The importance of Plant Breeding in the present context of food security and poverty reduction in Nepal.
1.2 Center of Origin of cultivated plants.
1.3 Qualitative and quantitative characters.

**B2 Breeding self-pollinated crops.**

2.1 Pure line selection
2.2 Mass selection.
2.3 Hybridization
2.3.1 Pedigree Method of Plant Breeding.
2.3.2 Bulk Method of Plant Breeding.
2.3.3 Backcross Method
2.3.4 The determination of Population in F2

**B3 Breeding cross-pollinated crops:**

3.1 Mass selection
3.2 Progeny selection
3.3 Selfing and inbreeding depression in cross-pollinated crops
3.4 Incompatibility/male sterility
B4 Polyploidy in plant breeding.
B5 Principles and practices of seed Production, production of Breeder seed of major crops (self-and cross-pollinated)

**C. Genetics**

C1 Cell division with particular reference to meiosis.
C2 Gregor Mendel : his life and contribution.
C.3 Mendelian principle of segregation.
C4 Mendelian Principle of independent assortment
C5 Epistasis and additivity .
C6 Linkage and crossing over
C7 Hardy-Weinberg Law.
C8 Probability and statistical testing (Chi-square, Binomial Distributions and Normal Distribution).
(NB:The examinees are expected to solve problems associated with Mendelian Laws of Inheritance and Handy- Weinberg Law)

**D. GENERAL**

D1 Nepal Agriculture Research Council: Its establishment, objectives, role and activities.
D2 General Knowledge on by-laws, Executive Board and NARC Ccouncil.
D3 Major Crop commodity program, establishment, and activities.
D4 Disciplinary divisions and their roles in research.
D5 Importance given by APP and 10th 5-Year Plan.
D6 Constraints for agricultural research; a road map to the improvement and sustainability of agriculture research.

**-END-**

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# Sub Faculty - Entomology
**PART: II**

**1. Introductory Entomology**
- 1.1 Role entomology in agriculture
- 1.2 Scope of entomological research in agriculture
- 1.3 Insects and their relatives
- 1.4 General structure of a typical insect
- 1.5 General metamorphosis and life cycle of Lepidoptera, Coleoptera and Hemiptera
- 1.6 Pest insects and beneficial insects

**2. Agricultural insect pests, their identification, damage symptom/s in crop, their life cycle and field management**
- 2.1 Cereal crops: White-, stripped-and pink-borer, green leafhoppers, brownplanthopper, hispa, gandhi bug, white grub, aphid, shoot fly, mealy bug, leafroller, armyworms.
- 2.2 Grain legumes: Gram pod borer, pod fly, pod borer, aphids, whitefly, leaf miner,stem fly, hairy caterpillar, cutworm.
- 2.3 Oilseed crops: Termite, red ant, white grub, hairy caterpiller, aphids, mites.
- 2.4 Industrial crops: Cutworm, white grub, termite, hairy caterpillar, tobaccocaterpillar, gram pod borer, top shoot borer, shoot borer, pink bollworm, spiny bollworm, mealy bug, pyrilla, red cotton bug, leaf hoppers, whiteflies, aphids, mites.

**3. Horticultural insect pests, their identification, damage symptom/s in crop, their life cycle and field management**
- 3.1 **Vegetables:** Cutworm, red ant, white grub, cabbage butterfly, diamondback moth, tobacco caterpillar, gram pod borer, epilachna beetles, fruit fly, whitefly, flea beetles, aphids, egg plant shoot and fruit borer, mites.
- 3.2 **Potato:** Cutworm, red ant, peach-potato aphid, white grub, epilachna beetles, potato tuber moth
- 3.3 **Fruit trees**: Cutworm, termite, leaf roller, bark eating caterpillar, tent caterpillar,hairy caterpillar, leaf miner, fruit fly, stone weevil, banana weevil, root borer, lemon butterfly, pomegranate butterfly, mango leaf hoppers, mango gall midge, mango gall psyllid, mealy bug, aphids, citrus psyllid, scale insects, thrips, mites.
- 3.4 **Tea, coffee and cardamom**: Aphids, twig/stem/berry borer, white grub, tea mosquito

**4. Post Harvest Entomology**
- 4.1 Grain weevils, beetles and moths in stored grains, their identification and damage symptom
- 4.2 Life-cycle of *Sitophilus oryzae* in wheat and *Sitotroga cereallela* in maize
- 4.3 Stored insect pests control methods
  - 4.3.1 Non-chemical methods
  - 4.3.2 Chemical methods

**5. Industrial Entomology**

**5.1 Apiculture**
- 5.1.1 Different kinds of honeybees and their identifications
- 5.1.2 Common typical nature of honeybees

5.1.3 Life-cycle of honeybees and brood rearing
5.1.4 Honeybee members in a typical apiary and their division of labour
5.1.5 Insect pests and diseases commonly found in an apiary and their management for the quality honey.
5.1.6 Insecticide poisoning of honeybees and methods to deter it.
5.1.7 Nature and properties of honey
5.1.8 Different hives, favourite honeybee species and modern apiculture
5.1.9 Scope of commercial apiculture in Nepal

**5.2 Sericulture**

5.2.1 Different types of silkworms
5.2.2 Life-cycle of *Bombax mori*
5.2.3 Rearing techniques
5.2.4 Diseases in silkworm and practices to avoid them
5.2.5 Use of mulberry and their cultivation

**6. Rodents and their management practices**

6.1 Different kinds of rats and mice in grain storage and in the standing crops
6.2 Typical nature of rats and mice
6.3 Damage and losses of grains and crops due to rats and mice
6.4 Methods of rodent control

**7. Insect-Pest Management in Cultivated Crops**

7.1 Use of cultivation practices
7.2 Use of mechanical methods
7.3 Use of physical methods
7.4 Use of insecticides of chemical and botanical origins
7.5 Use of natural enemies
7.6 Use of chemical attractants, repellants, sterilants and growth inhibitors
7.7 Use of insect resistant varieties
7.8 Use of quarantine
7.9 Integrated pest management practice

**8. Insecticide and plant protection equipment management**

8.1 General classification of insecticides based on chemical nature, mode of entry and mode of action.
8.2 Formulation of insecticides
8.3 Dose calculation
8.4 Sprayer calibration
8.5 Safe handling of insecticides
8.6 Avoidance of poisoning of non-target organisms
8.7 Types of sprayers and dusters
8.8 Parts of a hand compression knapsack sprayer and their functions
8.9 Care and maintenance of a sprayer

**9. Entomological laboratory techniques**

9.1 Insect collection and preservation
9.1.1 Insect collection equipments and their uses
9.1.2 Dry and wet preservation of insects and materials used for the purpose.
9.2 Simple methods of laboratory rearing of insects
9.2.1 Measuring devices of temperature and humidity inside the laboratory
9.2.2 Glasswares, plastic/metal containers and wooden cages
9.2.3 Chemicals and ready-made compounds to fix cages
9.2.4 Feeding materials to laboratory reared insects

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# Syllabus for Technical Officer (T-6)

**Open and internal competition examination**

## Sub Faculty - Horticulture (Olericulture)

**PART: II**

**1. General**

1.1. Importance and scope of horticulture in Nepal.
1.2 History of horticultural research and development plans and programs in Nepal.
1.3 Major constraints limiting production of horticultural crops in Nepal.
1.4 History, objective, role and activities of Nepal Agricultural Research Council (NARC)
1.5 Role of Horticulture Research Division in technology and variety development of vegetables.
1.6 Importance of seed act and plant quarantine in vegetable development
1.7 Classification of horticultural plants.

**2. Vegetable Production**

Production practices of following vegetables relating to location, altitude, aspect, soil, climate, seed, open pollinated & hybrid cultivar, sowing and transplanting time, spacing, irrigation, drainage, manure, fertilizer micro-nutrients, mulching, harvesting time, inter-cropping, mix-cropping and relay-cropping on production, productivity and quality of fresh vegetables.

2.1 Potato, sweet potato, yam, colocasia.
2.2 Tomato, brinjal, hot chilly, sweet pepper.
2.3 Cauliflower, cabbage, Chinese cabbage and broccoli
2.4 Bean, pea, cowpea, broad bean and vegetable soybean.
2.5 Radish, turnip and carrot
2.6 Onion and garlic
2.7 Cucumber, bottle gourd, sponge ground, bitter gourd, pointed gourd, ride gourd, snake gourd, pumpkin and squash.
2.6 Broad leaf mustard, Swiss chard, cress, spinach, fenugreek, coriander, and lettuce
2.9 Ginger and cardamom.
2.10 Asparagus, artichoke, drumstick and tree tomato

**3. Off-season Vegetable Production**

3.1 Present status, constraints and potentiality of off season vegetable in Nepal
3.2 Utilization of diverse agro-climatic zones for off-season vegetables production
3.3 Suitable crops, varieties and months for off-season production.
3.4 Protected cultivation:- Green house, lath house, plastic tunnel, hot beds, cold frame, etc.
3.5 Improved cultural and management technologies and practices for off-season production.
3.1 Cost and benefits of off-season vegetable production.

**4. Seed Production Technology**

4.1 Present status of vegetables seed production and distribution system in Nepal.

4.2. High value with low volume vegetables crops and their production zones of the country.
4.3. Influence of location, aspects, altitude, temperature, light, daylight, spacing irrigation, manures, fertilizers, micro nutrients, hormone, direct seeding, stickling-transplanting, seeding and planting time on seed yield and seed quality.
4.4 Pollination, fertilization, seed development, dormancy and germination.
4.5 Techniques of quality control in vegetable seed production.

4.6 Breeder, nucleus and foundation seed production in vegetable.
4.7 Seed production methods for open pollinated and hybrid cultivars.
1.8 Pre-basic, basic and improved/certified seed production in potato and ginger.

**5. Post-harvest Technology of Vegetables**

5.1. Post-harvest physiology: respiration, transpiration and ethylene production.
6.2 Method of harvesting, cleaning, grading, and packaging.
6.3 Post-harvest handling, transportation and marketing.
6.4 Consumer's acceptability and quality evaluation of vegetables.
6.1 Processing and preservation of vegetables, potato, ginger and cardamom.

**6. Modern Technology of Vegetable Production**

6.1 Application of tissue culture and bio-technology in agriculture.
6.2. Use of plant growth regulators in vegetables.
6.3. Technique of irrigation for efficient use of water.
6.4 Micro-nutrient, multi-nutrient, liquid fertilizers and bio-fertilizers.
6.5 Latest recommended superior hybrids and superior open pollinated cultivars used by Nepali farmers.
6.6 Integrated disease and pest management (including biological method, cultural method, pheromone traps, etc.)
6.7 Integrated soil and plant nutrient management.
6.8 Scope and limitation of using true potato seed in potato production.
6.9 Disease free seed potato production

**7. Plant Genetics and Variety Improvement**

7.1. Genes and their action: Mendelism, genotype and phenotype, homogygosity and heterogygosity, partial and complete dominance, genetic linkage etc.
7.2. Importance of variation
7.3. Breeding methods: self-pollinated vegetables and cross-pollinated vegetables.
7.4. Concept of heterosis and hybrid variety development
7.5. Mutation breeding
7.6. Vegetable genetic resources and their conservation.

**8. Vegetable Crop Physiology**

8.1. Photosynthesis
8.2. Respiration
8.3. Transpiration and translocation
8.4. Photoperiodism, light intensity and quality.
8.5. Growth and development: cell division, enlargement and differentiation.

**9. Research Methods and Management**

9.1. Research needs in vegetable, potato and ginger.
9.2. Steps in research project proposal preparation.
9.3. Design of experiments.
9.4. Implementation of research activities.
9.5. Laboratory research.
9.6. On-station research.
9.7. On-farm research
9.8. Outreach research.

9.9. Data base preparation.
9.10. Data analysis, technical report writing and presentation.

**10. Biological Statistics**

10.1. Need of biological statistics for vegetable research.
10.2. Probability, frequency, mean, median, mode, standard deviation, standard error, normal distribution, sampling theory, test of hypothesis, and confidence interval, T-test, F-Test and Chi-square test.
10.3. Estimate of error: replication and randomization.
10.4. Control error: blocking, proper plot technique and data analysis.
10.5. Complete randomized design: randomization, layout and analysis of variance.
10.6. Randomized complete block design: layout, randomization, analysis of variance.
10.7. Two or more factorial experiment: randomization, layout, analysis of variance and interaction.
10.8. Split plot design: randomization, analysis of variance and interaction of factors.
10.9. Comparison: pair comparison by Least Significant Difference (LSD) and Duncan's Multiple Range Test (DMRT)
10.10. Regression and correlation: simple linear regression and correction, multiple-linear regression and correction.

**-END-**

# Syllabus for Technical Officer (T-6)
**Open and internal competition examination**

## Sub Faculty - Pomology
**PART: II**

**1. General**

1.1 Importance and scope of horticulture in Nepal.
1.2 History of horticultural research and development in Nepal.
1.3 Fruit saplings production and distribution system in Nepal.
1.4 Main constraints to fruit research and production in Nepal.
1.5 Importance of nursery act and plant quarantine in fruit development.
1.6 Nepal Agriculture Research Council: History, objectives role and activities.
1.7 Classification of horticultural crops.

**2. General Principles and Practices of Fruit Production**

2.1 Suitable site, climate and soil requirement for fruit crops
2.2 Establishment of and orchard design, layout, planting and management.
2.3 Fruit Nursery Management.
2.4 Production of fruit plants - sexual & asexual methods for tropical, sub-tropical and temperate climates.
2.5 Training, pruning and top-working in fruit trees.
2.6 Protection of nursery and fruit trees from diseases, pests and adverse conditions.
2.7 Water management in orchard.
2.8 Nutrient management in orchard.
2.9 Fruit drop problem management.
2.10 High density planting of orchard.

**3. Fruit Crops Physiology**

3.1 Absorption
3.2 Photosynthesis
3.3 Transpiration and translocation
3.4 Respiration
3.5 Photoperiodism, light intensity and quality
3.6 Growth and development: cellular division, enlargement and differentiation
3.7 Plant growth hormones.
3.8 Use of plant growth regulators in horticulture.

**4. Fruit Production Technique**

4.1 Production technology of major tropical, sub-tropical and temperate fruits (mango, litchi, guava, banana, papaya, jackfruit, pineapple, graper, mandarin orange, sweet orange, lime, apple, pear, peach, plum and walnut) on following aspects:

(a) Introduction (b) Origin and distribution (c) botany (d) climate and soil (e) varieties (f) propagation (g) planting (h) irrigation and drainage (i) manuring (j) weeding (k) traing and pruning (l) inter culture (m) diseases and insect pests (n) harvesting

4.2 Wild and indigenous fruits found in Nepal.

**5. Fruit Variety Development**

5.1. Reproductive system of fruit crops
5.2. Breeding methods in fruit crops.
5.3. Application of bio-technology and tissue culture in fruit crops.
5.4. Maintenance of fruit varieties.

**6. Postharvest Handing, Processing and Marketing of Fruit**

6.1 Post harvest physiology- respiration, transpiration and ethylene production.
6.2 Method of harvesting, cleaning, grading, and packaging of fruit
6.3 Post harvest handling, transportation and marketing of fruit.
6.4 Consumer's acceptability and quality evaluation.
6.5 Processing and preservation of fruit.

**7. Research Method and Management**

7.1. Research needs in fruit.
7.2. Steps in research project proposal preparation.
7.3. Design of experiment
7.4. Implementation of research activities
7.5. Laboratory research.
7.6. On-station research.
7.7. On farm research
7.8. Outreach research.
7.9. Farmer's participatory research.
7.10. Collaborative research.
7.11. Multi-partnership research.
7.12. Data base preparation.
7.13. Data analysis, technical report writing and presentation.

**8. Statistics**

6.1 Basic statistics: Mean mode, medium, standard deviation, variances, t-test, chi-square test.
6.2 Experimental designs: Complete randomized design, randomized complete block design, Latin square design, split plot design.
6.3 Analysis variance
6.4 Data transformation
6.5 Comparison:- pair comparison by Least Significant Different (LSD) and Duncan's Multiple Range Test (DMRT)
6.6 Correlation and regression.
6.7 Need of biological statistics for research.

-END-

# Syllabus for Technical Officer (T-6)

Open and Internal Competition Examination

## Sub-Faculty: Plant Pathology
## PART: II

**1. Introduction**

1.1 Importance of plant diseases to human beings
1.2 Climate change and implication on diseases
1.3 Role of plant pathology in agriculture
1.4 History of plant pathology
1.5 Causes of plant diseases:
Biotic: Fungi, bacteria, viruses, mycoplasma, nematodes
Abiotic: Deficiencies and environment-related diseases

**2. Plant diseases of national importance and their management**

2.1 Rice:
- 2.1.1 Rice Blast (*Magnaporthe grisea*)
- 2.1.2 Bacterial blight (*Xanthomonas oxyzae* pv. *oryzae*)
- 2.1.3 Sheath blight (*Rhizoctonia solani*)
- 2.1.4 Brown spot (*Helminthosporium oryzae)*
- 2.1.5 Foot rot (*Fusarium moniliforme*)

2.2 Wheat:
- 2.2.1 Foliar blight (*Bipolaris sorokiniana* and *Pyrenophora tritici-repentis*)
- 2.2.2 Ruts (*Puccinia graminis, Puccinia triticina*)
- 2.2.3 Rusts (*Puccinia striiformis*)
- 2.2.4 Powdery mildew (*Erysiphe polygoni*)
- 2.2.5 Bunt of Wheat (*Tilletia caries, Tilletia foetida*)

2.3 Maize:
- 2.3.1 Northern leaf blight (*Exserohilum turcicum*), Southern leaf blight (*Bipolaris maydis*)
- 2.3.2 Stalk rot (*Erwinia carotovora*)
- 2.3.3 Banded leaf and Sheath blight (*Rhizoctonia solani*)
- 2.3.4 Ear rot (*Fusarium vertcilloides*)
- 2.3.5 Gray leaf spot (*Cercospora zeae-maydis*)

2.4 Finger millet:
- 2.4.1 Blast (*Pyricularia grisea*)
- 2.4.2 Cercospora leaf spot (*Cercospora eleusine*)

2.5 Potato:
- 2.5.1 Late blight of potato (*Phytophthora infestans*)
- 2.5.2 Early blight (*Alternaria solani*)
- 2.5.3 Bacterial wilt (*Ralstonia solanacearum*)
- 2.5.4 Rhizoctonia rot (*Rhizoctonia solani*)
- 2.5.5 Wart (*Synchytrium endobioticum*)

2.5.6 Viral diseases (Potato virus X, Y)

2.6. Tomato:
- 2.6.1 Wilt (*Ralstonia solanacearum*)
- 2.6.2 Late blight (*Phytophthora insfestans*)
- 2.6.3 Early blight (*Alternaria solani*)
- 2.6.4 Root-knot of Potato (*Meloidogyne* spp.)
- 2.6.5 Damping off (*Pythium* spp., *Fusarium* spp.)

2.7 Cruciferae:
- 2.7.1 Club root (*Plasmodiophora brassicae*)
- 2.7.2 Alternaria leaf spot (*Alternaria brassicae*)
- 2.7.3 Damping-off of seedlings (*Pythium* spp., *Rhizoctonia* spp., *Fusarium* spp. and others)
- 2.7.4 Stalk rot (*Sclerotinia sclerotiorum* )
- 2.7.5 Black rot (*Xanthomonas campestris* pv. *campestris*)
- 2.7.6 White rust (*Albugo candida*)

2.8 Cucurbits:
- 2.8.1 Powdery mildew (*Erysiphe cichoracearum*)
- 2.8.2 Downey mildew (*Peronospora cubensis*)

2.9 Pea nut:
- 2.9.1 Tikka disease (*Cercospora personata* and *Cercospora arachidicola)*

2.10 Lentil:
- 2.10.1 Wilt (*Fusarium oxysporum*)
- 2.10.2 Root rot (*Fusarium solani*)
- 2.10.3 Collar rot (*Sclerotium rolfsii*)
- 2.10.4 Gray mould (*Botrytis cinerea*)

2.11 Soybean:
- 2.11.1 Rust (*Phakopsora pachyrhizi*)
- 2.11.2 Anthracnose (*Colletotrichum glycines*)
- 2.11.3 Bacterial pustule (*Xanthomonas campestris* pv. *glycines*)

2.12 Sugarcane:
- 2.12.1 Red rot (*Colletotrichum falcatum*)

2.13 Citrus:
- 2.13.1 Huang lung bin/Greening (*Liberibacter asiaticum*)
- 2.13.2 Tristeza (CTV)
- 2.13.3 Citrus decline (disease complex)
- 2.13.4 Foot and root rots (*Phytophthora* spp.)
- 2.13.5 Powdery mildew (*Oidium* spp.)
- 2.13.6 Pink disease (*Pellicularia salmonicolor*)
- 2.13.7 Anthracnose (*Colletotrichum gloesporoides*)
- 2.13.8 Scab (*Elsinoe fawcetti*)
- 2.13.9 Gummosis (*Phytophthora* spp.)

2.14 Apple and temperate fruit:
- 2.14.1 Scab (*Ventunia inaequalis*)
- 2.14.2 Pink disease (*Pellicularia salmonicolor*)
- 2.14.3 Root not (Complex)
- 2.14.4 Powdery mildew (*Oidium* spp.)

2.15 Mango:
- 2.15.1 Mango malformation (Complex)
- 2.15.2 Anthracnose (*Colletotrichum gloesporioides*)

2.16 Banana:
- 2.16.1 Wilt (*Fusarium* spp.)
- 2.16.2 Sigatoka leaf spot (*Mycosphaerella* spp.)
- 2.16.3 Bunchy top (Viral)

2.17 Papaya:
- 2.17.1 Leaf curl (viral)
- 2.17.2 Ring spot (viral)

2.18 Tea:
- 2.18.1 Blister blight (*Exobasidium vexans*)
- 2.18.2 Blight (*Pestalosia theae*)

2.19 Coffee:
- 2.19.1 Rust ( *Hemileia vastatrix*)

2.20 Caradamom
- 2.20.1 Rhizome not (Complex)
- 2.20.2 Chhirke and Phoorke (Viral)

2.21 Zinger:
Rhizome rot (Complex)

**3. Policy, Strategy, Rules and Regulation**

3.1 Pesticide Act, 2048 and Rules, 2050
3.2 International Plant Protection Convention (IPPC) and Asia Pacific Plant Protection Commission (APP PC)
3.3 Plant quarantine in view of WTO issues and challenges, Importance in Nepalese griculture Trade, Survey and Surveillance, Pest status, Pest Risk Analysis (PRA)
3.4 WHO classification of pesticide by hazard
3.5 Lethal dose ($LD_{50}$) of a pesticide
3.6 Status of pesticide use in Nepal
3.7 Symptoms and treatment of pesticide poisoning

**4. Seed Pathology**

4.1 Seed borne diseases and their significance
4.2 Seed health testing techniques

**5. Plant Pathological equipments**

5.1 Autoclave
5.2 Incubator
5.3 Laminar flow
5.4 Oven
5.5 Microscope
5.6 Types of sprayers and duster and seed treatment equipment
5.7 Care and maintenance of sprayer
5.8 Safe handling of fungicides, bactericide (pesticides)

**6. Pathological Laboratory Techniques**

6.1 Disease (leaf/plant pests (Root, Shoot, etc) sample collection and handling
6.2 Pathogen isolation, culture, purification, preservation
6.3 Sterilization
6.4 Preservation of disease sample
6.5 Pathogenicity test
6.6 Use of equipments and calibration, maintenance
6.7 Different media used

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# Syllabus for Technical Officer (T-6)
**Open and internal competition examination**

## Sub Faculty - Soil Science
## PART: II

**1. Introduction to Soil Science**
- 1.1 Definitions of soil
- 1.2 Components of soil

**2. Weathering and soil formation**
- 3.1 Weathering and soil forming processes
- 3.2 Soil profile
- 3.3 Soil horizons

**4. Factors of soil formation**

**5. Physical properties of soil**
- 5.1 Mechanical analysis and soil texture
- 5.2 Soil structure
- 5.3 Importance of soil structure
- 5.4 Density of soil
- 5.5 Porosity of soil
- 5.6 Soil consistence
- 5.7 Soil colour
- 5.8 Soil temperature
- 5.9 Shrinkage and swelling of soils

**6. Soil and water**
- 6.1 Infiltration
- 6.2 Percolation
- 6.3 Permeability
- 6.4 Soil moisture constraints

**7. Chemical properties of soil**
- 7.1 Cation exchange
- 7.2 Cation exchange capacity
- 7.3 Base saturation
- 7.4 Soil pH
- 7.5 Soil pH and nutrient availability

**8. Biological properties of soil**
- 8.1 Soil microorganisms
- 8.2 Classification of microorganisms
- 8.3 Amonification
- 8.4 Nitrification
- 8.5 Denitrification
- 8.6 Biological nitrogen fixation

8.7 Importance of nitrogen fixation

8.8 Soil organic matter
8.9 Carbon nitrogen ratio
8.10 Maintenance of soil organic matter

**9. Soil chemical analysis**
9.1 Methods of soil analysis
9.2 Importance of soil analysis

**10. Soil Survey and classification**
10.1 Soil survey methods
10.2 General soil classification
10.3 Soils of Nepal

**11. Soil and water conservation**
11.1 Causes of soil erosion
11.2 Problems of soil erosion in Nepal
11.3 Methods of soil conservation
11.4 Importance of soil and water conservation

**12. Soil fertility management**
12.1 Soil fertility status
12.2 Plant nutrients
12.3 Functions of plant nutrients
12.4 Nutrient deficiencies
12.5 Chemical fertilizers
12.6 Organic fertilizers
12.7 Importance of fertilizer use

**13. General**
13.1 Nepal Agricultural Research Council: organization, objectives, roleand activities
13.2 Research stations and their research activities
13.3 Constraints for agricultural research and production in Nepal

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# Syllabus for Technical Officer (T-6)
**Open and internal competition examination**

## Sub Faculty - Veterinary
## PART: II

**1 Anatomy:**

1.1 Study of skeleton of ox, horse, dog, and fowl
Clssification of joints.
Study of basic cells , tissues and organs
Gross and Mircroscopic anatomy of different systems ( Nervous system, Digesteve system, urogenital system, Blood vascular system, Respiratory system)
General embryology

**2 Veterinary Physiology and Biochemistry and Biotechnology**

2.1 Cell Physiology, blood and special fluid system of body
2.2 Physiology of digestive, respiratory and cardiovascular system Neurophysiology and Myophysiology
2.3 Physical biochemistry –concentration of solution, diffusion, osmotic pressure, pH and buffer system.
2.4 Diagnostic Biochemistry –Blood sugar, keton bodies, blood urea nitrogen uric acid, and enzymes.
2.5 Basic principles of biotechnolgy, DNA, RNA, PCR and monoclonal antibodies.

**B Paraclinical Subjects**

**1. Veterinary Pathology**

a. General pathology –Degeneration, necrosis, circulatory disturbances, inflammation, repair, disturbances of growth and neoplasia,
b. Systemic pathology – diseases of body system ( urogenital, skeletal, muscular, cutaneous, endocrine and nutritional )
c. Special pathology – important disease of tropical animals ( Rinderpest , Foot and mouth disease, Anthrax, Rabies, Ephemeral fever, H.S, B.Q,TB, Johnes Disease, Brucellosis, Fascioliasis, Paramphistomiasis, Ascariasis, Hydatidosis, Taeniasis, Hookworm, canine distemper, Infectious canine hepatitis, Parvo virus enteritis, coccidiosis, metabolic diseases )
d. Poultry pathology – Important diseases of poultry in Nepal (Marek's Disease,New castle disease, Infectious laryngotacheitis, Avian influenza, Infectous Bronchitis, Mycoplasmosis, Coryza, Pullorum Disease, Fowl typhoid, Spirochaetosis, Avian encephalomyelitis, Inclusion body Hepatitis/Leechy heart disease., Egg Drop Syndrome 76, Coccidiosis, Endoparasites, Reoviral arthritis, Avian pox, Mycotoxicoses, Nutritional deficiency diseases, Infectious anaemea, Aspergillosis, Fowl cholera)

**2. Veterinary Parasitology:**

- Historical background of veterinary parasitology

- Morphology and life cycle of helminth ,arthropods and protozoans of veterinary importance prevalent in Nepal and their pathogenesis, clinical signs, diagnosis, control and treatment .

- Parasitic Zoonosis, Principles and methods of veterinary epidemiology in relations of parasitic infectionns, Host parasite relationship

**3. Veterinary Pharmacology and Toxicology:**

- Historical development of Pharmacology :
- Systemic pharmacology –(Pharmacology of drugs action on digestive, cardiovascular, respiratory, urinary and reproductiv systems )
- Neuropharmacology _( Anaesthetics, hypnotics, Analiptics, antipyretics, histamine and antihistaminics.)
- Toxicity caused by elements, chemicals, feed additives and preservatives.
- Veterinadry jurisprudence.

**4. Veterinary Microbiology ( Bacteriology and Mycology and Virology)**

4.1 Developmental history of veterinary microbiology, Morphology, Genetics and classification of bacteria, fungi, Rickettsia and Mycoplasma of Veterinay importance .

4.2 Pathogenic bacteria and fungi in relation to morphology, isolation, growth, biochemical and antigenic characters and pathogenesity.

4.3 Sterilization, antiseptics and disinfectants.

4.4 Structure of animal virus. Classification of animalsvirus. General characteristics of various families of RNA and DNA virus.

4.5 Interference and Interferon.

4.6 Cultivation of virus. Pox disease of cow, sheep, goat and fowl.African swine fever; Swine, Equine and Avian influenza. Pseudo-rabies, infectious bovine rhino -trachitis, Marek's desease, infectious laryngo - tracheitis, canine distemper, Ranikhet disease, Rinderpest, Blue tongue, Rabies, Ephemeral fever. Infectious Bronchitis, Transmissible gastroenteritis, Infectious canine hepatitis, egg drop syndrome, Papilomatosis, Swine fever, Mucosal disease, Foot and mouth disease, Duck virus hepatitis, Avian leucosis complex ,o ncogenic viral infection. Bovine spongiform disease.

**5. Epidemiology**

5.1 Definition and application of epidemiology. Ecological concepts of epidemiology.Pattern of disease destribution in the community.

**6. Knowledge o f Modern Diagnostic Technologies :**

6.1 Specimen collection , preservation and transportation with reference to haematological, Microbiogical and biochemical investigation.

6.2 Important Immuno diagnostics techniques (HA, HI, CFT ,Plate agglutination test and ELISA )

6.3 Antigen and vaccine.

**C. Clinical Subjects:**

**1. Veterinary Medicine and Public Health:**

1.1 Clinical medicine – Method of Physical examination, general and special examination of skin, conjunctiva, body temperature and other systems of body.

1.2 Haematology – different components of blood, Co agulation factors, anaemia, role of platelets, haemoglobin, and haemophilia.

1.3 Defintion, etiology, symptoms, diagnosis, treatment, control and prevention of diseases prevalent in domestic animals /poulry in Nepal.

1.4 Zoonoses, Meat, milk and water born diseases.

1.5 Meat inspection, Quarantine, Biosecurity.

**2. Theriongenology**

2.1 Pattern of reproduction in female farm animals (reproduction hormones, oestrus cycle, behaviour, ovulation, Super ovulation, and fertilization and gestation rectal examination, pregnancy diagnosis.

2.2 Andrology

2.3 Accidents of gestation

2.3 Parturation and post parturient complication in farm animals.

2.4 Reproductive disorders in farms animals.

**3. Veterinary Surgery and Radiology:**

3.1 General Surgucal principles

3.2 Special Surgery in cattle and dog

3.3 Post operative care.

3.4 Application of Radiology in diagnosis of diseases

D. Nepal Agricultural Research Council(NARC) Related.

1.1 Introduction of NARC

1.2 Organization

1.3 NARC vision

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# Syllabus for Technical Officer (T-6)

**Open and internal competition examination**

## Sub Faculty - Livestock Products, Production and Management

## PART: II

**Production and Management:**

1. Animal (Cattle/Buffalo/Sheep/ Goats and Swine ) Production and Management System in Nepal.
2. Characteristics of Native and exotic livestock breed of Nepal.
   - 2.1 Cattle: Native - Lulu, Achhame, Hill Cattle
     Exotic - Jersey, Holstein Friesian, Brown Swiss and Ayreshire
   - 2.2 Buffalo: Native – Parkote, Lime,
     Exotic - Murraha, Nili Ravi
   - 2.3 Sheep: Native - Bhyanglung, Baruwal, Kage and Lam Puchhare (Long Tailed)
     Exotic - Polwarth, Merino, Rambouillet
   - 2.4 Goat: Native - Chyangra, Sinahal, Hill goat (Khari) and Terai Goat
     Exotic - Jamunapari, Barberi, Black Bengal
   - 2.5 Swine Native - Hurraha, Chuwache
     Exotic - Landrace, Yorkshire
   - 2.7 Poultry Exotic - White Leghorn, New Hampshire, Austrolop
   - 2.8 Rabbit Exotic - Angora

History of Dairy in Nepal and its present status
Advanced Livestock Feeding Management from birth to Calving/Lambing/ Kidding/ Farrowing
Site Selection and Improved Housing Management for different stages of farm animals and avian.

Reproduction – Seasonality, estrous cycle and Mating behavior of farm animals.
Advanced Animal Breeding Management, Methods of Breeding
Feeding Management for Cows, Buffaloes, Ewes and Does for breeding
Selection of animals / avian for breed improvement
Planning of small holder dairy farm, commercial scale of sheep farm ( wool and meat , goat farm for meat.

Commercial Poultry farming.
Commercial Swine farming.
Hatchery Management ( Poultry, Quail,Turkey ) and chick production.
Brooding Management
Grower Management
Age Determination of ruminant farm animals by dentition
Principle of Dehorning and its methods.
Principle of Castration and its methods.
Principle of Debeaking.

Dipping and Shearing process of sheep.
Care and Management of sick animals, Isolation shed management, Segregation and Quarantine

Management.

Animal Nutrition:
Animal Feed Classification ; Importance of feed nutrients – Protein, Carbohydrate, Fat, Lipids, and water.; Minerals and Vitamins.
Digestive Systems of Ruminant and Non- Ruminants.
Role of Enzymes and Hormones in Digestive Systems.
Estimations of feed requirement for different stages of farm animals and avian.
Ration Formulations for Livestock / avian.

Pasture and Fodder :
Plant Taxonomy Classification of fodder grass, leguminous crops and fodder tree.
Plant Physiology – Plant Metabolism, Growth and development pattern.
Management practices for pasture production, forage production, fodder trees
Principle of Silage and Hay Making.

Dairy:
Definition of Milk and theories of Milk Secretion.
Composition of milk of different farm animals( Cows, Chaury, Buffalo, Exotic breed of cattle and buffalo )
Pasteurization and processing of Milk.
Preparation of Milk Products : Cheese, Butter, Paneer, Yoghurt, Ghee and Chhurpi.
Testing of quality and adulteration in Milk

Meat Production :
Meat Production from Male buffalo, sheep, Goat and avian in Nepal.
Methods of slaughtering animals and avian.
Its contribution to Livestock GDP.
Scope of increasing meat production from Male buffalo and goats in Nepal.
Estimation of dressing percentage.

Wool:
Definition of wool, Fur and Mohair.
Classification of wool .
Types of wool produced in Nepal.

Animal Health:
Important Ecto and Endoparasitic diseases and ite treatment of farm animals and avians.
Important contagious diseases.

Statistics:
Basic Knowledge about statistical data analysis.
Correlation and Regression
Analysis of Variance.
Experimental design on farm animals and avian with data analysis packages.

**-END-**

# Syllabus for Technical Officer (T-6)

**Open and internal competition examination**

## Sub Faculty - Animal Breeding and Genetics

## PART: II

**1. Principles of Genetics and Population Genetics**

Definition, importance and history of genetics
Study of animal cells and Cell division
Chromosomes, types of chromosomes and number of chromosomes in different animals
Mendelian principles
Dihybrid and polyhybridiation
Genetic constitution of population-frequencies of genes and genotypes, Hardy-Weinberg equilibrium
Gene interaction, epistasis and multiple alleles
Linkage and crossing over
Sex controlled inheritance and sex determination
Mutation and chromosomal aberrations
Cytoplasmic inheritance
Quantitative inheritance
Heredity and environment
Selection, migration, mutation and population size
Coefficient of inbreeding and genetic relationship
Values and means; breeding values
Variances-genetic and environmental
Resemblance-genetic and phenotypic

**2. Principles of Animal Breeding**

Definition, importance, achievements and history of Animal Breeding
Application of Genetic Principles in Animal Breeding
Gene and genotypic frequencies
Qualitative and quantitative inheritance
Heredity and environment
Principles of mating systems
Basis and methods of selection
Hybrid vigour/heterosis and estimation of heterosis
Genetic gain/Response to selection
Heritability and Repeatability
Correlations-Genetic, phenotypic and environmental
Dissemination methods

**3. Reproduction, Physiology and Biotechnology**

Definition, scope and importance of Biotechnology
Application of Biotechnology tools in Animal Improvement
Artificial Insemination

Embryo collection, embryo transfer
Reproductive systems of domestic animals
Reproduction parameters in domestic animals
Hormones and Heat synchronization using hormone

**4. Statistics**

Definition and importance of Statistics
Experimental design
Mean, Median and Mode
Measures of dispersion- Variance, Standard deviation, Standard errors etc
Analysis of Variance (ANOVA)
Regression and Correlation analysis

**5. General**

Nepal Agricultural Research Council
Identification of indigenous breeds of domestic animals
Characterization of indigenous breeds of domestic animals
Status of indigenous breeds in relation to conservation
Positive attributes of indigenous breeds
Available introduced breeds

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# Syllabus for Technical Officer (T-6)

**Open and internal competition examination**

## Sub-Faculty: Pasture/Forage and Agro-forestry

## PART: II

**1 General**

1.1 Livestock population and their distribution in Nepal.
1.2 Production and productivity of livestock in Nepal.
1.3 Ruminant's digestive, productive and reproductive systems.
1.4 Classification of feeds.
1.5 Proximate analysis of feeds.
1.6 Types of grassland and its distribution.
1.7 General knowledge about NARC.

**2 Forage Physiology**

2.1 Photosynthesis and respiration.
2.2 Seed germination, dormancy and other physiological processes associated with seed production.

**3 Forage Breeding**

2.1 Principles of breeding
2.2 Breeding and improvement objectives
2.3 Breeding methods

**4 Forage Agronomy**

4.1 Plant introduction, evaluation and utilization.
4.2 Fertilization and liming
4.3 Cutting management
4.4 Irrigation management
4.5 Cropping systems, crop rotation, inter-cropping, mixed cropping, multiple cropping and mixed farming systems.
4.6 Nursery establishment and management.

**5 Production Technology**

2.4 Production technology of forage crops
2.5 Production technology of temperate species
2.6 Production technology of fodder trees

**6 Grazing and Range Management.**

6.1 Grazing practices
5.1 Stocking rate and grazing pressure
5.2 Grassland productivity and carrying capacity.

**7 Herbage quality and Nutritive value.**

7.4 Nutritive value , digestibility and forage intake.
7.5 Feeding value of grass, legume and its products

**8 Agro-forestry.**
8.1 Scope and advantage,
8.2 Classification of agro-forestry systems.
8.3 Management of trees in agro-forestry systems.

**9 Forage Conservation.**
9.4 Principles of conservation
9.5 Silage making
9.6 Hay making

**10 Forage Toxicology**
10.1 Antiquality constraints and disorders

**11 Forage diseases and their control**
11.1 Diseases of pasture/forage and fodder trees, seed borne, soil borne and air borne diseases.
11.2 Biological control and cultural control measures of pasture/forage and fodder tree pathogens.

**12 Forage insects' management and their control.**
12.1 Principles of insect- pest control.
12.2 Physical and mechanical control, cultural control, biological control, chemical control and host plant resistance.

**13 Statistics.**
13.1 Experimental designs and data analysis (parametric and non- parametric).

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## Syllabus for Technical Officer (T-6)
## Open and internal competition examination

## Sub-Faculty: Animal Nutrition and Feeding
## PART: II

**1 General**

1.1 Livestock and Poultry population and their distribution in Nepal.
1.2 Production and productivity of livestock and Avian in Nepal.
1.3 Pasture, Forage and Agro-forestry production in Nepal.
1.4 General knowledge about NARC.

**2 General Chemistry**

2.1 Atoms, Molecules, and Ions
2.2 Status of Matter and Solutions
2.3 Chemical reactions and equilibrium
2.4 Calculations with chemical formulas and equations.
2.5 Organic Chemistry
  2.5.1 Hydrocarbons
  2.5.2 Derivatives of hydrocarbons,
2.6 Bio-Chemistry
  2.6.1 Introduction to Biological systems
  2.6.2 Biological molecules,

**3 Genetics and livestock breeding**

3.1 Principles of genectic

**4 Reproduction and physiology**

4.1 Reproduction
  4.1.1 Fertility and infertility
  4.1.2 Multiple ovulations
4.2 Physiology
  4.2.1 Indroductory knowledge of physiology

**5 Dairy Science**

5.1 Chemistry of milk
5.2 Microbiology of milk

**6 Diseases of Farm animals and birds**

6.1 Bacterial
6.2 Viral
6.3 Parasites
6.4 Metabolic and nutritional diseases

**7.** Digestive system of avian and animal. Anatomy and function of gastrointestinal tract, fecal and urinary extraction, role of digestive juices, rumen metabolism, rumen fermentation blood and nutrition.

**8 Nutrition of farm animals and birds.**

8.1 Nutrients
8.2 Proximate analysis of feeds
8.3 Classification of feeds
8.4 Basal Feeds
8.5 Protein supplements
8.6 Vitamin and mineral supplements and additives
8.7 Forages and roughages
8.8 Feeding standards
8.9 Energy values of feeds
8.10 Protein values of feeds.

**9 Animal Nutrition**

9.1 Animal feed classification.
9.2 Importance of different feed nutrients.
  9.2.1 Crude protein, carbohydrate, fat, lipids and water.
  9.2.2 Minerals and vitamins.
9.3 Sources of feed nutrients.
9.4 Importance of feed supplements and additive.
9.5 Use of cereals and agro industrial by products in the ration.
9.6 Digestive systems of ruminants and non ruminants.
9.7 Role of enzymes and hormones in the digestion.
9.8 Importance of the feeding standard.
9.9 Existing conventional and non-conventional feeding system in Nepal.
  9.9.1 Ruminants such as cattle, buffalo, sheep and goat.
  9.9.2 Non ruminants such as pig, poultry and rabbits.
9.10 Nutrients requirement for different ruminants and non ruminants animals.
9.11 Ration formulation for ruminants and non ruminants.
9.12 Chemical analysis and its implication in the ration formulation.
9.13 Importance of laboratory facilities.

**10 Pasture, Fodder and Fodder Tree**

10.1 Introductory plant taxonomy.
  10.1.1 Classification of grasses
  10.1.2 Classification of legumes.
  10.1.3 Classification of fodder tree.
10.2 Plant physiology.
  10.2.1 Plant metabolism.
  10.2.2 Growth and development pattern.
10.3 Distribution and classification of grass land.
10.4 Plant introduction, evaluation and utilization.
10.5 Grassland improvement techniques.
10.6 Agronomic and other management practices.
  10.6.1 Pasture species.
  10.6.2 Fodder crops.
  10.6.3 Fodder trees.
10.7 Grazing management system.
10.8 Conservation of forages.
10.9 Herbage quality.
10.10 Nursery establishment and management.

**11 Statistics**

11.1 Organization and description of data

11.2 Probability

## Syllabus for Technical Officer (T-6)

**Open and internal competition examination**

## Sub Faculty - Fishery

## PART: II

**1. Fish Biology:**

1.1 General characteristics of cultivable fishes-Common carp, rohu, naini, bhakur, silver carp, bighead carp, grass carp and rainbow trout

**2. Fish Culture:**

2.1 Fish culture practices in Nepal-Indigenous and exotic.
2.2 Monoculture
2.1 Polyculture- extensive, intensive
2.3 Raceway culture-
2.4 Rice fish culture- field preparation, construction of trench and dike, fish species, size and stocking, feeding, water management, growth check up and harvesting
2.5 Cage fish culture- materials for cage construction, fish species, stocking and harvesting
2.6 Pen fish culture or enclosure
2.7 Integrated fish culture with ducks, horticulture, and livestock
2.8 Pond preparation- Drying, liming, fertilization(inorganic and organic fertilizer), water management.

**3. Pond construction:**

3.1 Site selection for pond fish construction
3.2 Design and pond construction
3.3 Types of pond, nursing and rearing pond, production pond, and brood fishpond

**4. Fish breeding of cultivable species:**

4.1 Brood fish management
4.2 Methods of brood fish selection for breeding
4.3 Breeding technique- Natural breeding, Semi artificial breeding and artificial/induced breeding
4.4 Hormones- Application and of pituitary gland, and ovaprim
4.5 Nursery Technique of Carp- Nursery ponds and its preparation, stocking, and feeding.

**5. Hatchery management:**

5.1 Hatcheries operation- spawning, fertilization, incubation, and hatching and larvae nursing

**6. Fish harvest and Post Harvest Technology:**

6.1 Fish catching methods used in Nepal, fish packing procedure.

**7. Water quality and plankton:**

6.1 Temperature, dissolved oxygen, carbon dioxide, pH, light, turbidity, planktons

**8. Fish Health:**

8.1 Causes of fish diseases, common fish diseases, and Common fish parasites. EUS, fish poison

8.2 General symptom of infectious disease, causes

8.2 Fish parasites

8.3 Treatment of parasitic disease, prevention measure for Epizootic Ulcerative Syndrome (EUS) disease

8.4 Fish kill- mass mortality of fishes due to oxygen deficiency, and prevention measure

8.5 Fish predators and their control measures

**9. Aquatic weeds:**

9.1 Common aquatic weeds and control measures.

**10. Fish nutrition:**

10.1 Natural fish food & artificial feed, feed formulation, storage, & feeding.

**11. Biostatistics:**

11.1 Mean, probability, ANOVA, simple regression

**12. Main objectives of NARC, Role of Fisheries Research Centers and units under NARC**

**-END-**

# Syllabus for Technical Officer (T-6)

**Open and internal competition examination**

## Sub Faculty - Biotechnology

## PART: II

**1. Tissue culture:**

a. History
b. Media: composition, preparation, aseptic manipulation of in vitro cultures
c. Cell cultures: method, types of suspension culture, cell synchronization.
d. Somatic hybridization and protoplast culture and protoplast fusion
e. Somatic embryogenesis and its practical applications
f. Haploid production through anthers and ovary and its application in plant breeding, problems associated with haploid production
g. Embryo culture and its practical applications
h. Somaclonal variation and its application in plant breeding.
i. Meristem-tip culture
j. Clonal propagation or micropropagation: stages, multiplication by axillary and apical shoots, adventitious shoots, callus culture, factors affecting in vitro rooting, acclimatization of plants transferred to soil, technical problems in micropropagation, application of micropropagation
k. In vitro preservation of plant material, cryopreservation and freeze preservation.

**2. DNA technologies:**

1. Nucleic acid structure, chemical and physical properties of nucleic acid, DNA supercoiling
2. RNAs (rRNA, tRNA, mRNA)
3. Genetic code
4. Eukaryotic DNA replication
5. DNA damage, repair and recombination
6. DNA cloning and cloning vectors
7. Application of DNA technology in agriculture

**3. Laboratory procedures:**

1. Different types of media preparations in asceptic conditions
2. Calculation of molecular ions and weight in reagent and buffer preparations
3. Tissue culture methodologies
4. Gel electrophoresis
5. Genetic analysis using computer software (MSTAT, Gen STAT)

**-END-**

**Syllabus for Technical Officer (T-6)**
**Open and internal competition examination**

# Sub-Faculty: Food Technology
## PART: II

1. Post harvest Technology of Fruits, Vegetables, Cereal, Legumes, Oilseeds, Tea, Coffee, Spices and Meat and meat products (fish and poultry) Milk and dairy products.
2. General methods of food preservation.
3. Uses of various packaging material and containers in fresh and processed foods.
4. Heat processing of foods.
5. Application of irradiation in food preservation.
6. Infestation control and use of pesticides on foods.
7. Preservation of food with chemical additives.
8. Short and long term storage for perishable food commodities.
9. Modified atmosphere storage and control atmosphere storage.

**Food Engineering:**

1. Concept of Unit operation, (a) Material Balance (b) Heat balance and evaluation of heat requirement.
2. Fluid flow.
3. Heat Transfer:( a) Conduction, Convection and Radiation. (b) Heat exchangers. (c) Law of thermodynamics.
4. Principle of various methods of drying and uses in food industries.
5. Size separation and sieve analysis, filtration, sedimentation.
6. Size reduction, evaporation.
7. Distillation (a) Vapor-liquid relationship (b) Rectification
8. Mechanical refrigeration, steam generation and its utilization, boiler operation and maintenance.

**Food Chemistry:**

1. Development of food chemistry.
2. Proximate composition of foods and their determination.
3. Carbohydrates: - monosaccharides, disaccharides, polysaccharides and their general properties and structures.
4. Protein: - occurrence, physical and chemical properties, peptide bond, amino acid, classification of protein and their properties, food proteins.
5. Lipids: - Definition, occurrence and composition, fatty acid, hydrogenation, rancidity shortening and margarine.
6. Moister in foods, natural pigments in foods, vitamins in foods, flavoring compounds and food additives.
7. Browning in foods: - Enzymatic and non enzymatic browning, Millard reaction and methods of preventing browning

**Food Microbiology:**

1. Morphology and cytology of bacteria, yeasts, molds.
2. General Principal of serology and immunology.
3. Bacterial nutrition and metabolism.
4. Growth, reproduction, transformation, mutation and spore formation of microorganism.
5. Microbiology of air water and soil.
6. Microbiology of meat and meat products (fish, poultry) milk and milk products, fruits and vegetables products, poultry and poultry products, cereals and cereals products, spices.
7. Food plant sanitation.
8. Food-borne infection, intoxication and mycotoxine.
9. Industrial uses of microorganism.
10. General techniques of selection and preservation of microorganisms.
11. Fermented foods, fermented beverage.
12. Microbiology assay of nutrient.
13. Single cell protein.

**Biochemistry and human nutrition:**

1. Introductory of cell biochemistry.
2. Enzymes: General properties, classification, kinetics, coenzymes, and enzyme in food industry.
3. Carbohydrate metabolism, lipid metabolism, protein metabolism acid.
4. Losses of nutrients in foods processing.
5. Function of food nutrients, nutritional classification of food, energy value of food, recommended dietary allowances, digestion absorption and metabolism of food, nutritional quality of protein, food composition tables and its uses.
6. Balance diet and dietary standard.
7. Nutrition of infants, preschooler pregnant and lactating mother.
8. Supplementary foods.
9. Enrichment and fortification of food.
10. Present status of malnutrition in Nepal.
11. Malnutrition and nutrient deficiency disorders

**Quality control:**

1. Introduction to the concept of quality control and quality assurance.
2. Quality attributes of foods.
3. Sensory evaluation of foods & beverages.
4. Total quality management.
5. Hazard analysis of critical control points (HACCP) concept and its application in food industries.
6. Pesticide residue in food.
7. Role of food standard in maintaining the quality and safety of food.
8. Food analysis: gas liquid chromatography (GLC), HPLC, spectrometry etc.
9. Analysis of trace elements, additives ($SO_2$, benzoate, etc).
10. Food act and food regulations in Nepal.
11. Food sampling & inspection technique.
12. Food adulteration trends in Nepal.
13. Concept of GMP and good Laboratory practices (GLP).
14. Food plant sanitation.
15. Control of microorganisms in food industries.

**Statistics**:

1. Preliminary ideas of statistics.
2. Frequency distributions.
3. Normal distribution.
4. Probability.
5. Covariance and correlation coefficient.
6. Correlation of ranks.
7. Regression.
8. Test of significance: Chi-square test, T and Z test and F- value.
9. Analysis of variance and statistical quality control.

**General:**

2. Nepal Agriculture Research Council: - establishment, objective, role and activities.
3. Present agricultural issues and constraints.
4. Role of food technology in agricultural development.
5. Export and import of agricultural commodities.
6. Agricultural marketing.
7. Role of food technology in assuring food security in Nepal.

**-END-**

# Syllabus for Technical Officer (T-6)

Open and Internal Competition Examination

## Sub Faculty Agro-Meteorology

## PART-II

**1. Meteorology**

- Composition of the atmosphere
- Weather elements:
  Precipitation
  Temperature
  Relative humidity
  Wind
  Sunshine
  Global radiation
  Dew

**2. Climatology**

- Defination and scope of climatology
- Climataic classification of Nepal
- Thornwaite and koppen's classification
- Monsoon and annual rainfall

**3. Introduction to Agro-Meteorology**

- Definition of weather and climate
- Agro climate
- Weather problem in farming

**4. Plant and Agro Climatic Studies**

- Growth factor and yield of a plant
- Growth studies

**5. Radiation, Temperature and Light**

- Solar energy
- Heat budget
- Air temperature
- Soil temperature
- Slope effect

**6. Temperature and Plant**

- Cardinal temperature
- Heat tolerance crop
- High temperature effect
- Low temperature effect
- Thermo sensitive plant
- Photosensitive plant

**7. Sunshine and Light**

- Sunshine intensity
- Light intensity
- Day length and light intensities

**8. Precipitation**

- Hydrologic cycle
- Monsoon rainfall
- Rainfall distribution
- Rainfall variability
- Rainfall intensity
- Rainfall frequency

**9. Rainfall Effect**

- Excessive rain
- Effective rainfall

**10. Drought**

- Definition of drought
- Kinds of drought
- Drought tolerance
- Drought effect

**11. Moisture**

- Humid
- Evaporation
- Evapotranspiration
- Soil moisture
- Water evaporation from soil
- Water budget

**12. Wind**

- Wind effect controlling
- Local wind

**13. Agricultural Relationship of Climate**

- Effect of climate on soil
- Effect of climate on plant and disease

**14. Climate Change:**

- Defination and scope:
- Atmospheric composition and its changes
- Green house effects and anthropogenic influences
- National policy on climate change
- Variation of climate in Nepal
- Adoptation and metigation

-END-

# Syllabus for Technical Officer (T-6)

Open and internal competition examination

## Sub Faculty: Agri. Statistics (Biometrics/ Biostatistics)

**PART-II**

1. **Introduction**
   - 1.1. Statistics and biometrics
   - 1.2. Role of biometrics in agricultural research
   - 1.3. Basic concepts of statistics
   - 1.4. Measurement scales
   - 1.5. Variable/ observation and attribute
   - 1.6. Population and sample

2. **Classification and summarization of data**
   - 2.1. Data collection
   - 2.2. Frequency distribution
   - 2.3. Diagram and graphs

3. **Measures of central tendency and dispersion**
   - 3.1. Measures of central tendency
   - 3.2. Measures of dispersion

4. **Probability and distribution**
   - 4.1. Elementary probability and probability theory
   - 4.2. Normal distribution
   - 4.3. Binomial distribution

5. **Sampling**
   - 5.1. Sampling design
   - 5.2. Sampling fundamental

6. **Testing of hypothesis**
   - 6.1. Hypothesis
   - 6.2. Hypothesis testing
   - 6.3. Critical region and level of significance
   - 6.4. One and two tailed tests
   - 6.5. Degree of freedom
   - 6.6. Test of hypothesis
   - 6.7. Important parametric test
   - 6.8. Limitation

7. **Non-parametric test**

7.1. Chi-square test
7.2. Sign test
7.3. Wilcoxon's signed rank test
7.4. Rank correlation

**8. Correlation**
8.1. Simple linear correlation
8.2. Test of hypothesis

**9. Regression**
9.1. Simple linear regression
9.2. Multiple linear regression
9.3. Test of hypothesis
9.4. Assumption and problem data
9.5. Use and misuse of correlation and regression analyses

**10. Experimental design**
10.1. Basic concepts of statistical models and use of samples
10.2. Concepts of experimental design, factorial experiments
10.3. Principles and techniques of planning, establishing and executing field and greenhouse experiments
10.4. Completely randomized design
10.5. Randomized complete block design
10.6. Latin square design
10.7. Lattice design
10.8. Factorial experiments
10.9. Split-plot design
10.10. Experiment in farmers' fields
10.11. Assumption and problem data

**11. Means comparisons**
11.1. Pair comparison
11.2. Group comparison

**12. Special application of statistics**
12.1. Statistics in genetics and plant breeding
12.2. Statistics in livestock and fishery
12.3. Statistics in social science

**13. Biometrical software**

**14. Research Materials, Methods and Methodology**

**15. Field plot technique**
15.1. Size, shape and orientation of plots
15.2. Border and competition effects
15.3. Soil heterogeneity

15.4. Estimation of size of experiments for specified accuracy
15.5. Sub-sampling plots and yields for laboratory analysis

**16. Interpretation and report writing**

**17. Statistical system in Nepal and databases**

**18. General**

18.1. Agriculture Development Strategy
18.2. NARC Vision
18.3. Agriculture related policy and strategy (national and international)
18.4. Nepal Agricultural Research Council
18.5. Agriculture research and development: History, achievements, constraints and scope
18.6. Agricultural statistics

**-END-**

# कम्प्युटर अधिकृत टि ६ पद तहको
# खुला प्रतियोगितात्मकपरीक्षाकोपाठयक्रम

**पाठ्यक्रमकोउद्देश्यः-**

१) MS-Dos,Windows2000,WindowsXPरWindowsNT काज्ञानभएकोतथ्य प्रयोग गर्न सक्ने।Linuxकासमेतआधारभूतज्ञानहुनसक्ने।

२) File/disk managementसम्बन्धीकार्यगर्न सक्ने।

३) Computer printer, CD-Rom, Pen drives, Multimedia रScannerसमेतअन्यAccessoriesकाप्रयोग गर्न सक्ने।

४) MS-Office package प्रयोग गर्न सक्ने।

५) Computer fundamentalबारेराम्रो ज्ञान हुन सक्ने

६) Data structureरAlgorithmsबारेराम्रो ज्ञान हुन सक्ने।

७) SystemAnalysisगरीDesignसमेतगर्न सक्ने।

८) Databasedesignगर्न सक्ने,DBMSकाArchitectureबारेज्ञानहुनतथाOracle, Sybase,DB2,SQLServer,अन्यdatabase हरुकाGeneralconcept भएकोहुनसक्ने।

९) C,C++ रJavaprogramminglanguage प्रयोगगरीprogramलेख्नेरउक्तप्रोगाम प्रयोगगर्दा Outputनिकाल्नसक्ने।

१०) Network सम्बन्धीbasicconcept भएको,Network बारेsecurity दिने,Troubleshootingगर्नेतथाNetwork supporttoolप्रयोगगरीकामगर्न सक्ने।

११) e-CommerceTechnology रManagementInformationSystem(MIS) बारेराम्रोज्ञानभएकोहुने।

१२) नेपालसरकारलेतयारगरकोITPolicy2000,CyberLawofNepal,CopyWrite Law, नेपालमाविकासभईप्रयोगभैरहकोComputerTechnology बारेराम्रो ज्ञान हुन सक्ने।

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# कम्प्युटर अधिकृत टि ६ पद तहकोखुला प्रतियोगितात्मकपरीक्षाकोपाठयक्रम

पाठयक्रमकारुपरेखा :–यसपाठयक्रमकाआधारमानिम्नानुसारतीनचरणमापरीक्षालिईनेछ :
प्रथमचरण:–लिखितपरीक्षा पूणाङ्क:–१५०
द्वितीयचरण:–(क)प्रयोगात्मक पूणाङ्क:– ५०
(ख)अन्तर्वार्ता पूणाङ्क:– ३०

**प्रथम चरण – लिखित परीक्षा योजना(Examination Scheme)**

| पत्र | विषय | पूर्णाङ्क | उत्तीर्णाङ्क | परीक्षाप्रणाली | प्रश्नसख्याxअङ्कभार | समय |
|---|---|---|---|---|---|---|
| प्रथम | कम्प्युटर सम्बन्धीबिषय | १०० | ४० | वस्तुगतबहुउत्तर (MultipleChoice) | १००x१=१०० | १घण्टा१५ मिनेट |
| द्वितीय | | ५० | २० | विषयगत (Subjective) | ५x१०=५० | १घण्टा३० मिनट |

**द्वितीय चरण**

| | | | | | | |
|---|---|---|---|---|---|---|
| (क) | प्रयोगात्मक परीक्ष | ५० | २५ | प्रयोगात्मक | ५X१०=५० | १ घण्टा ३० मिनेट |
| (ख) | अन्तर्वार्ता | ३० | - | मौखिक | - | - |

१. लिखितपरीक्षाकोमाध्यमभाषानेपालीवाअंग्रेजीअथवानेपालीरअंग्रेजीदुवैहुन सक्नेछ।
२. पाठ्यक्रमकाप्रथमरद्वितीयपत्रतथाप्रयोगात्मकपरीक्षाकाविषयवस्तुएउटैहुनछ।
३. प्रथमरद्वितीयपत्रकालिखितपरीक्षाछट्टाछुट्टैहुनेछ।
४. लिखितपरीक्षातथाप्रयोगात्मकपरीक्षाकाप्रश्नसख्यानिम्नानुसारहुनेछन् :-

प्रथमपत्रकाएकाई 1 2 3 4 5 6 7 8 9 10 11 12
प्रश्नसंख्या 10 8 10 10 15 7 10 3 2 5 10 10

द्वितीयपत्रकाखण्ड **A** **B** **C** **D** द्वितीयपत्रकाएकाई
2 6 3 4 5 12 प्रश्नसंख्या 1 1 1 1 1

प्रयोगात्मकपरीक्षाकाएकाई 1 2 3 4 5 6 7 8 9 10 11 12
प्रश्नसंख्या - - - 1 2 1 1 - - - - -

५. प्रथमपत्रमावस्तगतबहउत्तर(MultipleChoice)प्रश्नहरुकाउत्तरसहीदिएमाप्रत्येकसहीउत्तर बापत१( एक)अङ्कप्रदानगरिनेछभनगलतउत्तरदिएमाप्रत्येकगलतउत्तरबापत२०पतिशत अर्थात०.२अङ्ककट्टागरिनेछ।तरउत्तरनदिएमात्यसबापतअङ्कदिईनेछैनरअङ्ककट्टापनिगरिने छैन।
६. द्वितीयपत्रकोविषयगतप्रश्नकालागितोकिएका१०अङ्कप्रश्नहरुकाहकमा१०अङ्कएउटालामो प्रश्नवाएउट प्रश्नकादुईवा दुईभन्दाबढीभाग (Twoormorepartsofasinglequestion)वा एउटाप्रश्न अन्तगतदुईवाबढीटिप्पणीहरु(Shortnotes)सोध्नसकिनेछ ।
७. द्वितीयपत्रकापाठ्यक्रमलाइ४वटाखण्ड/एकाईमाविभाजनगरिएकोछ।४वटाखण्ड/एकाईका लागि४वटउत्तरपुस्तिकादिईनेछरपरिक्षार्थीले प्रत्येकखण्ड/एकाईकाप्रश्नहरुकाउत्तरसाही खण्ड/एकाईकाउत्तरपुस्तिकामालेख्नुपर्नेछ ।
८. यसपाठयक्रममाजेसुकलखिएकाभएतापनिपाठ्यक्रममापरेकाऐन,नियमहरुपरीक्षाकामितिभन्दा३ (तीन)महिनाअगाडि(संशोधनभएकोवासंशोधनभईहटाईएकोवाथपगरीसंशोधनभई)कायम

रहेकोलाईयसपाठ्यक्रममारहेकोसम्झनुपर्दछ।

९. प्रथमचरणकालिखितपरीक्षाबाट छनौटभएकाउम्मेदवारहरुलाईमात्रद्वितीयचरणकाअन्तर्वार्तामा सम्मिलितगराईनेछ।

१०. यसभन्दाअगाडिलागुभएकोमाथिउल्लिखितसमुहकापाठ्यक्रमखारेजगरिएकोछ ।

## प्रथमरद्वितीयपत्रः– कम्प्यटरसम्वन्धी

**1. ComputerFundamentals**

1.1 Computers, Kinds of Computers in respect of size and function,
1.2 Generation of Computers,
1.3 Components and Architecture of Computers, Connecting the Components,
1.4 Getting started: Orientation to personal computers, The system unit, Starting the computers
1.5 Input Devices: The keyboard, The mouse, Other input devices
1.6 Processing: CPU, Memory
1.7 Storages devices: Overview of Storage Devices, The Floppy Disk Drive, The HardDrive, The Universal Serial Bus(USB) Devices and Other Storage Devices
1.8 Output devices: Monitors, Printers, Modems, Soundboards
1.9 Dos survival guide: Using Command Prompt, Creating and using AUTOEXEC.BATand CONFIG.SYS
1.10 Windows survival guide: The Windows Desktop,The Program Manager,Organizing the Desktop, The File Manager
1.11 Application software: Using Application Software
1.12 Windows Explorer, E-mails, Internet, Intranet, Extranets, Ethernet, HTTP
1.13 Computer Viruses, Antivirus

**2. Data Structure and Algorithms**

2.1 Fundamental of Data Structures, Abstract Data types,
2.2 Lists, Linked Lists, Stacks,
2.3 Queues, Priority Queue,
2.4 Trees: Traversal, Implementations, Binary Trees, BinarySearchTrees, BalancedSearch Trees, AVL Trees.
2.5 Indexing Methods. Hashing Trees, Suffix Trees
2.6 Worst-Case and Expected time Complexity.
2.7 Analysis of Simple Recursive and Nonrecursive Algorithms.
2.8 Searching, Merging and Sorting.
2.9 Introductory Notions of algorithm design: Divide-and-Conquer, DynamicProgramming, Greedy Methods, Backtracking
2.10 Graph algorithms: Depth-first Search and Breadth-first Search, Shortest PathProblems, Minimum Spanning Trees, Directed Acyclic Graphs.

**3. System Analysis and Design**

3.1 Defining the System, System Owner, System User, System Designers and system Builders, System Analysts, Variations on the System Analyst title, System life Cycle,
3.2 Joint Application Development (JAD): JAD definition, JAD purpose, JAD Philosophy, JAD Scope
3.3 Involved in a JAD: Sponsor, Business Users, System Analyst

3.4 Roles of JAD Group Member: Project Leader, Record Keeper, Time Keeper.
3.5 The System Design Environment: Development Process, Management Process, System Structure, Basic Component of Computer based Information System, Personal/ Centralized/Distribution System.
3.6 Concept formations: Introduction, Finding the Problem, Evaluating theProposal, Technical Feasibility, Operational Feasibility, Economic Feasibility.
3.7 Requirements analysis: Representing System Analysis Model, Requirement Model, Design Model,
3.8 Development Process: Design Method.
3.9 Entity Relationship Diagram (E-R Diagram): Notations, Entities: Strong Entities, Weak Entities, Attributes: Simple and Composite, Single Valued and Multiple Valued, Null and Derived Attribute.
3.10 Relationship Sets: Degree of Relationshipand Cardinality Relationship, Specialization, Generalization, Aggregation.
3.11 Data Flow Diagrams (DFDs): Introductions,DataflowDiagram,Symbol,Filesor datastore,Externalentities,Dataflows,
3.12 Describing System by Data Flow Diagram: Context diagram, Top level DFD, ExpansionLevelDFD,ConversionsofData.
3.13 Object Modeling: Object-Oriented Concept,ObjectStructure,ObjectFeature,Class andObject.
3.14 Representation: AssociationandComposition,Inheritance,MultipleInheritances.
3.15 Modeling: UseCaseDiagram,StateDiagram,EventFlowDiagram.
3.16 Documentation: AutomaticandManual System.

**4. OperatingSystems**

4.1 Definean OperatingSystem,Tracethe DevelopmentsinOperatingSystems,and identify thefunctionsofOperatingSystems,
4.2 Describethe basiccomponentsof theOperatingSystems,UnderstandInformationStorageandManagement Systems,
4.3 ListDisk Allocationand SchedulingMethods, IdentifytheBasicMemoryManagement strategies,ListtheVirtualMemoryManagement Techniques,DefineaProcessandlist thefeaturesoftheProcessManagementSystem
4.4 Identify the Features of Process Scheduling; List the features of Inter-ProcessCommunicationand Deadlocks,
4.5 IdentifytheConceptsofParallelandDistributedProcessing;IdentifySecurityThreats toOperatingSystems
4.6 OverviewoftheMS-DOSOperatingSystem
4.7 IntroductiontotheWindowsFamilyofProducts,UNIXFamilyofProducts, LinuxFamilyofProducts.
4.8 Introduction to WindowsNetworking
4.9 WindowsArchitecture,LinuxArchitecture
4.10 TroubleshootingWindows,&Linux
4.11 ManagingNetworkPrinting

4.12 ManagingHardDisksandPartitions
4.13 Monitoring andTroubleshootingWindows
4.14 Users,GroupsandPermissionLinuxandWindows.

**5. DatabaseManagementSystemandDesign**

5.1 Introduction,ADatabaseModel,RelationalDatabaseModel,Integrity,RDBMS.
5.2 SQLandEmbeddedSQL
5.3 WritingBasicSQLSELECTStatements
5.4 RestrictingandSortingdata
5.5 SingleRow Functions
5.6 DisplayingDatafromMultipleTables
5.7 AggregationDataUsingGroup Functions
5.8 SubQueries,ManipulatingDataandCreating&ManagingTables
5.9 CreatingViewsandControllingUserAccess
5.10 UsingSetOperators,DatetimeFunction
5.11 Database Design: Logical Design, ConceptualDesign, MappingConceptualto Logical,Pragmaticissues,PhysicalDesign,IntegrityandCorrectness, Relational Algebra,RelationalCalculus.
5.12 Normalization:1NF,2NF,3NF,BCNF,4NF,5NF,DKNF
5.13 Architecture of DBMS: Client-server,OpenArchitectures,TransactionProcessing, Multi-User&Concurrency,andBackup&RecoveryDatabase.
5.14 Basic Concept of major RDBMS products: Oracle,Sybase,DB2,SQLServerand otherDatabases.

**6. ProgrammingLanguage**

6.1 OverviewofProgrammingLanguage:History,ProgrammingParadigms,TheroleofLanguagetranslatesintheProgrammingProcess.
6.2 FundamentalIssuesinLanguageDesign.
6.3 VirtualMachines,CodeGeneration,LoopOptimization.
6.4 Concept of Procedural Programming, Structural Programming, Object-OrientedProgramming.
6.5 ConceptofCprogramming,C++Programming,
6.6 JavaProgrammingforDeclaration,Modularity andStorageManagement SoftwareDevelopment.

**7. Networking**

7.1 Basic Network Theory: NetworkDefinition,NetworkModels, Connectivity,NetworkAddressing.
7.2 Network Connectivity: The DataPackage, Establishing aConnection, ReliableDelivery,NetworkConnectivity,NoiseControl,BuildingCodes,ConnectionDevices.
7.3 Advanced Network Theory: TheOSI model,Ethernet,NetworkResources,Token ring,FDDI,WirelessNetworking.
7.4 Common Network Protocols: FamiliesofProtocols,NetBEUI,BridgeandSwitches, theTCP/IPProtocol,BuildingTCP/IPNetwork,TheTCP/IPSuite
7.5 TCP/IP Services: Dynamic HostConfigurationProtocol, DNSNameResolution, NetBIOSsupport,SNMP,TCP/IPUtilities,FTP

7.6 Network LAN Infrastructure: LANProtocolsonaNetwork,IPRouting,IPRouting Tables,RouterDiscoveryProtocols, DataMovement inaRoutedNetwork,Virtual LANs (VLANS)
7.7 Network WAN Infrastructure: The WAN Environment, Wan TransmissionTechnologies,WanConnectivityDevices,VoiceOverDataServices
7.8 Remote Networking: Remote Networking, Remote Access protocols, VPN Technologies.
7.9 Computer Security: ComputerVirus,Worm,TrojanHorse.
7.10 Network Security: Introduction,VirusProtection,LocalSecurity,NetworkAccess, InternetSecurity.
7.11 Disaster Recovery: TheneedforDisasterRecovery,DisasterRecoveryplan,Data backup,FaultTolerance.
7.12 Advanced Data Storage Techniques: EnterpriseDataStorage,Clustering,NetworkAttachedStorage,StorageArea Networks.
7.13 Network Troubleshooting: Using SystematicApproachtoTroubleshooting.
7.14 Network Support Tools: Utilities,TheNetworkBaseline.
7.15 NetworkAccessPoints(NAP),CommonNetworkComponent,CommonPeripheralPorts.

**8. ComputerArchitecture&Organization**

8.1 Evaluation ofComputers,DesignMethodology,SetArchitecture,MIPSISA,ALU Design.
8.2 Datapath Design:SingleandMultipleCycleImplementations,Pipelining,MemoryHierarchy ,Input/OutputSystem:Bus&RoleofOperatingSystem.

**9. ComplierDesign**

9.1 Introduction to Compiling,
9.2 LogicalAnalysis,SyntaxAnalysis,SemanticAnalysis,
9.3 RunTimeenvironment,
9.4 IntermediateCodeGeneration,CodeOptimization,
9.5 CompilerGenerationTools.

**10. E-CommerceTechnology**

10.1 Introduction to E-Commerce.
10.2 ElectronicCommerceStrategies.
10.3 ElectronicCommerce SecurityIssues.
10.4 SuccessModelsofE-Governance.
10.5 E-Business: b2b,b2c, b2e,c2c,g2g,g2c.
10.6 PrinciplesofElectronicPayment,Strategies&Systems.
10.7 E-marketing,reverseEngineering.
10.8 E-Banking, EDIMethods,SWIFT.
10.9 EncryptionandDecryptionMethods, XML,LayoutManagers,EventModel.

**11. MISandWebEngineering**

11.1 InformationSystems,Client-ServerComputing.
11.2 InformationSystemsandDecisionMaking.

11.3 DatabaseDesignissues,DataMining, DataWarehousing
11.4 KnowledgeManagement,ThestrategicuseofInformationTechnology.
11.5 Work ProcessRedesign(Reengineering) withInformationTechnology, Enterprise ResourcesPlanningSystems,and InformationSystemsSecurity,Information Privacy,and GlobalInformationTechnologyissues.
11.6 SoftwareSupportedDemonstrationsincludingadvancedSpreadsheettopics,SoftwareComponentBasedSystems (CBSE),
11.7 Multimedia
11.8 Object-OrientedProgrammingwithCOMS&DECOMS,
11.9 GroupDecisionSupport Systems
11.10 BasicsofWebsiteDesign.

**12. ITinNepal**

12.1 HistoryofITinNepal,
12.2 ITPolicyofNepal,2057B.S.
12.3 CyberlawofNepal(ElectronicTransactionOrdinance,2061B.S.)
12.4 CopyWriteAct,2022B.S.
12.5 UsesofComputersandSoftware Development
12.6 NepaliUnicode,NepaliFonts
12.7 LicensingIssues

**13. NARC General:**

12.1 NARC Act and Administration and Finacial By-Laws.
12.2 Public Procurement Act/Regulations

-END-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## प्राविधिक अधिकृत, टि. ६ सिभिल इञ्जिनियरिङ्ग पद तहको
## खुला प्रतियोगितात्मकपरीक्षाकोपाठ्यक्रम

पाठ्यक्रमकोरुपरेखा :–यसपाठ्यक्रमकाआधारमानिम्नानुसारदुईचरणमापरीक्षालिईनेछ :

प्रथमचरण:–लिखितपरीक्षा पूर्णाङ्क:–२००
द्वितीयचरण:–अन्तर्वार्ता पूर्णाङ्क:– ३०

**प्रथमचरण–लिखितपरीक्षायोजना(Examination Scheme)**

| पत्र | विषय | पूर्णाङ्क | उत्तीणाङ्क | परीक्षापणाली | प्रश्नसख्याXअङ्कभार | समय |
|---|---|---|---|---|---|---|
| प्रथम | सिभिल इञ्जिनियरिङ्ग सम्बन्धी | १०० | ४० | वस्तुगतबहुउत्तर (MultipleChoice) | १००X१=१०० | १घण्टा१५ मिनेट |
| द्वितीय | उपसमूह सम्बन्धी | १०० | ४० | विषयगत (Subjective) | १०X१०=१०० | ३घण्टा |

**द्वितीयचरण**

| विषय | पूर्णाङ्क | परीक्षापणाली |
|---|---|---|
| व्यक्तिगतअन्तर्वार्ता | ३० | मौखिक |

१. लिखितपरीक्षाकोमाध्यमभाषानेपालीवाअंग्रेजीअथवानेपालीरअंग्रेजीदुवैहुन सक्नेछ।
२. पाठ्यक्रमकोप्रथमरद्वितीयपत्रकाविषय वस्तुफरकफरकहुनेछन।
३. माथिउल्लिखितउपसमूहकापाठ्यक्रमकाप्रथमपत्रका विषयवस्तुएउटैहुनेछ।द्वितीयपत्रकाविषयवस्तु उपसमुहअनुसारफरकफरकहुनेछन।
४. प्रथमरद्वितीयपत्रकोलिखितपरीक्षाछुट्टाछुट्टैहुनेछ।
५. प्रथमपत्रकापाठ्यक्रमकोएकाईहरुबाटसोधिनेप्रश्नहरुकासंख्यानिम्नानुसारहुनेछ।द्वितीयपत्रको पाठ्यक्रमकोएकाईहरुबाटसोधिनेप्रश्नहरुकासख्याद्वितीयपत्रकोपाठ्यक्रमउल्लेखभएअनुसारहुनेछ।

| प्रथमपत्रकाएकाई | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| प्रश्नसंख्या | 20 | 15 | 12 | 12 | 10 | 10 | 8 | 8 | 5 |

६. प्रथमपत्रमावस्तुगत बहुउत्तर(MultipleChoice)प्रश्नहरुकाउत्तरसहीदिएमाप्रत्येकसहीउत्तर बापत१( एक)अङ्कप्रदानगरिनेछभनेगलतउत्तरदिएमाप्रत्येकगलतउत्तरबापत२०पतिशत अर्थात०.२अङ्ककट्टागरिनेछ।तरउत्तरनदिएमात्यसबापतअङ्कदिईनेछैनरअङ्ककट्टापनिगरिने छैन।

७. द्वितीयपत्रकोविषयगतप्रश्नकालागितोकिएको१०अङ्कका प्रश्नहरुकोहकमा१०अङ्कको एउटालामो प्रश्नवा एउटाप्रश्नकादुईवा दुईभन्दाबढी भाग(Twoormorepartsofasinglequestion)वा एउटाप्रश्न अन्तर्गतदुईवाबढीटिप्पणीहरु(Shortnotes)सोध्नसकिनेछ ।

८. द्वितीयपत्रकोपाठ्यक्रमलाइ४वटाखण्ड/एकाईमाविभाजनगरिएकोछ,४वटाखण्ड/एकाईकोलागि ४ वटा उत्तर पुस्तिकादिईनेछ र परिक्षार्थीलेप्रत्येकखण्ड/एकाईका प्रश्नहरुकाउत्तर सोही खण्ड/एकाईकाउत्तरपुस्तिकामालेख्नुपर्नेछ ।

९. यसपाठ्यक्रममाजेसुकैलेखिएकोभएतापनिपाठ्यक्रममापरेकाऐन,नियमहरुपरीक्षाकोमितिभन्दा३ (तीन)महिनाअगाडि( संशोधनभएकोवासंशोधनभईहटाइएकोवाथपगरीसंशोधनभई)कायम रहेकोलाइयसपाठ्यक्रममारहेकोसम्झनुपर्दछ।

१०. प्रथमचरणकालिखितपरीक्षाबाट छनौटभएकाउम्मेदवारहरुलाईमात्रद्वितीयचरणका अन्तर्वार्तामा सम्मिलितगराइनेछ ।

# प्राविधिक अधिकृत, टि. ६ सिभिल इञ्जिनियरिङपद तहको खुला प्रतियोगितात्मकपरीक्षाकोपाठ्यक्रम

## प्रथमपत्रः– सिभिलइञ्जिनियरिङ्गसम्वन्धीविषय

**1. Structure AnalysisandDesign 20%**

1.1 Stressesandstrains; theoryoftorsionand flexure;momentofinertia

1.2 Analysisofbeamsandframes:Bendingmoment,shearforceanddeflectionof beams andframes:determinatestructure- Energymethods;threehinged systems, indeterminatestructures-slopedeflectionmethodandmoment distribution method; use ofinfluence linediagramsforsimplebeams,unit load method

1.3 Reinforcedconcretestructures:Differencebetweenworkingstressandlimit statephilosophy,analysisof RCbeamsand slabsinbending,shear,deflection, bondand endanchorage,Designofaxiallyloadedcolumns;isolatedand combined footings,introductiontopre-stressedconcrete

1.4 Steel and timber structures: Standardand built-up sections: Design of riveted,boltedand weldedconnections,designofsimpleelementssuchas ties,struts, axiallyloadedand eccentric columns, columnbases,Design principles ontimber beamsand columns

**2. ConstructionMaterials 15%**

2.1 Properties ofbuilding materials: physical,chemical, constituents, thermal etc.

2.2 Stones-characteristics and requirementsofstones as a building material

2.3 Ceramic materials: ceramic tiles, MosaicTile, bricktypes andtesting etc.

2.4 Cementingmaterials:typesandpropertiesoflimeandcement;cementmortar tests

2.5 Metals: Steel; typesand properties; Alloys

2.6 Timberand wood:timber trees in Nepal, types and propertiesofwood

**2.7** Miscellaneous materials: Asphaltic materials(Asphalt, Bitumenand Tar); paints and varnishes; polymers

2.8 Soil properties and its parameters

**3. Concrete Technology 12%**

3.1 Constituentsand properties ofconcrete (physical and chemical)

3.2 Water cement ratio
3.3 Grade and strength ofconcrete, concrete mixdesign, testing ofconcrete
3.4 Mixing, transportation pouringand curing ofconcrete
3.5 Admixtures
3.6 High strength concrete
3.7 Pre-stressed concrete technology

**4. Construction Management 12%**

4.1 Constructionschedulingandplanning:networktechniques(CPM,PERT)and bar charts

4.2 Contractualprocedureandmanagement:typesofcontract,tenderandtender notice, preparationofbidding(tender)document, contractorspre-qualification, evaluation of tenders and selection of contractor, contract acceptance, conditionof contract;quotationanddirectorder,classificationsof contractors; dispute resolution; musterroll
4.3 Material management: procurement proceduresand materials handling
4.4 Cost control and quality control
4.5 Project maintenance
4.6 Occupational health and safety
4.7 Project monitoringand evaluation
4.8 Quality assuranceplan
4.9 Variation, alteration and omissions

**5. Estimating andCostingValuation andSpecification 10%**

5.1 Types ofestimates and their specific uses
5.2 Methods ofcalculating quantities
5.3 Key componentsofestimating normsand rate analysis
5.4 Preparation ofbill ofquantities
5.5 Purpose,types and importance ofspecification
5.6 Purpose,principles and methods ofvaluation

**6. DrawingTechniques 10%**

6.1 Drawing sheet composition and its essential components
6.2 Suitable scales, site plans,preliminary drawings, workingdrawings etc
6.3 Theoryofprojectiondrawing:perspective,orthographicand axonometric projection; first and third angle projection
6.4 Drafting toolsand equipments
6.5 Drafting conventions and symbols
6.6 Topographic, electrical, plumbingand structural drawings
6.7 Techniques offree hand drawing

**7. EngineeringSurvey 8%**

7.1 Introduction and basic principles
7.2 Linear measurements: techniques; chain, tape, ranging rods and arrows; representationof measurementandcommonscales;sourcesof errors;effectof slope and slope correction; correction for chain and tape measurements; Abneylevel and clinometers
7.3 Compassandplanetablesurveying:bearings;typesofcompass;problemsand

sources oferrors ofcompasssurvey;principlesandmethods ofplane tabling

7.4 Leveling and contouring: Principle of leveling; temporary and permanent adjustment of level; bench marks; bookingmethods and their reductions; longitudinalandcrosssectioning;reciprocal leveling;trigonometric leveling; contourintervalandcharacteristics ofcontours; methods ofcontouring

7.5 Theodolitetraversing:needoftraverseanditssignificance;computationof coordinates; adjustment ofclosed traverse; closingerrors

7.6 Uses ofTotal Station andElectronicDistanceMeasuringInstruments

**8. EngineeringEconomics 8%**

8.1 Benefitcostanalysis,costclassification,sensitivityanalysis,internalrateof return,timevalueofmoney;economicequilibrium,demand,supply and production, net present value, financial and economic evaluation

**9. Professional Practices 5%**

9.1 Ethicsandprofessionalism:codeofconductandguidelinesforprofessional engineeringpractices

9.2 Nepal Engineering Council Act, 2055and regulations, 2056

9.3 Relation with clients,contractor and fellow professionals

9.4 Public procurement practices forworks,goodsand services and its importance

-END-

# द्वितीयपत्रः– जनरलसम्वन्धीविषय

**SectionA–**

**1. Transportation and Road:**

1.1 Transportation systemand its classification.
1.2 Transportation planning: rationale, types and its philosophy.
1.3 Road transport and road construction in Nepal.
1.4 Classification ofroadsin Nepal (NRS and IRC)
1.5 General principles ofroad network planning.
1.6 Feasibility study ofroad projects.
1.7 Alignment, engineering surveyand its stages.
1.8 Geometricdesignofroads:mapstudy, elementofcross-sectionandhighway alignment,designof horizontal curve,superelevation,transition curve,vertical curves, and right ofway.
1.9. D r a i n a g e consideration in roads:
1.9.1. Introduction and design of culverts and minor bridges, cross drainage structures,subsurfacedrainagesystem.
1.10. Special consideration in Hill roadsdesign:
1.10.1. Problemsassociatedwithhill roadsconstruction
1.10.2. Routelocation,hairpinbendsandspecialstructures.
1.11. Road Pavement: Types ofpavementandtheirapplicabilityinhillroads, Design ofpavement,
1.12. Bioengineering practices along hill side
1.13. Activities andtechniquesin road constructionin ruralroads
1.14. Maintenance, repair and rehabilitation ofroads.
1.15. Role ofsocial mobilization in rural roaddevelopment.
1.16. Low-cost road construction

**SectionB –**

**2. Water SupplyandSanitation.**

2.1 Rural and community based water supplysystem.
2.2 Water supplysources and their management.
2.2.1 Surface water

2.2.2 Groundwater

2.3 Selection ofsource.

2.4 Water quality and treatment, waterdemandand supply,source protection

2.5 Intakes,collectionchamberand break pressure tanks.

2.6 Reservoir and distribution system.

2.7 Intakes, Pipelinedesign, design of transmission and distribution system, reservoir design.

2.8 Pipe and fittings: Pipe materials, pipe laying and fittings.

2.9 Operation and maintenance ofwater supplysystems

2.10 Sanitation, wastewater and solid waste management:

2.10.1On-site sanitationsystem

2.10.2Types ofsewerage system,design and construction ofsewers.

2.10.3Types, characteristics, sources, quantity, generation, collection, transportation and disposal ofsolid wastes.

2.10.4Sanitarylandfill,incineration, composting etc.

2.11 Environmentalhealthengineering-Epidemiology,pathogens(Bacteria,Virus, Helminthes, Protozoa)

**3. NARC General:**

3.1 NARC Act and Administration and Financial By-Laws.

3.2 Public Procurement Act/Regulations.

-END-

# जे.टि., टि.५ पद/तहकोखूला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

नेपाल कृषि अनूसन्धान परिषद्को जे.टि., टि.५ पद/तहको खूला प्रतिगियोतात्मक लिखित परीक्षा देहाय अनूसार पुर्णाङ्क १०० को हूनेछ । परीक्षाको समय ४५ मिनेटको हूनेछ र उतीर्णाङ्क ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

| पत्र | बिषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्न संख्या/ अङ्क भार | समय |
|---|---|---|---|---|---|
| १. पत्र एक | सेवा सम्बन्धी | १०० | वस्तूगत बहूउत्तर | ५०x२=१०० | ४५घण्टा |

**द्रष्टव्यः**

१. बस्तुगत बिषयमा उत्तर गलत भएमा प्राप्त गरेको प्रप्ताङ्कबाट २०% अङ्क कट्टा गर्न सकिनेछ ।
२ यो पाठ्यक्रम २०६० साल वैसाखपछि प्रकाशित विज्ञापनदेखि लागू हुनेछ ।
३. पाठ्यक्रममा जेसुकै लेखिएको भएतापनि यस पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनु पर्दछ ।

**खण्ड–२**
**अन्तर्वार्ता**

लिखित परीक्षाबाट छनौट भएका उमेद्वारहरुको मात्र अन्तरबार्ता हुनेछ ।
क) अन्तर्वार्ता :- ३५
ख) शैक्षिक योग्यता :- १०
ग) अनुभव :- ५

**द्रष्टव्यः-**

२) अन्तिम योग्यताक्रम तयार गर्दा लिखित, अन्तर्वार्ता, शैक्षिक योग्यता, अनुभव र प्रयोगात्मक परीक्षा भएमा सो समेतको अङ्क जोडी तयार गरिने छ ।

# Syllabus for Junior Technician (T-5)

**Open and internal competition examination**

## Sub Faculty - General Agricultural

**A. General**

1 Current Five Years Plan related to agriculture.
2 Agricultural marketing, credit, inputs, post harvest and mechanization.
3 Extension approaches roles of NGOs, INGOs, and private Sectors in agriculture development.
4 National food security.
5 Organic farming.
6 Role of NARC in Agriculture.

**B. Agronomy and Soils**

1 Importance of agronomic crops in Nepal.
2 Definition and principals of agronomy, importance in national food security.
3 Important food crops and their roles.
4 General climate: temperature, rainfall, humidity, solar radiation.
5 Food crops: popular varieties, their coverage domains, yield potential.
6 Oil seed crops: popular varieties, their coverage domains, potentials.
7 Pulses: popular varieties, their coverage domains, yield potentials.
8 Agronomic cash crops: sugarcane, jute, cotton, etc.
9 Seed rate, seed treatments, sowing methods of major food crops, oilseed crops and pulses.
10 Seeds: quality seed production, seed classification, tagging system, seed distribution system.
11 Cultivation practices, nursery management, zero or minimum tillage, water requirement, seed rate, weed control.
12 Fertilizers types in Nepal, their nutrient contents, fertilization calculation, role of nutrients (NPK) in crop production.
13 Organic nutrients, composting, green manures in Nepal and their uses.
14 Soil: classification, pH, texture, O.M., lime, important micro nutrients, Zn, B, Iron, etc.
15 Plant protection: major pests and diseases and their identification and control measures, integrated pest management, organic pesticides.
16 Post harvest loss and appropriate measures to minimize post harvest loss.

**C Livestock, Veterinary and Fisheries**

1 Cultivation practices of legumes, annual and perennial grasses and fodder trees.
2 Conservation of fodders, hay, silage and straws.
3 Pasture and grassland management.

4 Local and exotic breeds of farm animals in Nepal.
5 Artificial insemination; semen collection, processing and insemination, embryo transfer technology.
6 Principles of sterilization and disinfection.
7 Composition, nutritive value, physical and chemical properties of milk.
8 Common methods of dairy processing; manufacturing of dairy products in Nepal.
9 Collection, storage and transportation of milk and milk products, cleaning of dairy equipments and record keeping.
10 Common methods of identification and controlling of farm animals.
11 Common diseases of cow and buffalo.
12 Common diseases of poultry.
13 History and scope of fish culture in Nepal.
14 Local and exotic fish species available in Nepal.
15 Site selection for fish culture pond.
16 Fish seed production; hatchling, fry and fingerling production.
17 Fish culture in natural pond, lake and rivers; cage fish culture, enclosure fish culture.
18 Fish harvesting; gillnet, dragnet and fish poisoning.
19 Marketing and preservation of fish.

**D. Horticulture**

1 Scope and importance of horticulture in Nepal.
2 Plant propagation: Sexual and asesual.
3 Training and pruning.
4 Growth regulators.
5 Cultivation of major fruits.
6 Cultivation of major vegetables.
7 Cultivation of tubers, roots, and bulbs.
8 Cultivation of beverage crop: tea and coffee.
9 Cultivation of spices crop: ginger, cardamom, turmeric etc.
10 Cultivation of major ornamental plants: roses, orchid, chrysanthemum, gladiolus, begonia, tulips, lilies, dahlias and other seasonal flowers.
11 Major insect pest and diseases of fruit, vegetable and ornamental crops.
12 Establishment and management of fruit orchard.
13 Off-season vegetable production.
14 Kitchen garden.
15 Vegetable seed production ( open pollination and hybrid).
16 Marketing of horticulture crops.
17 Horticulture crops in Nepal, released and recommended varieties of fruits, vegetables, potato and spices.
18 Establishment and management of nursery.

-END-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## इलेक्टिसियन टि. ५ पदको खुला पतियोगितात्मक लिखित परीक्षाकोपाठयकम

पाठ्यक्रमको रुपरेखा :– यस पाठयक्रमको आधारमा निम्नानसार एक चरणमा परीक्षा लिइने छ :
लिखित परीक्षा पणाङ्क :– १००
अन्तवार्तापणाङ्क :– २०

पथमचरण – लिखित परीक्षा योजना(Examination Scheme)

| विषय | पणाङ्क | उत्तीणाङ्क | परीक्षा पणाली | पश्न सख्याXअङ्कभार | समय |
|---|---|---|---|---|---|
| सेवा सम्बन्धी | १०० | ४० | वस्तगत बहुउत्तर (Multiple Choice) | ५०X२ = १०० | ४५मिनेट |

द्वितीय चरण

| विषय | पणाङ्क | परीक्षा पणाली |
|---|---|---|
| व्यक्तिगत अन्तवार्ता | २० | मौखिक |

१. लिखित परीक्षाका माध्यम भाषा अंग्रेजी वा नेपाली अथवा अंग्रेजी र नेपाली दुवै हुनसक्नेछ ।
२. यथासम्भव पाठयक्रमकासबै एकाइहरुबाट प्रश्नहरु सोधिने छन्।
३. वस्तगतबहुउत्तर(MultipleChoice) पश्नहरुकाउत्तरसहीदिएमापत्येकसहीउत्तर बापत२( दुइ)अङ्कपदानगरिनेछभन गलतउत्तरदिएमाप्रत्येकगलतउत्तरबापत२० प्रतिशतअर्थात०.४अङ्ककट्टागरिनेछ।तरउत्तरनदिएमात्यसबापतअङ्कदिइनेछैन र अङ्क कट्टा पनि गरिने छैन ।
४. यसपाठयक्रममाजेसुकलखिएकाभएतापनिपाठयक्रममापरकाऐन,नियमहरुपरीक्षाका मितिभन्दा३( तीन)महिनाअगाडि(सशोधनभएकावासशोधनभइहटाइएकावाथपगरी सशोधन भइ) कायम रहकोलाइ यस पाठयक्रममा रहको सम्झनु पर्दछ ।
५. लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरुलाइ मात्र अन्तरवार्तामा सम्मिलित गराइनेछ ।

# इलेक्टिसियन टि. ५ पदको खुला पतियोगितात्मक लिखित परीक्षाकोपाठयकम

## विषय- सेवा सम्बन्धी

**1. Electrical Technology**

1.1 Electric current, Voltage, Resistance- definition, symbol, units and measurements, Types of electrical measuring equipments

1.2 The Electric Field- Basic phenomena,Laws of electric field, Capacitors

1.3 Themagneticfield-MagneticfieldQuantities,Fieldlinepatterns,Electro-magnetism,Inductance,Application of electro-magnetism

1.4 DirectCurrentCircuit,Electriccircuit,Series,parallelandmixedcircuits, Ohm'sLaw, Kirchoff's first and second law, Electrical work, energy and power- definition, symbols , units and measurements, Heat produced by electric current, current density and fuse, Efficiency

1.5 A.C.Circuits-Alternating currentgeneration,sinusoidalvoltage,characteristic quantitiessuchasinstantaneousvalue, maximumandr.m.s.(effective)value, frequency; period and cycle;vectorrepresentation and phase angle, Ohmic resistance, inductive reactance, capacitance and impedance concept, symbol, unit, voltageandcurrentcharacteristicinvectordiagram,phaseangle,their connections, ACpower–active,reactive and apparent power and their calculation, power factor, Three phase current-application of single phase and three phase currents, generation of three phase current, connection of sources and loadsin3phasesystem such asstaranddeltaconnection,powerofa3-phase system, the measurement of power, rotary field

1.6 Electrical Machines- Transformer, A.C. Motors, D.C. Motors, Generators-Working Principle, Construction and types

1.7 Selection of electric motors

1.8 Electrical supply and Distribution, Electrical Apparatus, Control and Protective Devices, Basic concepton electrical wiring, Earthing

1.9 Electrical Engineering Application- Electro-chemistry, Periodic system, chemical compounds and bounds, Conductance in fluids, electrolysis, Primary and secondary cells - construction, properties, mode of function and applicationconnectionofcells, Corrosion and its prevention

1.10 MaintenanceandSafety-Repairandmaintenanceofelectricalmotors,control andprotectivedevices,Safetyuseof electricalsystem –conceptand safety rules &regulation First Aid in accident, steps to be taken in electrical accidents.

**2 AutomobileTechnology**

2.1 Wiring circuit in construction equipment and vehicle

2.2 Construction, function and maintenance of Automobile battery

2.3 Auto IgnitionSystem- Componentsandtheirfunctions, Introductionto electronic ignition system

2.4 Auto charging system- Alternator, generator, regulator and cutouts
2.5 Automobile electric accessories and devices

**3 AutoElectronics**

3.1 FundamentalsinAppliedElectronics-Semiconductordiode,Transistor:BJT, JFET, MOSFET, Thyristor
3.2 Basic Electronics Circuit, Introduction to binary system and binary calculations, Gates, truth tables, electric analogy of gates, Concept of memory, flip-flop, ICcounters, decade counters, seven segment display
3.3 Digital Electronics, Half wave, full wave and bridge rectifiers, and filter, Amplifier and Op-amp, Regulated power supply, Difference amplifier, comparator, adder circuits
3.4 SensingDevices, Mechanicalsensors,Electricalsensors,ElectronicSensors, Magnetic sensors, Optical sensors, Thermal sensors,
3.5 MotorControlcircuits,Servo-mechanism,ThyristorcontrolledDCmotors, DC motorcontrolbySCR,ACmotorcontrolusingtriac,Steppermotor,Motor Control using PLC

**नेपाल कृषि अनुसन्धान परिषद्संग तथा अन्यसंग सम्वन्धित :**

१. नेपाल कृषि अनुसन्धान परिषद्, ऐन २०४८
२. नेपाल कृषि अनुसन्धान परिषद्, कर्मचारी प्रशासन विनियम, २०४९
३. आर्थिक प्रशासन बिनियम, २०४९
४. सार्वजनिक खरिद ऐन तथा सार्वजनिक खरिद नियमावली
५. नेपाल कृषि अनुसन्धान परिषद्को संगठनात्मक संरचना

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नेपाल कृषि अनूसन्धान परिषद्
# पदपुर्ति समिति

## मेकानिक्स टि. ५ पदकोखुलाप्रतियोगितात्मकपरीक्षाको पाठयक्रम

पाठयक्रमकारुपरेखा:–यसपाठयक्रमकाआधारमानिम्नानुसार चरणमापरीक्षालिइनेछ :

| | | |
|---|---|---|
| प्रथमचरण:– | लिखितपरीक्षा | पूर्णाङ्क:– |
| द्वितीयचरण:– | (क)प्रयोगात्मक | पूर्णाङ्क:– |
| | (ख)अन्तर्वार्ता | ५० |

## प्रथमचरण– लिखितपरीक्षायोजना(ExaminationScheme)

| पत्र/विषय | पूर्णाङ्क | उत्तीर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्याXअङ्कभार | समय |
|---|---|---|---|---|---|
| सेवासम्बन्धी | ५० | २० | वस्तुगतबहुवैकल्पिक (Multiple Choice) | ५०प्रश्नX१अङ्क =५० | ४५मिनेट |

**द्वितीय चरण**

| विषय | पूर्णाङ्क | उत्तीर्णाङ्क | परीक्षा प्रणाली | प्रश्न संख्या ह अङ्कभार | समय |
|---|---|---|---|---|---|
| (क) प्रयोगात्मक परीक्षा | ५० | २५ | प्रयोगात्मक | १० प्रश्न ह ५ अङ्क = ५० | १ घण्टा ३० मिनेट |
| (ख) अन्तर्वार्ता | २० | | | | |

**द्रष्टव्य:**

१. लिखितपरीक्षाकामाध्यमभाषा नेपाली वा अंग्रेजीअथवानेपाली र अंग्रेजीदुवैहुनसक्नेछ ।

२. लिखितपरीक्षामा यथासम्भव पाठयक्रमका सबएकाईबाटप्रश्नहरुसोधिनेछ ।

३. वस्तुगतबहुवैकल्पिक(MultipleChoice)प्रश्नहरुकोगलतउत्तरदिएमाप्रत्येकगलतउत्तरबापत २०प्रतिशतअङ्ककट्टा गरिनेछ । तर उत्तरनदिएमा त्यसबापतअङ्कदिइन छैनर अङ्ककट्टा पनिगरिनछैन ।

४. यसपाठयक्रमयोजनाअन्तर्गतकापत्र/विषयकाविषयवस्तुमाजेसुकैलेखिएकोभएतापनिपाठयक्रममा परेकाकानून,ऐन,नियमतथानीतिहरुपरीक्षाकामितिभन्दा३महिनाअगाडि( संशोधनभएकावासंशोधनभईहटाईएकावाथपगरीसंशोधनभई)कायमरहेकालाईयसपाठक्रममापरेको सम्झनु पर्दछ ।

५. लिखितपरीक्षाबाटछनौटभएकापरीक्षार्थीहरुलेमात्रप्रयोगात्मकपरीक्षारअन्तर्वार्तामाभागलिनपाउनेछैन।

६. प्रयोगात्मकपरीक्षारअन्तर्वार्तायथासम्भवएकैदिनलिइनेछ।प्रयोगात्मकपरीक्षामाउत्तीण हुन परीक्षार्थीहरुको मात्रतीनैभागका परीक्षाका प्राप्ताङ्कजोडीयोग्यताक्रमअनुसार परीक्षाफलप्रकाशित गरिनेछ ।

**पुनश्च:**

प्रयोगात्मकपरीक्षासंचालनगनसम्पूर्णसाधनश्रोतउपलब्धगराउनदायित्यमागगर्नेनिकायम ारहनेछ ।

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## मेकानिक्स टि. ५
## पदकोखुलाप्रतियोगितात्मकपरीक्षाको पाठयक्रम

### पत्र/ विषयः– सेवा सम्बन्धी

1. **WorkshopPractices**
   - 1.1.MeasuringInstruments-Scale, Trysquare, BevelProtractor,Vernier Caliper, Micrometer, GaugesandFillerGauges; Metric,FPSand SIUnit
   - 1.2.Hand tools andtheir applications
   - 1.3.Basic knowledgeofLathe, Milling, Shaper, Grindingand DrillingMachine

2. **Engineering Graphics andMachineDrawing**
   - 2.1.Findingout themissingviews from twogiven projection and dimensioning
     - 2.1.1.Missingviews of prismaticand cylindrical work pieces
     - 2.1.2.Missingviews of pyramidal, conical, cylindrical cut work pieces
   - 2.2. Isometrydrawingof machine parts includingsections
   - 2.3. Drawingof joints, drawingexercisesand orthographic projection

3. **Welding and Sheet MetalWorks**
   - 3.1.Different types of welding and their applications
   - 3.2.Weldingequipment, tools, accessories andtypes of electrodes
   - 3.3.SolderingandBrazing
   - 3.4.Weldingdefects, causesand remedies
   - 3.5.GeneralFitting-Male&FemaleJointsbyMarking,Sawing,Chiseling,Cutting, Joining
   - 3.6. Cutting, Folding,Bending ofSheet Metal

4. **Construction Equipment Types andTheir Major Components**
   - 4.1.Dozer,Loader,Excavator, Grader, Crane and Roller
   - 4.2.DraglineMachine
   - 4.3.PileDrive Machine

5. **Engines**
   - 5.1.Classification of engine
   - 5.2.Workingprincipleof twostrokecycleand fourstrokecycleengine
   - 5.3.Functions of enginecomponents
   - 5.4.Identification ofneed ofengineoverhaul
   - 5.5.Purpose and function ofsuper chargerand turbo charger
   - 5.6.Troubleshooting

6. **Thermodynamics**
   - 6.1.Terms used in thermodynamics
   - 6.2.First and Second law ofthermodynamics
   - 6.3.Otto cycle and dieselcycle

**7. Cooling System**

7.1.Introduction to coolingsystem
7.2.Purposeof coolingsystem
7.3.Workingprincipleofcoolingsystem
7.4.Components of coolingsystem
7.5.Coolants, its typesand properties
7.6.Troubleshooting

**8. BrakeSystem**

8.1.Purposeofbrakes in equipment
8.2.Classification ofbrakesandtheirfunctions
8.3.Components of brakesystem
8.4.Troubleshooting

**9. Suspension System**

9.1.Introduction to suspension system
9.2.Classification ofsuspension system
9.3.Workingprinciple andcomponents of suspension system
9.4.Troubleshooting

**10. SteeringSystem**

10.1.Introduction tosteeringsystem
10.2.Types of steeringsystem
10.3.Operation ofpower steering
10.4. Troubleshooting

**11. Transmission System**

11.1.Function of clutch
11.2.Introduction and purposeof Propeller shaft and Universal joint
11.3.Function ofGearBox
11.4.Knowledge aboutoperation ofTorqueConverter
11.5.Workingprinciple andcomponents of automatictransmission
11.6.Component of final driveand its functions

**12. HydraulicSystem**

12.1.Introduction to HydraulicSystem
12.2.Components of HydraulicSystem and their function
12.3.Knowledge about HydraulicHose and Pipe

**13. Starting System**

13.1.Introduction and functionof startingsystem
13.2.Function ofdifferent parts of startingsystem
13.3.Troubleshooting

**14. Track, Wheels andTyre**

14.1.Introduction to track, wheel and tyres
14.2.Types of wheel, tyres and ratingof tyres
14.3.Advantages and disadvantages of radialplyand cross plytyres
14.4.Comparisonbetween wheel mounted and track mounted machine

14.5.Troubleshootingof track,wheel and tyres

**15. Fuel, Lubricants andFilters**

15.1.Different types of fuels and lubricants used in equipment
15.2.Application and changinginterval of lubricants
15.3.Knowledgeofchanging ofAir, Fuel, Engine Oil, Hydraulicand Transmission filter

**16. Electrical System**

16.1.Maintenanceof thebattery
16.2.Lights used in equipmentand vehicles
16.3.Fuses and wiringinequipmentand vehicles
16.4.Electrical systemandcomponent used in equipments and vehicles
16.5.Basic KnowledgeofMotors and Generators(electro-mechanicalprinciple)

**17. Air Conditioning**

17.1.Introduction and layoutof air conditioningsystem
17.2.Introduction and functionof different componentsof air conditioning
17.3.Types of refrigerant
17.4.Troubleshooting

**18. EmissionControl System**

18.1.Purpose and importanceto emission control system
18.2.Vehicle emission normsand standards
18.3.Function and workingprincipleof emission control system and devices

**19. MaintenanceSystem**

19.1.Types of maintenancesystem
19.2.Importanceof maintenance
19.3.Advantageand disadvantageof different maintenancesystem

**20. RecordKeeping**

20.1.Importanceof record keeping
20.2.Knowledgeof maintenanceJob Card
20.3.Basic knowledgeof operation logsheet
20.4.Useof partscatalogue/workshop manual
20.5.Depreciation and its types
20.6.Methods of estimation
20.7.Costingand pricing

**21. Safety Practices**

21.1.Safety:Types and importance
21.2.Safetytoolsand devices

**नेपाल कृषि अनुसन्धान परिषद्संग तथा अन्यसंग सम्वन्धित :**

१. नेपाल कृषि अनुसन्धान परिषद्, ऐन २०४८
२. नेपाल कृषि अनुसन्धान परिषद्, कर्मचारी प्रशासन विनियम,४९
३. सार्वजनिक खरिद ऐन तथा सार्वजनिक खरिद नियमावलीमा भएका कोटेशन, दरभाउपत्र तथा वोलपत्र मार्फत खरिद सम्वन्धी व्यवस्था

४. नेपाल कृषि अनुसन्धान परिषद्को संगठनात्मक संरचना

# मेकानिक्स टि. ५
# पदकोखुलाप्रतियोगितात्मकपरीक्षाको पाठयक्रम

## प्रयोगात्मकपरीक्षा**(Practical Exam)** कालागिपाठयक्रम

1. Identification ofhand tools and specialtools.
2. Identification ofmain components and parts ofmachine.
3. Identification ofmajorspecifications of machine
4. Identification, handlingand storingof different lubricants and fuels
5. Identification and uses ofsafetytools anddevices
6. Uses of lifting andhoistingdevices
7. Changingof hydraulicpipe, hose andgreasenipples
8. Changeof oil/fuel/air/hydraulic/transmission filter and lubricants.
9. Servicingof coolingsystem.
10. Servicingof fuel system.
11. Servicingof clutch system.
12. Servicingof brakesystem.
13. Steering/Hydraulicsystem servicing.
14. Servicingof minor electrical systemcomponents.
15. Adjustment of fuel injection pump
16. Adjustment oftappet clearance
17. Adjustment of fuel injection pump timing
18. Useof workshop manuals andpartscatalog
19. Useof drill machine
20. Maintenanceof undercarriageofconstruction equipment
21. Testingof nozzle injector

-The End-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## प्राविधिक सेवा, सिनियर प्लम्बर टि. ५ पदको खुल्ला तथा समावेशि र आन्तरीक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

### १. प्रथम चरणः लिखित परिक्षाको योजना (Examination Scheme)

| पत्र | बिषय | प्रश्न संख्या x अंकभार | परिक्षा प्रणाली | समय | पूर्णाङ्क | उत्तिर्णाङ्क |
|---|---|---|---|---|---|---|
| प्रथमपत्र<br>भाग १ | सेवासम्बन्धी: खानेपानी, तथा पाईपलाईन | ८x५=४०<br>१x१०=१० | छोटोछोटोउत्तर<br>लामो उत्तर | १घण्टा<br>३०मिनेट | १०० | ४० |
| भाग २ | खानेपानीतथासरसफाई<br>नेपाल कृषिअनूसन्धानपरिषद् सम्वन्धी | २५x१=२५<br>५x५=२५ | बस्तुगतवहुउत्तर<br>छोटोछोटोउत्तर | १घण्टा<br>३०मिनेट | | |

### २. द्वितीय चरण : अन्तर्वार्ताको योजना

| विषय | पूर्णाङ्क | परीक्षा प्रणाली |
|---|---|---|
| व्यक्तिगत अन्तर्वार्ता | ३० | मौखिक |

**द्रष्टव्यः**

**उम्मेदवारहरुले ध्यान दिनुपर्ने कुराहरु**

१. लिखित परीक्षाको माध्यम नेपाली/अग्रेजी दुबै हुन सक्नेछ ।
२. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरु मात्र द्वितिय चरणको अन्तर्वार्तामा सम्मिलित हुन पाउनेछन् ।
३. पाठ्यक्रममा भएका यथा सम्भव सबै पाठ्यांशहरुबाट प्रश्न सोधिनेछ ।
४. यस पाठ्यक्रममा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका ऐन, नियमहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।
५. यस भन्दा अगाडि लागु भएको माथि उल्लेखित समूहको पाठ्यक्रम खारेज गरिएको छ ।

## प्रथम पत्र
## भाग १सेवा सम्बन्धीः खानेपानी तथा पाईपलाईन

**१. खानेपानी**

१.१. ग्रेभिटी फ्लो सिस्टम
- १.१.१. योजना अवधि, जनसंख्या तथा पानीको माग
  - १.१.१.१योजना अवधि
  - १.१.१.२ दैनिक पानीको माग
- १.१.२. खानेपानी आयोजना
  - १.१.२.१.प्रारम्भिक सर्वेक्षण
  - १.१.२.२.पानीको मुहानको छनौट
- १.१.३. इन्टेक
  - १.१.३.१ इन्टेकका किसिम
  - १.१.३.२ इन्टेकको सुरक्षा वा मर्मत सम्भार
- १.१.४. ब्रेक प्रेसर ट्याङ्की (बि.पि.टी.)
  - १.१.४.१ परिचय तथा आवश्यकता
  - १.१.४.२ ब्रेक प्रेसर ट्याङ्की बनाउने ठाउँ
  - १.१.४.३ ब्रेक प्रेसर ट्याङ्की किसिम
  - १.१.४.२ ब्रेक प्रेसर ट्याङ्कीको निर्माण कार्य
- १.१.५. रिजर्भ्वाएर ट्याङ्की
  - १.१.५.१ परिचय तथा आवश्यकता
  - १.१.५.२ रिजर्भ्वाएर ट्याङ्की निर्माण कार्य
  - १.१.५.३ रिजर्भ्वाएर ट्याङ्की बनाउने ठाउं

१.२. भूमिगत पानी
- १.२.१ बनावट
- १.२.२ प्रयोग गर्ने तरिका, प्रयोगबाट फाईदा र वेफाईदा (सतही पानीको तुलनामा)
- १.२.३ भूमिगत पानीका गुण, अवगुणहरु र अवगुण हटाउने साधारण तरिकाहरु
- १.२.४ ट्यूववेल : परिचय र ट्यूववेल जडान विधि, स्यालो र डिप ट्यूववेल, ट्यूववेलमा प्रयोग हुने सामाग्री, मर्मत संभार र ट्यूववेल केयरटेकर तथा उपभोक्ता समिति
- १.२.५ इनारः परिचय, प्रकार, निर्माण विधि र मर्मत संभार

१.३. पाइपलाइन
- १.३.१ परिचय
- १.३.२ पाइप लाइनका किसिम
- १.३.३ पाइप लाइन बिछ्याउन, खन्ने र पुर्ने काम
- १.३.४ पाइप गाड्नु पर्ने आवश्यकता
- १.३.५ पाइप लाइनमा हुने रोकावटहरु
- १.३.६ पाइप लाइनमा रोकावट पत्ता लगाउने तथा हटाउने उपायहरु

१.३.७ साधारण पाईप लाईन डिजाईनको ज्ञान
१.३.७.१ घरेलु पाईप लाईन ($^{१}/_{२}$" र १")
१.३.७.२ सामुदायिक पाईप लाईन (१" $१^{१}/_{२}$" र २")

१.४. पाइप फिटिङ्ग जडान
१.४.१ पाइप, परिचय, पाइपका किसिम, पाइपका गुण तथा अवगुण
१.४.२ सि.आई/जि.आई/एच.डि.पि. फिटिङ्ग, परिचय, प्रकार काम र महत्व
१.४.३ पाइप फिटिङ्ग तथा जडान
१.४.३.१ औजारको नाम र प्रयोग गर्ने तरिका
१.४.३.२ जडान हुने पाइप र फिटिङ्ग को नामावली
१.४.३.३ स्केच वनाउने

१.४.४ पाइप तथा फिटिङ्ग जडान
१.४.४.१ काट्ने तरिका
१.४.४.२ थ्रेडिगस् गर्ने तरिका र जोड्ने तरिका
१.४.४.३ जोड्ने उपयुक्त फिटिङ्गहरु
१.४.५ परिक्षण कार्य
१.४.५.१ जडान भएको पाईप तथा फिटिङ्गको लिक परिक्षण
१.४.५.२ लिक भएको कारण पत्तालगाउने कार्य
१.४.५.३. लिक मर्मत गर्ने तरिका

१.५. निर्माण समाग्री
१.५.१ परिचय
१.५.२ सिमेण्ट, हाइड्रेशन, जम्ने प्रकृया, कडा हुने प्रकृया, सिमेण्ट राख्ने तरीका
१.५.३ बालुवा
१.५.४ गिट्टी
१.५.५ पानी
१.५.६ सिमेण्ट मसाला
१.५.७ प्लाष्टर गर्ने काम ।
१.५.८ सिमेण्ट पनिङ्ग लगाउने काम
१.५.९ पाइप जडानमा प्रयोग हुने सामाग्री,शिशा, शन,टाइटेन ज्वाइन्ट रवर वासर,नटवोल्ट, क्याप र प्लग ।

**२. ढल**

२.१ ढल निकास
२.१.१ परिचय, ढलको किसिम (आकासे पानी र मलमूत्रको लागि)
२.२ ढल निकासको पाइप तथा फिटिङ्गस्
२.२.१ पाइपको प्रकार, फिटिङ्गसको प्रकार र जोड्ने प्रविधि
२.३ ढल विछ्याउने काम
२.३.१ लेभलिङ्गको महत्व
२.३.२ ढल विछ्याउदा गहिराइको महत्व

२.३.३ Alignment को महत्व
२.३.४ Slope को महत्व

२.४ घरेलु ढल निकास
२.४.१ परिचय, Septic Tank, Soak pit
२.४.२ चर्पी: परिचय, आवश्यकता, किसिम,निर्माण विधि,फाइदा, मर्मत संभार र प्रयोग विधि ।

२.५ ढल प्रशोधन
२.५.१ परिचय
२.५.२ साधारण ढल प्रशोधन प्रविधिहरु
२.५.३ घरेलु ढल प्रशोधन गर्ने तरिका

**३. सरसफाइ**

३.१. पानी सुरक्षित राख्ने तरिका मुहान देखि मुखसम्म पानी कसरी सुरक्षित राख्न सकिन्छ
३.२. सरसफाइः परिचय, किसिम र आवश्यकता, किसिम र आवश्यकता,
३.३. सरसफाइको महत्व
३.४. मर्मत संभार कार्यकर्ताको काम कर्तव्य
३.५. आयोजना स्तरमा हुने तालिम सञ्चालन मूल्याङ्कन
३.६. उपभोक्ता समूह परिचालन
३.७. सिनियर प्लम्बरको काम कर्तव्य र अधिकार

**<u>खानेपानी तथा सरसफाई सम्बन्धी:</u>**

१. नेपालमा खानेपानी तथा सरसफाईको अवस्था
२. शहरी सुविधा व्यबस्थापन
३. खानेपानी गुणस्तर नियन्त्रण सम्बन्धी विद्यमान ऐन तथा नियमहरु
४. खानेपानी चुहावट तथा नियन्त्रणका उपायहरु

**<u>नेपाल कृषि अनुसन्धान परिषद्संग तथा अन्यसंग सम्वन्धित:</u>**

१. नेपाल कृषि अनुसन्धान परिषद्, ऐन २०४८
२. नेपाल कृषि अनुसन्धान परिषद्, **कर्मचारी प्रशासन विनियम, २०४९**
३. सार्वजनिक खरिद ऐन तथा सार्वजनिक खरिद नियमावलीमा भएका कोटेशन, दरभाउपत्र तथा वोलपत्र मार्फत खरिद सम्वन्धी व्यवस्था
४. नेपाल कृषि अनुसन्धान परिषद्को संगठनात्मक संरचना

-The End-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## कम्प्युटर सहायक टि. ५ पद/तहको खुला प्रतियोगितात्मकपरीक्षाकोपाठ्यक्रम

## परीक्षाकोयोजना(Examination Scheme)

| भाग | परीक्षा | समय | पश्नसख्या | पुणाङ्क | उत्तीणाङ्क |
|---|---|---|---|---|---|
| १ | लिखित | ४५मिनट | ५० | ५० | २० |
| २ | प्रयोगात्मक | ४५मिनट | ७ | ५० | २५ |
| ३ | अन्तर्वाता | | | २० | |

दष्टव्य:

(१) पाठयक्रममा भएका यथासम्भव सवैपाठयांशहरुवाट पश्न सोधिनछन ।

(२) गल्ती गरेका पश्नोत्तरका लागि २० %अक कटा गरिनेछ ।

(३) लिखित परीक्षारपयोगात्मकवाटछनौटभएकाहरुलाइ मात्र अन्तरवार्तामा समावेश गराइनेछ ।

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# कम्प्युटर सहायक टि. ५ पद/तहको
# खुला प्रतियोगितात्मकपरीक्षाकोपाठ्यक्रम

**1. ComputerFundamentals**

1.1 Computer :- Definition, History, Generation, Characteristics, Types & Applications

1.2 Overview of a computer system:-

1.2.1 Data and data processing

1.2.2 Hardware

1.2.2.1 Definition of Hardware

1.2.2.2 Input Unit- Keyboard, Mouse, Scanner, etc.

1.2.2.3 CPU-Arithmetic Logic Unit (ALU), Control Unit (CU), Memory Unit (MU)

1.2.2.4 Output Unit: - Monitor Printer, etc.

1.2.2.5 Storage devices :- Primary & Auxiliary Memory (Floppy Disk, Hard Disk, Compact Disk, Super Disks, Zip Disks, Cartridge tape, etc)

1.2.2.6 Others:- Network card, Modem, Sound card, etc.

1.2.3 Software

1.2.3.1 Definition & Types of Software

1.2.3.2 Programming Language

1.2.4 Liveware

1.2.5 Firmware and Cache Memory

1.3 Setting&Protection of Computer Roomand Computer

1.4 Concept of Computer Viruses and Remedies

1.5 Concept ofMultimedia

1.6 IT Policy ofNepal, 2000

1.7 Computer Networking

1.7.1 Introduction to Networking

1.7.2 Types of Network like LAN, MAN, WAN

1.7.3 Concept about E-mail / Internet / Extranet / Intranet

1.7.4 Introduction to Network Media, Topology and Protocol

1.7.5 Setting Up Microsoft Network

1.7.6 Dial-Up Networking

**2 OperatingSystem**

2.1 Introduction to Operating System

2.2 Types of Operating System.

2.3 Functions of Operating Systems

2.4 Disk Operating System(DOS)

2.4.1 Introduction to DOS

2.4.2 Different Versions of DOS

2.4.3 PhysicalStructure of the disk

2.4.4 Types of DOS commands

2.4.5 Use of common DOS commands

2.4.6 Concept to File and Directory

2.4.7 Wildcards and Pathname

2.4.8 Systemfiles of MS-DOS and their functions

2.4.9 Creating and Using AUTOEXEC.BAT and CONFIG.SYS file

2.5Windows
- 2.5.1 Introduction to GUI
- 2.5.2 Introduction of Windows Operating System
  - 2.5.2.1 Basic Windows Elements-Desktop, Taskbar, My Computer, Recycle Bin, etc
  - 2.5.2.2 Starting and shutting down Windows
  - 2.5.2.3 File Management with Windows Explorer
  - 2.5.2.4 Windows applications: Notepad, WordPad, MS Paint, MS-DOS Prompt, Calculator, Character Map, Control Panel, etc
  - 2.5.2.5 Finding files of folders and saving the result
  - 2.5.2.6 Starting a program by using the Run command
  - 2.5.2.7 Changing window settings
    - 2.5.2.7.1 Adding/Removing Programs to/fromstart menu
    - 2.5.2.7.2 Clearing the contents of document menu
    - 2.5.2.7.3 Customizing the taskbar
    - 2.5.2.7.4 Control panel
      - 2.5.2.7.4.1 Date & Time
      - 2.5.2.7.4.2 Keyboard
      - 2.5.2.7.4.3 Mouse
      - 2.5.2.7.4.4 Multimedia
      - 2.5.2.7.4.5 Fonts
      - 2.5.2.7.4.6 Display
      - 2.5.2.7.4.7 Printer
      - 2.5.2.7.4.8 Modem
      - 2.5.2.7.4.9 Regional Settings
    - 2.5.2.7.5 Creating shortcut (icons) on desktop
    - 2.5.2.7.6 Systemtools: - Scandisk,Disk Defragmenter, Drive Space, Backup, Format

**3.WordProcessing**
- 3.1 Concept of Word Processing
- 3.2 Types of Word Processing
- 3.3 Introduction to MS Word
  - 3.3.1 Creating, Saving and Opening the documents
  - 3.3.2 ElementsofMS-WordEnvironment (Menu, Toolbars, Status bar, Rulers, Scrollbars, etc.)
  - 3.3.3 Copying, Moving, Deleting and Formatting Text (Font, Size, Color, Alignment, Line & paragraph spacing)
  - 3.3.4 Finding and Replacing Text
  - 3.3.5 Familiar with Devnagari Fonts
  - 3.3.6 Creating lists with Bullets and Numbering
  - 3.3.7 Creating and Manipulating Tables
  - 3.3.8 Boarders and Shading
  - 3.3.9 Use ofIndentation and Tab Setting
  - 3.3.10 Creating Newspaper Style Documents using Column
  - 3.3.11 Inserting Header, Footer, Footnotes, Endnotes and Page Numbers, File, Page break, Section break, Graphics, Pictures, Charts, Word Art, Symbols& Organization Chart

3.3.12 Opening & Saving different types of documents
3.3.13 Changing Default setting ofthe MS-Word
3.3.14 Mail Merge
3.3.15 AutoCorrect, Spelling and Grammar Checking, and Thesaurus
3.3.16 Customizing Menu and Toolbars
3.3.17 Security Techniques of Documents
3.3.18 Concept of OLE (Object Linking & Embedding)
3.3.19 Master Document, Cross Reference, Index, Table of Content
3.3.20 Setting Page Layout, Previewing and Printing

4 **Electronic Spreadsheet**
4.1 Concept of Electronic Spreadsheet
4.2 Types of Electronic Spreadsheet
4.3 Organization of Excel Spreadsheet (Cells, Rows, Columns, Worksheet, Workbook andWorkspace)
4.4 Introduction to MS-Excel
4.4.1 Creating, Opening and Saving Work Book
4.4.2 Elements of MS-Excel Environment (Menu, Toolbars, Status bar, Rulers, Scrollbars, etc)
4.4.3 Editing, Copying, Moving, Deleting Cell Contents
4.4.4 Familiar with Devnagari Fonts
4.4.5 Formatting Cells (Font, Border, Pattern, Alignment, Numberand Protection)
4.4.6 Formatting Row, Column and Sheets
4.4.7 Using Formula-RelativeCell and Absolute Cell Reference
4.4.8 Using basic Functions
4.4.9 GeneratingSeries
4.4.10 Changing default option of the MS-Excel
4.4.11 Sorting and Filtering Data
4.4.12 Summarizing Data with Sub Totals
4.4.13 Creating Chart
4.4.14 Inserting Header and Footer
4.4.15 Spell Checking
4.4.16 Customizing Menu & Toolbars
4.4.17 Importing fromand Exporting into other Formats
4.4.18 Pivot Table, Goal Seek, Scenario & Audit
4.4.19 Page Setting, Previewing and Printing

**5 DatabaseSystem**
5.1 Introduction to Data, Database and DBMS
5.2 Basic Concept of Tables, Fields, Records, Relationships and Indexing
5.3 Introduction to Ms-Access
5.3.1 Data Types
5.3.2 Creating, Modifying&Deleting Tables and Formatting & Validating Field Data
5.3.3 Creating, Modifying, Deleting & Using Simple Queries
5.3.4 Creating,Modifying&Deleting Forms/Reports/Macros

**6PresentationSystem**

6.1 Introduction to Power Point

6.1.1 Creating, Opening & Saving Slides

6.1.2 Formatting Slides

6.1.3 Slide show

6.1.4 Inserting Clip Art, Picture, Table, Chart, Graphs, Organization Chart, etc.

**7 WebPageDesigning**

7.1 Introduction to Web Page, WWW, Front page

7.2 Introduction to HTML

7.2.1 HTML document

7.2.2 Tags

7.2.3 Skeleton&Flesh

7.2.3.1 Text

7.2.3.2 Hyperlinks

7.2.3.3 Images

7.2.3.4 Lists & forms

7.2.3.5 Tables

7.2.3.6 Frames

-END-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## भाग१ – लिखितपरीक्षा

१)समय:–४५मिनेट
२)पश्नसख्या:–५०वटा
३)पश्नहरुकोकिसिम:–वस्तगतबहुउत्तर(MultipleChoice)
४)प्रतिपश्न(MarkingRate)–१अङ्क
५)पुर्णाङ्क:–५०
६)उत्तीणाङ्क:–२०
७)प्रश्नभार(Weightage):–प्रतिपश्न१अककादरले५०x१=५०अक
८)पाठयक्रममारहकापाठयाशहरुवाटदेहायअनसारपश्नहरुसोधिनेछ:–

| Course Unit | Topics | Number of Questions |
|---|---|---|
| 1 | Computer Fundamental | 12 |
| 2 | Operating System | 6 |
| 3 | Word Processing | 8 |
| 4 | Electronic Spreadsheet | 8 |
| 5 | Database System | 8 |
| 6 | PresentationSystem | 5 |
| 7 | Web Page Designing | 3 |
| | Total | 50 |

**दष्टव्य**:
गल्तीगरेकापश्नोत्तरकालागि२०पतिशतअककटागरिनेछ।

## भाग२–पयोगात्मकपरीक्षा

१)समय:–४५मिनेट
२)पश्नसख्या:–७वटा(सवैअनिवार्य)
३)पणाङ्क:–५०
४)उत्तीणाङ्क:–२५
५)पश्नकानिर्माण,पश्नभार(Weightage) रसमयकोवितरण:–

| S.No. | Topics | Marks | Time(Minutes) |
|---|---|---|---|
| 1 | English Typing | 5 | 5 |
| 2 | Devnagari Typing | 5 | 5 |
| 3 | MS-Word | 10 | 35 |
| 4 | MS-Excel | 10 | |
| 5 | MS-Access | 10 | |
| 6 | MS-Power Point | 5 | |
| 7 | Web Page Designing | 5 | |
| | Total | 50 | 45 |

६(क)English Typing Skill Testकालागि२५५शव्दहरुभएकाएउटाTextटाइपकालागि दिइनेछरमल्याकनदेहायअनसारगरिनेछः–

- ८भन्दाकमशुद्धशव्दप्रति मिनेट (CorrectWords/Minute)वापत– ० अक
- ८वासोभन्दाबढीर१६भन्दाकमशुद्धशव्दप्रति मिनेट (Correct Words/Minute)वापत– १अक
- १६वासोभन्दाबढीर२४भन्दाकमशुद्धशव्दप्रति मिनेट (CorrectWords/Minute)वापत–२अक
- २४वासोभन्दाबढीर३२भन्दाकमशुद्धशव्दप्रति मिनेट (CorrectWords/Minute)वापत–३अङ्क
- ३२वासोभन्दाबढीर४०भन्दाकमशुद्धशव्दप्रति मिनेट (CorrectWords/Minute)वापत–४अक
- ४०वासोभन्दाबढीशुद्धशव्दप्रति मिनेट (CorrectWords/Minute)वापत–५अक

६(ख)देवनागरीTyping Skill Testकालागि२००शव्दहरुभएकाएउटाTextटाइपकालागि दिइनेछरमल्याकनदेहायअनसारगरिनेछः–

- ७भन्दाकमशुद्धशव्दप्रति मिनेट (CorrectWords/Minute)वापत–०अक
- ७वासाभन्दाबढीर१४भन्दाकमशुद्धशव्दप्रति मिनेट (Correct Words/Minute) वापत– १अक
- १४वासोभन्दाबढीर२१भन्दाकमशुद्धशव्दप्रति मिनेट(Correct Words/Minute)वापत– २अक
- २१वासोभन्दाबढीर२८भन्दाकमशुद्धशव्दप्रति मिनेट (Correct Words/Minute)वापत–३अक
- २८वासोभन्दाबढीर३५भन्दाकमशुद्धशव्दप्रति मिनेट (Correct Words/Minute)वापत–४अक
- ३५वासोभन्दाबढीशुद्धशव्दप्रतिमिनेट(CorrectWords/Minute)वापत–५अक

**Formula for calculation of correct word/minute:**

Correct words/minute = (Total words typed -wrong words)/5

**Note**:अंग्रेजीवादेवनागरीTyping Skilll Testकालागिपरीक्षामादिइएकाTextलाई आधारमानीटाइपगरेकोTextसंगभिडाईचेकगरिनेछ। तत्पश्चातमाथिउल्लेखित Criteria वमाजिमअकदिइनेछ।

दिइएकाअंगजीवादेवनागरीTextमाउल्लेखितस्थानबमोजिमपरीक्षार्थीहरुलेआफनोText माPunctuation टाईपनगरेकोपाईएमात्यसकोशव्दमागणनागरिनेछैन।

-The End-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## ओभरसियर (सिभिल), टि.५ पद तहको खुला प्रतियागितात्मकपरीक्षाकोपाठयक्रम

## यस पाठयक्रमलाइ दुई भागमा विभाजन गरिएको छ ।

| भाग | परीक्षा | विषय | पूर्णाङ्क | प्रश्न सख्या | समय | परीक्षा पणाली | उत्तीर्णाङ्क |
|---|---|---|---|---|---|---|---|
| १ | लिखित | सेवा सम्बन्धी | १०० | ५० | ४५ मिनेट | वस्तगत बहउत्तर (Multiple Choice) | ४० |
| २ | अन्तरवार्त | | २० | | | | |

१. यथासम्भव पाठयक्रमकासव एकाईवाट पश्नहरु सोधिनेछन ।
२. लिखित परीक्षामा गल्ती गरेका पश्नोत्तरका लागि २० पतिशत अङ्क कट्टा गरिने छ ।
३. यसपाठयक्रममाजेसुकैलखिएको भएतापनिपाठयक्रममापरेकाऐन,नियमहरु परीक्षाका मितिभन्दा३महिनाअगाडि(सशाधनभएकावासशोधनभइहटाइएकोवाथपगरी संशोधन भइ) कायम रहकोलाइ यस पाठयक्रममा परको सम्झनु पर्दछ ।

नेपाल कृषि अनूसन्धान परिषद्

# पदपुर्ति समिति

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# ओभरसियर (सिभिल), टि.५ पद तहको खुला प्रतियोगितात्मकपरीक्षाकोपाठयक्रम

समय :– ४५ मिनट  पश्न सख्या :– ५०  पणाङ्क :– १००

**1. Surveying**

1.1 General
- 1.1.1 Classifications
- 1.1.2 Principleofsurveying
- 1.1.3 Selectionofsuitable method
- 1.1.4 Scales,plansandmaps
- 1.1.5 Entryintosurveyfieldbooksandlevel books

1.2 Levelling
- 1.2.1 Methodsoflevelling
- 1.2.2 Levelling instrumentsandaccessories
- 1.2.3 Principlesoflevelling

1.3 PlaneTabling
- 1.3.1 Equipmentsrequired
- 1.3.2 Methodsofpalnetabling
- 1.3.3 Twoandthree pointproblems

1.4 TheodoliteandTraversesurveying
- 1.4.1 Basic differencebetweendifferenttheodolites
- 1.4.2 Temporaryadjustmentsoftheodolites
- 1.4.3 Fundamentallines anddesiredrelations
- 1.4.4 Tacheometry: stadia method
- 1.4.5 Trigonometricallevelling
- 1.4.6 Checksinclosedtraverse

1.5 Contouring
- 1.5.1 Characteristics ofcontourlines
- 1.5.2 Methodoflocating contours
- 1.5.3 Contourplotting

1.6 SettingOut
- 1.6.1 Small buildings
- 1.6.2 Simplecurves

**2. ConstructionMaterials**

2.1 Stone
- 2.1.1 Formationandavailability ofstonesinNepal
- 2.1.2 Methodsoflayingandconstructionwithvariousstones

2.2 Cement
- 2.2.1 Differentcements: Ingredients,propertiesandmanufacture
- 2.2.2 Storageandtransport
- 2.2.3 Admixtures

2.3 Clay andClay Products
- 2.3.1 Brick: type,manufacture,laying,bonds

2.4 PaintsandVarnishes
- 2.4.1 Typeandselection
- 2.4.2 Preparationtechniques
- 2.4.3 Use

2.5 Bitumen
2.5.1 Type
2.5.2 Selection
2.5.3 Use

**3. MechanicsofMaterialsandStructures**

3.1 MechanicsofMaterials
3.1.1 Internaleffects ofloading
3.1.2 Ultimate strengthandworkingstressofmaterials
3.2 MechanicsofBeams
3.2.1 Relation betweenshearforceandbendingmoment
3.2.2 Thrust,shearandbendingmomentdiagramsforstatically determinate beamsundervarioustypesofloading
3.3 SimpleStrutTheory

**4. Hydraulics**

4.1 General
4.1.1 Propertiesoffluid:mass,weight,specificweight,density, specific volume,specific gravity,viscosity
4.1.2 PressureandPascal's law
4.2 Hydro-KinematicsandHydro-Dynamics
4.2.1 Energyofflowingliquid:elevationenergy,Kineticenergy,potential energy,internalenergy
4.3 MeasurementofDischarge
4.3.1 Weirsandnotches
4.3.2 Dischargeformulas
4.4 Flows
4.4.1Characteristicsofpipeflowandopenchannelflow

**5. SoilMechanics**

5.1 General
5.1.1Soiltypesandclassification
5.1.2Threephasesystemofsoil
5.1.3Unit Weightof soil mass: bulk density, saturateddensity,submergeddensityanddrydensity
5.1.4Interrelationshipbetweenspecific gravity,void ratio,porosity,degreeofsaturation,percentageofair voidsair contentanddensityindex
5.2 SoilWater Relation
5.2.1Terzaghi'sprincipleofeffectivestress
5.2.2Darcy'slaw
5.2.3Factorsaffectingpermeability
5.3 Compactionofsoil
5.3.1Factorsaffectingsoilcompaction
5.3.2Optimummoisturecontent
5.3.3Relation betweendrydensityandmoisturecontent
5.4 ShearStrengthofSoils
5.4.1Mohr-Coulombfailure theory

5.4.2Cohesionandangleofinternalfriction
5.5 EarthPressures
5.5.1Active andpassiveearth pressures
5.5.2Lateral earth pressuretheory
5.5.3Rankine'searth pressuretheory
5.6 FoundationEngineering
5.6.1Terzaghi'sgeneralbearingcapacity formulasandtheir application

**6. StructuralDesign**
6.1 R.C.SectionsinBending
6.1.1Underreinforced,overreinforcedandbalancedsections
6.1.2Analysisofsingleanddoublereinforcedrectangularsections
6.2 ShearandBondforR.C.Sections
6.2.1Shearresistance ofa R.C.section
6.2.2TypesofShearreinforcementandtheir design
6.2.3Determinationofanchoragelength
6.3 AxiallyLoadedR.C.Columns
6.3.1Shortandlongcolumns
6.3.2Designofa rectangularcolumnsection
6.4 DesignandDraftingofR.C.Structures
6.4.1Singlyanddoublyreinforcedrectangularbeams
6.4.2Simpleone-wayandtwo-wayslabs
6.4.3Axiallyloadedshortandlongcolumns

**7. Building Construction Technology**
7.1 Foundations
7.1.1Subsoilexploration
7.1.2Typeandsuitability ofdifferentfoundations:Shallow,deep
7.1.3Shoringanddewatering
7.1.4Designofsimplebrickorstonemasonryfoundations
7.2 Walls
7.2.1Typeofwallsandtheir functions
7.2.2Choosingwall thickness,Heighttolengthrelation
7.2.3Useofscaffolding
7.3 DampProofing
7.3.1SourceofDampness
7.3.2Remedial measurestopr-wentdampness
7.4 ConcreteTechnology
7.4.1Constituentsofcement concrete
7.4.2Gradingofaggregates
7.4.3Concretemixes
7.4.4Watercement ratio
7.4.5Factorsaffectingstrengthofconcrete
7.4.6Formwork
7.4.7Curing
7.5 Woodwork
7.5.1Frameandshuttersofdoorandwindow
7.5.2Timberconstructionofupperfloors
7.5.3Designandconstructionofstairs

7.6 FlooringandFinishing
7.6.1Floorfinishes: brick,concrete,flagstone
7.6.2Plastering

**8. Water Supply and Sanitation Engineering**

8.1 General
8.1.1 Objectivesofwatersupplysystem
8.1.2 Sourceofwaterandits selection:gravityandartisan springs,shallowanddeepwells;infiltration galleries.
8.2 GravityWater SupplySystem
8.2.1 Designperiod
8.2.2 Determinationofdailywaterdemand
8.2.3 Determinationofstoragetankcapacity
8.2.4 Selectionofpipe
8.2.5 Pipeline designandhydraulicgradeline
8.3 DesignofSewer
8.3.1 Quantityofsanitarysewage
8.3.2 Maximum,Minimumandselfcleaning velocity
8.4 Excreta DisposalandUnseweredArea
8.4.1 Pit latrine
8.4.2 Designofseptic tank

**9.IrrigationEngineering**

9.1 General
9.1.1 AdvantagesandDisadvantagesofirrigation
9.2 WaterRequirement
9.2.1 Cropseasonandprincipalcrops
9.2.2 Base period
9.3 FlowirrigationCanals
9.3.1 Canal lossesandtheir minimization
9.3.2 Maximumandminimumvelocities
9.3.3 Designofirrigationcanal sectionbasedonmanning's formula
9.3.4 Needandlocation ofspillways
9.3.5 Headworksforsmall canals

**10.HighwayEngineering**

10.1 General
10.1.1Introductiontotransportationsystems
10.1.2Historicdevelopmentofroads
10.1.3Classification ofroadinNepal
10.1.4Basic requirementsofroadalignment
10.2 GeometricDesign
10.2.1Basic designcontrolandcriteria fordesign
10.2.2Elementsofcrosssection,typicalcross-sectionforallroads infilling andcutting
10.2.3Camber
10.2.4Determinationofradiusofhorizontalcurves
10.2.5Superlevation

10.2.6Sightdistances
10.2.7Gradient
10.2.8UseofNepalRoadStandard,2027(FirstRevision2045) andsubsequentrevision inroaddesign
10.3 DrainageSystem
10.3.1Importanceofdrainagesystemandrequirementsofagood drainagesystem
10.4 RoadPavement
10.4.1Pavementstructureanditscomponents:subgrade,sub-base, baseandsurfacecourses
10.5 RoadMachineries
10.5.1Earthmovingandcompactingmachines
10.6 RoadConstructionTechnology
10.7 Bridge
10.7.1T-beambride
10.7.2Timberbridges
10.8 RoadMaintenanceandRepair
10.8.1Typeofmaintenance Works
10.9 TracksandTrails

**11. E s t i m a t i n g a n d C o s t i n g**
11.1 General
11.1.1Mainitemsofwork
11.1.2Unitsofmeasurementandpaymentofvariousitems of workandmaterial
11.1.3Standardestimate formatsofgovernmentoffices
11.2 Rate Analysis
11.2.1Basicgeneralknowledgeontheuseofrateanalysis normspreparedbyMinistryofWorksandTransportand the districtrates prescribedbydistrict development committee.
11.3 Specifications
11.3.1Interpretationofspecifications
11.4 Valuation
11.4.1Methodsofvaluation
11.4.2Basic generalknowledgeofstandardformatsusedby commercial banksandNIDCforvaluation

**12. ConstructionManagement**
12.1 Organization
12.1.1Needfororganization
12.1.2Responsibilitiesofa civil overseer
12.1.3Relation betweenOwner,ContractorandEngineer
12.2 Site Management
12.2.1Preparationofsite plan
12.2.2Organizinglabor
12.2.3Measurestoimprovelaborefficiency
12.2.4Accidentprevention
12.3 Contract Procedure
12.3.1Contracts
12.3.2Departmental worksandday-work
12.3.3Typesofcontracts

12.3.4Tenderandtendernotice
12.3.5Earnestmoneyandsecuritydeposit
12.3.6Preparationbeforeinvitingtender
12.3.7Agreement
12.3.8Conditionsofcontract
12.3.9Constructionsupervision

12.4 Accounts
12.4.1Administrativeapprovalandtechnical sanction
12.4.2Familiaritywithstandardaccountkeepingformatsusedin governmentalorganizations
12.4.3Musterroll
12.4.4Completionreport

12.5 PlanningandControl
12.5.1Constructionschedule
12.5.2Equipmentandmaterials schedule
12.5.3Constructionstagesandoperations
12.5.4Barchart

**13. NARC General:**

12.1 NARC Act and Administration and Finacial By-Laws
12.2 Public Procurement Act/Regulations.

-The End-

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## ड्राफ्टम्यान -Civil T-5
## पाठ्यक्रम योजना तथा पाठ्यक्रम

**लिखित परिक्षा समय :- २ घण्टा**

लिखित पूर्णाङ्क :- १००
लिखितउत्तिर्णाक :- ४०

**प्रयोगात्मक परिक्षा ५० मिनेट**

प्रयोगात्मक पूर्णाङ्कः- ५०
प्रयोगात्मकउत्तिर्णाङ्कः २५
अन्तरवार्ताः २०

उद्देश्यहरु

यो पाठ्यक्रम ड्राफ्टम्यानCivil प्राविधिक T-5पद, तहका उम्मेदवार छनौट परिक्षाको लागी निर्धारण गरिएको हो । ड्राफ्टम्यानCivil प्राविधिक T-5पद, तहका उम्मेदवार छनौटको लिखित परिक्षामा सरिक हुने उम्मेदवारहरको पेशा सम्बन्धी बिषयलाई आधार मानि प्रश्नहरु सोधिने छ ।

(क) लिखित परिक्षाको माध्यम नेपाली/अंग्रेजी भाषा हुनेछ ।
(ख) निम्न पत्रहरुको पाठ्यक्रमको रुपरेखा अनुसार बिषयबस्तु हुनेछ ।
(ग) लिखित परिक्षाबाट छनोट भएका उम्मेदवारहरुलाई मात्र प्रयोगात्मक परीक्षामा समावेश गराइने छ र प्रयोगात्मक परीक्षामा सफल भएकालाई मात्र अन्तरवार्तामा सम्मिलित गराईनेछ ।
(घ) प्रश्नप्रत्र निर्माण गर्दा सम्मव भएसम्म पाठ्यक्रममा समावेश भएका सबै बिषयलाई समेट्नु पर्दछ ।

| प्रश्नको किसिम | प्रश्नको संख्या र अंक | कैफियत |
|---|---|---|
| लामो उत्तर दिनु पर्ने प्रश्न | ५x१०=५० | |
| छोटो उत्तर दिनु पर्ने प्रश्न | ५x५=२५ | |
| बस्तुगत | २५x१=२५ | |

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# ड्राफ्ट्म्यान -Civil T-5
## विषयगतलिखित परिक्षाको पाठ्यक्रम

1. **Draftman**
   - i. Interduction.
   - ii. Name of tools , uses & Descripstion.
   - iii. Soting method & care of different kinds of tools.

2. **Simple Mathmatics**
   - i. Arithmetic. Simple geometrical figure Area & Rectangle etc.
   - ii. Stranded Geometrical figure & system & draw.

3. **Mensurtion**
   - i. Metric table.
   - ii. British table.
   - iii. Squre.

4. **Lettering**
   - i. Introduction.
   - ii. Kind of letter.
   - iii. Method.

5. **Tracing**
   - i. Introduction.
   - ii. Kind of Tracing.
   - iii. Type of Ink filling.

6. **Conventional &Un conventional sign.**
   - i. Introduction, Type & Improtance.
   - ii. Potting system of convertional & unconventional sign in drawing paper.

7. **Scale**
   - i. Introduction & type.
   - ii. Presentation of scale.
   - iii. Mechanical scale uses & types.

8. **Simple drawing, copy & Ink filling.**
   - i. Proper method of copy, its necessity description.
   - ii. Few parts of building like Window, doors, wooden, joints, tools, reinforcement, RC.C beam etc

9. **Advance of drawing.**
   - i. Building structure.
   - ii. Plan, front elevation, side elevation, rear elevation & section.

10. **Main compound wall of building**
    - i. Main compound wall of building
    - ii. Under structure

iii. Super structure
iv. Excavation, Brick Soling, P.C.C, Footing, Plinth D.P.C., Main wall, Partition Wall, Window, Ventilation, Doors, Verandah, Roof

**11. Print**

i. Introduction, types method
ii. Importance of Print & uses.

**12. NARC Related**

i. NARC Act, NARC Admin By-laws
ii. Public Procurement Acts / Regulations

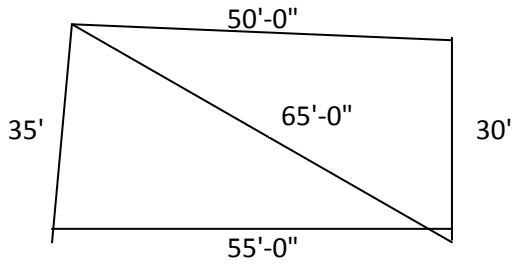
**13. NARC Related**

i. NARC Act, NARC Admin By-laws
ii. Public Procurement Acts / Regulations

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

# ड्राफ्टम्यान -Civil T-5 पद/तहको प्रयोगात्मक परीक्षाको पाठ्यक्रम

१. समय: ५० मिनेट
२. प्रश्न संख्या: ५ वटा (सबै अनिवार्य)
३. पुर्णाङ्क: ५०
४. उत्तिर्णाङ्क: २५
५. प्रश्नको निर्माण, प्रश्नभार (Weightage) र समयको विवरण:

| सि.नं. | विषय | अङ्क | समय | कै. |
|---|---|---|---|---|
| १. | २ वटा कोठा र ट्वाईलेट सहितको घरको प्लान बनाउनुहोस् । कोठाको साईज 11'x11' को २ वटा 4'x4' को ट्वाईलेट १ वटा, प्यासेज ४ को, वाल चौडाई 9", झ्याल ३ वटा, कोठाको ढोका २ वटा, ट्वाईलेटको ढोका १ वटा, मुल ढोका १ वटा, जम्मा ढोका चार वटा । | २० | २० | |
| २. | काठमाण्डौं महानगरपालिकामा घरको नक्शा बनाउँदा कुन Scale मा बनाउन पर्छ । यी मध्येको बाट छान्नुहोस् । | ५ | ५ | |
| ३. | नापी कार्यालय काठमाण्डौंमा जग्गाको नापी नक्शा (ब्लुप्रिन्ट) कुन कुन Scale मा बनाएको हुन्छ । | ५ | ५ | |
| ४. | निम्न जग्गाको क्षेत्रफल निकाल्नुहोस् ।   | १० | १० | |
| ५. | ड्राफ्टम्यानको आधारमा अक्षरलाई कति भागमा विभाजन गरिन्छ? स्केल अनुसार A, B, I, M लेख्नुहोस् । | १० | १० | |

१. स्केल अनुसार 9" गारोको भाग देखाई प्लान बनाएमा पुर्णाङ्क प्रदान गरिनेछ । झ्याल, ढोका आदि कुनै एक छुट भएमा प्रत्येकको २ नम्बरले कटौती गर्दै लगिने छ ।
२. दिईएको उत्तर मध्ये सहि उत्तर छानेमा ५ अङ्क प्रदान गरिने छ ।
३. सहि उत्तरको लागि ५ अङ्क प्रदान गरिने छ ।
४. दुई ओटा त्रिभुजको छुट्टा छुट्टै क्षेत्रफल निकाली जोडेर क्षेत्रफल निकाल्नु पर्नेछ । एउटा त्रिभुजको लागि ५ अङ्क प्रदान गरिने छ ।
५. ५ भाग हुने भनि लेख्नु पर्नेछ । यसको लागि २ अङ्क प्रदान गरिने छ । स्केल अनुसार A, B, I, M लेख्ने कामको लागि प्रत्येकको २/२ अङ्क प्रदान गरिने छ ।
६. प्रत्योगात्मक परीक्षामा परीक्षार्थीले कार्य सम्पादन गरेको सम्पूर्ण विवरणहरुका सम्भव भएसम्म Hard/Soft Copy प्रत्येक उम्मेदवारहरुको छुट्टा छुट्टै खाममा शिलबन्दी गरी भर्ना छनौट निर्देशनालयमा पठाउनु पर्नेछ ।

-The End-

नेपाल कृषि अनूसन्धान परिषद्

# पदपुर्ति समिति

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## (पाठ्यक्रमको अङ्क भार, कार्यविधि २४ सँग सम्बन्धित)
## जे.टि., टि.४ पद/तहको खूला प्रतिगियोतात्मक लिखित परीक्षा

नेपाल कृषि अनूसन्धान परिषद्को जे.टि., टि.४ पद/तहको खूला प्रतिगियोतात्मक लिखित परीक्षा देहाय अनूसार पुर्णाङ्क १०० को हूनेछ । परीक्षाको समय ४५ मिनेटको हूनेछ र उतीर्णाङ्क ५० प्रतिशत अङ्क प्राप्त गर्नू पर्नेछ ।

| पत्र | बिषय | पुर्णाङ्क | परीक्षा प्रणाली | प्रश्न संख्या/अङ्क भार | समय |
|---|---|---|---|---|---|
| १. पत्र एक | सेवा सम्बन्धी | १०० | वस्तूगत बहूउत्तर | ५० x २ = १०० | ४५मिनेट |

**द्रष्टव्यः**

१. बस्तुगत बिषयमा उत्तर गलत भएमा प्राप्त गरेको प्रप्ताङ्कबाट २०% अङ्क कट्टा गर्न सकिनेछ ।
२ यो पाठ्यक्रम २०६५ साल फागुनपछि प्रकाशित विज्ञापनदेखि लागू हुनेछ ।
३. पाठ्यक्रममा जेसुकै लेखिएको भएतापनि यस पाठ्यक्रममा परेका ऐन नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएको वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संझनु पर्दछ ।

**खण्ड-२**
**अन्तर्वार्ता**

लिखित परीक्षाबाट छनौट भएका उमेद्वारहरुको मात्र अन्तरबार्ता हुनेछ ।
क) अन्तर्वार्ता :- ३५
ख) शैक्षिक योग्यता :- १०
ग) अनुभव :- ५

**द्रष्टव्यः-**

२) अन्तिम योग्यताक्रम तयार गर्दा लिखित, अन्तर्वार्ता, शैक्षिक योग्यता, अनुभव र प्रयोगात्मक परीक्षा भएमा सो समेतको अङ्क जोडी तयार गरिने छ ।

नेपाल कृषि अनूसन्धान परिषद्

# पदपुर्ति समिति

नेपाल कृषि अनूसन्धान परिषद्
पदपुर्ति समिति

## प्राविधिक सहायक टी.४ पद/तहको पाठ्यक्रम

**(क) सामान्यः**

१. नेपालको अर्थतन्त्रमा कृषि क्षेत्रको महत्व ।
२. नेपाल कृषिअनुसन्धान परिषद् (नार्क) को संगठनात्मकसंरचना,कार्यविधि एवं उद्धेश्य ।
३. नेपाल कृषि अनुसन्धान परिषद् अन्तर्गत रहेका अनुसन्धान केन्द्रहरु र तिनमा गरिने बाली विशेष अनुसन्धान कार्यहरु बारे सामान्य जानकारी ।
४. नेपालमा कृषि/पशु विकासका समस्याहरु तथा समाधानका लागि अनुसन्धानको महत्व ।
५. नेपालको कृषि विकासमा त्रि-वर्षीय अन्तरिम आयोजना बारे सामान्य जानकारी ।
६. नेपालको भौगोलिक विविधता सुहाउँदो अन्नबाली, तेलहन, दलहन, नगदे बाली, औद्योगिक बाली, फलफूल, तरकारी, पशुपंक्षी तथा माछाका जातहरु ।

**(ख) बाली एवं माटोः**

१. उत्पादन प्रविधिः
   - ❖ मुख्य खाद्यान्न बाली (धान, गहुँ, मकै) ।
   - ❖ तेलहन बाली (तोरी, सरसों, बदाम) ।
   - ❖ दलहन बाली (चना, मुसुरो, भटमास, अरहर) ।
   - ❖ नगदे बाली (उखु, जुट, कपास) ।
   - ❖ औद्योगिक बाली (चिया, कफी) ।
   - ❖ मसला बाली (अलैंची, अदुवा, खुर्सानी, लसुन, प्याज) ।

२. बाली/विरुवा उत्पादनमा प्रभाव पार्ने वातावरणीय पक्षहरु (वर्षा, तापक्रम, आर्द्रता) बारे जानकारी ।
३. नेपाल कृषि अनुसन्धान परिषद्बाट उन्मोचन गरिएका बाली/विरुवाका जातहरु ।
४. माटोः परिभाषा, प्रकार, बनोट तथा गुणहरु बारे जानकारी ।
५. वीउ बिजनः परिभाषा, वीउ र खाद्यान्नमा फरक, गुणस्तर, उमारशक्ति, वीउको प्रकार (प्रजनन वीउ, आधार वीउ र प्रमाणित वीउ), वीउको विशेषता बारे जानकारी ।
६. मुख्य मुख्य रोग कीराहरु, तिनका लक्षण र रोकथामका उपायहरुः
   - ✚ खाद्यान्न बाली ।
   - ✚ दलहन बाली ।
   - ✚ तेलहन बाली ।
   - ✚ मसला बाली ।
   - ✚ नगदे बाली ।
७. मौरी कीरा पालन सम्बन्धी उन्नत प्रविधि बारे सामान्य ज्ञान ।
८. च्याउ उत्पादन सम्बन्धी उन्नत प्रविधि र यसको महत्व ।
९. नेपालमा पाइने विषादीहरुको नाम, प्रतिबन्धित विषादीहरु तथा विषादी छर्कदा अपनाउनु पर्ने सावधानीहरु ।

१०. रसायनिक मलहरु, तिनमा उपलब्ध हुने तत्वहरु (NPK) र तिनको मात्रा एवं बाली उत्पादनमा महत्व ।
११. प्रांगारिक मल: कमपोष्ट, हरियो मल, यसको महत्व र प्रयोग बारे जानकारी ।
१२. अन्न बाली भण्डारण प्रविधि र यसको महत्व ।
१३. श्रोत संरक्षण प्रविधि (Zero tillage or minimum tillage, थोपा सिंचाई, वर्षाको पानी संकलन) बारे जानकारी र यसको उपयोगिता ।
१४. गड्यौला मल उत्पादन प्रविधि, महत्व तथा फाईदाहरुबारे जानकारी ।

**(ग) बागवानी:**

१. परिभाषा र नेपालको कृषिमा यसको महत्व ।
२. उत्पादन प्रविधि बारे ज्ञान ।
   - ❖ तरकारी (बन्दा, काउली, टमाटर, बोडी आदि) ।
   - ❖ फलफूल (उष्ण प्रदेशीय, सुन्तला जात, पतझर जात आदि) ।
   - ❖ गाना एवं जरा तरकारी जातहरु (मूला, गाजर, आलु आदि) ।
   - ❖ चिया तथा कफी ।
   - ❖ मसला जातहरु (अलैंची, अदुवा, लसुन, खुर्सानी आदि) ।
   - ❖ कट फ्लावर (Cut Flower) ।
३. विरुवा प्रसारण प्रविधि: Sexual, asexual ।
४. तरकारी नर्सरी र फलफूल बगैंचा स्थापना एवं व्यवस्थापन बारे जानकारी ।
५. बेमौसमी तरकारी उत्पादन प्रविधि बारे जानकारी रतरकारीविकासमा यसकोमहत्व ।
६. फलफूल, तरकारी तथा अन्य सम्बन्धित बालीहरुमा (चिया/कफी, मसला) लाग्ने मुख्य मुख्य रोग, कीराहरु बारे जानकारी र त्यसको ब्यवस्थापनका उपायहरु ।
७. फलफूल एव तरकारीको Grading, Packaging तथा Transportation बारे सामान्य जानकारी ।
८. तरकारी वीउ उत्पादन प्रविधि बारे सामान्य जानकारी ।

**(घ) भेटनरी:**(पशु पालन र माछा) ।

१. आन्तरिक परजीवी (Internal Parasite): निम्न परजीवी रोगहरुको साधारण लक्षण, निदान तथा उपचार :- नाम्ले जुका (Liverfluke), गोलो जुका (Round Worm), फिते जुका (Tape Worm), कक्सिडियोसिस र (Coccidiosis), लहुमुत्ते (Babesiosis)।
२. बाह्य परजीवी (External Parasite) : निम्न बाह्य परजीवी रोगहरुको साधारण लक्षण, निदान तथा उपचार :- किर्ना (Tick), जुम्रा (Lice), उपियाँ (Fleas), लुतो (Mange)।
३. जीवाणु जनित रोगहरु (Bacterial Diseases) : निम्न जीवाणु जनित रोगहरुका बाह्य लक्षण, उपचार तथा रोकथाम : भ्यागुते रोग (Haemorrhagic Septicaemia), पटके रोग (Anthrax), चरचरे रोग (Black-Quarter), थुनिलो (Mastitis),

क्षयरोग र जोन्स रोग (Tuberculosis & John's Disease), खुर कुहिने रोग (Foot Rot), ब्रुसेलोसिस (Brucellosis), कुखुराको हैजा (Fowl Cholera)

४. विषाणु जनित रोगहरु Viral Disease : निम्न विषाणु जनित रोगहरुको बाह्य लक्षण तथा बचावटका उपायहरु :- गौगोटी (Rinderpest), खोरेत (Foot & Mouth Disease), रेविज (Rabies), स्वाईन फिभर (Swine Fever), कुखुराको विफर (Fowl Pox), रानीखेत (Ranikhet), गम्बोरो (Gumboro).

५. प्रजनन सम्बन्धी विकृतिहरु (Reproductive Disorders) : निम्न प्रजनन सम्बन्धी रोगहरुका कारण, साधारण लक्षण तथा उपचार :- साल नझर्ने (Retention of Placenta), तुहिने (Abortion), डिस्टोकिया (Dystokia).

६. पशु प्रजनन प्रणाली (Mating System)

– भाले र पोथीको स्वतन्त्र सहवास (Natural Breeting)

– सम्बन्धित भाले तथा पोथीको सहवास (Close Mating) : Inbreeding, Close breeding, Line breeding, Cross Breeding)

– असम्बन्धित भाले तथा पोथीको सहवास (Out breeding)

९. गर्भाधान विधि :

– प्राकृतिक गर्भाधान विधि (Natural Insemination)

–कृत्रिम गर्भाधान विधि (Artificial Insemination)

११. गाई, भैंसी, भेंडा, बाखा र बंगुरमा भाले खेजेको पोथीको लक्षण तथा कृत्रिम/प्राकृतिक गर्भाधान गराउने उपयुक्त समय ।

१२. विभिन्न पशु आहारा सम्बन्धी सामान्य जानकारी ।

१३. विभिन्न पशु आहारामा निहित पौष्टिक तत्वहरु, वर्गीकरण र तिनका गुणहरु ।

१५. सुख्खा याममा गाई, भैंसी, भेंडा, बाख्रालाई दिइने सुकेको घाँस (Hay) तथा साइलेज (Silage) बनाउने तरीका ।

१६. चरण विकासका लागि आवश्यक घाँसहरु र तिनको खेती गर्ने तरीका ।

१७. विभिन्न घाँसहरु :- नेपियर, पारा सेटारियो, किक्यु, राई घाँस, कक्सफुट, जैको बारेमा संक्षिप्त जानकारी ।

१८. विभिन्न कोशे घाँसहरु (Leguminous Grasses) :- वरसिम, स्टाइलो, सिराट्रो, बोडी (Cow pea), सेतो क्लोभर, रातो क्लोभर, लुसर्न, डेसमोडियम, केराउ, भेचको बारेमा संक्षिप्त जानकारी ।

१९. विभिन्न डाले घाँसहरु (Fodder Trees) :- बहर, कोइरालो, टांकी, काभ्रो, पाखुरी, डबडबे, निमारो, भिमसेनपाति, गिंदरी, इपिल इपिल ।

२१. गाई, भैंसी, भेंडा, बाखा, बंगुर, कुखुरा तथा खरायो पालनको लागि समय र अवस्था अनुसार सुधारिएको गोठ/खोरको व्यवस्था ।

२२. उन्नत नश्लका फुल पार्ने कुखुरा तथा मासुको लागि पालिने ब्रोइलरकुखुराको व्यवस्थापन ।

२३. दूधको बनावट तथा दूधबाट बन्ने पदार्थहरु दही, घ्यू, मखन, खुवा, चिज, छेना तथा छुर्पी उत्पादन गर्ने प्रकृया ।

२४ भौगोलिक अवस्था एवं जलवायू अनूसार विभिन्न क्षेत्रमा पाइने स्थानिय जातका पशूपंक्षीहरु ।
२५ देशमा लागू गरिएको पशू प्रजनन् निति वारे सामान्य जानकारी ।
२६ शारिरीक नापका आधारमा जिवित तौल निकाल्ने तथा दांत हेरेर उमेर पत्ता लगाउने वारेमा जानकारी ।

**द्रष्टव्य**

१. पाठ्यक्रममा भएका प्रत्येक एकाइबाट १, १ वटा प्रश्नहरुअनिवार्य रुपमा सोधिने छ ।

## निम्नस्तर प्राविधिक/प्राविधिक सहयोगी पदको वस्तुगत वहुउत्तर परीक्षाको

## परीक्षा योजना(Examination Scheme)

**खण्ड १: – लिखित परीक्षा (खुला तर्फ)**

| विषय | पूर्णाङ्क | उत्तिर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या X अङ्क | समय |
|---|---|---|---|---|---|
| सामान्य ज्ञान, कृषि सम्वन्धी सामान्य ज्ञान, आचरण र अनुशासन | १०० | ४० | वस्तुगत बहु वैकल्पिक (Multiple Choice) | ५० प्रश्न x २ अङ्क = १०० | ४५ मिनेट |

प्रश्न सोधिने एकाई र संख्या:

| खण्ड | प्रश्न संख्या |
|---|---|
| क | १६ |
| ख | १० |
| ग | १० |
| घ | १० |
| ङ. | ४ |

| | |
|---|---|
| जम्मा | ५० |

**खण्ड २ : – अन्तर्वार्ता ४० अङ्क**

द्रष्टव्यः लिखित परीक्षामा छनौट भएका उम्मेदवारहरुको मात्र अन्तरवार्ता लिइने छ ।

क. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ ।

ख. अन्तिम योग्यताक्रम तयार गर्दा लिखित र अन्तर्वार्ताको अङ्क जोडी तयार गरिने छ ।

## प्राविधिक सहयोगी, प्रथम स्तर पदको पाठ्यक्रम
## परिक्षा समय ४५ मिनेट

### (क) सामान्य बिषयः

१. नेपालको भौगोलिक क्षेत्र (प्रदेश, अंचल, जिल्ला तथा सदरमुकाम) र जात जाती सम्वन्धी सामान्य जानकारी ।
२. नेपालमा लगाइने बालिनाली र वीउं रोप्ने, स्याहार गर्ने तरिका र पाक्ने समय बारे सामान्य ज्ञान ।
३. नेपाल कृषि अनुसन्धान परिषद् अन्तरगतका अनुसन्धान केन्द्रहरु र तिनीहरुमा गरिने कार्यहरु बारे सामान्य जानकारी ।
४. रासायनिक मलहरु र त्यसले वोट विरुवामा पार्ने प्रभाव (घटि वा बढी भएमा हुने असर) सम्वन्धि सामान्य जानकारी ।
५. विभिन्न किसिमका गाउं घरमा वनाइने प्रांगारिक मल सम्वन्धि सामान्य जानकारी ।

### (ख) बाली सम्वन्धी ज्ञानः

१. निम्न अनुसारका बालीहरुको लागि उपयुक्त हुने माटो, वालीमा लाग्नसक्ने रोग र कीरा, रोकथाम गर्न सकिने घरायसि विधि बारेको बारेमा सामान्य जानकारी :-

- धान, गहुँ, मकै, तोरी, मुसुरो, भटमास, उखु ।

### (ग) बागवानी सम्वन्धी ज्ञानः

१. निम्न अनुसारका बागवानी बालीहरुको लागि उपयुक्त माटो, लाग्नसक्ने रोग र वाली उत्पादन क्षेत्र, जात र मुख्यमुख्य रोग र कीराको बारेमा सामान्य जानकारी ।

- बन्दा, काउली, गालभेंडा, मुला, आलु, सुन्तला जात फलफूल, आँप, स्याउ, अलैंची, अदुवा।

## (घ) पशुपालन र माछा:

(१) निम्न अनुसारका पशु बस्तुहरुको उत्पादन क्षेत्र, जात, आहारा (खाना) र प्राय: लाग्ने मुख्यमुख्य रोग र त्यसको पूर्व लक्षण बारेमा सामान्य जानकारी :-

- गाई, भैंसी, भेडा, बाखा, बंगुर, कुखुरा, खरायो, माछा ।

## (ङ) सरसफाई, अनुशासन सम्वन्धी सामान्य ज्ञान:

१. घर, कार्यालय, गोठ, खोर र खेतीबारीमा गरिने सफाई बारे सामान्य जानकारी

२. सरसफाई गर्दा उठाइएको फोहोरलाई विभाजन गरी नष्ट गर्ने वा सुरक्षित वन्दोवस्त गर्ने तरिका बारे सामान्य जानकारी

३. कर्मचारी भएपछि आज्ञापालन एवं पदीय मर्यादा पालना गर्ने तरिकाहरुबारे सामान्य जानकारी ।

-The End-