नेपाल सरकार

पशु स्वास्थ्य तथा पशु सेवा व्यवसायी परिषद

(ख) श्रेणीमा नाम दर्ताको लागि लिइने परीक्षाको पाठ्यक्रम

(नियमावलीको नियम १० को उपनियम् (१) संग सम्बन्धित)

पशु स्वास्थ्य तथा पशु सेवा व्यवसायी परिषद ऐनको दफा १७ अनुसार मान्यताप्राप्त शिक्षण संस्थाबाट पशु स्वास्थ्य तथा पशु सेवा व्यवसायसँग सम्बन्धित कम्तीमा स्नातक तह वा सो सरहको उपाधि हासिल गरि "ख" वर्गको लागि योग्यता पुगेका पशु स्वास्थ्य तथा पशु सेवा व्यवसायीलाई परिषदमा नाम दर्ताको लागि लिइने लिखित परीक्षाको पाठ्यक्रम

यो पाठ्यक्रमलाई निम्नानुसार तीन भागमा वर्गिकरण गरिएको छः

S. no.	Section	Full Mark	Remark
1.	Section-A: Information Related to the Council and Animal Services 15%	15	For All
2.	Section-B: Subject Related Knowledge	85	Any one related subject
	B.1. Animal health and Livestock Production and Management	85 or	
	B.2. Fisheries and Aquaculture	85or	
	B.3. Dairy Science	85	

परीक्षा योजना (Examination Scheme)

क्र.स.	खण्ड/विषय	पूर्णाङ्क	उत्रिणाङ्क	परीक्षा प्रणाली	प्रश्न संख्या	समय
१.	परिषद् तथा पशु सेवासम्बन्धी जानकारी	१००	४०	वहुवैकल्पिक प्रश्न (MCQs)	१५	९० मिनेट
२.	विषयसँग सम्बन्धित ज्ञान				८५	

द्रष्टव्यः

१. यो पाठ्यक्रमको योजनालाई एउटै चरणमा परीक्षा लिनेगरी तयार गरिएको छ ।
२. लिखित परीक्षाको प्रश्नपत्रको माध्यम भाषा पाठ्यक्रमको विषयवस्तु जुन भाषामा दिइएको छ सोही भाषाको आधारमा नेपाली वा अंग्रेजी मध्ये कुनै एक मात्र भाषा हुनेछ। तर विषयवस्तुलाई स्पष्ट गर्नुपर्ने अवस्थामा दुवै भाषा समेत प्रयोग सकिने छ।
३. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
४. लिखित परीक्षा एकैदिनमा एकैपटक लिइनेछ ।

५. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षरहरु (Capital letters): A. B. C. D मा लेख्नुपर्नेछ। सानो अक्षरहरू (Small letters): a, b, c. d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।

६. बहुबैकल्पिक प्रश्न हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।

७. विषयगत प्रश्न हुनेका हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नको उत्तर सोहीखण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

८. परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र विषयमा दिइए अनुसार हुनेछ ।

९. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई। कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।

१०. पाठ्यक्रम लागू मितिः २०८३/५/१०

खण्ड क (A) परिषद् तथा पशु सेवासम्बन्धी :जानकारी (१५) %

१. परिषद्को परिचय, प्रकार, कानुनी हैसियत तथा वर्गीकरणअनुसारका विशेषताहरूबारे सामान्य जानकारी।

२. पशु स्वास्थ्य तथा पशु सेवा व्यवसायी परिषद्को इतिहास, वर्तमान अवस्था तथा गठन प्रक्रियाबारे सामान्य जानकारी।

३. पशु स्वास्थ्य तथा पशु सेवा व्यवसायी परिषद्सँग सम्बन्धित तथा सो परिषद्अन्तर्गत बनेका ऐन, नियमावली, विनियम, कार्यविधि, निर्देशिका तथा अन्य नीतिगत व्यवस्थाबारे सामान्य जानकारी।

४. पशु स्वास्थ्य तथा पशु सेवा व्यवसायीहरूको वर्गीकरण तथा न्यूनतम शैक्षिक योग्यतासम्बन्धी सामान्य जानकारी।

५. पशु स्वास्थ्य तथा पशु सेवा व्यवसायीहरूले पालना गर्नुपर्ने नैतिक मूल्य, मान्यता तथा व्यावसायिक नैतिक आचारसंहितासम्बन्धी सामान्य जानकारी।

६. पशु स्वास्थ्य तथा पशु सेवा व्यवसायीहरूले पालना गर्नुपर्ने आचारसंहिता।

७. पशु स्वास्थ्य तथा पशु सेवा व्यवसायी उत्पादन गर्ने शैक्षिक संस्थाहरूमा आवश्यक पर्ने न्यूनतम भौतिक पूर्वाधार, प्रयोगशाला, उपकरण तथा अन्य आधारभूत सुविधाहरू।

८. पशु स्वास्थ्य तथा पशु सेवा व्यवसायी उत्पादन गर्ने उद्देश्यले तयार गरिने शैक्षिक पाठ्यक्रममा समावेश हुनुपर्ने आवश्यक विशेषताहरू।

Section-B: Subject Related Knowledge 85%

B.2. Livestock Production and Management

a. Animal Nutrition 15%

1. Feedstuffs: Terms and definitions, Proximate and detergent analysis of feeds, Energy value of feeds, Protein values of feeds, Measuring the intake and utilization of energy and nutrients of feeds
2. Nutritional Requirements of Animals: Energy, Protein, Minerals, vitamins and additives, Feeding Standards
3. The Nutritional Characteristics of Some Common Feeds: Classification of feedstuffs, Basal feeds, Protein, Vitamin and mineral supplements and additives, Forages and roughages
4. Ration Formulation: Feed formulation for cattle, Buffalo, swine & rabbit, poultry, sheep and goats, Preparation of mixed mineral supplements, Linear programming of feed mixtures
5. Winter, summer and perennial fodder cultivation status of Nepal
6. Digestive system of ruminant and non-ruminant animals and factors affecting on digestibility of nutrients
8. Classification of Feed Stuffs
9. Animal feed processing for improving the quality of feed stuffs

b. Pasture and Forage 20%

1. Agronomical management of tropical, sub-tropical and temperate species of grasses and legumes such as stylo, lucern, berseem, oat, rye grass, soybean, sorghum, paragrass, broomgrass, centro, napier, desmodium, vetch, clover, teosente, molasses, cowpea, valvet bean and kudzu etc.
2. Agronomical management of fodder trees such as Badahar, Kutmiro, Tanki, Epil epil, Khannyo, Kimbu, Kabro, Pakhuri, Dabdabe, Bakaino etc.
3. Pasture and rangeland management practices in different eco-zones
4. Different methods of forage conservation- hay, silage and their nutritive values
5. Utilization of crop residues – improvement of nutritive values
6. Agro-forestry / Silvi-pasture in community and leasehold forestry, fruit orchard

c. Animal Breeding 15%

1. Concept of genetic resistance to diseases and parasites
2. Indigenous and exotic breeds of livestock and poultry and their characteristics
3. Methods of selection- independent culling, tandem, and selection index
4. Hormones of reproduction and their functions – estrous cycle, ovulation, fertilization, gestation and parturition; induction and synchronization of ovulation
5. Reproductive disorders and their corrective measures
6. Collection, processing, evaluation and storage of warm and frozen semen
7. Artificial insemination technique, heat synchronization and pregnancy diagnosis
8. Embryo-transfer technology in livestock development
9. Formulation of breeding plan for livestock and poultry species

d. Dairy 15%

1. Pasteurization and homogenization of milk
2. Standardization of milk, cream and other milk products
3. Methods of preparation, types, nutritive value of yoghurt, butter, ghee, cheese, paneer, khuwa, ice cream and chhurpi
4. Milk borne diseases in brief

5. Packaging and storing of milk and milk products
6. Development and project planning of mini dairy plant
7. Costing of different dairy products
8. Schedule for maintenance of mini dairy plants

e. Livestock and Poultry Management 20%

1. Husbandry
2. Functions and tools of farm management
3. Management of different stages of animal (young, pregnant, lactating, dry etc)
4. Management of livestock and poultry breeding stocks
5. Handling and utilization of livestock and poultry farm wastes
6. Hatchery management- factors influencing hatching results
7. Management of chicks, growers and layers including broilers
8. Hygienic milk production

f. Animal Health 15%

1. Sanitation and prophylactic measures
2. External and internal parasites - their control measures
3. Symptoms, prevention and control measures of common livestock and poultry diseases - scour, mastitis, H.S., FMD, Calf pneumonia, bloat, PPR, black quarter, enterotoximia, foot rot, pox, swine fever, Ranikhet, Gamboro, Marex, CRD
4. Zoonotic diseases and their importance to public health
5. Livestock Marketing
6. Relationship between livestock production and marketing
7. Types of markets for livestock and livestock products
8. Factors affecting the livestock markets
7. Livestock market promotion and sustainable management
8. Economics of poultry (layers and broilers) farming
9. Economics of livestock (cattle, buffalo, goat, sheep, pig, and rabbit) farming

B3 Fisheries/Aquaculture 85%

1. **Taxonomy of Finfish: 5%**
   Principles and objectives of fish taxonomy, Taxonomic hierarchy and scientific nomenclature, External morphology and identification characters, Morphometric and meristic characteristics, Classification of major freshwater and marine fishes, Identification of commercially important finfish, Indigenous and exotic fish species
2. **Taxonomy of Shellfish: 6%**
   Introduction and importance of shellfish, General characteristics of crustaceans and molluscs, Classification of prawns, shrimps, crabs and lobsters, Classification of oysters, mussels, clams and other molluscs, Morphological characteristics used for identification, Identification of commercially important shellfish
3. **Unit 3 Freshwater Aquaculture: 10%**
   Introduction, scope and importance of freshwater aquaculture, Major freshwater cultured fish species, Site selection and pond construction, Pond preparation and management, Carp culture systems, Monoculture and polyculture, Stocking density and stocking methods, Natural and supplementary feeding, Water quality management, Fish growth and production management,

5. Packaging and storing of milk and milk products
6. Development and project planning of mini dairy plant
7. Costing of different dairy products
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Hatchery and nursery management, cage, pen and raceway culture, Integrated fish farming, Harvesting and post-harvest management, Sustainable freshwater aquaculture

4. **Unit 4 Limnology: 10%**
   Introduction, scope and importance of limnology, Physical characteristics of freshwater ecosystems, Chemical characteristics of lakes and ponds, Thermal stratification and water circulation, Dissolved oxygen and carbon dioxide, pH, alkalinity, hardness and nutrients, Plankton and benthic organisms, Primary productivity, Eutrophication, Lake and pond ecosystem dynamics, River and stream limnology, Human impacts on freshwater ecosystems, Limnologic methods and water quality assessment
5. **Fish Nutrition and Feed Technology: 10%**
   Principles and importance of fish nutrition, Digestive physiology of fish, Nutrient requirements of fish, Protein and amino acid nutrition, Lipid and fatty acid nutrition, Carbohydrate nutrition , Vitamins and minerals, Feed ingredients and their nutritional value, Plant and animal protein sources, Alternative and novel feed ingredients, Feed additives, probiotics and prebiotics, Principles of feed formulation, Feed manufacturing and processing, Pellet and extruded feed production, Feed storage and quality control, Feeding methods and feeding management, Feed conversion ratio and feed efficiency, Nutritional deficiency and nutritional diseases

6. Fish Food Organisms: 7%

   Introduction and importance of natural food organisms, Classification of fish food organisms, Phytoplankton, Zooplankton, Periphyton, Benthos, Aquatic insects and larvae, Natural food organisms in ponds, Nutritional value of live food, Culture of **Chlorella, Spirulina and other microalgae,** Culture of **Artemia,** Culture of **Daphnia and Moina,** Rotifer culture, Tubifex and other live feeds, Live feed production for fish larvae, Collection, preservation and storage of natural food organisms, Use of live feeds in hatchery and nursery management

7. **Aquatic Ecology and Bio diversity: 10%**
   Concepts and principles of aquatic ecology, Aquatic ecosystems and their components, Abiotic and biotic factors, Food chains and food webs, Energy flow in aquatic ecosystems, Ecological pyramids, Primary and secondary productivity, Population and community ecology, Species interactions, Ecological succession, Nutrient cycling, Aquatic pollution and ecological impacts, Ecosystem services, Conservation and management of aquatic ecosystems, Aquatic Biodiversity, Concept and importance of aquatic biodiversity, Levels of biodiversity: genetic, species and ecosystem, Aquatic flora and fauna, Freshwater and marine biodiversity, Fish diversity and distribution, Endemic, rare, threatened and endangered species, Indigenous and exotic species, Invasive alien aquatic species, Threats to aquatic biodiversity, Habitat degradation and fragmentation, Climate change and biodiversity, Biodiversity assessment methods, In-situ and ex-situ conservation, Fish gene banks and genetic conservation, Protected aquatic areas, community-based biodiversity conservation

8. **Fish Physiology: 10%**
   General principles of fish physiology, Homeostasis in fish, Respiratory physiology, Cardiovascular system and circulation, Osmoregulation and excretion, Digestive physiology, Metabolism and energy utilization, Endocrine system and hormones, Reproductive physiology, Growth and development, Neurophysiology and sensory systems, Stress physiology, Environmental effects on fish physiology, Adaptation to freshwater, brackish and marine environments

9. Fish Seed Production: 10%

Introduction and importance of fish seed production, Broodstock selection and management, Broodstock nutrition, Selection of mature breeders, Natural breeding, Induced breeding, Hormones used in induced breeding, Broodstock conditioning, Collection and handling of eggs and milt, Fertilization and egg incubation, Hatchery systems and equipment, Hatching management, Larval rearing, Nursery management, Live feed management, Fry and fingerling production, Stocking density, Water quality management, Seed grading and transportation, Fish seed quality assessment, Hatchery biosecurity, Common problems in seed production

10. Fish Pathology: 7%

Introduction, scope and importance of fish pathology, Normal and abnormal conditions in fish, Causes of fish diseases, Host–pathogen–environment relationship, Environmental and nutritional diseases, Clinical signs and disease diagnosis, Bacterial diseases of fish, Viral diseases of fish, Fungal diseases of fish, Non-infectious diseases, Pathological changes in fish organs, Basic histopathology, Disease transmission and prevention, Fish health management, Biosecurity in aquaculture, Disease surveillance and reporting, Principles of disease treatment and control

11. Fish Immunology: 7%

Introduction to fish immune system, Innate and adaptive immunity, Immune organs of fish, Immune cells, Antigens and antibodies, Humoral immunity, Cellular immunity, Complement system, Mucosal immunity, Skin and gill immunity, Immune response to pathogens, Fish immunoglobulins, Stress and immune response, Vaccination in fish, Immunostimulants, Probiotics and fish immunity, Environmental effects on fish immunity

12. Fish Parasitology: 8%

Introduction and importance of fish parasitology, Classification of fish parasites, Host–parasite relationship, Parasite life cycles, Protozoan parasites, Monogenean parasites, Digenean parasites, Cestodes, Nematodes, Acanthocephalans, Crustacean parasites, Common external and internal parasites of fish, Pathological effects of parasites, Diagnosis of parasitic infections, Parasite transmission, Prevention and control of parasitic diseases, Integrated parasite management

B.4. Dairy Science

1. Introduction to milk and milk products. Importance of indigenous dairy products in Nepalese dairy industry. 20%

- Dahi and Dahi-based dairy products; production technology, packaging
- Nauni and ghee: Production technology, packaging and marketing
- Chhurpi: Production technology, packaging and marketing
- Kheer: Production technology, packaging and marketing

- Kurauni (khoa): Nutritive value of Kurauni, methods of manufacture, packaging and preservation, factors affecting yield of Kurauni, physicochemical changes during manufacture and storage of Kurauni
- Kurauni-based confections: Burfi, Peda, milk cake, kalakand, Lalmohan, compositional profile, manufacture practices, nutritive value of Kurauni-based sweets
- Chhanna: Methods of manufacture, packaging and preservation
- Chhanna-based sweets: Mechanization of manufacturing process, its prospects
- Paneer: Nutritive value of paneer, methods of manufacture, packaging and preservation, physicochemical changes during manufacture and storage

2. Milk Processing and Marketing 25%

- Hygienic milk production, collection and transportation
- Different techniques used in milk preservation and storage
- Milk separation, factors affecting milk separation and creaming
- Clarification and bactofugation of milk
- Milk homogenization, effect of homogenization, theories of homogenization
- Judging and grading of milk, defects in milk, their causes and prevention
- Standardization of milk
- Milk pasteurization: LTLT, HTST
- Different types of milk pasteurizers used in dairy industry
- UHT milk and sterilized milk
- Types of milks: Recombined milk, toned milk, double toned milk, homogenized milk, soft curd milk, flavoured milk, vitaminized milk, etc.
- Effect of heat treatment in milk and its efficiency judgment
- Packaging of market milk
- Plant operation efficiency
- Operational losses in milk processing
- Milk marketing and distribution system
- Cleaning and sanitization of dairy plants

3. Milk quality control 25%

- Hygiene and sanitation of processing and manufacturing of milk products: Hygiene of milk processing, processing equipment and machinery, personnel handling milk and milk products, containers and packaging materials.
- Hygiene in production of milk products: Market milk, milk powder, condensed milk, butter, cheese, ice-cream, fermented milk products.
- Hygiene of storage, transport and sales of milk products: Demand and norms of storage condition, hygiene of transport and sales.
- Influence of milk on human health: Value of milk, spreading of diseases through milk.

- Quality control and assurance: Quality control of processing, manufacturing and marketing, Food Act, legislation, quality standards of dairy products, quality assurance and quality management systems, hazard analysis and critical control point system in dairy industry.
- CIP Cleaning: Introduction to cleaning, CIP cleaning, design of CIP systems, centralized CIP systems, cleaning effect, mechanical cleaning, manual cleaning.
- Composition and functions of different detergents: Alkalis, acids, polyphosphate, sulphates, selection of cleaning detergent, control of cleaning solutions
- Sterilization: Definition of sterility and sanitation, sterilization theory and methods of sterilization, use and composition of different sterilization agent, sanitizing machinery, equipment and process, verification of sterilizing effect – introduction, point of control (HACCP), method of taking samples, testing sterility, formation of resistance microorganisms, control of sterilizing 4
- Corrosion of dairy equipment
- Basic methods to arrange hygienic systems in dairy plant
- Bacteriological control of processing and manufacturing of products

4. Design and dairy equipment 20%

- Sanitary pipes, fittings, gaskets, installation, care and maintenance of pipes and fittings
- Description of equipment, working and maintenance of can washers, crate washers, factors affecting washing operations, and power requirements
- CIP cleaning and design of system
- Mechanical separation, fundamentals involved in separation, different types of separators, clarifiers, its care and maintenance
- Homogenizer, its classification, single- and two-stage homogenizers, its care and maintenance
- Batch and continuous pasteurizers, flow diversion valve, pasteurizer controls, its care and maintenance
- Different types of sterilizers, in-bottle sterilizers, UHT sterilizers, aseptic packaging, and equipment, care and maintenance
- Filling machines, types, pouch and bottle filling machines, care and maintenance
- Evaporators, , Compressors and Condensers -basic mechanisms, its construction, operation, types, basic concepts of multiple effect evaporators, care and maintenance
- Principles of drying, types of dryers, drum and spray dryer, air heating system, atomization, and feeding systems, spray dryer controls, cyclone separators, bag filters, care and maintenance
- Application of fluidization techniques in drying, batch fluidization, fluidized bed dryers

5. Dairy Microbiology and Dairy Chemistry 10%

- Microbiology of raw milk and Market milk
- Sarter culture
- Microbiology of fermented milk
- Microbiology of ice-cream
- Microbiology of Cheese
- Milk Fat, proteins, carbohydrates, vitamins and minerals
- changes in chemical nature of milk constituents during processing