दुग्ध विकास संस्थान

प्राविधिक सेवा तह–७ डेरी टेक्नोलोजिष्ट पदको लिखित परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रुपरेखा :– यस पाठ्यक्रमको आधारमा निम्नानुसार दुई चरणमा परीक्षा लिइने छ :

प्रथम चरण :–लिखित परीक्षा पूर्णाङ्क :–७०

द्वितीय चरण:–अन्तर्वार्ता पूर्णाङ्क :–३०

प्रथम चरण :–लिखित परीक्षा योजना (Examination Scheme)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क ४०%	परीक्षा प्रणाली	प्रश्न संख्या X अङ्कभार	समय	कैफियत
प्रथम	डेरी एण्ड फूड साइन्स सम्बन्धी	७०	२८	वस्तुगत बहुउत्तर (Multiple Choice)	७०X१ = ७०	१ घण्टा ५ मिनेट	
द्वितीय	खण्ड (क) डेरी एण्ड फूड इण्डष्ट्री व्यवस्थापन सम्बन्धी	५०	२८	विषयगत (Subjective)	५X१० = ५०	३ घण्टा	६ मध्ये ५ प्रश्नको उत्तर दिनु पर्नेछ ।
	खण्ड (ख) ऐन नियमहरु सम्बन्धी	२०			२X१० = २०		३ मध्ये २ प्रश्नको उत्तर दिनु पर्नेछ ।

द्वितीय चरण :– अन्तरवार्ता

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	३०	मौखिक

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।

२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टा छुट्टै हुनेछ ।

३. प्रथम पत्रमा वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरुको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत १(एक) अङ्क प्रदान गरिनेछ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अर्थात् ० २ अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।

४. द्वितीय पत्रको विषयगत प्रश्नका लागि तोकिएका १० अङ्कका प्रश्नहरुको हकमा १० अङ्कको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरु (Short notes) सोध्न सकिनेछ ।

५. द्वितीय पत्रको पाठ्यक्रमलाई २ खण्डमा विभाजन गरिएको छ । २ वटा खण्डको लागि २ वटै उत्तरपुस्तिका दिईनेछ र परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डको उत्तर पुस्तिकामा लेख्नु पर्नेछ ।

६. यस पाठ्यक्रममा जे सुकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन, नियमहरु परीक्षाको मिति भन्दा ३ (तीन) महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा रहेको मानिनेछ, पर्नेछ ।

Syllabus for Dairy Technologist (LEVEL- 7)

PAPER – I Dairy/Food science 70 marks

Physical Chemistry of Milk

Composition of milk of different species . Density and specific gravity, Surface tension , Viscosity of milk. Refractive index, Freezing point and boiling point of milk.. Osmotic pressure.. Electrical conductance concept of pH and their scale., milk as a buffer system. : Redox potential,

Milk Production Management & Dairy Development

introduction to Animal Husbandry. Distinguishing characteristics of Nepalese, Indian and exotic breeds of dairy animals and their performance.. General dairy farm practices- National Dairy Development Board-aim and objectives, policy orientation in dairy development. Dairy co-operative organization, Dairy development Corporation, Income & employment potential.. Milk production problems and policies.

Food & Dairy Microbiology

Assessment of microbial quality of milk.Role of microorganisms in spoilage of milk; souring, curdling, bitty cream, proteolysis,lipolysis; abnormal flavors and discoloration. Mastitis milk: Processing and public health significance, Food infection, intoxication and toxic infection caused by milk borne pathogens . Basic aspects and scope of food microbiology. Intrinsic and extrinsic factors that affect microbial growth in foods. Microbial spoilage of fruits, fruit juices,vegetables, cereals, meat, poultry, sea foods, carbonated soft drinks, canned foods; control of spoilage. Food preservation : physical methods; chemical preservatives and natural antimicrobial compounds, biology based preservation system.

Market Milk

Market milk industry in Nepal and abroad,Collection and transportation of milk; Organization of milk collection routes ,practices for preservation at farm, refrigeration, natural microbial inhibitors, lactoperoxidase system. Sensory, Physical ,Chemical & microbiological tests for grading raw milk. Reception and treatment (pre-processing steps) of milk in the dairy plant, Clarification, Homogenisation, Thermal processing of milk, HTST & UHT treatment. Nutritive value of milk. Efficiency of plant operation: product accounting, setting up norms for operational and processing losses for quantity, fat and SNF, monitoring efficiency. Maintaining plant hygiene & HACCP. Preparation of special milks; toned, double toned, standardised, flavoured, sterilised.. Detection of adulterants and preservatives in milk.

Heat and Mass Transfer

Basic heat transfer process, thermal conductivity . Heat transfer through composite walls and insulated pipelines. Heat flow through slab, hollow sphere and cylinder with uniform heat generation,. Heat Exchangers, jacketed kettles, LMTD, parallel and counter flow heat exchangers, Shell and tube and plate heat exchangers, Heat exchanger design. Application of different types of heat exchangers in dairy and food industry.,

Chemistry of Milk

Definition and structure of milk, factors affecting composition of milk, chemical composition & physico-chemical properties of casein, Whey protein and non proteins nitrogen constituents of milk , Estimation of milk proteins ,Milk enzymes with special reference to lipases, Xanthine Oxidase, phosphates, proteases and lactoperoxidase ,Milk carbohydrates

their status and importance. Physical and chemical properties of lactose, composition and classification of milk lipids. Milk phospholipids and their role in milk products. Unsaponifiable matter and fat soluble vitamins. Milk Salts. Trace elements

Traditional Dairy Products

Traditional milk products in Nepal & India. Classification of types, standards methods of manufacture , preservation & factors affecting yield of khoa. Mechanization in manufacture of khoa. Confectioneries made from Khoa.Chhana & chhana -based sweets, Paneer ,manufacture packaging and preservation.. Churpi,description & method of manufacture,. Misti dahi , Sikarni, Lassi, Mohi etc.

Condensed & Dried Milks

History, status and scope , Definition and legal standards: Manufacturing techniques of Condensed milk,sweetened condensed milk and evaporated milk.,Recombined sweetened condensed milk. Grading and quality of raw milk for condensed and evaporated milk, Recent advances with reference to freeze concentration and membrane concentration, Dried Milks:History and status , Grading and quality of raw milk for dried milks,Manufacture of skim milk powder (SMP), whole milk powders and heat classified powders.National and International Standards for dried milk, Manufacture of infant foods, malted milk foods and other formulated dried products

Fat Rich Dairy Products

Status of fat-rich dairy products , standard & manufacture of various typed of cream, Legal standards & Technology of Butter manufacture. Manufacture, packaging, storage and characteristics of margarine Ghee and butter oil; Methods of production, self life & storage

Dairy & Food Engineering

Principles of Refrigeration & air conditioning & its application in food Industry,

Construction, working, care & maintenance of various equipment used in dairy processing such as filtration, separation,mixing,CIP,Homogenisation,Pasteurisation,UHT, packaging, refrigearion , steam raising etc

Introduction of Dairy Plant design and layout. Type of dairies, reception flexibility. Classification of dairy plants. Location of plant,selection of site. Dairy building planning,. General points of considerations for designing dairy plant.

Economic Analysis

Basic concepts-wants, goods, wealth, utility, consumption, demand and supply, Consumer behaviour Theory of demand, Theory of production, . Concepts of costs-fixed and variable costs, short run and long run costs, average and marginal costs, economies and diseconomies of scale. Concept of market , pricing and output under different market situations, market price and normal price, price determination National income GDP, GNP, NNP, disposable personal Income, per capita income, inflation

Cheese Technology

Origin and history of development of cheese manufacture. Definition, standards and classification of cheese. Milk quality. Cheese additives and preservatives. Role of starter culture in relation to cheese quality. Rennet preparation and properties, rennet substitutes. Manufacture of different varieties of cheese: Cheddar, Gouda, Swiss, Mozzarella, Cottage. Role of milk constituents and changes during manufacture and ripening in cheese. Factors affecting yield of cheese. Packing,storage and distribution of

cheese. Manufacture of processed cheese, cheese spread and processed cheese foods. Mechanization and automation in cheese processing. Microbiological critical control of cheese cold store.

Ice-Cream & Frozen Deserts

History, development and status of ice cream industry, Definition, classification and composition of ice cream and other frozen desserts, Stabilizers and emulsifiers-their classification, properties and role in quality of icecream, Technological aspects of ice cream manufacture, , Types of freezers, Processing and freezing; of icecream mix and control of over run, Packaging, hardening, storage and shipping of icecream, food safety & legal standards, Recent advances in ice-cream industry and plant management, Technology for preparation of dried ice-cream milk mix. And Nutritive value of ice-cream.

Starter Culture and Fermented Milk Products

Introduction of starter cultures & their importance in dairy industry, classification of Lactic Acid Bacteria; Metabolism of Lactic Acid Bacteria Mixed and define strain starter culture; propagation of starter cultures; starter concentrates direct bulk and direct vat starter cultures; starter distillates. Quality and activity of starter cultures; defects in starters and their control; freezing and freeze-drying;. Kefir and Kumiss:. Microbiology of other fermented milks such as Bugarian milk, cultured buttermilk, Leben and Yakult; Concept of probiotic starters and their application in probiotic dairy food.

Quality and Safety monitoring in Dairy Industry

Current awareness on quality and safety of dairy foods; consumer awareness and their demands for safe foods; role of codex alimentarious commission (CAC) in harmonization of international standards; quality (ISO 9001:2000) and food safety (HACCP) system and their application during milk production and processing. National and international food regulatory standards;NS, BIS, PFA, ICMSF, IDF etc., their role in the formulation of standards for controlling the quality and safety of dairy foods.

By-Products Technology

Status, availability and utilization of dairy by-products Associated economic and pollution problems., Physico chemical characteristics & processing of whey, butter milk and ghee residue, By-products from skim milk: Casein:, Lactose:. Nutritional characteristics of by products.

Judging of Dairy Products

Introduction, definition and importance of sensory evaluation in relation: to consumer acceptability and economic aspects;. Design and requirements of sensory evaluation . Basic principles: Senses and sensory perception, Fundamental rules for scoring and grading of milk and milk products. Types of tests – difference tests (Paired comparison, due-trio, triangle) ranking,scoring, Hedonic scale and descriptive tests.

Packaging of Dairy Product

Importance of Packaging, Packaging

Characteristics of basic packaging materials: Paper (paper board, corrugated paper, fibre board), Class, Metal, Plastics, Foils and laminates, retort pouches, Package forms, Legal requirements of packaging materials and product information. Packaging of milk and dairy products. Modern Packaging Techniques: Vacuum Packaging, Modified atmosphere packaging (MAP), Eco-friendly packaging, Coding and Labelling of Food packages, Aseptic Packaging (AP)

Food Technology

Status of food industry in Nepal and abroad, magnitude and interdependence of dairy and food industry. Prospects for future growth ..Manufacture of breakfast cereals. *Bakery* products: Breads, biscuits, crackers and cakes.Soy milk.Peanut milk: Miltone (flavoured, (pasteurized),Vegetable protein isolate/concentrates:.Manufacture of malted milk - vacuum tray drying and spray drying processes.Vegetable, fruit and juice.Structural properties of vegetables and fruits..Post-harvest processing:.Fruit processing: Juice processing:.Tomato juice and tomato juice blends.Vegetable juices.Jams, jellies and fruit preserves.Beverage: Classification, scope, carbonated, non-alcoholic beverages manufacture.Coffee: production practices, structure of coffee / chicory.Coffee processing: Chocolate products, Cocoa bean processing, chocolate liquor.Cocoa butter, chocolate manufacture.Manufacture of chocolate confections.Confectioneries, Toffees, Caramels

Paper – II

Part – I Dairy & Food Industry Management **Marks -50**

Financial Management & Cost Accounting

Scope and objectives of financial management. Different Systems of Accounting:. Doubles entry system of Book-Keeping. : financial statements,. Financial Analysis : Ratio analysis. Break-even analysis,Profit analysis and operating analysis, Investment decision : Time value of money, Net present value, Investment evaluation criteria, NPV method, Internal rate of return method,
Profitability index method, Pay back period method, Accounting rate of return method.

Entrepreneurship Development and Industrial Consultancy

Entrepreneurship Development: Assessing overall business environment. Overview of Nepalese social, political and economic systems and their implications for decision making by individual entrepreneurs. Globalisation and the emerging business /entrepreneurial environment. Concept of entrepreneurship; entrepreneurial and managerial characteristics; managing an enterprise; motivation and entrepreneurship development; entrepreneurship development programs; SWOT analysis, Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises and Report and Evaluation

Marketing Management & International Trade

concepts & scope of marketing management ; concepts of marketing- mix, Marketing Opportunities Analysis: Marketing research and marketing information systems; Marketing Planning Process. Product policy and planning : Product mix;. Marketing channel decisions. Retailing, wholesaling and distribution. Pricing Decisions.. Promotion-mix decisions. Advertising; Exports- Direct exports, indirect exports, Licensing, Joint Ventures, Direct investment & internationalization process, World Trade Organization (WTO)

Industrial Statistics

Measures of central tendency, Measures of dispersion, Elementary notions of probability, Laws of addition and multiplication probability. Theoretical frequency distributions its applications. Concepts of sampling methods.Introduction to testing of hypotheses and their application in the field of dairying. Analysis of variance, Simple correlation coefficient and its test of significance. Basic concepts of statistical quality control, Control charts for variables and attributes, Fundamental concepts of acceptance sampling

COMPUTER- IT in Dairy & Food Industry

Computerization and IT in food & dairy industries. Computers, Operating Environments and Information Systems for various types of dairy Industries. Principles of communication. Role of Computer in Optimization;. Dairy Process Modeling and Simulation. Instrumentation, Process control.Inventory control, Automation, Robotics. Expert Systems and Artificial Intelligence. Instrumentation.

Dairy Plant Management & Pollution Control

Production Management, planning & Control, Work study and measurement moiton and time study.Plant Operations. Efficiency factors losses, . Personal Management . Safety : hazards ,Plant Maintenance. Prevention & Break-down maintenance . Food , personnel & plant hygiene, water quality etc. Cleaning and Sanitation ,Effluent treatment: Environmental pollution. Air pollution. Water pollution. Solid waste pollution. Noise pollution. Soil pollution. Radio active pollution. Recycling of factory effluent.

Dairy Extension Education

Principles and objectives of extension education. Extension Teaching Methods, Key elements of communication. Models of communication, Classification, planning and selection of A.V.Aids. Identification of rural leaders, their characteristics, roles and functions in rural development,

. Need, principles and steps of programme planning. Evaluation of extension programmes.. Group Discussion Technique, Developing Communication and Overall Skills. Brain-storming Technique for developing the Decision making Process

Paper II

Part - I ऐन र नियमहरु अंक २०

१. खाद्य ऐन, २०२३

२. खाद्य नियमावली, २०२७

३. उपभोक्ता संरक्षण ऐन, २०५५

४. आमाको दूधलाई प्रतिस्थापन गर्ने वस्तु (बिक्री वितरण नियन्त्रण) ऐन, २०४९

५. वातावरण संरक्षण ऐन, २०५३

६. सम्थान ऐन, २०२१

७. सम्थानको कर्मचारी तथा आर्थिक प्रशासन सम्बन्धि विनियमावली