1. Course offered :: UG, PG , PhD - Semester / Year wise

   - List of UG Courses (B.V.Sc & AH) As per latest MSVE Guidelines) , B.Tech. (D.T.) and B.F.Sc as per ICAR – V Deans Committee – 2016.

Sr No	Course No.	Title	Credit	Course offered in the Year
1	LPT	Livestock Products Technology	2+1	3rd Year

   - List of PG Courses (MVSc) and M.Tech. (Dairy Technology)

Sr No	Course No .	Title	Credit	Semester
1	LPT 601	Abattoir Practices and Meat Plant Operations	2+1	1st
2	LPT 602	Fresh Meat Technology	1+1	1st
3	LPT 603	Processing and Preservation of Meat	2+1	1st
4	LPT 609	Egg and Egg Products Technology	1+1	1st
5	LPT 612	Biotechnology of Foods of Animal Origin	1+1	1st
6	LPT 604	Processing of Milk and Milk Products	1+1	2nd
7	LPT 605	Packaging and Marketing of Livestock Products	1+1	2nd
8	LPT 606	Microbiology and Quality Control of Livestock Products	1+1	2nd
9	LPT 608	In-Plant Training	0+2	2nd
10	LPT 610	Market Milk Processing and Dairy Plant Practices	1+1	2nd

11	LPT 613	Fish and Fish Products Technology	1+1	2nd
12	LPT 607	Slaughterhouse By-products Technology	1+1	3rd
13	LPT 611	Processing and Marketing of Wool	1+1	3rd
14	LPT 691	Master's Seminar	1+0	3rd
15	LPT 699	Master's Research	10	3rd
16	LPT 699	Master's Research	20	4th

2. Lecture Schedule – UG, PG , PhD - Theory / Practical Schedule – Approved by BoS – Subject wise

NAME OF DISCIPLINE	:	LIVESTOCK PRODUCTS TECHNOLOGY
PROFESSIONAL YEAR	:	THIRD YEAR
CREDIT HOURS	:	2+1 =3

THEORY:

Unit	Lect. No.	Topic to be covered
I	1.	Retrospect and prospects of milk industry in India.
	2.	Retrospect and prospects of milk industry in India.
	3.	Layout of milk processing plant and its management.
	4.	Layout of milk processing plant and its management.

	5.	Composition of milk and nutritive value of milk.
	6.	Factors affecting composition of milk.
	7.	Physico-chemical properties of milk.
	8.	Microbiological deterioration of milk and milk products.
	9.	Collection, straining, filtration, clarification, chilling of milk.
	10	Standardization and homogenization of milk.
	11.	Pasteurization, UHT treatment and bactofugation of milk.
	12.	Dried and dehydrated milk.
	13.	Fermented milk: Dahi, yoghurt, lassi and acidophilus milk.
	14.	Preparation of cream, (standards, common defects and remedial measures).
	15.	Preparation of butter and ghee (standards, common defects and remedial measures).
	16.	Preparation of paneer or chhana and khoa.
	17.	Preparation of ice-cream (types, ingredients).
	18	Preparation of ice-cream.
	19.	Preparation of mozarella cheese.
	20	Preparation of mozarella cheese.
	21.	Utilization of dairy byproducts: skim milk, whey etc.
	22.	Packaging, transportation, storage and distribution of milk and milk products.
	FIRST INTERNAL ASSESSMENT	
	23.	Good manufacturing practices and implementation of HACCP in milk plant.
	24.	Introduction to organic and functional milk products.
	25.	Cleaning and sanitation in milk plant.

	26.	Dairy effluent management.
II	27	Introduction to wool, fur, pelt and specialty fibers with respect to processing industry. Glossary of terms of wool processing.
	28.	Basic structure and development of wool follicle.
	29.	Classification, impurities and grading of wool.
	30.	Brief outline of processing of wool.
	31.	Physical and chemical properties of wool.
	32.	Factors influencing the quality of wool.
III	33.	Introduction to Abattoir. Current Status & development.
	34.	Layout and management of rural, urban and modern abattoirs.
	35.	FSSA standards on organization and layout of abattoirs.
	36.	Animal welfare and pre-slaughter care, handling and transport of meat animals including poultry.
	37.	Stress and Meat quality (DFD and PSE conditions)
	38.	Procedures of Ante-mortem and post mortem examination of meat animals.
	39.	Slaughtering and dressing of meat animals and birds. Emergency and casualty slaughter.
	40.	Evaluation, grading and fabrication of dressed carcasses including poultry.
	41.	Utilization of abattoir by products: classification, significance.
	42.	Rendering, meat meal, bone meal, glue, gelatin, fat, fish meal.
	43.	Preparation of casing : classification, grading etc.
	44.	By-products of pharmaceutical value.
	SECOND INTERNAL ASSESSMENT	
	45.	Skin and hides; methods of flaying. Defects in hide.
	46.	Processing of leather. Preservation and tanning.
	47.	Treatment of condemned meat and carcasses.
	48.	HACCP concepts in abattoir management.

	49.	Management of effluent emanating from abattoir.
IV	50.	Prospect of meat industry in India.
	51.	Structure & composition of muscle (including poultry muscle). Nutritive value of meat.
	52.	Structure & composition of muscle (including poultry muscle). Nutritive value of meat.
	53.	Conversion of muscle to meat (Muscle Contraction Mechanism)
	54.	Conversion of muscle to meat.
	55.	Fraudulent substitution of meat.
	56.	Preservation of meat and aquatic foods: Chilling, freezing, drying,.
	57.	Preservation of meat and aquatic foods: Salting, curing and Smoking
	58.	Preservation of meat and aquatic foods: Canning, irradiation and chemical preservation of meat
	59.	Ageing of meat.
	60.	Modern processing technologies of meat and meat products.
	61.	Packaging of meat and meat products.
	62.	Formulation and development of meat and sea foods; kabab, sausages, meat balls/patties, tandoori chicken, soup, pickles, surimi, smoked fish.
	63	Restructured meat; Sectioned & Formed Meat products; Fermentation of meat products.
	THIRD INTERNAL ASSESSMENT	
	64.	Physicochemical and microbiological quality of meat and fish and their products.
	65.	Basics of sensory evaluation of meat products.
	66.	Composition of an egg. Nutritive value of and egg products.
	67.	Preservation, packaging of egg and egg products.

	68.	Laws governing national (FSSAI) /international trade (ISO, HACCP etc) in meat and meat products.
	69.	Organic and genetically modified meat and fish products.
	70.	GMP and HACCP in relation to meat processing plant.
	71.	Surprise Test Paper
	72.	Surprise Test Paper

PRACTICAL :

Unit No.	Practical No.	Topic to be covered
Paper I		
I	1.	Sampling of milk.
	2.	Platform tests (Physical examination, Acidity and Specific gravity of milk).
	3.	Estimation of fat in milk.
	4.	Estimation of SNF, total solids of milk.
	5.	Detection of adulteration of milk.
	6.	Determination of efficiency of pasteurization.
	7.	Cream separation.
	8.	Preparation of milk products: butter & ghee.
	9.	Preparation of milk products: paneer/*channa*
	10.	Preparation of milk products: *khoa.*
	11.	Preparation of milk products: ice-cream/*kulfi*
	12.	Preparation of milk beverages (whey drink & flavoured milk)
	13.	Visit to modern milk processing and milk products manufacturing plants

II	14.	Wool sampling techniques
	15.	Tests for identification of wool; determination of fleece density, fiber diameter, staple length, crimp and medulation percentage
	16.	Scouring/clean fleece yield
Paper II		
III	17.	Methods of ritual slaughter
	18.	Methods of humane slaughter (stunning)
	19.	Flaying and dressing of food animals (buffalo)
	20.	Flaying and dressing of food animals (sheep and goat)
	21.	Flaying and dressing of food animals (Pig)
	22.	Flaying and dressing of food animals (Poultry)
	23.	Carcass evaluation of different species
	24.	Determination of meat yield, dressing percentage, meat bone ratio
	25.	Cut up parts of carcasses{Buffalo, Sheep/Goat ,Pig ,Poultry}
	26.	Preparation of abattoir by-products (meat meal, bone meal, neats foot oil)
	27.	Visit to slaughterhouses/ meat plants
IV	28.	Estimation of deteriorative changes in meat and meat products
	29.	Packaging of meat, aquatic foods and shell eggs and their products
	30.	Preparation of comminuted meat products: nuggets, patties, sausages, balls
	31.	Preparation of non comminuted meat products: Loaf
	32.	Preparation of fish products: surimi
	33.	Preparation of traditional meat products: *tandoori chicken, soup, biryani.*
	34.	Evaluation of external & internal egg quality

	35.	Preservation and Quality Evaluation of eggs.

Semester-wise Break-up of LPT Courses (M.V.Sc.)

Semester- I

Sr. No.	Course No.	Course Title	Credits
1	LPT 601	Abattoir Practices and Meat Plant Operations	2+1
2.	LPT 602	Fresh Meat Technology	1+1
3.	LPT 603	Processing and Preservation of Meat	2+1
			5+3 = 8

Semester- II

Sr. No.	Course No.	Course Title	Credits
1	LPT 604	Processing of Milk and Milk Products	1+1
2.	LPT 605	Packaging and Marketing of Livestock Products	1+1
3.	LPT 606	Microbiology and Quality Control of Livestock Products	1+1
			3+3 = 6

Semester- III

Sr. No.	Course No.	Course Title	Credits
1.	LPT 607	Slaughterhouse By-products Technology	1+1
2.	LPT 691	Master's Seminar	1+0
3.	LPT 699	Master's Research	10
			3+10 = 13

Semester- IV

Sr. No.	Course No.	Course Title	Credits
1	LPT 699	Master's Research	20

Optional Courses to be opted in Semester I, II and/or III without exceeding prescribed maximum credit load for a semester considering credit load of minor, supporting and common courses.

1	LPT 608	In-Plant Training	0+2
2	LPT 609	Egg and Egg Products Technology	1+1
3	LPT 610	Market Milk Processing and Dairy Plant Practices	1+1
4	LPT 611	Processing and Marketing of Wool	1+1
5	LPT 612	Biotechnology of Foods of Animal Origin	1+1
6	LPT 613	Fish and Fish Products Technology	1+1

LPT-601: Abattoir Practices and Meat Plant Operations **Credit: 2+1**

Sr. No.	Lecture Schedule	No of Lectures
UNIT-I (14 Lectures)		
1	Handling and transportation of meat animals including poultry	2
2	Pre-slaughter, handling and care of food animals	2
3	Ante-mortem inspection	2
4	Humane slaughter -Principles and methods of stunning -	2
5	Ritual methods of the slaughter of food animals and poultry	2
6	Machinery for slaughter and dressing of food animals	1
7	Postmortem inspection	2
8	Handling, disposal and condemnation of unfit materials.	1
Unit-II (11 Lectures)		
9	Abattoir - layout, designing, organization and operation	4
10	Maintenance of meat and poultry processing plants, Record keeping	3
11	Legislations and regulations for establishment and operation of slaughterhouses and meat processing plants,	4
Unit-III (11 Lectures)		
12	Sanitation of slaughterhouse – Sanitary practices in meat plant and its benefits	3
13	Solid and liquid waste management of slaughterhouse	2
14	Different methods of effluent treatment and designs of effluent treatment plants	4
15	State and Central Pollution Control Board norms.	2
	Total Theory Classes	**36**

LPT-601: Abattoir Practices and Meat Plant (Practical Schedule)		
Sr. No.	Topic	No of Practical's
1	Design and outlay of modern abattoir	1
2	Designing of Poultry Processing Plant	1
3	Designing of Effluent Treatment Plant	1
4	Designing of effluent treatment plant	1
5	Judging and grading of food animals	1
6	Procedure for the slaughter of Cattle and Buffalo	1
7	Procedure for the slaughter of Pig	1
8	Procedure for the slaughter of Goat	1
9	Procedure for the slaughter of Sheep	1
10	Procedure for the slaughter of Poultry	1
11	Ante-mortem inspection of Food Animals	1
12	Postmortem inspection of Food Animals	1
13	Recording of carcass data - carcass yield, meat bone ratio, dressing percentage, meat bone ratio etc	1
14	Measurement of effluent characteristics - pH, BOD, COD, suspended solids, etc	1
15	Visit to slaughterhouse	1
16	Visit to Poultry processing plant	1
17	Visit to effluent treatment plant	1
18	DPR for the establishment of an abattoir.	1
	Total	**18**

LPT-602: Fresh Meat Technology **Credit: 1+1**

Sr. No.	Topic	No of Lectures
UNIT-I (Lectures 10)		
1	History, current development and prospects of meat and poultry industry in India	1
2	Skeletal muscle development – pre- and post-natal	2
3	Structure and chemistry of muscle including poultry –	2
4	Muscle Proteins - sarcoplasmic and myofibrillar proteins – Stromal proteins – Types of muscle fibres	1
5	Post mortem changes – Rigor mortis- Conversion of Muscle to meat	1
6	Pre and post-slaughter factors affecting meat quality	1
7	Defects during the conversion of muscle to meat – PSE/ DFD/ Cold, Shortening – Off odour development.	2
Unit-II (Lectures 7)		
1	Composition and nutritive value of meat and poultry	2
2	Qualities of fresh meat –pH, WHC, colour, odour, juiciness, texture/ tenderness and firmness	2
3	Chilling, ageing and conditioning of meat, Electrical stimulation	1
4	Carcass evaluation, grading and fabrication	1
5	Tenderization of meat	1
Practical (17 Classes)		
1	Estimation of pH	
2	Estimation of colour	
3	Estimation of WHC	
4	Estimation of ERV	
5	Estimation of shear force value	
6	Estimation of glycogen	
7	Estimation of R-value	
8	Estimation of myoglobin	
9	Estimation of proximate analysis of meat	
10	Estimation of drip loss	
11	Estimation of sarcomere length	
12	Estimation of fibre diameter	
13	Estimation of MFI	
14	Fractionation of sarcoplasmic, myofibrillar and stromal proteins	
15	Grading and evaluation of carcass	
16	Meat cutting: whole sale and retail cuts	
17		

LPT 603: Processing and Preservation of Meat **Credit :2+1**

Lecture No.	Theory Lecture Schedule
Unit I (Lectures 8)	
Lecture 1-	Basic principles of meat preservation
Lecture 2-	Preservation of meat- chilling, freezing, freeze-drying,
Lecture- 3-	Preservation of meat -Curing and smoking
Lecture- 4 -	Preservation of meat- dehydration
Lecture- 5-	Preservation of meat -thermal processing,
Lecture- 6-	Preservation of meat -direct microbial inhibition, use of chemicals and antimicrobials
Lecture- 7-	Preservation of meat -irradiation,
Lecture- 8-	Hurdle technology concept.
Unit II (Lectures 17)	
Lecture- 9	Principles of Meat Processing
Lecture- 10	Meat and non-meat ingredients and their roles -Additives
Lecture- 11.	Processing techniques - comminution, chopping, blending, marination, massaging, tumbling, etc
Lecture- 12	Cooking methods including microwaving
Lecture- 13	Traditional and ethnic meat products - tandoori and barbeque
Lecture- 14	Development of meat products - ham, bacon
Lecture- 15 products	Development of Ready-to-cook, Ready-to-eat meat
Lecture- 16	Emulsion formation /preparation
Lecture- 17	Factors affecting emulsion formation
Lecture- 18	Emulsion based meat products - sausages, nuggets and patties

Lecture- 19	Enrobed meat products
Lecture- 20	Restructured meat products,
Lecture- 21	Fermented meat products
Lecture- 12	Functional meat products
Lecture- 23	Shelf-stable meat products -Intermediate moisture meat products
Lecture- 24	Shelf-stable meat products – Canned
Lecture- 25	Retort meat products
Unit III (9 Lectures)	
Lecture- 26	Sensory evaluation
Lecture- 27	Layout and designing of sensory evaluation laboratory
Lecture- 28	Sensory physiology
Lecture- 29	Quality attributes
Lecture- 30	Types of sensory panels
Lecture- 31	Selection of sensory panelists-
Lecture- 32	Sensory evaluation tests
Lecture- 33	Types of sensory evaluation
Lecture- 34	Methods of sensory evaluation
Lecture- 35	Factors influencing sensory measurements
LPT 603 Practical Lecture Schedule (17 Classes)	
Practical-1	Traditional and ethnic Meat Products – Kebabs, pickles
Practical-2	Preparation of Meat Products - Ham and Bacon
Practical-3	Minced and emulsion based meat products – nuggets patties and sausages
Practical-4	Enrobed meat products
Practical-5	Restructured meat products

Practical-6	Fermented meat products
Practical-7	Shelf-stable meat products – Canned/ retorted Meat Products
Practical-8	Determination of emulsion stability
Practical-9	Cooking yield
Practical-– 10	Texture Profile Analysis
Practical-– 11	Sensory evaluation of meat products
Practical-12	Method of sensory evaluation - differential, descriptive, training tests, etc. – Test practices and training in the sensory lab
Practical-13	Estimation of tyrosine value
Practical-14	Estimation of nitrite content,
Practical-15	Estimation of TBARS value,
Practical-16	Estimation of peroxide value –
Practical-17	Visit of Meat and Poultry Processing Unit

LPT 604:Processing of Milk and Milk Products **Credit:1+1**

Lecture No.	Lecture Title
	Unit I (6 Lectures)
1	Basic concepts of dairy plant organization and operation
2	Collection, chilling and transportation of milk
3	Heat treatments of Milk, Different methods of pasteurization merits and demerits
4	Cleaning and sanitization of Dairy plants
5	Composition, nutritional, physico-chemical and functional properties of milk
6	Standards for milk and milk products. (FSSAI)
	Unit II (7 Lectures)
7	Manufacture of milk products - Flavoured Milk
8	Drying of milk and milk products - Evaporated and condensed milk, Milk powders
9	Definition, composition, manufacturing process and defects of Butter - Ice cream and other frozen desserts
10	Manufacture of different fermented milk products Viz., Dahi/Yoghurt, Lassi etc.
11	Manufacture of cheddar, mozzarella, cottage and processed cheese
12	Manufacture of indigenous milk products – paneer, channa, khoa, ghee, dahi and shrikhand
13	Rheology of milk products and Dairy by-products
	Unit III (4 Lectures)
14	Membrane filtration technology- principles and concepts
15	Different methods of Membrane filtration technology
16	Manufacturing and functional properties of casein - Caseinates- Co-precipitates
17	Manufacturing of Whey protein concentrates (WPC) - Lactose- Dairy whiteners

LPT-604 Practical Shedule	
Sr. No.	**Name of practical**
1	Platform tests
2	Determination of fat in milk
3	Determination of SNF, TS in milk
4	Estimation of protein in milk
5	Estimation of lactose and ash contents of milk

6	Preparation of butter, ice cream,
7	Cheese – cheddar, mozzarella and cottage cheese,
8	Preparation of khoa and khoa based products
9	Preparation o paneer, channa,
10	Preparation of, ghee, dahi, yoghurt,
11	Casein, caseinate, co-precipitate
12	Preparation of flavoured milk
13	Determination of degree of browning in milk
14	Measurement of rheological properties of different milk products
15	Evaluation of sensory quality of milk
16	Evaluation of sensory quality of milk products
17	Visit to dairy plant

LPT 605: Packaging and Marketing of Livestock Products **Credit: 1+1**

Sr. No.	Topic	No. of Lectures
	Unit-I (10 Lectures)	**1**
1.	Principles of packaging - objectives and functions	**1**
2.	Product characteristics affecting packaging requirements	**1**
3.	Packaging materials and their characteristics - Different packaging systems for fresh, cured, dehydrated, freeze-dried and shelf-stable products of milk, meat and chicken	**1**
4.	Aseptic packaging of milk- UHT milk	**1**
5.	Vacuum packaging, MAP and role of different gases	**1**
6.	Retort pouch processing - Active and intelligent/ smart (biosensors) packaging	**1**
7.	Edible and biodegradable packaging, Nanotechnology for food packaging	**1**
8.	Recycling of packaging materials	**1**
9.	Labelling requirements, Barcoding and its importance, Packaging standards and regulations	**1**
10.	Economics of different packaging systems	**1**
	Unit-II (07 Lectures)	
11.	Marketing of Livestock Products - Types of markets	**1**
12.	Marketing channels of live meat animals and Poultry - Existing systems - constraints and possible solutions	**1**
13.	Value Chain of meat, poultry and processed products - strategies and interventions for better profitability	**1**
14.	Meat retailing and establishment of retail outlets for meat and poultry	**1**
15.	FSSAI regulations for the domestic market, import and export of livestock products	**1**
16.	APEDA, regulations for the domestic market, import and export of livestock products	**1**
17.	EIA, GOI/ WTO regulations for the domestic market, import and export of livestock products	**1**

LPT- 605 Practical Schdule		
Practical No	**Topic**	**No. of Practicals**
1.	Different packaging materials and their properties	**1**
2.	Determination of thickness	**1**
3.	Determination of bursting strength	**1**
4.	Determination of piercing strength	**1**
5.	Determination of water vapour transmission rate	**1**
6.	Determination of gas transmission rate	**1**
7.	Determination of headspace gas analysis	**1**
8.	Vacuum packaging of milk products	**1**
9.	Vacuum packaging of meat products	**1**
10.	Shrink packaging of milk products	**1**
11.	Shrink packaging of meat products	**1**
12.	MAP packaging of milk products	**1**

13.	MAP packaging of meat products	**1**
14.	Retort packaging of milk and meat products	**1**
15.	Visit to milk processing plants	1
16.	Visit to meat processing plants	**1**
17.	Study of the value chain of livestock products including online marketing	**1**

LPT 606 Microbiology and Quality Control of Livestock Products Credit: 1+1=2

Lecture No.	Lecture Title
	Unit I (9 Lectures)
1	Microorganisms associated with spoilage of livestock products.
2	Microorganisms associated with spoilage of livestock products.
3	Factors affecting microbial growth.
4	Contamination of livestock products.
5	Microbial spoilage of meat, poultry, eggs, milk and their products.
6	Physical and chemical changes produced by microbes in milk, meat, eggs and their products.
7	Meat and milk-borne infections and intoxications.
8	Control of microbial growth in livestock products.
9	Antimicrobial resistance (AM).
	Unit II (8 Lectures)
1	Introduction to Good Laboratory Practices (GLP), Good Hygienic practices (GHP) and Good Manufacturing Practices (GMP), Sanitary and Phytosanitary measures (SPS).
2	Food Safety System Certification (FSSC)
3	Quality Control, Quality Assurance, Principles and practices - Quality Management Systems.
4	Food Safety and Standards Act (FSSAI, 2006 Act)
5	Codex regulation for food products safety - ISO 9001 - ISO 22000.
6	HACCP concepts - Risk-based quality assessment - Microbial quality control
7	FSSAI/ BIS standards for milk, meat and poultry.
8	Chemical residues in livestock products and their effects on the health of the consumer.

LPT- 606 Practical Schedule	
1	Basic requirements for setting up of quality control laboratory
2	Sampling methodsfor the microbiological examination of different processing plants, products and equipment.
3	Development of HACCP plan for milk and meat processing plants.
4	Microbial evaluation of market samples of milk, meat and egg for Total Viable Count.
5	Microbial evaluation of market samples of milk, meat and egg for Coliform Count.
6	Microbial evaluation of market samples of milk for Pathogens of Public Health importance- E. coli.
7	Microbial evaluation of market samples of meat for Pathogens of Public Health importance- E. coli.
8	Microbial evaluation of market samples of egg for Pathogens of Public Health importance- E. coli.

9	Microbial evaluation of market samples of milk for Pathogens of Public Health importance-Salmonella.
10	Microbial evaluation of market samples of meat for Pathogens of Public Health importance-Salmonella.

LPT 607: Slaughterhouse By-products Technology **Credit: 1+1=2**

Lecture No.	Lecture Title
	Unit I (6 Lectures)
1	Status and scope of slaughterhouse by-products utilization.
2	Trade practices
3	Planning, design and layout of by-products plant.
4	Classification of by-products -edible and inedible.
5	Rendering methods and products.
6	Yield and characteristics of rendered fat and meat cum bone meal.
	Unit II (6 Lectures)
1	Utilization of blood and intestine
2	Utilization of horns, hooves and bones,
3	Utilization of feathers and bristles,
4	Utilization of glandular by-products and ruminal contents.
5	Value-added by-products from slaughterhouse and poultry processing plants - Processing of animal by-products for pet foods.
6	High-value low volume by-products- collagen sheets, scaffolds, bone morphogenic, proteins, biopeptides, biodiesel, etc.
7	Legislation and regulations related to animal by-products.
	Unit III (5 Lectures)
1	Flaying
2	Classification and factors affecting the quality of hides and skin.
3	Physical and chemical characteristics of hide and skin.
4	Grading and processing of hide and skin for the manufacture of leather.
5	Preparation and quality control of gelatine and glue.

LPT- 607 Practical Schedule	
1	Preparation of casing.
2	Preparation of neat's foot oil.
3	Preparation of gelatin and glue.
4	Demonstration of preparation of carcass meal and meat meal.
5	Demonstration of preparation of bone meal.
6	Demonstration of preparation of blood meal.
7	Demonstration of preparation of feather meal.
8	Demonstration of preparation of slime meal.
9	Grading of casings
10	Collection and preservation of glandular by-products.
11	Preparation of pet foods
12	Visit to local by-products processing units.
13	Qualityevaluationof rendered animal fat- Yield colour and Fat percent

14	Qualityevaluationof rendered animal fat- Moisture content and unsaponifiable matter
15	Qualityevaluationof rendered animal fat- Iodine Number
16	Qualityevaluationof rendered animal fat- Melting point
17	Qualityevaluationof rendered animal fat- Peroxide Value

LPT 608: In-plant Training **Credit Hours : 0+2**

Practical (*34 sessions/ Hours equivalent to 34 credit hours of practical*)

LPT students shall undergo in-plant training in any one of the specialized area of Restructured and Revised Syllabi of Post-graduate Programmes Vol. 3

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LPT 609: Egg and Egg Products Technology **Credit: 1+1=2**

Lecture No.	Lecture Title
	Unit I (9Lectures)
1	Status of egg production and processing in India
2	Structure of egg
3	Composition and nutritive value of egg
4	Functional properties of eggs
5	Grading of eggs
6	Preservation of eggs
7	Packaging and marketing of shell eggs.
8	Quality evaluation of shell eggs and factors influencing egg quality.
9	Defects and Spoilage of eggs.
	Unit II (8 Lectures)
1	Layout and design of egg processing Unit.
2	Principles and procedures involved in pasteurization of egg products.
3	Principles and procedures involved in chilling and freezing of egg products.
4	Principles and procedures involved in Desugarization of egg.
5	Principles and procedures involved in drying of egg products.
6	Quality standards of egg products.
7	Packaging of egg products.
8	Designer egg products.

LPT- 609 Practical Schedule	
1	Evaluation of physical quality of egg.
2	Evaluation of physical quality of egg Products.
3	Evaluation of chemical quality of egg
4	Evaluation of chemical quality of egg Products
5	Evaluation of functional quality of egg
6	Evaluation of functional quality of egg Products
7	Evaluation of microbial quality of egg.
8	Evaluation of microbial quality of egg Products.
9	Various methods of Preservation of eggs.
10	Preparation of value-added egg products- Pickled Egg
11	Preparation of value-added egg products-Egg omelette Mix
12	Preparation of value-added egg products-Poached Egg,Scrambled Egg
13	Preparation of value-added egg products-Pancakes, Sponge cakes
14	Preparation of value-added egg products-Mayonnaise
15	Packaging of egg.
16	Packaging of egg products.
17	Visit to egg-processing plant.

LPT 610: Market Milk Processing and Dairy Plant Practices **Credit 1+1=2**

Lecture No.	Lecture Title
	Unit I (5 Lectures)
1	Organization of procurement and pricing plans of raw milk - Operation of automatic milk collection stations.
2	Organization of procurement and pricing plans of raw milk - Operation of automatic milk collection stations.
3	Reception of milk at Raw Milk Reception Dock (RMRD.
4	Assessing raw milk quality - Sanitary handling of milk.
5	Assessing raw milk quality -Milk standards and legislations.
	Unit II (6 Lectures)
6	Unit operations in milk processing plants - Clarification – Bactofugation
7	Different chilling methods of Milk
8	Standardization and Homogenization of milk (theories, methods and effects)
9	Heat treatments of milk (thermization, boiling, pasteurization,
10	Sterilization of milk (UHT and In-container)
11	Separation technologies (Microfiltration, Ultrafiltration, reverse osmosis, diafiltration, nanofiltration etc).
	Unit III (2 Lectures)
12	Distribution methods for liquid milk, Consumer pricing, Traceability, Handling of unsold and returned milk.
13	Adulteration of milk and its detection , Residues in milk and preventive steps
	Unit IV (4 Lectures)
14	Fortified, special and functional market milk , A1 and A2 milk
15	Design and layout of dairy plants of different capacities
16	Dairy by-products
17	Treatment of Dairy Effluents

Practical No.	LPT 610 Practical Schedule
1	Platform tests Fat, , Acidity
2	Platform tests Alcohol test, COB test, Specific gravity
3	Platform tests Organoleptic tests,
4	Determination of total solid and SNF
5	Principles of rapid milk analyzers including milko tester
6	Operation of automatic milk collection stations
7	Operation of automatic milk collection stations
8	Assessment of Raw milk quality

9	Estimation of Somatic cell count
10	Estimation of Bacteriological count
11	Estimation of Bacteriological count
12	Estimation of homogenization efficiency
13	Assessment of efficiency of pasteurization
14	Assessment of efficiency of Sterilization
15	Assessment of efficiency of boiliong
16	Detection of various adulterants in milk
17	Visit to milk Processing Plant

LPT 611: Processing and Marketing of wool **Credit:1+1**

Lecture No.	**Topic**
	Unit I (Lectures 10)
1	Status and Prospectus of wool Industry
2	Wool types and their uses
3	Growth and molecular structure of wool fiber
4	Physical and chemical properties of wool
5	Grading of wool
6	Characteristics of specialty hair fibers and their uses
7	Factors influencing quality of wool
8	Factors influencing quality of specialty hairs fibers
9	Principles and steps involved in processing of wool and specialty hairs fibers
10	Impurities in wool and their removal and Defects in wool
	Unit II (7 Lectures)
11	Physical testing of wool
12	Chemical testing of wool
13	Mechanical testing of wool
14	By-products of wool industry
15	Trade and Marketing of wool
16	Specification and regulation for quality control of wool

17	Characteristics of natural and synthetic fibers

Practical No.	**LPT- 611 Practical Schedule**
1	Physical testing of wool
2	Physical testing of specialty fibers
3	Chemical testing of wool
4	Chemical testing of Specialty fibers
5	Mechanical testing of wool
6	Mechanical testing of specialty fibers
7	Characteristics of wool
8	Characteristics of specialty fibers
9	Grading of wool
10	Grading of wool
11	Identification of Natural fibers
12	Identification of Synthetic fibers \
13	Various steps involved in processing of wool fibers
14	Various steps involve in processing of wool fibers
15	Various steps involve in processing specialty hair fibers
16	Various steps involve in processing specialty hair fibers
17	Visit to wool processing unit

LPT 612: Biotechnology of Food of Animal Origin Credit 1+1

Lecture No.	Lecture Schedule
	Unit I (Lectures 10)
1	Role of Biotechnology in improving productivity and quality of meat milk and their products
2	Role of Biotechnology in improving productivity and quality of meat milk and their products
3	Role of Biotechnology in improving productivity and quality of meat milk and their products
4	Application of biotechnological tools in food preservation and packaging
5	Transgenic meat animal production
6	Technique in Gene influencing meat quality traits
7	Production of meat and milk with the desired composition
8	Application of enzymes in dairy and meat industry
9	Genetically modified enzymes
10	Biotechnologically produced food flavours and colours for animal products
	Unit II (Lecture 7)
11	Starter culture in meat and milk-pre and probiotics and their supplementation in animal origin foods
12	Bio-preservatives Bacteriocin
13	Fermentation technology
14	Upstream and Downstream processing
15	Bio-sensors
16	Antimicrobial peptides
17	Meat species identification molecular tools

Practical No.	LPT- 612 Practical Schedule
1	Introduction of basic biotechnological techniques
2	Western Blotting
3	Enzyme Isolation
4	Enzyme identification
5	DNA extraction
6 & 7	Amplification of different types of PCR
8 & 9	Acquaintance with RT-PCR
10	Multiplex PCR
11	Gene identification
12	Gene Characterization
13	Biotechnological techniques for meat species identification
14	Biotechnological techniques for meat quality identification
15	Electrophoresis
16	Chromatography for fatty acids
17	Operation of fomenters

LPT 613: FISH AND FISH PRODUCTS TECHNOLOGY Credit: 1+1

Lecture No.	Lecture Schedule
1.	Fishery resources, marine and freshwater fishes
2.	Transportation of fish and hygienic handling of fish
3.	Fish muscle structure
4.	Composition and nutritive value fish
5.	Processing of fish - cutting, filleting, deheading, peeling, deveining, etc.
6.	Preservation – chilling and freezing.
7.	Principles and procedure of canning
8.	Principles and procedure of curing, smoking and dehydration
9.	Principles and procedure of smoking and dehydration
10.	Principles and procedure of surimi and other fish based products
11.	Quality control- identification of freshness of fish
12. & 13.	Chemical and microbial spoilage of fish,
14.	Labelling and marketing of fish and fish products
15.	Utilization of fish processing waste.
16. &17.	National and international regulations Standards, quality control and marketing of fish and fish products.

Practical No.	LPT 613 Practical Schedule
1.	Visit to fish processing plant
2.	Grading of live fish for freshness
3. & 4.	Filleting and other techniques for the processing of fish
5.	Estimation of proximate composition of fish (Moisture and Fat)

6.	Estimation of proximate composition of fish (Protein and Ash)
7. & 8.	Physicochemical evaluation of fish quality
9. &10.	Microbial evaluation of fish quality
11.	Preparation of Value added fish products.
12.	Preparation of Value added fish products.
13.	Preparation of Value added fish products.
14.	Preparation of Value added fish products.
15.	Preparation of Value added fish products.
16.	Preparation of Value added fish products.
17.	Preparation of Value added fish products.