Revised Course Curriculum and Syllabus of B. Sc. (Hons.) Animal Husbandry

As Per Recommendations of V Deans Committee ICAR, New Delhi

For

State Agricultural Universities of Maharashtra from

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(Dr.Y.G.Fulpagare)

Degree and Discipline Course Coordinators

Sr. No.	Name & Designation		Photo
1.	**Dr. Y. G. Fulpagare** **Associate Dean,** **College of Agriculture, Dhule** **Dist. Dhule**	**Degree Coordinator** **B.Sc. Hons.** **Animal Husbandry**	
2.	**Dr. U. Y. Bhoite,** **Head, Dept. of Animal Husbandry and Dairy Science,** **Mahatma Phule Krishi Vidyapeeth, Rahuri**	**Coordinator** **Student Ready Prog., (AHWE)**	
3.	Prof.Raskar A.B. Principal(I/C) and Assistant Professor	Discipline Coordinator Animal Science & Dairy Science	
4.	Dr.Bhoite D.P. Assistant Professor	Discipline Coordinator Vet. Reproduction	
5.	Dr.Khandare S.M. Assistant Professor	Discipline Coordinator Vet. Anatomy	

6.	Dr.Waghmare S.P. Assistant Professor	Discipline Coordinator Vet.Animal Nutrition	
7.	Dr.Sorate S.D. Assistant Professor	Discipline Coordinator Vet.Physiology and Biochemistry	
8.	Prof.Karche R.V. Assistant Professor	Discipline Coordinator Dairy Science	
9.	Prof.Shinde S.D. Assistant Professor	Discipline Coordinator Vet.Pharmacology	
10.	Prof.Karnewar S.D. Assistant Professor	Discipline Coordinator Animal Genetics and Breeding	

11.	Prof.Pawar S.V. Assistant Professor	Discipline Coordinator Animal Science	
12.	Prof.Kalamkar R.B. Assistant Professor	Discipline Coordinator Agril. Extension	
13.	Prof.D.M.Patil Assistant Professor	Discipline Coordinator Computer Science	
14.	Prof.Karpe A.H. Assistant Professor	Discipline Coordinator Agronomy	
15.	Prof.Gaikwad R.D. Assistant Professor	Discipline Coordinator Soil Science	

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Department–wise Course Distribution

Sr. No	Name of Department	Course No.	Title of the Course	Credits	Semester
1	**Agronomy (AGRO)**	AGRO-111	Forage Production -I	2=1+1	I
		AGRO-242	Forage Production -II	2=1+1	IV
		AGRO-243	Practical Forage Production	2=0+2	IV
			Total	**6=2+4**	
2	**Soil Science**	SS-111	Fundamentals of Soil Science	2=1+1	I
			Total	**2=1+1**	
3	**Agril. Extension (EXTN)**	EXTN-111	Fundamentals of Rural Sociology and Educational Psychology	2=1+1	I
		EXTN-122	Dimensions of Agricultural extension	2=1+1	II
		EXTN-363	Entrepreneurship Development and business management	1=1+0	VI
			Total	**5=3+2**	
4	**Agril. Economics (ECON)**	ECON-121	Principles of Agricultural Economics	2=1+1	I
		ECON-232	Agricultural Finance And Management	2=1+1	III
		ECON-243	Production Economics and Farm Management	2=1+1	IV
		ECON-354	Livestock Economics And Marketing	3=2+1	V
			Total	**9=5+4**	
5	**Agril. Statistics (STAT)**	STAT-111	Design of Experiment for Animal science	2=1+1	I
		STAT-232	Agricultural Informatics	3=1+2	III
		STAT-353	Information and Communication Technology	3=2+1	V
			Total	**8=4+4**	
6	**Livestock Production and management (LPM)**	LPM-111	Livestock Production and management	2=1+1	I
		LPM-232	Sheep and Goat Production	2=1+1	III
		LPM-233	Poultry Production	2=1+1	III
		LPM-244	Organic Livestock Farming System	2=1+1	IV
		LPM-355	Livestock Management	2=1+1	V
		LPM-356	Livestock Hygiene	2=1+1	V
		LPM-357	Farm Animal Behavior	2=1+1	V
		LPM-358	Pet Animal Management	2=1+1	V
		LPM-359	Integrated Livestock System	2=1+1	V
		LPM-3610	Animal Housing and Milking Systems	3=2+1	VI
		LPM-3611	Livestock Farm Hygiene	2=1+1	VI
		LPM-3612	Livestock Farm Practices	1=0+1	VI
		LPM-3613	Hatchery Management	2=1+1	VI
		LPM-3614	Diversified Poultry Production	3=2+1	VI
		LPM-4715	Implant Training at Livestock/ Poultry farm	5=0+5	VII
		LPM-4816	Commercial Poultry Production	10=0+10	VIII
		LPM-4817	Hatchery Management	10=0+10	VIII
			Total	**54=15+39**	
7	**Animal Nutrition (AN)**	AN-121	Principles Of Animal Nutrition	2=1+1	II
		AN-232	Analytical Techniques in Animal Nutrition	1=0+1	III
		AN-233	Applied Animal Nutrition	3=2+1	III

			Total	**7=4+3**	

8	**Vet. Anatomy (VAN)**	VAN-111	Introductory Veterinary Anatomy	3=2+1	I
		VAN-123	Anatomy of Circulatory System	2=1+1	I
		VAN-112	Anatomy of Digestive System	2=1+1	I
			Total	**7=4+3**	
9	**Vet. Physiology and Biochemistry (VPB)**	VPB-111	Physiology of Circulatory and Respiratory system	3=2+1	I
		VPB-112	Physiology of lactation	2=2+0	I
		VPB-123	Physiology of Digestive system	2=1+1	II
		VPB-124	Physiology of Reproductive system	2=1+1	III
		VPB-125	Physiology of Endocrine system	2=1+1	
			Total	**11=7+4**	
10	**Vet. Gynecology and Obstetrics (VGO)**	VGO-231	Animal Reproduction	2=1+1	III
		VGO-242	Andrology and Artificial Insemination	3=2+1	IV
			Total	**5=3+2**	
11	**Vet. Pharmacology And Toxicology (VPT)**	VPT-231	Introductory Veterinary Pharmacology	2=1+1	III
		VPT-232	Systemic Pharmacology	1=1+0	III
			Total	**3=2+1**	
12	**Animal Genetics and Breeding (AGB)**	AGB-121	Principles of Animal Breeding	2=1+1	II
		AGB-122	Principles of Animal Genetics	2=1+1	II
		AGB-243	Molecular Genetics Of Animals	2=2+0	IV
		AGB-354	Livestock Breeding System	2=1+1	V
			Total	**8=5+3**	
13	**Vet. Pathology And Paracitology (VPP)**	VPP-121	General Pathology	2=1+1	II
		VPP-122	Veterinary Immunology	2=1+1	II
		VPP-233	General Parasitology	2=1+1	III
		VPP-244	Introductory Veterinary Micro biology	3=2+1	IV
		VPP-365	Laboratory Diagnosis	2=0+2	VI
			Total	**11=5+6**	
14	**Vet. Medicine (VM)**	VM-241	Preventive Medicine-I	3=2+1	IV
		VM-352	Veterinary Epidemiology	2=1+1	V
		VM-353	Para Veterinary Technicians Skills	2=1+2	V
		VM-354	Preventive Medicine II	2=1+1	V
		VM-365	Veterinary Ethics and Jurisprudence	2=2+0	VI
		VM-476	Para Clinical Veterinary Skills	10=0+10	VII
			Total	**22=7+15**	
15	**Dairy Science**	DSC-121	Milk and Milk Products	2=1+1	I

	(DSC)	DSC-242	Dairy Microbiology	2=1+1	IV
		DSC-473	Implant Training At Milk / Meat / Feed processing Unit	5=0+5	VII
		DSC-484	Commercial Production of Milk Products	10=0+10	VIII
			Total	**19=2+17**	
16	**Animal Product Technology (APT)**	APT-361	Abattoir Practices And Slaughter Byproduct Technology	3=2+1	VI
		APT-362	Meat And Meat Product Technology	3=2+1	VI
			Total	**6=4+2**	
17	**Other Department**				
		LANG-111	Comprehension and Communication Skills in English	2=1+1	I
		LANG-242	Communication Skills And personality Development	2=1+1	IV
		ENV-231	Environmental Science	3=2+1	III
		NSS/NCC	National Service Scheme	2=0+2	IV
		DEG-121	Democracy and good Governance	1=1+0	II
		PHEY-121	Physical education and yoga	1=0+1	I
			Total	**11=3+8**	
				182=78+104	

Sr. No.	**Activity**	**Credits**	**Semester**
1	Internship Programme (Professional Package)	0+20	VII
2	AHWE & Placement in Industries	0+20	VII
	Total	**0+40**	
	Grand Total Credits	**140+42=182**	

Sr. No.	**RHWE & Placement in Industries schedule**	**Proposed Duration**
1	Orientation Programme	1 weeks
2	Stay at Placement unit – Company/Farm	9 weeks
3	Placement Programme	9 weeks
4	Report writing & Final Examination	2 weeks
Total		**21 Weeks**

Semester wise Layout of Courses B.Sc. (Hons) Animal Husbandry

Semester – I

Course No.	Courses	Credits		
		Theory	**Practical**	**Total**
A)	**Core courses**			
LPM- 111	Livestock Production and Management	1	1	2
VPB- 111	Physiology of Circulatory and Respiratory System	2	1	3
VPB-112	Physiology of Lactation	1	0	1
VAN-111	Introductory Veterinary Anatomy	2	1	3
VAN-112	Anatomy of Digestive System	1	1	2
	Sub total	**7**	**4**	**11**
B)	**Basic Courses**			
SS-111	Fundamentals of Soil Science	1	1	2
AGRO-111	Forage Production I	1	1	2
EXTN-111	Fundamentals of Rural Sociology and Educational Psychology	1	1	2
STAT-111	Design of Experiments for Animal Science	1	1	2
	Sub Total	**4**	**4**	**8**
E)	**Non-Gradial Courses**			
LANG-111*	Comprehension and Communication Skills in English*	1	1	2
NSS-121*	National Service Scheme*	0	1	1
DEG-111*	Democracy, Elections and Good Governance	1	0	1
PHEY-111*	Physical Education and Yoga	0	1	1
	Sub total	**2**	**3**	**5**
	Total Credits (A+B+C+D+E)	**13**	**11**	**24**

Semester – II

Course No.	Courses	Credits		
		Theory	**Practical**	**Total**
A)	**Core courses**			
DSC-121	Milk and Milk Products	1	1	2
AN-121	Principles of Animal Nutrition	1	1	2
AGB-121	Principles of Animal Breeding	1	1	2
AGB-122	Principles of Animal Genetics	1	1	2
VPB-123	Physiology of Digestive System	1	1	2
VAN-123	Anatomy of Circulatory System	1	1	2
VPB-124	Physiology of Reproductive System	1	1	2
VPP-121	General Pathology	1	1	2
VPP-122	Veterinary Immunology	1	1	2
VPB-125	Endocrine System	1	1	2
	Sub total	**10**	**10**	**20**
B)	**Basic Courses**			
ECON-121	Principles of Agricultural Economics	1	1	2
EXTN-122	Dimensions of Agricultural Extension	1	1	2
	Sub total	**2**	**2**	**5**
	Total Credits (A+B+C+D+E)	**12**	**12**	**24**

Semester – III

Course No.	Courses	Credits		
		Theory	**Practical**	**Total**
A)	**Core courses**			
VPP-233	General Parasitology	1	1	2
VPT-231	Introductory Veterinary Pharmacology	1	1	2
VPT-232	Systemic Pharmacology	1	0	1
VGO-231	Animal Reproduction	1	1	2
LPM-232	Sheep and Goat Production	1	1	2
LPM-233	Poultry Production	1	1	2
AN-232	Analytical Techniques in Animal Nutrition	0	1	1
AN-233	Applied Animal Nutrition	2	1	3
	Sub total	**8**	**7**	**15**
B)	**Common Courses**			
STAT-232	Agricultural Informatics	1	2	3
ECON-232	Agricultural Finance and Management	1	1	2
EVS-231	Environmental Studies and Disaster Management	2	1	3
	Sub total	**4**	**5**	**9**
	Total Credits (A+B+C+D+E)	**12**	**12**	**24**

Semester – IV

Course No.	Courses	Credits		
		Theory	**Practical**	**Total**
A)	**Core courses**			
VPP-244	Introductory Veterinary Microbiology	2	1	3
VM-241	Preventive Medicines –I	2	1	3
VGO-242	Andrology and Artificial Insemination	2	1	3
LPM-244	Organic Livestock Farming	1	1	2
DSC-242	Dairy Microbiology	1	1	2
AGB – 243	Molecular Genetics of Animals	2	0	2
	Sub total	**10**	**5**	**15**
B)	**Basic Courses**			
AGRO-242	Forage Production II	1	1	2
AGRO-243	Practical Forage Production	0	2	2
ECON-243	Production Economics and Farm Management	1	1	2
	Sub Total	**2**	**4**	**6**
B)	**Common Courses**			
LANG-242	Communication Skills and Personality development	1	1	2
	Sub total	**1**	**1**	**2**
	Total Credits (A+B+C+D+E)	**13**	**10**	**23**

Semester – V

Course No.	Courses	Credits		
		Theory	**Practical**	**Total**
A)	**Core courses**			
LPM-355	Livestock Management	1	1	2
VM-352	Veterinary Epidemiology	1	1	2
VM-353	Para Veterinary Technician Skills	1	2	3
AGB-354	Livestock Breeding Systems	1	1	2
LPM-356	Livestock Hygiene	1	1	2
ECON-354	Livestock Economics and Marketing	2	1	3
LPM-357	Farm Animal Behaviour	1	1	2
LPM–358	Pet Animal Management	1	1	2
LPM-359	Integrated Livestock Farming System	1	1	2
	Sub total	**10**	**10**	**20**
B)	**Common Courses**			
STAT-353	Information and Communication Technology	2	1	3
	Sub total	**2**	**1**	**3**
	Total Credits (A+B+C+D+E)	**12**	**11**	**23**

Semester – VI

Course No.	Courses	Credits		
		Theory	**Practical**	**Total**
A)	**Core courses**			
LPM-3610	Animal Housing and Milking Systems	2	1	3
LPM–3611	Livestock Farm Hygiene	1	1	2
LPM-3612	Livestock Farm Practices	0	1	1
LPM -3613	Hatchery Management	1	1	2
LPM- 3614	Diversified Poultry Production	2	1	3
APT-361	Abattoir Practices and Slaughter Byproduct Technology	2	1	3
APT-362	Meat and Meat Product Technology (Including Poultry Product Technology)	2	1	3
VM -364	Preventive Medicine-II	1	1	2
VPP-365	Laboratory Diagnosis	0	2	2
VM -365	Veterinary Ethics and Jurisprudence	2	0	2
	Sub total	**13**	**10**	**23**
B)	**Common Courses**			
EXTN-363	Entrepreneurship Development and Business Management	1	0	1
	Sub total	**1**	**1**	**1**
	Total Credits (A+B+C+D+E)	**14**	**11**	**24**

Semester VII **Animal Husbandry Internship and Industrial Training** **Credits = 20=0+20** **Duration = 24 weeks**		
Component- I **Credit=10=0+10**		
VM-475	Para Clinical Veterinary Skills I. Medicine II. Animal Reproduction	Credit=05=0+05 Credit=05=0+05
	Total Credit =	**10=0+10**
Component- II **Credit=0+10=10**		
LPM-4715	In Plant Training at livestock farm / Poultry farm	Credit=05=0+05
DSC-473	In Plant Training at Feed Mill/Factory /Meat/Milk processing unit	Credit=05=0+05
	Total Credit =	**10=0+10**
Component I + Component II (Duration 24 weeks)		**20=0+20**

Sr.No.	Title of the Course	Credits
1	STUDENT READY - Placement in Industries	0+10
2	STUDENT READY- Placement in Farm/Industries	0+10
	Total	**20 (0+20)**

Placement in Farm/Company/Industry/Lab

1	Registration, Orientation and Placement	1 week
2	Actual AHWE placement in Farm/Company/Industry/Lab	8 weeks
3	Examination	1 week
	Total	**10 weeks**

Placement in Industry/Company/Lab

Placement in Industries

1	Orientation and Placement	1 week
2	Actual work in Industry	8 weeks
3	Examination	1 week
	Total	**10 weeks**

Semester VIII

Student READY Programme

(RURAL AND ENTERPRENEURSHIP AWARENESS DEVELOPMENT YOJANA)

- **Students will have to register any two modules**

LPM-4816	Commercial Poultry Production	Credit=10=0+10
DSC-484	Commercial Production of Milk Products	Credit=10=0+10
LPM 4817	Hatchery Management	Credit=10=0+10
Total Credit =		**20=0+20**
Total Semester Ist to VIIIth Semester ***NCCC – Non-credit compulsory courses**		**182 Credits**

Department -Agronomy (AGRO)

Course: AGRO-111 Title: Forage Production -I
Credit: 2= 1+1
Syllabus
Theory –
Introduction on fodder production, Importance of grassland and fodders in livestock production, Agronomical practices for production of leguminous fodders in kharif seasons, Cultivation Practices of Jowar, Maize, Bajara , Cultivation Practices of irrigated forage grasses (Anjan grass, Hybrid Napier, Para grass and Guinea grass), Cultivation Practices of rainfed (scarcity) forage grasses (Dinanath grass, rhodes grass, marvel grass, Pavana grass and blue panic grass), Storage of fodders.

Practical-
Identification of seeds and plants of fodder/forage crops, Preparation of seedbed, Irrigation layouts for forage crops, Study of different seed treatments, Calculation on seed rate for different forage crops, Sowing of different forage crop, Study of important growth stages Calculation of fertilizer requirement and fertilizer application, Weed management, Harvesting of Forage crop, Cost of cultivation
Textbook -
A Text-Book of grasses by A. S. Hitchcock
Forage Crop Production in the Tropics Paperback – 2008 by C. George Thomas
Reference Books

- Principles of Agronomy _ S.R. Reddy
- Crop Production and Management – Y.B Morchand
- Principles of Agronomy- Sankaram S. And V.T Subblah Mudiyar
- Principles of Agronomy – T. Yellamanda Reddy and G.H. Sankara Reddy.
- Handbook of Agriculture- ICAR Publication
- Agricultural Development Today & Tommarow Vol. I _ Arun Kumar
- Agricultural Finance – subba Reddyand Raghu Ram
- Woman in Agriculture- Ranjit Kumar Samantha
- A History of Agriculture in India , Vol IV – M.S. Randhawa

Teaching Schedule

Lecture No.	Topic Details	Weightages %
1-2	Introduction on fodder production	10
3	Importance of grassland and fodders in livestock production	10

4-5	Agronomical practices for production of leguminous fodders in Kharif season	15
6-8	Cultivation Practices of Jowar, Maize and Bajara	15
9-13	Cultivation Practices of irrigated forage grasses (Anjan grass, Hybrid napier, Para grass and Guinea grass)	20
11-15	Cultivation Practices of rainfed (scarcity) forage grasses (Dinanath grass, rhodes grass, marvel grass, pavana grass and blue panic grass)	20
16	Storage of fodders	10

Practical Schedule

Practical No.	**Topic Details**
1	Identification of seeds and plants of fodder/forage crops
2-3	Preparation of seedbed
4	Irrigation layouts for forage crops
5-6	Study of different seed treatments
7	Calculation on seed rate for different forage crops
8	Sowing of different forage crop
9	Study of important growth stages
10-11	Calculation of fertilizer requirement and fertilizer application
12-13	Weed management
14	Harvesting of Forage crop
15-16	Cost of cultivation

Course No. AGRO-242 Course Title: **Forage Production II**

Credits: 2=1+1

Syllabus:

Theory

Agronomical practices for production of non-leguminous fodder, Feed and fodder management for individual animals, Fodder production for small units through inter cropping or back yard cultivation, Recycling of animal washings and wastes in fodder production, Silvipasture Development, Scarcity fodders, Cultivation Practices for Sugarcane, Barley and different grasses,

Practical syllabus:

Familiarization with the various types of fodder crops utilized in the state and the samples of fodder in India, Feeds and fodders used in small and backyard units of livestock, Collection and preservation of different fodders & their seed, Cost of cultivation of fodder production, Live-stock waste utilization and recycling, Different methods for Forage storage in animal and poultry farm, Silvipasture Development and importance of tree lopping in livestock feeding, Visit to fodder Cafeteria.

Text Book:

- Modern Techniques of Raising field Crops- Singh Chhidda
- Field Crop-II (Rabi Crops)- Patil.H.B
- Forage Crop Production in the Tropics- Thomas C.George
- Scientific Crop Production- Singh.N.P

Theory Schedule

Lect. No.	Topic	Weightages %
1-2	Agronomical practices for production of non-leguminous fodder	20
3-5	Feed and fodder management for individual animals	10
6-8	Fodder production for small units through inter cropping or back yard cultivation	15
8-10	Recycling of animal washings and wastes in fodder production	15

10-11	Silvipasture Development	10
11-12	Scarcity fodders	10
12-16	Cultivation Practices for Sugarcane, Barley and different grasses	20

Practical Schedule

Lect. No.	Topic
1	Familiarization with the various types of fodder crops utilized in the state and the samples of fodder in India
2	Feeds and fodders used in small and backyard units of livestock
3	Collection and preservation of different fodders & their seed
4	Cost of cultivation of fodder production
5	Live-stock waste utilization and recycling
6	Different methods for Forage storage in animal and poultry farm
7	Silvipasture Development and importance of tree lopping in livestock feeding
8-9	Visit to fodder Cafeteria

Course No- AGRO-243 Course Title: Practical Forage Production

Credits: 2= 0+2

Syllabus-

Practical- Allotment of 2R plot to each student, assessment of Physico- chemical properties of plot, preparatory tillage, secondary tillage for seed bed preparation, evaluation of soil structure, selection of crop on the basis of soil type & availability of other inputs.

Sowing: Seed rate, seed treatment, germination percentage, emergence percentage.

Fertilizer: N. P. K requirement of the crop, concept of soil test crop response & targeted yield.

Plant clinic: Timely diagnosis of pest & disease incidence, integrated pest & disease management- concept.

Irrigation: water requirement, irrigation scheduling, irrigation layout for the crop.

Soil & plant management: Inter culturing weed management, crop maturity indicators, crop harvest, biomass record, grain & fodder ratio, optimum grain moisture status.

Economics: Estimation of B:C ratio.

Text Book:

- Forage Crop Production in the Tropics- Thomas C.George
- Modern Techniques of Raising field Crops- Singh Chhidda
- Field Crop-II (Rabi Crops)- Patil.H.B
- Scientific Crop Production- Singh.N.P

Practical

Pract. No.	Topic	Weightages %
1-2	Allotment of 2R plot to each student, assessment of Physico- chemical properties of plot	10
3-5	Preparatory tillage, secondary tillage for seed bed preparation, evaluation of soil structure, selection of crop on the basis of soil type & availability of other inputs.	13
6-7	**Sowing:** seed rate, seed treatment, germination percentage, emergence percentage.	14
8-9	**Fertilizer:** N. P. K requirement of the crop, concept of soil test crop response & targeted yield.	13
10-15	**Plant clinic:** Timely diagnosis of pest & disease incidence, integrated pest & disease management- concept.	13
15-20	**Irrigation**: water requirement, irrigation scheduling, irrigation layout for the crop.	13
21-25	**Soil & plant management**: Inter culturing weed management, crop maturity indicators, crop harvest, biomass record, grain & fodder ratio, optimum grain moisture status	12
26-32	**Economics:** Estimation of B: C ratio.	12

Department -Soil Science (SS)

Course No. - SS-111 Course Title: Fundamentals of Soil science

Credits - 2= 1+1

Syllabus

Theory

Different approaches for soil evaluation and methods critical levels of different nutrients in soil, Biological method of soil fertility evaluation, soil test based fertilizer recommendation to forage crops, Definition of soil biology, types of organism in different soils, significance of soil biota in soil quality, Biochemical composition and degradation of soil organic matter and crop residue. Aerobic and anaerobic processes of organic matter decomposition, Methods of composition organic residues. Release of available plant nutrients, end product of degradations. Mesophilic, Thermophilic Thermoduric microflora in decaying organic residues, phase of decomposition and participation of different groups of microbes in organic matter decomposition, Humus formation, Organic farming microbial livestock involvement: organic farming, role of nitrogen fixing and phosphate solubilizing biofertilizers in organic farming, Role of composting cultures in organic farming, role of livestock in organic farming, Organic waste and their use for production of biogas and manures: Methanogenesis, methane producing microbes, biogas production using organic waste, utility of biogas slurry as manure

Practical

Determination of Organic carbon content from soil, Determination of available nitrogen in soil by alkaline method, Biological method of soil fertility evaluation, soil test based fertilizer recommendation to forage crops, Determination of available potassium in soil using flame photometer, Soil test based fertilizer recommendation to forage crops, Types of organism in different soils. Aerobic and anaerobic processes of organic matter decomposition. Organic waste and their use for production of biogas and manures. Utilization of organic amendments for improving soil structure and fertility. Preparation of farmyard manure, animal manure. Preparation of rural and urban compost and vermicompost. Methods of production of biofertilizers and their roles in crop production.

Text books:-

- Text book of Soil Science: Biswas B.D. & Mukherjee
- A text book of Soil Science: Daji J.A.

Reference books –

- Fundamentals of soil science :V.D.Patil & C.V.Mali
- Nature & properties of soil :Brady,N.C.
- Introduction of soil science : D.K.Das , Kalyani publication
- Fundamentals of soil science :Publ .ISSS, New Delhi
- Soil chemical analysis : M.L.Jackson
- Analytical agricultural chemistry :Chopra S.L. & Kanwar
- Plant and soil analysis : C.S.Piper
- Practical manual for introductory courses in soils : Khanna S.S. & Yadav D.V.
- Hesse, P.R. :A text of soil chemical analysis John Murray, Publ. Ltd.

Teaching Schedule

Lect. No.	Topic	Weightages %
1	Different approaches for soil evaluation and methods.	05
2	Soil testing, chemical methods, critical levels of different nutrients in soil	10
3	Biological method of soil fertility evaluation, soil test based fertilizer recommendation to forage crops	10
4-6	Definition of soil biology, types of organism in different soils, significance of soil biota in soil quality	10
7-9	Biochemical composition and degradation of soil organic matter and crop residue.	10
10	Aerobic and anaerobic processes of organic matter decomposition	10

11	Methods of composition organic residues. Release of available plant nutrients, end product of degradations.	10
12	Mesophilic, thermophilic thermoduric microflora in decaying organic residues, phase of decomposition and participation of different groups of microbes in organic matter decomposition, Humus formation	10
13	Organic farming microbial livestock involvement: organic farming, role of nitrogen fixing and phosphate Solubilizing Biofertilizers in organic farming	10
14	Role of composting cultures in organic farming, role of livestock in organic farming	10
15-16	Organic waste and their use for production of biogas and manures: Methanogenesis, methane producing microbes, biogas production using organic waste, utility of biogas slurry as manure	05

Practical Schedule

Pract. No.	**Topic**
1	Determination of Organic carbon content from soil
2	Determination of available nitrogen in soil by alkaline method
3	Determination of available phosphorus content in soil by Olsen's methods
4	Determination of available potassium in soil using flame photometer
5	Soil test based fertilizer recommendation to forage crops.
6	Types of organism in different soils.
7	Aerobic and anaerobic processes of organic matter decomposition.
8-9	Organic waste and their use for production of biogas and manures.
10	Utilization of organic amendments for improving soil structure and fertility.
11	Preparation of farmyard manure, animal manure.
12	Preparation of rural and urban Compost and Vermi- composting.
13	Methods of production of bio fertilizers and their roles in crop production.

Department –Agril.Extension (EXTN)

Course No- EXTN- 111

Course Title -Fundamentals of Rural Sociology and Educational Psychology

Credits: 2= 1+1

Theory Syllabus

Extension- Meaning, Definition, Scope and importance in agriculture and animal husbandry Sociology - Meaning, definition, Rural sociology - Meaning, definition, Scope, Importance of Rural Sociology in agricultural extension and Interrelationship between Rural sociology & Agricultural Extension. Indian Rural Society - Important characteristics, Differences between Rural and Urban societies. Cultural concepts - Culture, Customs, Folkways, Mores, taboos, Rituals and traditions- Meaning, Definitions and their role in Agriculture. Social change - Meaning, Definition, Nature of Social change, Dimensions of social change and factors of social change. Leader - Meaning, Definition, types and their role in Agricultural Extension and Animal Husbandry. Role of women in livestock industry. Study the function of dairy co-operative society / livestock societies and study of self help group in relation to livestock. Psychology and educational Psychology - Meaning, Definition, scope, and Importance of Educational Psychology in Agricultural Extension and Animal Husbandry. Teaching - Learning- process - Meaning and definition of Teaching, Learning experience and Learning situation; Elements of learning situation and Its characteristics. Principles of learning and their implication for teaching.

Practical

Study of village situation with bench mark survey, Study of Veterinary clinic in village, Study of Village Service Co-operative Society/dairy societies, Study of Voluntary organization / NGO in the village , Study of youth organization in village, Study of Village Organization for women, role of women in livestock industry, Study the problems faced by dairy farmers, Assessment of various needs in farm family, Study of Marketing of Farm and livestock produce by the farmers, Study of self help group in relation to livestock**.**

Text book-

- ✓ Fundamentals of rural sociology and educational psychology compiled by: Dr anup katoch (associate professor) department of agricultural economics extension education & rural sociology, coa, cskhpkv, palampur (hp**).**
- ✓ Fundamentals of rural sociology and educational psychology, **Publisher:** Agrotech Publications, **Author:** Sharma OP And Somani LL

Reference Book:

- Fundamentals of Rural Sociology & Educational Psychology by O.P Sharma & L.L. Somani, 2012
- Educational Psychology by S.K. Mangal, 1997
- Dimension of Agricultual Extension by Kadam.R.P
- Society, It's organization & operation- Anderson, W. A. & Parker, F.B.
- Rural sociology- Bertrand, A. L.

- Introductory Rural Sociology- Chitamber, J.B.
- Social Psychology- Crow L. D., & Crow, Allice
- Rural Sociology in India- Crow L. D., & Crow, Allice
- Rural Sociology in India- Desai. A. R.
- Educational Psychology- Ellis R. S.
- Education of Psychology- Skinner, C.E.
- An introduction to extension education.- Supe S. V.
- Education & communication for development.- O.P. Dhama & O. P. Bhatnagar
- Extension communication and management- G.L. Ray

Teaching Schedule

Lect. No.	**Topic**	**Weightages%**
1	Extension- Meaning, Definition, Scope and importance in agriculture and animal husbandry	10
2	Sociology - Meaning, Definition	05
3	Rural sociology - Meaning, definition, Scope, Importance of Rural Sociology in agricultural extension and Interrelationship between Rural sociology & Agricultural Extension.	10
4	Indian Rural Society - Important characteristics, Differences between Rural and Urban societies.	10
5-6	Cultural concepts - Culture, Customs, Folkways, Mores, taboos, Rituals and traditions- Meaning, Definitions and their role in Agriculture	10
7-8	Social change - Meaning, Definition, Nature of Social change, Dimensions of social change and factors of social change.	10
8-9	Leader - Meaning, Definition, types and their role in Agricultural Extension and Animal Husbandry	10
9-10	Role of women in livestock industry.	05
10-11	Study the function of dairy co-operative society, livestock species	10
12-13	Study of self help group in relation to livestock.	05
13-14	Psychology and educational Psychology - Meaning, Definition, scope, and Importance of Educational Psychology in Agricultural Extension and Animal Husbandry	05

15-16	Teaching - Learning- process - Meaning and definition of Teaching, Learning experience and Learning situation; Elements of learning situation and Its characteristics. Principles of learning and their implication for teaching.	10

Lect. No.	**Topic**
1	Study of village situation with bench mark survey
2	Study of Veterinary clinic in village
3	Study of Village Service Co-operative Society/dairy societies, livestock societies
4	Study of Voluntary organization / NGO in the village
5-6	Study of youth organization in village
7-8	Study of Village Organization for women, role of women in livestock industry
9	Study the problems faced by dairy farmers
10-11	Assessment of various needs in farm family
12	Study of Marketing of Farm and livestock produce by the farmers
13	Study of self help group in relation to livestock

Course No. EXTN-122 Course Title: Dimensions of Agricultural Extension

Credits: 2=1+1

Syllabus-

Theory-

Education - Meaning, Definition. Formal Education Definition & Characteristics, Informal and Non formal Education- Def & Characteristics, Agricultural Extension, Extension Education- Meaning, Definition, Concepts, Objectives, Principle, Rural Development- Meaning, Definition, Concepts, Objectives, Importance an problems, Developmental programmes of pre independence era- Sriniketan, Marthandam, Gurgaon experiments, Gandhian constructive programme, Developmental programmes of post independence era- Firka Development, Etawah pilot project, Nilokheri Experiment, Community Development Programme- Meaning,

Def, Concepts, Philosophy, Objectives, Principle, Difference between CDP and Extension Education, National Extension Service, Panchayat Raj System- meaning of Democratic Decentralization and Panchayat Raj, Agricultural Development programmes- IADP, HYVP, IVLP, WDP, NATP. ATMA, ATIC, NHM, NAP., Social justice and poverty slieviation programmes- ITDP, IRDP, SGSY, PMEY , New trends in extension, privatization, Women development programme- DWCRA, ICDS,MSY, MA VIM. Recognized extension system (T&V System)- Salient features, Fort nightly, Recognized extension system (T&V System) Salient features fort nightly Meeting, Monthly workshop, Linkages, Merits and Demerits, Single Window System of Extension in Maharashtra, Broad Based Extension (BBE)- Meaning and genesis. Dairy co-operative development programme at Anand, Warna and Mahananda, community dairy farming and milking.

Practical

Study ofVillage, Study of Polyclinic, Study ongoing development programme in village, Study of panchayat raj system, Study of watershed development area project, Study of self help group, Study and organization of participation of Rural Appraisal (PRA) techniques at village level, Abbreviation, study of dairy co-operatives.

Reference Book:

- Dimensions of Agricultural Extension- Singh.A.K
- Dimension of Agricultural Extension- Mande Jyoti
- Dimension of Agricultual Extension- Kadam.R.P

Teaching Schedule

Sr. No	Topic	Weightages %
1	Education - Meaning, Definition. Formal Education Def & Characteristics. Informal and Non formal Education- Def & Characteristics.	7
2	Agricultural Extension, Extension Education- Meaning, Definition, Concepts, Objectives, Principle	8
3	Rural Development- Meaning, Definition, Concepts, Objectives, Importance an problems	9

4	Developmental programmes of pre independence era- Sriniketan, Marthandam, Gurgaon experiments, Gandian constructive programme	7
5	Developmental programmes of post independence era- Firka Development, Etawah pilot project, Nilokheri Experiment.	6
6	Community Development Programme- Meaning, Def, Concepts, Philosophy, Objectives, Principle, Difference between CDP and Extension Education..	6
7	National Extension Service.	8
8.	Panchayat Raj System- meaning of Democratic Decentralization and Panchayat Raj	7
9	Agricultural Development programmers- IADP, HYVP, IVLP, WDP, NATP. ATMA, ATIC, NHM, NAP.	6
10	Social justice and poverty slieviation programmes- ITDP, IRDP, SGSY, PMEY.	7
11	New trends in extension, privatization	5
12	Women development programme- DWCRA, ICDS, VIM. Recognized extension system (T&V System)- Salient features, Fort nightly	4
13	Recognized extension system (T&V System) Salient features fort nightly Meeting, Monthly workshop, Linkages, Merits and Demerits, Single Window System of Extension in	9
14	Broad Based Extension (BBE)- Meaning and genesis	7
15-16	Dairy co-operative development programme at Anand, Warna and Mahananda, community dairy farming and milking.	4

Practical Schedule

Sr.No.	Topics
1-2	Study of village
3-4	Study of Krishi vidyan Mandal

5-6	Study of ongoing development programme in village
7	Study of Panchayat raj system
8-9	Study of watershed development area / project
10-11	Study of self-help group
12-13	Study and organization of participation of Rural Appraisal (PRA) techniques at village level
14	Abbreviation
15-16	Study of dairy co-operatives

Course No. : EXTN - 363

Course Title: Entrepreneurship Development and Business Management

Credits: 1=1+0

Theory:

Theory

Concept of Entrepreneur, Entrepreneurship Development, Assessment of entrepreneurship skills, SWOT Analysis & achievement motivation, Entrepreneurial behavior, Government policy and plan for entrepreneurship development, Developing Leadership Skills, Encoding and decoding communication skills; Communication skills for entrepreneurship development, Developing Speaking Skills, Developing Listening Skills, Developing organizational skill , Developing Managerial skills, Problem solving skill, Supply chain management and Total quality management, Project Planning Formulation and report preparation,

Text Books:-

- Trainers manual on developing entrepreneurial motivation, Akhouri, M.M; P. Mishra S.P. and Sengupta, Ritha (1989) . NIESBUD, NEW Delhi.
- Entrepreneurship, playing to win Taraporewala, Betty Gordan B (1979). Bombay.
- Developing New enterprenuers. Entrepreneurship development Institute of India (1987) EDLII, Ahmedabad, Nisiset Library : 338.93/edi/87/25104.

Reference Book

- The entrepreneurs handbook (1st and 2nd) Mancuso Joseph (1974). Arteck House INC, USA
- Entrepreneurship development Programme on India and its relevance to developing countries, PatelV.J (1987) ,Entrepreneurship development Institute of India, Ahmedbad, Nisiet Library ;338.93(540)/PAT/87/25103
- Dimensions of Agricultural Extension. Singh A.K. Lakhan singh, R.Roy Burman (2006) . Aman publishing House. Meerut.

Theory

Lecture No.	Course Topic	Weightage
1,2,3	Entrepreneur: Meaning, definition, characteristics and role demands of entrepreneur, identifying potential entrepreneurs.	10
4,5,6	Entrepreneurship Development – Concept of entrepreneurship, process of entrepreneurship development, importance of planning, monitoring and flow-up, managing completion, entrepreneurship development programmers.	15
7,8	Characteristics of Indian Agricultural Processing and Export industry.	10
9,10	SWOT analysis, generation, incubation and commercialization of ideas and innovations.	10
11,12	Entrepreneurial behavior – Concept, dimensions, factors affecting entrepreneurial behavior.	10
13	Government schemes and incentives for promotion of entrepreneurship. Government policy on small and Medium Enterprises (SMEs) SSIS.	10
14	Market survey, formulation of project, financial analysis of project.	10
15	Communication Skills. Communication – Meaning and process of communication. Advertisement – Meaning, types, forms, functions	15
16	Writing Skill : Business letter, Letters of inquiry quotation orders, and tenders, complaints letters.	10

Department –Agril. Economics (ECON)

Course No. ECON-121 Course Title: Principles of Agricultural Economics

Credits: 2=1+1

Syllabus-

Theory-

Economics Meaning, subject matter division of economics, Agril. economics meaning, definition, Basic terms & concepts, Wants, classification of wants & importance, Consumption, laws of consumption , Consumer surplus, Demand, Elasticity of demand, Supply, Elasticity of supply, Welfare economics, National income concept & importance, Public finance, Public resources, Public expenditure, Inflation

Practical

Study of law of diminishing marginal utility, Study of law of Equimarginal utility, Study of concept of consumer surplus, Estimation of elasticity of demand by point elasticity & proportional method, Estimation of elasticity of supply by point elasticity & proportional method, Study of measurement of methods of national income, Study of different types of taxes, Study of estimation of inflation rate by different methods

Reference Book:

- Principles of Economics- Seth.M.L
- Agricultural Economics- Reddy.S.Subbha
- Principles of Agricultural Economics- Pawar.D. B
- Agricultural Economics- Lekhi.R.K

Teaching Schedule

Lect. No.	Topics	Weightages %
1	Economics meaning, subject matter division of economics, Agril. Economics meaning, definition	8
2	Basic terms & concepts	7
3	Wants, classification of wants & importance	6
4	Consumption, laws of consumption	8
5	Consumer surplus	6
6	Demand	7
7	Elasticity of demand	7
8	Supply	7
9	Elasticity of supply	8
10	Welfare economics	5
11	National income concept & importance	4
12	Public finance	6
13	Public resources	5
14	Public expenditure	8

15-16	Inflation	8

Practical Schedule:

Pract. No.	Topics
1-2	Study of law of diminishing marginal utility
3-4	Study of law of Equimarginal utility
5-6	Study of concept of consumer surplus
7-8	Estimation of elasticity of demand by point elasticity & proportional method
9-10	Estimation of elasticity of supply by point elasticity & proportional method
11-12	Study of measurement of methods of national income
13-14	Study of different types of taxes
15-16	Study of estimation of inflation rate by different methods

Course No- ECON-232

Course Title: Agriculture Finance & Management

Credits: 2=1+1

Syllabus:

Theory -

Agril. Finance, Nature, Scope, importance & problems, Time value of money, Agril. Credit, Need, Classification, Credit analysis 4R's, 5C's, 7P'S, Repayment Plan History of financing Agril. Commercial banks, Lead bank scheme, RRB'S Higher financing; agencies RBI, NABARD, AFC, World bank, DICGC Crop insurance- Assessment of crop losses & compensation determination Agril. Co-operation, introduction, scope, principles, importance, History of cooperative movement, single window system, Successful co-operative system

Practical

Assessment of credit requirement of food grain, cash crops, horticulture crops food grain, cash crops, and horticulture crops. Testing of economic viability of long term investment, Preparation of balance sheet of business & computation of test ratio, Study of cash flow statement & calculation of break even analysis, Formulation of loan proposal (Short term loan), Formulation of loan proposal (medium term loan), Formulation of loan proposal (long term loan), Assessment of repayment capacity of

farmer, Assessment of risk bearing ability, Study of PACS, Study of DCCB, Study of SCB, Study of RRB Study of NABARD

Text book:-

- Text book of Agricultural Marketing and Co-operation- Wader.L.K, Murthy.C

Reference Book:

- Agricultural Economics- Reddy.S.Subbha
- Principles of Agricultural Economics- Pawar.D. B
- Agricultural Economics- Lekhi.R.K
- Agricultural Finance and Management- Reddy.S.Subba
- Indian Agriculture & Agri-Business- Diwase.S

Theory Schedule:

Lect. No.	Topic /activities covered during theory No	Weightages %
1.	Agril. Finance, Nature, scope, imp. & problems	8
2	Time value of money	7
3-4	Agril. Credit, need, classification Credit analysis 4R's, 5C's, 7P'S, Repayment Plan	9
5	History of financing Agriculture Business	8
6	Commercial banks	8
7	Lead bank scheme, RRB'S	7
8	Higher financing; agencies RBI, NABARD, AFC	7
9	World bank, DICGC	6
10	Crop insurance	8
11	Assessment of crop losses & compensation determination	8
12	Agril. Co-operation, introduction, scope, principles, importance	9
13	History of cooperative movement, single window system	8
14-16	Successful co-operative system	7

Practical Schedule:

Lect. No.	Topic /activities covered during Practical
1	Assessment of credit requirement of foodgrain, cash crops, horticulture crops foodgrain, cash crops, and horticulture crops.
2	Testing of economic viability of long term investment

3	Preparation of balance sheet of business & computation of test ratio
4	Study of cash flow statement & calculation of break even analysis
5	Formulation of loan proposal (Short term loan)
6	Formulation of loan proposal (medium term loan)
7	Formulation of loan proposal (long term loan)
8	Assessment of repayment capacity of farmer
9	Assessment of Risk bearing ability
10	Study of PACS
11	Study of DCCB
12	Study of SCB
13-16	Study of RRB Study of NABARD

Course No. ECON 243

Course Title: Production Economics and Farm Management

Credits: 2=1+1

Syllabus:

Theory

Production economics, meaning, definition, Objective. Nature and scope of Agril. Production economics. Concept of production, Basic concept & terms. Production function, meaning ,definition types. Laws of returns, Increasing, constant & decreasing Factor-Product relationship. Factor-Factor relationship. Product-Product relationship Farm Management—Objective & importance. Economic Principles applied to Farm Management -Types & systems of farming. Farm planning & Budgeting. Risk & Uncertainty. Linear programming: Assumptions, Advantage & Limitation.

Practical Syllabus:

Estimation of cost of cultivation of seasonal, Estimation of cost of cultivation of perennial crops, Methods of calculation of depreciation of Farm Assets, To study & estimate Net Worth statement of Farmer, To study & estimate Profit & Loss Statement , detail study of the farm inventory, Study of Break even analysis of Project involving high Investment, Economic analysis of different Crop enterprises, Economics of supplementary enterprises, Study of laws of Returns, Estimation of law of Equi-marginal Return, Stages of Production & relationship between TP, MP & AP . Preparation of Alternate farm plan, Study of Partial Budget, To study Farm records & Accounts

Reference books –

- Farm Management –S.P.Dhodyal
- Agril.Economics- Subba Reddy
- Economics of Farm production and farm management- V.T.Raju, DVS Rao

Theory Schedule:

Lect. No.	Topics	Weightages %
1-2	Production economics, meaning, definition, Objective	8
3-5	Nature and scope of Agril. Production economics	7
6	Concept of production, Basic concept & terms	6
7	Production function, meaning ,definition types	9
8	Laws of returns, Increasing, constant & decreasing	10
9	Factor-Product relationship	6
10	Factor-Factor relationship	6
11	Product-Product relationship	6
12	Farm Management—Objective & importance	8
13	Economic Principles applied to Farm	7
14	Management -Types & systems of farming	7
15	Farm planning & Budgeting	8
16	Risk & Uncertainty, Linear programming: Assumptions, Advantage & Limitation	12

Practical Schedule

Lect. No.	Topics
1	Estimation of cost of cultivation of seasonal
2	Estimation of cost of cultivation of perennial crops
3	Methods of calculation of depreciation of Farm Assets
4	To study & estimate Net Worth statement of Farmer
5	To study & estimate Profit & Loss Statement
6	To detail study of the farm inventory
7	Study of Break even analysis of Project involving high Investment
8	Economic analysis of different Crop enterprises
9	Economics of supplementary enterprises
10	Study of laws of Returns
11	Estimation of law of Equi-marginal Return
12	Stages of Production & relationship between TP,MP & AP
13	Preparation of Alternate farm plan
14	Study of Partial Budget
15-16	To study Farm records & Accounts

Course Title: ECON 354
Course No: Livestock Economics and Marketing

Credits: 3=2+1

Theory

Economics – Terms and definitions, Consumption, Demand and Supply. Factors of Production. Gross Domestic Product – Role of Poultry Sector in National GDP – Marketing- definition – Marketing Process – Need for marketing – Role of marketing –

– Marketing functions – Classification of markets – Marketing of various channels – Price spread – Marketing Efficiency – Integration – Constraints in marketing of agricultural produce. Market intelligence – Basic guidelines for preparation of project reports- Bank norms – Insurance – SWOT analysis – Crisis management

Practical

Techno-economic parameters for preparation of projects. Preparation of Bankable projects for various agricultural products and its value added products. Identification of marketing channel– Calculation of Price Spread – Identification of Market Structure – Visit to different Markets.

Text Book

- Agricultural Economics –S.Subba Reddy,P.Raghu Ram,T.V.Neelkanta Sasty

  I.Bhavani Devi. Published By Oxford And IBH Publishing Co.Pvt.Ltd New Delhi
- Agricultural Finance And Management - S.Subba Reddy, .Raghu Ram
- Agricultural Marketing In India Acharya and Agrwal, C.B. Memoria Satish Memoria

Teaching Schedule

Lect. No.	Topic	Weightages %
1	Economics – Terms and definitions – Consumption, Demand and Supply. Factors of production.	**10**
2-4	Gross Domestic Product- Role of Poultry Sector in National GDP	**10**
5-7	Marketing- definition – Marketing Process – Need for marketing – Role of marketing — Marketing functions	**20**
8-10	Classification of markets – Marketing of various channels – Price spread – Marketing Efficiency – Integration	**20**
11-14	Constraints in marketing of agricultural produce. Market intelligence –	**20**
15-16	Basic guidelines for preparation of project reports- Bank norms – Insurance – SWOT analysis – Crisis management	**20**

Practical Schedule

Lect. No.	Topic
1	Techno-economic parameters for preparation of projects.
2	Preparation of Bankable projects for various agricultural products and its value added products
3	Identification of marketing channel
4	Identification of Market Structure
5	Calculation of Price Spread
6	Visit to different Markets

Department –Agril. Statistics (STAT)

Course No. : STAT-111 Course Title: Design of Experiment for Animal Sciences

Course Credit: 2=1+1

Theory

UNIT I

Concept of design, Basic design and its principle, Analysis of variances : One way and two way classification, Principles of Experimentation, Plan and analysis of Completely Randomised, Randomised Block and Latin Square design.

UNIT II

Repeated Latin squares, Concept of orthogonal Latin Square Design, Graeco-Latin square designs, missing plot techniques in randomised block and Latin square designs; Factorial experiments.

UNIT III

Analysis of covariance technique, Nested, Switch over/Change over/cross over designs

UNIT IV

Estimation of Heritability, repeatability and genetic advance.

Practical

Analysis of Completely Randomised, Randomised Block and Latin Square design; randomised block and Latin square designs, Nested, Switch over/Change over/cross over designs, Analysis of non-orthogonal data, Estimation of heritability, repeatability and genetic advance.

Reference Book:-

- Panse, V.G. and Sukhatme, P.V. 1978. Statistical Methods for Agricultural Workers. III Edition, I.C.A.R, New Delhi.
- Cochran, W.G. and Cox. G.M. 1957. Experimental Designs. II Edition, John Wiley & Sons Inc., New York.
- Snedecor, G.W. and Cochran, W.G. 1967. Statistical Methods. VI Edition, Oxford & IBH Publishing Company, Bombay.
- Gomez, K.A. and Gomez, A.A. 1984. Statistical Procedures for Agricultural Research. II Edition, John Wiley & Sons, New York
- Nigam, A.K. and Gupta, V.K. 1979. Handbook on Analysis of Agricultural Experiments. I Edition, Indian Agril. Statistics Research Institute, New Delhi.
- Das, M.N. and Giri, N.C. 1986. Design and Analysis of Experiments. II Edition, Wiley Eastern Ltd., New Delhi.
- Kempthorne, Oskar. 1952. The Design and Analysis of Experiments. I Edition, John Wiley & Sons Inc., London.

- Amble, V.N. 1975. Statistical Methods in Animal Sciences. Indian Society of Agricultural Statistics, New Delhi.
- Gill, John L. Design and Analysis of Experiments in the Animal and Medical Science. Vol. I & II, Iowa State University Press, Iowa, USA.

Theory Schedule

Lect. No.	Topic	Weightages %
1	Basic definition of research and statistical experiments, treatments units etc.	4
2	Basic principles of experiments.	4
3	Design of experiments, general concepts, ANOVA one way classification, assumptions and models	4
4	Plan Layout analysis and applications of CRD with equal and unequal replications.	6
5	Plan Layout analysis and applications of RBD ,ANOVA and two way classification	6
6,7	Plan Layout analysis and applications of LSD, ANOVA of three way classification	6
8,9	Missing plot technique in RBD and LSD	5
10	Covariance Analysis LSD	9
11	Greco Latin Square Design	9
12	Factorial experiments Main effects and interaction, symmetric and asymmetric Design	8
13	Mixed Factorial	12
14	Covariance Analysis (RBD)	12
15	Nested design	3
16	Analysis of Switch over design	12

Practical Schedule

Practical No.	Topics
1	One Way Analysis
2	Two Way Analysis
3	Analysis of Completely Randomized Design
4	Analysis of Randomized Block Design
5	Missing plot technique in RBD
6	Analysis of Latin Square design
7	Missing plot technique in LSD
8	Greco Latin square design
9	Factorial design Yates method

10,11	Mixed factorial design
12	Co-variance analysis in RBD
13	Co-variance analysis in LSD
14.	Split plot design
15	Switch over design

Course No. STAT-232 Course Title: Agricultural Informatics
Credits: 3=1+2

Theory

Introduction to Computers, Anatomy of Computers, Memory Concepts, Units of Memory, Operating System, definition and types, Applications of MS-Office for creating, Editing and Formatting a document, Data presentation, tabulation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, creating database, uses of DBMS in Agriculture, Internet and World Wide Web (WWW), Concepts, components and creation of web, HTML, XML coding.

Computer Programming, General Concepts, Documentation and Program Maintenance, Debugging programs, Errors. Introduction to Visual Basic, Java, Fortran, C/ C++, etc, concepts and standard input/output operations, Variables and Constants, Operators and Expressions, Flow of control, Inbuilt and User defined functions, programming techniques for agriculture.

e-Agriculture, concepts, design and development. Application of innovative ways to use information and communication technologies (IT) in Agriculture. ICT for Data Collection, formation of development prorammes, monitoring and evaluation of Programmes. Computer Models in Agriculture: statistical, weather analysis and crop simulation models, concepts, structure, inputs-outputs files, limitation, advantages and application of models for understanding plant processes, sensitivity, verification, calibration and validation. IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management, Smartphone mobile apps in Agriculture for farm advises, market price, postharvest management etc; Geospatial technology, concepts, techniques, components and uses for generating valuable agri-information. Decision support systems, taxonomy, components, framework, classification and applications in Agriculture, DSS, Agriculture Information/Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning and crop calendars using IT tools.

Practical

Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix, Linux, Creating, Files & Folders, File Management. Use of MS-WORD and MS Power point for creating, editing and presenting a scientific Document, Handling of Tabular data, animation, video tools, art tool, graphics, template & designs. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data, handling macros. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system.

Introduction to World Wide Web (WWW) and its components, creation of scientific website, presentation and management agricultural information through web. Introduction of various programming languages such as Visual Basic, Java, Fortran, C, C++, and their components Hands on practice on writing small programmes. Hands on practice on Crop Simulation Models (CSM), DSSAT/Crop-Info/CropSyst/ Wofost. Preparation of Inputs file for CSM and study of model outputs, computation of water and nutrient requirements of crop using CSM and IT tools. Use of smart phones and other devices in agro-advisory and dissemination of market information. Introduction of Geospatial Technology, demonstration of generating information important for Agriculture. Hands on practice on preparation of Decision Support System.

Text Book:

- Fundamentals of Computers- Rajaraman.V
- Computer Fundamentals- Singh.P.K

Theory Schedule

Lect. No.	Topic	Weightages %
1	Introduction to Computers, Anatomy of Computers, Memory Concepts, Units of Memory,	**7**
2	Operating System, definition and types,	**7**
3	Applications of MS-Office for creating, Editing and Formatting a document, Data presentation, tabulation and graph creation, statistical analysis, mathematical expressions,	**7**
4	Database, concepts and types, creating database, uses of DBMS in Agriculture,	**7**
5-6	Internet and World Wide Web (WWW), Concepts, components and creation of web, HTML, XML coding.	**7**
7-9	Computer Programming, General Concepts, Documentation and Program Maintenance, Debugging programs, Errors. Introduction to Visual Basic, Java, Fortran, C/ C++, etc,	**7**
10-12	Concepts and standard input/output operations, Variables and Constants, Operators and Expressions; Flow of control, Inbuilt and User defined functions, programming techniques for agriculture.	**8**
13-15	E-Agriculture, concepts, design and development. Application of innovative ways to use information and communication technologies (IT) in Agriculture.	**7**
16-18	Collection, formation of development prorammes, monitoring and evaluation of Programmes. Computer Models in Agriculture: statistical, weather analysis and crop simulation models, concepts, structure, inputs-outputs files, limitation, advantages	**8**
19-21	Application of models for understanding plant processes, sensitivity, verification, calibration and validation.	**7**
22-25	IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management, Smartphone mobile apps in Agriculture for farm advises, market price, postharvest	**7**

	management etc;	
26-28	Geospatial technology, concepts, techniques, components and uses for generating valuable agri-information.	**7**
29-31	Decision support systems, taxonomy, components, framework, classification and applications in Agriculture, DSS, Agriculture Information/Expert System, Soil Information Systems etc	**7**
32	Preparation of contingent crop-planning and crop calendars using IT tools.	**7**

Practical Schedule-

Practical No.	**Practical's**
1	Study of Computer Components, accessories, practice of important DOS Commands.
2	Introduction of different operating systems such as windows, Unix, Linux, Creating, Files & Folders, File Management.
3	Use of MS-WORD and MS Power point for creating, editing and presenting a scientific Document, Handling of Tabular data, animation, video tools, art tool, graphics, template & designs.
4	MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data, handling macros.
5	MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system.
6	Introduction to World Wide Web (WWW) and its components, creation of scientific website, presentation and management agricultural information through web
7	Introduction of various programming languages such as Visual Basic, Java, Fortran, C, C++, and their components Hands on practice on writing small programmes.
8	Hands on practice on Crop Simulation Models (CSM), DSSAT/Crop-Info/CropSyst/ Wofost. Preparation of Inputs file for CSM and study of model outputs, computation of water and nutrient requirements of crop using CSM and IT tools.
9	Use of smart phones and other devices in agro-advisory and dissemination of market information. Introduction of Geospatial Technology, demonstration of generating information important for Agriculture.
10	Hands on practice on preparation of Decision Support System.

No: STAT-353
Course Title- Information and Communication Technology
Credits-3=2+1
Theory

IT and its Importance. IT tools, IT-enabled services and their impact on society; computer fundamentals; hardware and software; input and output devices; word and character representation; features of machine language, assembly language, high-level language and their advantages and disadvantages; principles of programming-algorithms and flowcharts; Operating systems (OS) - definition, basic concepts,

introduction to WINDOWS and LINUX Operating Systems; Local area network (LAN), Wide area network(WAN), Internet and World Wide Web, HTML and IP; Introduction to MS Office - Word, Excel, Power Point. Audio visual aids - definition, advantages, classification and choice of A.V aids; cone of experience and criteria for selection and evaluation of A.V aids; video conferencing. Communication process, Berlo' s model, feedback and barriers to communication

Practicals

Exercises on binary number system, algorithm and flow chart; MS Word; MS Excel; MS Power Point; Internet applications: Web Browsing, Creation and operation of Email account; Analysis of fisheries data using MS Excel. Handling of audio visual equipments. Planning, preparation, presentation of posters, charts, overhead transparencies and slides. Organization of an audio visual programme.

Teaching schedule:

Lect. No	Topic	Weightage %
1-3	IT and its importance.	7
4-6	IT tools, IT-enabled services and their impact on society.	7
7-10	Computer fundamentals; hardware and software; input and output devices.	10
11-13	Word and character representation; features of machine language, assembly language, high-level language and their advantages and disadvantages.	10
14-16	Principles of programming- algorithms and flowcharts.	10
15-17	Operating systems (OS) - definition, basic concepts, introduction to WINDOWS and LINUX Operating Systems.	13
17-20	Local area network (LAN), Wide area network(WAN), Internet and World Wide Web, HTML and IP.	10
21-23	Introduction to MS Office - Word, Excel, Power Point.	10
24-26	Audio visual aids - definition, advantages, classification and choice of A.V aids; cone of experience and criteria for selection and evaluation of A.V aids; video conferencing.	13
27-29	Communication process, Berlo's model, feedback and barriers to communication.	10

Practical schedule:

Prac. No	Topic	Weightages
1	Exercises on binary number system, algorithm and flow chart.	10
2	MS Word.	10
3	MS Excel.	10
4	MS Power Point.	10
5	Internet applications.	10
6	Web Browsing.	10
7	Creation and operation of Email account.	10
8	Analysis of fisheries data using MS Excel.	10
9	Handling of audio visual equipments.	10
10	Preparation, presentation of posters, charts, overhead transparencies and slides.	05
11	Organization of an audio visual programme.	05

Department -Livestock Production and Management (LPM)

Course No. LPM-111 Course Title: Livestock Production and Management
Credits 2=1+1
Syllabus –
Theory

Importance of livestock in national economy and different livestock development programmers of Government of India, Livestock census and trends of livestock production, Terminologies used in livestock and poultry production, Important Indian and Exotic breeds of cattle, buffalo, swine and poultry, Principles of maximization of livestock production, Feeding and management of calf, heifer, and milking animals, Feeding and management of dry, pregnant, draft animals and breeding bull. Housing principles, Space requirements for different classes and types of animals. Housing system for cattle and buffalo, Milk secretion and factors affecting milk yield and composition, Breeds characteristics of poultry, their methods of rearing, Cost of production of milk, economics of livestock production.

Practical

External body parts of cattle, buffalo and swine, Routine management practices followed on livestock farm, Methods of handling and restraining of animals, Methods of identification marks and dehorning of animals, Recording pulse rate, respiration rate and body temperature of animals, Estimation of age and body weight of animals, Clean and hygienic milk production and milking methods, Judging of animals for dairy and draft purpose, Study of computerized database on dairy farm, Vaccination and control of ecto and endo parasites in cattle and buffalo, Study of various dairy structures, Utilization of dairy farm wastes i. e. dung and urine etc, Preparation of viable bank proposal for cattle and buffalo.

Text Books:-

- Text-Book of Buffalo Production – Ranjhan, S. K. and Pathak, N. N. (1979) Vikas Publishing House Pvt. Ltd., 576, Masjid Road, Jangpura, New Delhi
- Text Book of Animal Husbandry – G. C. Banergee (1999), 9th ed Oxford and IBH Publishers, New Delhi.
- Text Book of Animal Husbandry – G. C. Banergee (1999), 9th ed Oxford and IBH Publishers, New Delhi.

Reference Book-

- Livestock and poultry Production – Harban Singh and Moore, E. N. (1968)
- Goat, Sheep and Pig Production and Management – Jagdish Prasad, (1996), Kalyani Publishers 1/1, Rajinder Nagar, Ludhiana

- Dairy Bovine Production – Thomas, C. K. and Sastri, N.S.R., Kalyani Publishers, 1/1, Rajender Nagar, Ludhiana.

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e-Book

Livestock production and management – Manoj kumar Rai,2012

Teaching Schedule

Lect. No.	Topic	Weightages %
1	Importance of livestock in national economy and different livestock development programmers of Government of India	6
2	Livestock census and trends of livestock production	6
3	Terminologies used in livestock and poultry production	6
4-5	Important Indian and Exotic breeds of cattle , buffalo and swine	8
6	Principles of maximization of livestock production	8
7-8	Feeding and management of calf, heifer, and milking animals	10
9-10	Feeding and management of dry, pregnant, draft animals and breeding bull.	10
11	Housing principles, space requirements for different classes and types of animals	8
12	Housing system for cattle and buffalo	8
13	Milk secretion and factors affecting milk yield and composition	10
14	Breeds characteristics of poultry, their methods of rearing	10
15	Cost of production of milk	5
16	Economics of livestock production	5

Practical Schedule

Sr. No.	Topic
1-2	External body parts of cattle, buffalo swine and poultry
3-4	Routine management practices followed on livestock and poultry farm
5	Methods of handling and restraining of animals and poultry
6	Methods of identification marks and dehorning of animals
7	Recording pulse rate, respiration rate and body temperature of animals
8	Estimation of age and body weight of animals
9-10	Clean and hygienic milk production and milking methods
11	Judging of animals for dairy and draft purpose
12	Study of computerized database on dairy farm
13	Vaccination and control of ecto and endo parasites in cattle and buffalo
14	Study of various dairy structures
15	Utilization of dairy farm wastes i. e. dung and urine etc.
16	Preparation of viable bank proposal for cattle and buffalo

Course No. : LPM-232 Course Title: Sheep and Goat Production
Credits: 2=1+1
Theory-

Importance of Sheep and Goat production in national economy. Important Indian and Exotic breeds of Sheep and Goat. Housing requirement of Sheep and Goat. Breeding seasons for Sheep and Goat. Methods of breeding Sheep and Goat. Feeding practices for Sheep and Goat. Flushing of ewes and does. Care and Management of pregnant ewes / does. Care and Management of Lambs / kids and rams / bucks.

Composition and utilization of Sheep and Goat milk. Grading and marketing of wool. Marketing of Sheep and Goat. Culling of Sheep and Goat. Preparation of animal for slaughter and different methods of slaughter. Dressing percentage and Meat bone ratio. Different Meat cuts and edible and non-edible offal's. Study of common ailments and control of parasites in Sheep and Goat. Preventive measures (vaccination) against different diseases of Sheep and Goat. Systems of rearing of sheep and goat. Insurance of sheep and goats.

PRACTICALS-

Study of body parts of sheep and goat. Differences between sheep and goat. selection of animals. identification marks. feeding of lambs / kids. feeding practices for milking goat. shearing and grading of wool. important management practices such as clipping, spraying, dusting, docking, Deworming, and ringing. preparation of animals for animal show. culling of animals. judging of sheep and goat. preparation of animal for slaughter and different methods of slaughter. dressing percentage and meat bone ratio. different meat cuts. study of composition of sheep and goat milk and its product preparation. study of farm records. preparation of bankable proposal for sheep and goat farm.

Textbook:-

- Textbook of Animal Husbandry – G.C. Banargi (1999), 9th ed. Oxford and IBH publishers, New Delhi.

Reference Books:-

- Goat, Sheep and Pig Production and Management – Jagdish Prasad (1996), Kalayani Publisher, 1/1 Rajinder Nagar, Ludhiana.
- Goats and their Profitable Management – Henry Stephan and Holmes Pegler (2005) Biotech books 1123/74 Trinagar, New Delhi
- Dairy Bovine Production – Thomas, C. K. and Sastri, NSR Kalyani Publishers 1/1 Rajinder Nagar Ludhiana
- Principles and practices of Dairy Farm Management – Jagdish Prasad (1989), Kalyani Publishers, 1/1 Rajinder Nagar, Ludhiana.

Teaching Schedule

Lect. No.	Topic	Weightage %
1	Importance of Sheep & Goat production in national economy	6
2	Classification and Study of Indigenous Sheep breeds	6
3	Classification and Study of exotic Sheep breeds	6

4	Classification and Study of Indigenous Goat breeds	6
5	Classification and Study of exotic Goat breeds	7
6	Housing of Sheep & Goat	6
7	Breeding of sheep & goat	6
8	Principles and practices of sheep and goat feeding, flushing of ewes & does	7
9	Care and management of ewes & does	6
10	Care and management of kids / lambs & rams / bucks	6
11	Grading & marketing of wool	7
12	Preparation of animal for slaughter & study different methods of slaughter	6
13	Study of common ailments & control of external & internal parasites	6
14	Study of different diseases of sheep	7
15	Study of different diseases of goat	6
16	Vaccination & health cover in Sheep & Goat	6

Practical's

Pract. No.	Topic
1	Body parts of sheep & goat and common terminologies used
2	Differences between sheep & goat
3-4	Selection of sheep & goat for different purposes & Identification marks.
5	Systems of rearing of sheep & goat.
6	Feeding practices of lambs & kids
7	Feeding practices of milking doe
8	Shearing of sheep & grading of wool
9-10	Management practices like clipping, spraying, dusting, docking, deworming & ringing
11	Culling of animals.
12	Judging of sheep & goat.
13	Preparation of animal for slaughter and different methods of slaughter
14	Study of different meat cuts, dressing percentage, meat bone ratio and edible and non-edible offal's

15	Preparation of milk products from sheep and goat milk (Dahi, Khoa, Paneer)
16	Study of various farm records maintained at sheep & goat farm Preparation of viable bank proposals

Course No. LPM -233 Course Title: Poultry Production

Credit: 2=1+1

Syllabus –

Theory –Importance of poultry keeping in India, Classification of chicken, Important breeds and varieties of chicken, Selection and care of hatching eggs, Incubation of eggs Hatchery management, Care and management of chicks, Care and management of growers.

Care and management of layers, Care and management of broilers , Selection and culling of birds for egg and meat production, Thermal stress in poultry during summer, Feeding practices for various categories of birds , Prophylactic measures for prevention of diseases.

Methods to enhance egg production, Methods to enhance meat production, Economics of poultry production and marketing, Care and management of turkey, Care and management of ducks, Care and management of quails, Care and management of geese and guinea fowl.

Care and management of emu.

Practical – Body parts of adult chicken, Body parts of duck, Body parts of turkey , Routine management practices of poultry farm viz., fumigation, incubation, brooding, Debeaking and sanitation, Hatching of eggs and chick sexing, Management of chicks Management of pullets and growers, Management of layers, Management of broilers Selection and culling, Feed and feed formulation and management, Different housing regimes, Vaccination, Dressing of birds, Organoleptic evaluation of chicken mean Proposal for commercial layer and broiler farms.

Text Book

- Banargee G.C. 1976. Poultry Oxford and IBH publication Co. New Delhi
- Jagdish Prasad 2000. Poultry production and management, Kalayani Publishers, New Delhi
- Newman, T. Principles and Practices of poultry husbandry Green World Publication Co. Lucknow
- Saxena U.C. 2000. Hand book of poultry feeding and management PIXE Publications, Karnal

Reference books:

- Jull, M.A. (1951). Poultry husbandry Mc Grow Hill Co New York
- Singh R.A. 2001. Poultry Production Kalyani Publishers New Delhi
- Pand, B. 1985 Poultry Production
- Anonymous 1996. Advances in poultry production processings of 20th world poultry congress.

- Gupta S. 2001. Indian Poultry year book, new Delhi

Theory Schedule

Lect. No.	Name of Topic	Weightage (%)
1	Importance of poultry keeping in India	3
2	Classification of chicken	3
3	Important breeds and varieties of chicken	3
4	Selection and care of hatching eggs	7
5	Incubation of eggs	3
6	Hatchery management	3
7	Care and management of chicks	3
8	Care and management of growers	3
9	Care and management of layers	3
10	Care and management of broilers	3
11	Selection and culling of birds for egg and meat production	7
12	Thermal stress in poultry during summer Feeding practices for various categories of birds	9
13	Prophylactic measures for prevention of diseases	9
14	Methods to enhance egg production, Methods to enhance meat production ,Economics of poultry production and marketing	13
15-16	Care and management of turkey, Care and management of ducks Care and management of quails, Care and management of geese and guinea fowl ,Care and management of Emu	22

Practical schedule

Pract.	Name of Topic
1	Body parts of adult chicken
2	Body parts of duck
3	Body parts of turkey
4	Routine management practices of poultry farm viz., fumigation
5	Hatching of eggs and chick sexing
6	Management of chicks
7	Management of pullets and growers
8	Management of layers
9	Management of broilers
10	Selection and culling
11	Feed and feed formulation and management
12	Different housing regimes
13	Vaccination
14	Dressing of birds
15	Organoleptic evaluation of chicken mean
16	Proposal for commercial layer and broiler farms

Course No. LPM-244 Course Title: Organic Livestock Farming
Credits : 2=1+1

Theory

Definition, Concepts of organic livestock farming, Present scenario of organic livestock production in India and abroad. Importance and scope, Limitations in implications organic livestock production, Requirements for organic livestock farming, Socio-economic impact of organic livestock farming, Marketing and export potential – inspection, certification, labeling, evaluation, accreditation, Steps to promote organic animal husbandry in India, Legal aspects – Registration, National programme and standards for organic animal husbandry, Organic fodder production, Characteristics of organic milk.

Practical

Comparative evaluation of organic and existing livestock products, Organic fodder production, Organic livestock management, Feeding of livestock for organic products, development of database for establishment of standards for organic animal products, Health care of livestock, Marketing and export of organic livestock products, Cost of production of organic milk. Visit to Organic Dairy farm.

Text Books:-

- The organic dairy and food industry paradigm shift. Banerjee, A. 2001. Indian Dairyman 53(12): 31-33
- General consumer altitudes to milk organic dairy products. Brandl, M. 2000. IDF Seminar, Atherns, Greece, September, 1999. Bull.Int. DairyFed.. 347:16-18
- Organic milk in India: Looking Beyond tomorrow. Chander, M. 2001. Indian Dairyman. 53 (12): 35-39
- US. Organic dairy: the processors perspective. Hirsberg, N. 2000. Organic dairy products IDF seminar. Althens, Greece, September, 1999. Bull. Int. Dairy Feed. 347:12-15

Reference Books

- Retailing of organic dairy products. Janet, J. P. 2000. Int. DAIRY Red. Bull. 347:8-11
- Organic agriculture. Lapisse, S. 1997.Cornerde-in nature. 1997. 164: 32-35
- Organic milk in India: A somnambulism or a New Pragmatic Vision. Indian Food Industry 23(3): 32-41
- Ponnusamy, K. and Shanmugan, M. 2004. Problems and prospects of production of organic dairy products in India. Indian Food Industry. 23(3): 41-44
- Sen, D. C. and Bag, S. K. 2003. Organic milk: An Emerging Area of Food Science, Beverage and Food word, August, 2003. PP. 47-48
- The Indian Express. 2004. Organic gathers critical mass. Chandigarh Edition, 6th February, P.11.

E-Book

Farm Animals and their management – James A.S.Watson, Wattie J. Mills,2005

Teaching Schedule:

No. of Lectures	Name of Topic	Weightage (%)
1-2	Definition, Concepts of organic livestock farming,	8
3-4	Present scenario of organic livestock production in India and abroad	13
5-6	Importance and scope of organic livestock production in India,	6
7-8	Limitations in implications organic livestock production,	6
9-10	Requirements for organic livestock farming	13
11	Socio-economic impact of organic livestock farming	6
12	Marketing and export potential – inspection, certification, labeling, evaluation, accreditation, Record keeping,	13
13	Steps to promote organic animal husbandry in India,	6
14	Legal aspects–Registration, National programme and standards for organic animal husbandry	13
15	Organic fodder production	8
16	Characteristics of organic milk	8

Practical Schedule

No. of Lectures	Name of Topic
1-2	Comparative evaluation of organic and existing livestock products
3-4	Organic fodder production
5	Organic livestock management
6	Feeding of livestock for organic products
7-8	Development of database for establishment of standards for organic animal products
9-10	Health care of livestock
11-12	Marketing and export of organic livestock products
13-14	Cost of production of organic livestock and their products
15-16	Visit to Organic Dairy farm

Course No. LPM-355 Course Title: Livestock Management

Credits: 2=1+1

Syllabus:

Theory

Handling and restraining of animals, Grooming, Brushing and cleaning of animals, Identification methods of animals, Hoof trimming of cow, sheep, goat, Tattooing in piggery, Branding of dairy animal, sheep, goat etc. Ear notching of pets animal ,pigs etc, Deworming, importance of Deworming and different deworming medicins, Culling,

Different reasons of culling in animals, Docking in sheep and goat, Mastitis and Management practices adopted to prevent infection of mastitis, Disbudding of dairy calf ,Nose ringing of dairy animal ,Need of hoof trimming practices ,Different tools needed for management of animals, Tools for branding ,tool of ear notching ,Tool for nose ringing and hoof trimming.

Practical

Identification methods of animals, Deworming, importance of Deworming and different deworming Medicins, Culling, Different reasons of culling in animals, Docking in sheep and goat, Mastitis and Management practices adopted to prevent infection of mastitis. Demonstration of hoof trimming of all dairy animal, Ear tattooing of animal, Nose ringing of animal ,Branding of different animal , Different tool needed for management of animals, Tools for branding ,tool of ear notching ,Tool for nose ringing and hoof trimming .

Text Book:-

- Text Book of Animal Husbandry – G. C. Banergee (1999), 9th ed Oxford and IBH Publishers, New Delhi.
- Text-Book of Buffalo Production – Ranjhan, S. K. and Pathak, N. N. (1979) Vikas Publishing House Pvt. Ltd., 576, Masjid Road, Jangpura, New Delhi A Comprehensive

Reference books:–

- Livestock and poultry Production – Harban Singh and Moore, E. N. (1968)
- Goat, Sheep and Pig Production and Management – Jagdish Prasad, (1996), Kalyani Publishers 1/1, Rajinder Nagar, Ludhiana
- Dairy Bovine Production – Thomas, C. K. and Sastri, N.S.R., Kalyani Publishers, 1/1, Rajender Nagar, Ludhiana.

e-Book

- Dairy Farming- Saurav singh, 2014

Theory Schedule:

Lect. No.	Topics	Weightages %
1-2	Handling and restraining of animal	10
3-4	Cleaning, Grooming and Brushing	10
5-6	Identification Methods of animal	10
7-8	Hoof trimming of cattle, sheep and goat	10
9-10	Deworming, Importance of Deworming and different Deworming Medicine	10
11-12	Culling, Different reasons of culling in animals	10
12-13	Docking in sheep and goat	10
14-15	Disbudding of dairy calf ,Nose ringing of dairy animal	10
16	Tattooing in piggery	10

17	Branding of dairy animal	10
18-20	Different tool needed for management practices, Tools for Branding, tool of Ear notching, Tool for Nose ringing and Hoof trimming.	10

Practical Schedule

Practical No.	Practicals
1-2	Handling and restraining of animal
3-4	Cleaning, Grooming and Brushing
5-6	Identification Methods of animal
7-8	Hoof trimming of cattle, sheep and goat
9-10	Deworming, importance of Deworming and different deworming medicins
11-12	Culling, Different reasons of culling in animals
12-13	Docking in sheep and goat
14-15	Disbudding of dairy calf ,Nose ringing of dairy animal
16	Tattooing in piggery
17	Branding of dairy animal
18-20	Different tool needed for management practices, Tools for branding, tool of Ear notching, Tool for nose ringing and hoof trimming.

Course No. LPM- 356
Course Title: Livestock Hygiene
Credits: 2=1+1
Syllabus:

Theory

Rainfall and geology relation to water supply Sources of water supply, impurities and pollution of natural water, Prevention of pollution and contamination of water sources, Hardness of water, Significance of hard and soft water, treatment of hard waters, Water supply for domesticated animals, Animal diseases associated with water supplies, General principle of sewage disposal and purification, removal and disposal of extra and other wastage from animal habitation. Effect for environment on the health and productivity of livestock and measures to counteract this, Day light change, effect of light on breeding habits, body covering, growth and production of farm animals, Experimental light treatment, mechanism of light action, Practical consideration, Concept of clean milk production, Contamination and control measures at farm level, Summary of hygienic and good milking practices, Milk quality control.

Practical Syllabus:

Familiarization with various types of animal houses, pens and cages for avian, Cost estimation of housing of animals and birds. Cost effective animal houses and avian pens, different systems of ventilation, drainage, sewage, disposal techniques, waste diversion for liquid manure, compost cow dung gas unit etc. Cost estimation of cost effective methods. Familiarization with rural and urban animal housing systems their construction, cost estimation and assessment of efficiency.

Text Book:-

- Text Book of Animal Husbandry – G. C. Banergee (1999), 9th ed Oxford and IBH Publishers, New Delhi.
- Text-Book of Buffalo Production – Ranjhan, S. K. and Pathak, N. N. (1979) Vikas Publishing House Pvt. Ltd., 576, Masjid Road, Jangpura, New Delhi A Comprehensive Dairy Microbiology -J.S. Yadav, Sunita Grover, V.K. Batish.

Reference books: –

- Livestock and poultry Production – Harban Singh and Moore, E. N. (1968)
- Goat, Sheep and Pig Production and Management – Jagdish Prasad, (1996), Kalyani Publishers 1/1, Rajinder Nagar, Ludhiana
- Dairy Bovine Production – Thomas, C. K. and Sastri, N.S.R., Kalyani Publishers, 1/1, Rajender Nagar, Ludhiana.
- Dairy Microbiology-E.M.Foster.
- Dairy Microbiology Hand book:The Microbiology of Milk and Milk Products-R.K.Robinson.
- Milk Hygiene: Hygiene in Milk Production, Processing and Distribution WHO Publication.
- Outline of Dairy Technology- Sukumar De
- Food Microbiology -Frazier V. and Westhoff D.C.,
- Food safety and Quality Assurance-Foods of Animal Origin- Hubbert W.T
- Food safety-Contaminants and Toxins- D'Mello J.P.F
- Applied Dairy Microbiology- Marth.E.H. and Steele J.L.
- Modern Food Microbiology- Jay. M.J
- Handbook of milk Microbiology- Srivatava.M.L.
- Basic Food Microbiology- Banwart.G.J.
- Industrial Microbiology- Prescott and Ponn
- Meat Hygiene - Gracey, Collins and Huey
- Meat Hygiene - Joshi.B.P
- Poultry Meat Hygiene and Inspection - Bremner.A and Jhonston M
- Diseases of Animals Transmissible to Man- Thapliyal D.C
- Food Hygiene for Food Handlers - Jill Trickett
- Food Hygiene and Sanitation - S. Roday

Theory Schedule:

Lect. No.	Topics	Weightages %
1	Rainfall and geology relation to water supply.	5
2	Sources of water supply, impurities and pollution of natural water,	5
3	Prevention of pollution and contamination of water sources,	5
4	Hardness of water ,Significance of hard and soft water, treatment of hard waters,	10
5	Purification of water supplies, storage coagulation and sedimentation, filtration, physical and chemical sterilization Distribution and storage of water supplies, Action of water on metals.	10
6	General principle of sewage disposal and purification, Removal and disposal of extra and other wastage from animal habitation	6
7	Effect for environment on the health and productivity of livestock and measures to counteract this.	6
8	Day light change, effect of light on breeding habits, body covering, growth and production of farm animals.	10
9	Experimental light treatment, mechanism of light action, Practical consideration.	10
10	Concept of clean milk production	10
11	Contamination and control measures at farm level,	10
12-13	Summary of hygienic and good milking practices,	8
14-16	Milk quality control.	5

Practical Schedule

Lect. No.	Topics
1-2	Familiarization with various types of animal houses, pens and cages for avian,
3 -4	Cost estimation of housing of animals and birds.
5-8	Cost effective animal houses and avian pens,
9-11	Different systems of ventilation, drainage, sewage, disposal techniques,
12-14	Waste diversion for liquid manure, compost cow dung gas unit etc.
15-16	Cost estimation of cost effective methods of housing.
17-18	Familiarization with rural and urban animal housing systems their construction, cost estimation and assessment of efficiency

Course No. LPM- 357 Course Title: Farm Animal Behavior

Credits: 2=1+1

Theory

Introduction, Importance and Patterns of livestock behavior, Daily and seasonal cycles of behavior, Physiological basis of behavior, Environmental modification of behavior,

Developmental changes in behavior, Developmental changes in behavior, Genetic differences in behavior, Behavioral disorders, Physical environment and behavior, Common vices and their remedial measures, Analysis of behavior in relation to location, Climatic environment and social behavior, Scope and limitation of integrated farming systems, Sustainability of integrated livestock farming systems and their economic importance, Livestock enterprises viz; cattle, buffalo, Livestock enterprises viz; sheep, goat, Livestock enterprises viz; poultry, New approach for changing farming systems in présent Energy crises vis-à-vis Gobar gas plant, FYM, solar and wind energy utilization, Project formulation, and evaluation of various livestock enterprises, Various livestock farming systems and their economic analysis.

Practical

Behavioral pattern of cattle- Indigenous and crossbreds, Behavioral pattern of buffalo, Behavioral pattern of sheep, Behavioral pattern of goat, Reproductive behavior, feeding/ grazing behavior, Common vices of different livestock species, Energy crises, Gobar gas plant, FYM, solar and wind energy utilization, Evaluation of farming systems and preparation of feasibility report.

Text Books:-

- Arora MP. 1995. Animal Behaviour. WB London.
- Bouenger EG. 1994. Animal Behaviour. WB London.
- Fraser AF & Broom DM. 1997. Farm Animal Behaviour and welfare. CABI.
- Fraser AF & Broom DM. 1999. Farm Animal Behaviour and Welfare.

Reference Book

- Kumar V. 1996. Animal Behaviour. WB London.
- Mukharjee TK. 1992. Integrated livestock Fish Production Systems.
- Raman KV & Balaguru T. (Eds.). 1992. Farming systems Research in India: Strategies for Implementation. NAARM.
- Renard C. (Ed.). 1997. Crop Residues in Sustainable Mixed Crop / Livestock Farming Systems. CABI.
- Speirs M. & Opsen O. 1992. Indigenous Integrated arming System in the Sahel. World Bank.

Theory

Sr. No.	Name of Topic	Weigh tage (%)
1	Introduction, Importance and Patterns of livestock behavior	6
2	Daily and seasonal cycles of behavior	3
3	Physiological basis of behavior	3
4	Environmental modification of behavior	3
5	Developmental changes in behavior	3
6	Genetic differences in behavior	3
7	Behavioral disorders.	3
8	Physical environment and behavior	3
9	Common vices and their remedial measures Analysis of behavior in relation to location, Climatic environment, social behavior. Scope and limitation of integrated farming systems	13
10-12	Sustainability of integrated livestock farming systems and their economic importance. Livestock enterprises viz; cattle, buffalo, Livestock enterprises viz; sheep, goat Livestock enterprises viz; poultry.	21
13	New approach for changing farming systems in présent energy crises vis-à-vis Gobar gas plant, FYM, solar and wind energy utilization.	13
14	Project formulation and evaluation of various livestock enterprises.	13
15-16	Various livestock farming systems and their economic analysis.	13

Practical

Sr. No.	Name of Topic
1	Behavioral pattern of cattle- Indigenous and crossbreds
2	Behavioral pattern of buffalo
3	Behavioral pattern of sheep
4	Behavioral pattern of goat
5	Reproductive behavior

6	feeding/ grazing behavior
7	Common vices of different livestock species
8	Energy crises, gobar gas plant, FYM, solar and wind energy utilization
9	Evaluation of farming systems and preparation of feasibility report

Course No. LPM- 358 **Course Title: Pet Animal Management**
Credits: 2=1+1
Syllabus:

Theory

Breeds of dogs- international pedigree breeds and those commonly seen in India. Pedigree sheet and major breed traits. Detection of oestrus and Breeding of dogs, selecting a breed to keep, selection of a pup. Feeding of dogs, Management of dogs-kennels and pregnant bitch. Dog shows- preparation for the shows, kennel clubs, important characters for judgment, Whelping. Utility of dogs- guarding, defense, patrolling, riot control, scouting, espionage, mine detection, tracking, guiding, hunting, races, retrieving, rescue, and other uses. Principles of training of dogs, Common diseases affecting dogs (bacterial, viral, parasitic, fungal, nutritional etc.) - Vaccination/ Deworming schedules.
Common breeds of cats, their habits, breeding and management. Common diseases of cats

PRACTICAL

Recognizing various breeds, Handling of dogs. Types and use of leads and collars. Brushing/grooming and bathing of dogs. Restraining of dogs for examination, Detection of oestrus, mating, whelping (through demonstration). Care of pups, weaning, Nail and tooth care, clipping of hairs for show purposes. Hygiene of kennel/pens, feeding utensils. Visit to dog show. Common breeds of cats, Handling, restraint, examination in cats and kittens.

Identification of common Pet birds. Handling of pet birds, their examination.

Reference books:

- The domestic dog its evolution, behaviour and interaction with people James Serpell,First ed.,Cambridge University Press
- The Dog its behavior, nutrition and health, Linda. P. Case,First edi.,Iowa State University Press
- Doglopaedia-A complete guide to dog care,J.M.Evans and Kay White, First Edition,Howell Book House, New York
- The Cat Its behavior, Nutrition and Health,Linda P. Case, First edition,Lowa State University Press.
- Restraint and handling of wild and domestic animals,Murray.E. Fowler, Second edition, Iowa state university press/AMES.
- The complete bird owner's handbook,Gary A. Callerstein,First edition,Howell book house, New York

- Keeping pet birds-A practical encyclopedia, Don Harper,First edition,Blitz Editions
- Companion bird medicine, Elish W. Burr, First edition, Lowa State University Press

e-Book-

Handbook of Pet care and Management – Dr. Amita Ranjan, 2012

Theory Schedule:

Lect. No.	Topics	Weightages %
1	Breeds of dogs- international pedigree breeds and those commonly seen in India	10
2	Pedigree sheet and major breed traits.	7
3	Detection of oestrus and Breeding of dogs. Selecting a breed to keep, selection of a pup.	10
4	Feeding of dogs	8
5	Management of dogs-kennels and pregnant bitch.	9
6-8	Dog shows- preparation for the shows, kennel clubs, important characters for judgment	9
9	Whelping.	9
10-12	Utility of dogs- guarding, defense, patrolling, riot control, scouting, espionage, mine detection, tracking, guiding, hunting, races, retrieving, rescue, and other uses.	9
13	Principles of training of dogs.	5
14	Common diseases affecting dogs (bacterial, viral, parasitic, fungal, nutritional etc.) - their Vaccination/ Deworming schedules.	9
15	Common breeds of cats, their habits, breeding and management.	9
16	Common diseases of cats	6

Practical Schedule

Lect. No.	Topics
1	Recognizing various breeds
2	Handling of dogs.
3	Types and use of leads and collars.
4	Brushing/grooming and bathing of dogs.
5	Restraining of dogs for examination.
6	Detection of oestrus, mating, whelping (through demonstration).
7	Care of pups, weaning,
8	Nail and tooth care, clipping of hairs for show purposes.
9	Hygiene of kennel/pens, feeding utensils.
10	Visit to dog show
11	Common breeds of cats,
12	Handling, restraint, examination in cats and kittens.
13-14	Identification of common pet birds.
15-16	Handling of pet birds, their examination.

Course No: LPM-359 Course Title- Integrated Livestock Farming System
Credits-2=1+1

Theory:

Scope and limitation of integrated farming systems - Sustainability of integrated Livestock Farming Systems and their economic importance. Integration of fish, arable farming and different livestock enterprises, Gobar gas plant, FYM, Vermi-compost, cattle, buffalo sheep, goat, pig, poultry, Bee-keeping etc. New approach for changing farming systems in present energy crises. Project formulation and evaluation of various livestock enterprises.

Practical

Various livestock farming units and their economic analysis - Evaluation of different farming systems and their economic importance - Preparing feasibility report for various farming projects.

Text books:

- Integrated Livestock Fish Production Systems.377 Mukherjee TK. 1992.
- Farming Systems Research in India: Strategies Raman KV & Balaguru T. (Eds.). 1992. for Implementation. NAARM.

Reference books:

- Crop Residues in Sustainable Mixed Crop/Livestock Farming Renard C. (Ed.). 1997.Systems. CABI.
- Indigenous Integrated Farming System in the Sahel. World Bank. Speirs M. & Opsen O. 1992.

e-Book-

- Forage for Sustainable livestock production – N. Das, A.K.Mishra,2009

Teaching schedule:

Lect. No	Topic	Weightage %
1	Scope and limitation of integrated farming systems	12
2	Sustainability of integrated Livestock Farming Systems.	12
3	Economic importance of integrated Livestock Farming	10
4	Integration of fish, arable farming.	12
5-6	Different livestock enterprises	11
7-8	Gobar gas plant, FYM, Vermi-compost	13
9-10	cattle, buffalo sheep, goat, pig, poultry, rabbit, silk worm, bee keeping etc.	10
10-13	New approach for changing farming systems in present energy crises.	10
14-16	Project formulation and evaluation of various livestock enterprises.	10

Practical schedule:

Prac. No	Topic
1	Loose housing dairy farm unit & their economic analysis.
2	Broiler poultry farm unit & their economic analysis
3	Layer poultry farm unit & their economic analysis
4	Commercial goat farm & their economic analysis

5	Evaluation of different farming systems and their economic importance
6	Preparing feasibility report for various Farming projects.
7	Visit to mechanized farm.

No: LPM -3610 Course Titles- Animal Housing and Milking Systems
Credits-3=2+1
Syllabus
Theory- Animal Housing and Milking Systems

General principles in planning animal houses- farmstead and animal houses .Selection of site and planning; layouts for livestock farm of different sizes in different climatic zones in India - Farm structures - General principles of construction of enclosures, floor and road. Housing requirements of different classes of Livestock - Preparation of layouts, plans, arrangement of alleys- Fitting and facilities in the houses for horses, dairy cattle, calves, bulls, work cattle, dogs, pigs, sheep, goats, and poultry. Improvement of existing buildings; water supply; feed and fodder delivery systems - Economics of Livestock housing. Housing - Disease control measures and sanitation of all classes of livestock, Milking processes – milk, udder anatomy, milk ejection, milk collection, post milking, Milking Installations – Vacuum, milk, extra material, Milking Parlors – All types of milking parlors, milking robots, Cooling, Maintenance and cleaning, Milking parlor design – Milking floor, hygiene, light and ventilation, waiting area

Practical

Visits to cattle farms and critical analysis of various types of managerial practice. Visit to sheep and goat farms and critical analysis of various managerial
practices under different conditions. Record keeping. - Preparation of project for commercial farming. Study of Breeding management in the farm. Study of practical housing management. Analysis of practical diseases control management. Preparation of plans for Animal houses for horses, cattle, sheep, pigs, goats and other livestock. Disease control- vaccination, dipping, grooming, spraying, farm fumigation, farm hygienic practices, regular basic treatments
Theory

Lecture No.	Course topic	Weightage
1,2,3	General principles in planning animal houses	07
4,5,6	Farm structures - General principles of construction of enclosures, floor and road.	07
7,8	Housing requirements of different classes of Livestock	05
9,10	Preparation of layouts, plans, arrangement of alleys	06
11-15	Improvement of existing buildings; water supply; feed and fodder delivery systems.	05
16-20	Economics of Livestock housing	05
20-24	Housing - Disease control measures and sanitation of all classes of livestock	05
25-28	Milking processes – milk, udder anatomy, milk ejection, milk collection, post milking	05

29-32	Milking Installations – Vacuum, milk, Milking Parlors – All types of milking parlors, milking robots, Maintenance and cleaning, Milking parlor design – Milking floor, hygiene, , waiting area	05

Practical Schedule

Pract. No.	Name of the Topic
1	Visits to cattle farms and critical analysis of various types of managerial practices
2	Visit to sheep and goat farms and critical analysis of various managerial practices under different conditions.
3	Record keeping - Preparation of project for commercial farming
4	Study of breeding management in the farm
5	Analysis of practical feeding management.
6	Study of practical housing management.
7	Preparation of plans for Animal houses for cattle, sheep and goats.
8	Preparation of plans for Animal houses for horses, pigs and other livestock
9	Vaccination, dipping, spraying in farm animals
10	Fumigation, livestock farm cleaning practices
12	Measurement of different houses and record keeping
13	Preparation of design of all types of milking parlors
14	Sanitization of milk parlor, CIP systems, tests for milking systems
15-16	Different Milk standard test for cooling system

Course No. LPM- 3611 **Course Title: Livestock Farm Hygiene**
Credits: 2=1+1
Syllabus:

Theory

Sources of water supply and their qualities, Sources of contamination of water and preservation. Bacteriology of water and air. Purification and sanitation of water. Disposal of sewage and farm refuses their relation with animal human health respectively. Sanitation of animal houses, Sources of air pollution in animal houses and its effect on animal health and production , method of prevention control of air and water home diseases of man and animal .Atmospherics pollution and methods of control, stray animal control , fallen animals and environment, radiation, drugs etc. as sources of pollution, Disaster management. Possibilities of recycling farm surplus / wastes etc, Importance of Zoonotic diseases of farm animals such as Bird flues, Tuberculosis, Brucellosis etc

Practical

Qualitative chemical examination of water, Estimation of total hardness in water, estimation of air, temperature and relative humidity in air, water and farm environment and testing and application of efficacy of different disinfects. Demonstration of water purification plant, Sewage disposal system and carcass or fallen animal disposal methods. Study of various

ventilation systems. Sampling of water for Bacteriological and chemical examination. Coli form test to determine potability of water. Visit to recycling plants.

Text books: –

- Handbook of Environmental Management, G.L.Maliwal 2006, Agrotech Publishing Academy, Udaipur,
- India.Environmental Pollution, Edited by Raj Kumar Annual Publications Pvt. Ltd., New Delhi

Reference Book -

- Ecology and Environmental Biology, Dr.T.K.Saha 2010, Books and Allied (P) Ltd., Kolkata, India.
- Guidelines for Drinking Water Quality 2004, World Health Organization, Geneva

E-Book –

Basic operations of animal husbandry – Sandeep tomar,2013

Theory Schedule:

Lect. No.	Topics	Weightages %
1	Sources of water supply and their qualities	05
2	Sources of contamination of water and preservation	10
3	Bacteriology of water and air.	10
4	Purification and sanitation of water.	10
5-6	Disposal of sewage and farm refuses their relation with animal human health respectively.	10
7-8	Sanitation of animal houses, Sources of air pollution in animal houses and its effect on animal health and production ,	10
9-10	Sources of air pollution in animal houses and its effect on animal health and production ,	10
11-12	Method of prevention control of air and water home diseases of man and animal.	10
13-14	Atmospherics pollution and methods of control, stray animal control, fallen animals and environment, radiation, drugs etc. as sources of pollution, Disaster management	10
15	Possibilities of recycling farm surplus / wastes etc.	10
16	Zoonotic diseases of farm animals such as Bird flues, Tuberculosis, Brucellosis etc	05

Practical

Practical No.	Topics
1-3	Qualitative chemical examination of water,
4 -7	Estimation of total hardness in water,
5-8	Estimation of air, temperature and relative humidity
9-11	Testing of pathogenic microbes in air, water and farm environment
12-14	Testing and application of efficacy of different disinfects

15-16	Demonstration of water purification plant,
17-18	Sewage disposal system and carcass or fallen animal disposal methods
19-20	Study of various ventilation systems.
21-22	Sampling of water for chemical examination.
23-24	Coli form test to determine potability of water.
25-26	Visit to recycling plants.

Course No: LPM 3612 Course Title- Livestock Farm Practices

Credits-1=0+1

Syllabus

Practical- Approaching and handling of cattle, sheep, Recording of respiration, pulse and rectal temperature in animals, Health management of farm animals, Carcass disposal, Disinfection, Housing Principles and Housing Systems, Layout plans for livestock housing, Layout plans for poultry, Routine livestock farm operations, Weighing of farm animals, First aid of farm animals

Text books-

- Hand book of Animal Husbandry- V.K. Taneja, C. Chakravarty, C.S. Viswanath, Aruna T. Kumar, Third revised, Indian Council of Agricultural Research, New Delhi.
- Handbook of livestock management- Richard A. Battaglia, Fourth, Pearson Education, Inc, New Jersey.
- Livestock Production and Management- N.S.R. Sastry and C.K. Thomas, Fourth revised, Kalyani Publishers, Ludhiana, India

Reference Book

- Horse care and management- Christine Stafford and Robert Oliver, First, St Edmundsbury Press Limited, Bury St Edmnds, Suffolk.
- Swine Production- D.P. Sharda, First, Indian Council of Agricultural Research, New Delhi.

Practical Schedule:

Pract. No	Topic
1	Approaching and handling of cattle, sheep
2	Recording of respiration, pulse and rectal temperature in animals.
3	Health management of farm animals
4	Carcass disposal
5	Disinfection
6	Housing Principles and Housing Systems
7	Layout plans for livestock housing
8	Layout plans for poultry
9	Routine livestock farm operations
10	Weighing of farm animals
11	First aid of farm animals

No. LPM -3613 **Course Title: Hatchery Management**

Credit: 2=1+1

Syllabus –

Theory – Hatchery Practices - types of hatcheries Management principles of incubation. Factors affecting fertility and hatchability. Selection, care and incubation of hatching eggs. Fumigation; sanitation and hatchery hygiene. Disposal of hatchery waste; Sexing, grading, packing and dispatch of day old chicks. Economics of hatchery business; Trouble shooting hatch failure: importance of hatchery records, break even analysis of unhatched eggs. Bio-security in the hatchery. Computer applications for hatchery management

Practical – Design and layout of the hatchery, Hatchery Equipment, Pre-incubation Storage of Hatching Eggs, incubation of eggs, Hatchery Routines And Procedures, Project Reports Of Setting Up A Hatchery, Hatchery Records And Maintenance

Text Book

- Modern Poultry Farming by Louis M. Hurd
- Poultry Production by B. Panda and S.C. Mohapatra

Reference Book

- Poultry Science (Fourth Edition) by Colin G. Scanes, George Brant and M.E. Ensminger
- Commercial chicken meat and egg production (Fifth Edition) by Donald D. Bell and William D. Weaver, Jr.
- Handbook of applied broiler production by D. Narahari and R. Kumararaj
- Scientific poultry production (Third Edition) by P.V. Sreenivasaiah
- Nutrition of the chicken (Fourth Edition) by Steven Leeson and John D. Summers

Theory Schedule

Lect. No.	Name of Topic	Weightage (%)
1	Hatchery Practices - types of hatcheries	6
2	Management principles of incubation	6
3	Factors affecting fertility and hatchability	6
4	selection, care and incubation of hatching eggs	10
5-6	Fumigation and. Sanitation Hatchery hygiene	5
7-8	Disposal of hatchery waste	5
9	Sexing, grading, packing and dispatch of day old chicks.	6
10	Economics of hatchery business	6
11	Trouble shooting hatch failure	6
12	importance of hatchery records	6
13	Disposal of hatchery waste	11
14	Break even analysis of unhatched eggs	7
15	Biosecurity in the hatchery.	10
16	Computer applications for hatchery management	10

Practical schedule

Practical	Name of Topic
1	Design and layout of the hatchery
2	Hatchery Equipment
3	Pre-incubation Storage of Hatching Eggs
4	incubation of eggs
5	Hatchery Routines And Procedures
6	Project Reports Of Setting Up A Hatchery
7	Hatchery Records And Maintenance
8	Fumigation and. Sanitation Hatchery hygiene

Course No. LPM- 3614
Course Title: Diversified poultry production
Credits: 3=2+1
Syllabus:
Theory
Emu: House design, brooding and rearing management – fold brooders – emu pediatrics – facilities – management under semi-intensive and free range system. Emu nutrition and breeder management, feed formulation, nutrient requirements – systems of feeding – sex identification – sex separate feeding – mating systems – breeding pen formation.
Pre-slaughter handling, bird hatching, transportation of birds, vehicle specification. Packaging and transport of poultry meat and eggs, packing materials – transport crates – vehicle specification. Handling and welfare measures in cage rearing of birds – furnished cages – enriched cages – get away cages. Management of pre-layer pullets – pre-layer nutrition and layer during peak egg production. HACCP concepts in poultry production, feed manufacturing and processing – SPF egg production – sanitary and Phyto-sanitory measures. Designer egg production – Environmental friendly method of poultry rearing. Marketing channels – integration in commercial operations – pet bird marketing – marketing.
Turkey - Introduction, Rearing and Breeding, Housing requirements, Light requirements, Husbandry and nutrition, Disease prevention and control.
Practical Syllabus:

Handling and restraining of emu

Diseases of birds and their control.

Emu - Digestive and reproductive system of birds

Welfare cage designs

Handling and restraining of emu

Handling and restraining of emu

Text books –

- Commercial Chicken Production Manual by Mack O. North
- Poultry science – by M.E.Ensminger
- Poultry Production – by Panda and Mohapatra

e-Book-

Emerging opportunities in alternative poultry farming systems – Dr.D.Thyagarjan, Dr. A. Ashok, 2013

Theory Schedule:

Lect. No.	Topics	Weightages %
1-2	**Emu:** House design, brooding and rearing management – fold brooders – emu pediatrics – facilities – management under semi-intensive and free range system	11
3-5	Emu nutrition and breeder management – feed formulation – nutrient requirements – systems of feeding – sex identification – sex separate feeding – mating systems – breeding pen formation	11
6-7	Pre-slaughter handling – bird hatching – transportation of birds – vehicle specification. Packaging and transport of poultry meat and eggs – packing materials – transport crates – vehicle specification.	11
8-9	Handling and welfare measures in cage rearing of birds – furnished cages – enriched cages – get away cages.	9
10-12	Management of pre-layer pullets – pre-layer nutrition and layer during peak egg production.	10
13-15	HACCP concepts in poultry production, feed manufacturing and processing – SPF egg production – sanitary and phyto-sanitory measures. Designer egg production – Environmental friendly method of poultry rearing.	13
16-17	Marketing channels – integration in commercial operations – pet bird marketing	13
18-19	**Turkey** - Introduction, Rearing and Breeding, Housing requirements, Light requirements,	13
20-21	Husbandry and nutrition, Disease prevention and control.	09

Practical Schedule

Lect. No.	Topics
1-3	Handling and restraining of emu
4 -7	Diseases of birds and their control.
5-8	**Emu** - Digestive and reproductive system of birds,
9-11	Welfare cage designs,
12-14	Handling and restraining of emu
15	Diseases of birds and their control.

Department –Animal Nutrition (AN)

Course No. AN-121 Course Title - Principles of Animal Nutrition

Credits : 2=1+1

Syllabus-

Theory-

Animal Nutrition- History, importance of nutrients in health and reproduction. Composition of animal body and plants, comparison between plant and animal, Nutritional terms and their definitions, Nutrient and their metabolism, role and requirement of water, carbohydrates, their digestion, absorption and metabolism in ruminants and non ruminants, proteins and amino acids and their digestion, use of NPN compound for ruminants and non ruminants. Composition of selected foodstuff with reference to selected amino acid, carbohydrate and fat as a source of energy and vitamin. Dog, rat, guinea pig and rabbit dietary allowances.

Practical-

Classification of feeds and fodder, identification of feeds and fodder, nutritive value of feeds and fodder, characteristics of good ration, study of nutritive value, starch equivalence

Text book:-

- Text book of Animal Nutrition - D.N. Verma – 2005

Reference books –

- Principal of Animal nutrition & feed technology- D.V. Reddy – 2001
- Applied Nutrition – Reddy 2001
- Animal Nutrition in the Tropics- Ranjhan.S.K

E-Book

Animal Nutrition – Ashok kumar Sharma,2012

Theory Schedule:

Lect. No.	Topic	Weightages %
1-2	Animal Nutrition- History	5
3-5	Importance of nutrients in health and reproduction	8
6-7	Composition of animal body and plants, comparison between plant and animal	9
8-9	Nutritional terms and their definitions	10
10-12	Nutrient and their metabolism	9
13-15	Role and requirement of water, carbohydrates	11
16-18	Digestion in ruminants and non ruminants	10
19-21	Absorption and in ruminants and non ruminants	10

22-24	Metabolism in ruminants and non ruminants	8
25-27	Proteins and amino acids and their digestion	7
28-30	Use of NPN compound for ruminants and non ruminants	8
31-32	Composition of selected foodstuff with reference to selected amino acid, carbohydrate and fat as a source of energy and vitamin. Dog, rat, guinea pig and rabbit dietary allowances.	5

Practical Schedule:

Pract. No.	Topic
1-2	Classification of feeds and fodder
3-4	Iidentification of feeds and fodder
5-7	Nutritive value of feeds and fodder
8-11	Characteristics of good ration
12-14	Study of nutritive value, starch equivalence

Course No. AN-232 Course Title- Analytical Techniques in Animal Nutrition
Credits: 1=0+1
Syllabus
Practical-

General precaution while working in laboratory. Preparation of different standard solution, reagents and indicators. Preparation of sample for chemical analysis.

Determination of proximate principles i.e estimation of crude protein, ether extract, crude fibre, nitrogen free extract and total ash. feed mixing, different feed processing techniques. Conservation of fodder- hay, silage and haylage making.

Reference books –

- Principal of Animal nutrition & feed technology- D.V. Reddy – 2001
- Applied Nutrition – Reddy 2001
- Animal Nutrition in the Tropics- Ranjhan.S.K

Text book:-

- Text book of Animal Nutrition - D.N. Verma – 2005

e-Book

- Animal Nutrition – Ashok kumar Sharma,2012

Practical Schedule:

Pract. No.	Topic	Weightages %
1	General precaution while working in laboratory.	10
2	Preparation of different standard solution, reagents and indicators	10
3	Preparation of sample for chemical analysis	10
4-5	Determination of proximate principles of estimation of crude protein	12
6	Determination of proximate principles of estimation of ether extract	12
7	Determination of proximate principles of estimation of crude fibre	12
8-9	Determination of proximate principles of estimation of nitrogen free extract	12
10-12	Feed mixing	12
12-16	Feed processing	10

Course No. AN-233 Course Title- Applied Animal Nutrition
Credits: 3= 2+1
Syllabus
Theory-

Feeding standards and nutrient requirement of different classes of animal. Energy requirement of different classes of animal. Protein energy inter relationship, thumb rule. Feed processing techniques. Preparation of UMMB, complete feed block, utilization of byproduct and top feeds. Concept of bypass nutrients. Importance of mineral elements, vitamins, feed additives and feed supplements, feeding of animals, computation of ration.

Practical-

Calculation of nutritive value in terms of DCP, TDN in feeds and fodders, calculation of requirements of nutrients in terms of DCP and TDN and ME for maintenance, growth and other types of production like milk, meat, wool, formulation of rations for poultry and swine with conventional and nonconventional feed ingredients

Text book:-

- Text book of Animal Nutrition - D.N. Verma – 2005

Recommended books –

- Principal of Animal nutrition & feed technology- D.V. Reddy – 2001
- Applied Nutrition – Reddy 2001
- Animal Nutrition in the Tropics- Ranjhan.S.K

Theory Schedule:

Lect. No.	Topic	Weightages %
1-3	Feeding standards	5
4-8	Nutrient requirement of different classes of animal.	8
9-10	Energy requirement of different classes of animal.	8
11-12	Protein energy inter relationship	8
13-16	Thumb rule.	8
17-18	Feed processing techniques. Preparation of UMMB, complete feed block, utilization of byproduct and top feeds	12
19-20	Concept of bypass nutrients	10
21-22	Importance of trace elements, vitamins	6
23-25	Feed additives	6
24-26	Feed supplements	8
27-28	Feeding of animals	8
29-30	Computation of ration	8
31-32	Nutrient requirement	5

Practical Schedule:

Pract. No.	Topic	Weightages %
1-2	Calculation of nutritive value in terms of DCP, TDN in feeds and fodders	15
3-4	Calculation of nutritive value in terms of DCP, TDN in concentrates	12
5-6	Calculation of requirements of nutrients in terms of DCP and TDN and ME for maintenance	14
7-8	calculation of requirements of nutrients in terms of DCP and TDN and ME for growth	14
9-10	calculation of requirements of nutrients in terms of DCP and TDN and ME for other types of production like milk, meat, wool	15
11-12	Formulation of rations for poultry and swine with conventional and nonconventional feed ingredients	15
13-15	Formulation of rations for swine with conventional and nonconventional feed ingredients	15

Department -Vet Anatomy (VAN)

Course No. - VAN 111 Course Title - Introductory Veterinary Anatomy
Credit- 3=2+1

Theory

Osteology: Definition of the terms used in Veterinary Anatomy in general and Osteology in particular. Classification, physical properties and structure of bones, Gross study of bones of appendicular and axial skeleton of Ox / Buffalo as type species and comparison with Sheep / Goat, Pig, Horse, Dog and Fowl with particular emphasis on their topography, contour, landmarks and functional anatomy from production point of view. Detail study of bones of head, neck, thorax, abdomen, pelvis, tail, fore limb and hind limb.

Myology: Structural and functional classification of muscles. Gross study of skeletal muscles of head, neck, thorax, abdomen, pelvis, tail, fore limb and hind limb with their origin, insertion and action and their structural and functional importance from production point of view in Ox / Buffalo as a type species. Comparative study of muscles in other domestic animals.

Arthrology: Classification and structure of joints. Articulation and ligaments of head, neck, thorax abdomen, pelvis, tail, fore limb and hind limb of Ox / Buffalo as type species, their structure, functional anatomy and comparison with other domestic animals from production point of view.

Biomechanics: Biomechanics and its application with reference to quadruped locomotion, kinetics of locomotion, stress and strains falling on locomotors apparatus, landmarks, angulation and weight bearing bones of ox, buffalo and comparison with other animals particularly horse and dog.

Practical

Comparative study of the bones of appendicular and axial skeleton, their structure, landmarks, angulations, weight bearing and function in Ox/Buffalo and comparison with that of Sheep/Goat, Pig, Horse, Dog and Fowl and relate them in live animals. Dissection of joints of all the body regions of Ox/Buffalo to study the structure and function and comparison with other domestic animals. Biomechanics and kinetics of locomotion.

Text books –

- Textbook of Veterinary Anatomy – K.M. Dyce, Wolfgang O. Sack, C.J.G. Wensig – 2009
- Text book of Veterinary Physiological chemistry-Larry R. Engel king – 2010
- Text book of Veterinary Physiology- James E. Breazile, C.G. Deames , P.T. Cardielhae 1971

Reference books –

- Veterinary Anatomy of Domestic mammals- Horst Erich Koning, Hams Georg Liebich - 2007
- Introduction to Veterinary Anatomy & physiology textbook.-Victoria Aspinall, Melanie Cappello - 2009

- Anatomy & Physiology of Farm Animals.- Rown D. Frandson, W. Lee wilke, Anna Dee fails – 2013

e-Book:-

- Handbook on Anatomy and Physiology of Domestic animals and birds – S.Satpathy, M.K.Singh,2015

Teaching Schedule

Lecture No.	Topics	Weightages %
1-2	Definition / terms used in Veterinary Anatomy in general and osteology in particular.	5
3-4	Classification, physical properties and structure of bones,	5
5-6	Gross study of bones of appendicular and axial skeleton of Ox / Buffalo as type species	05
7-9	Comparison with Sheep / Goat, Pig, Horse, Dog and Fowl with particular emphasis on their topography, contour, landmarks and functional anatomy from clinical and production point of view.	10
10--13	Detail study of bones of head, neck, thorax, abdomen, pelvis, tail, fore limb and hind limb.	05
14	Myology: Structural and functional classification of muscles.	5
15-17	Gross study of skeletal muscles of head, neck, thorax, abdomen, pelvis, tail,	10
18-20	Gross study of fore limb and hind limb with their origin, insertion and action and their structural and functional importance from clinical and production point of view in Ox / Buffalo as a type species.	10
21	Comparative study of muscles in other domestic animals.	5
22-24	Arthrology: Classification and structure of joints. Articulation and ligaments of head, neck, thorax abdomen, pelvis, tail, fore limb and hind limb of Ox / Buffalo as type species,	10
25-27	Joints structure, functional anatomy and comparison with other domestic animals from clinical and production point of view.	10
28-30	Biomechanics: Biomechanics and its application with reference to quadruped locomotion, kinetics of locomotion,	10
31-32	Stress and strains falling on locomotor apparatus, landmarks, angulation and weight bearing bones of ox, buffalo and comparison with other animals particularly horse and dog.	10

Practical Schedule

Sr. No.	Topics / Activities covered during practical
1-2	Comparative study of the bones of appendicular
3-5	Axial skeleton, their structure, landmarks, angulation, weight bearing and function in Ox/Buffalo
6-8	Comparison with that of Sheep/Goat, Pig, Horse, Dog and Fowl and relate them in live animals.
9-11	Dissection of joints of all the body regions of Ox/Buffalo
12-14	Study the structure and function of joints and comparison with other domestic animals.

15-16	Biomechanics and kinetics of locomotion.

Course No: - VAN-123
Course Title: - Anatomy of Circulatory System
Credit: - 2=1+1
THEORY:-

Angiology: Gross morphology of heart and disposition of arteries, veins and lymphatic of head, neck, thorax, abdomen, pelvis, tail, forelimb and hind limb in Ox / Buffalo as type and comparison with that of Sheep / Goat, Pig, Horse, Dog and Fowl

PRACTICAL:-

Demonstration of embalming of the carcass and preservation. Dissection/ Computer simulation models for dissection and demonstration of body parts. Study of heart and major blood vessels in different species of animals. Area of auscultation of heart. Dissection of blood vessels head, neck, thorax, abdomen, pelvis, tail, forelimb and hind limb in Ox / Buffalo and comparative study in other domestic animals.

Text Book:

- A text-book of veterinary anatomy by Sisson, Septimus, 1865-1924
- Textbook of Veterinary Anatomy By (author) K.M. Dyce , By (author) Wolfgang O. Sack , By (author) C. J. G. Wensing
- Introduction to Veterinary Anatomy and Physiology Textbook By (author) Victoria Aspinall , By (author) Melanie Cappello

Reference Book:

- Anatomy of domestic animals : systemic & regional approach / Chris Pasquini, Tom Spurgeon, Susan Pasquini ; contributors, Mike Smith ... [et al.] ; illustrations, Chris Pasquini ; cartoons, Chris Pasquini, John Roberts.
- Anatomy of the dog : an illustrated text / Klaus-Dieter Budras ; medical illustrator, Wolfgang Fricke ; Patrick H. McCarthy ; contributors, Ekkehard Henschel, Cordula Poulsen Nautrup
- Anatomy of the horse : an illustrated text / Klaus-Dieter Budras, W.O. Sack ; medical illustrator, Sabine Röck ; contributors, Anita Wünsche, Ekkehard Henschel.

Teaching Schedule:-

Lecture No.	Topics	Weightages %
1-3	Angiology: Gross morphology of heart and disposition of arteries,	20
4-8	Gross morphology of veins and lymphatic of head	20
9-13	Gross morphology of neck, thorax, abdomen, pelvis, tail	20
14-20	Gross morphology of forelimb and hind limb in Ox / Buffalo	20
20-30	Gross morphology of forelimb and hind limb in Ox / Buffalo comparison with that of Sheep / Goat, Pig, Horse, Dog and Fowl	20

Practical Schedule:-

Practical's No.	Topics	Weightages %
1-2	Demonstration of embalming of the carcass and preservation	20
3-6	Dissection/ Computer simulation models for dissection and demonstration of body parts.	20
7-9	Study of heart and major blood vessels in different species of animals. Area of auscultation of heart.	20
10-11	Dissection of blood vessels head, neck, thorax, abdomen, pelvis, tail, forelimb and hind limb in Ox / Buffalo	20
12-15	Dissection of blood vessels head, neck, thorax, abdomen, pelvis, tail, forelimb and hind limb in Ox / Buffalo and comparative study in other domestic animals.	20

Course No- VAN-112 Course Title- Anatomy of Digestive System
Credits: 2 = 1+1
Syllabus
Theory

Gross morphological and topographical study of various organs of digestive system of ruminants. Gross morphological and topographical study of various organs of digestive system of non ruminants. Outline of body cavities and study of organs of digestive system. Comparative topographic anatomy in live animals.

Practical

Outline of body cavities and study of organs of digestive system of different animals. Pleural and peritoneal reflections. Comparative topographic anatomy in live animals. Applied anatomy of sites for auscultation, palpation of anatomical structures in the abdominal and perineal regions. Radiographic visualisation of gross anatomical features of various regions of the body. (Note: Computer simulation model studies shall be used for better understanding of the subject.)

Text books –

- Text book of Veterinary Physiology- James E. Breazile, C.G. Deames , P.T. Cardielhae 1971
- Text book of Veterinary Physiological chemistry-Larry R. Engel king – 2010
- Textbook of Veterinary Anatomy – K.M. Dyce, Wolfgang O. Sack, C.J.G. Wensig – 2009

Reference books –

- Veterinary Anatomy of Domestic mammals- Horst Erich Koning, Hams Georg Liebich - 2007
- Introduction to Veterinary Anatomy & physiology textbook.-Victoria Aspinall, Melanie Cappello - 2009
- Anatomy & Physiology of Farm Animals.- Rown D. Frandson, W. Lee wilke, Anna Dee fails – 2013

e-Book:-

- Handbook on Anatomy and Physiology of Domestic animals and birds – S.Satpathy, M.K.Singh,2015

Teaching Schedule

Lecture No.	Topics	Weightages %
1-2	Gross morphological and topographical study of mouths.	12
3-4	Gross morphological and topographical study of pharynx, larynx and oesophagus	14
5-6	Gross morphological and topographical study of rumen, reticulam, omasum and abomasum of digestive system of ruminants.	12
7-8	Gross morphological and topographical study of associated organs of digestive system of ruminants.	12
9-10	Gross morphological and topographical study of small and large	12

	intestine of digestive system of ruminants.	
11-12	Gross morphological and topographical study of various organs of digestive system of Poultry	14
13	Outline of body cavities and study of organs of digestive system	12
14	Comparative topographic anatomy in live animals.	12

Practical Schedule

Pract. No.	**Topics / Activities covered during practical**
1	Outline of body cavities and study of organs of digestive of ruminant animals.
2	Outline of body cavities and study of organs of digestive of non ruminant animals.
3	Pleural and peritoneal reflections.
4	Comparative topographic anatomy in live animals.
5	Palpation of abdominal structures
6	Palpation of perennial Region Computer Simulation of Model Studies for Better understanding

Department -Vet Physiology and Biochemistry (VPB)

Course No- VPB- 111
Course Title- Physiology of Circulatory and Respiratory System
Credits: 3=2+1

Syallbus -

Theory-

General functions of blood , blood cells, plasma and serum, erythrocytes number, shape, size, composition, life span and fate of RBC, Hemoglobin, chemical structure, coagulation of blood, Lymph cerebrospinal fluid, synovial fluid composition , heart structure, course of circulation, rhythmic, excitation of heart, conducting system, transmission of impulse, cardiac cycle, heart sounds, heart beat and properties of heart pulse, blood pressure.

Respiratory apparatus, mechanisms of respiration, volume of air respired, intrathoracic pressure, artificial respiration, chemistry of respiration, blood gases, law of solubility of gas, exchange of gases in lungs and tissues, regulation of respiration, physicochemical regulation of respiratory centre, adaptation of respiration during muscle exercise

Practical-

Collection of blood samples from various animals, preservation of defibrinated blood, enumeration of erythrocytes, leukocytes, platelet count, estimation of Hemoglobin, coagulation time, bleeding time, blood group, effect of heat and cold on blood , effect of drug on heart.

Recording respiration, spirometry, vital capacities, PaO_2, PvO_2, $PaCO_2$, $PvCO_2$, cardiac output and calculation of related parameters.

Text books –

- Textbook of Veterinary Anatomy – K.M. Dyce, Wolfgang O. Sack, C.J.G. Wensig – 2009
- Text book of Veterinary Physiological chemistry-Larry R. Engel king – 2010
- Text book of Veterinary Physiology- James E. Breazile, C.G. Deames , P.T. Cardielhae 1971

Reference books –

- Veterinary Anatomy of Domestic mammals- Horst Erich Koning, Hams Georg Liebich - 2007

- Introduction to Veterinary Anatomy & physiology textbook.-Victoria Aspinall, Melanie Cappello - 2009
- Anatomy & Physiology of Farm Animals.- Rown D. Frandson, W. Lee wilke, Anna Dee fails – 2013

e-Book:-

Handbook of Animal Physiology – P.K.Biswas,2013

Teaching Schedule

Lect. No.	Topic	Weightages %
1	General functions of blood	5
2	General functions of blood cells, plasma and serum	6
3	Erythrocytes number, shape, size and composition	8
4	Life span and fate of RBC	6
5	Hemoglobin and its chemical structure	7
6	Coagulation of blood	3
7	Lymph and cerebrospinal fluid	3
8	Synovial fluid composition	3
9	Heart structure	3
10	Course of circulation, rhythmic	3
11	Excitation of heart	3
12	Conducting system of heart	3
13	Transmission of impulse	3
14	Cardiac cycle	3
15	Heart sounds	3
16	Heart beat and properties of heart pulse, blood pressure	6
17	Respiratory apparatus	5
18	Mechanisms of respiration, volume of air respired	3
19	Intrathoracic pressure, artificial respiration	5
20	Chemistry of respiration	5
21	Blood gases, law of solubility of gas	5
22	Exchange of gases in lungs and tissues	4
23	Regulation of respiration	5
24	Physicochemical regulation of respiratory centre	3
25-28	Adaptation of respiration during muscle exercise	3

Practical Schedule

Sr. No.	Topic /Activities covered during Practical
1 -2	Collection of blood samples of cattle and buffalo
3-4	Collection of blood samples of sheep and goat
5- 6	Enumeration of erythrocytes
7-8	Enumeration of Leukocytes,
9-10	Platelet count of cattle and buffalo
11-12	Platelet count of sheep and goat
13-14	Estimation of Hemoglobin, coagulation time, bleeding time, blood group
14-15	Effect of heat and cold on blood
16-17	Recording respiration in all species
18	Spirometry
19	Vital capacities

Course No. VPB-112 Course Title: Physiology of Lactation

Credits: 1 =1+0

Syllabus –

Theory

Introduction and importance of physiology of lactation in relation with milking management, internal structure of udder of different species, duct system, blood supply, lymphatic and nervous system of udder, development of mammary glands, involution of udder, hormones and their role in development of mammary glands, initiation and maintenance of lactation, induction of lactation, control of milk secretion, biosynthesis of milk, protein, lactose, fat, minerals and vitamins, milk harvesting and milking management, factors affecting milk yield and composition viz., physiological, genetic, nutritional, and environmental.

Text Books:-

- Text book of Animal Husbandry Banarjee G.C., (1986) 6th Oxford and IBH Publication Pvt. Ltd. New Delhi

Reference Books:-

- Dairy cattle principles, Practices profits and problems Bath D.L., (1978) 2nd ed Lea and Ebiger Publishing House, Philadelefia.
- Lactation of the dairy cow Colin, T., White Moore, (1980).
- Reproduction in farm animals Hafez, E.S.E. (1980) 4th ed K.M. Verghese Co. P.B. No. 7119 Bombay 400 031

- Physiology of lactation Smith, V.R. (1981) Iowa state University Press Ames Town
- Lactation II Smith, V.R. and Bruce Larson (1984)
- Principles of Dairy Science Smith, G.H and Vanvleck L.D., (1974) W.H. freeman and Co., Sanfransisco.
- Dairy bovine production Thomes, C.K. and Sastri, N.S.R., (1991) Kalyani publication Co. Ludhiana, India

Theory Schedule

No. of Lectures	Name of Topic	Weightage (%)
1-2	Introduction and importance of physiology of lactation in relation with milking management	6
3-4	Internal structure of udder of different species	6
5-7	Duct system, blood supply, lymphatic and nervous system of udder	13
8-10	Development of mammary glands	3
11-13	Hormones and their role in development of mammary glands	6
14-15	Involution of udder	3
16-18	Initiation and maintenance of lactation	7
19-21	Induction of lactation	3
22	Control of milk secretion	3
23	Biosynthesis of milk	7
24	Biosynthesis of protein	3
25	Biosynthesis of lactose	3
26	Biosynthesis of fat	3
27	Biosynthesis of minerals	3
28	Biosynthesis of vitamins	3
29	Milk harvesting and milking manage	10
30	Factors affecting milk yield	6
31-32	Factors affecting composition viz., physiological, Genetic, nutritional and environmental.	12

Course No- VPB-123 Course Title – Physiology of Digestive system

Credits: 2 = 1+1

Syllabus:

THEORY

Morphological characteristic of monogastric and polygastric digestive system. Prehension, rumination; daefecation, vomition; regulation of secretory function of saliva, stomach, intestine, pancreas; bile secretion; hunger, appetite control, developmental aspects of digestion; luminous, membranous and microbial digestion in rumen and intestine; permeability characteristics of intestine, forces governing absorption, control intestinal transport of electrolyte and water, enzymatic digestion in monogastric and fermentative digestion in rumen, modification of toxic substances in rumen. Digestion in birds.

PRACTICAL

Counting of rumen motility, estimation of volatile fatty acids and ammonia in rumen. Bacterial and protozoa count in-vitro action of proteolytic enzymes - pepsin and trypsin.

Text book:-

- Text book of Veterinary Physiological chemistry-Larry R. Engel king – 2010
- Textbook of Veterinary Anatomy – K.M. Dyce, Wolfgang O. Sack, C.J.G. Wensig – 2009
- Text book of Veterinary Physiology- James E. Breazile, C.G. Deames , P.T. Cardielhae 1971

Reference Book:

- Veterinary Anatomy of Domestic mammals-Horst Erich Koning, Hams Georg Liebich - 2007
- Introduction to Veterinary Anatomy and Physiology Text book. Victoria Aspinall, Melanie Cappello - 2009
- Animal Nutrition in the Tropics by S. K. Ranjhan
- Animal Digestive System by Willytuff, 2013
- Anatomy & Physiology of Farm Animals.- Rown D. Frandson, W. Lee wilke, Anna Dee fails – 2013

e-Book:-

Physiology of Animal growth and bio-energetic – U.K.Mishra, 2008

Teaching Schedule

Lecture No.	Topics	Weightages %
1-2	Morphological characteristic of monogastric and poly gastric digestive system.	10
3-4	Prehension, rumination; daefecation, vomition; regulation of secretory function of saliva,	10
5-6	Stomach, intestine, pancreas; bile secretion; hunger, appetite control, developmental aspects of digestion;	10
7-9	Luminous, membranous and microbial digestion in rumen and intestine;	5
10-11	Permeability characteristics of intestine	10
12	forces governing absorption, control intestinal transport of electrolyte and water,	5
13	Enzymatic digestion in monogastric	15
14	Fermentative digestion in rumen,	10
15	Modification of toxic substances in rumen.	5
16	Digestion in birds.	20

Practical Schedule

Sr. No.	Topics / Activities covered during practical
1-2	Counting of rumen motility
3-4	Estimation of volatile fatty acids
5-7	Ammonia in rumen
8-10	Bacterial count in-vitro
11-12	Protozoa count in-vitro
13-15	Action of proteolytic enzymes trypsin.
16	Action of proteolytic enzymes – pepsin

Course No- VPB-124 Course Title – Physiology of Reproductive system

Credits: 2 = 1+1

Theory- Female generative organs, functions of ovary, structure of graffian follicles and corpus luteum, estrogen and progesterone and their actions, changes in the female genital organs during the various phases of the sexual cycle and their regulation, ovulation and fertilization, pregnancy, functions of placenta

Practical's- Study of female genitalia, palpation technique, heat detection in farm animals and companion animals, collection and examination of vaginal mucus by various techniques, pregnancy diagnosis, sexual health control, life history card for the female, recording systems.

Text book:-

- Text book of Veterinary Physiology- James E. Breazile, C.G. Deames , P.T. Cardielhae 1971
- Textbook of Veterinary Anatomy – K.M. Dyce, Wolfgang O. Sack, C.J.G. Wensig – 2009
- Text book of Veterinary Physiological chemistry-Larry R. Engel king – 2010

Reference book:

- Applied Animal Reproduction by Henry Joe Bearden, John W. Fuquay 0 Reviews Reston Pub. Co., 1980
- Veterinary Anatomy of Domestic mammals- Horst Erich Koning, Hams Georg Liebich - 2007
- Introduction to Veterinary Anatomy & physiology textbook.-Victoria Aspinall, Melanie Cappello - 2009
- Anatomy & Physiology of Farm Animals.- Rown D. Frandson, W. Lee wilke, Anna Dee fails – 2013

e-Book:-

- Advance reproductive biology in mammels – Prof.Ghulam mohy– ud-din vani,2013

Theory Schedule

Lect. No.	Topic	Weightages %
1-4	Female generative organs	12
5-6	Changes in the female genital organs during the various phases of the sexual cycle and their regulation	12
7-9	Functions of ovary, structure of graffian follicles and corpus luteum	11
10-11	Estrogen and progesterone and their actions	12
12-13	Ovulation	13
14	Fertilization	11
15	Pregnancy	14
16	Functions of placenta	15

Practical Schedule:

Practical No.	Topic
1	Study of female genitalia
2-3	Palpation technique
4-5	Heat detection in farm animals and companion animals
6-8	Collection and examination of vaginal mucus by various techniques
9-10	Pregnancy diagnosis

11-12	Sexual health control
14	Life history card for the female
15	Recording systems

Course No- VPB-125 Course Title – Physiology of Endocrine system

Credits: 2= 1+1

Syllabus

Theory-

General organization and methods of study of endocrine system , hormones, definition, and classification, general mode of action, and regulation of hormones, physiology of hormones, hypothalamus and hypophysis and their relationship to target glands and organs, endocrine physiology of thyroid and parathyroids, female generative organs

Practicals-

sperm motility, sperm concentration, live and dead sperm count, demonstrations, estimation of progesterone and oestrogen by ELISA techniques, characteristics of oocytes, effect of heat and cold on scrotal musculature , demonstration on factors affecting let down of milk. Demonstration of oestrous cycle in different species, demonstration of parturition in various animals, egg laying and phenomenon of mating.

Text book:-

- Text book of Veterinary Physiology- James E. Breazile, C.G. Deames , P.T. Cardielhae 1971
- Textbook of Veterinary Anatomy – K.M. Dyce, Wolfgang O. Sack, C.J.G. Wensig – 2009
- Text book of Veterinary Physiological chemistry-Larry R. Engel king – 2010

Reference Book:

- Applied Animal Endocrinology- E. James Squires
- Veterinary Anatomy of Domestic mammals- Horst Erich Koning, Hams Georg Liebich - 2007
- Introduction to Veterinary Anatomy & physiology textbook.-Victoria Aspinall, Melanie Cappello - 2009
- Anatomy & Physiology of Farm Animals.- Rown D. Frandson, W. Lee wilke, Anna Dee fails – 2013

e-Book:-

- Advance reproductive biology in mammels – Prof.Ghulam mohy– ud-din vani,2013

Theory Schedule:

Lect. No.	Topic	Weightages %
1-3	General organization and methods of study of endocrine system	15
4-5	Hormones, definition, and classification,	16
6	General mode of action, and regulation of hormones	16
7-8	Physiology of hormones	15
9-10	Hypothalamus and hypophysis and their relationship to target glands and organs	12
11-14	Endocrine physiology of thyroid and parathyroids	11
15-16	Female generative organs	15

Practical Schedule:

Pract. No.	Topic
1-2	Sperm motility, sperm concentration,
3-4	Live and dead sperm count
5-7	Demonstrations, estimation of progesterone and oestrogen by ELISA techniques
8-10	Characteristics of oocytes, effect of heat and cold on scrotal musculature
11-12	Demonstration on factors affecting let down of milk.
13-14	Demonstration of oestrous cycle in different species
15-16	Demonstration of parturition in various animals
17-18	Egg laying and phenomenon of mating

Department -Veterinary Gynecology and Obstetrics (VGO)

Course No. VGO-231 Course Title- Animal Reproduction

Credits: 2=1+1

Syllabus

Theory - Animal Reproduction — Introduction, development of female genitalia, growth , puberty, sexual maturity, role of hormones, symptoms of estrous cycle, synchronization, ovulation, pregnancy diagnosis, examinations, gestation, fertility, infertility and sterility, parturition in domestic animals, causes, stages of parturition, repeat breeding and AI.

Practical- study of female genitalia, palpation techniques, heat detection, study of pelvis, use of obstetrical instruments, attending case of normal parturition, manipulation of fetal malpresentation, post operative care of obstetrical cases.

Text books –

- Applied Veterinary gynecology & obstetrics textbook, Student Edition – Dr. Pradeep Kumar – 2008

e-Book-

Animal Reproduction and Gynecology – Dr.Surender sinha, 2016

Theory Schedule:

Lect. No.	Topic	Weightages %
1	Animal Reproduction — Introduction	12
2-3	Development of female genitalia, growth , puberty, sexual maturity,	12
4-5	Role of hormones, symptoms of estrous cycle	15
6-7	Synchronization, ovulation	12
8-9	Pregnancy diagnosis, examinations, gestation	14
10-11	Fertility, infertility and sterility	11
12-14	Parturition in domestic animals, causes, stages of parturition	14
15-16	Repeat breeding and AI.	10

Practical Schedule:

Lect. No.	Topic
1-2	Study of female genitalia

3-5	Palpation techniques
6-7	Heat detection
8-9	Study of pelvis, use of obstetrical instruments
10-11	Attending case of normal parturition
12-14	Manipulation of fetal malpresentation
15-16	Post operative care of obstetrical cases

Course No- VGO-242 Course Title- Andrology and Artificial Insemination

Credits: 3= 2+1

Syllabus-

Theory-

Introduction, development, comparative study of male genitalia and gonads, growth puberty, sexual maturity, endocrine control of reproduction in the male domestic animals, factors affecting maturity and sex drive in bulls, sexual behavior in males, forms of male infertility, general considerations, factors affecting infertility in male, diseases, Introduction, history development, advantages and limitations of AI , methods of semen collection in various species, techniques of AI, factors affecting quality and quantity of semen, storage of semen.

Practical- Andrological investigation of breeding bulls, assessments of sire, physical examinations, observing sexual behavior, spermatic cord, seminal vesicle, reproductive disorders in bulls, collection of semen, evaluation dilution, preservation techniques, insemination techniques in chilled and frozen semen, selection of bull for AI.

Textbook:-

- Textbook of Andrology and Artificial Insemination in Farm Animals by Singh

Reference Book

- Veterinary Andrology & Artificial Insemination: Veterinary Andrology, Semenology & Artificial Insemination by Umesh Kumbhar

e-Book-

- Animal Reproduction and Gynecology – Dr.Surender sinha, 2016

Theory Schedule

Lect. No.	Topic	Weightages %
1	Introduction, development of male genitalia	**7**
2	Comparative study of male genitalia and gonads, growth puberty, sexual maturity	**8**
3-4	Endocrine control of reproduction in the male domestic animals	**9**
5	Factors affecting maturity and sex drive in bulls	**8**

6	Sexual behavior in males, forms of male infertility, general considerations	**9**
7	Factors affecting infertility in male, its treatment, and diagnosis, diseases	10
8	Introduction, history development, advantages and limitations of AI	11
9	Methods of semen collection in various species	10
10-12	Techniques of AI	9
13-14	Factors affecting quality and quantity of semen	10
15-16	Storage of semen	9

Practical Schedule

Lect. No.	Topic
1	Andrological investigation of breeding bulls
2	Assessments of sire
3	Physical examinations, observing sexual behavior
4-5	Collection of semen
6-7	Evaluation dilution of semen
8	Preservation techniques of semen
9-10	Insemination techniques in chilled and frozen semen
11-12	Selection of bull for AI.

Department -Veterinary Pharmacology and Toxicology (VPT)

Course No- VPT-231 Course Title- Introductory Veterinary Pharmacology

Credits: 2=1+1

Theory:-

Historical development branches and scope of Pharmacology. Sources and nature of drugs. Pharmacological terms and definitions. Principles of drug activity: Pharmacokinetics - Routes of drug administration, absorption, distribution, biotransformation and excretion of drugs. Pharmacodynamics-Concept of drug and receptor, dose-response relationship, terms related to drug activity and factors modifying the drug effect and dosage. Fundamentals of drug-screening and assay of drugs. Adverse drug reactions, drug interaction

Practical:-

Pharmacy appliances. Principles of compounding and dispensing. Metrology: systems of weights and measures, pharmacy calculations, Pharmaceutical processes, Compounding and dispensing of powders, ointments, mixtures, liniments, lotions, tinctures and emulsions

Text Book:

- Applied pharmacology for Veterinary Technicians- Boyc p. wanamaker, lcothy locket Massey
- Handbook of Veterinary Pharmacology –Walter H. Hsu -2013
- Fundamentals of Pharmacology for Veterinary Technicians-Janet Amundsen Romich. 2005.

Reference Book:

- Veterinary Pharmacology and Therapeutics- Edited by Jim E. Riviere, Edited by Mark G. Papich
- Handbook of Veterinary Pharmacology Edited by Walter H. Hsu, Edited by William O. Reece
- Applied Pharmacology for Veterinary Technicians - Boyce P. Wanamaker, Kathy Lockett Massey
- Booth, N.H., "Veterinary Pharmacology and Therapeutics," 6th ed, Iowa State University Press, 1988.
- Oswiler, G.D., "Clinical and Diagnostic Veterinary Toxicology," 3rd ed, Kendall/Hunt, 1985.
- Upson, D.W., "Handbook of Clinical Veterinary Pharmacology," 4th ed, Upson Enterprises, 1993.

E-book – Vet. Toxicology – A.K.Srivastava and P.K.Varma, 2013

Teaching Schedule

Lecture No.	Topics	Weightages %
1-2	Historical development branches and scope of Pharmacology	15
3-5	Sources and nature of drugs	15
5-6	Pharmacological terms and definitions	10

7-9	Principles of drug activity; Pharmacokinetics:-Routes of drug administration, absorption, distribution, biotransformation and excretion of drugs.	15
10-12	Pharmacodynamics:-Concept of drug and receptor, dose-response relationship, terms related to drug activity and factors modifying the drug effect and dosage.	15
13-17	Fundamentals of drug-screening and assay of drugs.	15
18-23	Adverse drug reactions, drug interaction	15

Practical Schedule

Sr. No.	Topics / Activities covered during practical	Weightage %
1-2	Pharmacy appliances	15
3	Principles of compounding and dispensing	15
4-6	Metrology: systems of weights and measures	15
7-8	Pharmacy calculations	10
9	Pharmaceutical processes	15
12-13	Compounding and dispensing of powders, ointments	15
14-15	Compounding and dispensing of mixtures, liniments, lotions, tinctures and emulsions	15

Course No: VPT-232 Course Title: Systemic Pharmacology
Credit: 1=1+0
Syllabus-
THEORY

Drugs acting on digestive system: Stomachics, antacids and antiulcers, prokinetics, carminatives, antizymotics, emetics, Antiemetics, purgatives, antidiarrhoeals

Drugs acting on cardiovascular system: cardiac glycosides, antiarrhythmic drugs, vasodilators and Haematinics.

Drugs acting on respiratory system: Expectorants, antitussives, bronchodilators and Mucolytics

Drugs acting on urogenital system: Diuretics and anti-diuretics drug, Fluid therapy in animal.

Drugs acting on skin and mucous membranes: - Basic definition and example of drug acting on skin and mucous membrane:- Emollients, demulcents, Adsorbents and Protective,

Astringents, Caustics, Keratolytics, Wound-healing Agents, Topical Antimicrobials and counter irritants.

Text Books-

- Applied pharmacology for Veterinary Technicians
- Boyc p. wanamaker, lcothy locket Massey
- Pharmacological basic of therapeutics - Goodman & Gilaman - Macmillan
- Clinical pharmacology - Laurence
- Basic & clinical pharmacology-Katzung
- Modern pharmacology - Craig

Reference Books-

Handbook of Veterinary Pharmacology – Walter H. Hsu -2013

- Fundamentals of Pharmacology for Veterinary Technicians
- Janet Amundsen Romich. 2005.

E-Book:-

Vet. Toxicology – A.K.Srivastava and P.K.Varma, 2013

Teaching Schedule

Lecture No.	Topics	Weightages %
1-3	**Drugs acting on digestive system:** Stomachics, antacids and antiulcers, prokinetics, carminatives	15
4-6	**Drugs acting on digestive system:** antizymotics, emetics, Antiemetics, purgatives, antidiarrhoeals	15
7-9	**Drugs acting on cardiovascular system:** cardiac glycosides, antiarrhythmic drugs, vasodilators and Haematinics	15
10-11	**Drugs acting on respiratory system:** Expectorants, antitussives	15
12	**Drugs acting on respiratory system:** bronchodilators and	10
13-14	**Drugs acting on urogenital system:** Diuretics and anti-diuretics drug, Fluid therapy in animal.	15

15	**Drugs acting on skin and mucous membranes:** - Basic definition and example of drug acting on skin and mucous membrane :- Emollients, demulcents, Adsorbents and Protective, Astringents, Caustics, Keratolytics, Wound-healing Agents, Topical Antimicrobials and counter irritants.	15

Department -Animal Genetics and Breeding (AGB)

Course No. AGB-121 Course Title: Principles of Animal Breeding

Course Credit: 2= 1+1
Syllabus

Theory-
History and concept of Animal Breeding,Study of common terms used in genetics,Chromosome, gene, mutation,Gene action, Variations, its causes and importance, Inheritance, sex linked, sex influenced and sex limited characters,Importance of heredity and environment, Concept of heritability and its estimates,Concept of repeatability and its estimates, Concept of selection and basis,Methods of selection ,Response to selection ,Sire evaluation, Breeding systems, Genotypic and phenotypic effects , Heterosis, practical uses ,Concept of GCA and SCA and selection for specific combining ability ,

Practical - Estimation of gene and genotypic frequency, Estimation of heritability by intra sine regression of Dausha on dam and paternal half sib met correlation method, Estimation of repeatability, Important economic traits of livestock, Important economic traits of poultry, Estimation of breeding value of cow/sire, Computation of selection differential and genetic progress, Construction of sire index, Estimation of heterosis.

Text Books:-

- A text book of Animal Genetics I, Kanakraj, P, (2001) International Book Distributing Co. Lucknow. India.
- A text book of population genetics Tomar S.S., (1998)Vol. I and II Kalyani publisher, Ludhiana, India.

Reference Books:-

- Introduction to quantitative genetics, Falconer, D.S. (1981) English language book Society, England
- Animal genetics and breeding practices, Jagdish Prasad, (1996) International Book Distribution co Lucknow, India
- Genetics of livestock improvement, Lasley J.S. (1978) New Delhi, Prentice House of India.
- Breeding and improvement of farm animals,Rice V.A. And Andrews F.N., (1964) 6th ed

e-Book:-

Animal Reproduction – Ashok kumar Sharma, 2012

Theory Schedule

Lect. No.	Name of Topic	Weightage (%)
1	History and concept of Animal Breeding	6
2	Study of common terms used in genetics	6
3	Chromosome, gene, mutation	6
4	Gene action,	6
5	Variations, its causes and importance	6
6	Inheritance, sex linked, sex influenced and sex limited characters,	7
7	Importance of heredity and environment,	6
8	Concept of heritability and its estimates,	6
9	Concept of repeatability and its estimates.	6
10	Concept of selection and basis	6
11	Methods of selection	6
12	Response to selection	6
13	Sire evaluation	6
14	Breeding systems	7
15	Genotypic and phenotypic effects	7
16	Heterosis, practical uses , Concept of GCA and SCA and selection for specific combining ability	7

Practical Schedule

Pract. No.	Name of Topic
1-2	Estimation of gene and genotypic frequency
3-4	Estimation of heritability by intra sine regression of Dausha on dam and paternal half sib met correlation method

5	Estimation of repeatability
6	Important economic traits of livestock
7	Important economic traits of poultry
8	Estimation of breeding efficiency
9	Estimation of breeding value of cow/sire,
10-11	Computation of selection differential and genetic progress
12-14	Construction of sire index.
15-16	Estimation of heterosis

Course No. AGB-122 Course Title: Principles of Animal Genetics

Credits: 1+1=2

Syllabus-

Theory-

History of genetics, relation of genetics with other fields of science. Ultra structure of cell, cell organelles & their functions, Study of chromosome structure, morphology, number, types, karyotypes & ideogram, Mitosis stages, importance, Meiosis: stages, importance, difference between mitosis & meiosis, Genetics & its importance, Mendel's law of inheritance, monohybrid, Mendel's laws of inheritance: Di & Tri — hybrid ratio, deviation from Mendelian inheritance., Exception to Mendel's law (gene interactions), Types of gene action, Multiple Alleles — its characteristics, pseudoalleles, Quantitative & qualitative traits, difference between them, Cytoplasmic inheritance — its characteristics features, examples of cytoplasmic inheritance; difference between chromosomal & cytoplasmic inheritance, Linkage — definition, phases, linkage map, linkage group, number of linkage groups, types of linkage, linage value, detection of linkage, significance of linkage., Crossing over — types, theories, mechanism, factors affecting crossing over, data.

Practical Syllabus-

Simple, compound, phase contrast. fluorescent & electron microscope. Preparation-of stains & fixatives, Preparation of microscopic slides of mitosis — onion root tips & identification, Preparation of microscopic slide of meiosis — Tradescatia / Bajra. Identification of stages of meiosis, Microphotography: Conventional & digital, Methods of finding out the gametes & gametic recombination, Monohybrid ratio & its modifications, Di — hybrid ratio & its

modifications, Fri-hybrid ratio, Chi-square test, Interaction of genes — 1, comp shape, complementary, Gene interactions — I1, Supplementary, Epistatis & Inhibitory, Gene interactions — III, Additive, Duplicate & Lethal, Inheritance of quantitative characters, Study of linkage of genes, Induction of polyploidy using colchicines, Induction of mutation by using chemicals

Text Book:

- Principles of Genetics- Gardner, Simmons
- Genetics- Gupta. P. K
- Genetics- Verma.P.S, Aggarwal
- Fundamental of Genetics- Singh B. D

Reference Book:

- Principles of Genetics- Gardner,simmons
- Genetics- Gupta.P.K
- Genetics- Verma.P.S,Aggarwal
- Fundamental of Genetics- Singh.B.D

e-Book:-

- Applied Animal Genetics – Veena kumari, 2014

Teaching Schedule

Lecture No.	Name of Topic	Weightages %
1	History of genetics, relation of genetics with other fields of science. Ultra structure of cell, cell organelles & their functions.	4
2	Study of chromosome structure, morphology, number, types, karyotypes & ideogram	3
3	Mitosis stages, importance	4
4	Meiosis: stages, importance, difference between mitosis & meiosis	4
5	Genetics & its importance, Mendel's law of inheritance, monohybrid	4
6	Mendel's laws of inheritance: Di & Tri — hybrid ratio, deviation from Mendelian inheritance.	5
7	Exception to Mendel's law (gene interactions)	4
8	Types of gene action, Multiple Alleles — its characteristics,	6

	pseudoalleles. Quantitative & qualitative traits, difference between them.	
9	Cytoplasmic inheritance — its characteristics features, examples of cytoplasmic inheritance; difference between chromosomal & cytoplasmic inheritance.	4
10	Linkage — definition, phases, linkage map, linkage group, number of linkage groups, types of linkage, linage value, detection of linkage, significance of linkage.	6
11	Crossing over — types, theories, mechanism, factors affecting crossing over, data. calculation of crossing over percentage from test cross	6

Practical Schedule

Sr. No.	Title of the practical exercise
1	Simple, compound, phase contrast. Fluorescent & electron microscope. Preparation-of stains & fixatives.
2	Study of animal cell organelles
3	Study of mitosis, Identification of different stages of Mitosis
4	Study of meiosis, Identification of different stages of Meiosis
5	Methods of finding out the gametes & gametic recombination.
6	Monohybrid ratio & its modifications.
7	Di hybrid ratio & its modifications.
8	Chi-square test
9	Interaction of genes complementary
10	Induction of mutation by using chemicals.

Course No. AGB-243 Course Title: Molecular Genetics of animals

Credits: 2=2+0

Syllabus-

Theory-

Chromosomal aberration : numerical, Chromosomal aberration: structural, DNA, DNA double helix structure, forms of DNA - A, B, C & Z form, modes of replication - theories of DNA

replication - conservative, semi-conservative & dispersive, DNA repair - direct repair of DNA, excision repair of DNA, very short patch repair, short patch repair, long patch repair, functions of DNA, RNA & its structure, function & types, components of RNA, types & functions of **RNA -** rRNA, mRNA, Mutation: introduction, types of mutation, characteristics of mutation, classification of mutations, induction of mutation — physical & chemical mutagenesis, classification of mutagens, detection of mutations - CIB method & attached X- chromosome technique, significance of mutations, Sex determination: definition, sex chromosomes & different methods of sex determination, sex linked, sex influenced & sex limited characters & their significance.

Text Book:

- Principles of Genetics- Gardner, Simmons
- Genetics- Gupta. P. K
- Genetics- Verma.P.S, Aggarwal
- Fundamental of Genetics- Singh B. D
- Principles of Genetics- Gardner,simmons

Sr.No	Topic	Weightage %
1-5	Chromosomal aberration : numerical Chromosomal aberration: structural	20
6-9	DNA, DNA double helix structure, forms of DNA - A, B, C & Z form, modes of replication - theories of DNA replication - conservative, semi-conservative & dispersive, DNA repair - direct repair of DNA, excision repair of DNA, very short patch repair, short patch repair, long patch repair, functions of DNA	20
10-13	RNA & its structure, function & types, components of RNA, types & functions of **RNA -** rRNA, mRNA	20
14	Mutation: introduction, types of mutation, characteristics of mutation, classification of mutations, induction of mutation — physical & chemical mutagenesis, classification of mutagens, detection of mutations - CIB method & attached X- chromosome technique, significance of mutations	20

15-16	Sex determination: definition, sex chromosomes & different methods of sex determination, sex linked, sex influenced & sex limited characters & their significance.	20

Reference Book

- Genetics- Gupta.P.K
- Genetics- Verma.P.S,Aggarwal
- Fundamental of Genetics- Singh.B.D

e-Book:-

- Applied Animal Genetics – Veena kumari, 2014

Course No. AGB- 354 Course Title: Livestock Breeding System

Credits: 2=1+1

Syllabus:

Theory

Breeding method-Different mating systems .Inbreeding and its measures, effects and application of inbreeding with its merits and demerits, inbreeding coefficient and coefficient of relationship, Line-breeding. Out breeding, Strain crossing, Cross breeding its merits and demerits, Heterosis- Definition, causes, measurements and its application in animal breeding, outcrossing, top crossing ,grading up, criss-crossing, Species Hybridization, Performance records and standardization .Breeding Behavior- current breeding programmes in the state and country. Importance of breeding records in dairy animals, Pedigree sheet, Heritability etc

Practical

Computation of inbreeding coefficient, coefficient of relationship and heterosis. Analysis of breeding records of different livestock's and poultry farms and their maintenance ,milk recording study of pedigree and history sheet. Use of pedigree sheets in breeding horses dogs and laboratory animal etc., their preparation and interpretation.

Text books: –

- Introduction to quantitative genetics, Falconer, D.S. (1981)English language book Society, England
- Animal genetics and breeding practices, Jagdish Prasad, (1996) International Book Distribution co Lucknow, India
- Genetics of livestock improvement, Lasley J.S. (1978) New Delhi, Prentice House of India.
- Breeding and improvement of farm animals Rice V.A. And Andrews F.N., (1964) 6th ed.

Reference book:-

- A text book of Animal Genetics I, Kanakraj, P, (2001) International Book Distributing Co. Lucknow. India.
- A text book of population genetics Tomar S.S., (1998) Vol. I and II Kalyani publisher, Ludhiana, India.

e-Book-

- Applied Animal Genetics – Veena kumari, 2014

Theory Schedule:

Lect. No.	Topics	Weightages %
1	Breeding method-Different mating systems	8
2	Inbreeding and its measures	7
3	Effects and application of inbreeding with its merits and demerits	6
4	Inbreeding coefficient and coefficient of relationship	9
5	Line-breeding	10
6	Out breeding, Strain crossing	7
7	Cross breeding its merits and demerits	7
8	Heterosis- Definition, causes, measurements and its application in animal breeding	8
9	Out crossing, top crossing, Grading up, Criss crossing,	7
10-13	Species Hybridization, Performance records and standardization.	7
14	Breeding Behavior- current breeding programmes in the state and country.	8
15	Importance of breeding records in dairy animals	8
16	Pedigree sheets	8

Practical Schedule

Lect. No.	Topics
1-2	Computation of inbreeding coefficient
3 -4	Coefficient of relationship and heterosis.
5-8	Analysis of breeding records of different livestock's and poultry farms and their maintenance,
9-11	Analysis milk recording study of pedigree and history sheet.
12-16	Use of pedigree sheets in breeding horses dogs and laboratory animal etc., Their preparation and interpretation.

Department -Vet. Pathology and Parasitology(VPP)

Course No. VPP-121 Course Title: General Pathology

Credits: 2= 1+1

Syllabus –

Theory

Introduction, history and scope and pathology, causes of diseases – intrinsic, extrinsic, nutritional, physical, chemical and viable. Developmental disturbances, disturbance of circulation, disturbance of cell metabolism, icterus, necrosis, gangrenes, disturbance in growth , classification of inflammation, healing, fever.

Practical –

Study of gross pathological specimens and recognition of gross pathological lesions, techniques of preservation, dispatch and section cutting, lesions,

Text Books:

1. A textbook of Veterinary Pathology for students and practioners

   Author: Kinsley, Albert Thomas, **Publisher:** Chicago, A. Eger

Teaching Schedule

Lecture No.	Topic Details	Weightages %
1	Introduction and history of Pathology	5
2	Scope of Pathology	15
3	Causes of diseases – intrinsic, extrinsic, nutritional, physical, chemical and viable.	5
4	Developmental disturbances,	10
5	Disturbance of circulation,	10
6	Disturbance in growth	10
7	Disturbance of cell metabolism	10
8	Icterus	5
9	Necrosis	5
10-11	Gangrenes	10
12	Classification of inflammation	5
13	Healing	5
14	Fever.	5

Practical Schedule

Pract. No.	Topic Details
1-2	Study of gross pathological specimens

3-5	Recognition of gross pathological lesions
6-7	Techniques of preservation
8-10	Dispatch and section cutting

Course No- VPP-122 Course Title – Veterinary Immunology

Credits: 2 = 1+1

Syllabus-

Theory

Concepts in Veterinary Immunology. Immune system: organs, tissues and cells. Types of immunity. Development of humoral and cellular immune responses. Antigens: definition, specificity, types and factors affecting immunogenicity, blood group antigens. Antibodies: Structure, properties and function of different classes of immunoglobulins, Site, mechanism and theories of antibody production, Monoclonal antibodies. Major histocompatibility complex, Complement system; Cytokines: Major types and functions. Serological reactions: Agglutination, precipitation, haemagglutination; Phagocytosis, opsonic index, cytolysis; neutralization, toxin and antitoxin reaction,; Hypersensitivity: classification and mechanism of induction. Autoimmunity and immunotolerance. Immunisation of animals. Biologicals: Role of conventional and modem vaccines in immunoprophylaxis. Adjuvants. Quality control of biologicals.

Practical

Preparation of antigen, Raising of antisera, Concentration of Immunoglobulins, Agglutination (plate, tube). Precipitation {Agar gel precipitation test (AGPT), Indirect agglutination (Latex co-agglutination, Passive haemagglutination (PHA), Reversed passive haemagglutrnarion (RPHA)}, Haemagglutination, immunoperoxidase test (IPT), Enzyme linked immunosorbent assay (ELISA), Veterinary biologicals (visits and appraisal).

Text book:-

- Textbook of Veterinary Anatomy – K.M. Dyce, Wolfgang O. Sack, C.J.G. Wensig – 2009
- Text book of Veterinary Physiological chemistry-Larry R. Engel king – 2010

Reference books –

- Veterinary Anatomy of Domestic mammals- Horst Erich Koning, Hams Georg Liebich - 2007
- Introduction to Veterinary Anatomy & physiology textbook.-Victoria Aspinall, Melanie Cappello - 2009
- Anatomy & Physiology of Farm Animals.- Rown D. Frandson, W. Lee wilke, Anna Dee fails – 2013

Teaching Schedule

Lecture No.	Topics	Weightages %
1	Concepts in Veterinary Immunology	4
2	Immune system: organs, tissues and cells.	3
3	Types of immunity. Development of humoral and cellular immune responses.	3
4	Antigens: definition, specificity, types and factors affecting immunogenicity, blood group antigens.	4
5	Antibodies: Structure, properties and function of different classes of immunoglobulins, Site, mechanism and theories of antibody production,	6
6	Monoclonal antibodies	5
7	Major histocompatibility complex,	5
8	Complement system;	5
9	Cytokines: Major types and functions.	5
10	Serological reactions: Agglutination, precipitation, haemagglutination inhibition;	10
11	Phagocytosis, opsonic index, cytolysis	5
12	neutralization, toxin and antitoxin reaction	5
13	Hypersensitivity: classification and mechanism of induction. Autoimmunity	10
14	Immunisation of animals.	10
15	Biologicals: Role of conventional and modem vaccines in immunoprophylaxis.	10
16	Adjuvants ,Quality control of biologicals.	10

Practical Schedule

Topic. No.	Topics / Activities covered during practical	Weightage %
1	Concentration of Immunoglobulins,	10
2	Agglutination (plate, tube).	10
3	Precipitation {Agar gel precipitation test (AGPT),	10
4	Indirect agglutination (Latex co-agglutination, Passive haemagglutination (PHA),	15
5	Reversed passive haemagglutrnarion (RPHA)},	10
6	Haemagglutination inhibition,	10
7	Enzyme linked immunosorbent assay (ELISA),	15

8	Cell mediated immune (CMI) response.	10
9	Veterinary biologicals (visits and appraisal).	10

Course No: - VPP- 233

Course Title: - General Parasitology

Credit: - 2=1+1

THEORY:-

Parasites and parasitism. Types of Parasitism. Commensalism, symbiosis and predatorism, Types of hosts: Final and Intermediate hosts, paratenic hosts and reservoir hosts, natural and unnatural hosts. Host- parasite relationship; mode of transmission of parasites and methods of dissemination of the infective stages of the parasite. Parasite specificity in relation to species, breed, sex and location. Tissue reactions caused by parasites to the host. Resistance of hosts to parasitic infections/infestations. Immunity against parasitic infections. Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD). General description of helminth parasites affecting domestic animals and birds in India

PRACTICAL:-

Demonstration of the types of final and intermediate hosts. Demonstration of different organ/tissues of the hosts affected with endo and ecto parasite; demonstration of specific parasitic lesions caused by endo and ecto parasite. Demonstration of parasitic culture, bermann technique, sporulation etc. Faecal examination technique, egg count, blood smear preparation-thick and thin smear. Staining of blood smear. Examining of skin scraping and nasal washing

Text Book:

- Veterinary Parasitology, 4th Edition M. A. Taylor, R. L. Coop, R. L. Wall
- Veterinary Clinical Parasitology, Eighth Edition, by Anne M. Zajac, Gary A. Conboy
- Georgis' Parasitology for Veterinarians, 10th Edition by Dwight D. Bowman

Reference Book:

- Veterinary Parasitology Reference Manual, 5th Edition William J. Foreyt
- General characteristics, Mehra N.K and Gupta. S.K., 1993. 2001. Veterinary Parasitology: Reference Manual. 5th edition.
- Georgi, J.R., "Parasitology for Veterinarians,' 5th ed, Saunders, 1990.
- Sloss, M.W., "Veterinary Clinical Parasitology," 6th ed, Iowa State University Press,
  1994.

- Soulsby, E.J.L., "Helminths, Arthropods and Protozoa of Domesticated Animals," 7th ed, 1982.
- Bowman, D.D., "Georgia's Parasitology for Veterinarians," 7th ed, Saunders, 1999.
- Foreyt, B., "Veterinary Parasitology Reference Manual," 4th ed, Washington State, 1997.
- Sloss, M.W., "Veterinary Clinical Parasitology," 6th ed, Iowa State, 1994.

Theory Teaching Schedule:-

Lecture No.	Topics	Weightages %
1-2	Parasites and parasitism. Types of Parasitism	10
3-4	Commensalism, symbiosis and predatorism, Types of hosts: Final and Intermediate hosts, paratenic hosts and reservoir hosts, natural and unnatural hosts	15
5-6	Host- parasite relationship; mode of transmission of parasites and methods of dissemination of the infective stages of the parasite.	15
7-8	Parasite specificity in relation to species, breed, sex and location. Tissue reactions caused by parasites to the host. Resistance of hosts to parasitic infections/infestations.	15
9-10	Immunity against parasitic infections	15
11-12	Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD).	15
13-15	General description of helminth parasites affecting domestic animals and birds.	15

Practical Teaching Schedule:-

Lecture No.	Topics	Weightages %
1-2	Demonstration of the types of final and intermediate hosts	20
3-6	Demonstration of different organ/tissues of the hosts affected with endo and ecto parasite	20
7-9	Demonstration of specific parasitic lesions caused by endo and ecto	20

	parasite	
10-11	Demonstration of parasitic culture, bermann technique, sporulation etc	20
12-13	Faecal examination technique, egg count, blood smear preparation-thick and thin smear.	10
14-15	Staining of blood smear. Examining of skin scraping and nasal washing	10

Course No: - VPP- 244

Course Title: - Introductory Veterinary Microbiology

Credit: - 3=2+1

THEORY:-

Introduction and history of Microbiology. Morphology, structure, growth and nutrition of bacteria. Classification and nomenclature of bacteria. Sources and transmission of infection. Pathogenicity, virulence and infection. Resistance and susceptibility of host, bacteraemia, septicaemia, toxaemia endotoxins and exotoxins; Bacterial genetics. Plasmids, Antibiotic resistance. Introduction to morphology, growth, nutrition, reproduction in fungi, Classification of fungi. Introduction to viruses: General properties, Replication, Cultivation and Purification of viruses Cell-Virus interaction. Viral genetics. Interferon.

PRACTICAL:-

Equipment, Sterilization, disinfection and asepsis, Staining (simple & Grams, acid fast, lactophenol cotton blue). Special staining (metachromatic granules, capsular, spore). Bacterial motility, Preparation of culture media. Aerobic and anaerobic cultivation, Isolation of bacterial in pure culture. Morphological and cultural characteristics, biochemical characters, Antibiogra, Phenol coefficient test, Slide culture technique for fungus.

Text Book:

- Veterinary Microbiology:- D. Scott McVey, Melissa Kennedy, M. M. Chengappa John Wiley & Sons, 30-May-2013
- Veterinary Microbiology and Microbial Disease, 2nd Edition P. J. Quinn, B. K. Markey, F. C. Leonard, P. Hartigan, S. Fanning, E. S. Fitzpatrick October 2011, ©2011, Wiley-Blackwell

Reference Book:

- The American Biology Teacher Vol. 22, No. 6, Microbiology in Introductory Biology (Jun., 1960), pp. 360-370
- Carter, G.R., "Diagnostic Procedures in Veterinary Bacteriology and Microbiology," 5th ed, Academic Press, 1990.

- Carter, G.R., "Essentials of Veterinary Bacteriology and Mycology," 4th ed, Lea & Febiger, 1991.
- Smith, R.D., "Veterinary Clinical Immunology," Butterworth-Heinemann, 1991.
- Timoney, J.F., "Hagan and Bruner's Microbiology and Infectious Diseases of Domestic Animals," 8th ed, Lea & Febiger, 1988.
- Tizard, I.R., "Veterinary Immunology: An Introduction," 4th ed, Saunders, 1992.
- Hirsch & Zee, "Veterinary Microbiology," 1st ed, Blackwell Science, 1999.
- Tizard, I.R., "Veterinary Immunology: an Introduction, "6th ed, Saunders, 2000.

Theory Teaching Schedule:-

Lecture No.	Topics	Weightages %
1-3	Introduction and history of Microbiology	10
4-7	Morphology, structure, growth and nutrition of bacteria	15
8-10	Classification and nomenclature of bacteria	15
11-14	Sources and transmission of infection. Pathogenicity, virulence and infection	15
15-20	Resistance and susceptibility of host, bacteraemia, septicaemia, toxaemia endotoxins and exotoxins; Bacterial genetics. Plasmids, Antibiotic resistance.	15
21-25	Introduction to morphology, growth, nutrition, reproduction in fungi, Classification of fungi.	15
26-30	Classification of fungi. Introduction to viruses: General properties, Replication, Cultivation and Purification of viruses Cell-Virus interaction. Viral genetics. Interferon.	15

Practical Teaching Schedule:-

Lecture No.	Topics	Weightages %
1-2	Equipment, Sterilization, disinfection and asepsis	10
3-4	Staining (simple & Grams, acid fast, lactophenol cotton blue)	15
5-6	Special staining (metachromatic granules, capsular, spore)	15
7-8	Bacterial motility, Preparation of culture media	15
9-10	Aerobic and anaerobic cultivation, Isolation of bacterial in pure culture	15

11-12	Morphological and cultural characteristics and biochemical characters of fungus	15
13-15	Antibiogra, Phenol coefficient test, Slide culture technique for fungus	15

Course No: VPP-365 Course Title- Laboratory Diagnoses

Credits-2=0+2

Syllabus

Practical-

Training in examining clinical samples (biochemical, pathological, parasitological and bacteriological). Analyzing and correlating with clinical findings and interpreting the results. Collection, labeling, transportation, and preservation of body fluid samples. Writing results and report Interpretation of date in relation to specific diseases. Clinical significance and of serum glucose, lipids, proteins, blood urea nitrogen, creatinine, uric acid, ketone bodies, bilirubin from samples. Clinical significance of examination of urine samples. Clinical evaluation of blood (Haemoglobin, packed cell volume, total erythrocytic count erythrocytic sedimentation rate, total leukocytic count and differential leococytjc count) from clinical samples. Laboratory evaluation of samples for parasitic diseases (routine faecal examinations- direct smear method, simple sedimentation and
floatation methods, Quantitative faecal examination, pastoral larval counts). Examination of skin scrapings, examination of blood smear/blood for protozoan diseases.

Text books:-

- A text book of Parasitology. P.R. Yadav. 2001,
- Text book of Biochemistry with Clinical correlations.5th Edition,Thomas M. Devlin

Reference books-

- Veterinary Laboratory Diagnosis. Chauhan. R.S. 2003 . First Edition. International Book Distributing Co, Luknow.
- Veterinary Clinical Pathology Fourth edition. E.H.Coles , 1986. W.B.Saunders company, Philedelphia, Pennsylvania
- Helminths, Arthropods and Protozoa of domesticated animals. EJL Soulsby. 2005, Elsevier India Private Limited, NewDelhi.
- Veterinary Hematology and clinical chemistry. Mary Anna Tharall. 2004. Lippincott, Williams and Wilkins.
- Harper's Illustrated Biochemistry ,28th Edition ,Robert K. Murray, David A. Bender, Kathleen M. Botham, Peter J. Kennelly, Victor W. Rodwell and P. Anthony Weil.
- Principles of Biochemistry,3rd Edition,Donald J. Voet, Judith G. Voet and Charlotte W. Pratt.
- Mark's Basic Medical Biochemistry - A Clinical Approach,2nd Edition,Colleen Smith, Ph.D., Allan D. Marks, MD. and Michael Lieberman, Ph.D.
- Principles of Biochemistry, Lehninger's 5th Edition,Dave Nelson and Mike Cox
- Biochemistry,4th Edition,Geoffrey L. Zubay
- Advance reproductive biology in mammels – Prof.Ghulam mohy– ud-din vani,2013

E-Book:-

- Vet.Diagnostics current trend – R.P.Gupta, S.R.Garg,2013

Practical Schedule:

Pract. No	Topic
1	Introduction & laboratory diagnosis techniques
2	Estimation of blood glucose
3	Estimation of total cholesterol & HDL cholesterol
4	Estimation of total proteins & albumin
5	Estimation of urea & BUN
6	Estimation of serum creatinine
7	Estimation of serum bilirubin
8	Estimation of ALT (SGPT) & AST (SGOT)
9	Estimation of hemoglobin, PCV, Erythrocyte indices, ESR
10	Estimation of TLC,TEC & DLC
11	Collection, preservation & dispatch of clinical materials-Introduction
13	Estimation of fecal sample, quantitative fecal examination
14	Examination of skin scrapings
15	Examination of blood for parasites

Department - Veterinary Medicine(VM)

Course No- VM -241 Course Title- Preventive Medicine -I
Credits: 3=2+1
Syllabus-
Theory

Prevention and control of infectious diseases, namely mastitis, haemorrhagicsepticaemia, brucellosis, tuberculosis, Johne's disease.black quarter, tetanus, listeriosis, leptospirosis, campylobacteriosis, actinomycosis, actinobacillosis, enterotoxaemia, glanders, strangles, ulcerative lymphangitis, colibacillosis, fowl typhoid, putiorum disease, fowl cholera, avian mycoplasmosis, sppirochaetosis, salmonellosis, swine erysipelas. Other important bacterial diseases of regional importance (e.g. contagious caprinepleuropneumonia, contagious bovine pleuropneuonia etc.). Bacterial diseases of bio terrorism Instance - anthrax, botulism etc Chlamydosis, Q fever, anaplasmosis, Dermatphillosis, aspergillosis (brooders pneumonia), candidiasis, histoplasmosis, sporotrichosis, coccidiodomycosis, mycotoxicosis, etc

Textbook-

1.Veterinary Drug Handbook: Elizabeth J. Davidson, Donald C. Plumb

Reference Book:-

1. Preventive Veterinary Medicine A. Chakra warty
2. Veterinary Drug Handbook: Elizabeth J. Davidson, Donald C. Plumb

e-Book:-

Infectious Diseases of cattle – Dr.Rajib Deb, Dr. Sandip chakraborty, 2012

Teaching Schedule

Lecture No.	Topics	Weightages %
1-2	Prevention and control of infectious diseases	10
3-4	Prevention and control of mastitis, hemorrhagic septicemia, brucellosis, tuberculosis	12
5-6	Prevention and control of Johne's disease, black quarter, tetanus	10
7-8	Prevention and control of enterotoxaemia, glanders, strangles, ulcerative lymphangitis, colibacillosis, fowl typhoid, putiorum disease	12
9-10	Prevention and control of bacterial diseases	10
11-12	Prevention and control of anthrax, botulism etc Chlamydosis, Q fever	12
13-14	Prevention and control of anaplasmosis, Dermatphillosis, aspergillosis	12

15-16	Prevention and control of histoplasmosis, sporotrichosis, coccidiodomycosis, mycotoxicosis, etc	12

Practical Schedule

Lect. No.	Topic
1-2	Collections of materials from ailing animals
3-4	Preservations of materials from ailing animals
5-6	Dispatch of materials from ailing animals
7-8	Collections of materials from sick animals
9-10	Preservations of materials from sick animals
11-12	Dispatch of materials from sick animals
13-14	Screening of Herd for infectious diseases using previous epidemiological data
15-16	Screening of Herd for infectious diseases using previous epidemiological data

Course No- VM -352 Course Title- Veterinary Epidemiology

Credits: 2=1+1

Syllabus-

Theory-

Definitions and aims of epidemiology. Factors influencing occurrence of livestock diseases and production. Ecological basis and natural history of diseases. Sources, Storage, retrieval and representation of disease information/data. Epidemiological hypothesis. Epidemiological methods: descriptive, analytical (observational), experimental, theoretical (modeling), serological and molecular. Survey of animal diseases. Surveillance and monitoring of livestock diseases. Animal disease forecasting. Strategies of disease management: prevention, control and eradication. Economics of animal diseases.

Practical- Visit to primary health centres / infectious disease hospitals, vety. hospitals and organized farms for the collection of data for epidemiological investigation, processing and analysis of data, Collections, preservations and dispatch of material (blood, urine, faeces, skin scrapings, other body fluids) screening of livestock through tests, mass diagnostic campaigns, vaccination and other disease prevention and control programme on field.

Text Book

- Veterinary Epidemiology Butterworth-Heinemann, 2003
- Introduction to Veterinary Epidemiology- Hans Houe, Annette Kjaer Ersboll, Nils Toft Biofolia, 2004

e-Book:-

Animal disease informatics – B.R.Shomi, P.Krishnamurthi,2013

Theory Schedule

Lecture No.	Topics	Weightages %
1	Definitions and aims of epidemiology.	15
2-4	Factors influencing occurrence of livestock diseases and production.	15
5-7	Ecological basis and natural history of diseases	10
8-9	Epidemiological hypothesis.	15
10	Epidemiological methods:	10
11	Surveillance and monitoring of livestock diseases.	10
12	Animal disease forecasting.	10
13	Strategies of disease management	15

Practical Schedule

Lect. No.	Topic
1	Visit of primary health centres for the collection of data for epidemiological investigation
2	Visit of primary infectious disease hospitals for the collection of data for epidemiological investigation
3	Visit of Veterinary hospitals for the collection of data for epidemiological investigation
4	Visit of organized farms for the collection of data for epidemiological investigation
5-6	Processing and analysis of data
7-8	Collections of material (blood, urine, faeces, skin scrapings, other body fluids, culture and sensitivity of isolates
8-9	Preservations of material (blood, urine, faeces, skin scrapings, other body fluids,
10-11	Dispatch of material (blood, urine, faeces, skin scrapings, other body fluids,
12-13	Screening of livestock through tests
14-15	Mass diagnostic campaigns Vaccination and other disease prevention control programme on field

Course No. VM- 353 Course Title: Para-veterinary Technician skills

Credits: 3=1+2

Syllabus:

Theory

Knowledge and need of theoretical skill of A.I Technique , Importance of AI ,Methods of AI ,Advantages and disadvantages of AI, study pregnancy diagnosis ,Different method of pregnancy diagnosis ,Diagnostic test for Pregnancy diagnosis ,Importance of various par veterinarian skill ,Blood sampling, deworming ,heat detection ,dressing of wound ,removal of maggots ,Bandage different technique, primary first aid medication, California Mastitis test (CMT)

Practical

Value of Para veterinarian procedure and skill ,AI technique, pregnancy diagnosis, Heat detection , Blood sampling , Deworming ,heat detection ,dressing of wound ,removal of maggots ,Bandage different technique, primary first aid

Text book Book:-

1. Preventive Veterinary Medicine A. Chakra warty
2. Veterinary Drug Handbook: Elizabeth J. Davidson, Donald C. Plumb

e-Book:-

Use of Animals in drug discovery and development- S.S.Agarwal and Dr. Sumit Gallaya, 2015

Theory Schedule:

Lect. No.	Topics	Weightages %
1-2	Knowledge and need of theoretical skill of A.I Technique ,	10
3-5	Importance of AI ,Methods of AI ,Advantages and disadvantages of AI,	10
6	study pregnancy diagnosis	10
7-8	Different method of pregnancy diagnosis	10
9-10	Diagnostic test for Pregnancy diagnosis	20
11-14	Importance of various Para veterinarian Technician Skill	10
15-16	Blood sampling, Deworming, heat detection, dressing of wound, removal of maggots, Bandage different technique, and primary first aid medication, California Mastitis test (CMT)	30

Practical Schedule

Lect. No.	Topics
1-2	Value of Para veterinarian procedure and skill
3 -4	AI technique, pregnancy diagnosis, Heat detection
5-8	Blood sampling
9-11	Deworming
12-14	Heat detection ,dressing of wound ,removal of maggots ,Bandage
15-16	Different technique, primary first aid

Course No- VM -354 Course Title- Preventive Medicine-II

Credits: 2=1+1

Syllabus-

Theory

Prevention and control of infectious diseases, namely foot and mouth disease, rinderpest bovine viral diarrhoea, malignant catarrhal fever, Infectious bovine rhinotracheitis, enzootic bovine leucosis, ephemeral fever, blue tongue, sheep and goat pox, PPR, classical swine fever. Important exotic diseases for differential diagnosis - African swine fever, swine vesicular disease, vesicular stomatitis, Rift valley fever, Aujeezky's disease. Rabies, African horse sickness, equine influenza, equine infectious anaemia, equine rhinopneumonitis, canine distemper, Infectious canine hepatitis, canine parvoviral disease.Highly pathogenic avian influenza, Newcastle (Ranikhet) disease, Merek's disease.avian leucosis, Infectious bronchitis, infectious larynotracheitis, avian encaphalomyelitis, fowl pox, infectious bursal disease, Inclusion body hepatitis-hydropericardlumsypdrome. Other emerging and exotic viral diseases of global importance.Amphistomosis, fascioliosis, {Gastrointestinal nematodiasis, schistosomosis, echinococcosis, tapeworm infestations (cysticercosis), verminous broochitis, coeneurosis, trichomonosis, blood protozoan infections (trypanosomosis. theileriosis. babesiosis etc.). canine eperythrozoon infection, coccidiosis.

Practical- collections, preservations, and dispatch of materials from ailing animals, Survey of incidence, occurrence, outbreak etc. and correlate the ecobiology climatology with diseases, draw out possible disease predictions

Textbook-

1.Veterinary Drug Handbook: Elizabeth J. Davidson, Donald C. Plumb

Reference Book:-

3. Preventive Veterinary Medicine A. Chakra warty

4. Veterinary Drug Handbook: Elizabeth J. Davidson, Donald C. Plumb

e-Book:-

Fundamentals of General Vet. Surgery – Dr. M.D. Moin ansari, 2014

Teaching Schedule

Lecture No.	Topics	Weightages %
1-4	Prevention and control of viral diseases	20
5-8	Prevention and control of Fungal diseases	30
9-12	Prevention and control of protozoal diseases	30
13-16	Prevention and control of miscleneous diseases	20

Practical Schedule

Lect. No.	Topic
1-2	Collections, preservations, and dispatch of materials from ailing animals
3-4	Survey of incidence, occurrence, outbreak of diseases
5-7	survey of incidence of diseases
8-10	Occurrence of diseases
11-12	Outbreak of diseases
13-14	Correlate the ecobiology climatology with diseases
15-16	Draw out possible disease predictions

Course No. – VM - 365

Course Title: Veterinary Ethics and Jurisprudence

Credits: 2=2+0

Syllabus: Theory

Definition of animal welfare and ethics. Human and animal welfare in relation to ecosystem and environmental factors. Animal welfare organizations, Animal Welfare Board of India - their role, functions and current status. Rules, regulations, laws on animal welfare. Prevention of Cruelty to Animals (PCA) Act, 1960 (59 of 1960). Role and function of Committee for the purpose of Controlling and Supervising Experiments in Animals (CPCSEA). Protection and welfare of performing animals. Welfare of animals during transportation. Animal welfare in commercial livestock farming practices. Protection and welfare of working animals. Pet and companion animal welfare. Animal welfare during natural calamities and disaster management. Common offences against animals and laws related to these offences. Cruelty to the animals and bestiality. Causes of sudden death in animals. Collection and dispatch of materials for chemical examination, detection of frauds-doping, alternation of description, bishoping etc. Cattle slaughter and evidence procedure in courts. Provincial and Central acts relating to animals. Glanders and Farcy Act, 1899 (13 of 1899). Dourine Act 1910 (5 of 1910). National and International regulation on livestock diseases and role of OIE

Text Book

- Text book of Veterinary Ethics And Jurisprudence- - Chakrabarti

- Animal Right (A Referance Hand Book)- Clifford J. Sherry
- Stress and Animal Welfare –Donald Broom
- Veterinary Jurisprudence- Kirti Dua

Lect. No.	Topics	Weightages %
1-2	Definition of animal welfare and ethics. Human and animal welfare in relation to ecosystem and environmental factors.	10
3-5	Animal welfare organizations, Animal Welfare Board of India - their role, functions and current status. Rules, regulations, laws on animal welfare.	10
6-8	Prevention of Cruelty to Animals (PCA) Act, 1960 (59 of 1960). Role and function of Committee for the purpose of Controlling and Supervising Experiments in Animals (CPCSEA). National and International regulation on livestock diseases and role of OIE	10
9	Protection and welfare of performing animals. Welfare of animals during transportation.	05
10-12	Animal welfare in commercial livestock farming practices. Protection and welfare of working animals.	10
13-15	Pet and companion animal welfare. Animal welfare during natural calamities and disaster management.	10
16-20	Common offences against animals and laws related to these offences.	05
21-25	Cruelty to the animals and bestiality. Legal aspects of Examination of animals for soundness, examination of injuries and post-mortem examination.	10
26-32	Causes of sudden death in animals. Collection and dispatch of materials for chemical examination, detection of frauds-doping, alternation of description, bishoping etc.	10

Department -DAIRY SCIENCE (DSC)

Course No. DSC-121 Course Title : Milk and Milk Products

Credits: 2=1+1

Syllabus

Theory

Present status of Dairy Industry in Maharashtra and India. Definition and composition of milk. Physico-chemical properties of milk. Microbial quality of raw milk. Factors affecting composition of milk. Physico-chemical and microbial standards for different types of milk. Nutritional importance of milk and its constituents. Reception and processing (Platform test, Chilling, Standardization, Homogenization, Pasteurization, Storage, Marketing) of milk. Classification and composition of milk products (Heat coagulated, Heat and acid coagulated, Evaporated, Fermented Frozen and Fat riched products). ISI, PFA and Agmark standards for milk products,A1 and A2 type of milk. International requirement for export of milk. Preservation of milk and milk products by-Bio, Herbal, Chemical and physical preservatives. Utilization of dairy by-product: whey and high acid milk. Packaging of milk and milk products with modern techniques.

PRACTICALS

Platform tests, sampling of milk and milk products for various tests. Determination of Fat, SNF, TS, Acidity, Sp. Gravity. Standardization of milk. Cream separation. Cleaning and sanitization of dairy equipments. Manufacture of – Khoa, Basundi and Rabri, Paneer, Channa, Dahi, Ice cream and Kulfi, Butter and Ghee. Manufacture of milk sweets : Pedha, Gulab-Jamun, Rasogolla, Shrikhand.

Text Books:-

- Milk and its properties – Shrivastava, S. M. (1983) Kalyani publishers, 1/1 Rajinder Nagar, Ludhiana
- Milk and Milk Products – Winton and Winton (1993), Agrobios (India), Agro. House, Behind Nasrani Cinema, Chopsani Road, Jodhapur

Reference Book -

- Milk Testing – Davis J. G. Agrobios (India), Agro. House, Behind Nasrani Cinema, Chopsani Road, Jodhapur.

- Chemistry of Milk and Milk Products – Singh V. B. (1965), Asian Publishers, New mandi, Muzaffarnagar.
- Dairying in India – Gupta, H. A. (1997) Kalyani Publisher, 1/1 Rajinder Nagar,Ludhiana.
- Outlines of Dairy Technology – Sukumar De (2000) Oxford University Press, New Delhi

e-Book –

Dairy Technology and Engineering – Yasin Khan,2013

Teaching Schedule

Lect. No	Name of the Topic	Weightage %
1	Present status of dairy industry in Maharashtra and India	6
2	Definition of milk, composition of milk of different species of livestock	6
3	Physico - chemical properties of milk	6
4	Factors affecting composition of milk	7
5	Microbial quality of raw milk and microbial standards for different types of market milk	6
6	Nutritional importance of milk and its constituents	6
7	Reception of milk and platform tests	6
8	Standardization and Homogenization of milk	7
9	Pasteurization of milk and its methods	6
10	Chilling, storage & marketing of milk	6
11	Classification and composition of Indigenous milk products	6
12	BIS / ISI standards, PFA rules, food safety laws and Agmark for milk products,A1 and A2 type of milk	7
13	International requirements for export of milk.	6
14	Preservation of milk and milk products by Bio, Herbal, Chemical and physical preservatives	6
15	Utilization of dairy by-products like whey & high acid milk	7
16	Packaging of milk & milk products with modern techniques	6

Practicals Schedule

Pract. No.	Name of the Topic
1	Sampling of milk & milk products
2	Study the different platform tests
3	Determination of Fat by Gerber's method
4	Determination SNF & Total solids
5	Determination of Acidity and Specific gravity of milk
6	Study of cleaning & sanitization of dairy equipments
7	Standardization of milk by Pearson's method

8	Study of Cream separator & separation of cream
9	Preparation of Khoa, Basundi and Rabri
10	Preparation of Paneer & Channa
12	Preparation of Dahi, Chakka and Shrikhand
13	Preparation of Butter
14	Preparation of Ghee
15	Preparation of Ice-cream and Kulfi
16	Preparation of Pedha and Gulabjamun
17	Preparation of Rasogolla

Course No. DSC-242 Course Title: Dairy Microbiology

Credits: 2=1+1

Syllabus

Theory –

Microbial spoilage of food- milk and their products. Fermented dairy products. preservatives and preservation methods, physical method, chemical method. Definitions of pre and probiotic symbiotic and bacteria, Critical control point systems in controlling microbiological hazards in foods. Dairy starter culture-role, classification of dairy starter organisms.types of starter cultures, propagation of starter culture, preservation of starter, commercial starter, probiotic starter organisms- nutritional and therapeutic benefits. Factors affecting starter activity. Microbiological considerations of fermented milk and milk products, manufacture of various fermented milk products, Nutritional and therapeutic importance of fermented milk and milk products.

Practical

Activation of starter culture , Propagation of starter culture, Examination of purity of starter culture by culture technique and microscopically, Examination of activity of starter culture by chemical method. Preservation of starter culture- liquid culture and freezing., Manufacture of fermented milk: Technology and evaluation, Dahi, yoghurt, butter, Chakka, Shrikhand, butter milk / Chhach, Lassi etc.

Text Book:

- Yadav, J.S; Grover, S and Batish, V.K; (2004) A comprechemisive Dairy Microbiology metropolitan Book co. Pvt. Ltd. Delhi.
- Foster, E.M. (1958) Dairy microbiology, Mac Millan and co. Ltd. London.
- Robinson, R.K; (1981) Dairy Microbiology, Vol. II, Microbiology of Milk products, Applied science publisher, London.

Reference Book -

- Davice, F.L; and Law, B.A. (1984) Advances in microbiology and Biochemistry of cheese and Fermented Milk; Elsever Applied sci. London.
- APHA (1948) Standard Methods for Examination of Dairy products, 9th Edu. American Public Health Association, Washington.

e-Book

Dairy Microbiology – K singh,2012

Theory Schedule

Lect. No.	Topic	Weightages %
1	Microbial spoilage of food- milk and their products...	6
2	Fermented dairy products	10
3	Preservatives and preservation methods, physical method, chemical method	11
4	Definitions of pre and probiotic symbiotic and bacteria	9
5	Critical control point systems in controlling microbiological hazards in foods	9
6	Dairy starter culture- role, classification of dairy starter organisms	10
7	Types of starter cultures, propagation of starter culture, preservation of starter, commercial starter	12
8	Probiotic starter organisms- nutritional and therapeutic benefits	10
9	Factors affecting starter activity	5
10-14	Microbiological considerations of fermented milk and milk products	10
15-16	Nutritional and therapeutic importance of fermented milk and milk products	8

Practical Schedule -

Sr. No.	Topic
1-2	Activation of starter culture
3	Propagation of starter culture
4-5	Examination of purity of starter culture by culture technique and microscopically
6-7	Examination of activity of starter culture by chemical method.
8-10	Preservation of starter culture- liquid culture and freezing.
11-12	Manufacture of fermented milk: Technology and evaluation
13-16	Dahi, yoghurt, butter, Chakka, Shrikhand, butter milk / Chhach, Lassi etc.

Department - Animal Product Technology(APT)

Course No: APT 361 Course Title- Abattoir Practices and Slaughter byproduct Technology
Credits-3=2+1
Syllabus
Theory-

Retrospect and prospect of meat industry in India. Structure and composition of muscles (including poultry muscle), conversion of muscles to meat nutritive value of meat. Fraudulent substitution of meat, preservation of meat and aquatic foods – drying, salting, curing, smoking chilling, freezing, canning, radiation, antibiotic and chemical. Ageing of meat. Modern processing technologies of meat and meat products. Packaging of meat and meat products. Formulation and development of meat and sea foods – kabab, sausages, meat balls / patties, tandoori chicken, soup, pickles, surimi, smoked fish. Physico-chemical and microbiological quality of meat and aquatic food and food products. Basics of sensory evaluation of meat products. Nutritive value, preservation, packaging of egg and egg products. Laws governing national/international trade in meat and meat products. Organic meat food products. Food products of genetically modified animals and marine origin.

Practical-

Chilling/freezing of meat, meat products and aquatic foods. Ageing of meat Preservation and packaging of meat aquatic food and shell eggs and their products. Slaughtering and evisceration of poultry birds, Estimation of dressing percentage and yield. Preparation of different meat cuts in poultry and sheep/goat meat. Determination of microbial loads in various animal food products estimation of deteriorative changes in meat and meat products. Preparation of ready-to-eat meat/poultry products. Evaluation of external and internal egg quality, preservation technique of eggs.

Text books:-

- Principles of Meat Science. Aberle, Forest, Gerrard, Mills, Hedrick, Judge and Merkel. 2001. 4th Edition. Kendall Hunt Publishing Company
- Meat Science. 7th Edition. Lawrie and Ledward. 2006. Woodhead Publishing Company.x
- Meat Hygiene. Romans , Costello , Carlson , Greaser and Jones , 2000 10th Edition. W.B.Saunders Company.
- The Meat We Eat. Romans , Costello , Carlson , Greaser and Jones , 2000 14th Edition. Prentice Hall.

Reference Book

- Meat Science and Applications. Hui, Nip, Rogers and Young. 2001 Marcel Dekker Inc

- Meat and Meat Products- Technology, .Varnam and Sutherland. 2002.
- Chemistry and Microbiology. Chapman and Hall.Ranken. 2000.
- Handbook of Meat Products Technology. Blackwell

Teaching schedule:

Lect. No	Topic	Weightage %
1	Retrospect and prospect of meat industry in India.	8
2	Structure and composition of muscles (including poultry muscle),	8
3	Conversion of muscles to meat nutritive value of meat.	5
4	Fraudulent substitution of meat,	5
5	Preservation of meat and aquatic foods – drying, salting, curing, smoking chilling, freezing, canning, radiation, antibiotic and chemical.	6
6	Ageing of meat..	5
7	Modern processing technologies of meat and meat products	6
8	Packaging of meat and meat products.	6
9-13	Formulation and development of meat and sea foods – kabab, sausages, meat balls / patties, tandoori chicken, soup, pickles, surimi, smoked fish.	10
14-19	Physico-chemical and microbiological quality of meat and aquatic food and food products.	6
20-24	Basics of sensory evaluation of meat products.	6
	Nutritive value, preservation, packaging of egg and egg products.	10
25-26	Laws governing national/international trade in meat and meat products.	8
27-29	Organic meat food products.	6
30-32	Evaluation of external and internal egg quality, preservation technique of eggs.	5

Practical schedule

Pract. No	Topic
1	Chilling/freezing of meat, meat products and aquatic foods.
2	Ageing of meat
3	Preservation and packaging of meat aquatic food and shell eggs and their products.
4	Slaughtering and evisceration of poultry birds.
5	Estimation of dressing percentage and yield.
6	Preparation of different meat cuts in poultry and sheep/goat meat.
7	Determination of microbial loads in various animal food products
8-12	Estimation of deteriorative changes in meat and meat products.
13-14	Preparation of ready-to-eat meat/poultry products.
15	Evaluation of external and internal egg quality,
16	Preservation technique of eggs.

Course No: APT -362

Course Titles- Meat and Meat product technology (Including Poultry product technology)

Credits-3=2+1

Syllabus

Theory: Layout and management of rural urban and modern abattoirs. BIS and food safety standard on organization and layout of abattoirs. Pre-slaughter care, handling and transport of meat animals including poultry. Slaughtering and dressing of carcasses. Evaluation, grading and fabrication of dressed carcasses including poultry. Abattoir byproducts: meat bone fish meal and byproducts of pharmaceutical value. Skin and hides: methods of flaying, defects and preservation. Management of organic wastes emanating form animal industries fallen animals and abattoir effluent. HACCP concepts in abattoir management. Introduction to wool, fur, pelt and specialty fibers with respect to processing industry.

Practicals-

Methods of ritual and human slaughter flaying and dressing of food animals including poultry. Carcass evaluation. Determination of meat yield, dressing percentage, meat bone ratio and cut up parts. Preparation of different abattoir byproducts. Visit to leather processing unit and slaughterhouses/meat plants.

Text books:

- Basic requirements for an abattoir. BIS. (1967) Indian Standards. IS: 4393-1967.
- Principles of meat sciences. Forrest J, and Hedrick, HB (1994) WH Freeman and CO., San Francisco.
- Meat technology. Gerrad, F. (1991) 3rd edn. Leonard Hill, London, UK.
- Gracey, JF and Collins, DS. (1994) Meat hygiene. 9th edn. ELBS with Baillere, Tindal, London.
- Animal welfare and meat science. Gregory, NG (1988) CABI Publishing, Wallingford, UK.
- Meat handbook. Levie, A. (1979)4th edn. AVI Publishing Co., Westport, USA.
- Animal byproducts processing and utilization. Mann, I. (1962) Food and Agricultural Organization (FAO), Rome.

Reference Book

- Animal byproducts processing. Ockermann HW and Hansen CL. (1988) Ellis Horwood Ltd., Chichester, England.
- Practical meat inspection. Wilson , A (1985) Blackwell Scientific Publication, London.

Teaching schedule:

Lect. No	Topic	Weightage %
1	Food animals and meat hygiene	5
2	Abattoir and its management	10
3	BIS standard on organization & organization of abattoirs	7
4	Pre-slaughter care, handling and transport of meat animals including poultry	8
5	Ante mortem and post mortem examination.	10
6-8	Slaughtering and dressing of carcasses.	10
9-13	Evaluation, grading and fabrication of dressed carcasses including poultry.	10

14-17	Abattoir byproducts-blood & bones	8
18-22	Abattoir byproducts-intestines & meat	7
23-25	Abattoir byproducts-horns and glands	8
26-28	Skin and hides	5
29-30	Management of organic wastes from animal industries, fallen animals and abattoir effluent.	7
31-32	HACCP concepts in abattoir management.	5

Practical Schedule

Pract. No	Topic
1	Humane slaughter of food animals
2	Ritual methods of slaughter
3	Slaughter and dressing of cattle
4	Slaughter and dressing of sheep/goat
5	Slaughter and dressing of pigs
6	Grading of cattle and beef carcass evaluation
7	Grading of sheep/goats and their carcass evaluation
8	Grading of pig and pork carcass evaluation
9	Estimation of dressing percentage and yield
10	Utilization of slaughter house by-products

Other Departments

Department -Language (LANG)

Course No- LANG- 111

Course Title - Comprehension and Communication Skills in English

Credits: 2=1+1

Syllabus:

Theory:

Reading Comprehension: To locate specific information for meaning of words, phrases sand sentences for understanding logical relationship between statements. Taking and making notes

1.Techinical Reports: Structure; Language. Pressnotes/ articles Precise, summary; abstracts. Paragraph writing. Job application & CV writing. Notice, agenda and minutes Personal and professional correspondence. Stress and Intonation, Group discussion. Interview (Interviewee & interviewer). Listening com

prehension. Power point presentation.

Practical:

Reading Comprehension: 'Location of specific information, meaning of words, phrases. Sample analysis, writing 'analysis. Taking and making notes, case studies/Sample analysis, technical reports, press notes, news articles: Sample analysis and case studies, .fob application and CV writing, sample analysis, notice, agenda minutes writing: sample :analysis and case studies, personal and professional correspondence. Sample analysis and case studies.

Stress and Intonation- Practice and Drill. Group discussion, mock interviews.

Listening Skills: Practice of listening to talks, speeches & lectures.

Power point presentation-Practice and sample analysis.

Following syllabus will not be included in the examination. But, it is decided in the meeting to cover following topics in the classroom

Word order, Subject- Verbs Agreement, Preposition, Tenses, Voices, Phrasal verbs etc. Technical reports, Handling media, Business presentation, Referencing, E-mail, FAX etc.

Reference books –

- English for Practical Purposes- Patil.Z.N
- Teacher’s Handbook of Practical English- Singh Sheila

Theory Schedule

Lect. No.	Topic	Weitages %
1	Reading Comprehension: To locate specific information for meaning of words	8
2	Phrases and sentences for understanding logical relationship between statements	8
3-4	Taking and making notes	8
5	Technical Reports: Structure; Language	8
6-7	Press notes/ articles Precise, summary; abstracts	9
8	Paragraph writing	5
9	Job application & CV writing.	6
10	Notice, agenda and minutes	7
11	Personal and professional correspondence.	6
12	Stress and Intonation	5
13	Group discussion.	8
14	Interview (Interviewee & interviewer).	8
15	Listening comprehension.	6
16	Power point presentation.	8

Theory

Lect. No.	Topic	Weitages %
1-2	Reading Comprehension: 'Location of specific information, meaning of words, phrases. Sample analysis, writing analysis.	**12**
3-4	Taking and making notes, case studies/Sample analysis, technical reports, press notes, news articles	**12**
5-6	Sample analysis and case studies, fob application and CV writing	10
7-8	Sample analysis, notice, agenda minutes writing: sample :analysis and case studies	11
9-10	Personal and professional correspondence. Sample analysis and case studies. Stress and Intonation- Practice and Drill. Group discussion, mock interviews.	12
11	Listening Skills: Practice of listening to talks, speeches & lectures.	10
12-13	Power point presentation-Practice and sample analysis.	12
14-15	Word order, Subject- Verbs Agreement, Preposition, Tenses, Voices, Phrasal verbs etc.	10
16	Technical reports, Handling media, Business presentation, Referencing, E-mail, FAX etc.	11

Course No. LANG-242

Course Title: Communication Skills and Personality Development

Credits: 2=1+1

Theory

Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and nonverbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

Practical

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations.

Theory Schedule:

Lect. No.	Topics	Weightages %
1	Communication Skills: verbal and nonverbal communication.	10
2	Meaning and process of communication	10
3 -5	Structural and functional grammar,	10
6-8	Listening and note taking, writing skills, oral presentation skills;	10
9-10	Field diary and lab record; indexing, footnote and bibliographic procedures.	10
11-12	Reading and comprehension of general and technical articles	10
13-14	Precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking	10
15	Group discussion	15
16	Organizing seminars and conferences	15

Practical Schedule:

Lect. No.	Topics
1	Listening and note taking,
2	Writing skills
3	Oral presentation skills

4	Field diary and lab record
5	Indexing, footnote and bibliographic procedures
6	Reading and comprehension of general and technical articles,
7	Precise writing, summarizing, abstracting; individual and group presentations

Course No :EVS-231
Course Title:- Environmental Studies and Disaster Management
Credits: 3=2+1
Theory

Unit 1 : Multidisciplinary nature of environmental studies Definition, scope and importance

Unit 2: Natural Resources: Renewable and non-renewable resources Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefitsh and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of an individual in conservation of natural resources. • Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow in the ecosystem. • Ecological succession. • Food chains, food webs and ecological pyramids. • Introduction, types, characteristic features, structure and function of the following ecosystem :-

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4: Biodiversity and its conservation:- Introduction, definition, genetic, species & ecosystem diversity and biogeographical classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation.

Hot-sports of biodiversity.

Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India.

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 5 : Environmental Pollution: definition, cause, effects and control measures of :-

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards.

Solid Waste Management: causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies.

Unit 6: Social Issues and the Environment:

From Unsustainable to Sustainable development

Urban problems related to energy

Water conservation, rain water harvesting, watershed management

Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. dyes.

Wasteland reclamation, Consumerism and waste products, Environment Protection Act., Air (Prevention and Control of Pollution) Act., Water (Prevention and control of Pollution) Act., Wildlife Protection Act., Forest Conservation Act

Issues involved in enforcement of environmental legislation.

Public awareness.

Unit 7: Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme.

Environment and human health: Human Rights, Value Education, HIV/AIDS.

Women and Child Welfare.

Role of Information Technology in Environment and human health.

Case Studies.

Unit 8: Field work: Visit to a local area to document environmental assets river/forest/grassland/hill/mountain, visit to a local polluted site-Urban/Rural/Industrial/Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc.

DISASTER MANAGEMENT

Theory:

UNIT-1 :-Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches,

volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

UNIT-2 :-Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT-3:-Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

Teaching Schedule

Lect. No.	Topic	Weightages %
1	Unit 1 : Multidisciplinary nature of environmental studies Definition, scope and importance	**10**
2	Unit 2: Natural Resources: Renewable and non-renewable resources Natural resources andassociated problems.	**10**
3	Unit 3: Ecosystems • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow in the ecosystem. • Ecological succession. • Food chains, food webs and ecological pyramids. • Introduction, types, characteristic features, structure and function	**10**
4	Unit 4: Biodiversity and its conservation:- Introduction, definition, genetic, species & ecosystem diversity and biogeographical classification of India.	**10**
5-7	Unit 5 : Environmental Pollution: definition, cause, effects and control measures	**10**
8-12	Unit 6: Social Issues and the Environment: From Unsustainable to Sustainable development Urban problems related to energy Water conservation, rain water harvesting, watershed management	**10**
13-16	Unit 7: Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme.	**10**
17-22	**DISASTER MANAGEMENT** UNIT-1 :-Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.	**10**

23-26	UNIT-2 :-Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.	**10**
27-32	UNIT-3:-Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.	**10**

Practical Schedule-

Practical No.	Practical's
1	Visit to a river area to document environmental
2	Visit to a river area to document environmental assets /forest/grassland/hill/mountain, and etc
3-4	Visit to a urban polluted
5	Visit to a Rural/Agricultural polluted
6	Visit to a Industrial polluted site.
7	Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
8	Study of pond, ecosystems-
9	Study of river, ecosystems-pond, ,
10	Study of hill slopes ecosystem.

Course No. PHEY-111 Title: Physical and Health Education
Credits: (0+1) 1 Semester I

Practical: -

Exercise No.	Topic	Weightages
1.	Introduction to physical education definition, objectives, scope, and importance; physical culture; Warming up - General Warming down - General	6
2.	Meaning and importance of Physical Fitness and Wellness; Physical fitness components -speed, strength, endurance, power, flexibility, agility, coordination and balance;	6
3.	Methods of Training; aerobic and anaerobic exercises;	6
4.	weight training, circuit training,	6
5.	Interval training, Fartlek training;	6
6.	Effects of Exercise on Muscular, Respiratory, Circulatory & Digestive systems	6
7.	Need and requirement of first aid.	6

8.	Yoga; Introduction to - Asanas,	7
9.	Yoga Instroduction to Asanas	7
10.	Yoga Introudction to Pranayam	7
11.	Suryanamaskar	6
12.	Skill of Volleyball, Rules & Regulation	6
13.	Advance Skill of Volleyball, Specific Warming up	6
14.	Meditation	6
15.	Skill of Athletics, Short Distance running	7
16.	skill of Athletics Throwing events	6
	Total	**100**

Practical:

Introduction to physical education definition, objectives, scope, and importance; physical culture; Warming up - General Warming down – General, Meaning and importance of Physical Fitness and Wellness; Physical fitness components -speed, strength, endurance, power, flexibility, agility, coordination and balance; Methods of Training; aerobic and anaerobic exercises; weight training, circuit training, Interval training, Fartlek training; Effects of Exercise on Muscular, Respiratory, Circulatory & Digestive systems, Need and requirement of first aid., **Yoga; Introduction to - Asanas,(Practical NO.8& 9)** Ashtang Yoga Steps & meaning, (Yam,Niyam,Asan,Pranayam,Pratyahar, Dharana, Dhayhan Samadhi) Padmasan, Pavanmuktasan, pashchimottanasan, Dhanurasan, halasan, matsyasam, shalabhasan, bhujangasan, Matsyendrasan, Vakrasan, Uttanasan, Makavasan, Gomukhasan, Garudasan, Vrukshasan, Santulasan, Paadhastasan, Trikonasan, Vajrasan, Ushtrasan, Chakrasan, Sarvangasan, Shavasan. **Yoga Introudction to Pranayam (Practical No.10)** Suryabhudan, (Anulom vilom) Ujjayec, Shitkari, Shitali, Bhastrika, (Kapal bhati) Bhramari, Omkar. Suryanamaskar, Skill of Volleyball, Rules & Regulation, Advance Skill of Volleyball, Specific Warming up, Meditation, Skill of Athletics, Short Distance running, skill of Athletics Throwing events.

Reference Books:

1. O.P. Aneja. Encyclopaedia of Physical education, sports and exercise science (4 volumes).
2. Anil Sharma. Encyclopaedia of Health and Physical Education (7 Volumes).
3. N V Chaudhery, R Jain. Encyclopedia of Yoga Health and Physical Education (7 Volumes).
4. Pintu Modak, O P Sharma, Deepak Jain. Encyclopaedia of Sports and Games with latest rules and regulations (8 volumes).
5. Edwin F Bryant. Yoga sutrap of Patanjali.
6. Physical Education And Recreational Activities, Deepak Jain Year of Pub.: 2011
7. Dimensions Of Physical Education, Anil Sharma Year of Pub.: 2011
8. Physical Fitness, Vijaya Lakshmi Year of Pub.: 2005

9. Research Process In Physical Education And Sports: An Introduction by K. G. Jadhav / Sachin B. Pagare / Sinku Kumar Singh Year of Pub.: 2011
10. Sports Training And Biomechanics In Physical Education, Sinku Kumar Singh Year of Pub.: 2011
11. Test, Measurement and Evaluation in Physical Education, P. L. Karad Year of Pub.: 2011
12. Foundations of Physical Education, Exercise Science, and Sport, Deborah A. Wuest, Charles A. Bucher

Marking System for All Agriculture Disciplines. - (Total 100 Marks)

1. Mannual - 20 Marks
2. Asanas - 20 Marks
3. Physical Feetness Test - 20 Marks
4. Games Skills - 20 Marks
5. Presence - 20 Marks

Course No. H/NSS/NCC-111 **Course Title: National Service Scheme/ National Cadetcorps**

Credits: (0+1) 1 **Semester I**

Practical-

Exercise No.	Topic	Weightages
1.	Introduction and basic components of NSS: Orientation: history, objectives, principles, symbol, badge; regular programmes under NSS, organizational structure of NSS,	7
2.	Code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health	7
3.	NSS programmes and activities Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey,	7
4.	Analysing guiding financial patterns of scheme, youth programme/ schemes of GOI,	7
5.	Coordination with different agencies and maintenance of diary	6
6.	Understanding youth Definition, profile, categories, issues and challenges of youth;	6
7.	Opportunities for youth who is agent of the social change	6
8.	Community mobilisation Mapping of community stakeholders, designing the message as per problems and their culture;	6
9.	Identifying methods of mobilisation involving youth-adult partnership	6
10.	Social harmony and national integration Indian history and culture,	6

11.	Role of youth in nation building, conflict resolution and peace-building	6
12.	Volunteerism and shramdan Indian tradition of volunteerism, its need, importance, motivation and constraints;	6
13.	Shramdan as part of volunteerism	6
14.	Citizenship, constitution and human rights Basic features of constitution of India, fundamental rights and duties,	6
15.	Human rights, consumer awareness and rights and rights to information	6
16.	Family and society Concept of family, community (PRIs and other community based organisations) and society	6
	Total	**100**

National Cadet Corps (NC)

Practical NCC: Introduction to NCC, defense services, system of NCCtraining, foot drill, sizing, forming up in three ranks, open and close order march, dressing, getting on parade, dismissing and falling out, saluting, marching, arms drill, shoulder arm, order arm, present arm, guard of honour, ceremonial drill, weapon training – rifle bayonet, light machine gun, sten machine carbine, introduction and characteristic stripping, assembling and cleaning, loading, unloading and firing. Field craft, visual training, targets, judging distance, fire discipline and fire control orders, battle craft, field signals, description of ground, section formation, section battle drill, scouts and patrols, ambush, field engineering, map reading, conventional signs, grid systems, use of service protractor, prismatic compass and its use, self-defense, general principles, precautions and training, attacks and counter attacks, marching and searching, first aid, hygiene and sanitation, civil defense, leadership and NCC song.

Reference books :-

1. National Service Scheme: A Report, by KhwajaGhulamSaiyidain. Published by Ministry of Education, Govt. of India, 1961.
2. Training and consultancy needs in national service scheme, by N. F. Kaikobad, Krishan K. Kapil. Published by Tata Institute of Social Sciences, 1971.
3. National Service Scheme: guide-lines to project-masters, by Andhra University, Dept. of Sociology & Social Work. Published by Dept. of Sociology & Social Work, Andhra University, 1971.
4. National Service Scheme in Gujarat: An Evaluation Report for the Year 1986-87, by Tata Institute of Social Sciences Training Orientation & Research Centre (NSS), India, India. Dept. of Youth Affairs and Sports.Published by The Centre, 1987.
5. National Service Scheme in Maharashtra: An Evaluation Report for the Year 1986-87, by Tata Institute of Social Sciences Training Orientation & Research Centre (NSS), India, India Dept. of Youth Affairs and Sports. Published by The Centre, 1988.
6. National Service Scheme in India: A Case Study of Karnataka, by M. B. Dilshad. Published by Trust Publications, 2001.

Course No. DEG-111 **Course Title: Democracy, Elections and Good Governance**

Credits: (1+0) 1 **Semester I**

Syllabus

Theory

Unit No. 1

Democracy – Introduction meaning, classification, Principles of Democracy, Dimensions of democracy, Democracy and Diversity Decentralization : concept, features,Fundamental Rights in the Indian Constitution, Outcomes of Democracy and Challenges of Democracy

Unit No. 2

Independent Election Commission in India powers of election commission in India,Elections to local self Government Bodies, National level, State level,Institutions at the local level Municipal Cooperation, Municipal Council Nagar Panchayat, ZillaParishad, PanchayatSamiti, Gram Panchayat : powers duties, Constitutional Provision of 73 & 74 constitutional Amendment Act and Important features of 73 & 74 Constitutional Amendment Act

Unit No. 3

Good Governance : Concept, meaning,Government & Good Governance, , Good Governance and India, Nature of G.G. in India,Attributes of Poor Goverance1 and Steps taken for Good Governance in India.

Teaching Schedule (Theory)

Lecture	Topic	Weightage (%)
1	Democracy – Introduction meaning, classification	4
2	Principles of Democracy, Dimensions of democracy	6
3	Democracy and Diversity Decentralization : concept, features,	6
4	Fundamental Rights in the Indian Constitution	10
5	Outcomes of Democracy, Challenges of Democracy	5
6	Independent Election Commission in India powers of election commission in India	8
7	Elections to local self-Government Bodies, National level, State level	8
8	Institutions at the local level Municipal Cooperation, Municipal Council Nagar Panchayat	8

9 & 10	ZillaParishad, PanchayatSamiti, Gram Panchayat : powers duties	10
11	Constitutional Provision of 73 & 74 constitutional Amendment Act	5
Lecture	**Topic**	**Weightage (%)**
12	Important features of 73 & 74 Constitutional Amendment Act	5
13	Good Governance : Concept, meaning	5
14	Government & Good Governance, , Good Governance and India, Nature of G.G. in India	5
15	Attributes of Poor Goverance1	5
16	Steps taken for Good Governance in India	10
	Total	**100**

Suggested Readings:

1) Development and Democrasy in India by Shailendra D Dharma, Publication : Publisher: Lynne Rienner, Boulder. Year: 2002

2) The Constitution of India, by P. M. Bakshi. Publication:Universal Law Publishing. Edn.: 14th, Year :2017

SEMESTER VII

Animal Husbandry Internship and Industrial Training Programme

The student of A.H. degree course shall be required to undergo compulsory rotating internship for a Minimum period of six calendar months which will be at par with RAWE. The 6 month period will be divided in two periods each of one will be of 3 months and treated as component I and II.

Attachment- Attachments of students of animal husbandry under Internship or Animal husbandry Work experience Programme (AHWE) will be with Cooperative dairies or private dairy units who are providing veterinary care and services to farmers, State Government veterinary clinics, NGO centers which are associated with Animal Health care practices, State government or private animal disease diagnostic centers, Mahatma Phule Krishi vidyapeeth's livestock farms and laboratories, Milk and meat processing plants in Maharashtra state. The list of contacted and concerned livestock firms is enclosed at Annexure.

Component -I

Credits: 10=0+10

Course No: VM 476

Course title: Para-Clinical Veterinary Skills

Credits: 10=0+10

I. Medicine –

Credits=05=0+05

Syllabus -

Recording history, handling, examination, diagnosis,

first aid treatment and post operative care of sick animals.

Castration, preparation of teaser bulls.

Care, sterilization, storage and upkeep of equipment used for artificial Insemination.

Preparation of A.V. and Collection of semen.

Evaluation of semen (Macroscopic/ Microscopic tests).

Preparation of extender and Extension of semen.

Semen preservation and Artificial Insemination techniques.

Collection, labeling, transportation, and preservation of samples.

Examination of clinical samples (biochemical, pathological, parasitological and bacteriological).

Analyzing and correlating with clinical findings and interpreting the results based on laboratory diagnosis.

General Management practices and Report writing

II. Animal Reproduction –

Credits=05=0+05

Syllabus

Artificial insemination and pregnancy diagnosis.

Infertility, distokia and related cases.

Selection, care, training, maintenance

Andrological examinations of breeding bull for semen collection.

Attending cases for pregnancy diagnosis,

Infertility, first aid treatment and or post operative care treatment of infertile animals

Distokiya of sick/affected animals under field conditions.

Analyzing and correlating with clinical findings and interpreting the results based on laboratory diagnosis.

General Management practices and Report writing

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Component -II

Credits: 10=0+10

Course No: LPM 4715
Course Title- In plant Training at Livestock farm / Poultry farm
Credits: 05=0+05

In plant training at Livestock farm

Syllabus

Restraint of animals, Animal identification, Dentition and ageing of animals, Housing layout/requirements. Feeding, Physical. Evaluation of livestock health parameters ,Heat detection, AI technique, pregnancy diagnosis, attending parturition cases/distokiya, Blood sampling, Vaccination, Deworming, Heat detection ,Primary first aid, Examination of animal inducting behavior and general appearances, attending lambing cases/distokiya, general appearance and general management practices and record keeping. Selection and Identification of sheep and goat, Feeding, Flushing, Care and management, Shearing, grading and Marketing of wool, Processing of wool and its products, Important management practices for sheep and goat Preparation of animal for show, Fattening of lambs and kids, Preparation of animals for slaughter and methods of slaughter, Dressing percentage and Meat bone ratio, Study of farm records, Vaccination. Bank proposals for sheep and goat unit

In plant Training at Poultry farm

Syllabus

Preparation of value added egg products. Visit to broilers and layer units. Visit to slaughter houses, Broiler and layer Housing, Equipment and Environment, Feeding, cage and litter management, Cleaning and disinfection, Broiler and layer nutrition and feeding: Broiler and layer -Flock health and Bio security, vaccination, Selection of site for poultry units. Selection of poultry housing system. Principles in poultry house construction. Selection of feeding and watering troughs. Selection of breed for broiler / leyer. Preparation of houses before arriving of chicks. Sexing of chicks and its importance. Purchase of day old chicks and precaution during transportation. Vaccination of birds. Brooding of chicks. Feeding and watering of chicks in brooders. Feed ingredients for chicks in brooder. Analysis of available water and water treatment before watering the birds. Cages / Deep litter management. Importance of light arrangement in poultry houses. Accommodation of birds. Preparation of

broiler rations viz; chick starter and chick finisher. Preparation of layer ration viz; Chick mash, grower mash and finisher. Marketing fowls and culling and eggs marking in layers. Cockerel management. Precautionary measures to be taken in poultry birds. Weighing of broilers at 35 days and 42 days. Collection of eggs, grading of eggs. Care during transportation of broilers birds. Care during transportation of eggs. Storage of eggs. Study of FCR in broilers. Study of FCR in layers. Marketing of broilers and eggs. Merits and demerits of contractual marketing. Merits and demerits of private marketing. Pre-requisites required for bank proposals. Preparation of bank proposal broilers / layers. Position of India in global poultry industry. Study of export potential of poultry birds and eggs. Minimum requirements for export of poultry birds. The quarantine measures and phyto-sanitory certificate. Preparation of value added broiler meat products, Broiler & layer production economics and marketing, General management practices and record keeping.

Course No: DSC 473

Course Title- In Plant training at Feed Mill/Feed Factory/ Meat/Milk processing unit

Credits: 05=0+05

In plant training at Feed Mill/Feed Factory

Syllabus –

-Principles of feed compounding and mixing (Selection of material for quality control, feed processing),

Feed compounding involves the various steps:

Selection of locally available ingredients.

Formulation of appropriate balanced ration.

Procurement of raw materials.

Quality check of raw materials.

Weighing the ingredients according to formulation.

Processing such as Grinding, flaking, etc.

Uniform mixing.

Packing and storage of mash form feed.

Further processing for preparation of other forms of feed (pelleting, extruding, etc.)

Qualitative detection of undesirable constituents and common adulterants of feed

Laboratory ensiling of green fodders

Planning for balanced feeding. Diet charts, preparation of balanced diet for new born growing and milking animals

Hygienic preparation, preservation and storage of foods.

Visit to rural and urban areas for observing feeding habits/animal feeding routines; storage
-General precaution while working in laboratory.
-Preparation of different standard solution, reagents and indicators- Normal solution, equivalent weight, molar and normal solutions, titration, standard solution, titre, end point and indicators
-Preparations of solutions of various strength of common acids, alkalies and alcohols for determination proximate principles of feed
-Preparation of sample for chemical analysis – herbage, faeces, silages.
-Processing and weighing of biological samples for proximate analysis, general precautions in weighing samples
-Proximate principles in feed – general views, main features of Weende's system of analysis
-Determination of proximate principles i.e. estimation of crude protein, ether extract, crude fiber, nitrogen free extract , total ash and calcium , phosphorus in feed samples.
-Demonstration of detergent method of forage analysis

In Plant training at Meat/Milk processing Unit

Syllabus

Meat, fat and other edible carcass Parts,
Principles of meat processing technology,
Selection and grading of raw materials for meat processing,
Non-meat ingredients. Seasonings used in meat processing,
Heat treatment of meat products
Categories of processed meat products
Fresh processed meatproducts,
Raw-fermented sausages,
Raw-cooked meat products,
Precooked-cooked meat products Cured meat cuts Processed products made of chicken Meat products with high levels of extenders and fillers Traditional / ethnic mat products,
Meat drying Simple meat processing under basic conditions Casings
Packaging of fresh and processed meat Canning / sterilization of meat products Handling and maintenance of tools and core equipment
Simple test methods for meat products,
Meat processing hygiene Cleaning and sanitation in meat plants
Recipes for processed meat products
General management practices and record keeping.

Student READY Programme

(RURAL AND ENTERPRENEURSHIP AWRENESS DEVELOPMENT YOJANA)

Semester VIII

EXPERIENTIAL LEARNING PROGRAMME

MODULE 1

1.	**Module No.**	**:**	**LPM 4816**
2.	**Title**	**:**	Commercial Poultry Production
3.	**Credits**	**:**	10=0+10
4.	**Departments**	**:**	Livestock production and management
5.	**No. of Students**	**:**	15 (Batch A)

1. Name of the Experiential Learning Unit

Commercial Poultry Production

2. Location with Address

Department of Livestock production and management at College of Animal Husbandry, Baramati

3. Objectives

1. To train the students for commercial poultry production
2. To develop the skill and awareness regarding sustainable techniques in profitable poultry farming

4. Activity components

Training Modules:

a) Experiential Learning in Poultry unit: Duration: 6 months

S.No.	Module	Duration
1	**Development of a Bankable Business Proposal**: Students in designated groups shall develop a bankable proposal of given in **Annexure-1**. Understanding the requirement of various permits and licenses for establishment of commercial broiler production unit and procedures for	Simultaneously with following modules
2	**One day Old chick procurement:** Attachment with Hatchery unit	3 weeks
3	**Hands-on- Training and Experiential Learning:** The in-charge shall prepare not less than 4 different product mix to be manufactured daily by the	6 weeks per product mix.
4	**Report writing:** As per Guidelines given in **Annexure 2**	Simultaneously

Financial Requirements:

Sr. No.	Particulars	(Rs. Lakh)
I	**Non recurring**	
1.	Poultry shed @ 2.5 sq. ft. per bird for 500 birds @ Rs. 150 per sq.ft.	1.88
2.	Store room 12 x 10 @ Rs. 150 per sq. ft.	0.18
3.	Feeders, waterer, egg cages etc.	0.05
	Total	**2.11**
II	**Revolving fund**	
i)	Cost of chick @ Rs. 17 per chick for 500 chicks	0.08
ii)	Feed cost average 6 kg per bird up to 18 weeks Rs. 10 per kg	0.30
iii)	Feed cost @ 100 g for 52 week @ Rs. 10 per kg	1.82
iv)	Veterinary aids	0.03
v)	Electricity and other miscellaneous charges	0.03
vi)	Labour charges @ Rs. 100 per day for 1 labour	0.49
	Total	**2.75**
	Sub total	**4.86**

Budget estimate for broiler under deep litter system for 500 birds

Sr. No.	Particulars	(Rs. Lakh)
I	**Non recurring**	
1.	Poultry shed @ 1 sq. ft. per bird for 500 birds @ 150 per sq. ft.	0.75
2.	Store room 12 x 10 @ Rs. 150 per sq. ft.	0.18
3.	Feeders, waterer, etc.	0.05
	Total	**0.98**
II	**Revolving fund**	

i)	Cost of chick @ Rs. 17 per chick for 500 chicks	0.08
ii)	Feed cost average 4 kg per bird up to 6 weeks Rs. 18 per kg	0.36
iii)	Veterinary aids	0.02
iv)	Electricity and other miscellaneous charges	0.01
v)	Labour charges @ Rs. 100 per day for 1 labour	0.05
	Total	**0.52**
	Sub total	**1.50**
	Grand total	**6.36**

Given Price data –

Cost Per Bird Per 2.5 KG

Chick = 27 Rs.

Medicines = 0. 56 Rs.

Water (8 Lit * 1.5 Rs.) = 12 Rs.

Feed (3.5 Kg * 27.1) = 94.85 Rs.

Vaccination = 0.71 Rs.

Electricity = 4 Rs.

Cost of Litter = 6.88 Rs.

FCR = Chick Cost + (Medicine Cost + Vaccination Cost) + Water Cost + Feed Cost + Labour Charge + Electricity Cost + Cost of Litter

= 27 + (0.56 + 0.71) + 12 + 94.85 + 4 + 6.88

= 27 + 1.27 + 12 + 94.85 + 4 + 6.88

= 145.5 / per 2.5 Kg

= 58.2 Rs / per Kg .

Cost of Production For 500 Birds

-: Given Cost :-

Sr.no.	Particular	Quantity	Rate (Rs)	Total
(A)	**Cost of Chiks**	500	27	13500 /-
(B)	**Cost of Feed**	--	--	--
1 .	**Pre-Starter**	166 Kg	27.9 Rs/ Kg	4631 /-
2 .	**Starter**	462 Kg	27.2 Rs/ Kg	12567 /-
3 .	**Finisher**	1143 Kg	26.2 Rs/ Kg	29946 /-
	Subtotal	--	--	47144 /-
(C)	**Cost of Water**	4000 Lit	1.5 Rs/ Lit	6000 /-
(D)	**Cost of Medicines**	--	--	283.8 /-
(E)	**Cost of Vaccination**	--	--	355 /-
(F)	**Cost of Litter**	555 Kg	6.20 Rs/Kg	3441 /-
(G)	**Cost of Electricity**	--	--	2000 /-

Total Cost = A + B + C + D + E + F + G

= 13500 + 47144 + 6000 + 283.8 + 355 + 3441 +2000

Total Cost = 72723 Rs.

Total Income = 58298 + 5000 = 63298 Rs.

Total Income =Total Cost- (Feed cost + Cost of chick)

=72723- (13500+47144)

=12079/5 Students=2415 Rs

Profit/Loss and guidelines for sharing profit

Total Income for the students – 2415 Rs / Batch / 30 Days of Broiler Production

So Approx. students will get 6000 Rs in 3 month

The profit will be shared by the students, department and the faculty involved in the programme. The profit share will be as follows:

1. Students - 75%
2. Department - 15%
3. Unit Manager/Institute -10%

Payment of honorarium to Faculty @ Rs.15,000.00 per month and Honorarium to Staff @ Rs. 5000.00 per month may also be considered from the profit.

If the EL unit is found to register loss, remedial measures should be taken by the monitoring team. If it is not rectified, it should be closed immediately. Thorough planning should follow.

Syllabus

Theory

Poultry industry in India (related to broilers and layers). Modern breeds of broilers and layers. Modern hatchery for commercial chick production. Development of chicken embryo. Housing systems. Feeding and Management of broilers. Feeding and Management of layers. Vaccination schedules for broilers and layers. Diseases and their control. Threats of new poultry diseases. Value added convenient poultry products. Economics of broiler and layer production.

Reference Books

1. Poultry by Jull
2. Poultry by G.C. Banarjee
3. Livestock and poultry production – Harban Singh and Moore, E. N. (1968)

Practical

Selection of site for poultry units. Selection of poultry housing system. Principles in poultry house construction. Selection of feeding and watering troughs. Selection of breed for broiler / leyer. Preparation of houses before arriving of chicks. Sexing of chicks and its importance. Purchase of day old chicks and precaution during transportation. Vaccination of birds. Brooding of chicks. Feeding and watering of chicks in brooders. Feed ingredients for chicks in brooder. Analysis of available water and water treatment before watering the birds. Cages / Deep litter management. Importance of light arrangement in poultry houses. Accommodation of birds. Preparation of broiler rations viz; chick starter and chick finisher.

Preparation of layer ration viz; Chick mash, grower mash and finisher. Marketing fowls and culling and eggs marking in layers. Cockerel management. Precautionary measures to be taken in poultry birds. Weighing of broilers at 35 days and 42 days. Collection of eggs, grading of eggs. Care during transportation of broilers birds. Care during transportation of eggs. Storage of eggs. Study of FCR in broilers. Study of FCR in layers. Marketing of broilers and eggs. Merits and demerits of contractual marketing. Merits and demerits of private marketing. Pre-requisites required for bank proposals. Preparation of bank proposal broilers / layers. Position of India in global poultry industry. Study of export potential of poultry birds and eggs. Minimum requirements for export of poultry birds. The quarantine measures and phyto-sanitory certificate. Preparation of value added broiler meat products. Preparation of value added egg products. Visit to broilers and layer units. Visit to slaughter houses.

Teaching Schedule

Theory

Sr. No.		**Weightages**
1.	Poultry Industry in India related to broilers and layers	6
2.	Study of modern strains of broilers	7
3.	Study of modern strains of layers	6
4.	Study of modern hatchery for commercial chick Production	7
5.	Incubation and hatching of eggs	6
6&7.	Housing systems of poultry- cages and deep – litter	12
8.	Management of broilers	7
9.	Management of layers	6
10&11	Study of important diseases of broilers and layers	12
12.	Threats of new poultry diseases	7
13.	Vaccination schedule for broilers and layers	6
14.	Value added poultry products	6
15.	Economics of broiler production	6
16.	Economics of layer production	6

Practical

1. Selection of site for different poultry units
2. Important aspects in poultry house construction
3. Housing system for poultry
4. Feeding and watering systems for poultry
5. Different strains of broilers
6. Different strains of layers
7. Preparation of houses before arrival of chicks
8. Sexing of chicks

9. Purchase of day old chicks and precaution during transportation
10. Vaccination schedule for broilers
11. Vaccination schedule for layers
12. Brooding of chicks and precautions during brooding
13. Feed ingredients for chicks in brooding
14. Feeding and watering of chicks during brooding
15. Analysis of available water and water treatment before watering the birds
16. Management of birds in cage system
17. Management of birds on deep litter system
18. Light management in poultry houses
19. Accommodation of birds in cages
20. Accommodation of birds in deep-litter system
21. Feed ingredients required in broiler ration
22. Preparation of broiler ration
23. Feed ingredients required in layer ration
24. Preparation of layer ration
25. Marketing of fowls culling of laying birds
26. Marking of poor shelled eggs and measures to be taken
27. Cockerel management and study of its economics
28. Precautionary measures to be taken in poultry farms
29. Weighing of broilers at marketing age
30. Collection of eggs and grading of eggs
31. Care during transportation of broiler birds
32. Care during transportation of eggs
33. Storage of eggs
34. Study of feed conversion ratio in broilers
35. Study of feed conversion ratio in layers
36. Marketing of broilers
37. Marketing of eggs
38. Marketing of layers / culled birds
39. Merits and demerits of contractual marketing system
40. Merits and demerits of private marketing system
41. Pre-requisites for bank proposals
42. Preparation of bank proposal for broilers
43. Preparation of bank proposal for layers
44. Minimum requirements for export of poultry birds
45. To study the quarantine measures and phyto-sanitary certification
46. Preparation of value added broiler meat products
47. Preparation of value added eggs products
48. Visit to commercial broiler and layer units, hatchery, slaughter house and cold storage

Annexure-1

GUIDELINES FOR DEVELOPEMENT OF BANKABLE PROJECT FOR COMMERCIAL POULTRY UNIT

1. **Introduction:** It should cover the name of the company, location of unit, activities, products, capacity of unit and project outlay.
2. **Company:** It should cover the location of registered office, date of formation, registration and authorized share capital. It should also cover the date of incorporation and commencement of business, the objectives, areas of operation, subscribed share capital.
3. **Promoters and their background:** Name and address of promoters, their background, experience and net worth.
4. **Management of the company:** Persons looking after the day to day management, their background, experience, etc. should be covered.
5. **Project profile:**

   i. **Land and location:** This should cover the area of land, location of the unit, distances from nearby town, availability of approach roads, power and water supply and other communication including schools, banks, hospitals, etc.

   ii. **Civil structures**: Name of the Architect, type of structures proposed, technical specifications of civil structures, drawings and detailed cost analysis of various civil structures along with the present position of implementation may be indicated.

6. **Marketing and business prospects:**

   a) The product, capacity of the unit, year-wise capacity utilization and actual quantity of products produced per year.

   b) Areas of marketing of the product and strategies i.e. Talukas, district or state-wise quantities proposed for sale, methods of sale, agencies/contractors, method of transportation of products, incentives or commission proposed to be paid, expenditure on publicity and brand name should be indicated. It should also cover the proposed marketing network in terms of staff and material.

   c) Market survey for raw materials as well as for the products to be sold covering the demand/supply position, other sources of supply of products, the average price of products for the last 4-5 years and also the potential for selling the products should also be covered.

7. **Socio-economic benefits:** The number of villages, farmers, customers benefited and also number of persons employed either directly or indirectly in this activity.

8. **Schedule of implementation:** The proposed implementation schedule of the scheme may be indicated starting from purchase of land till commercial production.

9. **SWOT analysis:** The strengths, weaknesses, opportunities and threats should be discussed separately.

10. Project cost:

i) **Land:** Area of land, cost of land and conversion charges.

ii) **Site and land development:** It should cover the land levelling, fencing/compound wall, internal roads, drainage, etc. The specifications, unit cost and the total cost should be furnished.

iii) **Civil structures:** The civil structures comprises of factory building, raw material and finished products godowns, office, laboratory, quarters, garage, canteen, etc. Detailed plan lay outs along with cost estimates certified by the Engineer should be given.

iv) **Hatchery machinery:** Imported/indigenous components, major suppliers, quantities, unit cost and the total cost of the plant and machinery including the misc. equipment should be given. The quotations along with the specifications are required to be enclosed.

v) **Electrical system:** Covering transformer, diesel generators, internal and external electrification and also the deposits to be paid to the State Electricity Boards. The specifications of transformer as well as generators along with the quotations should be furnished. With reference to electrification, the break up is required to be given.

vi) **Water supply and other utilities:** Source of water, specifications and expenditure on water supply system, cost of boilers for steam generation, etc.

vii) **Vehicles:** Number and cost along with justification on requirement of the various vehicles, price quotations from the dealers along with specifications should be furnished.

viii) **Pre-operative and preliminary expenses:** The item-wise cost and justification should be given.

ix) **Contingencies:** Percentage of contingencies and its reasonableness.

x) **Margin money for working capital:** The margin money for working capital may be worked out taking into account the requirements of various raw material, packing material, fuel, etc., finished products and sundry debtors for one cycle of operation.

11. Sources of finance: The total project cost and source of funds (equity/public issue, subsidy, loan, etc. should be furnished.

12. Techno-economic parameters: Should cover the capacity of the plant, year-wise capacity utilization, quantity of products manufactured, commission on sale of products, transportation charges, power and fuel charges, packing material charges, salaries and wages, marketing expenses and other overheads. The procurement prices of various ingredients as well as the sale price of various products should be indicated.

13. Economics of the project

Based on the various techno-economic parameters, the economics of the project has to be

worked out for the project period or till the repayment of bank loan.

Annexure-2

GUIDELINES FOR REPORT WRITING*

1. Spiral or any sort of proper binding.
2. Cover page (Mentioning Name of the Poultry Unit with year, work area, Roll No. as well as ID No., Submitted by (Name of the student) and submitted to: The Dean, College of Animal Husbandry, Baramati
3. Acknowledgements (with date and signature over the name).
4. Index/contents (having Serial No., Title and page numbers)
5. Main Text (with heading in Bold and large font size). Start each sub-topic on separate page (fresh page). Regular text minimum Times New Roman - 12; Headings bigger font.
6. Introduction: Give introductory part with definition, objective, production status per day/per month/per year even comparing past year data too. HACCP requirements and specific standards set by the Poultry unit where training is undertaken, if any (Latest prevailing standard should be mentioned).
7. Management hierarchy, Managemental aspects related to section
8. Make and capacities (rated and actual) of the Equipment in the section.
9. Layout of the section and drawings or photographs of relevant machineries. (Figures have to be quoted in the text where applicable).
10. Flow chart for rearing of chicks/Broiler with all technical details. The flow diagram should not stretch to more than 2 pages (1 page is desirable). Flow chart should be centered and arrows included in between the spaces.
11. Tables should have caption and having proper borders throughout.
12. Significance of major technological steps. Technological important things like cheese/paneer yield, fat recovery in ghee section, overrun of butter, capacity utilization of equipments and actual capacity of equipment, leakage of packages, bag length, and weight of product including weight allowance should be dealt.
13. Cleaning and sanitization to be discussed to the point. maintenance of equipment, calibration of equipments and apparatus
14. Expenses incurred such as raw materials, processing, cleaning and sanitization, storage has to be considered.
15. Procurement of product from given firm and their cost and pretreatment if any
16. Marketing survey done if any, mode of survey.
17. Try to include some facts from the TQM & MRM meeting.
21. Problems faced during day-to-day operations. Consumer complaints and how was it solved.
22. Costing of the product and the package too.

*Report to be written module-wise after completion of each module and compiled into one report at the end of the training for final evaluation.

Annexure 3

EVALUATION OF WORK PERFORMANCE*

Name of Student: **Module:**

Registration No: **Period:**

Sr. No	Parameter	Max. Marks	Marks Obtained	Remarks of Training In-charge
Attendance & Punctuality		**20**		
1	Attendance	10		
2	Punctuality	5		
3	Presence in Lecture/meeting	5		
Sincerity & learning attitude		**60**		
1	Working with own hand	20		
2	Involvement & creativity	10		
3	Record Keeping in Section	10		
4	Understanding the process	10		
5	Grading by section in-charge	5		
6	Timely report writing	5		
Behavior & Attitude (with staff, students and workers)		**20**		
1	Manners and Discipline	10		
2	Communication & interaction	10		
	Total	100		

*Evaluation to be made after completion of each module.

Signature of Training In-charge

MODULE 2

1.	**Module No.**	**:**	**DSC 484**
2.	**Title**	**:**	Commercial production of milk products
3.	**Credits**	**:**	10=0+10
4.	**Departments**	**:**	Livestock production and management
5.	**No. of Students**	**:**	15 (Batch B)

1. Name of the Experiential Learning Unit

Commercial production of milk products

2. Location with Address

Department of Livestock production and management at College of Animal Husbandry, Baramati

3. Objectives

To impart hands-on-training/Experiential learning on Processing of Milk Products in a commercial environment to sharpen their technical as well as managerial skills thereby enhancing the professional confidence and to provide an opportunity to develop a set of skills such as leadership, teamwork, interpersonal communication, analytical problem solving, entrepreneurial/business skills which are not gained in a class room environment.

4. Activity components

Training Modules:

b) Experiential Learning in Pilot Dairy Plant: Duration: 6 months

S.No.	Module	Duration
1	**Development of a Bankable Business Proposal**: Students in designated groups shall develop a bankable proposal of Techno-economic feasibility for manufacture of a product mix assigned by the training in-charge as per the guidelines given in **Annexure-1**. Understanding the requirement of various permits and licenses for establishment of commercial milk processing unit and procedures for obtaining the same.	Simultaneously with following modules
2	**Milk Procurement:** Attachment with milk collection/ chilling centre to understand intricacies involved in milk procurement, interaction with milk producers, issues & constraints in milk procurement and transportation of raw	3 weeks

	milk.	
3	**Hands-on- Training and Experiential Learning:** The in-charge Pilot Dairy Plant shall prepare not less than 4 different product mix to be manufactured daily by the	6 weeks per product mix.
	students on commercial basis. All the students shall be divided in groups, each group manufacturing a given product mix daily in quantity sustainable at commercial level. The student group shall be responsible for a given product mix from procurement of raw material to processing including packaging and storage, conduct manufacturing, organize resources and utilities, sell the product, maintain accounts and documents, wind up production and submit the report of performance. Students shall be rotated after prescribed duration so that each group has acquired hands-on training on all the product mixes.	
4	**Report writing:** As per Guidelines given in **Annexure 2**	Simultaneously

6. Infrastructure required

i) Civil work

S. No.	Description	Total area, sq. ft.	Rate, Rs./sq. ft.	Total cost, Rs.
1	Experimental Dairy	3000	2000	60,00,000
2	Milk Parlor	500	2000.	10,00,000

ii) Equipment/Machinery required

S. No.	Description	Quantity	Cost (Rs. in lakhs)
MILK RECEPTION SECTION			
1	Can Tipping Bar (MS)	1 No.	0.50
2	Can Scrubber	1 No.	
3	Roller Conveyor	1 No.	
4	Weighing Scale – 500 kg.	1 No.	2.00
5	Weigh Bowl – 250 kg	1 No.	
6	Dump Tank – 1000 liters	1 No.	
7	Conical filter	1 No.	
8	Milk Pump – 1 HP	1 No.	0.20

MILK PROCESSING SECTION			
1	Pasteurization Plant – 2000 lit/h	1 Unit	7.00
2	Triprocess cream Separator – 2000 lit/h	1 No.	6.00
3	S.S. Milk Pump – 2000 lit/h	2 Nos.	0.50
BUTTER & GHEE SECTION			
1	Butter churn	1 No.	10.00
2	Ghee Kettle – 500 lit	1 No.	2.00
3	Ghee Tin Seaming Machine	1 No.	0.50
4	Cream Vat – 500 lit	1 No.	0.50
DRY MILK SECTION			
1	Spray drier (10 lit water evaporation/h) with condensing unit	1 No.	25.00
ICECREAM SECTION			
1	Ice cream freezer	1 No.	10.00
2	Homogenizer	1 No.	10.00
3	Mix aging tank	1 No.	1.00
4	Hardening Room	1 No.	5.00
STORAGE SECTION			
1	Milk Storage Tank – 2000 lit (Double walled insulated)	3 Nos	10.0
2	Milk Pump – 2 HP	3 Nos	
PACKING SECTION			
1	Form Fill Seal Pouch Filling Machine (2000 Packs/h)	2 No.	15.0
REFRIGERATION SECTION			
1	Cold Storage Room 200 CBM	1 Room	10.0
2	Refrigeration Unit with Hermetic compressor (2 Nos)	1 Nos.	
QUALITY CONTROL LAB			
1	Quality control equipment	-	10.0
UTILITY SECTION			
1	Steam Boiler – 100 kg/h	1 unit	3.50
2	Water Softening Plant	1 unit	0.50
3	Steam Pipe Line (M.S.)	1 Lot	4.00
4	Air Compressor (For Pouch Packing)	1 No.	0.50
5	D.G. set 125 KVA	1 No.	3.00
6	S.S. Pipes & Fittings	1 Lot	7.00
7	Water pipe line	1 Lot	3.00
8	Chilled water pipe line	1 Lot	3.00
9	Electrical control panel & wiring	1 Lot	2.50
10	Effluent treatment plant	1 Lot	8.80
11	Maintenance Unit	1 Lot	10.00

INSTALLATION & COMMISSIONING			
1	Total cost of Plant & Machinery including Sale Tax, Excise Duty, Packing charges and Transportation		10.00
2	Miscellaneous		10.0
	Total Cost of equipment		**195.5**
Total Cost (Building + equipment)			**265.5**

4.1.5 Recurring contingency required

The recurring contingency will be required for the purchase of milk and other raw materials, ingredients, packaging materials, spares, etc. The total recurring contingency required would be Rs. 5 lakhs.

4.1.6 Total budget required

The total budget required for establishment of the experiential learning unit will be Rs. 27.5 lakhs (Cost for building & equipment, 25.5 + Recurring contingency 5 lakhs).

4.1.7 Support for Guest Faculty required

The Guest Faculty is required to deliver special lectures on preparation of bankable project proposal, maintenance of dairy plant, waste disposal and environmental issues, energy audit and energy saving, quality audit and quality assurance, export orientation and certification, marketing issues, financial management, legal issues, successful entrepreneurship – case studies, etc.

4.1.7 Economics – Gross turnover/profit statement (For a batch of 15 students)

Financial viability of a Mini Dairy Processing Plant for Experiential Learning for total milk handling of 1000L/Day has been worked out as under:

S.No.	Product Mix	Quantity of Milk	Quantity of Products Manufactured	Sale Price, Rs.	Total Sales Revenue, Rs.
1.	Market Milk (Toned milk)	600 lit	550 lit	27/-	14,850.00
2.	Ghee	100 lit	60 kg	350/-	21,000.00
3.	Dahi/ Lassi	500 lit	500 kg	50/-	25,000.00
4.	Ice Cream	400 lit	400 kg	60/-	24,000.00
5.	Burfi	400 kg	100 kg	200/-	20,000.00
				Total Rs.	**1,04,850.00**

Total Expenditure including Raw Materials Cost

S.No.	Items & Expenditure	Rate	Total Cost, Rs.
1.	Milk purchase	30/-/lit	60,000.00
2.	Ice Cream Raw Materials	-	4200.00
3.	Processing Cost @ Rs. 4/lit	4/-	8,000.00
4.	Packaging Cost		5,300.00
5.	Losses @ 3%		1,800.00
6.	Staff Salaries (Technical assistants: 02 for refrigeration & Electrical, Processing @ Rs 2500/per person/month)		5,000.00
7.	Depreciation @10%	10/-	8,200.00
8.	Marketing @ 5% of sale price		5,242.00
		Total Rs.	**97,742.00**

Net Savings per Month

S. No.	Details of Items	Amount in Rs.
1	Total Sale Price per day	1,04,850.00
2	Total Expenditure per day	97,742.00
3	Net savings per day	7,108.00
4	Net profit per 4 month	2,13,240.00

4.1.8 Profit/Loss and guidelines for sharing profit

The profit will be shared by the students, department and the faculty involved in the programme. The profit share will be as follows:

4. Students - 75%
5. Department - 15%
6. Unit Manager/Institute -10%

Payment of honorarium to Faculty @ Rs.15,000.00 per month and Honorarium to Staff @ Rs. 5000.00 per month may also be considered from the profit.

If the EL unit is found to register loss, remedial measures should be taken by the monitoring team. If it is not rectified, it should be closed immediately. Thorough planning should follow.

5.0 Evaluation of Experiential Learning Programme/ HOT

Sr.No.	Parameters	Max. Marks
1.	Project Planning and Writing	10
2.	Presentation	10
3.	Regularity	10
4.	Monthly Assessment	10
5.	Output delivery	10
6.	Technical Skill Development	10
7.	Entrepreneurship Skills	10
8.	Business networking skills	10
9.	Report Writing Skills	10
10.	Final Presentation	10
	Total	100

Work performance in each module/industry to be evaluated using proforma given in **Annexure 3.** Average of all the modules to be taken for final scoring**.** Bankable business project report shall be evaluated on the basis of correctness and realistic projections made for techno-economic aspects of the project. Evaluation to be conducted by Heads of Divisions of all processing divisions, training in-charge, Managing Director of model Dairy or Incharge of Pilot Dairy Plant.

Annexure-1

GUIDELINES FOR DEVELOPEMENT OF BANKABLE PROJECT FOR DAIRY PLANTS

6. **Introduction:** It should cover the name of the company, location of plant, activities, products, capacity of plant and project outlay.
7. **Company:** It should cover the location of registered office, date of formation, registration and authorized share capital. It should also cover the date of incorporation and commencement of business, the objectives, areas of operation, subscribed share capital.
8. **Promoters and their background:** Name and address of promoters, their background, experience and net worth.
9. **Management of the company:** Persons looking after the day to day management, their background, experience, etc. should be covered.
10. **Project profile:**

i. **Land and location:** This should cover the area of land, location of the plant, distances from nearby town, availability of approach roads, power and water supply and other communication including schools, banks, hospitals, etc.

Tips:

Ample space is required for buildings, future expansion, parking of transport vehicles and for empty cans. About two acres of land is required for a milk processing plant handling about 10000 liters of milk per day (8 hours). However the built up area to total area should be around 1:3 ratio;

The location of a plant should be close to the milk producing area in case of products manufacturing unit and if liquid milk is the main product it should be close to the consumer;

The location of site should have proximity to road/rail facilities, services, such as water, electricity and effluent mains, social infrastructure, etc.

The subsoil of the site should be firm with proper drainage.

ii. **Civil structures**: Name of the Architect, type of structures proposed, technical specifications of civil structures, drawings and detailed cost analysis of various civil structures along with the present position of implementation may be indicated.

Tips: The civil works comprises of factory building, quarters, office, garages, security post, etc. The factory building for the milk reception, quality control, processing, packing and storage of milk products should be as per the BIS. The total covered area depends on the processes involved, products manufactured, the quantity of milk handled and the equipment chosen for services and product manufacturing. About 4000 sq.ft. area of building is required for handling 10000 liters of milk.

Essential sections of a 'Milk Processing Plant'

i. **Raw Milk Reception Dock (RMRD)** - consisting of can conveyor, can washer, weighting balance, dump tank etc.
ii. **Processing hall** - cream separator, chiller, homogenizer, pasteuriser and other related machinery are installed.
iii. **Storage area**- for milk storage tanks.
iv. **Products manufacturing area**-depends upon the type of products and the quantity

of milk handled, the required equipment needs to be installed.

v. **Packing area**-for packing of liquid milk and other products.
vi. **Cold storage**-for keeping the milk and milk products before sending to market.
vii. **Quality control laboratory**-for testing the quality of milk and milk products.
viii. **Utilities area**-for installing boiler, generator set, water treatment plant, maintenance and store area for spares.
ix. **Waste water treatment plant area**-for treating the dairy effluents before releasing to the fields.
x. **Quarters and office area**-for all the essential staff.
xi. **Vehicle parking area**-both for the milk procurement and distribution vehicles.
xii. **Input supply area**- for providing veterinary service, supply of feed, fodder seeds, etc.

iii. **Plant and machinery:** The major plant and machinery (imported and indigenous separately), sources of supply, specifications and quotations for various items of equipment need to be given.

Tips: The machinery should be as per the BIS. Most of the dairy machinery are manufactured in the country by ALFA-LAVAL, L&T, HMT, Nichrome Pvt. Ltd., Samarpan Fabricators, Goma Engineering Ltd., etc.

iv. **Technical collaboration:** The name of the technical collaborators for monitoring and marketing of the products along with their addresses and the type of collaborations should be indicated. Technical collaboration fee/royalty to be paid should also be indicated.

Tips: Normally the technical collaboration may be for supply of machinery, technical know-how for manufacture or marketing of products. If any such collaboration arrangement is there, name of the firm, country and term of agreement is required to be mentioned.

v. **Manufacturing process:** It should cover the manufacturing process of a product or product mix in the form of flow chart, proportion of various products to be manufactured and the composition of the different products.

vi. **Infrastructural facilities:**

a) **Raw material:** Ingredients required for manufacture of intended product mix (raw milk, sugar, flavor, stabilizer, culture etc.), source and method of procurement, basis of price fixation, agreements if any for regular supply of raw material may be indicated.

Tips: The principal raw material is milk. The extent of milk shed area, milch animal population, average milk yield, percentage of animals in milk, marketed surplus, etc will determine the size of the plant. The method of procurement, transportation of milk and input supply to the farmers is required to be highlighted. The availability of other inputs such as packing materials, disinfectants and consumable should be ascertained.

b) **Packing material:** The type of packing material required, source of supply, capacity and price of bag, approximate quantity required per month and method of purchase need to be furnished.

c) **Utilities:**

Power: The total power requirement of the unit, source of power supply, position of power supply in the area and stand by arrangements made by the company, whether permission is obtained or applied to the State Electricity Board for power connection.

Tips: Normally a three phase electricity supply is required for milk processing plants. The power requirement depends upon the load to be connected and the necessary approval from SEB should

be obtained for connection. Depending upon the position of power supply, standby generators may be considered for connecting the essential sections.

Water: The source of supply, quantity available vis-a-vis daily requirement and arrangements be made for supply of water.

Tips: A milk processing plant requires the water in the ratio of 2:1 (2 liters of water for 1 liter of milk processed) for cleaning of equipment; cold storage and drinking purposes (source of water supply, quantity available and suitability for the purpose has to be mentioned). Accordingly, the size of the well is required to be designed and depends on the quality of water, the water softening plant may be considered.

Fuel: The requirement of coal, diesel and gas, source of supply, adequacy of availability and cost of material may be mentioned.

Steam: Quantity required, source and capacity of boiler. The steam requirement (kg/h) depends upon the processes involved and the source of steam may be met by coal/oil/gas fired/electric boiler.

Transportation: The mode of transportation of raw material as well as feed, whether owned or hired vehicles, availability of vehicles and cost per kilometer.

Tips: The vehicles required for procurement and distribution of milk depends on the quantity of milk to be handled. The number of vehicles required, source of supply, rental charges etc. need to be furnished. Depending upon the need, the requirement of vehicles may be considered in the project cost

Compressed air: It will be required for various pneumatic operations flow control operations as well as for cleaning purposes. The total requirement of compressed air and the capacity of the compressors is required to be furnished.

Laboratory: Layout of laboratory for testing the raw material as well as finished products, specification of laboratory equipment, quantity and cost, the proposed tests to be carried out and the adequacy of man power for carrying out these tests.

Workshop: A maintenance workshop is an integral part of milk processing for carrying out repairs and maintenance of equipment.

vii. **Pollution control:** The type of measures proposed for controlling the air and water pollution.

Tips: There are no hazardous effluents generated from a milk processing plant. However, construction of effluent treatment plant is necessary in case of multiproduct large size plants for treating the effluents before discharging for proper disposal. The final effluent should meet the requirements of Pollution Control Board and is necessary to get clearance from them.

viii **Manpower:** It should cover the technical skill and unskilled labourers required, their availability and source, method of recruiting them and also their salary structures/wage rates should be mentioned.

Tips: For dairy plant of 10000 liter per day capacity, manpower requirement is: Plant Manager (1), Procurement officer (1), Field supervisors (2), Processing supervisors (2), Mechanics (2), Driver (1), Watchman (3), Administrative staff (3), Laboratory staff (2) and Unskilled labour (8). Total: (25)

6. Marketing and business prospects:

d) The product mix, capacity of the plant, year-wise capacity utilization and actual quantity

of products produced per year.

e) Areas of marketing of the product and strategies i.e. Talukas, district or state-wise quantities proposed for sale, methods of sale, agencies/contractors, method of transportation of products, incentives or commission proposed to be paid, expenditure on publicity and brand name should be indicated. It should also cover the proposed marketing network in terms of staff and material.

f) Market survey for raw materials as well as for the products to be sold covering the demand/supply position, other sources of supply of products, the average price of products for the last 4-5 years and also the potential for selling the products should also be covered.

7. **Socio-economic benefits:** The number of villages, farmers, customers benefited and also number of persons employed either directly or indirectly in this activity.

8. **Schedule of implementation:** The proposed implementation schedule of the scheme may be indicated starting from purchase of land till commercial production.

9. **SWOT analysis:** The strengths, weaknesses, opportunities and threats should be discussed separately.

11. **Project cost:**

i) **Land:** Area of land cost of land and conversion charges.

ii) **Site and land development:** It should cover the land leveling, fencing/compound wall, internal roads, drainage, etc. The specifications, unit cost and the total cost should be furnished.

Tips:

Preferably the entire site should be fenced with barbed wire or compound wall is constructed with gates at suitable places;

Internal roads should be of tar/bricks/WBM depending upon the soil conditions, rainfall and the number of vehicles moving every day.

x) **Civil structures:** The civil structures comprises of factory building, raw material and finished products godowns, office, laboratory, quarters, garage, canteen, etc. Detailed plan lay outs along with cost estimates certified by the Engineer should be given.

xi) **Plant and machinery:** Imported/indigenous components, major suppliers, quantities, unit cost and the total cost of the plant and machinery including the misc. equipment should be given. The quotations along with the specifications are required to be enclosed.

xii) **Electrical system:** Covering transformer, diesel generators, internal and external electrification and also the deposits to be paid to the State Electricity Boards. The specifications of transformer as well as generators along with the quotations should be furnished. With reference to electrification, the break up is required to be given.

xiii) **Water supply and other utilities:** Source of water, specifications and expenditure on water supply system, cost of boilers for steam generation, etc.

xiv) **Vehicles:** Number and cost along with justification on requirement of the various vehicles, price quotations from the dealers along with specifications should be furnished.

xv) **Pre-operative and preliminary expenses:** The item-wise cost and justification should be given.

xvi) **Contingencies:** Percentage of contingencies and its reasonableness.

xi) **Margin money for working capital:** The margin money for working capital may be worked out taking into account the requirements of various raw material, packing material, fuel, etc., finished products and sundry debtors for one cycle of operation.

14. Sources of finance: The total project cost and source of funds (equity/public issue, subsidy, loan, etc. should be furnished.

15. Techno-economic parameters: Should cover the capacity of the plant, year-wise capacity utilization, quantity of products manufactured, commission on sale of products, transportation charges, power and fuel charges, packing material charges, salaries and wages, marketing expenses and other overheads. The procurement prices of various ingredients as well as the sale price of various products should be indicated.

16. Economics of the project

Based on the various techno-economic parameters, the economics of the project has to be worked out for the project period or till the repayment of bank loan. The items of income includes sale of liquid milk, milk products and miscellaneous items, while the expenditure includes the cost of raw material, transportation and commission, power, fuel packing distribution, wages and salary, repairs and maintenance, insurance, advertisement and other overheads. The income as well as expenditure for each year has to be worked out and then it should be subjected to cash flow analysis.

Tips: Sample calculations for the relevant techno-economic parameters for the model diary processing plant of 10000 litres per day reported by NABARD may be used as reference. (http://www.nabard.org/modelbankprojects/animal_milkprocess.asp)

14. Cash flow analysis: Considering the capacity utilization and also the various techno-economic parameters, the income and expenditure streams have to be worked out to arrive at the gross profit. From the cash flow analysis, the Benefit: Cost Ratio (BCR), Net Present worth (NPW) and Internal Rate of Return (IRR) of the project may be worked out to establish the economic/financial viability of the project.

15. Documents and clearances required: Site Plan, structural drawings, quantities and detailed cost analysis of various civil structures certified by an Architect, Price quotations and specifications for various items of plant and machinery, Approval from State Electricity Board for load connection, NOC from Panchayat, approval from Inspector of Factories, Registrar of Copy Rights, approval for brand registration, Registration of Company, Memorandum of Articles of Association, Registration of Unit under SSI (If applicable), agreement between the Company and the collaborator for technical assistance and market survey report.

References:

1. http://www.nabard.org/modelbankprojects/animal_feed.asp#
2. http://www.nabard.org/modelbankprojects/animal_milkprocess.asp

Annexure-2

GUIDELINES FOR REPORT WRITING*

18. Spiral or any sort of proper binding.
19. Cover page (Mentioning Name of the Dairy plant with year, work area, Roll No. as well as ID No., Submitted by (Name of the student) and submitted to: The Dean, College of Dairy Science.
20. Acknowledgements (with date and signature over the name).
21. Index/contents (having Serial No., Title and page numbers)
22. Main Text (with heading in Bold and large font size). Start each sub-topic on separate page (fresh page). Regular text minimum Times New Roman - 12; Headings bigger font.
23. Introduction: Give introductory part with definition, objective, production status per day/per month/per year even comparing past year data too. PFA requirements and specific standards set by the Dairy where training is undertaken, if any (Latest prevailing standard should be mentioned).
24. Management hierarchy, Managemental aspects related to section
25. Make and capacities (rated and actual) of the Equipment in the section.
26. Layout of the section and drawings or photographs of relevant machineries. (Figures have to be quoted in the text where applicable).
27. Flow chart for preparation of milk product with all technical details. The flow diagram should not stretch to more than 2 pages (1 page is desirable). Flow chart should be centered and arrows included in between the spaces.
28. Tables should have caption and having proper borders throughout.
29. Significance of major technological steps. Technological important things like cheese/Paneer yield, fat recovery in ghee section, overrun of butter, capacity utilization of equipments and actual capacity of equipment, leakage of packages, bag length, and weight of product including weight allowance should be dealt.
30. Cleaning and sanitization to be discussed to the point. Boiler inspection, cream separator dismantling for cleaning, maintenance of equipment, calibration of equipments and apparatus, QA procedures (Milk scan, Acidometer, etc.).
31. Expenses incurred such as raw materials, processing, cleaning and sanitization, steam, refrigeration, storage has to be considered.
32. Procurement of raw/finished product from given firm and their cost and pretreatment if any - i.e. nuts for 'Nut ice cream'.
33. CCPs followed for the specific section.
34. Fat and SNF (TS) loss and its accounting.
35. Marketing survey done if any, mode of survey.
36. Microbiological and chemical analyzes ETP analysis (BOD, COD, pH, etc.)

37. Try to include some facts from the TQM & MRM meeting.
23. Yield of dairy product as applicable to the section.
24. Packaging and labeling of the product (with best before and nutrition facts, cost, etc).
25. Problems faced during day-to-day operations. Consumer complaints and how was it solved.
26. Costing of the product and the package too.
27. Conclusions: Concrete conclusion should be written-not just that experience gained was too good and helpful!

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*Report to be written module-wise after completion of each module and compiled into one report at the end of the training for final evaluation.

Annexure 3

EVALUATION OF WORK PERFORMANCE*

Name of Student: **Module:**

Registration No: **Period:**

Sr. No	Parameter	Max. Marks	Marks Obtained	Remarks of Training In-charge
Attendance & Punctuality		**20**		
1	Attendance	10		
2	Punctuality	5		
3	Presence in Lecture/meeting	5		
Sincerity & learning attitude		**60**		
1	Working with own hand	20		
2	Involvement & creativity	10		
3	Record Keeping in Section	10		
4	Understanding the process	10		
5	Grading by section in-charge	5		
6	Timely report writing	5		
Behavior & Attitude (with staff, students and workers)		**20**		
1	Manners and Discipline	10		
2	Communication & interaction	10		
	Total	100		

*Evaluation to be made after completion of each module.

Signature of Training In-charge

MODULE 3

1.	**Module No.**	**:**	**LPM 4817**
2.	**Title**	**:**	**Hatchery Management**
3.	**Credits**	**:**	**10=0+10**
4.	**Departments**	**:**	Livestock production and management
5.	**No. of Students**	**:**	15 (Batch A or B)

1. Name of the Experiential Learning Unit

Hatchery Management

2. Location with Address

Department of Livestock production and management at College of Animal Husbandry, Baramati

3. Objectives

To impart hands-on-training/Experiential learning on hatchery unit in a commercial environment to sharpen their technical as well as managerial skills thereby enhancing the professional confidence and to provide an opportunity to develop a set of skills such as leadership, teamwork, interpersonal communication, analytical problem solving, entrepreneurial/business skills which are not gained in a class room environment.

4. Activity components

Training Modules:

c) Experiential Learning in Hatchery unit: Duration: 6 months

Sr.No	Module	Duration
1	**Development of a Bankable Business Proposal**: Students in designated groups shall develop a bankable proposal of Techno-economic feasibility for manufacture of a Hatchery unit assigned by the training in-charge as per the guidelines given in **Annexure-1**. Understanding the requirement of various permits and licenses for establishment of commercial Hatchery unit and procedures for Obtaining the same.	Simultaneously with following modules
2	**Egg Procurement:** Attachment with Hatchery centre to understand intricacies involved in Egg procurement, interaction with Egg producers, issues & constraints in Egg procurement and transportation of raw Eggs	1 weeks
3	**Hands-on- Training and Experiential Learning:** The in-	6 weeks per

	charge Pilot Hatchery unit shall prepare for hatchery	Batch.

2

	students on commercial basis. All the students shall be divided in groups, each group manufacturing a given Eggs for hatching 2000 in quantity sustainable at commercial level. The student group shall be responsible for a given Per batch from procurement of raw material to processing including packaging and storage, conduct manufacturing, organize resources and utilities, sell the product, maintain accounts and documents, wind up production and submit the report of performance. Students shall be rotated after prescribed duration so that each group has acquired hands-on training on all the process in Hatchery	
4	**Report writing:** As per Guidelines given in **Annexure 2**	Simultaneously

7. Infrastructure required

The project profile has been prepared based upon the following presumptions:

(i)	Working hours/shift	:	8 hrs.
(iii)	Working days	:	300
(iv)	Total number of working hrs.	:	2400 hrs.
(viii)	Margin Money	:	25% of capital investment.
(xi)	Operative period of the project	:	10 years
(xii)	Value of machinery and equipment	:	Taken on the basis of a particular supplier of machinery & equipments

(xiii) Value of raw material, packing materials and others	:	As per the local market rates on whole sale basis.
(xiv) Construction charges	:	Rs. 75/- per sq. ft.
(xv) Break - even point utilization	:	Calculated on full capacity basis.

IMPLEMENTATION SCHEDULE

The module will be implemented for 6 months. The implementation schedule has been worked out as follows:

(vi) Procurement of parent stock chicks	1 week
(xii) Commercial production	1.5 month

The project may yield result by the 1.5 month.

TECHNICAL ASPECTS

Process of Manufacture

One day old parent stock chicks of improved species of broiler or layers are procured from the reliable parent stock suppliers. Procured chicks are transferred to poultry sheds. These poultry birds are given balanced nutrition like poultry feed, feed mixes, medicines, etc., depending upon their age and variety upto laying stage. The layed eggs are collected and transferred to hatchery section. The eggs are cleaned thoroughly to get rid of foreign matters and checked for their suitability for hatching, eggs having cracked shells and unfertile eggs are segregated and disposed off by selling at subsidized rates. Thoroughly cleaned eggs are stored in air conditioned room in order to bring down normal to suitable temperature. The conditioned eggs are transferred to setter incubators and incubated for 18 days. A temperature of 99.9ºF and relative humidity of 82% is maintained in the setter incubators. At the end of 18th day, eggs are transferred to holder incubators maintained at a temp. of 98.9ºF and

relative humidity of 87% and incubated for 3 days. At the end of 21 days, chicks come out after breaking egg shells. Egg shell and membranes are removed and each chick is checked for its sex and separated out. Each and every chick is vaccinated by Marex-D vaccine and packed in chick baskets and are sold to the poultry farms.

In order to produce healthy day-old chicks of high potentiality in the most economical manner, proper planning of hatchery is needed which involves application of sound scientific and business principles.

Quality Control and Standards

Day old chicks are produced keeping in view the customer's requirements. The Bureau of Indian Standards has laid down specifications for day old chicks (layer/broiler) under the following ISI Specification:

IS: 9800:1981: Basic requirements for day old chicks (layer/broiler)

Entrepreneurs interested in getting ISI mark shall have to abide by the specifications laid down. However, it is optional to get ISI mark but the hatchery must maintain the quality of chicks to compete in the present day cut-throat competition.

Production Capacity (per month)

a) Quantity : 2000 day old chicks

b) Value : Rs 30,000/-

Motive Power 15 K.W.

Pollution Control

If hatchery is run on scientific lines, no significant pollution is created. However, hatchery unit must take care

in maintaining proper hygienic and sanitary conditions, in and around hatchery and poultry sheds. Proper disposal facility should be made available for dumping refuse and discharge of water from the hatchery. Litter should be replaced at frequent intervals and disposed off early. Dead poultry birds, diseased birds, spoiled eggs and other refuse and rejects should be dumped in disposal pit without any delay. Entrepreneur should get No Objection Certificate from State Pollution Control Board.

FINANCIAL ASPECTS

A. Fixed Capital

(i) Land and Building				Amount (In Rs.)
i) Land 20000 sq. ft.		Value		1,50,000
ii) Land Development		L.S.		25,000
		Sub Total		1,75,000
Built–up Area and other Civil Works			Amount (In Rs.)	
i)	Hatchery-cum-office building (60'×120') 7200 sq.ft.			2,40,000
ii)	Store (30'×60') 1800 sq.ft			35,000
iii)	Layer/Breeder House/Sheds (100'×30') 300 sq.ft.			1,00,000
iv)	Disposal pits			10,000
v)	Water storage tank			30,000
vi) Boundary wall/barbed wire fencing, etc.				35,000
		Sub Total		4,50,000
		Total		6,25,000
(ii) Machinery and Equipments				
Sl. No.	Description	Qty./No.		Amount (In Rs.)
1	Egg Hatcher (Automatic)(capacity 2000 eggs)	1 No.		1,00,000

2	Egg setter (capacity 13500 eggs) (Automatic)	1"		1,00,000
3	Electric egg tester	1"		600
4	Electric De-beaker	1"		1250
5	Egg weighing scale (1-100 gram cap.)	1"		750
6	Feeder, waterer and brooder	LS		35,000
7	Misc. items like buckets, trays, baskets etc.	LS		10,000
8	Weighing balance	1 No.		5,000
9	Generator (10 KVA)	1"		90,000
10	Air conditioner (1.5 TR)	1"		25,000
11	Veterinary clinic instruments/equipment	LS		6,000
12	Office equipments/furniture	LS		20,000
13	Refrigerator	1 No.		25,000
14	Electrification and installation	LS		25,000
		Total		4,43,600
(iii)	Preliminary and Pre-operative Expenses like Legal			20,000
	Expenses, Establishment Cost, Travelling, Start up			
	Expenses, Consultancy Fees, Interest during Construction,			
	Trial Run Expenses etc.			
(iv	Other Fixed Expenses for Purchase of About 500 Nos.			50,000
	Day-old Parent Stock chicks and Feeding Charge up			
	to Laying Stage			
		Total Fixed Capital (i+ii+iii+iv)		5,13,600

B. Working Capital (per month)

(i) Raw Materials and Packaging Materials					
Sl. No.	Description		Qty/No.	Rate No.	Amount (In Rs.)
1	Parent stock		125 Nos.	75	9,375
	Chicks				
2	Poultry feed		8 Tonnes	6000	4,800
3	Feed Mix		LS		2,500
4	Medicine/		LS		2,000
	vaccines/				
	Antibiotics				
5	Chemicals/		LS		2,500
	sanitisers/				
	lime etc.				
6	Chick baskets		75 Nos.	35	2625
			Total		23,800
(ii) Utilities					Total
					(In Rs.)
Power 300 KWH units @ Rs. 7.5					2250
Water 250 K.Lt. @ 5					1250
Fuel like Diesel, K/oil etc. LS					1,000
			Total		4500

(iii) Other Contingent Expenses	Amount

		(In Rs.)
Postage and Stationery		200
Telephone		200
Consumable stores		500
Repairs and maintenance		1000
Transport charges		1000
Advertisement and publicity		1000
Insurance		500
Taxes		500
Sales expenses		1,000
Misc. expenditure		4,000
Total		9900
(v) Total Recurring Expenditure		38,200
(i+ii+iii+iv)		
(iv) Working Capital		Amount (In Rs.)
Recurring expenditure		38,200
(for one month)		

C. Total Capital Investment

	(In Rs.)
Fixed Capital	5,13,600
Working Capital (For 1 month)	38,200
Total	5,51,800

FINANCIAL ANALYSIS

1.	Cost of Production (per year)		Amount
			(In Rs.)
a)	Total recurring expenditure		5,13,600
b)	Depreciation on building and		20,750
	other Civil Construction @ 5%		
c)	Depreciation on machinery		25,000
	and equipments @ 10%		
d)	Depreciation on hand tools		3000
	and misc. equipments and		
	poultry equipments @ 25%		
e)	Depreciation on office equipments		2000
	and furniture @ 20%		
f)	Interest on Total capital	@ 15%	77,040
	Total		
	or Say		6,41,390
2. Turnover (per month)			Amount (In Rs.)
a)	By sale of 2000 Nos. of day		27,500
	old chicks @ Rs 13.75		
b)	By sale of 500 Nos. of unfertile eggs @ Rs. 2		1000
c)	By sale of 100 Nos. of culled birds @ Rs. 45		4500
d)	By sale of 50 bags litter @ Rs. 10		500
	Total		33,000
3.	Net Profit (per 1.5 month)		5000
	(before Income Tax)		

4.	Net Profit Ratio		17%
5.	Rate of Return		24%
6.	Break-even Point		

i) Fixed Cost			Amount (In Rs.)
a)	Depreciation on machinery		25,000
	and equipment		
b)	Depreciation on hand tools		3,000
c)	Depreciation on office equipment		1,000
	and furniture		
d)	Depreciation on building		20,750
	and other civil works		

Fixed Cost		Amount (In Rs.)
e)	Interest on Total investment	3120
f)	Insurance	3000
h)	40% of other contingent	1152
	Expenses	
	Total	
2. Net Profit (per 1.5 month)		5000

4.1.9 Profit/Loss and guidelines for sharing profit

Total Income for the students – 1000 Rs / Batch / 1.5 month

So Approx. students will get 3000 Rs in 4.5 month (Batch -1.5month)

The profit will be shared by the students, department and the faculty involved in the programme. The profit share will be as follows:

Students - 75%

Department - 15%
Unit Manager/Institute -10%

8

5.0 Evaluation of Experiential Learning Programme/ HOT

Sr.No	Parameters	Max. Marks
1.	Project Planning and Writing	10
2.	Presentation	10
3.	Regularity	10
4.	Monthly Assessment	10
5.	Output delivery	10
6.	Technical Skill Development	10
7.	Entrepreneurship Skills	10
8.	Business networking skills	10
9.	Report Writing Skills	10
10.	Final Presentation	10
	Total	100

Work performance in each module/industry to be evaluated using proforma given in **Annexure 3.** Average of all the modules to be taken for final scoring**.** Bankable business project report shall be evaluated on the basis of correctness and realistic projections made for techno-economic aspects of the project. Evaluation to be conducted by Heads of Divisions of all training in-charge, Managing Director of hatchery unit.

Annexure-1

GUIDELINES FOR DEVELOPEMENT OF BANKABLE PROJECT FOR HATCHERY UNIT

1. **Introduction:** It should cover the name of the company, location of plant, activities, products, capacity of hatchery and project outlay.
2. **Company:** It should cover the location of registered office, date of formation, registration and authorized share capital. It should also cover the date of incorporation and commencement of business, the objectives, areas of operation, subscribed share capital.
3. **Promoters and their background:** Name and address of promoters, their background, experience and net worth.
4. **Management of the company:** Persons looking after the day to day management, their background, experience, etc. should be covered.
5. **Project profile:**

i. **Land and location:** This should cover the area of land, location of the plant, distances from nearby town, availability of approach roads, power and water supply and other communication including schools, banks, hospitals, etc.

ii. **Civil structures**: Name of the Architect, type of structures proposed, technical specifications of civil structures, drawings and detailed cost analysis of various civil structures along with the present position of implementation may be indicated.

Power: The total power requirement of the unit, source of power supply, position of power supply in the area and stand by arrangements made by the company, whether permission is obtained or applied to the State Electricity Board for power connection.

Water: The source of supply, quantity available vis-a-vis daily requirement and arrangements be made for supply of water.

Fuel: The requirement of coal, diesel and gas, source of supply, adequacy of availability and cost of material may be mentioned.

Transportation: The mode of transportation of raw material as well as feed, whether owned or hired vehicles, availability of vehicles and cost per kilometer.

Compressed air: It will be required for various pneumatic operations flow control operations as well as for cleaning purposes. The total requirement of compressed air and the capacity of the compressors is required to be furnished.

Laboratory: Layout of laboratory for testing the raw material as well as finished products, specification of laboratory equipment, quantity and cost, the proposed tests to be carried out and the adequacy of man power for carrying out these tests.

Workshop: A maintenance workshop is an integral part of hatchery unit for carrying out repairs and maintenance of equipment.

Pollution control: The type of measures proposed for controlling the air and water pollution.

ix **Manpower:** It should cover the technical skill and unskilled laborers required their availability and source, method of recruiting them and also their salary structures/wage rates should be mentioned.

6. **Marketing and business prospects:**

g) The product mix, capacity of the plant, year-wise capacity utilization and actual quantity of products produced per year.

h) Areas of marketing of the product and strategies i.e. Talukas, district or state-wise quantities proposed for sale, methods of sale, agencies/contractors, method of transportation of products, incentives or commission proposed to be paid, expenditure on publicity and brand name should be indicated. It should also cover the proposed marketing network in terms of staff and material.

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7. **Socio-economic benefits:** The number of villages, farmers, customers benefited and also number of persons employed either directly or indirectly in this activity.

8. **Schedule of implementation:** The proposed implementation schedule of the scheme may be indicated starting from purchase of land till commercial production.

9. **SWOT analysis:** The strengths, weaknesses, opportunities and threats should be discussed separately.

Annexure-2

GUIDELINES FOR REPORT WRITING*

1. Spiral or any sort of proper binding.
2. Cover page (Mentioning Name of the Dairy plant with year, work area, Roll No. as well as ID No., Submitted by (Name of the student) and submitted to: The Dean, College of Dairy Science.
3. Acknowledgements (with date and signature over the name).
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9. Layout of the section and drawings or photographs of relevant machineries.

(Figures have to be quoted in the text where applicable).

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14. Procurement of raw/finished product from given firm and their cost and pretreatment if any -
15. CCPs followed for the specific section.
16. Marketing survey done if any, mode of survey.
17. Try to include some facts from the TQM & MRM meeting.
28. Yield of product as applicable to the section.
29. Problems faced during day-to-day operations. Consumer complaints and how was it solved.
30. Costing of the product and the package too.
31. Conclusions: Concrete conclusion should be written-not just that experience gained was too good and helpful!

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*Report to be written module-wise after completion of each module and compiled into one report at the end of the training for final evaluation.

Annexure 3

EVALUATION OF WORK PERFORMANCE*

Name of Student: **Module:**

Registration No: **Period:**

Sr. No	Parameter	Max. Marks	Marks Obtained	Remarks of Training In-charge
Attendance & Punctuality		**20**		
1	Attendance	10		
2	Punctuality	5		
3	Presence in Lecture/meeting	5		
Sincerity & learning attitude		**60**		
1	Working with own hand	20		
2	Involvement & creativity	10		
3	Record Keeping in Section	10		
4	Understanding the process	10		
5	Grading by section in-charge	5		
6	Timely report writing	5		
Behavior & Attitude (with staff, students and workers)		**20**		
1	Manners and Discipline	10		
2	Communication & interaction	10		
	Total	100		

*Evaluation to be made after completion of each module.

Signature of Training In-charge