KERALA VETERINARY AND ANIMAL SCIENCES UNIVERSITY

Faculty of Poultry Science

CURRICULUM

POULTRY PRODUCTION AND BUSINESS MANAGEMENT

Course Curricula for Undergraduate Programme in Poultry Production and Business Management (UG - Certificate in Poultry Production, UG - Diploma in Poultry Production, B.Sc. in Poultry Production and Business Management, B.Sc. (Hons.) in Poultry Production and Business Management and B.Sc. (Hons. with Research) in Poultry Production and Business Management)

Introduction

Poultry refers to all domesticated species of birds reared for egg, meat, feathers, oil and ornamental purpose, which includes chicken, duck, turkey, goose, guinea fowl, quail, pigeon, emu and ostrich. Poultry Science refers to the study of principles and practices involving production, processing and marketing of poultry and its products. Poultry science is an allied subject of agriculture.

Commercially available white eggs are infertile and considered as vegetarian food relished by more number of people for its taste, high quality nutrition and many other cookery uses. Poultry meat is a cheapest and delicious non-vegetarian food with no religious taboo.

India ranks number two in egg production with an annual production of 142.77 billion eggs and fifth in meat production with an annual production of 10.25 million tonnes. Poultry meat contributes 49.00 per cent of the total meat production of India. The per capita availability of egg is 103 per year, which are 77 eggs less than the ICMR (NIN) recommendation of 180 eggs per year. The per capita availability of meat is 7.39 kg per year (BAHS - 2024), which is 3.41 kg less than the ICMR (NIN) recommendation of 10.80 kg per year. Poultry industry provides employment to approximately 5 million people in India.

Present report is prepared for placing in the syllabus revision committee of BSc. (Hons.) Poultry Production and Business Management course in relevance to NEP 2020 provisions and also in the Board of Studies of Faculty of Poultry Science, and Academic Council of Kerala Veterinary and Animal Sciences University, Pookode.

Restructuring of undergraduate programme in Poultry Production and Business Management has to be carried out as per NEP guidelines to build among students' strong foundation of knowledge with increased practical exposure and skill development to build competence and confidence for the application of the gained knowledge.

More emphasis has been given on basic skill enhancement courses, exposure visits, case studies, industry attachments and flexibility in choice of courses via electives offered in fourth year and also through online courses along with provision of advanced skill development through project work / case study/ experiential learning/ internship, etc., with amalgamation of multiple exit and entry options as per NEP.

The details of the course structure for the undergraduate courses in Poultry Production and Business Management [UG- certificate, UG-Diploma, B.Sc., B.Sc. (Hons.) and B.Sc. (Hons. with Research)] have been prepared after having multistage in-depth deliberations and discussions. The course curriculum will strengthen the knowledge and skill base of the students and meet the expectations of the NEP - 2020 towards making India a knowledge superpower and realizing the dream of Atmanirbhar Bharat (self-reliant India).

Highlights

- The whole course programme of 4 years under-graduate programme in Poultry Production and Business Management will be of 170 credits, which will have 160 credits offered by the parent university and 10 credits of online non-gradial courses to be taken by the student as per his/ her choice.
- The coursework consists of 65 credits in major course Poultry Production and 51 credits of minor course Business Management till 6^{th} semester and 85 credits in major course Poultry Production and 51 credits of minor course Business Management till 7^{th} semester. In the 8^{th} semester, the student can take 20 credits from major or minor or both major and minor.
- After the admission of students in the university, the students will register for the Induction cum Foundation Course (IFC), at the start of first semester, which will be of 2 weeks duration (non-gradial). The course will include discussions on operational framework of academic process in university, sessions from alumni, business leaders, university academic and research managers besides classes on personality development (instilling life and social skills, social awareness, ethics and values, teamwork, leadership etc.) and communication skills. Steps will be taken to identify the strength and weakness of students (with remedial measures) along with diverse potentialities and to enhance cultural integration of students from different backgrounds. It will also create a platform for students to learn from each other's life experiences.
- Student will have to do common courses under categories like multi-disciplinary, value added, ability enhancement etc. Students can join in NSS programme of the college.
- The course programme of the first three semesters is designed for skill development in Poultry Production through skill enhancement programmes (SEP) along with basic and fundamental courses. The skill enhancement programmes (SEP) of 9 credit hours will be offered in three modules during the first 3 semesters of the degree programme with full flexibility to the student to choose area as per NEP guidelines. Each of the SEP module offers skill development areas of related domains of poultry science for the students and students will gain complete hands-on experience on the selected module.
- UG-Certificate in Poultry Production will be awarded to students successfully completing first two semesters and earned 40 credits (including 6 credits of Skill Enhancement Programme-based courses) and 4 credits of Skill Enhancement Courses (internship) of 5 weeks duration.

- UG-Diploma in Poultry Production will be awarded to students successfully completing first four semesters and earned 80 credits (including 6 credits of Skill Enhancement Programme-based courses) and 4 credits of Skill Enhancement Courses (internship) of 5 weeks duration.
- In the third year, students will acquire distinct knowledge, skill, competency and confidence to start his/her own enterprise, and can get jobs as per their merit. The third year courses are designed to impart hard-core knowledge in the subjects Poultry production and Business management.
- During the 5th semester, the students will have a study tour/ industry visit of 10 days duration, which will be counted as 2 credits (Non-gradial).
- UG-Degree in Poultry Production and Business Management will be awarded to students successfully completing first six semesters and earned 120 credits (including 6 credits of Skill Enhancement Programme-based courses) and 4 credits of Skill Enhancement Courses (internship) of 5 weeks duration and 10 credits of non-gradial online courses.
- The fourth-year course programme have been meticulously designed not only to impart specialized knowledge to the students in the selected major and minor disciplines but also to prepare the students to take up either research or employment or entrepreneurship as their future career.
- The students who have passed in all subjects up to third year and satisfactorily completed a 4 credit internship (5 weeks) can only be able to register for fourth year.
- In the 8th semester, students may opt all their credits from the pool of elective courses (preferably of a department where he/ she wants to specialize himself/ herself) except the Research Methodology and Ethics/ Business Research Methods course which is compulsory to all.
- In the 8th semester, student may undergo Internship / Case study/ Research project work related to the subject undertaken as elective courses and or SEP. The students have to submit Internship report/ Case study report/ Research report/ Dissertation at the end of 8th semester.
- If the student doesn't want to do Research Project Work/ Case Study/ Internship, he/she can take 12 more credits of elective courses to fulfil the 20 credits in the 8th semester. All students might have completed 4 credits (5 weeks) of internship after 2nd semester or 4th semester or 6th semester.
- UG Honours Degree in Poultry Production and Business Management will be awarded to students successfully completing eight semesters, 5 weeks internship and 10 credits of non-gradial online courses. The student who has passed in all subjects up to first six semesters and earned 120 credits will only be able to register for fourth year.
- If a student secures 7.5 or more CGPA at the end of 6th semester, he/ she may opt for Research Project Work of 12 credits in the 8th semester instead of internship or course work and will be awarded B.Sc. (Hons. with Research) in Poultry Production and Business Management. Maximum 20% of students can opt for research.

- The student can choose one of the two Honours degrees (clause 4.4 and 4.4.1 of the regulations) before registering the 7th semester.
- The core and elective courses can be modified maximum up to 30% with approval from competent authority of the University.
- The students will also have to take 10 credits of non-gradial online courses either from MOOC/ Swayam/ NPTEL/ mooKIT/ edX/ Coursera or any other portal accepted by the university preferably during the third and fourth year as a partial requirement for the degree of BSc. Poultry Production and Business Management and B.Sc. (Hons.) Poultry Production and Business Management.
- A student must submit the list of online courses along with the content he intends to undertake to the Dean of the college for permission and records. The online courses may relate with the main discipline or from any other discipline like social science, psychology, anthropology, economics, business management, agriculture, language, humanity, music, etc. The objective is to allow the students to groom their passion and strengthen their knowledge and competency based on his/her choice. A separate certificate would be issued by the Institute/University offering the courses. However, the university/ institute will keep a record of such courses registered and completed by each student and will indicate the title of the (successfully completed) courses in final transcript issued to the student.
- At each stage of exit (UG-Certificate/ UG-Diploma/ B.Sc. PPBM, B.Sc. (Hons.) PPBM), the students are expected to acquire competency and confidence to get jobs, to face the real challenges in varied jobs and research, as well as to start their own consultancy/ enterprise.
- The University will form a Research and Development Cell (R&D Cell)/ PC group. The Dean of the College (Chairman of the R&D Cell/ PC group) will nominate a Nodal Officer for internship programme, an Internship Supervisor and a Mentor/ Advisor per student. The R&D Cell/ PC group will organise, execute and monitor the entire internship programme through the Nodal Officer. The Internship Supervisor will be nominated by the Dean of the College at the start of the academic year for each batch. The Mentor/ Advisor will be nominated for each student by the Dean of the College in consultation with the student for providing Professional/ Research Guidance to the student during the internship. The internship programme implementation in the university shall be as per detailed guidelines prescribed by UGC notification on Internship, 2023.

Entry and exit options

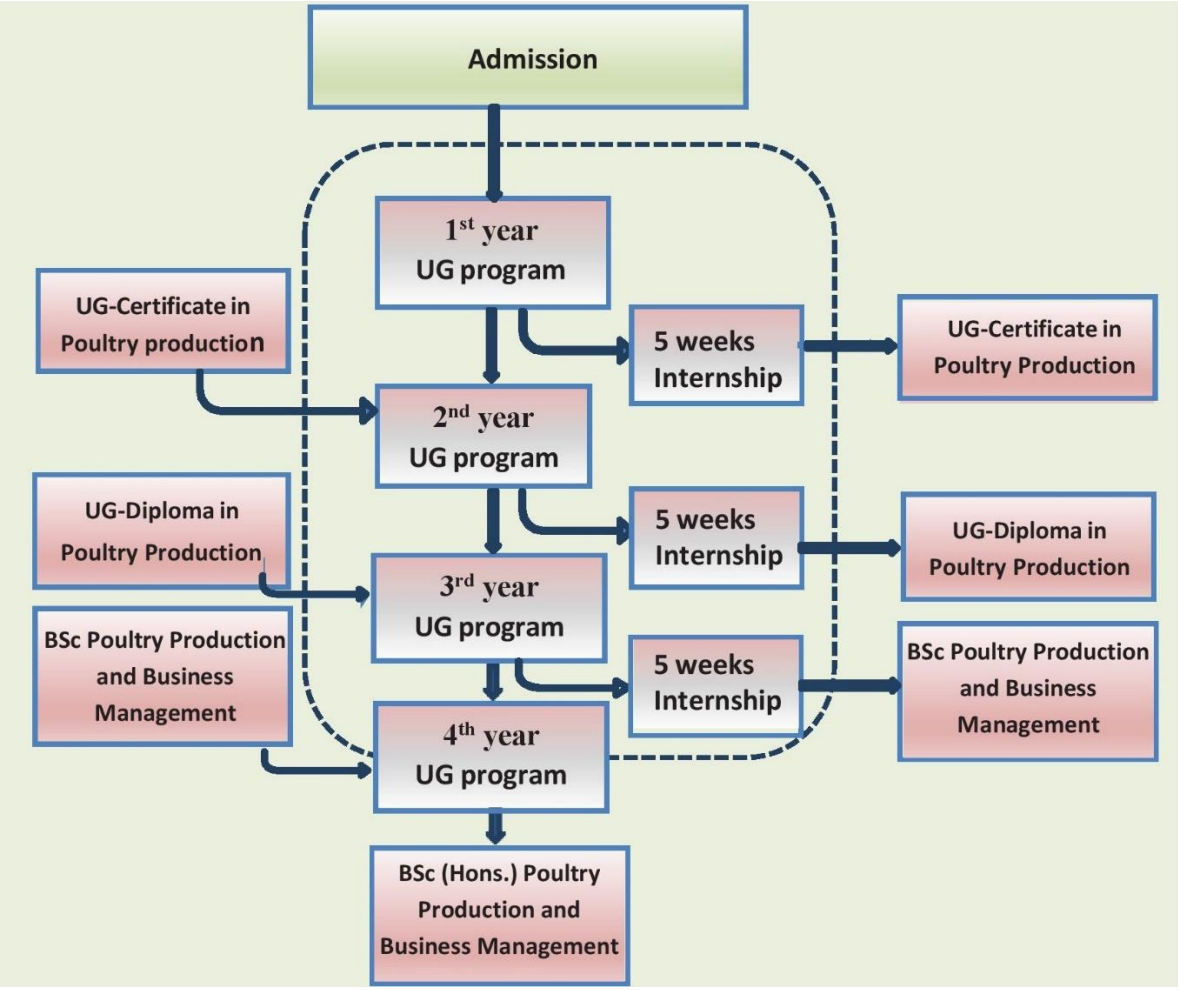

Fig. 1. Entry and Exit options in UG (Hons.) Programme in Poultry Production and Business Management

Exit and entry options

a. Exit Option - First year of Undergraduate Programme of BSc (Hons.) PPBM course

- Students exiting the programme after the first year must complete a total of 40 credits (including Skill Enhancement Programme-SEP of total of 6 credits) and a 4 credit Skill Enhancement Course-SEC (internship) of 5 weeks duration over and above the 40 credits for the award of 'Undergraduate Certificate'.
- Students shall be allowed to join back in the second year before the expiry of the credits earned, subject to a maximum duration of 7 years.

b. Exit Option - Second year of Undergraduate Programme of BSc (Hons.) PPBM course

- Students exiting the programme after the second year must complete a total of 80 credits (including Skill Enhancement Programme-SEP of total of 6 credits) and a 4 credit Skill

Enhancement Course-SEC (internship) of 5 weeks duration over and above the 80 credits for the award of 'Undergraduate Diploma'.

- Students shall be allowed to join back in the third year before the expiry of the credits earned, subject to a maximum duration of 7 years.

c. Exit Option - Third year of Undergraduate Programme of BSc (Hons.) PPBM course

- Students exiting the programme after the third year must complete a total of 120 credits (including Skill Enhancement Programme-SEP of total of 6 credits) and a 4 credit Skill Enhancement Course-SEC (internship) of 5 weeks duration over and above the 120 credits for the award of 'Undergraduate Degree'.
- Students can resume the fourth year Undergraduate Programme before the expiry of the credits earned, subject to a maximum duration of 7 years.

Semester-wise course distribution

Sl. No.	Course Title		Credit Hours	Total Credit hours
First Year				
I Semester				
1	IFC 111	Deeksharambh (Induction-cum-Foundation Programme) (2 weeks)	2 (0+2) Non-gradial	
2	PPM 111	Fundamentals of Poultry Production	3 (2+1)	**20 (12+8)**
3	PPM 112	Basic Avian Anatomy and Physiology	3 (2+1)	
4	AVN 111	Feeds and Feeding of Poultry	3 (2+1)	
5	MDC 111	Principles of Management	3 (3+0)	
6	VAC 111	Personality Development and Organisational Behaviour	3 (2+1)	
7	AEC 111	Communicative English	2 (1+1)	
8	SEP 111/ SEP 112	Feed Quality Control / Feed Milling Operations	3 (0+3)	
II Semester				
1	PPM 121	Layer Production	3 (2+1)	**20 (10+10)**
2	PPM 122	Broiler Production	3 (2+1)	
3	PPM 123	Incubation and Hatchery Management Practices	3 (2+1)	
4	MDC 121	Entrepreneurship Development and Business Management	3 (2+1)	
5	VAC 121	Computer Application in Poultry Business	3 (1+2)	
6	AEC 121	Business Communication	2 (1+1)	
7	SEP 121/ SEP 122/ SEP 123	Commercial Layer Production/ Commercial Broiler Production/ Hatchery Operations	3 (0+3)	
Post-Semester II (Only for exit option for award of UG-Certificate in Poultry Production)				
8	SEC 121	Internship (5 weeks)	4 (0+4) Non-gradial	
Second Year				
III Semester				
1	PPM 211	Diversified Poultry Production	4 (3+1)	**20 (9+11)**
2	PPM 212	Breeder Flock Management	3 (2+1)	
3	AVN 211	Feed Mill Management and Processing Technology	2 (1+1)	
4	PBG 211	Basic Animal Husbandry Statistics	3 (2+1)	
5	MDC 211	Fundamentals of Financial Accounting	3 (1+2)	

6	AEC 211	Physical Education, First Aid, Yoga Practices and Meditation	2 (0+2)	
7	SEP 211/ SEP 212/ SEP 213	Quail Production/ Duck Production/ Turkey Production	3 (0+3)	
IV Semester				
1	PPM 221	Pet Bird Management	3 (2+1)	**20 (13+7)**
2	PBG 221	Introduction to Chick Sexing and Grading	2 (1+1)	
3	PPT 221	Poultry Processing and Products Technology	3 (2+1)	
4	ADM 221	Flock Health	3 (2+1)	
5	ADM 222	Biosecurity and Waste Management	2 (1+1)	
6	PBE 221	Production and Operations Management	3 (2+1)	
7	PBE 222	Business Management and Ethics	2 (2+0)	
8	AEC 221	Communications Skills	2 (1+1)	
Post-Semester IV* (Only for exit option for UG-Diploma in Poultry Production)				
9	SEC 221	Internship (5 weeks)	4 (0+4) Non-gradial	
Third Year				
V Semester				
1	PPM 311	Automation in Poultry Production	2 (1+1)	**20 (13+7)**
2	AVN 311	Pet Bird Nutrition	2 (1+1)	
3	PBG 311	Fundamentals of Poultry Breeding and Genetics	3 (2+1)	
4	PBE 311	Quantitative Methods for Business Management	3 (2+1)	
5	PBE 312	Financial Management	4 (3+1)	
6	PBE 313	Managerial Economics	3 (2+1)	
7	PBE 314	Human Resource Management	3 (2+1)	
8	PPM 319	Educational and Study tour (10 days)	2 (0+2) Non-gradial	
VI Semester				
1	PPM 321	Recent Concepts in Poultry Housing	2 (1+1)	**20 (13+7)**
2	PBG 321	Climate Change Adaptation in Poultry Production	2 (1+1)	
3	ADM 321	Laboratory Techniques for Flock Health	2 (0+2)	
4	PBE 321	Marketing Management	3 (2+1)	
5	PBE 322	Supply Chain Management	3 (2+1)	
6	PBE 323	Accounting for Management	2 (1+1)	
7	PBE 324	Business Regulations and Legal Aspects of Poultry Business	2 (2+0)	

8	PBE 325	International Trade Agreements and Poultry Business	2 (2+0)	
9	PBE 326	Risk Management and Insurance	2 (2+0)	
Post-Semester VI* (Only for exit option for UG-Diploma in Poultry Production and Business Management				
10	SEC 321	Internship (5 weeks)	4 (0+4) Non-gradial	
Fourth Year				
VII Semester				
1	PPM 411	Commercial Layer and Broiler Management	3 (2+1)	**20 (13+7)**
2	PPM 412	Advanced Breeder Stock and Hatchery Management	3 (2+1)	
3	PPM 413	Physiology of Poultry Production	2 (1+1)	
4	PPM 414	Poultry Extension, Marketing and Economics	3 (2+1)	
5	AVN 411	Poultry Nutrition and Feeding	3 (2+1)	
6	PBG 411	Poultry Breeding and Genetics	3 (2+1)	
7	PPT 411	Advanced Poultry Meat and Egg Products Technology	3 (2+1)	
VIII Semester				
Elective subjects				
Poultry Production Management	PPM 421	Rural Poultry Production	2 (1+1)	**20**
	PPM 422	Poultry Economics, Project Formulation and Marketing	3 (2+1)	
	PPM 423	Poultry Behaviour and Welfare	3 (2+1)	
	PPM 424	Research Methodology and Ethics*	3 (2+1)	
	PPM 429	Internship (12 weeks)	12 (0+12)	
	PPM 491	Seminar	1 (0+1)	
	PPM 499	Research	12 (0+12)	
Avian Nutrition	AVN 421	Commercial Poultry Nutrition	2 (1+1)	
	AVN 422	Non-conventional Feed Resources	2 (1+1)	
	AVN 423	Minerals and Vitamin Nutrition, and Feed Additives	3 (2+1)	
	AVN 424	Valorization of Waste as Poultry Feed	2 (1+1)	
	AVN 425	Role of Poultry in Human Nutrition	2 (2+0)	
	AVN 429	Internship (12 weeks)	12 (0+12)	
	AVN 491	Seminar	1 (0+1)	
	AVN 499	Research	12 (0+12)	
Poultry Breeding	PBG 421	Avian Andrology and Female	3 (2+1)	

and Genetics		Reproduction		
	PBG 422	Conservation and Characterization of Avian Genetic Resources	2 (1+1)	
	PBG 423	Pet Bird Breeding and Genetics	3 (2+1)	
	PBG 429	Internship (12 weeks)	12 (0+12)	
	PBG 491	Seminar	1 (0+1)	
	PBG 499	Research	12 (0+12)	
Poultry Processing and Technology	PPT 421	Poultry Processing Plant Practices and Operations	2 (1+1)	
	PPT 422	Packaging and Marketing of Poultry Products	3 (2+1)	
	PPT 423	Physical, Chemical and Microbiological Safety of Poultry Products	3 (2+1)	
	PPT 424	Slaughterhouse By-Products Technology	2 (1+1)	
	PPT 429	Internship (12 weeks)	12 (0+12)	
	PPT 491	Seminar	1 (0+1)	
	PPT 499	Research	12 (0+12)	
Avian Disease Management	ADM 421	Poultry Health and Biosecurity	3 (2+1)	
	ADM 422	Pet Bird Health Care	2 (1+1)	
Poultry Business and Entrepreneurship	PBE 421	Business Research Methods*	3 (3+0)	
	PBE 422	Computerised Accounting with Tally	2 (1+1)	
	PBE 423	e-Commerce in Agribusiness	3 (2+1)	
	PBE 424	Corporate Regulations	2 (2+0)	
	PBE 425	Food and Retail Business Management	3 (2+1)	
	PBE 426	Agricultural Marketing Regulations	3 (2+1)	
	PBE 427	Export Management of Poultry and its' Products	3 (2+1)	
	PBE 429	Case Study/ Internship (12 weeks)	12 (0+12)	
	PBE 491	Seminar	1 (0+1)	
	PBE 499	Research	12 (0+12)	
Online courses can be taken in all 4 years (preferably 3rd and 4th year)			10	**10**

* Research Methodology and Ethics/ Business Research Methods is a compulsory course

Department/ semester-wise course breakup

Sl. No.	Course Catalogue number	Course Title	Credit Hours
Poultry Production Management			
1	PPM 111	Fundamentals of Poultry Production	3 (2+1)
2	PPM 112	Basic Avian Anatomy and Physiology	3 (2+1)
3	PPM 121	Layer Production	3 (2+1)
4	PPM 122	Broiler Production	3 (2+1)
5	PPM 123	Incubation and Hatchery Management Practices	3 (2+1)
6	SEP 121	Commercial Layer Production	3 (0+3)
7	SEP 122	Commercial Broiler Production	3 (0+3)
8	SEP 123	Hatchery Operations	3 (0+3)
9	SEC 121	Internship (5 weeks)	4 (0+4) NG
10	PPM 211	Diversified Poultry Production	4 (3+1)
11	PPM 212	Breeder Flock Management	3 (2+1)
12	SEP 211	Quail Production	3 (0+3)
13	SEP 212	Duck Production	3 (0+3)
14	SEP 213	Poultry Processing and Value Addition	3 (0+3)
15	PPM 221	Pet Bird Management	3 (2+1)
16	SEC 221	Internship (5 weeks)	4 (0+4) NG
17	PPM 311	Automation in Poultry Production	2 (1+1)
18	PPM 319	Educational and Study tour (10 days)	2 (0+2) NG
19	PPM 321	Recent Concepts in Poultry Housing	2 (1+1)
20	SEC 321	Internship (5 weeks)	4 (0+4) NG
21	PPM 411	Commercial Layer and Broiler Management	3 (2+1)
22	PPM 412	Advanced Breeder Stock and Hatchery Management	3 (2+1)
23	PPM 413	Physiology of Poultry Production	2 (1+1)
24	PPM 414	Research Methodology and Ethics	3 (2+1)
25	PPM 421	Rural Poultry Production	2 (1+1)
26	PPM 422	Poultry Economics, Project Formulation and Marketing	3 (2+1)
27	PPM 423	Poultry Extension, Marketing and Economics	3 (2+1)
28	PPM 424	Poultry Behaviour and Welfare	3 (2+1)
29	PPM 429	Internship (12 weeks)	12 (0+12)
30	PPM 491	Seminar	1 (0+1)
31	PPM 499	Research	12 (0+12)

Avian Nutrition			
32	AVN 111	Feeds and Feeding of Poultry	3 (2+1)
33	SEP 111	Feed Quality Control	3 (0+3)
34	SEP 112	Feed Milling Operations	3 (0+3)
35	AVN 211	Feed Mill Management and Processing Technology	2 (1+1)
36	AVN 311	Pet Bird Nutrition	2 (1+1)
37	AVN 411	Poultry Nutrition and Feeding	3 (2+1)
38	AVN 421	Commercial Poultry Nutrition	2 (1+1)
39	AVN 422	Non-conventional Feed Resources	2 (1+1)
40	AVN 423	Minerals and Vitamin Nutrition, and Feed Additives	3 (2+1)
41	AVN 424	Valorization of Waste as Poultry Feed	2 (1+1)
42	AVN 425	Role of Poultry in Human Nutrition	2 (2+0)
43	AVN 429	Internship (12 weeks)	12 (0+12)
44	AVN 491	Seminar	1 (0+1)
45	AVN 499	Research	12 (0+12)
Poultry Breeding and Genetics			
46	PBG 211	Basic Animal Husbandry Statistics	3 (2+1)
47	PBG 221	Introduction to Chick Sexing and Grading	2 (1+1)
48	PBG 311	Fundamentals of Poultry Breeding and Genetics	3 (2+1)
49	PBG 321	Climate Change Adaptation in Poultry Production	2 (1+1)
50	PBG 411	Poultry Breeding and Genetics	3 (2+1)
51	PBG 421	Avian Andrology and Female Reproduction	3 (2+1)
52	PBG 422	Conservation and Characterization of Avian Genetic Resources	2 (1+1)
53	PBG 423	Pet Bird Genetics and Breeding	3 (2+1)
54	PBG 429	Internship (12 weeks)	12 (0+12)
55	PBG 491	Seminar	1 (0+1)
56	PBG 499	Research	12 (0+12)
Poultry Processing and Technology			
57	PPT 221	Poultry Processing and Products Technology	3 (2+1)
58	PPT 411	Advanced Poultry Meat and Egg Products Technology	3 (2+1)
59	PPT 421	Poultry Processing Plant Practices and Operations	2 (1+1)

60	PPT 422	Packaging and Marketing of Poultry Products	3 (2+1)
61	PPT 423	Physical, Chemical and Microbiological Safety of Poultry Products	3 (2+1)
62	PPT 424	Slaughter House By-Products Technology	2 (1+1)
63	PPT 429	Internship (12 weeks)	12 (0+12)
64	PPT 491	Seminar	1 (0+1)
65	PPT 499	Research	12 (0+12)
Avian Disease Management			
66	ADM 221	Flock Health	3 (2+1)
67	ADM 222	Biosecurity and Waste Management	2 (1+1)
68	ADM 321	Laboratory Techniques for Flock Health	2 (0+2)
69	ADM 421	Poultry Health and Biosecurity	3 (2+1)
70	ADM 422	Pet Bird Health Care	2 (1+1)
Poultry Business and Entrepreneurship			
71	MDC 111	Principles of Management	3 (3+0)
72	VAC 111	Personality Development and Organisational Behaviour	3 (2+1)
73	AEC 111	Communicative English	2 (1+1)
74	MDC 121	Entrepreneurship Development and Business Management	3 (2+1)
75	VAC 121	Computer Application in Poultry Business	3 (1+2)
76	AEC 121	Business Communication	2 (1+1)
77	MDC 211	Fundamentals of Financial Accounting	3 (1+2)
78	AEC 211	Physical Education, First Aid, Yoga Practices and Meditation	2 (0+2)
79	PBE 221	Production and Operations Management	3 (2+1)
80	PBE 222	Business Management and Ethics	2 (2+0)
81	PBE 311	Quantitative Methods for Business Management	3 (2+1)
82	PBE 312	Financial Management	4 (3+1)
83	PBE 313	Managerial Economics	3 (2+1)
84	PBE 314	Human Resource Management	3 (2+1)
85	PBE 321	Marketing Management	3 (2+1)
86	PBE 322	Supply Chain Management	3 (2+1)
87	PBE 323	Accounting for Management	2 (1+1)
88	PBE 324	Business Regulations and Legal Aspects of Poultry Business	2 (2+0)
89	PBE 325	International Trade Agreements and Poultry Business	2 (2+0)

90	PBE 326	Risk Mangement and Insurance	2 (2+0)
91	PBE 421	Business Research Methods	3 (3+0)
92	PBE 422	Computerised Accounting with Tally	2 (1+1)
93	PBE 423	e-Commerce in Agribusiness	3 (2+1)
94	PBE 424	Corporate Regulations	2 (2+0)
95	PBE 425	Food and Retail Business Management	3 (2+1)
96	PBE 426	Agricultural Marketing Regulations	3 (2+1)
97	PBE 427	Export Management of Poultry and its' Products	3 (2+1)
98	PBE 429	Internship (12 weeks)	12 (0+12)
99	PBE 491	Seminar	1 (0+1)
100	PBE 499	Research/ Case Study	12 (0+12)
Other Courses			
101	IFC 111	Deeksharambh (Induction-cum-Foundation Program) (2 weeks)	2 (0+2) NG
102	AEC 221	Communication Skills	2 (1+1)

SYLLABUS FOR EACH SUBJECT

SEMESTER-I

IFC 111 - Deeksharambh (Induction-cum-Foundation Programme) (2 weeks) 2 (0+2) (NG)

Objectives

- Help for cultural Integration of students from different backgrounds,
- Know about the operational framework of academic process in university,
- Instilling life and social skills,
- Social awareness, ethics and values, Teamwork, leadership, creativity, etc.
- Identify the traditional values and indigenous cultures along with diverse potentialities both in indigenous and developed scenario.

Practical

Discussions on operational framework of academic process in university, as well as interactions with academic and research managers of the university. Interaction with alumni, business leaders, perspective employers, outstanding achievers in related fields, and people with inspiring life experiences.

Group activities to identify the strength and weakness of students (with expert advice for their improvement) as well as to create a platform for students to learn from each other's life experiences. Activities to enhance cultural Integration of students from different backgrounds

Field visits to related fields/ establishments

Sessions on personality development (instilling life and social skills, social awareness, ethics and values, teamwork, leadership, etc.) and communication skills

PPM 111 - Fundamentals of Poultry Production 3(2+1)

Objectives

- To provide knowledge on history and present status of Indian poultry industry
- To teach about basic knowledge on poultry production
- To study the classes, breeds, varieties, strains and lines of poultry
- To impart knowledge on different systems of rearing and housing, and equipment used in different housing systems

Theory

Unit I

Development of poultry industry in India. Role of government and private agencies in poultry development. Indian poultry statistics. Future prospects and constraints of Indian poultry industry. Classification, breeds, varieties, strains and lines of different species of poultry.

Unit II

Site selection and location of poultry farm. Systems of rearing - Backyard system, semi-intensive system and intensive system. Alternate systems of rearing - Cage free barn, free-range system, portable house, pasture pen cum pasture rotation, yarding, chicken tractor and rondeel system. Mixed farming and integration. Organic poultry production.

Unit III

Space requirement - Floor space, feeder space and drinker space requirement for different age groups under different rearing conditions. Importance of poultry housing and equipment.

Unit IV

Principles of housing - layout of poultry farm and basic principles of construction of poultry houses. Types of houses - open sided deep litter, slat / wire, slat cum litter / wire cum litter, cage houses, raised platform cage houses and low-cost housing. Types of cages - stacked, stair-step Californian, 'A' type, furnished and welfare cages. Conventional vs Reverse cages. Environmentally controlled houses. Fundamentals of ventilation - ventilation systems, tunnel ventilation, duct ventilation and windowless house. Roof - Types of roof and materials used. Insulating materials for poultry houses - R-value.

Unit V

Poultry farm equipment - Brooding, feeding, and watering equipment, nest boxes, filler flats, vaccinators, dubbing and beak trimming equipment.

Practical

Design and layout plan for poultry house. Design of cages. Construction co-efficient. Costing of cages and equipment. Comparative economics of various housing systems. Roof types of common poultry houses. Demonstration of various systems of production. Demonstration of various equipment used in poultry houses. Catching, handling and control of poultry.

Suggested Readings

1. Aengwanich, W., Sanchez, S. and Koppel, K. 2016. *Encyclopaedia of Development and Scopes of Successful Poultry Production and Disease Management*. Koros Press Limited, United Kingdom. 331p.
2. American Poultry Association [APA]. 2018. *The American Standard of Perfection, Illustrated. A complete Description of All Recognized Varieties of Fowls; As revised by*

the American Poultry Meeting, at Rochester, New York, Nineteen Hundred and Four. Forgotten Books, England. 350p.
3. BAHS. 2023. *Basic Animal Husbandry Statistics-2023*. Department of Animal Husbandry & Dairying, Government of India, Krishi Bhavan, New Delhi, 149p.
4. BAHS. 2024. *Release of Basic Animal Husbandry Statistics 20*24. Department of Animal Husbandry & Dairying, Government of India, Krishi Bhavan, New Delhi, 30p.
5. Bell D.D. and Weaver, Jr. W.D. 2002. *Commercial Chicken Meat and Egg Production*. 5th ed. Springer Science + Business Media, New York. 1364p.
6. Gosh, N. and Samanta, R. 2008. *Manual on Avian Production and Management*. International Book Distributing Co., Lucknow, U.P., India. 156p.
7. Jadhav, N.V. 2014. *Commercial Poultry Production & Hatchery Management*. Daya Publishing House, New Delhi. 90p.
8. Nandan, R. 2015. *Livestock and Poultry Production: Management and Planning*. Anmol Publications Pvt. Ltd., New Delhi, India. 328p.
9. Narayanan, M.K. and Anilkumar, K. 2022. *Package of Practices Recommendations 2022*. Directorate of Entrepreneurship, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India.
10. Panda, B. and Mohapatra, S.C. 1989, *Poultry Production*. 1st ed. Indian Council of Agricultural Research, New Delhi, 190p.
11. Roberts, V. 2008. *British Poultry Standards*. 6th ed. Blackwell Publishing, West Sussex. United Kingdom. 472p.
12. Sapcota, D., Narahari, D. and Mahanta, J.D. 2018. *Avian (Poultry) Production*. 2nd ed. New India Publishing Agency, New Delhi, India. 361p.
13. Sreenivasaiah, P.V. 2006. *Scientific Poultry Production: A Unique Encyclopedia*. 3rd ed. International Book Distributing Co., Lucknow, U.P. India. 1487p.
14. Vijayakumar, P. 2009. *OLP-001 Introduction to Poultry Farming.* Indira Gandhi National Open University, New Delhi, 54p.
15. Vyas, M.K. *Glimpse of Indian Poultry Industry*. Hind Publications, Hyderabad, India.

PPM 112 - Basic Avian Anatomy and Physiology **3(2+1)**

Objectives

- To provide knowledge on anatomy of domesticated birds
- To teach the basic principles of physiology of poultry

Theory

Unit I

The major body systems - Skeletal, integumentary, respiratory, cardiovascular, digestive, reproductive, neuro-endocrine and excretory.

Unit II

Regulation of feed intake and appetite, Photoperiod, moulting and egg formation.

Unit III

Thermoregulatory mechanisms. General principles of poultry behaviour, welfare and physiological indicators in relation to welfare of poultry. Physiology of stress and adaptation.

Practical

Skeletal structure of poultry. Structure of various systems of poultry - respiratory, cardiovascular, digestive, reproductive and excretory. Body parts, feather types, parts and tracts, and comb types of poultry.

Suggested Readings

1. Abdallah, N.B. 2010. *Poultry: Anatomy, Breeding and Genetics*. Delve Publishing, Oakville, Canada. 231p.
2. Aengwanich, W., Sanchez, S. and Koppel, K. 2016. *Encyclopaedia of Development and Scopes of Successful Poultry Production and Disease Management*. Koros Press Limited, United Kingdom. 331p.
3. Colin G. Scanes and Sami Dridi. 2021. *Sturkie's Avian Physiology*, 7th ed. Oxford Academic, Oxford University Press.
4. Ensminger, M.E. 2015. *Poultry Science*. 3rd ed. CBS Publishers & Distributors Pvt. Ltd., New Delhi, India. 469p.
5. Konig, H.E., Korbel, R., Liebich, H. and Klupiec, C. 2016. *Avian Anatomy: Textbook and Colour Atlas*, 2nd ed. 5m Publishing. 340p.
6. McLelland, J. 1990. *A Color Atlas of Avian Anatomy*. Wolf Publishing Ltd., England. 127p.
7. Sathapathy, S., Singh, M.K. and Joshi, S.K. 2015. *A handbook on Anatomy and Physiology of Domestic Animals and Birds*. Satish Serial Publishing House, New Delhi.

AVN 111 - Feeds and Feeding of Poultry **3(2+1)**

Objectives

- To teach about different feed ingredients, their composition and their addition in the poultry feed
- To provide basic concepts of feed formulation

Theory

Unit I

Fundamentals of feeds and feeding in poultry. Nutrients in feed ingredients - Macro- and micro-nutrients like energy, protein, fat, vitamins and minerals. Essential amino acids, limiting amino acids and essential fatty acids. Proximate composition.

Unit II

Nutrient requirements for various species of poultry as per various feeding standards like BIS, NRC, etc. Factors influencing nutrient requirements, factors affecting feed intake and feed efficiency.

Unit III

Feed formulation - Nutrient interrelationships - Partitioning of energy, calorie : protein ratio. Feed additives - enzymes, prebiotics, probiotics, nutraceuticals etc. Anti-nutritional and toxic substances in feedstuffs. Mycotoxins and toxin binders.

Unit IV

Types of feed and feeding systems. Feed safety guidelines and certification.

Practical

Commonly used feed ingredients - energy and protein supplements. Identification of feed ingredients of vegetable and animal origin. Proximate analysis and interpretation of feed analysis report. Least cost feed formulation.

Suggested Readings

1. Aengwanich, W., Sanchez, S. and Koppel, K. 2016. *Encyclopaedia of Development and Scopes of Successful Poultry Production and Disease Management*. Koros Press Limited, United Kingdom. 331p.
2. Bureau of Indian Standards [BIS]. 2007. *Indian Standard Poultry Feeds – Specification* 5th Revision. Bureau of Indian Standards, New Delhi. 28p.
3. Bureau of Indian Standards [BIS]. 2024. *Indian Standard Chicken Feeds – Specification* 6th Revision. Bureau of Indian Standards, New Delhi. 40p.
4. Ensminger, M.E. 2015. *Poultry Science*. 3rd ed. CBS Publishers & Distributors Pvt. Ltd., New Delhi, India. 469p.
5. Krishna, G. 2012. *Livestock Nutrition Analytical Techniques*. 790p.
6. Kumar, S.2014. *Feeding Methodologies of Poultry*. South India Book Traders, Jodhpur, India.
7. Leeson, S. and Summers, J.D. 2001. *Scott's Nutrition of the Chicken*. 4th ed. University Books, Belgium. 591p.
8. Leeson, S. and Summers, J.D. 2005. *Commercial Poultry Nutrition*. 3rd ed. Nottingham University Press, England. 398p.

9. McNab, J.M. and Boorman, K.N. 2002. *Poultry Feedstuffs: Supply, Composition and Nutritive Value*. CABI Publishing, New York, USA. 427p.
10. Narayanan, M.K. and Anilkumar, K. 2022. *Package of Practices Recommendations 2022*. Directorate of Entrepreneurship, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India.
11. National Research Council [NRC]. 1994. *Nutrient Requirements of Poultry*. National Academy Press, Washington, D.C., USA. 157p.
12. Panda, A.K. *Poultry Feedstuff & Feed Additives*. Hind Publications, Hyderabad, India.
13. Panda A.K. and Rao, S.V.R. *Poultry Feed and Formulation*, Hind Publications, Hyderabad, India.
14. Rao, S.V.R., Kannan, A. and Raju, M.V.L.N. 2022. *Poultry Feed Region Specific 2022*. ICAR-Directorate of Poultry Research, Hyderabad, India. 106p.
15. Reddy, V.R., Bhosale, D.T. 2001. *Handbook of Poultry Nutrition*. 1st ed. International Book Distributing Co.
16. Tiwari, S.P., Rajagopal, S. and Mehra, U.R. 2012. *Analytical Techniques in Animal Nutrition*. Satish Serial Publishing House, New Delhi, India. 212p.

MDC 111 - Principles of Management **3 (3+0)**

Objectives

- To build basic knowledge about various forms of business and emerging modes of business.
- To acquire detailed knowledge about various principles of management.

Theory

Unit I

Business - Trade and commerce. Forms of business organization - Sole proprietorship, partnership, company and other forms of organisations, private, public and global enterprises, Business services. Steps of starting a business. Emerging modes of business.

Unit II

Management - meaning, definition. Evolution of management. Schools of management thought. Importance of management. Functions of management.

Unit III

Levels of management. Managerial skills at various levels. Management and administration. Role of a Manager. Manager vs leader. Leadership and motivation - leadership styles, theories of motivation.

Unit IV

Authority and responsibility relationships. Span of control. Delegation, Centralization and Decentralization.

Unit V

Scientific management – features. Henry Fayol's contribution to management - Principles of management.

Suggested readings

1. Agarwala, D.V. 1984. *Management - Principles, Practices -Techniques*. Deep and Deep Publications, New Delhi.
2. Aswathappa, K. 1985. *Essentials of business administration*. Himalaya Publishing House, Bombay.
3. Chatterjee, S.S. 1983. *Principles and Practice of Management*. Vikas Publishing House, New Delhi.
4. Davar, R.S. 1982. *The management Process*, Progressive corporation private Ltd., Bombay.
5. Deshmukh and Parulkar. 1978. *Principles of Management*. Vidya Prakashan, Nagpur.
6. Jain, E. 1941. Principles *of Management*. International Book House Publishers, New Delhi.
7. Mrityunjoy, B. 1974. *Business administration: Principles and Techniques*. Asia Publishing House, Bombay.
8. Prasad, L.M. 1950. *Principles and practice of management.* Sultan Chand & sons publishers, New Delhi.
9. Tripathi, P.C., Reddy, P.N. and Bajpai, A. *Principles of Management.* McGraw-Hill Publishers.
10. Vasishth, N. and Vasishth, V. 2022. *Principles of Management*. Taxmann Publications Pvt. Ltd., New Delhi.

VAC 111 - Personality Development and Organisational Behaviour 3 (2+1)

Objectives

- To make students realize their potential strengths, cultivate their inter-personal skills and improve employability.
- To know about organisational behaviour and significance of organisational ethics
- To understand and appreciate the human behaviour in organisations

Theory

Unit I

Personality Definition, nature of personality, theories of personality and its types. The humanistic approach - Maslow's self-actualization theory, shaping of personality, determinants of personality, Myers-Briggs typology indicator, locus of control and performance, Type A and Type B behaviours, personality and organizational behaviour.

Unit II

Organisational behaviour - meaning and definition. Organisational structure - personality, attitudes, learning, perception, leadership, motivation and job performance, value, attitude, belief, conflict, negotiation, group dynamics, team building, organisational communication, organisational culture, organisational development and organisational change.

Unit III

Organisational creativity and innovation - Management of innovation, entrepreneurial management, benchmarking, best management practices across the world.

Unit IV

Stress in organisations - Nature and causes of stress, individual and organisational consequences of stress, managing stress. Contemporary issues in organisational behaviour and management

Unit V

Ethics in organisation, ethical and unethical behaviour, managing for ethical behaviour. Multiculturism and cross-cultural differences. Learning organisations.

Practical

Games in team building. Preparation of organisational charts. Analysis of leadership styles. Measuring organisational climate. Analyse stress management practices followed by specific companies. Case study related to organisational behaviour.

Suggested readings

1. Agarwala, T. 2003. Innovative human resource practices and organizational commitment: An empirical investigation. *International Journal of Resource Management*. **14**(2): 175-197.
2. Andrews, S. 1988. *How to Succeed at Interviews*. Tata McGraw-Hill.
3. Griffin, R.W. 2009. *Management: Principles and Applications*. Cengage Learning, New Delhi. 542p.
4. Gupta, M. 2009. *Principles of Management*. PHI Learning Pvt. Ltd., New Delhi. 284p.
5. Mullins, L. 2007. *Management and Organizational Behaviour*. Pearson Education, New Delhi.

6. Noe, R.A., Hollenbeck, J.R., Gehart, B. and Wright, P.M. 2021. *Fundamentals of Human Resource Management*. 9th ed. McGraw Hill Publishers.
7. Prasad. L.M. 2019. *Organizational Behaviour*. Sultan Chand & Sons. 550p.
8. Robbins, S.P., Judge, T.A. and Vohra, N. 2018. *Organizational Behaviour*. 18th ed. Pearson Education, New Delhi. 800p.
9. Shaffer, D.R. 2009. *Social and Personality Development*. 6th ed. Belmont, CA: Wadsworth.

AEC 111 - Communicative English 2 (1+1)

Objectives

- To develop fundamental communication skills, language accuracy, and critical thinking abilities essential for effective English communication in academic and professional contexts.
- To enhance language proficiency of students through interactive activities and practical applications.

Theory

Unit 1

Introduction to Communication - Communication Process: The magic of effective communication; Building self-esteem and overcoming fears; Concept, nature and significance of communication process; Meaning and scope.

Unit 2

Communication Types and Barriers - Types of Communication: Written Communication. Oral Communication. Face-to-face Communication. Non-verbal Communication (Silence). Communication Barriers. Identification of Linguistic and non-linguistic barriers to communication and reasons behind communication gap / miscommunication. Strategies for overcoming communication barriers

Unit 3

Phonetics and pronunciation skills: vowel sounds, diphthongs and consonants

Unit 4:

Academic Writing Process. Research for Academic Writing: Data collection methods**.** Use of print, electronic and digital sources**.** Selecting key points and note making**.** Paraphrasing and summary writing**.** plagiarism**.**

Unit 5

Language Accuracy. Grammar Essentials: Parts of Speech**.** Auxiliary verbs. Subject-verb agreement**.** Phrasal verbs and Modals**.** Tenses and Conditionals**.**

Practical

Interpersonal communication: Face to face conversation. Debate. Extempore speech. Mock viva. Paraphrasing and summary writing**.** Documentation and avoiding plagiarism**.** Title creation and body paragraph. Introduction and conclusion writing. Revising and proof reading

Suggested Reading

1. Hornby, A.S. 2006. *Oxford Advanced Learner's Dictionary*. Oxford University Press.
2. Murphy, R. 2012. *English Grammar in Use*. 4th ed. Cambridge University Press.
3. Kumar, S. and Pushp, L. 2015. *Communication Skills*. 2nd ed. Oxford University Press.
4. Raman, M. and Sharma, S. 2015. *Technical Communication: Principles and Practice.* 3rd ed. Oxford University Press.
5. Richards, J. C. and Bohlke. D. 2018. *Four Corners Level 1: Student's Book with Online Self-Study*. 2nd ed. Cambridge University Press.
6. Swan, M. 2017. *Practical English Usage*. 4th ed. Oxford University Press.

SEP 111 - Feed Quality Control **3(0+3)**

Objectives

- To train the students on physical and chemical evaluation of feed and feed ingredients.
- To give knowledge on quality control of animal feed.

Practical

Sampling instruments and methods. Physical evaluation of feed and feed ingredients. Chemical evaluation of feed and feed ingredients (Proximate analysis) - Dry matter, metabolizable energy, crude protein, ether extract, crude fibre, calcium and phosphorus.

Quality control of animal feed. Methods to improve quality of feed. GMP, HACCP etc. in feed manufacture.

Suggested Readings

1. AAFCO. 2020. *Feed Inspector's Manual*. 8th ed. Association of American Feed Control Officials Inspection and Sampling Committee. 152p.
2. Garg, M.R, Sherasia, P.L. and Bhander, B.M. 2013. *Quality Control Manual for Cattle Feed Plants*. Animal Nutrition Group, National Dairy Development Board, Anand, Gujarat, India. 206p.

3. Jadhav, N.V. 2014. *Commercial Poultry Production & Hatchery Management*. Daya Publishing House, New Delhi. 90p.
4. Kotaiah, T. 2016. *Poultry Vision 2020*. Hind Publications, Hyderabad, India. 180p.
5. Njidda, A.A., Jokthan, G.E., Abdu, S.B. and Njidda, A.A. *ANP 508 Feed Formulation (2 Units)*. National Open University of Nigeria. 124p.
6. Kundu, S.S., Mahanta, S.K., Singh, S. and Pathak, P.S. 2021. *Animal Feed Technology*. Satish Serial Publishing House, New Delhi. 343.
7. Missaglia, A.P., Bruno, A. and Battaglia, D. 2020. *Good practices for the feed sector: Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding*. FAO of United Nations, Rome. 113p.
8. Pandey, D. 2022. *Poultry Feed Technology*. 1st ed. Agrotech Press, 264p.
9. Rayhan, A. 2020. *Optimizing Feed Milling Processes for Enhanced Efficiency and Quality: A Comprehensive Technical Study*. https://www.researchgate.net/publication/372907868_Optimizing_Feed_Milling_Processes_for_Enhanced_Efficiency_and_Quality_A_Comprehensive_Technical_Study.
10. Saxena, H.C. 2006. *Poultry Feed Technology Feed Formulation & Manufacturing*. 1st ed. International Book Distributing Company, Lucknow.
11. UNDP. 1980. *Fish Feed Technology*, UNDP, FAO of United Nations, Rome. http://www.fao.org/docrep/x5738e/ x5738e0j.htm#TopOfPage.
12. Vyas, M.K. 2008. *Glimpse of Indian Poultry Industry*. Hind Publications, Hyderabad, India.161p.
13. Vyas, M.K. and Purohit, S. 2019. *Good Production Practices for Poultry Feed Industry*. Hind Publication, Hyderabad, India. 148p.

SEP 112 - Feed Milling Operations **3(0+3)**

Objectives

- To make the student aware about feed mill management.
- To give knowledge on different feed milling operations.

Practical

Layout of a feed mill. Feed ingredients entry, storage and addition. Micronutrients' entry, storage and addition. Types of equipment used in feed mill and their usage - Machines used for grinding, mixing and pelleting process. Material flow in feed manufacturing. Effect of processing on the nutritional value of feeds. Feed formulation.

Suggested Readings

1. Jadhav, N.V. 2014. *Commercial Poultry Production & Hatchery Management*. Daya Publishing House, New Delhi. 90p.

2. Missaglia, A.P., Bruno, A. and Battaglia, D. 2020. *Good practices for the feed sector: Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding*. FAO of United Nations, Rome. 113p.
3. Njidda, A.A., Jokthan, G.E., Abdu, S.B. and Njidda, A.A. *ANP 508 Feed Formulation (2 Units)*. National Open University of Nigeria. 124p.
4. Pandey, D. 2022. *Poultry Feed Technology*. 1st ed. Agrotech Press, 264p.
5. Rayhan, A. 2020. *Optimizing Feed Milling Processes for Enhanced Efficiency and Quality: A Comprehensive Technical Study*. https://www.researchgate.net/publication/372907868_Optimizing_Feed_Milling_Processes_for_Enhanced_Efficiency_and_Quality_A_Comprehensive_Technical_Study.
6. Saxena, H.C. 2006. *Poultry Feed Technology Feed Formulation & Manufacturing*. 1st ed. International Book Distributing Company, Lucknow.
7. SFMCA. 2021. *National Biosecurity Manual for Feed Mills Version 1*. Stock Feed Manufacturer's Council of Australia, Curtin ACT, Australia. 43p.
8. UNDP. 1980. *Fish Feed Technology*, UNDP, FAO of United Nations, Rome. http://www.fao.org/docrep/x5738e/ x5738e0j.htm#TopOfPage.
9. Vyas, M.K. and Purohit, S. 2019. *Good Production Practices for Poultry Feed Industry*. Hind Publication, Hyderabad, India. 148p.

SEMESTER – II

PPM 121 - Layer Production **3(2+1)**

Objectives

- To impart basic knowledge on management of layers at different ages
- To train the students on management of birds in different seasons

Theory

Unit I

Systems of layer farming. Layout of the farm. Systems of housing - Deep litter and cage system of rearing layers, cages and modified cages for egg type birds. Floor, feeder and drinker space requirements under different systems of rearing at different ages. Layer farm equipment.

Unit II

Brooder, grower and layer management. Feeding and types of feeding - phase feeding, restricted feeding etc. Watering.

Unit III

Lighting programme. Flock uniformity. Judging and culling of unproductive birds. Moulting. Monitoring egg production curve. Record keeping.

Unit IV

Medication and vaccination - vaccination schedule. Biosecurity and health management. Management during different seasons. Good husbandry practices in commercial layer farming.

Unit V

Production of SPF, designer, enriched and nutraceutical eggs. Commercial layer farm economics.

Practical

Design of different chick, grower and layer houses, and house specifications. Beak trimming, dubbing, deworming, vaccination, medication and other farm routines and operations. Farm sanitation and disinfection. Maintaining farm records - calculating hen-housed egg production, hen-day egg production and other economics traits. Production loss reasons and corrective measures. Identifying good and poor layer. List of commercial hybrid strains of white egg and brown egg layers. List of crossbreds and synthetic breeds for backyard purpose. Visit to commercial layer farms.

Suggested Readings

1. Bell D.D. and Weaver, Jr. W.D. 2002. *Commercial Chicken Meat and Egg Production*. 5th ed. Springer Science + Business Media, New York. 1364p.
2. Das, S.K. 194. *Poultry Production*. CBS Publishers & Distributors, New Delhi, India. 232p.
3. Ensminger, M.E. 2015. *Poultry Science*. 3rd ed. CBS Publishers & Distributors Pvt. Ltd., New Delhi, India. 469p.
4. Ince, J. 2019. *Commercial Poultry Production and Management*. Oxford Book Company, Jaipur, India. 271p.
5. Jadhav, N.V. 2014. *Commercial Poultry Production & Hatchery Management*. Daya Publishing House, New Delhi. 90p.
6. Murugan, M. 2020. *Commercial Chicken Egg Production*. Associated Publishing Company, New Delhi, India. 108p.
7. Parkhurst, C.R. and Mountney, G.J. 1988. *Poultry Meat and Egg Production*. Chapman & Hall, New York, U.S.A. 294p.
8. Prabakaran, R. 2003. *Good practices in planning and management of integrated commercial poultry production in South Asia*. Food and Agricultural Organization of the United Nations, Rome. 97p.
9. Sapcota, D., Narahari, D. and Mahanta, J.D. 2018. *Avian (Poultry) Production*. 2nd ed. New India Publishing Agency, New Delhi, India. 361p.

PPM 122 - Broiler Production **3(2+1)**

Objectives

- To acquaint basic knowledge on management of broilers at different ages
- To teach the students on Indian broiler integration

Theory

Unit I

Systems of rearing broilers. All-in all-out and multiple batch systems. Systems of integration in broiler production. Location, layout and design of broiler houses. Broiler farm equipment.

Unit II

Brooding and rearing of broilers. Litter materials and deep litter management. Floor, feeder and drinker space requirements of broilers under different systems at different ages.

Unit III

Feeding of broilers - Mash, crumble and pellet feeding. Weekly growth rate, feed conversion and livability in broilers. FCR, European economic factor and corrected FCR. Sex separate feeding. Feeding broilers for optimum growth rate and feed efficiency. Watering of broilers - water quality and water sanitation.

Unit IV

Lighting management of broilers. Management during different seasons. Farm records. Broiler farm routine, medication and vaccination schedule. Bio-security and health management.

Unit V

Transportation of broilers. Different ways of marketing of broilers. Broiler performance indices. Organic chicken and lean meat production technology.

Practical

Broiler house design. Comparative judging of live broilers according to confirmation and grading of broilers. Broiler management - brooding, growing and maintenance. Vaccination, medication and transportation of chicks and broiler farm routines. Feeding of broilers at different ages. Working out feed efficiency. Record keeping. Calculation of performance indices. Economics of broiler farm. List of commercial hybrid strains of white feathered broilers and colour broilers. Visit to broiler farms. Project preparation.

Suggested Readings

1. Ensminger, M.E. 2015. *Poultry Science*. 3rd ed. CBS Publishers & Distributors Pvt. Ltd., New Delhi, India. 469p.
2. Ince, J. 2019. *Commercial Poultry Production and Management*. Oxford Book Company, Jaipur, India. 271p.
3. Jadhav, N.V. 2014. *Commercial Poultry Production & Hatchery Management*. Daya Publishing House, New Delhi. 90p.
4. Kotaiah, T. 2009. *Guidelines for the Broiler Farming*. Hind Publications, Hyderabad, India. 71p.
5. Kotaiah, T. 2016. *Poultry Vision 2020*. Hind Publications, Hyderabad, India. 180p.
6. Murugan, M. 2017. *Commercial Broiler Chicken Production*. Satish Serial Publishing House, New Delhi, India. 86p.
7. Narahari, D. and Kumaraj, R. 2008. *Handbook of Applied Broiler Production*. Poultry Punch Publications, New Delhi, India. 249p.
8. Panda, A.K., Swain, B.K. and Kadam, M. *Recent Advances in Broiler Chicken Nutrition*. Hind Publications, Hyderabad, India.
9. Parkhurst, C.R. and Mountney, G.J. 1988. *Poultry Meat and Egg Production*. Chapman & Hall, New York, U.S.A. 294p.
10. Prabakaran, R. 2003. *Good practices in planning and management of integrated commercial poultry production in South Asia*. Food and Agricultural Organization of the United Nations, Rome. 97p.
11. Sapcota, D., Narahari, D. and Mahanta, J.D. 2018. *Avian (Poultry) Production*. 2nd ed. New India Publishing Agency, New Delhi, India. 361p.

PPM 123 - Incubation and Hatchery Management Practices 3(2+1)

Objectives

- To provide knowledge on natural and artificial incubation of eggs
- To give practical training on commercial hatchery operations

Theory

Unit I

Layout, design and location of hatchery.

Unit II

Methods of incubation. Physical requirements of incubation.

Unit III

Hatchery operations - Collection, selection, disinfection, candling and storage of hatching eggs - setter and hatcher operations, pedigree hatching, chick pull out and grading, and packing and dispatch. In-ovo, and in-hatch vaccinations, medications and feeding.

Unit IV

Incubation conditions for different species of poultry. Role of computer in modern hatchery operations. Quality control measures in the hatchery. Biosecurity measures, hatchery sanitation, fumigation and waste management.

Unit V

Major causes of hatch failure - Post hatch break open study, analysis of poor hatchability, diagnosis of hatchability problem. Parthenogenesis.

Practical

Layout and design of hatchery. Incubator design and drawing. Demonstration of parts of incubator and other hatchery equipment. Operations of incubator. Observation of embryonic development in various species - malposition and malformation. Routine managerial practices in hatchery - Collection, selection, cleaning, storing, candling and setting of hatching eggs. Determination of fertility, hatchability on TES and FES, dead germs and dead-in-shell percentage. Chick grading, wing banding, dubbing, toe clipping, toe punching, vaccination, sexing, packing and transportation of chicks. Cleaning, disinfection and fumigation of eggs, storeroom and hatchery - fumigation procedure. Hatchery records. Visit to commercial hatchery.

Suggested Readings

1. Ahmed, M. *Principles & Practices of Hatchery Management*. Hind Publications, Hyderabad, India.
2. Banday, M.T. and Bakat. M. 2014. *ABC of Hatchery Management*. Patridge Publishing.
3. Dafwang, I.I., Odiba, J.Y. and Ikani, E.I. 2022. *Hatchery Management Practices in Poultry*. National Agricultural Extension and Research Liaison Services, Ahmadu Bello Univeristy. Zaria. 32p. https://naerls.gov.ng/wp-content/uploads/2022/11/Harchery-Management-Practices-in-Poultry.pdf.
4. Deeming, D.C. and Ferguson, M.W.J. 1991. *Egg incubation its effects on embryonic development in birds and reptiles*. Cambridge University Press, Cambridge, United Kingdom. 448p.
5. Ensminger, M.E. 2015. *Poultry Science*. 3rd ed. CBS Publishers & Distributors Pvt. Ltd., New Delhi, India. 469p.
6. FAO. 2017. *Questions & Answers Handbook for Good Management Practices and Biosecurity in Small and Medium-Scale Poultry Hatcheries*. FAO of United Nations, Rome. 83p.

7. Jadhav, N.V. 2014. *Commercial Poultry Production & Hatchery Management*. Daya Publishing House, New Delhi. 90p.
8. Murugan, M. 2019. *Textbook on Commercial Poultry Production and Hatchery Management*. Indian Council of Agricultural Research, New Delhi, India.
9. Robert, L. and Smith, T.W. *Hatchery Management Guide for Game Bird and Small Poultry Flock Owners*. Cooperative Extension Service, Mississippi State University.
10. Saxena, H.C. 2009. *Hatchery Practices and Management*. International Book Distribution Co.
11. Singh, R.K. *Hand Book of Modern Hatchery Practices*. Hind Publications, Hyderabad, India. 200p.
12. Singh, R.K. and Vyas, M.K. *How to Start a Poultry Hatching Business*. Hind Publications, Hyderabad.

MDC 121 – Entrepreneurship Development and Business Management 3(2+1)

Objectives

- To provide student an insight into the concept and scope of entrepreneurship.
- To expose the student to various aspects of establishment and management of a small business unit.
- To enable the student to develop financially viable agribusiness proposal.

Theory

Unit I

Development of entrepreneurship, motivational factors, social factors, environmental factors, characteristics of entrepreneurs, entrepreneurial attributes/competencies. Concept, need for and importance of entrepreneurial development. Evolution of entrepreneurship, objectives of entrepreneurial activities, types of entrepreneurs, functions of entrepreneurs, importance of entrepreneurial development, and process of entrepreneurship development.

Unit II

Environment scanning and opportunity identification need for scanning - spotting of opportunity, scanning of environment, identification of product / service - starting a project, factors influencing sensing the opportunities. Infrastructure and support systems - good policies, schemes for entrepreneurship development, role of financial institutions, and other agencies in entrepreneurship development. Steps involved in functioning of an enterprise.

Unit III

Selection of the product / services, selection of form of ownership, registration, selection of site, capital sources, acquisition of manufacturing know how, packaging and distribution.

Planning of an enterprise, project identification, selection and formulation of project, project report preparation, enterprise management.

Unit IV

Production management - product, levels of products, product mix, quality control, cost of production, production controls, material management. Production management - raw material costing, inventory control.

Unit V

Personal management - manpower planning, labour turn over, wages / salaries. Financial management / accounting - funds, fixed capital and working capital, costing and pricing, long term planning and short-term planning, book keeping, journal, ledger, subsidiary books, annual financial statement, and taxation. Marketing management - market, types, marketing assistance, market strategies. Crisis management - raw material, production, leadership, market, finance, natural etc.

Practical

Visit to small-scale industries/agro-industries. Interaction with successful entrepreneurs/ agric-entrepreneurs. Visit to financial institutions and support agencies. Preparation of project proposal for funding by different agencies.

Suggested Readings:

1. Charantimath, P.M. 2009. *Entrepreneurship Development and Small Business Enterprises*. Pearson Publications, New Delhi.
2. Desai, V. 2015. *Entrepreneurship: Development and Management*. Himalaya Publishing House.
3. Gupta, C.B. 2001. *Management Theory and Practice*. Sultan Chand and Sons.
4. Indu, G. 2008. *Handbook on Empowerment and Entrepreneurship*. Agrotech Public Academy.
5. Khanka, S.S. 1999. *Entrepreneurial Development*. S. Chand and Co.
6. Mehra, P. 2016, *Business Communication for Managers*. Pearson India, New Delhi.
7. Pandey, M. and Tewari, D. 2010, *The Agribusiness Book*. IBDC Publishers, Lucknow.
8. Singh, D. 1995. *Effective Managerial Leadership*. Deep and Deep Publications.
9. Singhal, R.K. 2013. *Entrepreneurship Development and Management*. Katson Books.
10. Tripathi, P.C. and Reddy, P.N. 1991. *Principles of Management*. Tata McGraw Hill.
11. Vasant, D. 1997. *Small Scale Industries and Entrepreneurship*. Himalaya Publishing House.

VAC 121 - Computer Application in Poultry Business **3(1+2)**

Objectives

- To equip students with fundamental and practical knowledge of computer applications in poultry business, with a focus on word processing, spreadsheet analysis, presentations, database management and internet usage
- To enhance students' efficiency in handling documentation, data analysis, and business communication using modern computer tools.

Theory

Unit I

Fundamentals of Computer and Office Automation: Introduction to Computer Applications**,** Basics of Number System and conversion, Office Automation: Objectives, Tools, and Importance**,** Office Equipment: Types and Uses**,** Basic Computer Networks: LAN, WAN, VPN, ISDN**,** Information Retrieval Systems, Introduction to Management Information Systems (MIS)

Unit II

Microsoft Office - Word and Excel - MS Word: Creating and formatting documents**,** Working with tables**,** Mail merge, spelling and grammar tools**,** Inserting graphics, hyperlinks, and objects**,** Drafting letters, notices, invitations, and designing letterheads. MS Excel: Creating and formatting worksheets**,** Charts, sorting and filtering data**,** Mathematical and statistical functions**,** Inserting hyperlinks and basic data analysis.

Unit III

MS PowerPoint, MS Access & Database Basics-MS PowerPoint: Creating and designing presentations**,** Applying templates, adding animations, hyperlinks, pictures, slide numbers, date/time**,** Running slide shows and printing presentations**.** MS Access: Introduction to databases**,** Characteristics and types of database systems**,** Creating and formatting databases**,** Generating reports and printing**,** Security and Backup of Databases

Unit IV

Internet, HTML, and Industry Applications - Internet Basics: WWW, FTP, Email, Search Engines, Portals, Web browsing**,** Business communication tools and practices online**.** HTML: Introduction to HTML**,** Creating web pages, inserting tables and hyperlinks**,** Designing homepage and login pages**.**

Practical

MS Word - for creating and formatting documents, working with tables, checking spelling and grammar, inserting graphics, hyperlinks, and objects, as well as drafting letters, notices, invitation letters, and performing mail merge operations. MS Excel - students will create, format, and print worksheets; develop charts, perform sorting and filtering; insert hyperlinks;

and apply mathematical and statistical functions. Emphasis will be placed on using Excel for report generation and statistical quality control specific to the poultry industry. MS PowerPoint - to design and create presentations using templates, add animations and transitions, insert hyperlinks, pictures, slide numbers, and date/time, and run and print slide shows. Using MS Access, learners will be introduced to database creation, data entry, formatting, and report generation. HTML - create simple web pages, insert tables and hyperlinks, and design home and login pages. Internet usage - web browsing, email communication, and online interactions.

Suggested Readings

1. Sinha, P.K. and Sinha, P. 2020. *Computer Fundamentals*. 6th ed. BPB Publications, New Delhi, India.
2. Nordell, R. 2021. *Microsoft Office 365 - In Practice*. McGraw Hill Education, New York, USA.
3. Rajaraman, V. 2018. *Introduction to Information Technology*. 3rd ed. PHI Learning Pvt. Ltd., New Delhi, India.
4. Duckett, J. 2011. *HTML and CSS: Design and Build Websites*. 1st ed. Wiley, USA.
5. Weverka, P. 2018. *Office 2019 All-in-One For Dummies*, Hoboken. John Wiley & Sons NJ, USA.
6. Parameswaran, R. *Computer Applications in Business*. S. Chand Publishing, New Delhi, India.

AEC 121 - Business Communication **2(1+1)**

Objectives

- To develop effective business communication skills essential for professional success in corporate environments.
- To equip students to learn and communicate efficiently in various business contexts, understand organizational communication dynamics, and master written and oral communication techniques required in modern business settings.

Theory

Unit I

Fundamentals of Business Communication -Nature and importance of business communication, communication process in organizations, formal and informal communication networks, barriers to business communication, cross-cultural communication in global

business, ethics in business communication, communication technology and digital platforms. E Communication.

Unit II

Written Business Communication - Business writing principles, memo writing, Job Application Materials, business letters - inquiry, complaint, adjustment, sales letters, email communication and netiquette, report writing - informational and analytical reports, proposal writing, executive summaries, minutes of meetings, business correspondence formats.

Unit III

Oral Business Communication - Interpersonal communication in workplace, team communication and collaboration, business presentations - planning, organizing and delivering, meeting management, negotiation skills, conflict resolution, telephone and video conferencing etiquette, customer service communication.

Unit IV

Corporate Communication and Public Relations - Internal communication strategies, external communication with stakeholders, crisis communication management, media relations, corporate image building, social media communication for business, marketing communication, investor relations, corporate social responsibility communication.

Practical

Case study analysis and solutions, role-play exercises for business scenarios, presentation workshops with audio-visual aids, mock interviews and group discussions, business letter and email drafting sessions, report writing practice, meeting simulation exercises, digital communication tools training.

Suggested Reading

1. Bovee, C.L. and Thill, J.V. 2017. *Business Communication Today.* 14th ed. Pearson.
2. Lesikar, R.V. and Pettit J.D. 1994. *Business Communication: Theory and Application.* 7th ed. McGraw-Hill.
3. Murphy, H.A., Hildebrandt, H.W. and Thomas, J.P. 2017. *Effective Business Communications.* 7th ed. McGraw-Hill.
4. Ober, S. 2012. *Contemporary Business Communication*. 8th ed. Cengage Learning.
5. Sharma, R.C. and Mohan, K. 2017. *Business Correspondence and Report Writing.* 5th ed. Tata McGraw-Hill.
6. Penrose, John M. 2007. *Business Communication for Managers: An Advanced Approach.* 5th ed. Cengage Learning.

SEP 121 - Commercial Layer Production **3(0+3)**

Objective

- To give hands-on training on layer farm management

Practical

Brooding arrangement. Types of brooding. Grower management. Layer management. Feeding and watering management. Other management practices - Beak trimming, dubbing, deworming, vaccination, medication and other farm routines.

Biosecurity measures. Record keeping. Calculation of hen-day egg production, hen-housed egg production and other economic traits. Identifying good and poor layers. Economics of layer rearing. Bankable project preparation.

Suggested Readings

1. Bell D.D. and Weaver, Jr. W.D. 2002. *Commercial Chicken Meat and Egg Production*. 5th ed. Springer Science + Business Media, New York. 1364.
2. Gosh, N. and Samanta, R. 2008. *Manual on Avian Production and Management*. International Book Distributing Co., Lucknow, U.P., India. 156p.
3. Jadhav, N.V. 2014. *Commercial Poultry Production & Hatchery Management*. Daya Publishing House, New Delhi. 90p.
4. Kadam, M., Jaywant, R.J. and Kolluri, G. 2019. *Scientific Poultry Practices*. Hind Publications, Hyderabad, India. 404p.
5. Kotaiah, T. Vyas, M.K. and Purohit, S. *Seven Stages of Layer Management*, 3rd ed. Hind Publications, Hyderabaed, India.
6. Narayanan, M.K. and Anilkumar, K. 2022. *Package of Practices Recommendations 2022*. Directorate of Entrepreneurship, Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala, India.
7. Panda, A.K., Rao, S.V.R. and Reddy, M.R. 2008. *Growth Promotors in Poultry: Novel Concepts*. International Book Distributing Co., Lucknow, U.P., India. 131p.
8. Sapcota, D., Narahari, D. and Mahanta, J.D. 2018. *Avian (Poultry) Production*. 2nd ed. New India Publishing Agency, New Delhi, India. 361p.

SEP 122 - Commercial Broiler Production **3(0+3)**

Objective

- To give hands-on training on broiler farm management

Practical

Types of brooder and grower management. Lighting management. Feeding and watering of broilers. Judging and grading of broilers. Vaccination, medication and transportation of chicks and broilers. Calculation of feed efficiency and other indices. Record keeping. Economics of broiler rearing and bankable project preparation.

Suggested Readings

1. Gosh, N. and Samanta, R. 2008. *Manual on Avian Production and Management*. International Book Distributing Co., Lucknow, U.P., India. 156p.
2. Kotaiah, T. 2016. *Poultry Vision 2020*. Hind Publications, Hyderabad, India. 180p.
3. Murugan, M. 2017. *Commercial Broiler Chicken Production*. Satish Serial Publishing House, New Delhi, India. 86p.
4. Narahari, D. and Kumaraj, R. 2008. *Handbook of Applied Broiler Production*. Poultry Punch Publications, New Delhi, India. 249p.
5. Panda, A.K., Swain, B.K. and Kadam, M. *Recent Advances in Broiler Chicken Nutrition*. Hind Publications, Hyderabad, India.

SEP 123 - Hatchery Operations **3(0+3)**

Objective

- Hands-On training on entire hatchery management from egg receiving to chick transport

Practical

Egg receiving, cleaning, candling and fumigation. Egg storage. Starting an incubator. Setter operations and maintenance, Embryo development, Egg transfer, hatcher operations and maintenance, chick pull, hatch window and grading. Hatchery waste disposal. Chick transport. Hatchery automation. Hatchery sanitation. Estimation of hatchery traits.

Suggested Readings

1. Ahmed, M. *Principles & Practices of Hatchery Management*. Hind Publications, Hyderabad, India.
2. Banday, M.T. and Bakat. M. 2014. *ABC of Hatchery Management*. Patridge Publishing.
3. Dafwang, I.I., Odiba, J.Y. and Ikani, E.I. 2022. *Hatchery Management Practices in Poultry*. National Agricultural Extension and Research Liaison Services, Ahmadu Bello Univeristy. Zaria. 32p. https://naerls.gov.ng/wp-content/uploads/2022/11/Harchery-Management-Practices-in-Poultry.pdf.
4. Saxena, H.C. 2009. *Hatchery Practices and Management*. International Book Distribution Co.
5. Singh, R.K. *Hand Book of Modern Hatchery Practices*. Hind Publications, Hyderabad, India. 200p.

6. Singh, R.K. and Vyas, M.K. *How to Start a Poultry Hatching Business*. Hind Publications, Hyderabad.

SEMESTER -III

PPM 211 - Diversified Poultry Production 4(3+1)

Objectives

- To introduce other species of poultry and their management
- To teach about systems of rearing of poultry species other than chicken
- To study the rearing of chicken other than commercial layer and broiler

Theory

Unit I

Domestication. Breeds/varieties of ducks, geese, turkey, guinea fowl, quail, pigeon, emu and ostrich. Systems of rearing, housing management and equipment. Integrated farming systems. Nomadic system of duck rearing.

Unit II

Brooder, grower and layer management. Feeding and watering. Breeder flock management. Incubation periods and incubation procedure. Rearing for meat. Production standards of meat and egg type hybrids.

Unit III

Common diseases, processing of egg, meat and feather.

Unit IV

Capon, cockerel, poussin (Spring chicken) production. Intensive rearing of country chicken for meat. Rearing of Aseel for cock fighting. Fancy chicken rearing.

Practical

Brooder, grower and layer management. Feeding and watering - feed and water requirement. Breeder flock management - Egg collection, incubation and hatchery practices. Vaccination and medication. Processing. Visit to commercial farms. Nomadic duck rearing in Kerala. Economics of rearing birds for egg and meat purpose.

Suggested Readings

1. Ahmad, K. 2013. *Guidelines for Quail Farming*. Hind Publications, Hyderabad, India.

2. Ahmad, K. 2017. *Guidelines for Turkey Farming*. Hind Publications, Hyderabad, India.
3. Cherry, P. and Morris, T.R. 2008. *Domestic Duck Production: Science and Practice*. CAB International, Oxfordshire, United Kingdom. 239p.
4. Hambrick, J. and Gammon, L.T. 2013. *Ducks: Habitat, Behaviour and Diseases*. Nova Science Publishers, Inc., New York, USA. 70p.
5. Jalaludeen, A., Churchil, R.R. and Baéza, E. 2022. *Duck Production and Management Strategies*. Springer Nature Singapore Pte Ltd., Singapore. 657p.
6. Kadam, M., Jaywant, R.J. and Kolluri, G. 2019. *Scientific Poultry Practices*. Hind Publications, Hyderabad, India. 404p.
7. Kumarr, R. 2012. *Poultry Development and Alternative Poultry*. Hind Publications, Hyderabad, India. 235p.
8. Maini, S.K. 2009. *Emu Farmer's Management Manual*. Hind Publications, Hyderabad, India. 128p.
9. Naveena, B.M. 2012. *Emu Meat Processing*. Hind Publications, Hyderabad, India. 121.p.
10. Panda, B. and Mohapatra, S.C. 1989, *Poultry Production*. 1st ed. Indian Council of Agricultural Research, New Delhi, 190p.
11. Parkhurst, C.R. and Mountney, G.J. 1988. *Poultry Meat and Egg Production*. Chapman & Hall, New York, U.S.A. 294p.
12. Shanaway, M.M. 1994. *Quail Production Systems: A review*. FAO of the United Nations, Rome. 123p.
13. Sharma, D. and Singh, H. 2013. *Guinea Fowl Genetics & Breeding*. Satish Serial Publishing House, New Delhi, India. 195p.
14. Thyagarajan, D. and Ashok, A. 2012. *Scientific Turkey Farming*. Satish Serial Publishing House, New Delhi, India. 225p.
15. Select articles from journals and other sources.

PPM 212 - Breeder Flock Management **3(2+1)**

Objectives

- To inculcate knowledge on commercial broiler and layer breeding programmes
- To give practical knowledge on breeder management from egg to adult

Theory

Unit I

Breeding industry, flock size, layer breeders, broiler breeders. Commercial strains of broiler and layer breeders - production standards. Layout and location of breeder farm, housing and equipment. Important economic traits of broiler and layer.

Unit II

Selection of breeder flock. Management of breeder flocks of broilers and layers: in cages, slat, and deep litter houses. Breeder male and female management. Special care of breeder flock. Collection, selection and care of hatching eggs. Pedigree hatching.

Unit III

Feeding of breeders: Restricted feeding, sex separate feeding. Grading and culling, flock uniformity, spiking. Salmonella testing. Lighting management. Factors influencing fertility, hatchability and quality of chicks. Vaccination and medication schedule.

Practical

Lay out of breeder farm. Routine managerial practices in breeder farms: Beak trimming, dubbing, semen collection and artificial insemination. Vaccination and medication schedule for breeders. Salmonella testing. Introduction to random sample test. Performance indices for breeders. Economics of breeder farms.

Suggested Readings

1. Abdallah, N.B. 2018. *Poultry: Anatomy, Breeding and Genetics*. Delve Publishing, Oakville, Canada. 235p.
2. Aengwanich, W., Sanchez, S. and Koppel, K. 2016. *Encyclopaedia of Development and Scopes of Successful Poultry Production and Disease Management*. Koros Press Limited, United Kingdom. 331p.
3. Gopaiah, K.V. 2017. *Broiler Breeder Production*. Random Publications, New Delhi, India. 302.
4. Sapcota, D., Narahari, D. and Mahanta, J.D. 2018. *Avian (Poultry) Production*. 2nd ed. New India Publishing Agency, New Delhi, India. 361p.
5. Singh, R.K. and Vyas, M.K. *Breeder Management Guide*. Hind Publications, Hyderabad, India.
6. Tsymbal, E.l. 2018. *Poultry Breeding and Genetics*. Intelliz Press LLC, New York, U.S.A. 315p.
7. Vyas, M.K., Purohit, S. and Kumar, R. 2019. *Management of Parents Stock*. Hind Publications, Hyderabad, India. 237p.
8. Select articles from journals and other sources.

AVN 211 - Feed Mill Management and Processing Technology 2 (1+1)

Objectives

- To acquaint knowledge on purchase of quality feed ingredients, proper handling, storage and processing
- To analyse physical and chemical properties of feed ingredients and end products

Theory:

Unit I

Layout and design of feed mill. Principles of material handling, silo grains/feed stuffs, purchase of raw materials, sampling methods, handling and storage method, batch weighing, grinding and mixing. Detection of infested grains. Mycotoxin in feed ingredients.

Unit II

Pelleting and other processing operations - Crumbling, flaking, popping, extrusion. Processing of oil seeds, pelleting technology, particle-size reduction technology, feed milling equipment. Rodent control. Role of computer in modern feed mill operations. Handling, labelling, storage and delivery of finished products.

Unit III

Quality control. National and international regulations pertaining to feed manufacturers - GMP and HACCP and other protocols. Biosecurity in feed mills.

Practical:

Layout and design of feed mill. Feed mill operations. Maintenance and safety of feed mill. Disintegrators, grinders, pulverisers, extruders, feed mixers, bucket elevators, various conveyer systems and pelleting machines. Physical and chemical evaluation of feed and ingredients. Floatation techniques, spot tests for minerals, quick chemical tests for minerals and adulterants in feed stuffs, quality test for protein meal. Economics of feed manufacturing unit. Visit to feed mill.

Suggested Readings

1. AAFCO. 2020. *Feed Inspector's Manual*. 8th ed. Association of American Feed Control Officials Inspection and Sampling Committee. 152p.
2. FAO and IFIF, 2010. *Good Practices for Feed Industry – Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding*. FAO Animal Production and Health Manual No. 9. Rome. 79p.
3. Garg, M.R, Sherasia, P.L. and Bhander, B.M. 2013. *Quality Control Manual for Cattle Feed Plants*. Animal Nutrition Group, National Dairy Development Board, Anand, Gujarat, India. 206p.
4. Jadhav, N.V. 2014. *Commercial Poultry Production & Hatchery Management*. Daya Publishing House, New Delhi. 90p.
5. Kundu, S.S., Mahanta, S.K., Singh, S. and Pathak, P.S. 2021. Animal Feed Technology. Satish Serial Publishing House, New Delhi. 343.

6. Missaglia, A.P., Bruno, A. and Battaglia, D. 2020. *Good practices for the feed sector: Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding*. FAO of United Nations, Rome. 113p.
7. Njidda, A.A., Jokthan, G.E., Abdu, S.B. and Njidda, A.A. *ANP 508 Feed Formulation (2 Units)*. National Open University of Nigeria. 124p.
8. Pandey, D. 2022. *Poultry Feed Technology*. 1st ed. Agrotech Press, 264p.
9. Rayhan, A. 2020. *Optimizing Feed Milling Processes for Enhanced Efficiency and Quality: A Comprehensive Technical Study*. Retrieved from https://www. researchgate.net/publication/372907868_Optimizing_Feed_Milling_Processes_for_ Enhanced_Efficiency_and_Quality_A_Comprehensive_Technical_Study.
10. Saxena, H.C. 2006. *Poultry Feed Technology Feed Formulation & Manufacturing*. 1st ed. International Book Distributing Company, Lucknow.
11. UNDP. 1980. Fish feed formulation, Material flow in feed manufacturing, Feed Milling process, In: *Fish Feed Technology*, UNDP, FAO of United Nations, Rome. Retrieved from http://www.fao.org/docrep/x5738e/ x5738e0j.htm#TopOfPage.
12. Vyas, M.K. 2008. *Glimpse of Indian Poultry Industry*. Hind Publications, Hyderabad, India.161p.
13. Vyas, M.K. and Purohit, S. 2019. *Good Production Practices for Poultry Feed Industry*. Hind Publication, Hyderabad, India. 148p.

PBG 211 - Basic Animal Husbandry Statistics **3(2+1)**

Objective

- To inculcate knowledge and skills on application statistical tools in poultry production and business management

Theory

Unit I

Basic concepts: variable, statistics, types and sources of data. Classification and tabulation of data, construction of frequency distribution tables. Graphical representation of data, simple, multiple, component and percentage bar diagram, pie diagram, histogram, frequency polygon and frequency curve.

Unit II

Average and measures of location: arithmetic mean, mode, median, geometric mean and harmonic mean for raw and grouped data. Dispersion: range, quartiles, standard deviation, variance, coefficient of variation and standard error of mean for raw and grouped data. Sampling: basic concepts, sampling vs. complete enumeration, parameter and statistic. Sampling methods: simple random sampling and stratified random sampling.

Unit III

Tests of significance: basic concepts. Test for equality of means: one sample and two (independent) sample; paired t-tests. Introduction to experimental designs (CRD, RBD and LSD).

Practical

Construction of frequency distribution table. Graphical representation of data: histogram, frequency polygon, frequency curve; bar chart-simple, multiple, component and percentage bar charts; pie chart. Mean median, mode and quadrille for raw and grouped data. Tests for equality of means: one sample and two (independent) sample; paired t-tests. Analysis of CRD, RBD and LSD.

Suggested Readings

1. Cochran, W.G. and Cox, G.M. 1957. *Experimental Designs*. 2nd ed. John Wiley.
2. Dean, A.M. and Voss, D. 1999. *Design and Analysis of Experiments*. Springer.
3. Federer, W.T. 1985. *Experimental Designs*. MacMillan.
4. Fisher, R.A. 1953. *Design and Analysis of Experiments*. Oliver & Boyd.
5. Kaps, M. and Lamberson, W.R. 2004. Biostatistics for Animal Science. CABI Publishing. 445p.
6. Kathiravan, G., Jebarani, W. and Thirunavukkarasu, M. 2002. *Biostatistics and Computer Applications*. Tamil Nadu Veterinary and Animal Sciences University, Chennai. 146p.
7. Morris, T.R. 1999. *Experimental Design and Analysis in Animal Sciences*. CAB International, Oxon, United Kingdom. 208p.
8. Nigam, A.K. and Gupta, V.K. 1979. *Handbook on Analysis of Agricultural Experiments*. IASRI Publ.
9. Pearce, S.C. 1983. *The Agricultural Field Experiment: A Statistical Examination of Theory and Practice*. John Wiley.
10. Petrie, A. and Watson, P. 2006. Statistics for Veterinary and Animal Science. 2nd ed. Blackwell Publishing. 298p.

MDC 211 - Fundamentals of Financial Accounting **3 (1+2)**

Objectives

- To equip the students with the skills of preparing financial statements.
- To enable the students to acquire knowledge about financial reporting standards and to understand process of financial accounting

Theory

Unit I

Need, definition, scope and functions of accounting. Evolution of accounting. Conceptual framework of accounting - principles, concepts, conventions, systems of accounting - single and double entry system, accounting standards.

Unit II

Accounting mechanism - Journalizing, ledger posting, balancing, trial balance. Bank reconciliation statement.

Unit III

Final accounts - Trading account, profit and loss account, manufacturing account, balance sheet.

Unit IV

Depreciation accounting - concept, objectives of providing depreciation, methods of providing depreciation.

Practical

Identification of financial transactions, journalizing, ledger posting and preparation of financial statements of poultry business firms. Preparation of Cash Book. Preparation of Bank Reconciliation Statement. Preparation of Depreciation Accounts. Single and double entry systems.

Suggested Readings

1. Chatfield, M. and Vangermeersch, R. 2009. *The History of Accounting: An International Encyclopedia*. 1st ed. Garland Science. 649p.
2. Financial Accounting Standards Board [FASB]. 2020. *Conceptual Framework for Financial Reportin*g. Financial Accounting Standards Board.
3. Gupta, S.P. 2014. *Financial accounting*. 6th ed. Sultan Chand & Sons.
4. Horngren, C.T., Sundem, G.L., and Elliott, J.A. 2006. *Introduction to Financial Accounting*. 9th ed. Pearson Education.
5. International Accounting Standards Board [IASB]. 2018. *Conceptual Framework for Financial Reporting*. International Accounting Standards Board.
6. Laux, C. and Leuz, C. 2009. The crisis of fair-value accounting: Making sense of the recent debate. *Accounting, Organizations and Society*. **34**(6–7): 826–834. https://doi.org/10.1016/ j.aos. 2009.06.003.
7. Singh, M.K. and Gupta, D. 2019. *Financial Accounting for Managers*. Vikas Publishing House.
8. Sharma, R. 2018. *Business Accounting: Theory and practice*. McGraw-Hill Education.

9. Weygandt, J.J., Kimmel, P.D. and Kieso, D.E. 2019. *Financial accounting: Tools for Business Decision Making*. 10th ed. Wiley.

AEC 211 - Physical Education, First Aid, Yoga Practices and Meditation 2(0+2)

Objectives

- To make the students aware about physical education, first aid and yoga practices
- To disseminate the knowledge and skill how to perform physical training, perfor first aid and increase stamina and general well being through yoga

Practical

Physical education. Training and coaching - Meaning and concept; Methods of training. Aerobic and anaerobic exercises. Calisthenics, weight training, circuit training, interval training, Fartlek training. Effects of exercise on muscular, respiratory, circulatory and digestive systems. Balanced diet and nutrition: Effects of diet on performance, physiological changes due to ageing and role of regular exercise on ageing process. Personality, its dimensions and types. Role of sports in personality development. Motivation and achievements in sports. Learning and theories of learning. Adolescent problems and its management. Posture, postural deformities, exercises for good posture.

Yoga: Introduction to asanas, panayama, meditation and yogic kriyas. Role of yoga in sports. Teaching of asanas – demonstration, practice, correction and practice.

Governance of sports in India. Important national sporting events. Awards in Sports. History, latest rules, measurements of playfield, specifications of equipment, skill, technique, style and coaching of major games (Cricket, Football, Table Tennis, Badminton, Volleyball, Basketball, Kabaddi and Kho-Kho) and Athletics.

Need and requirement of first aid. First aid equipment and upkeep. Handling and transport of injured traumatized persons. Emergency procedure for suffocation, demonstration of artificial respiration. Treatment of injuries (wounds and bleeding) - methods of dressing and bandages, first-aid procedure for injured bones. Handling unconsciousness. Treatment of burns and scalds. Emergency procedure for poisoning with special references to snakebite, injuries to muscles and joints, and treatments. Sports injuries and their treatments.

SEP 211 - Quail Production 3(0+3)

Objective

- Hands-On training on egg and meat type quail rearing

Practical

Brooding arrangement, types of brooding, types of grower management, types of layer management. Feeding and watering management. Beak trimming, deworming, vaccination, medication and other farm routines. Meat-type quail rearing.

Biosecurity measures, record keeping. Calculation of hen-day egg production, hen-housed egg production and other economics traits. Record keeping. Economics of quail rearing.

Suggested Readings

1. Ahmad, K. 2013. *Guidelines for Quail Farming*. Hind Publications, Hyderabad, India. 95p.
2. Kumarr, R. 2012. *Poultry Development and Alternative Poultry*. Hind Publications, Hyderabad, India. 235p.
3. Parkhurst, C.R. and Mountney, G.J. 1988. *Poultry Meat and Egg Production*. Chapman & Hall, New York, U.S.A. 294p.
4. Shanaway, M.M. 1994. *Quail Production Systems: A review.* FAO of the United Nations, Rome. 123p.

SEP 212 - Duck Production **3(0+3)**

Objective

- Hands-On training on duck production

Practical

Types of brooding, growing, laying and fattening management. Judging and grading. Vaccination, medication and transportation of ducklings and ducks. Feeding of egg- and meat-type ducks. Calculation of feed efficiency and other indices. Record keeping. Economics of duck rearing.

Suggested Readings

1. Cherry, P. and Morris, T.R. 2008. *Domestic Duck Production: Science and Practice*. CAB International, Oxfordshire, United Kingdom. 239p.
2. Hambrick, J. and Gammon, L.T. 2013. *Ducks: Habitat, Behaviour and Diseases*. Nova Science Publishers, Inc., New York, USA. 70p.
3. Jalaludeen, A., Churchil, R.R. and Baéza, E. 2022. *Duck Production and Management Strategies*. Springer Nature Singapore Pte Ltd., Singapore. 657p.
4. Kumarr, R. 2012. *Poultry Development and Alternative Poultry*. Hind Publications, Hyderabad, India. 235p.

5. Parkhurst, C.R. and Mountney, G.J. 1988. *Poultry Meat and Egg Production*. Chapman & Hall, New York, U.S.A. 294p.

SEP 213 - Turkey Production **3(0+3)**

Objective

- Hands-On training on turkey production

Practical

Types of brooding, growing, laying and fattening management. Judging and grading. Vaccination, medication and transportation of turkeys. Feeding of egg- and meat-type turkeys. Calculation of feed efficiency and other indices. Record keeping. Economics of turkey rearing.

Suggested Readings

1. Ahmad, K. 2017. *Guidelines for Turkey Farming*. Hind Publications, Hyderabad, India.
2. Kadam, M., Jaywant, R.J. and Kolluri, G. 2019. *Scientific Poultry Practices*. Hind Publications, Hyderabad, India. 404p.
3. Kumarr, R. 2012. *Poultry Development and Alternative Poultry*. Hind Publications, Hyderabad, India. 235p.
4. Panda, B. and Mohapatra, S.C. 1989, *Poultry Production*. 1st ed. Indian Council of Agricultural Research, New Delhi, 190p.
5. Thyagarajan, D. and Ashok, A. 2012. *Scientific Turkey Farming*. Satish Serial Publishing House, New Delhi, India. 225p.
6. Select articles from journals and other sources.

SEMESTER – IV

PPM 221 - Pet Bird Management **3(2+1)**

Objective

- To give knowledge on management of several species of ornamental pet birds

Theory

Unit I

Common pet bird's species and characteristics of pet birds. Basic anatomy and physiology. Pet bird housing and environment. Grooming of pet birds.

Unit II

Pet bird behaviour. Pet bird welfare. Environmental enrichment. Incubation and hand-raising. Sexing of pet birds. Marketing of pet birds. Rules and regulations in rearing, import and export of pet birds.

Practical

Design and layout of aviaries. Structure of different body systems. Feeding and watering. Grooming equipment. Different identification methods. Incubation and hand-raising. Equipment for environmental enrichment. Visit to aviaries.

Suggested Readings

1. Alderton, D. 2016. *A Complete Practical Guide to Caged & Aviary Birds: How to Keep Pet Birds, with Expert Advice on Buying, Housing, Feeding, Handling, Breeding and Exhibiting*. Southwater Publications. 256p.
2. Arent, L.R. 2018. *Raptors in Captivity: Guidelines for Care and Management*. Reprint ed. Hancock House Publishers Ltd., Canada. 304p.
3. Bays, T.B. Lightfoot, T. and Mayer, J. 2006. *Exotic Pet Behavior: Birds, Reptiles, and Small Mammals*. Elsevier.
4. Chitty, J. and Lierz, M. 2008. *BSAVA Manual of Raptors, Pigeons and Passerine Birds*. 1st ed. British Small Animal Veterinary Association, CBS Publishers. 352p.
5. Digney, P. 1998. *A Guide to Incubation and Handraising Parrots*. ABK Publications. 104p.
6. Harcourt-Brown, N. and Chitty, J. 2005. *BSAVA Manual of Psittacine Birds*. 2nd ed. British Small Animal Veterinary Association, CBS Publishers. 320p.
7. Jordan, R. 2003. *Guide to Macaws as Pet and Aviary Birds*. Birdkeeper Pty. Ltd. 135p,
8. Luescher, A. 2006. *Manual of Parrot Behavior*. 1st ed. Wiley-Blackwell Publishing. 352p.
9. Mayer J and Donnelly TM. 2012. *Clinical Veterinary Advisor: Birds and Exotic Pets*. Elsevier.
10. McMicheal, J.C. 2010. *Caiques: Their Care, Breeding and Some Natural History*. Avian Publications. 136p.
11. Moustaki, N. 2021. *Finches for dummies*. 2nd ed. John Wiley & Sons Inc. 160p.
12. Moustaki, N. 2021. *Parakeets for dummies*. 2nd ed. John Wiley & Sons Inc.
13. Moustaki, N. 2021. *Parrots for dummies*. 2nd ed. John Wiley & Sons Inc.
14. Muller, M.G. 2010. *Practical Handbook of Falcon Husbandry and Medicine*. 1st ed. Nova Science Publishers Inc. 403p.
15. Pellham, K.H. 2015. *Cockatiel Care: The Essential Guide to Ownership, Care, & Training for Your Pet*. Amazon Digital Services. 126p.
16. Speer, B.L., Thornton, K.C. and Spadafori, G. 2020. *Birds for du*mmies. 2nd ed. John Wiley & Sons Inc.
17. Verhoef, E. 1999. *The Complete Encyclopedia of Cage & Aviary Birds*. Rebo Books.

PBG 221 - Introduction to Chick Sexing and Grading 2(1+1)

Objectives

- To impart training on vent method of sexing chicks at day-old age
- To impart training on autosexing using sex-linked genes

Theory

Unit I

Introduction to Chick Sexing School. History of Chick Sexing. Definitions of common terms. Preparation and maintenance of work area. Types of chick sexing – Vent sexing, autosexing using sex-linked genes, machine sexing, in-ovo sexing. Process of vent sexing - Posture of chick sexer, adjustment of the height of lamp and table, chick sexing process, correction of the method of eversion. Vent sexing machine using artificial intelligence (AI).

Unit II

Chick quality and grading. Elementary embryology.

Practical

Practice of chick sexing. Posture of chick sexer. How to hold the chick, squeeze feaces, evert the vent, sex the chicks and put chicks in the boxes properly. Practice of chick sexing on male chicks. Autosexing using sex-linked genes. Machine sexing. Chick grading standards.

Suggested Readings

1. Martin, R.D. 1994. *The Specialist Chick Sexer*. Bernal Publishing. 279p.
2. NSDC. *Chick Sexing and Grading Technician – Model Curriculum*. National Skill Development Corporation, Agriculture Skill Council of India, Gurgaon, Haryana, India. 35p.
3. Select articles from journals and other sources.

PPT 221 - Poultry Processing and Products Technology 3(2+1)

Objective

- To give introduction to egg and meat processing and further processing

Theory

Unit I

Egg structure, physical and chemical composition, internal and external quality, preservation and grading. Packaging and Marketing of Products. Table egg production for export marketing system. Block chain technology in poultry product safety and traceability

Unit II

Types of killing the birds. Meat composition and nutritive value. Poultry meat as a source of protein, vitamins, minerals and fatty acids. Transportation of live birds. Slaughter house operations: Primary and secondary processing. Poultry meat inspection and grading. Preparation of ready-to-cook and ready-to-eat chicken, cut-up parts, deboning. Co-products and by-products. Preservation, grading and value addition of product. Poultry processing and animal welfare. Organic standards of poultry meat.

Unit III

Packaging and marketing of products. Poultry meat versus red meat. Meat hygiene: HACCP - Codex regulations. National Meat and Poultry Processing Board (NMPPB)-ISO 22000 - Good hygiene practices - Good manufacturing practices. Spoilage bacteria associated with live bird, plant and meat.

Practical

Structure of egg, egg quality analysis and preservation. Preparation of products. Visit to egg powder plant. Processing plant equipment. Slaughter of live birds, cut-up parts, product preparation. Visit to meat plant. Practical aspects of Kosher, Modified Kosher and Halal laws in Poultry processing.

Suggested Readings

1. Barbut, S. 2005. *Poultry Products Processing: An Industry Guide*. CRC Press, Washington, USA. 548p.
2. Entrepreneurship Development Cell [EDC]. 2000. *Meat and Meat Products*. 1st ed. Tamil Nadu Veterinary and Animal Sciences University. 172p.
3. Mahajan, N. 2014. *Preservation of Meat and Poultry Products*. Random Publications, New Delhi, India. 320p.
4. Marwaha, K. 2012. *Meat Hygiene*. Gene-tech Books, New Delhi, India. 270p.
5. Mead, G.C. 2005. *Food safety control in poultry industry*. Woodhead Publishing Limited, Cambridge, England. 561p.
6. Narahari, D., Sundararasu, V. and Ahmed, M. 2005. *Food Safety and Quality Control of Poultry Products*. Tamil Nadu Veterinary and Animal Sciences University, Chennai, India. 143p.
7. Owens, C.M., Alvarado, C.Z. and Sams, A.R. 2010. *Poultry Meat Processing*. 2nd ed. CRC Press, Taylor & Francis Group. 441p.

8. Panda, B. and Mohapatra, S.C. 1989, *Poultry Production*. 1st ed. Indian Council of Agricultural Research, New Delhi, 190p.
9. Panda, H. 2013. *Technology of Chicken Meat and Poultry Products*. Engineers India Research Institute, New Delhi, India. 436p.
10. Pearson, A.M. and Dutson, T.R. 1995. *HACCP in Meat, Poultry and Fish Processing*. Chapman & Hall, New York, USA. 393p.
11. Tiwari, S.P. and Dinani, O.P. 2020. *Recent Trends in Poultry Production*. International Books, Periodical Supply Service, New Delhi, India. 439p.
12. Verma, R.P. 2017. *Technology of Chicken Meat and Poultry Products*. Random Publications, New Delhi, India. 320p.

ADM 221 - Flock Health **3(2+1)**

Objectives

- To study about common diseases and disorders of poultry, their diagnosis, vaccination, prevention and treatment
- To study about control of emerging poultry diseases of zoonotic importance, disease diagnostic techniques

Theory

Unit I

Bacterial, viral, protozoan and parasitic diseases of poultry. Important nutritional deficiency diseases. Emerging and re-emerging diseases.

Unit II

Vaccination schedule for commercial layers and broilers. Vaccination principles: handling of vaccine, types of vaccine, methods, schedule, pre and post vaccination care, vaccination failure, quality control.

Unit III

Medication - Types of administration, general principles and precautions with emphasis on administering medication through water and feed.

Unit IV

Immunity. Control of vertically transmitted and hatchery borne diseases. Disease control strategy in poultry farming. Metabolic disorders in poultry. Mycotoxins and their control. Differential diagnosis of various diseases. Ectoparasitic control. Medication procedures. Common medicines, tonics and dose calculation.

Practical

Clinical examination of live birds. Post mortem examination. Culture and sensitivity. Introduction to molecular diagnostic techniques. Use of rapid disease diagnosis kits. Estimation of serum antibody titre level. Diagnosis of parasitic infection in birds. Deworming and vaccination protocols of different species of poultry. Common medicines and tonics used for poultry, its administration and dosage.

Suggested readings

1. FAO. 2013. *Poultry Development Review*. Food and Agriculture Organization of the United Nations, Rome. 120p.
2. Hambidge, G. 2013. *Diseases and Parasites of Poultry*. Biotech Books, New Delhi, India. 267p.
3. Joshi, H, Vyas, M.K. and Purohit, S. 2023. *Vaccination in Poultry*. 2nd ed. Hind Publications, Hyderabad, India. 160p.
4. Kadam, M., Jaywant, R.J. and Kolluri, G. 2019. *Scientific Poultry Practices*. Hind Publications, Hyderabad, India. 404p.Lewis, G.D. 2019. *Diseases of Poultry*. Oxford Book Company, Jaipur, India. 262p.
5. Masferrer, M.N. and Pascual, R.D. 2019. *Atlas of Avian Necropsy: Macroscopic Diagnosis Sampling*. Updated ed. Servet.
6. Mathur, O.P. 2017. *Poultry Metabolic Disorders and Mycotoxins*. Random Publications, New Delhi. 294p.
7. Mohiuddin, S.M. 2007. *Moulds and Mycotoxins in Poultry Diseases*. International Book Distributing Co., Lucknow, U.P. India. 284p.
8. Mondal, M. 2015. *Poultry Disease*. 1st ed. Narendra Publishing House, New Delhi, India. 259p.
9. Pandit, S.V. and Deshmukh, V.V. 2019. *Infectious Diseases of Poultry*. International Books & Periodical Supply Service, New Delhi, India. 200p.
10. Pattison, M., McMullin, P., Bradbury, J.M. and Alexander, D. 2008. *Poultry Diseases*. 6th ed. Elsevier.
11. Perez, Q. *2012*. *Diseases Control Strategy in Poultry Farming*. Koros Press Limited, Birmingham, United Kingdom. 256p.
12. Singh, R.K. 2016. *Postmortem Techniques & Diseases of Poultry*. Hind Publications, Hyderabad, India. 148p.
13. Thyagarajan, D. 2011. *Diseases of Poultry*. Satish Serial Publishing House.
14. Vegad, J.L. 2015. *Poultry Diseases Farmers. A Guide for Farmers and Poultry Professionals*. International Book Distributing Co.
15. Vyas, M.K. 2008. *Glimpse of Indian Poultry Industry*. Hind Publications, Hyderabad, India.161p.
16. Select articles from journals and other sources.

ADM 222 - Biosecurity and Waste Management 2(1+1)

Objectives

- To study about advantage of biosecurity measures in bird and human health
- To provide knowledge on waste disposal

Theory

Unit I

Location and design of farms to promote biosecurity. General farm hygiene - sanitation procedures, quarantine, Water sanitation - sanitisers. Transmission of avian pathogens. Measures to prevent disease outbreak - Fly, rodent, ecto- and endo-parasite control.

Unit II

Disinfection: Types of disinfectants, mode of action, recommended procedure, precaution and handling. Biosecurity - Proactive measures to minimize entry of infections. Farm premises - farm fencing, disinfectant pits, personnel management and restriction of movement. Locational, structural and operational biosecurity in poultry farms. Vaccination programmes. Breeder farm biosecurity to prevent vertically transmitted disease. Specific pathogen free (SPF) egg production.

Unit III

Poultry production and greenhouse gas emission: commercial broiler, layer, backyard poultry. Various types of wastes generated by poultry industry. Composition of poultry manure. Manure and waste disposal. Potential for poultry litter used as fertilizers. Recycling of poultry manure for livestock feeding, bio-gas and power generation. Organic manure. Composting and rendering the hatchery and slaughter house wastes. Dead bird disposal - disposal in diseases of zoonotic importance. Impact of wastes on environmental pollution.

Practical

Water quality standards and sanitation. Fumigation, vaccination, medication and disinfection procedures. Disinfectants and sanitisers used in poultry farms, its administration and dosage - dose calculation. Use of rapid disease diagnosis kits. Estimation of serum antibody titre levels. Monitoring bacterial load in sheds.

Design and layout of biogas plant, rendering plant, ensiling, composting. Different disposal methods.

Maintaining HACCP standards in poultry farms - development in the EXIM policies for flock health. Concept of compartmentalization and zoning as per terrestrial code. Geographical information system (GIS) in disease control. Various methods of manure and waste disposal.

Recycling of poultry manure. Composting and rendering of hatchery and slaughter house wastes.

Suggested Readings

1. Collins, E. 1999. *Poultry Waste Management Handbook*. NARES Series 132. Natural Resources.
2. FAO. 2013. *Poultry Development Review*. Food and Agriculture Organization of the United Nations, Rome. 120p.
3. Kadam, M., Jaywant, R.J. and Kolluri, G. 2019. *Scientific Poultry Practices*. Hind Publications, Hyderabad, India. 404p.
4. Kumar, M. 2011. *Waste Disposal Systems in Slaughterhouses Suitable for Developing Countries*. Days Publishing House, New Delhi. 203p.
5. Kumar, S. and Joshi, H. 2016. *Biosecurity in Poultry*. Hind Publications, Hyderabad, India. 175p.
6. MacLeod, M., Gerber, P., Mottet, A., Tempio, G., Falcucci, A., Opio, C., Vellinga, T., Henderson, B. and Steinfeld, H. 2013. *Greenhouse gas emissions from pig and chicken supply chains – A global life cycle assessment*. Food and Agriculture Organization of the United Nations, Rome. 171p.
7. Overcash, M.R., Humenik, F.J. and Miner, R.J. 1983. *Livestock Waste Management*. CRS Press.
8. Shane, S.M., Halvorson, D., Hill, D., Villegas, P. and Wages, D. 1995. *Biosecurity in the Poultry Industry*. International Book Distributing Co., Lucknow, India. 120p.
9. Vyas, M.K. 2019. *Hand book of Integration in Poultry*. Hind Publications, Hyderabad.

PBE 221 - Production and Operations Management **3 (2+1)**

Objectives

- To provide a comprehensive understanding of the role of operations management in businesses and its importance in the efficient use of resources.
- To introduce students to the various aspects of operations management, including production planning, control, and important technologies

Theory

Unit I

Operations management - An overview, problems and perspectives, planning and policy, implementation.

Unit II

Facilities planning - Product selection, process selection, facilities location, facilities layout. Capacity planning - work design, job design. Operations planning and control - planning and control for mass production, planning and control for batch production, planning and control for job shop production, planning and control of projects.

Unit III

Maintenance management - Value engineering and quality control. Introduction to re-engineering - Materials Management, purchase system and procedure, inventory management, stores management, standardization, codification and variety reduction, waste management. Inventory control - Decisions, ABC analysis, EOQ, safety stock. Inventory policies, computerization. Processing - Materials handling, system, loading, unloading, handling machinery, storage, documentation.

Unit IV

Warehousing - types, location, design. Transportation - types, importance. Organization and planning - strategic planning. Ethical issues in production and operations management

Practical

Demand forecasting for operations. Case studies of product and service designs. Work and job designs. Economic evaluation of capacity plans. Case studies of plant and facilities location. Case analysis of planning and control for mass production, batch production, job production and projects. Exercises in material requirements planning, ABC analysis, inventory replenishment systems. Audit of TQM practices of poultry units.

Suggested Readings

1. Chase, R.B., Jacobs, F.R. and Aquilano, N.J. 2006. *Operations Management for Competitive Advantage*. 11th ed. McGraw-Hill/Irwin.
2. Heizer, J., Render, B. and Munson, C. 2020. *Operations Management: Sustainability and Supply Chain Management*. 13thed. Pearson.
3. Juran, J.M. and Godfrey, A B. (1999). *Juran's Quality Handbook*. 5th ed. McGraw-Hill.
4. Krajewski, L.J., Ritzman, L.P. and Malhotra, M.K. 2013. *Operations Management: Processes and Supply Chains*. 10th ed. Pearson Education.
5. Miles, L.D. 2001. *Techniques of Value Analysis and Engineering*. 3rd ed. McGraw-Hill.
6. Mobley, R.K. 2002. *An Introduction to Predictive Maintenance*. 2nd ed. Elsevier.
7. Slack, N., Brandon-Jones, A. and Burgess, N. 2019. *Operations Management*. 9th ed. Pearson.
8. Stevenson, W.J. 2018. *Operations Management*. 13th ed. McGraw-Hill Education.

PBE 222 - Business Management and Ethics 2(2+0)

Objectives

- To learn the fundamentals of management including planning, organizing, leading and controlling, and how these functions are applied in different sectors
- To analyse organizational structures, decision-making processes, and the relationship between planning, control and communication in achieving organizational goals.

Theory

Unit I

Management - meaning and nature. Management process. Management as a profession. Planning - definition and nature, steps in planning process, techniques of planning and types of plans. Strategy formulation - types of strategies. Decision-making - classification of decisions, steps in decision-making process, models of decision-making.

Unit II

Organizing function - concept and process, span of management, delegation of authority, centralization and decentralization, line and staff authority. Concept of management hierarchy. Departmentalization. Various organizational structures.

Unit III

Controlling - meaning, process of control, relationship between planning and control, role of communication in control, operational and management controls, requirements of an effective control system, principles of control.

Unit IV

Business ethics - meaning and scope of business ethics, types of business ethics, factors influencing business ethics, arguments for and against business ethics.

Suggested Readings

1. Drucker, P.F. 2008. *Management: Tasks, responsibilities, practices*. Harper Collins Publishers.
2. Harvard Business Review. (n.d.). *Management articles and case studies*. Retrieved from https://hbr.org/
3. McGrath, E.H .2011. *Basic Managerial Skills for All.* 9th ed. Prentice Hall India Learning Private Ltd.
4. Mullins, L.J. 2016. *Management and organizational behaviour*. 10th ed. Pearson Education.
5. Robbins, S.P. and Coulter, M. 2021. *Management*.14th ed. Pearson Education.
6. Weihrich, H., Koontz, H. and Mann, R.S. 2014. *Management: A global perspective*. 14th ed. McGraw-Hill Inc., New York, U.S.A.

AEC 221 - Communication Skills **2 (1+1)**

Objectives

- To acquire competence in oral, written and non-verbal communication
- To develop strong personal and professional communication
- To demonstrate positive group communication

Theory

Unit I

Basic Communication Skills: Listening, speaking, reading and writing skills; Precis writing/ Abstracting/Summarizing; Style of technical communication; Curriculum vitae/resume writing; Innovative methods to enhance vocabulary, analogy questions.

Unit II

Critical Reasoning and Thinking. Introduction to Critical Thinking. Benefits and barriers to critical thinking. Critical thinking in academic contexts. Reasoning and Arguments. Deductive and inductive arguments. Identification of fallacies. Inferential comprehension. Academic Writing Standards. Critical thinking in academic writing.

Unit II

Structural and Functional Grammar: Sentence structure, modifiers, connecting words and verbals; Phrases and clauses; Case: subjective case, possessive case, objective case; reported speech. Writing effective sentences; Basic sentence faults.

Advanced Grammar: Prefixes and Suffixes**.** Relative Pronouns and Passives**.**

Writing Mechanics: Punctuation rules**.** Abbreviations.

Practical

Listening and note taking; Writing skills: precis writing, summarizing and abstracting; Reading and comprehension (written and oral) of general and technical articles; Micro-presentations and Impromptu Presentations: Feedback on presentations; Stage manners: grooming, body language, voice modulation, speed; Group discussions; Public speaking exercises; Vocabulary building exercises; Interview Techniques; Organization of events.

Suggested readings

1. Allport, G.W. 1937. *Personality: A Psychological Interpretation*. Holt, New York.
2. Michele, B. and Brandreth, G. 1994. *How to Interview and be Interviewed*. Sheldon Press, London.

3. Dale, C. 1997, *The Quick and Easy Way to Effective Speaking*. Pocket Books, New York.
4. Francis Peter, S.J. 2012. *Soft Skills and Professional Communication*. Tata McGraw Hill, New Delhi.
5. Kumar, S. and Lata, P. 2015. *Communication Skills*.2nd ed. Oxford University Press.
6. Neuliep, J.W. 2003. *Intercultural Communication: A Contextual Approach*. Houghton Mifflin Co, Boston.
7. Pease, A. 1998. *Body Language*. Sudha Publications, Delhi.
8. Raman, M. and Singh, P. 2000. *Business Communication*. Oxford University Press.
9. Seely, J. 2013. *Oxford Guide to Effective Writing and Speaking*. Oxford University Press.
10. Thomson, A.J. and Martinet, A.V. 1977. *A Practical English Grammar*. Oxford University Press.

SEMESTER- V

PPM 311 - Automation in Poultry Production 2(1+1)

Objective

To acquaint students on different types of automation in poultry industry

Theory

Unit I

Concept of automation in poultry industry and its' advantages.

Unit II

Applications of automation in poultry farms - Automatic climate control systems, automatic feeders and waterers, automatic egg and manure collection system etc.

Unit III

Automation in feed mill units. Automation in hatchery.

Unit IV

Automation in egg and meat processing plant.

Practical

Automation - trolley type feeders, automation of waterers, egg and manure collection system. Different automatic ventilation and cooling models. Automatic chick handling, vaccination and packaging systems in hatchery. Automation of feed mill equipment. Automatic processing and packaging of eggs and meat. Visit to environmentally controlled houses, commercial feed mills, egg and meat processing plants.

Suggested Readings

1. Barbut, S. 2015. Chapter 1: Automation. *The Science of Poultry and Meat Processing*. University of Gulph.
2. Inocenti, E. 2024. *Poultry farm automation using PLC*. Our Knowledge Publishing.
3. Kadam, M., Jaywant, R.J. and Kolluri, G. 2019. *Scientific Poultry Practices*. Hind Publications, Hyderabad, India. 404p.
4. Singh, R. 2016. *Management of Environmental controlled Houses in Poultry*. Hind Publications, Hyderabad. 104p.
5. Symeon, K.G. and Dotas, V. 2024. *Recent Advances in Poultry Management*. MDPI. 354p.
6. Zhao, Y., Cambra-Lopez, M., De Moura, D.J. and Zheng, W. 2022. *Precision Poultry Farming*. MDPI. 176p.
7. Select articles from journals and other sources.

AVN 311 - Pet Bird Nutrition **2(1+1)**

Objectives

- To acquire knowledge on pet food and its composition
- To impart knowledge on pet bird nutrition.

Theory

Unit I: Introduction. Pet bird nutrition. Pet bird, dietary classification - florivore, granivore, frugivore, omnivore, nectarivore.

Unit II: Feed ingredients- Seeds, fruits, vegetables, berries, weeds, insects and worms for pet birds. Protein, energy, vitamin, mineral supplements - calcium. Sprouted seed feeding. Fortified seed mixture.

Unit III: Table food for pet birds. Feeding of pet birds and feeding types. Balanced diet to different species of pet birds.

Unit IV: Handfeeding of orphaned chicks and baby chick feed formula. Weaning period of different species of pet bird. Common problems and their remedial measures in pet bird feeding. Misconceptions in pet bird feeding.

Practical

Proximate composition of different seeds, fruits, vegetables, berries, weeds, insects and worms. Feed formulation for different species of pet birds. Equipment for feeding and watering

Suggested Readings

1. Black, G.R. 2007. *Avian Nutrition*. Avian Publications. 324p.
2. Black, G.R. 2007. *Parrot Nutrition*. Avian Publications.
3. Burgmann, P. 1993. *Feeding Your Pet Bird*. Barron's Educational Series Inc., U.S. 182p.
4. Pathak, N. 2021. *Avian Nutrition: Poultry, Ratite and Tamed Birds*. CBS Publications. 294p.
5. Select articles from journals and other sources.

PBG 311 - Fundamentals of Poultry Breeding and Genetics 3(2+1)

Objectives

- To obtain knowledge on influence of different genes and their actions on production, reproduction and morphological changes in poultry
- To know about different types of selection and breeding of poultry

Theory

Unit I: Basic principles of genetics. Chomosomes and genes - Chromosome number in different species. Mendel's laws of inheritance related to poultry.

Unit II: Qualitative and quantitative traits in poultry breeding. Additive and Non-additive gene actions – Dominance, incomplete dominance, co-dominance, epistasis, cryptomere and complementary gene action.

Unit III: Sex limited, sex-influenced, sex-linked traits – Auto-sexing. Economic traits. Selection methods - Poultry breeding for meat and egg production.

Unit IV: Methods of mating. Systems of breeding. Common breeding programmes practiced in industry. Commercial hybrid broilers, layers and backyard hybrids available.

Practical

Estimation of qualitative and quantitative traits in poultry. Exercises on individual and family selection - Osborne index. Estimating heritability. Breeding programme for developing commercial hybrid layers and broilers. Breeding programmes for rural poultry. Semen collection, evaluation, dilution and insemination in chicken and turkey – Breeding records.

Suggested Readings

1. Crawford, R.D. 1990. *Poultry Breeding and Genetics*. Elsevier.
2. Falconer, D.S. 1997. *Introduction to Quantitative Genetics*. Benjamin Cummings.
3. Hutt, F.B. 1949. *Genetics of the Fowl*. McGraw-Hill
4. Muir, W.M and Aggrey, S.E. 2003. *Poultry Genetics, Breeding and Biotechnology*. CABI.

5. Prasad, J. 2017. *Poultry Production and Management*. 6th ed. Kalyani Publishers, Ludhiana, India. 460p.
6. Sharma, D. and Singh, H. 2013. *Guinea Fowl Genetics & Breeding*. Satish Serial Publishing House, New Delhi, India. 195p.
7. Singh, R.P. and Kumar, J. 1994. *Biometrical Methods in Poultry Breeding*. Kalyani Publications.

PBE 311 - Quantitative Methods for Business Management 3(2+1)

Objectives

- To learn the origin, meaning, scope, and limitations of statistics and its relationship with business and industry.
- To master data collection, classification and tabulation, and use diagrams and graphs to represent data clearly and understand measures of central tendency and dispersion.
- To learn statistical techniques to solve the problems related business and industry

Theory

Unit I

Quantitative techniques - Introduction, meaning, types of quantitative techniques.

Probability concepts - Mutually exclusive, exhaustive, independent, dependent event. Addition and multiplication theorems in probability. Probability distributions - Binomial, Poisson, Normal.

Unit II

Simple correlation and regression - Meaning, Karl Pearson's correlation, Rank correlation, computations, uses,

Unit III

Regression equations, prediction.

Unit IV

Consumer price index number. Time series analysis - Components of time series, definition, computation of trend. Computation of seasonal variation (Simple average method only).

Practical

Problems based on binomial, Poisson and Normal distributions. Correlation and regression calculation. Rank correlation coefficient. Computation of consumer price index. Computation of trend and computation of seasonal variation.

Suggested Readings

1. Chakravarty, A.K. 2015. *Business Statistics*. Excel Books.
2. Freund, J.E. and Perles, B.M. 2014. *Modern Elementary Statistics*. 12th ed. Pearson.
3. Gupta, S.P. 2014. *Statistical Methods*. 43rd ed. Sultan Chand & Sons.
4. Hillier, F.S. and Lieberman, G.J. 2014. *Introduction to Operations Research*. 10th ed. McGraw-Hill Education.
5. Kothari, C.R. 2018. *Research Methodology: Methods and Techniques*. 4th ed. New Age International.
6. Kruskal, W.H. and Wallis, W.A. 1952. *Use of ranks in one-criterion variance analysis*. *Journal of the American Statistical Association*. **47**(260): 583–621.
7. Miller, I.R. and Miller, M.L. 2014. *Probability and Statistics for Engineers*. 9th ed. Pearson Education.
8. Nagar, A.L. and Das, R.K. 2016. *Business Statistics: Theory and Application*. S. Chand Publishing.
9. Sundaram, S. 2016. *Business Statistics*. Himalaya Publishing House.
10. Taha, H.A. 2017. *Operations Research: An Introduction.* 10th ed. Pearson Education.
11. Walpole, R.E. Myers, R.H. and Ye, K. 2012. *Probability and Statistics for Engineers and Scientists*. 9th ed. Pearson.
12. Vohra, N.D. 2017. *Quantitative Techniques in Management*. 5th ed. McGraw-Hill Education.

PBE 312 - Financial Management **4(3+1)**

Objectives

- To understand the Basics of Financial Management.
- To evaluate Investment and Financing Decisions.
- Application of Financial Management Techniques

Theory

Unit I

Introduction to financial management - Nature and importance of the finance functions, objectives of financial management, functions of finance manager. Time value of money - Process of compounding, process of discounting, future value of annuity. Financial forecasting

- Need for financial forecasting, techniques of financial forecasting - cash flow forecast, proforma financial statements.

Unit II

Sources of long-term finance - Need for long term finance, types of capital, equity capital, preference capital, debenture capital, term loans, internal accruals, deferred credit. Capital investment decisions - Nature of investment decision, identification of potential investment opportunities, determinants, appraisal of investment decisions, methods of appraisal, payback period, average rate of return, net present value, internal rate of return, benefit-cost ratio, profitability index, capital rationing.

Unit III

Cost of capital - Concept, determinants of cost of capital, cost of different sources of finance - cost of debentures, cost of term loans, cost of preference capital, cost of equity capital, cost of retained earnings, weighted averages cost of capital.

Unit IV

Capital Structure - Importance of the capital structure decision, factors influencing capital structure, theories of capital structure, net income approach, net operating income approach, Miller and Modigliani approach. Leverage - Measures of leverage, operating leverage, financial leverage, combined/total leverage, computation, application utility and implications.

Unit V

Dividend policy - dividend decision, theories of dividend policy, traditional approach, Walter model, Gordon's dividend capitalisation model, Miller Modigliani model, rational expectation model.

Unit VI

Estimation of working capital requirements - Concept of working capital, factors affecting the composition of working capital, sources of short-term finance, criteria for evaluation of working capital management. Receivables management - purpose and cost of maintaining receivables, credit granting decisions, monitoring receivables. Cash management - liquidity, profitability trades off, need and objective of cash management, preparation of cash budget and its usefulness.

Practical

Compounding. Discounting-calculation of NPV, IRR, Profitability index, Payback period. Calculation of WACC. Testing of NI, NOI and MM models. Calculation of OL, FL and combined leverage. Testing of dividend models. Estimation of working capital.

Suggested Readings

1. Brealey, R.A., Myers, S.C. and Allen, F. 2017. *Principles of Corporate Finance*. 12th ed. McGraw-Hill Education.
2. Chandra, P. 2017. *Financial Management: Theory and Practice*. 10th ed. McGraw-Hill Education.
3. Khan, M.Y. and Jain, P.K. 2017. *Financial Management: Text, Problems and Cases*. 8th ed. Tata McGraw-Hill Education.
4. Ross, S.A., Westerfield, R. and Jaffe, J. 2016. *Corporate Finance*. 11th ed. McGraw-Hill Education.
5. Shim, J.K. and Siegel, J.G. 2008. *Financial Management for Non-Financial Managers*. 3rd ed. Barron's Educational Series.
6. Van Horne, J.C. and Wachowicz, J.M. 2013. *Fundamentals of Financial Management*. 13th ed. Pearson Education.

PBE 313 - Managerial Economics **3(2+1)**

Objectives

- To have an in depth understanding of economic concepts in business concerns
- To familiarize with the students the importance of economic approaches in managerial decision making

Theory

Unit I

Managerial economics - Importance, scope, micro economic issues in managerial decisions. Demand functions – Estimation of demand functions, demand forecasting, consumer survey, sales force estimate, Delphi method, trend equation method (linear, second degree, exponential), regression method.

Unit II

Elasticity - Price elasticity, income elasticity, cross elasticity, estimation of elasticity using differential calculus, applications.

Unit III

Production functions - Estimation of average cost, marginal cost and related concepts, empirical cost functions, applications. Pricing methods - Cost plus pricing, pricing of new products, skimming price and penetration pricing, odd pricing, psychological pricing, break even pricing etc.

Unit IV

Market structures - perfect competition, monopoly, monopolistic market, oligopoly, duopoly. Market equilibrium under perfect and imperfect market employing marginal curves - Simple illustrations.

Unit V

Break-even analysis - Concepts, graphical representation, estimation of breakeven point, applications.

Practical

Demand function for various poultry products. Demand estimation using linear and exponential functions. Estimation of price elasticity of consumables (food products). Estimation of cross elasticities, and classification into substitutes and complementary. Demand and output determination under various market structures. Calculation of AC, MC, Total Cost, AR, MR, etc. exercises in break-even analysis.

Suggested Readings

1. Akerlof, G.A. 1970. *The market for "lemons": Quality, uncertainty, and the market mechanism*. *Uncertainty in Economics*, **235**: 237-251.
2. Arrow, K.J. 1962. The economic implications of learning by doing. *The Review of Economic Studies*. 29(3): 155-173.
3. Damodaran. S. 2010. *Managerial Economics*. 2nd ed. Oxford University Press. 600p.
4. Dwivedi, D.N. 2015. *Managerial Economics*. 8th ed. Vikas Publishing.
5. Geetika, P.G. and Chowdhury, P.R. 2017. *Managerial Economics*. 3rd ed. McGraw Hill Education, 698p.
6. Hirshey, M. 2008. *Managerial Economics*
7. Hirschey, M. and Pappas, J.L. 1996. *Managerial Economics*. 8th ed. Fort Worth, TX: The Dryden Press.
8. Maheshwari, K.L. and Varshney, R.L. 2014. *Managerial Economics*. Sultan Chand & Sons, 982p.

PBE 314 - Human Resource Management **3(2+1)**

Objectives

- To study human resource management functions, including job analysis, recruitment, performance appraisal, compensation, and employee welfare.
- Application of these concepts through practical activities

Theory

Unit I

Human Resource Management (HRM) - meaning, definition, objectives, HRM environment. Job analysis - Job description, job specification, job design, job enrichment and job enlargement.

Unit II

Human resources planning. Recruitment Process - Selection Process. Human resource development strategies. Career planning. Performance appraisal. Compensation planning - transfer, promotion, termination, Grievance redressal mechanism, employee welfare.

Unit III

Change management - Definition, meaning, objectives ans importance of IR through Indian and global prospective. Workers organization - Registration, functions.

Unit IV

Employers' organisation - Role. Collective bargaining - Definition, importance to employers, employees and management. Worker's participation in management. Worker's welfare and education.

Practical

Role plays of negotiations. Collective bargaining. Case studies of workers participation in management. Compensation packages. Welfare schemes. Case studies performance appraisal systems. Familiarization with HR planning methods.

Suggested Readings

1. Armstrong, M. 2014. *Armstrong's Handbook of Human Resource Management Practice*. 13th ed. Kogan Page.
2. Nessler, G. 2020. *Human Resource Management*. 15th ed. Pearson Education.
3. Kaufman, B.E. 2010. *Theoretical Perspectives on Work and the Employment Relationship*. 3rd ed. Industrial Relations Research Association.
4. Mathis, R.L. and Jackson, J.H. 2011. *Human Resource Management*. 13th ed. Cengage Learning.

SEMESTER- VI

PPM 321 - Recent Concepts in Poultry Housing 2(1+1)

Objectives

- To flourish knowledge on latest developments in poultry housing

- To flourish knowledge on precision farming

Theory

Unit I

Introduction, Elevated platform open sided (EPOS) poultry house, Windowless insulated environmentally controlled (WIEC) house, Tunnel ventilated (TV) broiler house.

Unit II

Turnkey system, Rondeel or Roundel system. Enriched cages, Precision farming. Commercial free range system.

Unit III

Design considerations for large-scale poultry farming. Poultry housing structures from environmental requirements to biosecurity. Housing Vs. feeding systems.

Unit IV

Engineering design fundamentals and building operations insights, structural materials.

Practical

Construction standards of EPOS. Construction standards of WIEC. Turnkey system. Rondeel or Roundel system. Precision farming. Design considerations of large-scale poultry farming. Engineering design fundamentals and building operations insights. Visit to EPOS, WIEC and Turnkey farms.

Suggested Readings

1. Inocenti, E. 2024. *Poultry farm automation using PLC*. Our Knowledge Publishing.
2. Kamboh, A.A. 2020. *Poultry: An Advanced Learning*.
3. Sandilands, V. 2021. *Instant Insights: Poultry housing systems*. burleigh dodds Science Publishing Ltd, Cambridge, U.K.
4. Singh, R. 2016. *Management of Environmental controlled Houses in Poultry*. Hind Publications, Hyderabad. 104p.
5. Symeon, K.G. and Dotas, V. 2024. *Recent Advances in Poultry Management*. MDPI. 354p.
6. Zhao, Y., Cambra-Lopez, M., De Moura, D.J. and Zheng, W. 2022. *Precision Poultry Farming*. MDPI. 176p.
7. Verma, J. 2024. *Poultry Production & Management: Recent Trends*. New India Publishing Agency. 246p.
8. Select articles from journals and other sources.

PBG 321 - Climate Change Adaptation in Poultry Production 2(1+1)

Objectives

- To teach about the climatic factors affecting the poultry production
- To produce climate resilient breeds of poultry
- To manage the poultry under extreme climatic conditions by changing the micro-climate

Theory

Unit I

Definition of climate. Classification of climatic regions. Climatic factors. Assessment of climate.

Unit II

Study of climatic factors in relation to poultry production. Introduction of breeds into different climatic regions.

Unit III

Microclimate modification in poultry houses. Management of poultry in extremes climatic conditions

Unit IV

Agro-meteorology and weather forecasting for animal husbandry activities. Disaster Management.

Practical

Estimation of microclimatic conditions in poultry house - Measurement of Temperature, Relative humidity, Air velocity and Mean temperature of the surrounding. Measurement of intensity of light in poultry houses. Construction of climatographs and hythergraphs. Estimation of cooling power of atmosphere.

Suggested Readings

1. Daghir, N.J. 2008. *Poultry Production in Hot Climates*. 2nd ed. CAB International, Oxfordshire, United Kingdom. 387p.
2. Defra. 2005. *Heat Stress in Poultry: Solving the Problem*. Department for Environment, Food and Rural Affairs (DEFRA), London, United Kingdom. 24p.
3. Kibria, G., Haroon, A.K.Y. and Nugegoda, D. 2013. *Climate Change and Agricultural Food Production*. New India Publishing Agency, New Delhi, India. 287p.
4. Moudgal, R.P., Mohan, J. and Singh, R. 2000. *Poultry Production under Stress*. Division of Avian Physiology and Reproduction, Central Avian Research Institute, Izatnagar, India. 300p.
5. Rao, G.S.L.H.V., Varma, G.G. and Beena, V. 2017. *Livestock Meteorology*. New India Publishing Agency, New Delhi, India. 522p.
6. Sejian, V., Gaughan, J., Baumgard, L. and Prasad, C. 2015. *Climate Change Impact on Livestock: Adaptation and Mitigation*. Springer India.
7. Tiwari, S.P. and Dinani, O.P. 2020. *Recent Trends in Poultry Production*. International Books, Periodical Supply Service, New Delhi, India. 439p.

8. Vyas, M.K. 2019. *Hand book of Integration in Poultry*. Hind Publications, Hyderabad, India. 109p.

ADM 321 - Laboratory Techniques for Flock Health 2(0+2)

Objective

- To impart training on the importance of laboratory techniques and the procedure for sample collection

Practical

Importance of disease diagnosis. Laboratory safety and protocols. Common laboratory equipment and their uses. Techniques for sample collection, sample preservation and transportation, preparation of samples for laboratory analysis. Introduction to culturing techniques. Microbiological culture preparation and culturing - antibiotic sensitivity test. Serological tests – HA, HI, ELISA, agglutination tests etc.. Microscopical examination of blood and faecal samples - Slide preparation and staining.

Performing sample collection and carrying out various microbiological, pathological and parasitological tests. Assessment of water quality. Disposal of laboratory wastes. Cleaning and disinfection of equipment.

Suggested Readings

1. Baigent, S., Coward, V., Scott, R., Hansen, R., Ceeraz, V. and Barrow, P. 2021. Laboratory diagnosis of poultry diseases. In: *Poultry health: a guide for professionals*. pp. 297-313.
2. Barger, A.M. and MacNeill, A.L. 2015. *Clinical Pathology and Laboratory Techniques for Veterinary Technicians*. 1st ed. Wiley-Blackwell. 280p.
3. Chaturvedi, G.C., Singh, P. and Sing, N. *Laboratory Manual: Practical Veterinary Microbiology*. Department of Veterinary Microbiology, Mahatma Jyotiba Fule College of Veterinary & Animal Science, Chomu, Jaipur. 119p.
4. Das, G. and Kumar, S. 2021. *Laboratory Manual of Veterinary Parasitology (Part II)*. Jaya Publishing House, New Delhi.
5. Kumar, B. and Maharana, B.R. 2019. *Veterinary Parasitology: A Clinical Laboratory Manual*. 1st ed. Kalyani Publishers.
6. Malik, B.S. 2002. *A Laboratory Manual of Veterinary Microbiology: Part III Pathogenic Bacteriology & Mycology*. 4th ed. CBS Publishers and Distributors Pvt. Ltd. 258p.
7. Petersen, J. and McLaughlin, S. 2016. *Laboratory Exercises in Microbiology: Discovering the Unseen World Through Hands-On Investigation*. CUNY Academic Works, City University of New York. 184p.
8. Saif, Y.M. and Toro, H. 2017. *Diagnosis of Major Poultry Diseases*. Servet. 112p.

9. Singh, S.D., Singh, N., Sharma, G.D. and Kumawat, A. *Laboratory Manual: Veterinary Pathology*. Department of Veterinary Pathology, Mahatma Jyotiba Fule College of Veterinary & Animal Sciences, Chomu, Jaipur. 86p.
10. Temesgen, A.B. *Veterinary Clinical Pathology Laboratory Manual*. 1st ed. Lambert Academic Publishing. 44p.

PBE 321 - Marketing Management **3(2+1)**

Objectives

- To create conceptual clarity on various marketing aspects.
- To know about various markets and marketing strategies in order to achieve overall organizational objectives.

Theory

Unit I

Marketing concept. Customer orientation. Customer value - Exploration identification, creation, delivery and retention. Marketing Environment. Market structure. Market segmentation. Market targeting. Scenario planning. Formulation of marketing strategies.

Unit II

Product strategies - Product mix, production line, differentiation, branding, packaging, product life cycle, positioning, new product development.

Unit III

Pricing strategies. Promotion strategies - Advertising, print, electronic, social media. Virtual-Media planning. Sales promotion.

Unit IV

Sales force management distribution strategies, creating and managing dealer networks, direct marketing, retailing. Consumer behaviour analysis.

Practical

Product life cycle analysis of selected products. Brand building practices of selected organizations. Analyse consumer behaviour towards poultry products. Analyse the influence of marketing mix on buying decision. Preparation for marketing plans. Case studies of trade channels. Measuring the effectiveness of advertising. Preparation of advertisement copy. Market surveys to assess the marketing potential of poultry products. Behavioural studies of consumers and distribution channels.

Suggested Readings

1. Gandhi, J.C. 1985. *Marketing - A Managerial Introduction*. Tata McGraw-Hill, New Delhi.
2. Kotler, P. 2003. *Marketing Management*. 7th ed. Pearson Education, New Delhi.
3. Kotler, P. and Armstrong, G. 1987. *Marketing: An Introduction*. Prentice Hall International Editions.
4. Kotler, P. and Armstrong, G. 2008. *Principles of Marketing*. 9th ed. Prentice Hall, New Delhi.
5. Kotler, P. and Keller, K.L. 2003. *Marketing Management*. 12th ed. Pearson Education, New Delhi.
6. Ramaswamy, V.S. 2002. *Marketing Management*. MacMilan India, New Delhi.

PBE 322 - Supply Chain Management **3(2+1)**

Objectives

- To flourish knowledge about supply chain management.
- To study how logistics and supply chain management maximize customer value and increase organizational efficiency

Theory

Unit I

Supply chain - Supply chain orientation, supply chain management, definition and scope. SCM - A management philosophy, a set of activities, a set of management processes. Consequences of SCM - Customer value, customer satisfaction and differential advantage.

Unit II

Role of marketing in SCM - Influence of market concept, market orientation and relationship marketing on SCM. Sales force activities and behaviours in SCM - Co-operative behaviours, information sharing. Nurturing supply chain relationships - Sales person logistics expertise.

Unit III

R&D in SCM - Intrafirm R&D, interfirm R&D, supply chain R&D. Supply chain sales forecasting. Role of production in SCM - Intrafirm production, interfirm production, supply chain production. Role of purchasing in SCM - Changing role of purchasing, organisation, communication and IT.

Unit IV

Role of logistics in SCM - Order processing, inventory, transportation, warehousing and networks logistics strategy, capabilities and advantage. IT and SCM - Poultry environment, intrafirm IT, interfirm IT, supply chain IT. Financial issues in SCM - Trends in logistics cost, DuPont model, supply chain costing. Customer service in SCM - Definition of customer service, customer service as a performance outcome, customer responses. Inter-functional co-ordination in SCM - Concurrent management, nature of inter-functional co-ordination.

Unit V

Inter-corporate co-operation in SCM - Changing markets and SCM, nature of co-operation, outcomes of co-operation. Measuring performance in SCM - Conceptual model of measurement, problems with measurers.

Practical

Case studies of Sales force deployment. Link between R&D and SCM. Cases related logistics management. Route scheduling - Field visits to Quick Food Restaurants (QFR) and Integrated Processing Plants. Cases dealing with the role of IT in SCM and customer services.

Suggested Readings

1. Bowersox, D.J., Gloss, D.J. and Cooper, M.B. 2016. *Supply Chain Management*. McGraw Hill Education.
2. Chopra, S. and Meindl, P. 2016. *Supply Chain Management: Strategy, Planning and Operation*. 6th ed. Pearson.
3. Coyle, J.J., Bardi, E.J. and Longley, C.J. 2003. *The Management of Business Logistics: A Supply Chain Perspective*. 7th ed. Thomson Press. 707p.
4. Hugos, M. 2018. *Essentials of supply chain management*. 4th ed. Wiley Publications.
5. Shapiro, J.F. 2008. *Modeling The Supply Chain*. 2nd Revised ed. Brooks International. 674p.
6. Silver, E.A., Pyke, D.F. and Thomas, D.J. 2016. *Inventory and Production Management in Supply Chains*. 4th ed. CRC press.
7. Wisner, J., Tan, K. and Leong, G. 2018. *Principles of Supply Chain Management: A Balanced Approach*. South-Wester College Publishing. 576p.

PBE 323 - Accounting for Management **2(1+1)**

Objective

- To develop theoretical and practical knowledge about various accounting terms and techniques

Theory

Unit I

Definition, meaning, nature, objectives, scope, importance, advantages and limitations of management accounting. Distinction among financial, cost and management accounting systems.

Unit II

Financial statement analysis - meaning, nature, uses and limitations of financial statements. Financial statement analysis tools - ratio analysis, cash flow analysis, funds flow analysis.

Unit III

Cost management - definition and purpose of cost accounting, concept of cost, cost centre, cost unit, elements of cost, classification of cost, analysis of total cost, cost sheet. Absorption costing, marginal costing, difference between absorption costing and marginal costing. Cost-volume-profit analysis, break-even analysis.

Unit IV

Budgetary control - nature and scope, organization for budgetary control, preparation of various functional and master budgets, fixed vs. flexible budgeting.

Practical

Journalising. Preparation of cash book. Preparation of bank reconciliation statement. Preparation of final accounts. Preparation of depreciation accounts. Calculation and interpretation of ratios. Preparation of cash flow and funds flow statements. Preparation of cost sheet. Break-even chart. Profit graph. Preparation of flexible budget.

Suggested Readings

Gupta, S.P. and Gupta, K.L. *Management and Cost Accounting*. Sahitya Bhavan Publication.

Gupta, S.K. and Sharma, R.K. *Management Accounting*. Kalyani Publisher.

Pandey, I.M. *Financial Management*. Vikas Publishing House Pvt. Ltd.

PBE 324 - Business Regulations and Legal Aspects of Poultry Business 2(2+0)

Objectives

- To have an awareness about various regulatory factors affecting business
- To know various legal factors affecting poultry business

Theory

Unit I

Laws relating to poultry enterprises. Legal formalities to start a new venture in poultry business. Clearance from statutory bodies. Compliance to mandatory and voluntary standards in poultry farms and poultry processing units. Mandatory certificates and procedure. Panchayath and Government of India acts and rules, validity. Taxation to poultry enterprises - Farms, birds, hatcheries, at point of processing and sales.

Unit II

Indian Contract Act, 1872. Sale of Goods Act, 1930 and later amendments.

Unit III

Essential Commodities Act. Consumer Protection Act. RTI Act. Labour laws. Kerala Value Added Tax Rules, 2005.

Unit IV

Food Safety and Standards Act, 2006. The Central Goods and Service Tax Act 2017. The Central Sales Tax Act 1956. Income Tax in poultry business.

Suggested Readings

1. Atrey, A. 2018. *Law of Witness - Role of Witnesses in Criminal Justice System: A Need to Reform*. New ed. Kamal Publishers. 493p.
2. Braithwarte, J. and Drahos. P. 2000. *Global Business Regulations*. Cambridge University Press.
3. Davis, K. and Frederick, W.C. 1984. *Business and Society: Management, Public Policy, and Ethics (Mcgraw Hill Series in Management)*. 5th ed. McGraw-Hill Higher Education. 586p.
4. Pathak, A. 2010. *Legal Aspects of Business*. 4th ed. Tata McGraw-Hill Education.
5. Maheswari, S.N. and Maheswari, S.K. 2018. *Business Law*. Himalaya Publishing House, Mumbai. 238p.
6. Pailwar, V.K. 2010. *Economic Environment of Business*. PHI Learning. 464p.
7. Sulphey, M.M. and Basheer, A. 2011. *Laws for Business*. PHI Learning.
8. Varshney, G.K. *Business Regulatory Framework*. Revised ed. Sahithya Bhavan Publications. 346p.

PBE 325 - International Trade Agreements and Poultry Business 2(2+0)

Objectives

- To learn the basics of international trade, including its principles, theories, and the difference between internal and international trade
- To study the theories of trade such as absolute and comparative advantage, and understand the concept of gains from trade and trade barriers
- To understand the role of trade blocks and organizations, like WTO and GATT, and their impact on global trade, especially in developing countries
- To apply practical skills by analysing trade policies, poultry exports, and the impact of WTO regulations on Indian trade

Theory

Unit I

Principles of trading, trade, distinction between internal and international trade, need and purpose of international trade, positive and negative arguments on international trade, free trade vs. protection.

Unit II

Theories of international trade - classical theory, absolute advantage theory of Adam Smith, comparative advantage model of Ricardo, refinement of international trade theories - JS Mill, Cairnes and Bastable, Taussig's restatement of classical theory. Modern theories of international trade - Heberler, opportunity cost theory, factor endowment theory, Hecksher-Ohlin theorem, modern version of the theory of comparative costs, comparisons of modern theory and classical theory, criticisms of the modern theory. Extension of Hecksher-Ohlin model, Posner's technological gap model, Vernon's product cycle model. Gains from international trade - Determinants of gains, terms of trade (net barter, gross barter), different concepts, factors affecting terms of trade, terms of trade of developing countries, concepts of nominal protection of effective protection coefficients.

Unit III

Trade barriers - Tariff barriers and non-tariff barriers, impact of tariff, nominal and effective tariffs, optimum tariff; extent and effects of NTB, different kinds of NTB. Quantitative restrictions - Quotas, types of import quotas, economic effects of quotas, merits and demerits of tariffs and quotas.

Unit IV

Emerging trends in trade in meat and meat products - Role of APEDA. Balance of payments and balance of trade - Concepts and importance, components of balance of payments, disequilibrium in the balance of payments, methods of correcting balance of payments disequilibrium, financing the balance of payments deficit.

Unit V

Trade blocks and trade organizations - EEC, NAFTA, ASEAN. Multilateral trade facilitating institutions - UNCTAD, GATT, WTO, Trade reforms under GATT, Uruguay round, WTA - components of WTA, TRIMS, TRIPS, GATS, AOA. Main components - FTA, export competition, market access, sanitary and phytosanitary requirements, withdrawal of quantitative restrictions and technical barriers to trade, IPR. Impact of WTO on Indian trade especially in meat industry - for procedures of imports and exports.

Practical

Analyse export competitiveness of poultry products. Trend analysis of global production. Consumption and price of poultry products. Case studies of various FTAs and their impact on Indian economy. Export-import policy with special reference to agricultural products including poultry products. Critical evaluation of various theories of trade. Comparative analysis of tariff and non-tariff trade barriers in various countries. Impact of WTO on Indian agricultural trade. Share of poultry products in Indian export basket.

Suggested Readings

1. APEDA. 2020. *Agricultural and Processed Food Products Export Development Authority*. Retrieved from http://www.apeda.gov.in.
2. Caves, R.E., Frankel, J.A. and Jones, R.W. 2007. *World Trade and Payments: An introduction*. 9th ed. Pearson Education.
3. Dornbusch, R., Fischer, S. and Startz, R. 2014. *Macroeconomics*. 11th ed. McGraw-Hill Education.
4. Krugman, P.R., Obstfeld, M. and Melitz, M.J. 2018. *International Economics: Theory and policy*. 10th ed. Pearson Education.
5. Salvatore, D. 2019. *International Economics*. 12th ed. Wiley.
6. Sodersten, B. and Reed, G. 2004. *International Economics*. 3rd ed. Palgrave Macmillan.
7. World Trade Organization [WTO]. 2020. *The WTO and the Multilateral Trading System*. Retrieved from https://www.wto.org.

PBE 326 - Risk Management and Insurance 2(2+0)

Objectives

- To impart knowledge on risk management.
- To understand about insurance and its relevance in risk management

Theory

Unit I

Risk - Classification of risk, the cost of risk, degree of risk. Meaning, scope and objective of Risk management - Personal risk management, corporate risk management.

Unit II

Risk management process - The administration of risk management process, risk identification, perception of risk, risk evaluation.

Unit III

Presentation of data - Probability concepts, risk and law of large number, risk control. Risk avoidance. Risk reduction. Classifications.

Unit IV

Risk Financing. Retention - Determination of retention levels, captive insurer, self-insurance, risk retention group. Transfer and non-insurance transfer.

Unit V

Insurance - Definition, purpose aand need of insurance, insurance as risk transfer and risk sharing mechanism, Benefits and cost of insurance to society, Types of insurance business. Insurance as contract. Fundamental principles of insurance. Insurance documents. Survey Report. Types of Insurer. Insurance intermediaries. Distribution system in insurance industry. Important activities of an insurance company. Typical operational structure of an insurance company.

Suggested Readings

1. Dayal, H. 2017. *Fundamentals of Insurance: Theories, Principles and Practices*. Notion Press. 164p.
2. Jaiswal, B. and Manoj, S. 2020. *Insurance and Risk Management*. New Royal Book Company.
3. Pandey, I.M. 2015. *Financial Management*. 11th ed. Vikas Publishing House. 946p.
4. John T. McNulty. *The Basics of Insurance*.
5. Kinder, J. and Kinder, G. 1988. *Secrets of Successful Insurance Sales*. Napoleon Hill Foundation.

SEMESTER VII

PPM 411 - Commercial Layer and Broiler Management 3(2+1)

Objective

To impart knowledge on different systems of rearing and management of commercial layer and broilers for maximum egg and meat production

Theory

Unit I

Development of Poultry Industry in India and the World. Systems of layer and broiler farming. Location and layout of the farm. Systems, types and design of houses. Poultry farm equipment. Automation in poultry houses and its maintenance - Environmentally controlled houses and their management. Deep litter and cage system of management - Litter materials. All in/All out and Multiple batch systems of rearing layers and broilers. Brooding management. lighting programme for egg-type and meat-type birds. Water quality standards, watering and water sanitation. Biosecurity and health management. Production indices for broilers and layers. Integration in broiler and layer production.

Unit II

Cages and modified cages for egg-type birds. Feeding management in layers. Medication and vaccination schedules and procedure for layers. Brooder, grower, pre-layer, layer and cockerel management. Management of layers during peak egg production and maintaining the persistency in production. Strategies to prolong the egg production beyond 72 weeks of age. Factors causing uneven growth and low egg production. Monitoring egg production curve. Culling of unproductive birds. Record keeping. Management during different seasons. Induced moulting.

Unit III

Management of broilers during different seasons. Mash, crumble and pellet feeding of Broilers. Weekly growth rate, feed conversion and livability in broilers. Sex separate feeding. Feeding broilers for optimum growth rate and feed efficiency. Broiler farm records. Broiler farm routine, medication and vaccination schedule. Transport of broilers. Regulations and specifications for the production of export quality broilers.

Practical

Layer farm layout. Design of different chick, grower and layer houses, their specifications. Selection and culling of layers. Beak-trimming, dubbing, deworming, delicing, vaccination and other farm routines and operations. Farm sanitation, disinfection and waste disposal. Visit commercial layer farms including environmental controlled houses. Record keeping - Calculating Hen day egg production, Hen housed egg production and other economic traits. Calculating the cost of production of eggs and meat and economics. Location and layout for a broiler farm. Broiler house design. Visit to commercial broiler farms including environmental controlled houses. Broiler brooding, Medication, vaccination, transportation and farm routines. Record keeping - Calculating the cost of production of broilers. Feeding of broilers at different ages. Working-out feed efficiency.

Suggested Readings

1. Bell, D.D. and Weaver, W.D., Jr. 2002. *Commercial Chicken Meat and Egg Production*. 5th ed. Kluwer Academic Publishers.

2. Narahari, D. 1997. *Commercial Broiler Production*. Emkay Publishers.

3. Rajini, R.A. 2012. *Simply Poultry Science*. Alpha Publishers.

4. Sapcota, D., Narahari, D. and Mahanta, J.D. 2017. *Avian Poultry Production*, 2nd revised ed. New India Publishing Agency.

5. Scanes, C.G., Brant, G. and Ensminger, M.E. 2003. *Poultry Science*, 4th ed. Prentice-Hall.

6. Sreenivasaiah, P.V. 2015. *Textbook of Poultry Science*. Write and Print Publications.

PPM 412 - Advanced Breeder Stock and Hatchery Management 3(2+1)

Objective

- To impart knowledge about care and management of breeders and hatchery operations

Theory

Unit I

Different types of commercial breeder flocks. Special care of breeder chicks, breeder male and female management. Feeding the breeder flocks: Separate sex feeding, feed restriction in broiler breeders. Management for improving fertility and hatchability, management of parent and grandparent farms, management of pure lines. Artificial Insemination. Care and management of hatching eggs.

Unit II

Vaccination of layer and broiler parents. Nutrient supplementation. Seasonal management of breeders, lighting management in breeder farms, flock testing and culling.

Unit III

Natural and artificial incubation: Stages of embryonic development, incubation principles. Location of hatchery, layout and design of hatchery. Hatchery equipment. Hatchery management: Ventilation and temperature control, pre-incubation storage, fumigation and sanitation, hatchery operations, routine and schedule, egg candling, packaging and transportation of hatching eggs and chicks, hatchery troubleshooting. Factors affecting fertility and hatchability. Biosecurity and hatchery waste disposal - Control of vertically transmissible and hatchery borne diseases. Special incubator management during hot summer. Hatch analysis.

Unit IV

SPF egg production. Import and export regulations. Maintaining *Salmonella* and *Mycoplasma* free breeding flock. Application of HACCP and Good Management Practices (GMP) in hatchery management for better chick quality.

Practical

Layout and blueprints for breeder farm and hatchery. Incubator management, candling, hatchery sanitation, fumigation procedures and hatchery hygiene. Pedigree hatching. Hatchery waste disposal and recycling. Calculating the cost of production of hatching eggs and day-old-chicks, management of bangers. Attending breeder farm routines and operation - Flock testing and culling of reactors. Analyzing hatchability results. Use of computers in hatchery operations. Economics of setting up of layer and broiler hatchery. Vaccinating day-old chicks and concept of in-ovo vaccination. Visit to commercial breeder farm and hatchery.

Suggest Readings

1. Bell, D.D. and Weaver, W.D., Jr. 2002. *Commercial Chicken Meat and Egg Production*, 5th ed. Kluwer Academic Publishers.
2. FAD PRep. 2013. *Poultry Industry Manual*. Foreign Animal Disease Preparedness & Reponse Plan, National Animal Health Emergency Management System, , United States Department of Agriculture, U.S.A. 174p.
3. Leeson, S. and Summers, J.D. 2009. *Broiler Breeder Production*. Context Products.
4. Sreenivasaiah, P.V. 2006. *Scientific Poultry Production: A Unique Encyclopaedia*. International Book Distributing Co.
5. Taylor, L.W. 2003. *Fertility and Hatchability of Chicken and Turkey*. John Wiley and Sons.
6. Select articles from journals and other sources.

PPM 413 - Physiology of Poultry Production 2(1+1)

Objective

To study the basic principles of physiology of poultry production in relation to egg production, incubation, stress and role of environment.

Theory

Unit I

Skeletal system of poultry - Comb pattern and plumage. Physiology of poultry digestive system - Digestion, metabolism and absorption of feed and water, role of enzymes. Poultry circulatory system, respiratory system, physiology of growth.

Unit II

Poultry nervous system and its function, excretory system. Male and female reproductive system - Semen production, semen characteristics, semen extenders, egg formation, egg laying pattern, photoperiodic responses. Role of endocrine glands and their functions. Neuroendocrine control of egg production - Ovulation and oviposition, clutch and Pause.

Unit III

Thermoregulatory mechanism - Stress due to adverse environmental factors. Acid-base balance.

Practical

Demonstration of various systems of birds. Structure of feather. Identification of endocrine glands and demonstration of hormones estimation in poultry production and reproduction. Haematology of poultry species - SGOT, SGPT, free fatty acids. Morphology of Poultry spermatozoa. Demonstration of artificial insemination in poultry.

Suggested Readings

1. Etches, R.J. 1995. *Reproduction in Poultry*. CAB International.
2. Scanes, C.G. 2022. *Sturkie's Avian Physiology*. 7th ed. Academic Press Inc. 1462p.
3. Scanes, C.G. and Velleman, S.G. 2022. *Insights in Avian Physiology*. Frontiers.

PPM 414 - Poultry Extension, Marketing and Economics 3(2+1)

Objectives

- To learn about role of extension education in poultry industry
- To get knowledge on forming poultry cooperatives

Theory

Unit I

Extension Education - Principles of extension technique. Poultry extension - objectives and its role in poultry development programmes. Qualities of extension worker different poultry development programmes, their impact and future strategy. Extension methodology and techniques. Handling audio-visual aids and their importance in poultry education programmes.

Methods of effective communication. Rural sociology - its impact, social institutions and their role in poultry development concept of socio-economic cultural change.

Unit II

Marketing process, nature and importance of marketing, communication media, methodology of survey and their assessment. Adoption process and factors influencing adoption. Marketing channels for poultry and poultry products. Marketing societies and farmers co-operatives. Formation of poultry co-operative societies - their objectives and impact on social structure. Salesmanship, qualities of a salesman. Advertising agencies and their role in acceptability of poultry products. Pricing, demand and supply, and its relationship with pricing. Effect of season in marketing.

Unit III

Economics of egg production. Economic of broiler production. Factors affecting economic returns. Economics of poultry production and its relationship with national economy. Benefits and limitation of poultry farming. The role of poultry products sale points in efficient marketing. Poultry farm records, inventory receipt and expenditure. Specific forms for maintaining feed, flock, strength, mortality, incubation, performance and health records. Accountancy financial statement of profit and loss. Model scheme for setting up of a layer/broiler farm of various sizes. Importance of poultry insurance. Financial institutions involved in support of poultry programme.

Practical

Preparations of communication materials such as posters, charts, bulletins, boards and films. Handling of audio-visual aids. Organization of poultry exhibition in rural and urban areas. Conducting group discussions, meetings to educate village farmers and arranging demonstrations. Familiarizing with local marketing channels of poultry and poultry products. Preparation of a flow diagram showing steps required for formation of co-operative societies. Calculation of economics of broiler production. Calculation of economic of cockerel production. Calculation of cost of preparation of egg and meat products. Study of registers and accounts. Project formulation for egg and meat type chicken, etc.

Suggested Readings

1. Chauhan, N.M., Thorat, G. and Trivedi, M. 2014. *Management Efficiency of Poultry Owners*. Biotech Books, New Delhi, India. 197p.
2. Stephenson, L. *Poultry Extension*. Department of Animal & Food Sciences, Martin-Gatton College of Agriculture, Food and Environment, University of Kentucky.
3. Narahari, D. and Rajini RA. 2005. *Poultry Economics and Projects*. Pixie Publication India (P) Ltd.

AVN 411 - Poultry Nutrition and Feeding 3(2+1)

Objectives

- To teach about nutrients and their functions, nutrient requirements of poultry and factors influencing the same
- Imparting knowledge of different types of feeds and feeding methods

Theory

Unit I

Digestive system, digestion, metabolism and absorption of nutrients in poultry. Factors influencing the feed consumption in birds. Macro and micro-nutrients. Protein and amino acids. Nutrient requirements for various species of poultry. Factors influencing the nutrient requirements. Partitioning of energy - Calorie: protein ratio. Nutrient interrelationships.

Unit II

Feed ingredients composition. Feed storage techniques. Milling and quality control. Processing of feed. Types and forms of feeds and feeding methods. Commonly occurring antinutrients and toxicants in poultry feed ingredients. Mycotoxins and their prevention. Feeding chicks, growers, layers, broilers and breeders. Principles of computing feed - Balanced feeds, least cost feed formulation and programming. Feeding in different seasons and stress conditions. Nutritional and metabolic disorders in poultry.

Unit III

Systems of feeding - restricted, forced, controlled and phase feeding. Use of Additives and Non-additives - Enzymes, probiotics, prebiotics, antibiotics, herbs and other performance enhancers. Utilization of non-conventional feedstuffs. Feeding of ducks, turkeys, Japanese quails and Guinea fowls.

Unit IV

Organic, functional, designer and SPF feed production - Production of feeds free from drug residue, pesticide residue and toxins. Regulations for import and export of feed and feed supplements.

Practical

Physical and sensory evaluation of feed ingredients - sampling techniques for ingredients and compounded feed. Estimation of proximate principles of feed and feed ingredients. Computing various poultry feed formulae based on commonly available feed ingredients. Computer applications in feed formulations. Estimation of Aflatoxin, calcium, phosphorus, sand, silica and salt. Mash, pellet and crumble feed preparation. Feeding procedures. Visit to feed mills. Hands-on training in feed analytical lab.

Suggested Readings

1. Bell, D.D. and Weaver, W.D. Jr. 2002. *Commercial Chicken Meat and Egg Production*. 5th ed. Kluwer Academic Publishers.

2. ICAR. 2013. *Nutrient Requirements of Poultry*. ICAR Publication.

3. Leeson, S. and Summers, J.D. 2001. *Scott's Nutrition of the Chicken*. University Books.

4. Leeson, S. and Summers, J.D. 2008. *Commercial Poultry Nutrition*, 3rd ed. University Books.

5. Singh, R.A. and Panda, B. 1992. *Poultry Nutrition*. Kalyani Publishers.

PBG 411 - Poultry Breeding and Genetics 3(2+1)

Objectives

- To impart knowledge on different systems of breeding, selection methods, design and implementation of the breeding programme in developing egg- and meat-type birds
- Modern tools in poultry breeding

Theory

Unit I

Genetic classification of Poultry - Origin and breed characteristics of poultry. Mendel's laws of inheritance related to poultry. Qualitative and Quantitative traits in Poultry breeding. Additive and Non-additive gene actions - Dominance, incomplete dominance, epistasis and complementary gene action. Lethals, semi-lethals and mutations in poultry. Sex-limited, sex-linked and sex-influenced traits. Economic traits. Partitioning of variance, heritability, quantitative inheritance - Phenotype, genotype and environment interactions.

Unit II

Systems of breeding, systems of mating, selection methods. Breeding programme for developing egg-type, meat type and rural poultry strains - Developing hybrids. Breeding and management of other species of poultry. Formation and management of inbred pure lines, grandparent and parent stock - Industrial breeding.

Unit III

Artificial insemination in chicken. Auto-sexing. Random sample test. Use of molecular genetics in poultry breeding. Quantitative trait loci and marker-assisted selection, conservation of poultry genetic resources.

Practical

Breeds of poultry. Estimation of qualitative and quantitative traits in poultry. Exercises on individual and family selection. Constructing multi-traits selection index and Osborne index. Estimating heritability. Breeding programme for developing commercial hybrid layers, broilers and Japanese quail, breeding programmes for rural poultry. Semen collection, evaluation, dilution and insemination in chicken and turkey. Breeding records - Use of computers to maintain breeding records and for selection– Estimation of effective population size, rate of inbreeding, response to selection and genetic and phenotypic responses.

Suggested Readings

1. Acharya, R.M. and Kumar, P. 2017. *Poultry Production*. Satish Serial Publishing House. 294p.
2. Aggrey, S.E., Zhou, H., Tixier-Boichard, M. and Rhoads, D.D. 2020. *Advances in Poultry Genetics and Genomics*. burleigh dodds Science Publishing.
3. Crawford, R.D. 1990. *Poultry Breeding and Genetics*. Elsevier.
4. Falconer, D.S. 1997. *Introduction to Quantitative Genetics*. Benjamin Cummings.
5. Hutt, F.B. 1949. *Genetics of the Fowl*. McGraw-Hill
6. Jull, M.A. 1932. *Poultry Breeding*. John Wiley & Sons, Inc., New York, U.S.A. 376p.
7. Muir, W.M. and Aggrey, S.E. 2003. *Poultry Genetics, Breeding and Biotechnology*. CABI.
8. Singh, R.P. and Kumar, J. 1994. *Biometrical Methods in Poultry Breeding*. Kalyani Publications
9. Stevens, L. 1991. *Genetics and evolution of the domestic fowl*. Cambridge University Press. 306p.

PPT 412 - Advanced Poultry Meat and Egg Products Technology 3(2+1)

Objective

- To know about composition and nutritive value of eggs and chicken meat, grading and preservation methods of eggs and meat, functional and value-added poultry products.

Theory

Unit I

Physical and chemical composition and nutritive value of eggs and meat. Grading of eggs and meat by different standards. Egg quality deterioration. Factors affecting egg quality. Handling, processing, packaging materials, packaging, transport and marketing of eggs.

Unit II

Quality control of poultry meat. Preservation of egg and meat. Functional and value-added egg and meat products. Further processing of eggs and meat. Various egg and meat fast foods.

Unit III

Sanitary and phytosanitary measures to ensure food safety. Pre- and Post-oviposition value addition to the eggs and Post-processing value addition to the meat for export. Microbial safety of poultry products. Import and export of poultry products. Further processing of poultry for export. Implementation of GMP and HACCP procedures for food safety, Codex regulations for poultry products safety. Traceability and branding of poultry products.

Practical

Measuring internal and external egg qualities. Measurement of meat quality. Preservation of table eggs, grading of eggs. Processing and further processing of poultry. Preservation of poultry meat. Preparation of various eggs and poultry meat products and fast foods - Preservation, packaging and transport. Quality control of value-added poultry products. Measures of microbial safety of poultry products for export. Visit to poultry processing plant.

Suggested Readings

1. Biswas, A. and Kondaiah, N. 2014. *Meat Science and Technology*. Jaya Publishing House.
2. Brown, M. 2000. *HACCP in the meat industry*. CRC Press, U.S.A. and Woodhead Publishing Ltd., England. 329p.
3. Mead, G. 2004. *Poultry Meat Processing and Quality*. Elsevier
4. Mountney, G.J. and Parkhairst, C.R. 1995. *Poultry Products Technology*, 3rd ed. AVI Publications.
5. Rashid, M. and Agarwal, R. 2013. *Meat Hygiene and Food Safety*. Narendra Publishing House, New Delhi. 178p.
6. Romanoff, A.L. and Romanoff, A.J. 1949. *The Avian Egg*. CAB international.
7. Sim, J.S. and Nakai, S. 1994. *Egg Use and Processing Technologies: New Developments*. CAB International.
8. Stadelman, W.J. and Cotterill, O.J. 1995. *Egg Science and Technology*, 4th ed. CRC Press.
9. USDA. 1999. *Generic HACCP Model for Poultry Slaughter*. United States Department of Agriculture, Washington, D.C., U.S.A. 41p.

SEMESTER VIII

ELECTIVE SUBJECTS

DEPARTMENT OF POULTRY PRODUCTION MANAGEMENT

PPM 421 - Rural Poultry Production 2(1+1)

Objectives

- To understand rural poultry production
- To teach on breeding, feeding and management of rural poultry

Theory

Unit I

Status, strategies, action plan and scope. Features of indigenous breeds of poultry. Breeds and breeding for rural poultry – Selection for behaviour. Systems of rearing: Backyard, semi-intensive and extensive system. Poultry housing and management.

Unit II

Feeds and feeding for rural poultry. Egg production, quality, pricing and marketing. Meat production, quality, packaging, pricing and marketing. Participatory poultry production. Climate change adaptation of rural poultry.

Unit III

Preference for role of rural poultry in human nutrition and health. Diseases, immunity, disease resistance and immunization of rural poultry. Waste management. Social and cultural significance. Role of women in rural poultry. Natural Farming. Traditional knowledge and practices.

Practical

Establishment of rural poultry farm. Breeding strategies for rural poultry production. Brooding, grower and layer management. Feeding and watering. Health cover. Economics of rural poultry production of difference species. Visit to rural poultry unit.

Suggested Readings

1. Acharya, R.M. and Kumar, P. 2017. *Poultry Production*. Satish Serial Publishing House. 294p.

2. FAO. 2013. *Poultry Development Review.* Food and Agriculture Organization of United Nations, Rome. 120p.
3. Kryger, K.N., Thomsen, K.A., Whyte, M.A. and Dissing, M. 2010. *Smallholder Poultry Production - Livelihoods, Food Security and Sociocultural Significance*. FAO of United Nations, Rome. 67p.
4. Sorensen, P. 2010. *Chicken Genetic Resources Used in Smallholder Production Systems and Opportunities for Their Development*. Food and Agriculture Organization of the United Nations, Rome. 53p.
5. Tiwari, S.P. and Dinani, O.P. 2020. *Recent Trends in Poultry Production*. International Books, Periodical Supply Service, New Delhi, India. 439p.
6. Van Eekeren, N., Maas, A., Saatkamp, H.W. and Verschuur, M. 2006. *Small-scale chicken production*. Agromisa Foundation and CTA, Wageningen. 91p.
7. Verma, R.P. 2017. *Rural Poultry Production: The Need and Strategy for Sustainable Development*. Random Publications, New Delhi, India. 292p.
8. Rathod, P.A. 2020. *Guide to Backyard Poultry Farming for Sustainable Livelihoods*. ICRISAT.

PPM 422 - Poultry Economics, Project Formulation and Marketing 3(2+1)

Objectives

- To study about measures of performance efficiency in poultry farms and its allied sector, components of project reports
- Preparation of viable projects related to poultry Industry

Theory

Unit I

Glossary of terms used in poultry economics and projects. Measures of performance efficiency in the broiler, layer, breeder and other poultry species. Hatcheries and other poultry related operations. Production standards and goals for layer, broiler and breeders.

Unit II

Planning poultry enterprise. Minimum viable units. Bank norms for poultry projects. Poultry insurance. Methods to improve the production efficiency and reduce the production cost. Components of project reports and preparing projects and return on investment.

Unit III

Integration in Poultry production and marketing. Marketing channels for eggs and meat. Cost of production of the egg, broiler, hatching egg, day-old chick and compounded feed. New regulations on cage rearing of layers. Traceability and branding of poultry products. Export norms for poultry products.

Practical

Preparing different poultry projects for bank finance. Calculating the cost of production of various products under various systems-case study. Preparation of Balance sheet, break-even points, Cost: Benefit ratio and other farm economic indices. Preparation of feasibility and viability reports.

Suggested Readings

a. Bell, D.D. and Weaver, W.D. Jr. 2002. *Commercial Chicken Meat and Egg Production*, 5th ed. Kluwer Academic Publishers.

b. Narahari, D. and Rajini RA. 2005. *Poultry Economics and Projects*. Pixie Publication India (P) Ltd.

PPM 423 - Poultry Behaviour and Welfare 3(2+1)

Objectives

- To teach about behaviour and welfare legislations of poultry.

Theory

Unit I

Biology of poultry related to behaviour and welfare. Behaviour of poultry: Social behaviour, reproductive behaviour, and movement and maintenance behaviour. Behaviour of ducks and Turkey. Factors affecting poultry behaviour.

Unit II

Concept of poultry welfare. Different freedoms to the birds. Present housing systems with relation to the welfare. Welfare and productivity - Feed restriction, welfare cages. Vices of poultry and remedial measures, Welfare legislations, Premium price for the egg and meat of organic poultry, Ethical background of bird welfare.

Unit III

Catching and handling of birds. Precautions and requirements before, during and after transport of birds from one place and another. Thermal imaging. Assessment of welfare in poultry. Welfare in relation to different country's requirement. Different designs of welfare cages. Welfare laws in India.

Practical

Behaviour of poultry during different environment. Reproductive behaviour and Social behaviour. Vices of Poultry and remedial measures.

Suggested Readings

1. Appleby, C. M., Hughes, B.O. and Elson, H.A.1992. *Poultry Production Systems: Behaviour, Management and Welfare*. CAB International, Oxon, United Kingdom. 238p.
2. Appleby, M.C., Mench, J.A. and Hughes, B.O. 2004. *Poultry Production Behaviour and Welfare*. CAB Publishing. 288p.
3. DAHD. 2015. *Poultry Farm Manual*. Department of Animal Husbandry, Dairy and Fisheries, GOI.
4. FAO. 2013. *Poultry Development Review.* Food and Agriculture Organization of United Nations, Rome. 120p.
5. Mench, J.A. 2017. *Advances in Poultry Welfare*. Woodhead Publishing.
6. Perry, G.C. *Welfare of the Laying Hen: Poultry Science Symposium Series. Volume twenty seven*. CABI Publishing. 448p.
7. Poultry Service Association [PSA]. 2017. *Poultry Handling and Transportation Manual*. Canadian Poultry & Egg Processing Council, Ottawa, Canada. 95p.
8. Tiwari, S.P. and Dinani, O.P. 2020. *Recent Trends in Poultry Production*. International Books, Periodical Supply Service, New Delhi, India. 439p.
9. Weeks, C.A. and Butterworth, A. 2004. *Measuring and Auditing Broiler Welfare*. CABI Publishing. 336p.

PPM 424 - Research Methodology and Ethics 3(2+1)

Objectives

- To provide basic knowledge on research tools and techniques
- To develop skills on on-farm research and ethics in general with specific reference to natural farming

Theory

Unit I

Research Ethics: Introduction, Ethical ethos- Researcher's obligations and participant's rights, Research Ethics: Researcher-Participant, General Ethics, Ethical Issues in India, Ethics Committees.

Unit II

Concept, nature and scope of research in social sciences. Types of research – fundamental, applied and action research. Experimental and non-experimental research. Identification of

concepts, constructs, variables. Hypothesis – importance, selection criteria, formulation and testing of hypothesis. Selection and formulation of research problem.

Unit III

Measurement and levels of measurement. Research designs – exploratory, experimental and ex-post-facto research design. Sampling – Sampling methods, probability and non-probability sampling. Sources of errors.

Unit IV

Methods of data collection – survey, observation, interview/ questionnaire, case study, content analysis, sociometry, focus group discussion, projective techniques. Online tools of data collection. Reliability and validity of measuring instruments.

Unit V

Social statistics – designs in data analysis, parametric and non-parametric statistical methods. Data analysis and interpretation, and inference. Report writing. Review of studies in social research.

Unit VI

Introduction to library and its service. Sources of information - Primary sources, secondary sources and tertiary sources. Tracing information from reference sources. Literature survey. Citation techniques/ Preparation of bibliography. Online Public Access Catalogue and other computerized library services. Use of internet including search engines and its resources. e- resources access methods.

Practical

Construction of data collection tools, GPS-enabled data collection, development of online tools for data collection (Google forms, Survey Monkeys etc.). Application of statistical software for data analysis and interpretation. Creative scientific thinking, selecting a research problem and working it out with all the steps. Report writing and presentation of the reports.

Suggested Readings

1. Babbie, E. 2008. *The basics of social research*. 4th ed. Belmont, CA, USA; Thompson Wordsworth.
2. Creswell, J.W. 2009. *Research design: Qualitative, quantitative, and mixed methods approaches*. 3rd ed. Thousand Oaks: Sage Publications.
3. Creswell, J.W. 1994. *Research Design - Qualitative and Quantitative Approaches*. University of Nebraska, Lincoln.
4. Creswell, J.W. 2012. *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. 4th ed. Boston, MA: Pearson.

5. Edwards, A.L. 1969. *Techniques of Attitude Scale Construction.* Vakil, Feffer and Simons
6. Fink, A. 2003. *The Survey Kit* (10 booklets). Sage Publications.
7. Garrett, H.E. 1966. *Statistics in Psychology and Education*. International Book Bureau, Hyderabad.
8. Goode, W.J. and Hatt, P.K. 1952. *Methods in Social Research*. McGraw-Hill.
9. Guilford, J.P. 1971. *Psychometric Methods*. TATA McGraw Hill.
10. Henerson, E.M, Morris, L.L. and Gibbon, C.T. 1987. *How to Measure Attitudes*. Sage Publicatons.
11. Kamat, P.V. *Research Ethics*. Retrived from https://www3.nd.edu/~pkamat/pdf/ethics.pdf.
12. Kerlinger, F.N. and Lee, H.B. 2000. *Foundations of Behavioral Research*. Orlando, FL: Harcourt College Publishers.
13. Kumar, R. 2014. *Research Methodology: A Step by Step Guide for Beginners*. 4th ed. Thousand Oaks, California: Sage Publications.
14. Miller, D.C. 1991. *Handbook of Research Design and Social Measurement*. Indiana University. Sage Publications.
15. Neuman, W.L. 2006. *Social Research Methods: Qualitative and Quantitative Approaches.* Toronto: Pearson.
16. Parveen, Huma and Showkat, Nayeem. (2017). *Research Ethics*. https://www.researchgate.net/publication.
17. Oppenheim, A.N. 1979. *Questionnaire Design and Attitude Measurement*. Heinemann Educational Books.
18. Sekaran, U. and Bougie, R. 2013. *Research Methods for Business A Skill-Building Approach*. 6th Edition, Wiley, New York.
19. Sivakumar, P.S., Sontakki, B.S., Sulaiman, R.V., Saravanan, R. and Mittal, N. 2017. *Good Practices in Agricultural Extension Research. Manual on Good Practices in Extension Research and Evaluation. Agricultural Extension in South Asia*. Centre for research on innovation and science and policy (CRISP), Hyderabad. India.

DEPARTMENT OF AVIAN NUTRITION

AVN 421 - Commercial Poultry Nutrition 2(1+1)

Objectives

- To impart knowledge on advanced poultry nutrition with respect to commercial egg and meat production

Theory

Unit I

Breed specific nutrient requirements. Factors influencing the digestibility of nutrients. Reasons to assist the birds for digestion. Gut health management.

Unit II

Commercial use of feed ingredients by the industry – their drawbacks. Use of different feed additives and supplements: Enzymes, prebiotics, probiotics, postbiotics, phytobiotics, nucleotides, acidifiers, emulsifiers, and essential oils, etc. Trace minerals: organic, inorganic and nanoparticles. Pre-digested proteins.

Unit III

Unconventional feed ingredients: Merits and demerits. Measures to counteract the demerits. Responsible use of them for reducing the cost of production. Least cost feed formulation. Phase feeding for layers and broilers. Juvenile nutrition.

Practical

Analytical methods for quick estimation of proximate principles and other nutrients. Use of latest technologies like NIR. Force-feeding, challenge feeding. Factors preventing the birds from optimum feeding: Particle size, feed milling technologies, etc. Seasonal variations in feeding practices, in-ovo feeding, visit to commercial poultry nutrition lab and feed mill.

Suggested Readings

1. ICAR. 2013. *Nutrient Requirements of Poultry*. ICAR Publication.
2. Leeson, S. and Summers, J.D. 2001. *Scott's Nutrition of the Chicken*. University Books.
3. Leeson, S. and Summers, J.D. 2008. *Commercial Poultry Nutrition*, 3rd ed. University Books.
4. Singh, R.A. and Panda, B. 1992. *Poultry Nutrition*. Kalyani Publishers.

AVN 422 - Non-conventional Feed Resources 2(1+1)

Objectives

- To build-up concepts involving the availability and potential use of various classes of non-conventional feed resources including ameliorative measures to ensure feed and food safety
- To find non-conventional feed ingredients suitable for poultry
- To reduce cost of production of egg and poultry meat

Theory

Unit I

Present and future feed requirements and current availability for livestock and poultry. Use of non-conventional feeds. By-products of agricultural, industrial, food processing units and forest by-products. Slaughterhouse by-products, aquatic weeds. Permissible levels of inclusion of various non-conventional feeds in the ration of different kinds of poultry. Formulation of economical rations using the non- conventional feed.

Unit II

Classification of toxic principles in animal feedstuffs. Chemico-physical properties of various anti-nutritional factors (ANFs). Effect of anti-nutritional factors on health and production of poultry.

Unit III

Detoxification of toxin principles by various physical, chemical and biological techniques.

Practical

Estimation of proximate composition, physical form, palatability and stability during storage and anti-nutritional and toxic factors of non-conventional feed ingredients. Qualitative methods for the detection of ANFs in feedstuffs. Least cost feed formulation using non-conventional feed ingredients.

Suggested Readings

1. Chharang, D. 2022. *Non Conventional Animal Feed Resources*. Blue Rose Publishers. 175p.
2. Devendra, C. 1985. *Non-conventional Feed Resources in Asia and the Pacific*, 2nd ed. APHCA, FAO.
3. FAO. 1995. Tropical Feeds and Feeding Systems. In: *Proceedings of the First FAO Electronic Conference*. Food and Agriculture Organization of the United Nations, Rome.
4. FAO. 2004. *Assessing Quality and Safety of Animal Feeds*. Food and Agriculture Organization of the United Nations, Rome.
5. Liner, I.E. 1980. *Toxic Constituents of Animal Food Stuffs*, 2nd ed. Academic Press.
6. Singh, U.B. 1987. *Advanced Animal Nutrition for Developing Countries*. Indo-Vision.
7. Speedy, A. and Sansoucy, R. 1991. *Feeding Dairy Cows in the Tropics*. Food and Agriculture Organization of the United Nations, Rome.
8. Spinelli, J. Chapter 12. Unconventional Feed Ingredients for Fish Feed. In: *Fish Feed Technology*. Food and Agriculture Organization of the United Nations, Rome.
9. Swain, B.K., Naik, P.K. and Singh, N.P. 2014. *Unconventional Feed Resources For Efficient Poultry Production*. Indian Council of Agricultural Research. 55p.
10. Tania, M. 2010. *Nutritional Composition of Unconventional Poultry Feed Resources: A Laboratory Investigation*. Lambert Academic Publishing. 68p.

11. Select articles from journals and other sources.

AVN 423 - Minerals and Vitamin Nutrition, and Feed Additives 3(2+1)

Objectives

- To impart knowledge on sources, functions and analysis of various minerals, vitamins and other feed additives
- To understand signs of deficiency and toxicity of various minerals, vitamins etc.

Theory

Unit I

General role of minerals, factors affecting mineral requirements. Macro-minerals and micro-minerals, their distribution, metabolism, physiological functions, deficiencies and excesses, and sources and requirements. Probable essential minerals.

Unit II

Mineral interactions. Chelated minerals and concept of nano-minerals. Bioavailability studies in minerals. Impact of minerals on reproduction, fertility, and immunity. Soil-plant-animal-human relationship, development of area-specific minerals. Toxic minerals: their role in health and production of farm animals. Newly recognized trace minerals.

Unit III

Water-soluble and fat-soluble vitamins. Role of vitamins in energy metabolism. Vitamin-mineral interrelationship. Vitamin toxicosis. Role of vitamins in reproduction, fertility and immunity.

Unit IV

Feed additives and nutraceuticals. Probiotics, prebiotics, synbiotics, eubiotics, postbiotics. Feed enzymes. Phytochemical feed additives, polyphenols and essential oils, organic acids and acidifiers.

Practical

General principles of mineral estimation. Sampling and processing techniques. Use of atomic absorption spectrometry and ICP in mineral estimation. Estimation of macro- and micro-minerals. Formulation of mineral mixture for poultry. Estimation of some important vitamins (vitamin A, E and C). Purified diets for mineral and vitamin studies. Calculation of mineral and vitamin requirements.

Suggested Readings

1. El-Hack, M.E.A. and Alagawany, M. 2020. *Natural Feed Additives Used in the Poultry Industry*. Bentham Books. 312p.

2. McDonald. P., Edwards, R.A., Greenhalgh, J.F.D., Morgan, C.A., Sinclair, L.A. and Wilkinson, R.G. 2011. *Animal Nutrition*. 7th ed. Benjamin Cummings.

3. McDowell, R.L. 1989. *Vitamins in Animal Nutrition*. Academic Press.

4. McDowell, R.L. 2003. *Minerals in Animal and Human Nutrition*. 2nd ed. Elsevier Science.

5. Ozturk, E. 2024. *Vitamins and Minerals in Poultry*. IKSAD Publishing House. 354p.

6. Singh, P.K. 2015. *Feed Supplements for Livestock and Poultry*. Daya Publising House.

7. Suttle, N.F. 2010. *Mineral Nutrition of Livestock*. 4th ed. CAB International.

8. Swain, R. and Sethy, K. 2023. *Mineral Nutrition of Livestock and Poultry*. Walnut Publication. 224p.

9. Zempleni, J., Suttle, J.W., Gregory III, J.F. and Stover, P.J. 2013. *Handbook of Vitamins*. 5th ed. CRC Press. 605p.

AVN 424 - Valorization of Waste as Poultry Feed **2(1+1)**

Objective

- To inculcate making nutritive feed from the wastes

Theory

Unit I

Benefits of feed from waste. Dried poultry waste. Protein recovery from wastewater of poultry processing plant.

Unit II

Poultry by-products - feather meal, poultry by-product meal, hatchery by-product meal, shell waste from egg-breaking plants, spent hens, their biohazards.

Unit III

Hide and tannery waste by-products, fruit, vegetable and brewer's waste. Municipal refuse, Insect meal production and usage.

Practical

Estimation of nutritive values of poultry and poultry by-product wastes, hide and tannery waste by-products etc. Insect meal production and usage. Biohazards of all the above wastes. Feed formulation using above items.

Suggested Readings

1. El Boushy, A.R.Y. and van der Poel, A.F.B. 2000. *Handbook of Poultry Feed from Waste: Processing and Use*. 2nd ed. Kluwer Academic Publishers. 410p.
2. Kumar, M. 2011. *Waste Disposal Systems in Slaughterhouses Suitable for Developing Countries*. Daya Publishing House, New Delhi. 228p.
3. Kundu, S.S., Mahanta, S.K., Singh, S. and Pathak, P.S. 2021. *Animal Feed Technology*. Satish Serial Publishing House, New Delhi. 343p.
4. U.S. Grains Council. *A Guide To Distiller's Dried Grains with Solubles (DDGS)*. 3rd ed. U.S. Grains Council.

AVN 425 - Role of Poultry in Human Nutrition 2(2+0)

Objectives

- To understand the role of poultry in human nutrition
- To eliminate the myths of eating egg and poultry meat

Theory

Unit I

Consumption pattern of egg and poultry meat. Macro-, micro- and other essential nutrients of egg and poultry meat. Poultry meat and egg consumption and human health - Advantages of poultry meat compared to other animal meat.

Unit II

Enriched egg and meat production for human consumption - Sources and metabolism of fatty acids, role of cholesterol in human nutrition. Nutraceuticals and functional food from poultry meat and egg. Nutrient content of scavenging chicken meat and egg. Recommended daily allowance from egg and poultry meat.

Suggested Readings

1. Farrell, D. 2013. The role of poultry in human nutrition. In: *Poultry Development Review*. Food and Agriculture Organization of the United Nations, Rome. pp. 1-8.
2. Select articles from journals and other sources.

DEPARTMENT OF POULTRY BREEDING AND GENETICS

PBG 421 - Avian Andrology and Female Reproduction 3(2+1)

Objectives

- To understand anatomy, physiology and endocrinology of male and female reproductive system
- To learn techniques for evaluating and enhancing reproductive performance in male and female birds
- To study fertility management, semen quality evaluation and artificial insemination
- To evaluate the reproductive performance

Theory

Unit I

Male and female reproductive system - anatomy, physiology, endocrinology.

Unit II

Spermatogenesis - Sperm biology, factors affecting sperm production. Photoperiod and Male sexual maturity. Methods of semen collection, semen evaluation, semen dilution, preservation. Fertility management in male breeders. Artificial insemination techniques.

Unit III

Role of ovary and uterus in egg formation. Factors affecting egg production. Photoperiod and age at sexual maturity. Nutrition and feed consumption on egg production. Monitoring and evaluating the reproductive success.

Practical

Male and female reproductive systems - Methods of semen collection, semen evaluation, semen dilution, preservation, role of semen diluents, preparation and composition, artificial insemination technique, fertility assessment. Factors affecting reproduction, monitoring and evaluation of reproductive success.

Suggest Readings

1. Etches, R.J. 1996. *Reproduction in Poultry*. CAB International, Oxon, United Kingdom. 318.
2. Froman, D.P., Kirby, J.D. and Proudman, J.A. 2000. Reproduction in Poultry: Male and Female. In: Hafes, B. and Hafes, E.S.E. (Eds.). *Reproduction in Farm Animals*. 7th ed. Wiley.
3. Hocking, P. 2009. *Biology of Breeding Poultry: Poultry Science Symposium Series Volume twenty-nine*. Carfax Publishing Company, U.K. 464p.

4. Ogbuewu, I.P. Okali, I.C. Iloeje, M.U. 2021. *Reproduction in Poultry*. 128p.

PBG 422 - Conservation and Characterization of Avian Genetic Resources 2(1+1)

Objectives

- To study the concepts of conservation and characterization of avian genetic resources
- To study the methods of conservation and national and international strategies for conservation

Theory

Unit I

Domestic bird diversity in India: Origin, history and utilization. Present status and flow of avian genetic resources and its contribution to livelihood security. Methodology for phenotypic and genotypic characterization of poultry breeds through systematic surveys. Management of breed. Physical, biochemical and performance traits and uniqueness of birds of a breed. Social, cultural and economic aspects of their owners/ communities rearing the breed.

Unit II

Methods for increasing effective population size of endangered breed/ species. Effective number of alleles, inbreeding effective size, variance effective size, minimum viable population size. Methodology for characterization of AvGR; nuDNA and mtDNA based diversity analysis and relationship among the breeds. Concept of conservation: *In-situ* and *ex-situ* (in-*vivo* and *in-vitro*). Models of conservation. Prioritization of breeds for conservation. Strategies for conservation of poultry genetics resources. Gene bank concept. Preservation of ecosystem. Geotagging of native germplasm.

Unit III

Status, opportunities and challenges in the conservation of AvGR. IPR issues on animal genetic resources/ animal products or by-products. Registration of poultry breeds and protection of poultry owner's rights in India. Breed societies and their role in conservation.

Practical

Method of phenotypic and genotypic characterization of native breeds. *In-situ* and *ex-situ* conservation. Models of conservation. Registration of poultry breed. Geotagging of native germplasm.

Suggested Readings

1. Henson, E. 1992. *In situ conservation in livestock and poultry*. Food and Agriculture Organization of the United Nations, Rome.
2. Nivsarkar, A.E., Vij, R.K. and Tantia, M.S. 2000. *Animal Genetic Resources of Indian Cattle and Buffaloes.* ICAR.
3. Oldenbroek, K. 2007. *Utilisation and Conservation of Farm Animal Genetic Resources.* WA Publishers.
4. Sahai, R. and Vij, R.K. 1997. *Domestic Animal Diversity, Conservation and Sustainable Development.* SI Publishers.
5. van Vleck, L.D, Pollak, E. and Bltenacu, E.A.B. 1987. *Genetics for Animal Sciences.* WH Freeman.
6. Select articles from journals and other sources.

PBG 423 - Pet Bird Genetics and Breeding 3(2+1)

Objectives

- To learn about pet bird varieties
- To learn about the colour mutations and colour combinations in pet birds

Theory

Unit I

Avian Colouration: Functional and evolutionary perspectives. Types and varieties of different species of pet birds. Basic genetics of pet birds. Primary colour mutations, establishing new mutations, combinations of mutations. Combination colours, crossovers and recombinant frequencies. Good and bad matings. Breeding for specific colours, Importance of ancestry. Inheritance of colour: dipping into the green, light greens, dark greens, olive x mauve, light yellows, dark yellows, skyblues, cobalts, etc.

Unit II

Genetics of pigmentary plumage colours, genetics of structural plumage colours. Genetics of colours produced by interactions. Genetics of plumage patterning. Genetics of bare part colouration and egg colouration.

Unit III

Sexual dichromatism in pet birds. Pet bird breeding, parent rearing, artificial incubation, handrearing.

Practical

Types and varieties of different species of pet birds. Basic genetics, colour mutations - producing different colour and colour combinations of pet birds. Breeding and reproduction: Pet bird breeding, parent rearing, artificial incubation, hand-rearing.

Suggested Readings

1. Martin, T. 2002. *Guide to Colour Mutations & Genetics in Parrots*. 293p. ABK Publications. 295p.
2. Martin, T. and Andersen, D. 2007. *A Guide to Cockatiels and Their Mutations as Pet & Aviary Birds*. Revised ed. ABK Publications. 194p.
3. Roberts, M. 1984. *All About Breeding Lovebirds*. Tfh Publications Inc. 96p.
4. Watmough, W. 2016. *A Guide to Breeding Specific Colours in Your Pet Birds*. 1st ed. Maugham Press. 58p.

POULTRY PROCESSING AND TECHNOLOGY

PPT 421 - Poultry Processing Plant Practices and Operations 2(1+1)

Objective

- To impart knowledge about the handling of meat-type birds, layout and design of poultry processing plant, sanitation and basics of poultry processing plant practices and its operations

Theory

Unit I

Handling and transportation of poultry. Pre-slaughter handling and care, ante-mortem inspection. Principles and methods of stunning. Ritual methods of poultry slaughter. Machinery for slaughter and dressing. Postmortem inspection - Handling, disposal and condemnation of unfit materials.

Unit II

Poultry processing plant - layout, designing, organization and operation. Maintenance of poultry processing plant. Record keeping. Legislations and regulations for establishment and operation of processing plants.

Unit III

Sanitation of processing plant - Sanitary practices and its benefits. Solid and liquid waste management of processing plant. Different methods of effluent treatment and designs of effluent treatment plants. State and central pollution control board norms.

Practical

Design and outlay of modern poultry processing and effluent treatment plants for different capacities. Grading of carcass. Procedure for the slaughter of poultry. Ante-mortem and post-mortem inspection. Recording of carcass data - carcass yield, meat bone ratio, etc.

- Measurement of effluent characteristics - pH, BOD, COD, suspended solids, etc. Visit to poultry processing, rendering and effluent treatment plants. DPR for the establishment of a poultry processing plant.

- **Suggested Readings**

Barbut, S. 2015. *The Science of Poultry and Meat Processing*. Shai Barbut, Food Science Department, University of Guelph, Canada. 764p.

Childs, R.E., Reed, M.J. and Hamann, J.A. 1970. Guidelines for Poultry Processing Plant Layouts. Agricultural Research Service, USDA, U.S.A. 44p.

Guerrero-Legarreta, I. and Hui, Y.H. 2010. Handbook of *Poultry Science and Technology Volume 1: Primary Processing*. Wiley. 781p.

Guerrero-Legarreta, I. and Hui, Y.H. 2010. Handbook of *Poultry Science and Technology Volume 2: Secondary Processing*. Wiley. 614p.

ICAR-NRC on Meat. 2021. *Training for Master Trainers: Handbook of Meat and Poultry Processing*. ICAR – National Research Centre on Meat, Hyderabad, India. 142p.

Marel. 2025. The world of Poultry processing. Marel Inc., Gainesville, U.S.A. https://niftem-t.ac.in/olapp/pmfme/upload/mt_handbook_meat.pdf. 24p.

Silverside, D. and Jones, M. 1992. Small-Scale Poultry Processing: FAO Animal Production and Health Paper 98. Food and Agriculture Organization of the United Nations, Rome. 109p.

Sindhu, A.S. 2018. Poultry Processing Plant. Random Publications. 300p.

PPT 422 - Packaging and Marketing of Poultry Products 3(2+1)

Objectives

- To impart knowledge about properties of different packaging material, techniques used in packaging of different livestock products, marketing channels and value chain of processed products

Theory

Unit I

Principles of packaging - objectives and functions. Product characteristics affecting packaging requirements. Packaging materials and their characteristics. Different packaging systems for egg, and fresh, cured, dehydrated, freeze-dried and shelf-stable products of chicken meat. Aseptic packaging of meat - Vacuum packaging, MAP and role of different gases, retort pouch processing, active and intelligent/ smart (biosensors) packaging, edible and biodegradable packaging. Nanotechnology for food packaging. Recycling of packaging materials. Labelling requirements: Barcoding and its importance. Packaging standards and regulations. Economics of different packaging systems.

Unit II

Marketing of poultry products: Types of markets. Marketing channels of live poultry - Existing systems, constraints and possible solutions. Value chain of poultry, meat and processed products - strategies and interventions for better profitability. Meat retailing and establishment of retail outlets for meat and poultry. FSSAI, APEDA, EIA, GOI/ WTO regulations for the domestic market, import and export of poultry products.

Practical

Different packaging materials and their properties. Determination of thickness, bursting strength, piercing strength, water vapour transmission rate, gas transmission rate, headspace gas analysis. Vacuum, shrink, MAP and retort packaging of meat products. Visit to poultry processing plants. Study of the value chain of poultry products including online marketing.

Suggested Readings

1. Aberle, E.D., Forrest, J.C., Gerrard, D.E. and Mills, E.W. 2013.*Principles of Meat Science*. 5th ed. Kendall Hunt Publishing Company, Iowa.
2. Biswas, A.K. and Mandal, P.K. 2014. *Poultry, Egg and Fish Processing Technology*. Studium Press (India) Pvt. Ltd., New Delhi, 269p.
3. Jensen, W.K., Devine, C. and Dikeman, M. 2004. *Encyclopaedia of Meat Sciences.* Vol. I, II and III, 1st ed. Elsevier Academic Press, UK.
4. John, P.J. 2013. *A handbook on food packaging*. Daya Publishing House, New Delhi. 202p.
5. Jull, M.A. 1951. *Poultry Husbandry*. J.V. Publishing House, Jodhpur, India. 526p.
6. Mead, G.C. 2005. *Food safety control in poultry industry*. Woodhead Publishing Limited, Cambride, England. 561p.
7. Robertson, G.C. 2012. *Food Packaging-Principles and Practices*. 3rd ed. CRC Press.
8. Verma, R.P. 2017. *Technology of Chicken Meat and Poultry Products*. Random Publications, New Delhi, India. 320p.
9. Select articles from journals and other sources.

PPT 423 - Physical, Chemical and Microbiological Safety of Poultry Products 3(2+1)

Objectives

- To teach about the physical, chemical and microbiological safety of poultry meat and egg, and their products
- To teach about different food safety standards

Theory

Unit I

Quality characteristics of poultry meat and eggs. Physical, chemical, microbiological and organoleptic characteristics of poultry meat and eggs. Shelf life assessment. Sensory evaluation of poultry products. Subjective and objective evaluation.

Unit II

Microorganisms associated with spoilage of poultry products. Factors affecting microbial growth. Contamination of poultry products. Microbial spoilage of poultry meat, eggs and their products. Physical and chemical changes produced by microbes in poultry meat, eggs and their products. Meat-borne infections and intoxications. Control of microbial growth in poultry products. Microbiological standards for different poultry products.

Unit III

Introduction to Good Laboratory Practices (GLP), Good Hygienic practices (GHP) and Good Manufacturing Practices (GMP), Sanitary and Phytosanitary measures (SPS) and Food Safety System Certification (FSSC). Quality Control, quality Assurance - principles and practices, quality management systems. Food Safety and Standards Act (FSSAI, 2006 Act), Codex regulation for food products safety. ISO 9001, ISO 22000. HACCP concepts. Risk-based quality assessment. Microbial quality control. FSSAI/ BIS standards for poultry meat. Antimicrobial resistance (AMR) - Chemical residues in poultry meat, egg and their products, and their effects on the health of the consumer. Integrated fly and pest control.

Practical

Physical and chemical methods to assess the quality of poultry meat and meat products. Subjective and objective sensory evaluation of poultry products. Shelf life assessment - identification of chemical spoilage Sampling methods for the microbiological examination - Microbial evaluation of market samples of poultry meat and egg - Total Viable Count, coliform, etc. Pathogens of public health importance - *E. coli, Salmonella, Staphylococcus aureus, Campylobacter* etc. Rapid detection methods of food pathogens, chemical residues etc.

Suggested Readings

1. Hester, P.Y. 2017. *Egg Innovations and Strategies for Improvements*. Academic Press, London, United Kingdom. 625p.
2. Nollet, L.M.L. 2012. *Handbook of Meat, Poultry and Seafood Quality*. 2nd ed. Wiley-Blackwell. 562p.
3. Sahoo, J. and Chatli, M.K. 2013. *Abattoir Practices & Animal Byproducts Technology*. Narendra Publishing House, New Delhi. 650p.
4. Sams, A.R. 2001. *Poultry Meat Processing*. CRC Press. 334p.

PPT 424 - Slaughter House By-Products Technology 2(1+1)

Objectives

- To impart knowledge about the utilization and processing of animal by-products
- To develop human resource in this field

Theory

Unit I

Status and scope of slaughterhouse by-products utilization. Trade practices. Planning, design and layout of by-products plant. Classification of by-products - edible and inedible. Rendering methods and products. Yield and characteristics of rendered fat, meat cum bone meal, feather meal and blood meal.

Unit II

Utilization of blood, bones, feathers, and inedible offal. High-value low volume secondary by-products like pet food, aqua food etc. Collagen sheets, scaffolds, bone morphogenic proteins, biopeptides, biodiesel, etc. Regulations pertaining to processing and utilization of poultry by-products.

Practical

Rendering of poultry processing wastes, quantitative analysis and quality evaluation of rendered products and fat. Pet food and aqua food preparation. Visit to local by-product processing unit. Yield of by-products.

Suggested Reading

1. Aberle, E.D., Forrest, J.C., Gerrard, D.E. and Mills, E.W. 2013. *Principles of Meat Science,* 5th ed. Kendall Hunt Publishing Company, Iowa.
2. Jensen, W.K., Devine, C. and Dikeman, M. 2004. *Encyclopaedia of Meat Sciences,* Vol. I, II and III, 1st ed., Elsevier Academic Press, UK.

3. Joshi, V.K. and Sharma, S.K. 2011. *Food Processing Waste Management*. New India Publishing Agency, New Delhi. 472p.
4. Kumar, M. 2011. *Waste Disposal Systems in Slaughterhouses Suitable for Developing Countries*. 203p.
5. Mann, I. 1962. *Animal By-products: Processing and Utilization*. Food and Agriculture Organization of the United Nations, Rome.
6. Ockerman, H.W. and Hansen, C.L. 1999. *Animal By-product Processing and Utilization*. CRC Press.

DEPARTMENT OF AVIAN DISEASE MANAGEMENT

ADM 421 - Poultry Health and Biosecurity 3(2+1)

Objectives

- To impart knowledge about common diseases and disorders of poultry, diagnosis, vaccination, prevention, control and treatment.
- Biosecurity measures in the control of common poultry diseases

Theory

Unit I

Common bacterial diseases: *Salmonella*, *pasteurella*, *E.coli*, Fowl typhoid, *Mycoplasma*, infectious coryza, *Gallibacterium*, *Clostridium* etc.

Unit II

Common viral diseases: Newcastle, infectious bronchitis, infectious laryngotracheitis, Marek's, fowl pox, infectious bursal disease, egg drop syndrome - 76, avian encephalomyelitis, avian influenza, duck viral hepatitis, chicken infectious anaemia etc.

Unit III

Common fungal, parasitic and metabolic diseases: Aspergillosis, mycotoxicosis, fatty liver haemorrhagic syndrome (FLHS), gout, ascites, leg weakness, coccidiosis, ecto- and endo-parasitic infestation of poultry etc.

Unit IV

Diagnosis, vaccination, prevention, treatment and control of various poultry diseases. Principles of biosecurity - Locational, structural and operational biosecurity in Poultry farms. Water sanitation and control of water-borne diseases. Quarantine of poultry. Farm sanitation and disinfection procedures.

Practical

Ante-mortem and post-mortem examination of birds. Sample collection, despatch, processing and detection of pathogens/ etiological agents. Different sanitizers and disinfectants available and their uses. Care and contraindication of using different products. Personal hygiene and isolation. Different vaccines and routes of administration. Methods of medication. Water quality analysis, Field visit to poultry diagnostic lab.

Suggested Readings

1. Kumar, S. and Joshi, H. 2016. *Biosecurity in Poultry*. Hind Publications, Hyderabad, India. 175p.
2. Majo, N. and Dolz, R. 2019. *Atlas of Avian Necropsy*. Undated ed. Servet. 190p.
3. Pattison, M., McMullin, P., Bradbury, J.M. and Alexander, D. 2008. *Poultry Diseases*. 6th ed. Elsevier.
4. Saif, Y.M. 2008. *Diseases of Poultry*. Blackwell Publishing House.
5. Shane, S.M., Halvorson, D., Hill, D., Villegas, P. and Wages, D. 1995. *Biosecurity in the Poultry Industry*. International Book Distributing Co., Lucknow, India. 120p.
6. Thyagarajan, D. 2011. *Diseases of Poultry*. Satish Serial Publishing House.
7. Vegad, J.L. 2018. *Poultry Diseases: A Guide for Farmers & Poultry Professionals.* 2nd ed. CBS. 892p.

ADM 422 - Pet Bird Healthcare **2(1+1)**

Objectives

- To study about common diseases and disorders of pet birds, their diagnosis, vaccination, prevention and treatment
- To study about control of emerging diseases of pet birds and diagnostic techniques

Theory

Unit I

Bacterial, viral, protozoan and parasitic diseases of pet birds. Important nutritional deficiency diseases. Emerging and re-emerging diseases. Vaccination. Medication - Types of administration - General principles and precautions with emphasis on administering medication through water and feed. Disease control strategy.

Unit II

Mycotoxins and their control. Differential diagnosis of various diseases. Endo- and Ecto-parasitic control. Medication procedures - Common medicines, tonics and dose calculation.

Practical

Post mortem examination. Use of rapid disease diagnosis kits. Estimation of serum antibody titre level. Water quality standards and sanitation, fumigation, vaccination, medication and disinfection procedures. Common medicines, tonics, disinfectants and sanitizers used in pet bird rearing, its administration and dosage. Dosage calculation of medicines.

Suggested Readings

1. Beaufrere, H. and Graham, J.E. 2024. *Blackwell's Five-Minute Veterinary Consult Avian*. 2nd ed. Wiley. 564p.
2. Freeman, S. 2023. *The Beginner's Guide to Aviary Care: A Comprehensive Book*. 53p.
3. Johnson-Delaney, C.A. and Bennett, T. 2025. *Manual of Clinical Procedures in Pet Birds*. Wiley-Blackwell. 208p.
4. Rosskopf, W.J. and Woerpel, R.W. 1996. *Diseases of Cage and Aviary Birds*. 3rd ed. Williams & Wilkins. 1088p.
5. Samanta, I. and Bandyopadhyay, S. 2017. *Pet Bird Diseases and Care*. Springer.
6. Samour, J. 2016. *Avian Medicine*. 3rd ed. Elsevier.
7. Schmidt, R.E., Struthers, J.D. and Phalen, D.N. 2024. *Pathology of Pet and Aviary Birds*. 3rd ed. Wiley Blackwell.
8. Stroud, R. 2011. *Diseases of Canaries*. Read Books Ltd. 252p.
9. Wernery, U., Wernery, R., Kinne, J. and Samour, J. 2004. *Colour Atlas of Falcon Medicine*. Schlutersche. 160p.
10. Van Zon, R. 2023. *Emergency Care for Birds: A Guide for Veterinary Professionals*. CRC Press. 244p.

DEPARTMENT OF POULTRY BUSINESS AND ENTREPRENEURSHIP

PBE 421 - Business Research Methods **3(3+0)**

Objectives

- To enable students for acquiring basic knowledge in business research methods
- To develop basic skills to conduct survey researches and case studies

Theory

Unit I

Business Research: Meaning and definition, Features of business research, Theory building - Induction and deduction theory, concept, operational definition - Variable - Proposition – Hypothesis. Types of business research: Basic and applied, exploratory, descriptive and causal - Phases of business research.

Unit II

Exploratory Research: Objectives, methods, experience survey. Secondary data analysis - Case study, pilot study by focus group interview. Process of problem definition. Understand background of the problem. Determination of unit of analysis. Determine the relevant variables and state the research questions. Hypothesis and research objectives.

Unit III

Meaning of Research Design: Methods of descriptive and causal research, survey, experiments. Secondary data studies and observation. Sampling design: Simple random sampling, restricted random sampling, stratified, cluster and systematic, non-random sampling, convenient and judgment sampling. Sampling error and non-sampling error.

Unit IV

Measurement and Scaling: Nominal, ordinal, interval and ratio scale. Criteria for good measurement. Reliability and validity. Designing questionnaire. Means of survey data collection - Personal interview, telephonic mail and internet.

Unit V

Data Processing: Processing stages – Editing, coding and data entry. Descriptive analysis under different types of measurements. Percentages. Frequency table. Contingency table. Graphs. Measures of central tendency and index number. Interpretation.

Unit VI

Preparation of Research Report: Format, report writing stages, gathering material and data, make overall format, make detailed outline, write first draft, rewrite, final word processing and publishing.

Suggested Readings

1. Adams, J., Khan, H.T.A., Raeside, R. and White, D. 2007. *Research Methods for Graduate Business and Social Science Students*. 1st ed. SAGE Publications Pvt. Ltd.
2. Bhattacharyya, D.K.. 2013. *Research Methodology*. 3rd ed. Pillappa Publisher.
3. Brace, I. 2018. *Questionnaire Design: How to plan, structure and write survey material for effective market research*. 4th ed. Kogan Page.
4. Cooper, D.R. and Schindler, P.S. 2017. *Business Research Methods*. 12th ed. McGraw-Hill Education.

5. Gaur, A.S. and Gaur, S.S. 2009. *Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS*. 2nd ed. Sage Response. 172p.
6. Malhotra, N.K.. 2020. *Marketing Research: An Applied Orientation*. Pearson Education.
7. Michael, V.P. 2019. *Research Methodology in Management*. 5th ed. Himalaya Publishing House.
8. Murthy, S.N. and Bhojanna, U. 2008. *Business Research Methods*. 2nd ed. Excel Books, New Delhi.
9. Paneerselvam, R. 2004. *Research Methodology*, Prentice-Hall of India.
10. Singh, K. 2015. *Quantitative Social Research Methods*. 1st ed. SAGE Publications India. 431p.
11. Wilkinson, T.S. and Bhandarkar, P.L. 2013. *Methodology and Techniques of Social Research*. 24th ed. Himalaya Publishing House.
12. Zikmund, W.G. 2003. *Business Research Methods*. 7th ed. Thomson 748p.

PBE 422 - Computerised Accounting with Tally **2(1+1)**

Objective

- To enable the students to acquire basic knowledge in the computerised accounting systems and its applications in the area of business

Theory

Unit I

Accounting basic terms, branches of accounting. Mode of accounting - Manual acconting, computerised accounting.

Unit II

Introduction to tally - Tally interface, F11 features, F12 configaration,
company creation, accounting groups, accounting ledgers.,accounting vouchers, voucher entry.

Unit III

Inventory management with Tally - Stock group, stock items, stock category, unit of measure, godown inventory voucher, bill wise details, invoicing, cost centre, cost category.
budget and control, bank reconsliation statement, interest calculation, order processing, stock valuation methods, reorder level.

Unit IV

Tax Application in Tally - Introduction to GST, GST activation and classification, GST computation, composite GST, tax invoice, credit and debit note, returns.

Practical

Company creation - Accounting group creation, ledger creation, voucher entry. Inventory management - Stock group creation, creation of stock item, stock category creation, creation of unit of measure, invoice preparation, budget preparation. Preparation of bank reconsliation statement. GST computation, tax invoice preparation, tax returns.

Suggested Readings

1. Agarwal, N. 2004. *Tally 6.3.* Dream Tech., New Delhi.
2. Nandhini, A.K. and Nandhini, K.K. *Implementing Tally 6.3 I/c.* BPB Publications, New Delhi.

PBE 423 - e-Commerce in Agribusiness 3(2+1)

Objectives

- Understand the principles and dynamics of e-commerce within the context of agribusiness
- Learn about e-commerce platforms, technologies, and strategies for marketing and selling agricultural products online
- Explore the benefits and challenges of e-commerce adoption in agribusiness, including logistics, payment systems, and customer engagement
- Develop skills to leverage e-commerce opportunities to reach wider markets, increase sales, and improve efficiency in agricultural trade

Theory

Unit I

Introduction, meaning and forces behind E-commerce, industry framework, brief history of E-commerce, advantages of E-commerce, inter-organizational E-commerce, intra organizational e-commerce, pure v/s partial E-commerce.

Unit II

Network infrastructure for e-commerce - Internet, intranets and extranets as e-commerce infrastructure. Encryption - WWW and security encryption, transaction security, secret key encryption, public key encryption, virtual private network, implementation management issues.

Unit III

Electronic payments - overview of e-payments, digital token based electronic payment system, smart cards, credit cards / debit cards based electronic payment system, emerging financial instruments, home banking and online banking. Electronic data interchange (EDI) - Development of EDI, application of EDI in business, legal requirements in e-commerce.

Unit IV

Introduction of e-commerce in supply chain management (SCM) and customer relationship management (CRM). E-commerce standards - Introduction, types of standards, document translation standards. E-commerce platforms.

Unit V

E-commerce law - introduction, E-commerce transaction, electronic fund transaction act and regulation, forms of agreement, legal issues in Indian scenario. Mobile commerce - introduction to M-commerce, mobile computing applications, wireless application protocols, WAP technology. Web Security - Introduction to web security, firewalls and transaction security, client server network, emerging client server security threats, firewalls and network security.

Practical

E-commerce case studies of which include six success stories like India times.com, Rediff. com, Baazee. com, SAIL, ITC- E-choupal, AMUL. Digital Marketing - Introduction, effects of E-business technologies on marketing strategy. First generation marketing tools - Email marketing, online marketing, search marketing, affiliate marketing. Second generation digital marketing tools and viral marketing. Future challenges and opportunities of E-commerce.

Suggested Readings

1. Bairwa, S.L., Sen, C., Meera, L.K. and Kumari, M. 2018. *Agribusiness Management: Theory and Practices*. Write and Print Publications.
2. Mishra, A., Biswas, D. and Giri, A. 2019. *Agribusiness Management*. Himalaya Publishing House. 220p.
3. Suarker, S.P. 2020. *E-Commerce Business: The Essential Guide to E-Commerce Success, Learn All the Valuable Information You Need in Starting a Successful E-Commerce Business*. Zen Mastery Srl. 82p.

PBE 424 - Corporate Regulations **2 (2+0)**

Objective

- To familiarise the students with corporate law and to make them aware of the importance of corporate governance in the management of organisations.

Theory

Unit I

Introduction to companies act - objectives of the act, features of the act. Meaning and definition of company - Features. Kinds of companies - Private company, public company, associate company, dormant company, one-person company, small company, government company.

Unit II

Formation of companies - Promotion, role of promoters, incorporation, capital subscription, commencement of business. Pre-incorporation and provisional contracts. Document of companies - Memorandum of association, definition, contents and alteration. Doctrine of Ultravires - Articles of Association, definition, contents and alteration. Distinction between memorandum and articles, constructive notice of memorandum and articles, doctrine of indoor management - prospectus, contents, statement in lieu of prospectus, liabilities for miss statements.

Unit III

Management of companies - board and governance, director's appointment, position, powers & rights, duties and liabilities, qualification, disqualification, removal of directors. Key managerial personnel.

Unit IV

Introduction to corporate governance - Need and importance of corporate governance, corporate social responsibility. Company meetings and winding up - Requisites of a valid meeting, statutory meeting, annual general body meeting, extra ordinary meeting, board meetings, resolutions - types. Company secretary: Qualification, appointment, duties.

Unit V

Winding up: Meaning, modes of winding up, winding up by tribunal, members' voluntary winding up, creditors' voluntary winding up, consequence of winding up, liquidator - Powers, duties and liabilities.

Suggested Readings

1. Banal, K.K. 2020. *Company law and Secretarial Practices.* 5th ed. Bharat Law House.
2. Gogna, P.K. 2019. *Company Law.* 5th ed. S. Chand & Company.
3. Kuchhal, M.C. and Kuchhal, V. 2021. *Business Law.* Vikas Publishing House.
4. Puliani, R. and Mahesh, P. 2001. Manual of Companies Act Corporate Laws and SEBI Guidelines. Bharat Law House, New Delhi.
5. Bagarial A.K. 2020. *Company Law.* 8th ed. Vikas Publishing House.

6. Saxena, R.K. 2020. *Corporate Law.* 10th ed. Vikas Publishing House.
7. Singh, A. 2018. *Company Law and Practice.* 7th ed. Eastern Book Company.
8. Tulsian, P. C. 2012. *Business Law.* 10th ed. McGraw Hill Education.

PBE 425 - Food and Retail Business Management 3(2+1)

Objectives

- Understand the principles of food retail management, including product assortment, merchandising, and customer service
- Learn about inventory management, supply chain logistics, and pricing strategies in food retail operations
- Explore marketing techniques to attract and retain customers, including promotions, branding, and store layout optimization
- Develop skills to effectively manage food retail businesses, ensure food safety, and meet consumer demands in a competitive market environment

Theory

Unit I

Introduction to international food market - India's competitive position in world food trade, foreign investment in global food industry. Retail management and food retailing - The nature of change in retailing, organized retailing in India, E-tailing and understanding food preference of Indian consumer. Food consumption and expenditure pattern. Demographic and psychographic factors affecting food pattern of Indian consumer.

Unit II

Value chain in food retailing. Principal trends in food wholesaling and retailing - food wholesaling, food retailing, changing nature of food stores, various retailing formats, competition and pricing in food retailing, market implications of new retail developments, value chain and value additions across the chain in food retail, food service marketing.

Unit III

The 4 P's in food retail management - Brand management in retailing, merchandise pricing, pricing strategies used in conventional and non-conventional food retailing, public distribution system, promotion mix for food retailing, management of sales promotion and publicity, advertisement strategies for food retailers.

Unit IV

Managing retail operations - Managing retailers' finances, merchandise buying and handling, merchandise pricing, logistics, procurement of food products and handling, transportation of food products. Retail Sales Management - Types of retail selling, salesperson selection, salesperson training, evaluation and monitoring, customer relationship management. Managing human resources in retailing. Legal and ethical issues in retailing.

Practical

Understanding food retail markets. Retail markets of poultry and its product. Value chain analysis. Retail format and strategies. Market intelligence and pricing. Consumer behaviour and marketing. Importance of branding. Designing logistics and transportation plans.

Suggested Readings

1. Bajaj, C., Tuli, R. and Srivastava, V.N. 2010. *Retail Management*. Oxford University Press.
2. Dube, L., Hitsch, G.J. and Chintagunta, P.K. 2010. Tipping and compensation in the food retailing industry. *Journal of Marketing Research*, **47**(4): 516-529.
3. Food and Agriculture Organization [FAO]. 2020. *The state of food security and nutrition in the world*. https://www.fao.org/publications.
4. Gupta, S.K. and Sharma, R. 2017. Organized retailing in India: A comprehensive review. *Indian Journal of Economics and Business*, **16**(2): 179-195.
5. India Brand Equity Foundation [IBEF]. 2023. *Food processing industry in India*. https://www.ibef.org/industry/food-processing-india.
6. Kotler, P. and Keller, K.L. 2016. *Marketing management* 15th ed. Pearson Education.
7. Lal, R. 2016. *Retail marketing: A strategic approach*. Routledge.
8. McKinsey & Company. 2020. *The future of food retailing in India: Challenges and opportunities*. https://www.mckinsey.com/industries/agriculture/our-insights/the-future-of-food-retailing-in-india.
9. Ministry of Food Processing Industries [MoFPI], 2020. *Annual report 2022-23*. MoFPI, Government of India. https://mofpi.nic.in.
10. Sexton, R.J. and Isengildina-Massa, O. 2015. *Agricultural marketing and food policy*. Springer.

PBE 426 - Agricultural Marketing Regulations **3(2+1)**

Objectives

- Understand the regulatory framework governing agricultural marketing at local, national, and international levels
- Learn about marketing laws, policies, and regulations affecting the sale and distribution of agricultural products

- Explore the role of government agencies and industry organizations in enforcing marketing regulations and ensuring fair trade practices
- Develop skills to navigate compliance requirements, understand market access regulations, and mitigate legal risks in agricultural marketing activities

Theory

Unit I

Evolution of market legislation. Need and scope for market legislation. Review of agricultural produce market acts in India. Distribution of legislative powers between parliament and state assemblies. Salient features of Essential Commodities Act. Food Safety and Standards Act 2006. Consumer Protection Bill 2019. Patent Act 2002. Monopolies and Restrictive Trade Practices Act/ Competition Act 2002. Forward Markets Act 1952. Standards of Weights and Measures Act 1976. The Central Warehousing Corporation Act.

Unit II

Establishment of market - constitution of Agricultural Produce Market Committee (APMC), special market, conduct of business of the market committee, powers and duties of market committee, staff of the market committee, regulation of the contract farming trade. Role of state department of Agricultural Marketing and Directorate of Agricultural Marketing and Inspection.

Unit III

Agricultural marketing policies of the government - Administered price policies, commission for agricultural costs and prices (CACP) and its working. Policies of procurement. Levy and public distribution system. Minimum support prices. Ceiling and parity prices. Floor price scheme. Food security policy - Procurement, buffer stock, distribution, subsidies. Food zone - Agri Export Zones (AEZS)/ Export Oriented Units (EOUs).

Unit IV

Introduction and meaning of intellectual property, Brief introduction to GATT, WTO, TRIPS and WIPO, Treaties for IPR protection: Madrid protocol, Berne convention, Budapest treaty, etc. Types of Intellectual Property and Legislations Covering IPR in India: Patents, copyrights, trademark, industrial design, geographical indications, integrated circuits, trade secrets.

Unit V

Patents Act 1970 and patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, patent opposition and revocation, infringement, compulsory licensing, patent cooperation treaty, patent search and patent database.

Practical

Evolution and historical perspectives of Agricultural Marketing Legislation, Marketing tax and fees, different agents involved in marketing practices, study on different agricultural marketing models, Review of agricultural marketing policies. Study on reform in agricultural marketing sectors in India. Presentation and group discussions on above topics. Visits to different APMC's.

Suggested Readings

1. Acharya, S.S. and Agarwal, N.L. 1994. *Agricultural Prices - Analysis and Policy*. Oxford and IBH, New Delhi.
2. Kahlon, A.S. and George, M.V. 1965. *Agricultural Marketing and Price Policies*. Allied Publishers Private Limited, New Delhi.
3. Prasad, J. 1999. *Encyclopaedia of Agricultural Marketing: Market Regulation and Development (Vol. 3)*. Mittal Publications, New Delhi.
4. Puliani, S. 2020. *The Karnataka Agricultural Produce Marketing (Regulation and Development) Act 1966*. KLJ Publications.

PBE 427 Export Management of Poultry and its' Products 3(2+1)

Objectives

- Understand the principles and practices of exporting agricultural products
- Learn about international trade regulations, documentation, and logistics specific to agricultural exports
- Explore market analysis and market entry strategies to identify and capitalize on export opportunities
- Develop skills to manage export operations effectively, negotiate contracts, and navigate global markets to maximize returns for agricultural products

Theory

Unit I

International Trade - meaning, definition, nature and scope. Salient features of international trade, differences between internal trade and international trade, advantages and disadvantages of international trade. Theories of international trade - Mercantilism, theory of absolute cost advantage, theory of comparative cost advantage and modern theory of international trade.

Unit II

Terms of trade - Meaning and types. Free trade - Meaning, advantages and disadvantages, free trade agreements. Protectionism - Meaning, advantages and disadvantages of protectionism, types of protection - tariffs, quotas, subsidies, dumping, cartels and commodity agreements.

Unit III

Balance of Trade (BoT) and Balance of Payments (BoP) - Meaning, differences between BoT and BoP, India's BoT and BoP position. Foreign exchange – Meaning, foreign exchange rate, types of foreign exchange rate, mechanisms of determining foreign exchange rate.

Unit IV

Foreign exchange market - Meaning and functions, instruments of international payments, foreign exchange control and forcodex eign exchange reserves.

Unit V

WTO - origin, structure, objectives and functions. Agreement on agriculture - Domestic support, market access and export subsidies. FAO / WHO Codex Alimentarius and SPS measures. Export procedures and documentations, types of export - direct export and indirect export, export houses - Objectives and types. Agricultural export promotion organizations - APEDA, MPEDA, Commodity Boards and State Export Promoting Agencies. India's agricultural exports and imports - Composition and trading countries. India's foreign trade policy - Meaning and objectives. Export and import regulations of India and other important countries.

Practical

International Trade. Export procedure and documentation. Preparation of proforma invoice. Export license. Bill of landing and certificate of origin. Calculation of exchange rates. Preparing export plans. Quality standards and certification. Mapping India's agricultural trade policies for poultry exports. Visit to export promotion organisations/exporting firms.

Suggested Readings

1. Kumari, P. 2022. *Agricultural Exports of India*. Meena Book publications. 153p.
2. Lokanadhan, K. 2009. *Innovations in Agri-Business Management*. New India Publishing Agency. 370p.
3. Paul, J. and Aserkar, R. 2013. *Export Import Management*. 2nd ed. Oxford Press India.
4. Sheth, R.B., Thoke, N. and Kulkarni, A.V. 2022. *Management of Agribusiness and Agri Exports*. Nirali Prakashan. 132p.
5. Vyas, M.K. 2008. *Glimpse of Indian Poultry Industry*. Hind Publications, Hyderabad, India.161p.