

SEMESTER –V

COURSE NO.	COURSE TITLE	CREDIT HOURS
VPT-311	General and Systemic Veterinary Pharmacology	2+1=3
VMC-311	Systematic Veterinary Bacteriology & Mycology	2+1=3
VPP-311	Special Veterinary Pathology	2+1=3
VPE-311	Milk and Meat Hygiene, Food Safety and Public Health	2+1=3
LPT-311	Milk and Milk Products Technology	1+1=2
LPT-312	Abattoir Practice and Animal Product Technology	1+1=2
VAE-311	Principles and Techniques of Veterinary and A H. Extension	2+1=3
Total Credits		12+7=19

VPT-311: GENERAL AND SYSTEMIC VETERINARY PHARMACOLOGY

Credit Hours 2+1= 3

THEORY

Historical development branches and scope of Pharmacology. Sources and nature of drugs. Pharmacological terms and definitions. Principles of drug activity: Pharmacokinetics - Routes of drug administration, absorption, distribution, biotransformation and excretion of drugs. Pharmacodynamics-Concept of drug and receptor, dose-response relationship, terms related to drug activity and factors modifying the drug effect and dosage. Fundamentals of drug-screening and assay of drugs. Adverse drug reactions, drug interaction, drug- designing and development, bio prospecting of drugs. Introduction to biopharmaceutics and gene therapy. Drugs acting on digestive system: Stomachics, antacids and antiulcers, prokinetics, carminatives, antizymotics, emetics, antiemetics, purgatives, antidiarrhoeals, cholerectics and cholagogues. Rumen pharmacology.

Drugs acting on Cardiovascular system: cardiac glycosides, antiarrhythmic drugs, vasodilators and antihypertensive agents, haematjnic, coagulants and anticoagulants. Drugs acting on respiratory system: Expectorants and antitussives, respiratory stimulants, bronchodilators and mucolytics.

Drugs acting on urogenital system: Diuretics, urinary alkalizers, and acidifiers, fluid therapy, ecobolics and tocolytics.

Pharmacotherapeutics of hormones and vitamins.

Drugs acting on skin and mucous membranes: Emollients, demulcents and counter irritants. Bio-enhancers, Immunostimulants and immunosuppressants. New drugs and drug formulations.

PRACTICAL

Pharmacy appliances. Principles of compounding and dispensing.

Metrology: systems of weights and measures, pharmacy calculations. Pharmaceutical processes. Pharmaceutical dosage forms Prescription writing, incompatibilities. Drug standards and regulations, Custody of poisons. Compounding and dispensing of powders, ointments, mixtures, liniments, lotions, liquors, tinctures, emulsions, and electuaries.

VMC- 311: SYSTEMATIC VETERINARY BACTERIOLOGY AND MYCOLOGY C

redit Hours 2+1=3

THEORY

Study of following important pathogenic bacteria and fungi in relation to their morphology, isolation, growth, colonial, biochemical and antigenic characters. Pathogenicity and diagnosis of bacterial and fungal diseases caused by the following genera:

Bacteria: *Staphylococcus*, *Streptococcus*, *Bacillus*, *Clostridium*, *Mycobacterium*, *Enterobacteriaceae* (*E.colii*, *Salmonella*, *Yersinia*, *Klebsiella* and *Proteus*), *Campylobacter*, *Brucella*, *Pasteurella* and *Mannheimia*, *Pseudomonas* and *Burkholderia*, *Moraxella*, *Haemophilus* and *Taylorella*, *Listeria*, *Actinobacillus*, *Actinomyces*, *Arcanobacterium* and *Corynebacterium*, *Nocardia*, *Dermatophytes*, *Spirochetes*, *Gram negative anaerobes*, *Mycoplasma*, *Rickettsia*, *Chlamydia* and *Chlamydophila*. Fungi: *Dermatophytes*, *Rhizopus*, *Sporothrix*, *Candida*, *Mycetozoa*, *Cryptococcus*, *Aspergillus*, *Zygomycetes* and *Dimorphic fungi*. Mycotic mastitis and abortion. Mycotoxicoses.

PRACTICAL

Laboratory identification of agents of Mastitis, Haemorrhagic septicaemia. Enteric infections. Brucellosis. Tuberculosis and Johne's disease, Clostridial infections, Wooden tongue and Lumpy jaw, Anthrax, Glanders, Aspergillosis. Dermatophytosis, Demonstration of other agents of importance (Phycomycetes, yeasts etc.).

REFERENCE TEXTBOOKS

1. Veterinary Microbiology - Dwight C. Hirsh
2. Veterinary Microbiology & microbial diseases - Quinn, Markey & Carter
3. Clinical Veterinary Microbiology - Quinn & Carter
4. Essentials of Veterinary Microbiology - Carter & Wise

VPP- 311: SPECIAL VETERINARY PATHOLOGY

Credit Hours 2+1=3

THEORY

General pathology of viral infections. Pathogenesis, gross and microscopic pathology of Foot and mouth disease, Rinderpest, malignant catarrhal fever, blue tongue, infectious bovine rhinotracheitis, bovine viral diarrhoea, caprine encephalitis-arthritis complex, PPR, equine infectious anaemia, equine influenza, equine viral arteritis, equine rhinopneumonitis, African horse sickness, classical swine fever, Aujeszky's disease, swine influenza, rabies, canine distemper, infectious canine hepatitis, canine parvovirus, feline panleukopenia, maedi, jaagziekte, scrapie, bovine and feline spongiform encephalopathies, pox virus diseases in different animals. Vesicular stomatitis, vesicular exanthema, equine encephalomyelitis, diseases caused by rota and corona viruses,

General pathology of bacterial infections. Pathogenesis, gross and microscopic pathology of Tuberculosis, Johne's disease, actinomycosis, actinobacillosis, anthrax, clostridial group .of diseases, streptococosis including strangles in horses, staphylococosis, glanders, pasteurellosis, leptospirosis, listeriosis, swine erysipelas, brucellosis, corynebacterium infections, nocardiosis, campylobacteriosis, Hemophilus, salmonellosis and colibacillosis in swine.

General pathology of mycoplasmal, chlamydial and rickettsial infections and their differentiation. Pathogenesis, gross and microscopic pathology of contagious bovine pleuropneumonia (CBPP), contagious caprine pleuropneumonia (CCPP), porcine enzootic pneumonia, chlamydial group of diseases and anaplasmosis, Q-fever and ehrlichiosis. General pathology of mycotic infections. Pathogenesis, gross and microscopic pathology of superficial and .deep mycoses - ringworm, favus, aspergillosis, zygomycosis, histoplasmosis, cryptococcosis and candidiasis.

General pathology of helminthic and protozoal infections. Pathogenesis, gross and microscopic pathology of fascioliasis, amphistomiasis, ascariasis, strongylosis, hemonchosis, spirocercosis, filariasis, hookworm, tapeworm infections, coccidiosis, toxoplasmosis, babesiosis,

theileriasis and trypanosomiasis. Pathological changes in nutritional and metabolic diseases: (deficiency/excess of carbohydrates, proteins, fats, minerals and vitamins and in conditions like milk fever, pregnancy toxemia, post-parturient haemoglobinuria, ketosis, hypomagnesemic tetany, azoturia, piglet anaemia and sway back/enzootic ataxia and Rheumatism like syndrome).

General pathology of toxicosis. Pathogenesis, gross and microscopic pathology of heavy metal toxicities like arsenic, copper, lead, mercury, cadmium, strychnine, nitrate/nitrite, hydrocyanic acid (HCN), fluoride, oxalate toxicities, insecticide/pesticide poisoning. Pathogenesis, gross and microscopic pathology of aflatoxicosis, ochratoxicosis, trichothecosis and ergototoxicosis. Pathology of exotic and emerging diseases.

PRACTICAL

Post-mortem examination of large and small animals for diagnosis of special diseases. Study of gross lesions particularly those of pathognomonic significance. Study of histopathological slides pertaining to special pathology including special staining of causative agents. Study of rapid diagnostic techniques like biopsy, exfoliative cytology, frozen sectioning.

VPE-311: MILK AND MEAT HYGIENE, FOOD SAFETY AND PUBLIC HEALTH

Credit Hours 2+1=3

THEORY

Milk hygiene in relation to public health. Microbial flora of milk and milk products. Sources of milk contamination during collection and transport of milk and processing of dairy products. Control of milk and milk product contamination. Hygienic handling/ management of dairy equipment Quality control of milk and milk products. Milk hygiene practices in India and other countries. Legislation and standards for milk and milk products. Milk as a source of disease transmission.

Pathological conditions associated with the transport of food animals. Elements of meat inspection. Hygiene in abattoirs. Ante-mortem inspection of meat animals. Humane slaughter of animals. Postmortem inspection of meat animals. Methods of inspection of meat. Rigor mortis and examination of lymph nodes. Speciation of meat. Health implications of emergency and causality slaughter. Hygienic disposal of unsound meat. Inspection of poultry and aquatic foods (fish) for human consumption. Occupational health hazards in meat processing plants. Meat as a source of disease transmission. Food safety, definition, hazard analysis and critical control point (HACCP) system and chemical and microbial toxicities associated with milk, meat and aquatic foods. Risk analysis: assessment and management and food safety measures. Toxic residues (pesticides, antibiotics, metals and hormones) and microbial toxins in food and their health hazards. Types of bio-hazards. Sanitary and phytosanitary measures in relation to foods of animal origin and aquatic foods. International and national food safety standards {Office International des Epizootics (OIE), World Trade Organisation (WTO), Sanitary and Phytosanitary (SPS) and Codex Alimentarius}.

PRACTICAL

Sanitary collection of samples for chemical and bacteriological examination. Grading of milk by MBR test Test for pasteurization and plant sanitation. Microbiological examination of raw and pasteurized milk, milk products and water. Standard plate, coliform, faecal streptococcal, psychrophilic, mesophilic and thermophilic counts. Detection of adulterants and preservatives in milk and milk products. Isolation and identification of organisms of public health significance from milk.

Visit to abattoirs, meat processing plants, marketing centers and food service establishments. Ante-mortem and post mortem inspection of food animals. Methods of slaughter (demonstration at the slaughter houses). Demonstration of speciation of meat. Physical and bacteriological quality of meat and aquatic foods (fish). Demonstration of toxic chemical and microbiological residues in milk and meat

LPT- 311: MILK AND MILK PRODUCTS TECHNOLOGY

Credit Hours 1+1=2

THEORY

Milk Industry in India. Layout of milk processing plant and its management, Composition and nutritive value of milk and factors affecting composition of milk. Physico-chemical properties of milk. Microbiological deterioration of milk and milk products. Collection, chilling, standardization, pasteurization, homogenization, bactofugation. Principles of dehydration. Preparation of butter, paneer/channa, ghee, khoa, lassi, dahi, ice-cream, Cheddar cheese and dairy byproducts, Good Manufacturing Practices. Implementation of HACCP. Toxic/pesticides residues in milk and milk products. Packaging, transportation, storage and distribution of milk and milk products. Organic milk food products. Legal and BIS standards of milk and milk products. Sanitation in milk plant

PRACTICAL

Sampling of milk, estimation of fat, solid not fat (S.N.F.) and total solids. Platform tests. Cream separation. Detection of adulteration of milk. Determination of efficiency of pasteurization. Microbiological quality evaluation of milk and milk products. Preparation of milk products like curd, ghee, paneer/channa, khoa, ice-cream, milk beverages. Visit to Modern milk processing and milk manufacturing plants.

REFERENCE BOOKS

1. Outline of Dairy Technology by Sukumar De (1985) - Oxford University Press, Delhi.
2. The Technology of Milk Processing by Anantha Krishnan C.P., Khan A.Q., Padmanabhan P.N. (1991) - Shri Lakshmi Publication, Chennai.
3. Milk Products Preparation and Quality Control by Anantha Krishnan C.P., Khan A.Q., Padmanabhan P.N. (1993) - Shri Lakshmi Publication, Chennai.
4. Milk and Dairy Products properties and processing by Rosenthal I (1991), VCH New York.
5. Milk and Milk processing by Herrington BL (2000). Greenworld Publ., New Delhi.

LPT-312: ABATTOIR PRACTICES AND ANIMAL PRODUCTS TECHNOLOGY Credit Hours 1+1=2

THEORY

Layout and management of rural, urban and modern abattoirs. BIS standards on organization and layout of abattoirs, Pre-slaughter care, handling and transport of meat animals including poultry. Ante-mortem and post-mortem examination. Slaughtering and dressing of carcasses. Evaluation, grading and fabrication of dressed carcasses including poultry.

Abattoir byproducts: meat, bone, fish meal and byproducts of pharmaceutical value. Skin and hides: methods of flaying, defects and preservation Management of organic wastes emanating from animal industries, fallen animals and abattoir effluent. HACCP concepts in abattoir management. Introduction to wool, fur, pelt and specialty fibers with respect to processing industry. Glossary of terms of wool processing. Basic structure and development of wool follicle. Post shearing operations of wool, classification and grading of wool, physical and chemical properties of wool. Impurity of wool, factors influencing the quality of wool. Brief outline of processing of wool, tests for Identification of wool.

PRACTICAL

Methods of ritual and humane slaughter, flaying and dressing of food animals including poultry. Carcass evaluation. Determination of meat yield, dressing percentage, meat bone ratio and cut up parts. Preparation of different abattoir byproducts. Visit to leather processing unit and slaughterhouses/meat plants. Wool sampling techniques, determination of fleece density, fiber diameter, staple length, crimp and modulation percentage, scouring/clean fleece yield. Visit to wool production/ processing centre.

VAE- 311:PRINCIPLES AND TECHNIQUES OF VETERINARY AND ANIMAL HUSBANDRY EXTENSION Credit Hours 2+1=3

THEORY

Concept of Sociology. Man-animal relationship (Society, Community, Association, institutions). Difference in livestock production practices of rural, urban and tribal communities including rearing patterns. Social change and factors of change. Social groups, its types and functions. Social transformation in relation to animal rearing. Evolution of veterinary and animal husbandry extension in India. Extension education: definition, philosophy and principles.

Concept of Community development Teaching learning process, steps of teaching. Extension teaching methods; their classification and use. Information delivery system in Veterinary and Animal Husbandry extension. Information communication technology.

Role of animals in economy, health and socio-psychology of rural, semi urban and urban society. Client and stakeholder dealings: techniques and procedures including tools for data collection, analysis, history taking, follow-up and appraisal on prognosis. Adoption and diffusion of livestock innovations. Leadership and role of leaders in animal husbandry extension.

Farming in rural India - large and small scale farming, mixed farming, co-operative and collective farming, contractual farming, Co-operative Farming for Live Stock Production, Advantages and limitations of cooperatives. Economic principles underlying co-operative societies, co-operative milk unions in India Social survey and its types. Social sampling. Identification of key communicators and operating through them. Identifying organizational difficulties in the way of organizing animal husbandry extension programmes. Identification of constraints in the adoption of improved animal husbandry practices. Animal Husbandry programme planning and evaluation. Feedback evaluation of extension programmes and their impact analysis. Panchayati Raj Institutions, Krishi Vigyan Kendra (KVK), Animal Husbandry Development Programmes in Cattle, buffalo, sheep, goat poultry, rabbit and piggery.- Key village scheme, Gosadan/Goshala. Integrated Cattle Development Programme (ICDP), Integrated Rural Development Programme (IRDP), Agricultural Technology Management Agency (ATMA). Gender considerations in Veterinary practice. Changing expectations from new recruits to the profession and employers of veterinarians. Growing changes in corporate, client influence and changes in work ethics. Information communication technologies. Virtual class room and self learning. E-learning. Information kiosks. Agriculture portals. E-commerce- scope and local application. Computer aided teaching/learning, web-sites dedicated to veterinary and animal sciences education, web directories and virtual learning institutions (e-institutions).

PRACTICAL

Audio-visual equipments. Principles and use of overhead, slide and multimedia projectors, digital video/still camera. Preparation and use of visual aids like posters, charts, flash cards, flipcharts, etc. Use of literature and media in Extension. Identification of key elements in social sampling of data. Collection and analysis of data. Identification of key communicators and operation programme. Enumeration of organizational difficulties in animal husbandry extension programmes. Identification of constraints in the adoption of improved animal husbandry practices. Constraint analysis.

Group discussions, techniques and procedures for awareness campaigns on different veterinary and animal husbandry practices - signs of diseases, preservation of eggs, clean milk production, controlling of ectoparasites, pail feeding of calves, sexing and culling of birds, first aid for minor wounds, disinfection of byres, branding, use of horn cauterization, timely A. I., choice of good progeny, care in pregnancy, infertility, environments! hygiene, preparation of feeds and feeding schedules, deworming, preventive hygiene, vaccination etc. Organization of animal welfare camps, exhibition, livestock shows etc. Hands on training in the use of computers for teaching and information dissemination. Rapid Rural Appraisal/Participatory Rural Appraisal in identifying livestock production/health care practices.

REFERENCE BOOKS

1. **Adams, M. E.** 1982. Agricultural Extension in developing countries. ELBS with Longman & Scientific and Technical, Essex, England
2. **Falvey, L and Chantalakhana, C.** (eds).1999. Small Holder Dairying in the Tropics, ILRI (International Livestock Research Institute), Nairobi, Kenya
3. **Jervig, C.** 1996. Managing a Veterinary Practice. W. B. Saunders Company Ltd. London
4. **Kulandaiswamy, V.** 1986. Co-operative Dairying in India. Rainbow Publications, Coimbatore.
5. **Oakley, P and Garforth, C.** 1985. Guide to Extension Training. FAO of the United Nations, Rome
6. **Ramkumar, S., Garforth, C., Rao S.V.N. and Waldie, K** (eds).2001. Landless Livestock Farming : Problems and prospects. *Proceedings of the Workshop* held on 29 January 2001, RAGACOVAS, Pondicherry
7. **Sandhu, A.S.**1993. Textbook on Agricultural Communication : Process and methods. Oxford and IBH Publishing Co. Pvt. Ltd.
8. **Sastry, N.S.R, Reddy, D.P.R. and Hermon,R.R.** 1993. Planning for Development of Animal Husbandry Sector. National Institute of Rural Development, Hyderabad
9. **Sastry, N. S. R and Thomas, C. K.** 2005. Livestock Production Management, Kalyanai Publishers, Ludhiana: Chapters on " *Extension and livestock development, Livestock Extension, Participatory and Rapid Rural Appraisal*"
10. **Swanson, B.E.** (ed), 1993. Agricultural Extension- A Reference Manual. FAO of The United Nations, Rome
11. **Van den Ban A. W & Hawkins. H. S.** 1996. Agricultural Extension. Blackwell Sciences, Oxford.
12. **Waldie,K. and Ramkumar. S.** 2002. Landless women and dairying: the opportunities for development within a poverty perspective".RAGACOVAS, Pondicherry
13. **Chitambar, J.B** (1993). Introductory Rural Sociology.
14. **Kuppuswamy,B.** (1994). Social Change in India
15. **Indian Society of Agricultural Economics** (1989). Livestock Economy of India.
16. **Dahama, O.P & O.P.Bhatnagar** (1994). Education and Communication for development.
17. **Hans Raj** (1992). Theory and Practice in Social Research.
18. **Directorate of Extn. Govt. of India** (1961). Extension Education in Community development