

SEMESTER-VI

COURSE NO.	COURSE TITLE	CREDIT HOURS
VPT-321	Veterinary Neuropharmacology	2+1=3
VMC-321	Systematic Veterinary Virology	2+1=3
VPP-321	Avian Pathology	1+1=2
VPP-322	Aquatic Animal Diseases, Health Care and Management	1+1=2
VPE-321	Veterinary Epidemiology and Zoonosis	2+1=3
LPT-321	Meat Science	1+1=2
VPB-321	Animal Biotechnology	2+1=3
VAE-321	Livestock Economics, Marketing and Business Management	2+1=3
Total Credits		13+8=21

VPT-321: VETERINARY NEUROPHARMACOLOGY

Credit Hours 2+1=3

THEORY

Drugs acting on autonomic nervous system: Neurohumoral transmission, adrenoceptors agonists and antagonists, adrenergic- neuron blockers, cholinceptors agonists and antagonists, ganglionic stimulants and blockers.

Autacoids: Histamine and antihistamine agents, 5-Hydroxytryptamine and its antagonists, prostaglandins, angiotensin and bradykinin.

Drugs acting on central nervous system (CNS): Pharmacology of neurotransmitters History of general anaesthetics and theories of anaesthesia. Inhalent, intravenous and dissociative anaesthetics; hypnotics and sedatives; tranquilizers, psychotropic drugs, anticonvulsants, opioid analgesic, nonsteroidal anti-inflammatory drugs, analeptics and other CNS stimulants, central muscle relaxants.

Drugs acting on somatic nervous system: Local anaesthetics and peripheral muscle relaxants. New drugs and drug formulations.

PRACTICAL

Demonstration of the effect of CNS depressants, analgesics, CNS stimulants, muscle relaxants, anticonvulsants, local anaesthetics in laboratory animals.

Demonstration of the action of adrenergic and cholinergic agonists and antagonists on isolated and intact preparations of the animals

Alternate use of animals as model for demonstration

VMC- 321: SYSTEMATIC VETERINARY VIROLOGY

Credit Hours 2+1=3

THEORY

Brief history, classification and characteristics of various families of DNA and RNA viruses causing diseases in livestock and poultry, laboratory diagnostic techniques, immunity to viral infections, systemic virology including: DNA viruses: **Poxviridae**: Pox viruses of cow, sheep, goat and fowl **Asfarviridae** African swine fever, **Herpesviridae**: Aujeszky's disease, malignant catarrhal fever, infectious bovine rhinotracheitis, equine abortion. Marek's disease, infectious laryngotracheitis. **Adenoviridae** - Infectious canine hepatitis, egg drop syndrome (EDS), Inclusion body hepatitis-Hydropericardium syndrome (IBH-HPS). **Papillomaviridae**: Papillomatosis, **Parvoviridae**: Canine Parvovirus. **Circoviridae**: Chicken infectious anaemia. RNA viruses: **Orhomyxoviridae**: Swine, equine and Avian influenza. **Paramyxoviridae**: Rinderpest, PPR, canine distemper and Ranikhet disease, **Flaviviridae**: Classical swine fever, bovine viral diarrhoea. **Piconaviridae**: - foot and mouth disease (FMD), duck viral hepatitis, **Rhabdoviridae**: - Rabies, vesicular stomatitis, ephemeral fever, **Coronaviridae**: - Avian Infectious bronchitis, transmissible gastroenteritis, **Togaviridae**: - Equine encephalitis, Arteriviridae: equine viral arteritis, Caliciviridae: vesicular exanthema, **Retroviridae**: Avian leucosis group. Lentiviruses- Equine infectious anemia virus, Sheep pulmonary adenomatosis, MaediVisna. **Reoviridae**: African horse sickness and blue tongue, Calf Rotavirus, **Birnaviridae**: Infectious bursal disease. Prions, Exotic and emerging animal and poultry viruses.

PRACTICAL

Glassware and media preparation, Demonstration of Cell culture, virus propagation by egg inoculation, animal inoculation and cell culture, study of cytopathogenesis, viral inclusions, diagnostic procedures, serological techniques, preservation and transportation of clinical samples for virological investigations. Diagnostic procedures for Peste des petits ruminants (PPR), FMD, Ranikhet disease (RD), Blue tongue, Infectious bronchitis (IB), Infectious bursal disease (IBD) and other viral agents.

REFERENCE BOOKS

1. Veterinary Virology - Murphy, Gibbs, Horzineck and Studert
2. Essentials of Veterinary Microbiology - Carter & Wise
3. Veterinary Microbiology & microbial diseases - Quinn, Markey & Carter
4. Veterinary Microbiology - Dwight C. Hirsh

VPP-321: AVIAN PATHOLOGY

Credit Hours 1+1=2

THEORY

Viral Diseases: Pathogenesis, gross and microscopic pathology of Ranikhet disease, infectious bursal disease, infectious bronchitis, infectious laryngotracheitis, fowl pox, avian influenza, Marek's disease, leukosis/sarcoma group of diseases, avian encephalomyelitis, inclusion body hepatitis, hydropericardium syndrome, chicken infectious anaemia Avian nephritis, egg drop" syndrome, infectious stunting syndrome, reovirus infections.

Bacterial Diseases: Pathogenesis, gross and microscopic pathology of Colibacillosis (colisepticaemia, yolk sac infection, egg peritonitis, coligranuloma). infectious coryza, clostridial diseases (botulism, necrotic enteritis, gangrenous dermatitis, ulcerative enteritis), salmonellosis (Pullorum disease, fowl typhoid, paratyphoid infection), fowl cholera, tuberculosis and spirochaetosis

Mycoplasmal and Chlamydial Diseases: Pathogenesis, gross and microscopic pathology of Mycoplasma gallisepticum infection (chronic respiratory disease), Mycoplasma synoviae infection, Avian chlamydiosis (psittacosis).

Fungal Diseases: Pathogenesis, gross and microscopic pathology of aspergillosis, thrush and favus. Mycotoxicosis: Pathogenesis, gross and microscopic pathology of Aflatoxicosis, ochratoxicosis and trichothecenes.

Parasitic Diseases: Pathogenesis, gross and microscopic pathology of Helminthic diseases (flukes, cestodes, nematodes), protozoal diseases (coccidiosis, histomoniasis), ectoparasites, Avian malaria Nutritional and metabolic diseases: Pathogenesis, gross and microscopic pathology of major diseases due to deficiency/excess of carbohydrates, proteins, minerals and vitamins in poultry Vices and Miscellaneous Diseases: Pathology of important vices and miscellaneous conditions. Pathology of exotic and emerging poultry diseases.

PRACTICAL

Post mortem examination and diagnosis of poultry diseases based upon clinical signs and gross lesions Writing of postmortem report. Collection, preservation and dispatch of morbid materials in poultry diseases. Clinical examination of blood, faeces and other tissues/fluids for poultry disease diagnosis Submission of feed samples for analysis. Study of gross specimens and histopathological slides of different diseases of poultry.

VPP-322AQUATIC ANIMAL DISEASES, HEALTH CARE AND MANAGEMENT

Credit Hours 1+1=2

THEORY

Introduction to aquatic animals, aquatic animal ecology and national economy. Fishery as a method of recycling animal and poultry wastes and feed surplus. Types of common aquatic animals, fresh and saline water fish, their collection. Care and breeding, egg and spawn management. Integrated aquaculture. Ornamental fisheries. Aquatic animal feeds and feeding. Economic production; Pond and nursery management Inland and marine capture fisheries. Stock assessment and population dynamics. Fish harvesting and process technology, fish preservation, inspection, utilization of fish in animal feed. Anatomy, physiology, immunology and inflammatory response in finfish and shellfish (crustaceans and mollusks). OIE regulations related to aquatic animal health. Viral, bacterial, mycotic and parasitic diseases affecting aquatic animals. Nutritional and toxic pathology. Miscellaneous non-infectious diseases associated with physicochemical abnormalities of water. Neoplasia of teleosts. Vaccines and vaccination.

PRACTICAL

Identification of culturable fishes. Techniques to study growth and age in fishes. Composite fish culture techniques. Management of artificial diets, induced breeding techniques. Determination of hydrological parameters, qualitative and quantitative analysis of phyto-and zoo-planktons. Fishing gears and crafts. Management of a typical fish farm.

Normal anatomy and histology of finfish and shellfish. Ante-mortem and post-mortem examination of fish. Haematology. Histopathology of important viral, bacterial, fungal and parasitic diseases. Visit to organized fishery.

(To be taught jointly with Departments of Livestock Production Management and Veterinary Medicine)

REFERENCE BOOKS

1. Veterinary Pathology (199) Jones, Hunt, King William & Wilkins
2. Pathologic Basis of Veterinary Disease 4th Ed. (2007) M. McGavin, and James Zachary Mosby Press, 2006. ISBN: 0323028705
3. Veterinary Pathology 6th Ed. (2003). Ganti Sastri and Rama Pao. CB Publishers, New Delhi
4. Textbook of Veterinary General Pathology 2nd Ed. (2007). J. L. Vegad, I.B. D.C, Lucknow
5. Thomsons' Special Veterinary Pathology (2005). Carlton, McGavin and Zachary. Mosby Publications
6. Textbook of Special Veterinary Pathology-Infectious Diseases of Livestock and Poultry. J.L. Vegad. IBDC publishers
7. Veterinary Pathology in the Tropics- For Students & Practitioners (2000). Gerald Munene Mugeru. New Age International (P) Ltd, New Delhi.
8. Necropsy: Simplified procedures and Basic diagnostic methods for practicing veterinarians. Strafuss, A.C and Charles C. Thomas Springfield
9. Schalm's Veterinary Hematology, 5th Edn. (2000). Feldman, Zinkl and Jain. Lei Febiger
10. Veterinary Clinical Laboratory Procedures (1996). Sirois, Margi ,McBride, Douglas F. C.V. Mosby, USA
11. Color Atlas of Veterinary Pathology (2006). Jaap Van Dijk, Erik Gruys, Johan Mouwen,ISBN-13: 978-0-7020-2758-1 Saunders
12. Pathology of Laboratory Rodents and Rabbits 2nd Ed (2001). Dean Percy and Stephen Barthold. ISBN: 0-8138-2551-2, Blackwell

VPE- 321: VETERINARY EPIDEMIOLOGY AND ZONOOSES

Credit Hours 2+1 =3

THEORY

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

Definition, history and socio-economic impact of zoonotic diseases. Classification of zoonoses and approaches to their management. New, emerging, re-emerging and occupational zoonoses. . Role of domestic, wild, pet and laboratory animals and birds in transmission of zoonoses. Zoonotic pathogens as agents of bio-terrorism. Reservoirs, clinical manifestations in animals and humans, and the management of the following zoonoses: rabies, Japanese encephalitis, Kyasanur forest disease, influenza, anthrax, brucellosis, tuberculosis, leptospirosis, listeriosis, plague, rickettsiosis, chlamydiosis and dermatophytosis. Food borne zoonoses: salmonellosis, staphylococcosis, clostridial food poisoning, campylobacteriosis, helmintriosis.toxoplasmosis and sarcocystosis. Veterinary Public Health Administration.

PRACTICAL

Collection of epidemiological samples. Measurement of disease: determination of morbidity and mortality rates/ratios. Generation of epidemiological protocols and reports. Demonstration of selected software programmes/models e.g. EPIZOO, HandiSTATUS and India-Admas-EPITRAK. Evaluation of vaccines and diagnostic tests. Determination of Associations and risks: relative risk, Odd's ratio and attributable risk. Survey of an animal disease on a farm. Field survey of zoonotic diseases. Concurrent isolation and identification of important pathogens of zoonotic importance from animal and human sources including foods of animal origin and their interpretation. Study of rural environment and health status of rural community. Visit to primary health centre/human hospital and study of the common diseases affecting rural/urban population, and probable relationships of these human disease conditions with animal diseases present in the area.

LPT-321: MEAT SCIENCE**Credit Hours 1+1 = 2****THEORY**

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

PRACTICAL

Chilling/freezing of meat, meat products and aquatic foods. Ageing of meat preservation and packaging of meat aquatic foods and shell eggs and their products. Determination of microbial loads in various animal food products, estimation of deteriorative changes in meat and meat products. Preparation of ready-to-eat meat/poultry products. Evaluation of external and internal egg quality, preservation technique of eggs.

REFERENCE BOOKS

1. Meat Hygiene for Developing countries by Joshi BP (1994) - Almora Book Depot, UP.
2. Processing and utilization of animal by-products by Mann I (1962) - FAO Rome.
3. Animal Blood Processing & Utilization by Divakaran S (1982) - FAO Rome
4. Meat Hygiene (10th ed.) by Gracey JF, Collins DS and Huey RJ (2000) - WB Saunders Co. Ltd.
5. Meat Science - An Introductory Text by Warris PD (2000) - CABI Publ. Co., UK.
6. Principles of Meat Science (3rd Ed) by Hedrick HB, Aberle ED, Forrest JC, Judge MD and Markel RA (1994) - WH Freeman & Co., New York.
7. Meat Science (6th Ed.) by Lawrie RA (2002). - Pergmon Press UK.
8. The Technology of Food Preservation (Fist Edition) Desrosier MW and Desrosier JN - CBS Publ. N.Delhi.

VPB-321 : ANIMAL BIOTECHNOLOGY**Credit Hours 2+1=3****THEORY:**

Definitions, basic concepts and scope of animal biotechnology. Recombinant DNA.technology. Gene cloning, vectors and expression vectors. Transformation and transfection. Polymerised chain reaction (PCR), construction of genomic library and cDNA library. DNA sequencing. Principles of transfer of nucleic acids and proteins (Southern, Northern and Western blotting), Nucleic acid hybridization, DNA probes and DNA fingerprinting.

Biotechnological application in animal improvements:

Embryo biotechniques, *in-vivo* and *in- vitro* embryo production and preservation, sexing, micromanipulation and cloning, transgenic animal and biopharming. Mapping of genome and genome sequencing. Marker assisted selection. Gene banking. Nutritional biotechnology including bioconversion of lignocellulose, genetic manipulation of microbes for improved feed utilization and health. Animal tissue culture, transformation and cell lines, tumor markers and acute phase proteins

Molecular diagnosis including PCR and DNA probes. Hybridoma and monoclonal antibodies. New generation vaccines: Subunit recombinant and recombinant vectored vaccines Fermentation process and technologies for milk, meat and leather. Ethics arid regulatory issues in Biotechnology. IPR. Bioinfomnatics.

PRACTICAL

DNA and plasmid isolation. Gel electrophoresis. PCR. Screening of gametes and embryo. Use of Multimedia and audio-visual aids for molecular biology aspects.

(The course is to be taught jointly with the Departments of Veterinary Microbiology and Veterinary Gynaecology and Obstetrics)

REFERENCE BOOKS

1. **Harper's Biochemistry.** XXV edition. 2002. Robert K. Murray; Daryl K Granner; Peter A. Mayes & Victor W. Rodwell. Published by McGraw - Hill Health professions Division, London.
2. **Textbook of Biochemistry.** IV edition. 1974. Edward Staunton West; Wilbert R. Todd; Howard S. Manson & John T. Van Brugeen. Published by Oxford and IBM publishing co. Pvt. Ltd., New Delhi.
3. **Biochemistry.** V edition. 2002. Jeremy M. Berg; John L. Tymoczko & Lubert Stryer. Published by W.H.Freeman & company, New York.
4. **Biochemistry - A concise text for Medical Students.** V edition. 1992. D. K. Apps; B. B. Cohen & C. M. Steel. Published by ELBS with Bailliere Tindall.
5. **Lehninger Principles of Biochemistry.** IV edition. 2005. David L. Nelson & Michael M. Cox. Published by Wily Freeman & Company, New York.
6. **Fundamentals of Biochemistry for Medical Students.** VII edition. 1998. Ambika Shanmugam. Published by the Author, Chennai.
7. **Introduction to Biotechniques - PCR.** II edition. 1997. C. R. Newton & A. Graham. Published by BIOS Scientific Publishers ltd. Oxford.
8. **Textbook of Medical Physiology.** X edition. 2000. Arthur C. Guyton & John E. Hall. Published by W. B. Sauders company - A Harcourt health Science company, Singapore.
9. **Biochemistry.**1993. S. C. Rastogi. Published by Tata McGraw-Hill Publishing company ltd., New Delhi.
10. **Biochemistry and Molecular Biology.** 1997. William H. Elliott & Daphne C. Elliott. Published by Oxford University press, Oxfor.
11. **Essentials of Molecular Biology.** II edition. 1993. David Freifelder & George M. Malacinski. Published by Panima publishing corporation, New Delhi.
12. **Trends in Molecular biology and Biotechnology.** 1996. Ed. By Sheela Srivastava; P. S. Srivastava & B. N. Tiwary. Published by CBS Publications & Distributors, New Delhi.
13. **Molecular and Cell Biochemistry - Molecular biology and Biotechnology.** 1991. Smith & Wood. Published by Chapman & Hall, Madras.
14. **Principles of Gene Manipulation - An introduction to genetic Engineering.** Vedition. 1994. R. W. Old & S. B. Primrose. Published by Blackwell Science ltd. Berlin.
15. **Methods in Biotechnology. Animal Cell Biotechnology - Methods & Protocols.** 1999. Ed. by. Nigel Jenkins. Published by Human Press Inc., New Jersey. * Latest editions may be followed.

THEORY

Economics:

Introduction, definition and scope (production, consumption, exchange and distribution) of economic principles as applied to livestock. Common terms - wants, goods, wealth, utility, price, value, real and money income. Important features of land, labour, capital and organization.

Livestock produce and products. Livestock contributions to national economy. Demand projections of livestock produce. Theory of consumer behaviour law of diminishing marginal utility and indifference curve analysis. Theory of demand; meaning, types of demand, demand curve and law of demand, individual and market demand, elasticities of demand and factors affecting demand. Laws and types of supply. Elasticity of supply. Cost concepts and principle of fixed and variable costs. Theory of production, law of diminishing returns, laws of returns to scale and concept of short and long run periods. Economics of animal disease and disease losses. Marketing:

Livestock business- concepts, nature and scope. Components, characteristic of small business. Marketable livestock commodities. Concept of market; meaning and classification of markets. Market price and normal price, price determination under perfect competition in short and long run. Marketing of livestock, and perishable and non-perishable livestock products. Merchandising - product planning and development Marketing functions; exchange functions-buying, selling and demand creation. Physical functions- grading, transportation, storage and warehousing. Facilitative functions -standardization, risk bearing, market information and market intelligence. Market opportunities - marketing channels of livestock and livestock products, organized/unorganized markets and cattle fairs. Import and export of animal and animal products. International Agreements/Regulations (WTO and General Agreement on Trade and Tariff-GATT) for marketing/trade of live animals and products. Management: Resource Management- Organizational aspects of livestock farms, sources and procurement of inputs and financial resources. Break- even - analysis. Personnel (Labour) Management-Identification of work and work (job) analysis/division of labour. Accounting:

Definition, objectives, common terms. Different systems of book keeping- single and double entry system. Various types of account books including books of original entry. Classification of accounts and rules of debit and credit Recording of business transactions. Analysis of financial accounts- income and expenditure accounts, trading account, profit and loss accounts.

PRACTICAL

Book keeping; general entry, writing of journal and ledger, cash book (two and three column), purchase-safe and purchase-sale return registers, trading account, profit and loss accounts, income and expenditure accounts, balance sheet bills of exchange (bill of receivable and bill of payable), bank reconciliation statement,.

Economics of a dairy unit poultry, piggery, sheep and goat units. Visit to" farms, markets and cattle fairs, backyard units and preparation of report.

REFERENCE BOOKS

1. **Acharya, S. S & Agarwal N.L** (1994) Agriculture marketing in India,Oxford.
2. **Johl, S. S.& Kapur, T.R.** (2005) Fundamentals of farm business management
3. **Indian Society** (1989) Livestock Economy of India Agricultural Economics: Oxford and IBH Publications
4. **Sadhu & Singh** (1989) Fundamentals of Agricultural Economics: Himalaya Publishing House.
5. **Singh, G.N. Singh .D.S & Ram Iqbal Singh** (1987) Agricultural Marketing in India: Chugh Publications
6. **Maheswari & Maheswari** (1993) Advanced Accountancy 5th ed. Volume -I
7. **Seth. M.L.** (1994) Micro Economics 12th Ed.
8. **Dewitt, K.K.** (1984) Modern Economic Theory 21st Edition.
9. **James, A.F.Stoner & Charles Wankel** (1988) Management 3rd Edition