DETAILED SYLLABUS FOR THE POST OF
VETERINARY SURGEON GRADE II
ANIMAL HUSBANDRY

(Category No:204/2022)

Module	Topic	Marks	Remarks
Module -I	Veterinary Anatomy, Physiology and Biochemistry	10	
Module –II	Livestock Production Management (Livestock and Poultry)	10	
Module –III	Veterinary Parasitology, Veterinary Microbiology and Veterinary Pathology	20	
Module –IV	Veterinary Public Health and Epidemiology	10	
Module –V	Animal Nutrition and Animal Genetics and Breeding	10	
Module –VI	Veterinary Gynaecology and Obstetrics	10	
Module –VII	Veterinary Medicine, Pharmacology and Toxicology	10	
Module –VIII	Animal Husbandry Extension Education and Farm	5	
Module –IX	Veterinary Surgery and Radiology	10	
Module –X	Livestock Products Technology and Value addition	5	
	Total	**100**	

Module -I

Veterinary Anatomy, Physiology and Biochemistry

VETERINARY ANATOMY

Study of properties and structure of bone - Classification of skeletons- classification of bones, joints and movements permitted.

Structure of heart- General plan of systemic and pulmonary circulations, lymphatic and venous systems- parts of central, peripheral and autonomic nervous system and sense organs.

Splanchnology, boundaries of thoracic, abdominal and pelvic cavities, topography of different organs of digestive respiratory, urinary, endocrine, male and female reproductive systems of domestic animals and fowl. Areas of auscultation, percussion of heart and lungs and site for Paracentesis Thoracis. Study of peritoneal reflections, organs of digestive, urinary, male and female reproductive systems present in abdomen and differences in horse, dog, pig and fowl.

Study of mammary glands in cow and differences in mare, bitch and sow. Study of bones of fore limb, hind limb and pelvis of ox and differences in horse, dog, pig and fowl.

Study of external genital organs. Study of microscopic structures of digestive, circulatory, urinary, respiratory, nervous, lymphatic, endocrine, male and female genital systems and mammary glands of domestic animals.

Introduction to embryology, gametogenesis, fertilization, cleavage, types of eggs, morula, blastulation, gastrulation, types of implantation, twinning. Formation of foetal membranes in mammals and birds, Placenta and its classification.

VETERINARY PHYSIOLOGY AND BIOCHEMISTRY

Introduction to Blood; Properties of blood as a body fluid, metabolism and fate of R.B.C; Haemoglobin-chemical structure, synthesis, physiological functions, derivatives of haemoglobin; Heart- morphological characteristic, systemic excitability conduction and transmission processes. Electro Cardio Graph and its significance in Veterinary Sciences - Echocardiography. Haemorrhage /haemostasis. Haemodynamics of circulation . Circulatory controls- shock stresses, regional and fetal circulation.

Muscle Physiology-basic muscle unit characteristic-electrical phenomenon in muscle cell - muscle action potential, excitation and propagation of impulse characteristics Organization of nervous system- Mechanism of information processing, hierarchical control. Major function system- sensory, consciousness, emotion, motor and visceral control and basic functional unit - neuron structure, Functions of nervous system-reflexes-control of posture and movements, autonomic nervous system

and visceral control.

Eye: functional morphology, nourishment and protection neural pathway, receptors- optics, ocular muscles and movements, photochemistry, Vision defects.

Ear: Physiology of hearing and common hearing impairment. Vestibule apparatus. Physiology of olfaction and taste. Morphological characteristic of mono gastric and poly gastric digestive system. Prehension, rumination; defecation; vomition; regulation of secretory function of saliva, stomach, intestine, pancreas; bile secretion; hunger, appetite control, developmental aspects of digestion.

Functional morphology of respiratory apparatus. Mechanics of breathing. Transport of blood gases, foetal and neonatal oxygen transport, dissociation curves, pressures, recoil tendency, elasticity, surfactants, pleural liquid, compliance, exchanges of gases in lungs and tissues, neural and chemical regulation of breathing, diffusion, perfusion, hypoxia.

Kidney- Functional morphology of nephrons, factors determining filtration pressure, determination of glomerular filtration rate (GFR) and renal plasma flow – Re-absorption mechanisms for glucose, protein, amino acids, electrolytes; ammonium mechanism, glomerulo-tubular balance, methods of studying renal functions; urine concentration; micturition, uremia.

Fluid, water balance, fluid therapy, dehydration, water concentration mechanisms. Hormone cell interaction, sub-cellular mechanisms-metabolism of hormones-methods of study of endocrine system; Genetic and endocrine control of gonadal development, modification of gonadotrophin release, ovarian functions, follicular development, dynamics, endocrine and receptor profiles, sexual receptivity, ovarian cycle, post-partum ovarian activity, ovum transport, capacitation, fertilization, reproductive cycles in farm animals- hormones present in the biological fluids during pregnancy and their uses for the diagnosis of pregnancy- maternal foetal placental participation in pregnancy and parturition, immunology of gestation, preparturient endocrine status.

Spermatogenic cycle and wave- function of sertoli cell-leydig cell-semen. Functional and metabolic organization of mammary glands.

Heat balance, heat tolerance, hypothermia, hyperthermia, thermo-regulation in farm animals, role of skin, responses of animals to heat and cold, fever, body temperature and hibernation. Temperature regulation in birds. Climatology- various parameters and their importance. Effect of different environmental variables like temperature, humidity, light, radiation, altitude on animal performance. Acclimation, acclimatization - general adaptive syndrome. Clinical aspects of endocrine - reproductive functions, circadian rhythm. Structure of Biological Membranes and Transport across Membranes Dissociation of Acids, pH, Buffer Systems. Enzymes: Definition and classification. Coenzymes, cofactors and iso-enzymes.

Bioenergetics of carbohydrate metabolism. Lipid metabolism: Beta oxidation of fatty acids, ketone body formation, biosynthesis of fatty acids. Disorders of Carbohydrate Metabolism: Diabetes mellitus, Ketosis, Bovine Ketosis, Pregnancy toxemia, hypoglycaemia in baby pigs, hyperinsulinism in Dogs. Biochemical tests of renal function - Urine analysis.

Module –II

Livestock Production Management (Livestock and Poultry)

LIVESTOCK PRODUCTION MANAGEMENT

Demographic distribution of livestock and role in Indian economy. Problems and prospects of livestock industry in India. Common animal husbandry terms. (glossary) Body conformation and identification. Transportation of livestock and wild or zoo animals. Common farm management practices including disinfection, isolation, quarantine and disposal of carcass. Introduction to methods of drug administration.

Importance of grasslands and fodder in livestock production. Agronomical Practices for fodder production. Important leguminous and non-leguminous fodders in different seasons. Soil and Water conservation and drainage of water for fodder production. Fodder production for small livestock units. Structures for storage of feeds and fodders. Scarcity fodders and preservation of green fodder. Recycling of animal washings and wastes in fodders production and use of recycle waste.

Housing systems, layout and design of different buildings for animals. Selection of site. General principles affecting the design and construction of building for housing for various livestock species. Arrangements of the building with special reference to Indian conditions. Utilization of local materials. Building materials used for construction of wall, roof and floor of animal houses, their characteristics, merits and demerits.

Breeds of cattle and buffalo and descriptions of important breeds. Economic traits of cattle and buffaloes. General management and feeding practices of calves, heifers, pregnant, lactating and dry animals, bulls and working animals. Draught ability of cattle and buffaloes. Raising of buffalo males for meat production.

Routine animal farm operations and labour management. Animal farm accounts and records. Methods of milking and precautions. Factors affecting quality and quantity of milk production. Clean milk production.

Breeds of sheep and goat and their descriptions. Important economic traits for meat, milk and fibre. General management and feeding practices during different stages of growth, development and production (milk, meat and wool).

Breeding schedule and management of ram and buck. Weaning and fattening of lambs and kids. Basic principles of habitat and housing of various classes of wild zoo animals. Size and space requirement (dimension) of cubicles, enclosures of important wild zoo animals.

Management of livestock in fringe areas, in and surrounding the breeding areas. Feeding habits, feeds and feeding schedules of captive animals. Restraining, capture, handling, physical examination of captive animals.

Definition of animal welfare and ethics. Human and animal welfare in relation to ecosystem and environmental factors. Prevention of Cruelty to Animals (PCA) Act, 1960 {59 of 1960). Role and function of Committee for the Purpose of Controlling and Supervising Experiments in Animals (CPCSEA). Protection of wild life in nature and captivity.

Indian poultry industry – Brief outline of the different segments – poultry statistics. Classification of poultry with respect to production characters, age and standards. Production characters of other avian species. Brooding management – Types of brooders – preparation of shed – Importance of environmental factors. Housing – Backyard and semi-intensive units; their management and economic achievements. Deep litter management – control of litter-borne diseases and recycling of litter. Cage management. Stress management. Feeding management– Water management. Breeding systems and methods of mating. Selection and culling. Health care for common poultry diseases – vaccination. General principles of poultry medication. Principles of incubation and hatchery management practices. Factors affecting fertility and hatchability, selection and care of hatching eggs and hatchery hygiene. Vertical & horizontal integration in commercial poultry production – Contract farming. Export or import of poultry produce and marketing. Management of ducks, geese, turkeys, Japanese quails, guinea fowls etc.

Importance and selection of laboratory animal, care and housing standards of mice, rats, hamster and guinea pigs. General considerations on feeding and breeding of laboratory animals. Concept of production of specific pathogen free and germ free laboratory animals. Scope of rabbit farming in the country, breeds and their distributions in India. Limitation of rabbit animal production, Selection, care and management of breeding stock for commercial purpose. Identification, care and management of kindling animals. Hygienic care and Housing for rabbit production. Disposal, utilization and recycling of waste etc. Important breeds of dogs, cats and pet birds. Feeding of dogs, cats and pet birds. Dog show: preparation for show, kennel clubs, important characteristics for judgment.

Introduction and scope of swine farming in the country. Selection and breeding techniques in swine. Important breeds (exotic and indigenous) & their characteristics. Housing and feeding of swine.

Horses, donkeys and mules and their utility. Colors and markings. Identification of breeds of horses. Dentition and ageing of horses. Care and routine management of equines including grooming, saddling and exercise. Stable and its management. Vices of horses. Foot care and shoeing care. Feeding routine for horse, donkeys and mules. Care of stallion. Mating of horses, brood mare and its care.

Module –III

Veterinary Parasitology, Veterinary Microbiology and Veterinary Pathology

VETERINARY PARASITOLOGY

Types of parasites (ecto, endo, hyper, obligatory, facultative, stenoxenous, euryxenous, monoxenous, heteroxenous, histozoic, coelozoic, temporary, permanent, pseudo, aberrant, incidental, opportunistic, zoonotic, protelean etc.). Types of hosts (definitive, intermediate, reservoir, paratenic, natural, unnatural, etc.) and vectors. Types of animal associations (symbiosis, phoresy, commensalism, parasitism, mutualism and predatorism). Modes of transmission of parasites and methods of dissemination of the infective stages of the parasites. International Code of Zoological Nomenclature: Immunity against parasitic infections or infestations, natural and acquired immunity, premunity, sterile immunity, autoimmunity, passive immunity, concomitant immunity and immune evasion by parasites. General harmful effects of parasites including various tissue reactions caused by parasites. General control measures against parasites.

Trematodes: Introduction, general account and classification, general life cycle of trematodes with morphological features of their developmental stages. Important morphological features, life cycles, modes of transmission pathogenesis, epidemiology, diagnosis and general control measures (including chemo- and immuno-prophylaxis) of the following trematode parasites: Liver flukes (*Fasciola, Dicrocoelium* and *Opisthorchis*), intestinal flukes (*Fasciolopsis*). Blood flukes causing nasal schistosomosis (*Schistosoma nasalis*), visceral schistosomosis (*S. spindale, S. indicum, S. incognitum*) and cercarial dermatitis. Paramphistomes (*Paramphistomum, Cotylophoron, Calicophoron, Gigantocotyle*, *Gastrothylax, Fischoederius,Carmyerius, Gastrodiscus, Gastrodiscoides* and *Pseudodiscus*). *Paragonimus*, *Prosthogonimus* and Echinostomes.

Cestodes: Introduction, general account and classification, general life cycle of cestodes with morphological features of their developmental stages (Metacestodes). Important morphological features, life cycles, modes of transmission, pathogenesis, epidemiology, diagnosis and management of the following cestode parasites: Equine tape worms (*Anoplocephala, Paranoplocephala*) and ruminant tape worms (*Moniezia, Avitellina, Stile*sia*,Thysaniezia*). Dog tape worms (*Dipylidium, Taenia, Echinococcus*). Poultry tape worms (*Davainea, Cotugnia, Raillietina, Amoebotaenia, Choanotaenia* and *Hymenolepis*. Broad fish tapeworm (*Diphyllobothrium)* and *Spirometra.*

Nematodes: Introduction, general account and classification, general life cycle of nematodes with morphological features of their developmental stages. Important morphological features, life cycles, modes of transmission, pathogenesis, epidemiology, diagnosis and management of the following nematode parasites: *Ascaris, Parascaris, Toxocara, Toxascaris, Ascaridia*, *Heterakis* and *Oxyuris*. *Strongyloides, Strongylus, Chabertia, Syngamus* and *Oesophagostomum*. Kidney worms (*Stephanurus* and *Dioctophyma*), hook worms (*Ancylostoma* and *Bunostomum*). *Trichostrongylus,*

Ostertagia, Cooperia, Nematodirus, *Haemonchus* and *Mecistocirrus*. *Habronema, Draschia, Thelazia, Spirocerca, Gongylonema*, *Physaloptera* and *Gnathostoma. Dirofilaria, Parafilaria, Onchocerca, Setaria* and *Stephanofilaria*. Lung worms (*Dictyocaulus, Muellerius, Protostrongylus* and *Metastrongylus*). Guinea worm (*Dracunculus*), *Trichinella*, *Trichuris*, *Capillaria.* Acanthocephala (*Macracanthorhynchus*). Study of anthelmintic resistance and its types.

Arthropods: Introduction, general account and classification, general life cycle of arthropods with morphological features of their developmental stages. Important morphological features, general bionomics, life cycle, vector potentiality, pathogenesis and control of following arthropods affecting animals and birds: Bugs (*Cimex)*. Biting midges (*Culicoides*), black flies (*Simulium*), sandflies (*Phlebotomus*), mosquitoes (*Culex, Anopheles* and *Aedes*). Horse flies (*Tabanus*), *Haematopota* and *Chrysops*. *Musca*, *Stomoxy*s, *Haematobia* and *Sarcophaga.* Warbles (*Hypoderma*), stomach bots (*Gasterophilus,Cobboldia*), nasal bots (*Oestrus ovis,Cephalopina*), Bottle flies (*Calliphora, Lucilia, Chrysomya*), myiasis. *Hippobosca*, *Melophagus, Pseudolynchia.* Lice (*Haematopinus*, *Linognathus*, *Trichodectes*,

Introduction, general account and classification, general life cycle of protozoa with morphological features of their developmental stages. Differentiation from bacteria and rickettsia. Important morphological features, life cycles, modes of transmission, pathogenesis, epidemiology, diagnosis and general control measures (including chemo- and immuno-prophylaxis) of the following protozoan parasites of veterinary and zoonotic importance : *Leishmania* (Visceral and cutaneous leishmanosis), *Trypanosoma* (*T. evansi, T. theileri, T. equiperdum*). *Trichomonas* (Bovine and avian trichomonosis). *Histomonas* (Black head in turkeys). *Entamoeba*, *Giardia* and *Balantidium* spp, Coccidia and coccidiosis of poultry and domestic animals. Cyst forming coccidia (*Toxoplasma, Sarcocystis* and *Neospora caninum*) and *Cryptosporidium.* Malarial parasites of animals and poultry (*Plasmodium, Haemoproteus* and *Leucocytozoon*). Piroplasms (*Babesia*, *Theileria)* and *Hepatozoon*. *Anaplasma* and *Ehrlichia* Resistance to antiprotozoals.

VETERINARY MICROBIOLOGY

Introduction and history of Microbiology; Classification and nomenclature of bacteria; Microscopy and Micrometry; Bacterial stains and techniques; Structure and morphology of bacteria; Growth and nutritional requirement of aerobic and anaerobic bacteria; Normal, opportunistic and saprophytic bacterial flora: Types and sources of infection, method of transmission of infection. Pathogenicity, virulence, determinants of virulence, Epizootic and enzootic diseases, bacteremia, septicaemia and toxaemia, endotoxins, exotoxins, antitoxins, toxoids; Bacterial genetics (Mutation, Transformation, Transduction and Conjugation), plasmids and antibiotic resistance.

Introduction, classification, general properties of fungi; Growth and Reproduction of fungi; Study of following important pathogenic fungi in relation to their isolation, growth, morphological, cultural, biochemical and antigenic characteristics, epidemiology, pathogenesis, diagnosis and control of fungal diseases caused by following genera:

Basic concepts and scope of Recombinant DNA technology; Gene cloning, Cloning vectors and expression vectors; Transformation and transfection; Southern, Northern and Western blotting; Bioinformatics, Gene banks; Application of molecular and biotechnological techniques: Polymerase chain reaction, Nucleic acid hybridization, DNA library, DNA sequencing and DNA fingerprinting; IPR. Ethics and regulatory issues in Animal Biotechnology.

History of Immunology; Lymphoid organs, tissues and Cells: Types of Immunity; Antigens, hapten, epitope, Specificity, T dependent and T independent Antigens, heterophile Antigens, cross reacting Antigens, blood group Antigens, Mitogens and factors affecting immunogenicity; Adjuvants; Antibody: Structure, physiochemical properties and functions of various classes of immunoglobulins, Theories of antibody production; Hybridoma and monoclonal antibodies, Serological reactions. Major histocompatibility complex (MHC) structure, function and gene organization; Structure of BCR and TCR; Antigen processing and presentation; Complement system: activation pathways and biological consequences; Cytokines: general properties, major types and function; Hypersensitivity: classification and mechanism of induction; Autoimmunity; Immunotolerance; Concept of Immunity to Microbes, Vaccines and other biological.

History of Virology; Introduction to viruses; Structure of Viruses; Classification of Viruses; Viral Replication; Genetic and Non-genetic viral interactions; Virus-Cell Interactions; Viral Pathogenesis, Oncogenesis, latency and immunopathology. Studies on General Properties, Antigens, Cultivation, Pathogenesis, Epidemiology, Clinical Signs, Diagnosis, Prevention and Control of Viruses and Prions Causing Diseases in Livestock and Poultry.

VETERINARY PATHOLOGY

Major intrinsic and extrinsic causes of disease. Haemodynamic disorders (hyperaemia, congestion, haemorrhage, oedema, thrombosis, embolism and infarction). Glycogen overload, amyloidosis and fatty changes. Reversible and irreversible cell injury- degenerations, necrosis and its types, apoptosis, differences between post-mortem autolysis and necrosis, gangrene and its types. Major exogenous and endogenous pigments. Metastatic and dystrophic calcification. Photosensitization. Disturbances in growth (Aplasia, hypoplasia, atrophy, hypertrophy, hyperplasia, metaplasia and dysplasia). Inflammation: Definitions, classification, various cell types
and their functions, mediators, cardinal signs and systemic effects. Wound healing by primary and secondary intention including growth factors. Immunopathology in brief (immunodeficiency, hypersensitivity and autoimmunity).

Pathological changes affecting Digestive, Respiratory, Musculoskeletal, Cardiovascular, Haematopoietic, Lymphoid, Urinary, Reproductive, Nervous, Endocrine systems, Skin and

Appendages, Ear and Eye.

Animal Oncology: Definitions, general characteristics and classification of neoplasms. Differences between benign and malignant tumours, aetiology, carcinogenesis and spread of neoplasms, tumour immunity, effects and diagnosis of tumours, staging and grading of neoplasms.

Pathology of various types of tumours in domestic animals (epithelial, connective tissue, hematopoietic tissue etc.)

Veterinary Clinical Pathology: Introduction, Haematology – Different anticoagulant used in haematology, interpretation of blood tests (haemoglobin, packed cell volume, total erythrocyte count, erythrocytic indices, erythrocytic sedimentation rate, total leukocyte count, absolute count of different leucocytes), blood smear examination and its interpretation.

Urinalysis- Interpretation of physical, chemical and microscopic examination of urine. Study of biopsy and cytology including exfoliative cytology as rapid diagnostic techniques.

Necropsy: Introduction, objectives, pre-necropsy guidelines, procedure for post mortem examination of various species of animals including wild animals, post mortem changes, collection, preservation and dispatch of specimens (morbid materials) for laboratory examination, writing of post mortem report, veterolegal necropsy , veterolegal wounds.

Pathology of viral infections, prion diseases,bacterial infections, gross and microscopic pathology of mycoplasma infection, gross and microscopic pathology of superficial and deep mycoses , gross and microscopic pathology of fasciolosis, babesiosis, theileriosis and trypanosomosis,changes of nutritional imbalances Gross and microscopic pathology in (brief) of toxicities.

Avian Inflammation, Viral Diseases: Pathogenesis, gross and microscopic pathology of Ranikhet disease, infectious bursal disease, infectious bronchitis, infectious laryngotracheitis, fowl pox, avian influenza, Marek's disease, leukosisorsarcoma group of diseases, reticuloendotheliosis, avian encephalomyelitis, inclusion body hepatitis, hydro-pericardium syndrome, chicken infectious anaemia, avian nephritis, egg drop syndrome, reovirus infections.

Bacterial Diseases: Pathogenesis, gross and microscopic pathology of colibacillosis, infectious coryza, clostridial diseases, salmonella infections, fowl cholera, tuberculosis and spirochaetosis. Pathogenesis, gross and microscopic pathology of *Mycoplasma* infections, chlamydiosis.

Pathogenesis, gross and microscopic pathology of aspergillosis, thrush, favus, aflatoxicosis, ochratoxicosis and trichothecosis.

Gross and microscopic pathology (in brief) of helminthic diseases (flukes, cestodes, nematodes), protozoal diseases (coccidiosis, histomoniasis), ectoparasites.

Gross and microscopic pathology of nutritional imbalances due to carbohydrates, proteins, minerals and vitamins. Miscellaneous diseases (Heat stroke, vent gleet, internal layer, false layer, pendulous crop, breast blister, ascites syndrome, fatty liver and kidney syndrome, fatty liver syndrome, cage layer fatigue, gout, hemorrhagic syndrome, round heart disease, impaction of oviduct, egg bound condition, bumble foot) and common vices.

Pathology of important diseases of rats, mice, and guinea pigs , Pathology of important diseases of rabbits, Gross and microscopic pathology of important diseases of wild animals.

Module –IV

Veterinary Public Health and Epidemiology

VETERINARY PUBLIC HEALTH AND FOOD SAFETY

Aims and scope of Veterinary Public Health. Role of veterinarians in public health. One Health concept and initiatives. Veterinary Public Health administration. Sources of contamination. Principles and concepts of food hygiene and safety. Milk hygiene in relation to public health. Hygienic and safe milk production practices including steps for prevention and control of milk contamination, adulterants, antimicrobial residues, agrochemicals, subclinical mastitisorudder infections etc.. Microbial flora of milk and milk products. Milk plant and dairy equipment hygiene. Quality control of milk and milk products. Milk hygiene practices in India and other countries.

Elements of meat inspection and meat hygiene practices. Pathological conditions associated with the transport of food animals. Hygiene in abattoirs and meat plants. Detection of conditions or diseases and judgements during ante mortem and post mortem inspection. Examination of lymph nodes. Meat as a source of disease transmission. Sources of contamination of meat and methods of carcass decontamination. Speciation of meat. Animal welfare and public health issues. Classification of low risk and high risk material generated in an abattoir and its hygienic disposal. Inspection of poultry for human consumption. Occupational health hazards in abattoir and meat plants.

Food borne infections and intoxications associated with foods of animal origin. Toxic residues (pesticides, antibiotics, metals and hormones) in foods and associated health hazards. Types of biohazards. Hazard analysis and critical control points (HACCP) system. Importance of ISO 9000 and 14000 series in meat industry. Risk analysis, assessment and management. International food safety standards: World Organisation for Animal Health (OIE), World Trade Organization (WTO) agreements. Sanitary and phytosanitary measures in relation to foods of animal origin. Food Safety and Standards Act and Regulations. Role of Food Safety and Standards Authority of India (FSSAI), Bureau of Indian Standards (BIS) and other national agencies.

VETERINARY EPIDEMIOLOGY

Definitions, components and aims of epidemiology. Factors influencing occurrence of livestock diseases and animal production. Determinants of disease. Transmission and maintenance of infections. Ecology of disease. Measures and patterns of disease occurrence. Survey and surveillance of animal diseases and related parameters. Epidemiological methods- Descriptive, analytical, experimental, theoretical, serological and molecular. Animal disease forecasting. Strategies of disease management: prevention, control and biosecurity. Economics of animal diseases. National and international regulations on livestock diseases. Role of OIE and laws on international trade of animals and animal products.

Definition, history and socio-economic impact of zoonotic diseases. Classification of zoonoses and approaches to their management. Multisectoral approach for zoonoses prevention and control.

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 bioterrorism. Epidemiology, clinical manifestations and management of the following zoonoses: Rabies, Japanese encephalitis, influenza, Kyasanur forest disease, Crimean Congo haemorrhagic fever, Nipah encephalitis, Ebola virus infection, anthrax, brucellosis, tuberculosis, leptospirosis, listeriosis, plague, glanders, Q fever, rickettsiosis, chlamydiosis, taeniasis, cysticercosis, hydatidosis, larva migrans, diphyllobothriasis, trichinellosis, toxoplasmosis, fasciolosis, paragonimiasis, sarcocystosis, cryptosporidiosis, amoebiasis, giardiasis, leishmaniasis, superficial and systemic mycosis and prion diseases. Foodborne bacterial zoonoses: salmonellosis, *E. coli* infection, staphylococcal gastroenteritis, clostridial food poisoning, campylobacteriosis etc.

Biodiversity: uses, threats and conservation. Natural resources: types, uses and abuses. Environmental contaminants in food chain-bioaccumulation, biomagnification and persistent organic pollutants. Environmental pollution: Sources, nature of pollutants, effects on animal and human health. Rural and urban pollution. Air pollution, sources and hazard. Air pollution in animal houses, effect on health and productivity. Airborne diseases – Classification, health hazard, prevention and control. Water-Sources, contamination & their prevention. Water qualities- Physical, chemical, bacteriological and radiological. Water purification methods for community water supplies. Waterborne diseases – Classification, health hazard, prevention and control. Soil, marine and thermal pollution- Classification, sources, hazard, prevention and control. Biosafety: Importance, classification and biosafety measures for prevention of risk hazards. Disaster management and mitigation. Solid and liquid waste management at farms and biomedical waste management. Sanitation and disinfection of farm and hospital environment in veterinary public practice for infection control. Global warming and greenhouse effect- Definition, greenhouse gases, impact of climate change and international treaties or protocols. Management of waste from animal industries. Stray and fallen animal management and carcass disposal. Vector and reservoir control.

Module –V

Animal Nutrition and Animal Genetics and Breeding,

ANIMAL NUTRITION

History of animal nutrition. Importance of nutrients in animal production and health. Composition of animal body and plants. Nutritional terms and their definitions. Nutritional aspect of carbohydrates, protein and fats. Role and requirement of water, metabolic water. Importance of minerals (major and trace elements) and vitamins in health and production, their requirements and supplementation in feed. Common feeds and fodders, their classification, availability and importance for livestock and poultry production. Measures of food energy and their applications - gross energy, digestible energy, metabolizable energy, net energy, total digestible nutrients, starch equivalent, food units, physiological fuel value. Direct and indirect calorimetry, carbon and nitrogen balance studies. Protein evaluation of feeds - Measures of protein quality in ruminants and non-ruminants, biological

value of protein, protein efficiency ratio, protein equivalent, digestible crude protein. Calorie protein ratio. Nutritive ratio. Introduction to feed technology- Feed industry; Processing of concentrates and roughages. Various physical, chemical and biological methods for improving the nutritive value of inferior quality roughages. Preparation, storage and conservation of livestock feed through silage and hay and their uses in livestock feeding. Harmful natural constituents and common adulterants of feeds and fodders. Feed additives in the rations of livestock and poultry and their uses.

Importance of scientific feeding. Feeding experiments. Digestion and metabolism trial. Norms adopted in conducting digestion trial. Measurement of digestibility. Factors affecting digestibility of a feed. Feeding standards, their uses and significance, merit and demerits of various feeding standards with reference to ruminants. Balanced ration and its characteristics.

Nutrient requirements and methods for assessing the energy and protein requirements for maintenance and production in terms of growth, reproduction, milk, meat, wool and draft purpose. General principles of computation of rations.

Formulation of rations and feeding of dairy cattle and buffaloes during different phases of growth and production (neonate, young, adult, pregnant, lactating and dry animals; breeding bull) and working animals. Formulation of ration and feeding of sheep and goat during different phases of growth and production (milk, meat and wool). Feeding of high yielding animals and role of bypass nutrients. Metabolic disorders and nutritional interventions. Use of NPN compound for ruminants.

Nutrient requirements in poultry, swine and equine - Energy and protein requirement for maintenance and production. Methods adopted for arriving at energy and protein requirements for maintenance and production in terms of growth, reproduction and production (egg, meat and work).

Feeding standards for non-ruminants and poultry Formulation of rations as per Bureau of Indian Standards and Indian Council of Agricultural Research specifications.

Feeding of swine (Piglets, Growers, Lactating and pregnant sows, Breeding boar, Fattening animals), equine (foal, yearling, broodmare, stallion and race horses) and poultry (Starter, Growers, Broilers, Layers) with conventional and unconventional feed ingredients.

Feeding of ducks, quails, turkeys and laboratory animals. Nutrient requirements of mice, rat, rabbit and guinea pig.

Diet formulation, preparation and feeding of rabbits and laboratory animals.

Nutrient requirement and feeding of different categories of dogs and cats; peculiarities of feeding cats.

Feeding of wild animals and birds in captivity. Metabolic disorders and nutritional intervention.

ANIMAL GENETICS AND BREEDING

Introduction and importance of statistics and biostatistics, Classification and tabulation of data.

History of Genetics. Mitosis vors Meiosis. Chromosome numbers and types in livestock and poultry. Overview of Mendelian principles. Modified Mendelian inheritance. Pleiotropy, Penetrance

and expressivity. Multiple alleles; lethals; sex-linked, sex limited and sex influenced inheritance. Sex determination. Linkage, crossing over and construction of linkage map. Mutation, Chromosomal aberrations. Cytogenetics, Extra-chromosomal inheritance. Molecular genetics, nucleic acids-structure and function. Gene concept, DNA and its replication. Introduction to molecular techniques.

Population Genetics: Introduction to population genetics; individual vors population. Quantitative vors qualitative genetics; concept of average effect and breeding value.

Livestock and Poultry Breeding: History of Animal Breeding. Classification of breeds. Economic characters of livestock and poultry and their importance. Selection, types of selection, response to selection and factors affecting it. Bases of selection: individual, pedigree, family, sib, progeny and combined, indirect selection. Method of selection, Single and Multi trait. Classification of mating systems. Inbreeding coefficient and coefficient of relationship. Genetic and phenotypic consequences of inbreeding, inbreeding depression, application of inbreeding. Out breeding and its different forms. Genetic and phenotypic consequences of outbreeding, application of outbreeding, heterosis. Systems of utilization of heterosis; Selection for combining ability (RS and RRS). Breeding strategies for the improvement of dairy cattle and buffalo. Breeding strategies for the improvement of sheep, goat, swine and poultry. Sire evaluation. Development of new breeds or strains. Current livestock and poultry breeding policies and programmes in the state and country. Methods of conservation- livestock and poultry conservation programmes in the state and country. Application of reproductive and biotechnological tools for genetic improvement of livestock and poultry. Breeding for disease resistance.

Breeding of pet, zoo and wild animals: Classification of dog and cat breeds. Pedigree sheet, selection of breeds and major breed traits. Breeding management of dogs and cats. Common pet birds seen in India and their breeding management.

Module –VI

Veterinary Gynaecology and Obstetrics

VETERINARY GYNAECOLOGY AND OBSTETRICS

Applied clinical anatomy and embryology of female reproductive tract - Hereditary and congenital anomalies of female reproductive tract –Puberty and sexual maturity and their endocrine control- Delayed puberty- Its causes, clinical approach, treatment and prevention of delayed puberty- Applied reproductive physiology and endocrinology of oestrous cycle- Oestrous cycle and factors affecting the length of the oestrous cycle-Aberrations of oestrus and their clinical management and problems in oestrus detection and oestrus detection aids –Transportation and survivability of gametes in female reproductive tract-Follicular Dynamics and its clinical impact on fertility improvement-ovulation and aberrations of ovulation-Incidence causes, diagnosis treatment and prevention of ovulatory failures- Fertilization and aberrations of fertilization- Fertilization failures - embryonic

mortality-incidence, causes, diagnosis, treatment and prevention – Pathological affections of ovary, uterine tubes, uterus, cervix , vagina and external genitalia – Clinical management of specific and non-specific forms of infectious infertility- Role of nutrition, climate and stress on reproductive efficiency - Managemental causes of infertility- Anoestrus and repeat breeding syndrome - Diagnostic procedures in infertility investigation – Clinical uses of hormones and drugs in the management of infertility- Surgical procedures for correction of abnormalities of the female reproductive tract. Herd reproductive health management and fertility parameters in individual animals and in herds.

Assisted reproductive techniques: Synchronization of estrus and ovulation and its principle. methodology and implications- Multiple ovulation and Embryo transfer technology-In vitro fertilization.

Maternal recognition of pregnancy – Applied Endocrinology of pregnancy – Pregnancy diagnosis- Duration of pregnancy -Factors affecting gestation length- Care and management of pregnant animals-Implantation, Placentation- Classification, functions –Wandering of ovum- Telegony- Superfetation and Superfecundation – Clinical management of specific and non specific causes of abortion, extra uterine pregnancy, dropsy of fetal membranes and fetus, mummification, maceration, cervicovaginal prolapse, uterine torsion and hysterocele. Parturition- Signs of approaching parturition - Stages of parturition - Initiation and induction of parturition - lactational disorders - Puerparium and factors affecting puerparium - Postpartum care of the dam and neonate in different species of farm and pet animals - Dystocia – Classification - Clinical signs and diagnosis - Handling of Fetal and maternal dystocia – Obstetrical interventions - Mutation – Forced extraction – Fetotomy – Cesarean section in small and large animals – Maternal obstetrical paralysis - Retention of fetal membranes, Total uterine prolapse and common metabolic diseases of puerperal period – Post partum hemorrhage – Sub involution of placental sites - Injuries incidental to parturition - Post partum uterine infections – Post partum resumption of ovarian activity .

Module –VII

Veterinary Medicine and Veterinary Pharmacology and Toxicology,

VETERINARY MEDICINE

History and scope of Veterinary Medicine, concept of animal diseases. Concepts of diagnosis, differential diagnosis, treatment and prognosis. General systemic states, hyperthermia, hypothermia, fever, septicemia, toxemia, shock, allergy, anaphylaxis, oedema, coma, anaemia, common clinical poisonings and dehydration. Estimates of diseases, patterns of disease, disease monitoring and surveillance, herd health and quarantine.

Etiology, clinical manifestations, diagnosis, differential diagnosis, treatment, prevention and control of the following diseases of cattle, buffalo, sheep, goat, horse, pig, dog, cat and poultry: Diseases of digestive, respiratory, cardiovascular, urinary, nervous, musculoskeletal, haemopoietic, and lymphatic systems, skin, sense organs including affections of peritoneum, liver and pancreas. Emergency medicine and critical care.

Diagnosis and management of diseases caused by deficiency of iron, copper, cobalt, zinc, manganese, selenium, calcium, phosphorus, magnesium, iodine, vitamin A, D, E, B complex, K and C. Diseases of neonates, Alternative or integrated or ethno veterinary medicine in animal disease management. Aetiology, clinical manifestations, diagnosis, differential diagnosis, treatment prevention and control of metabolic or production and endocrine diseases of cattle, buffalo, sheep, goat, horse, pig, dog, cat and poultry i.e. Milk fever, eclampsia, osteodystrophy fibrosa, lactation tetany, downer cow syndrome, ketosis, fat cow syndrome, hypomagnesaemia, Nutritional haemoglobinuria, azoturia, diabetes, hypothyroidism, Cushing syndrome, Addison's disease and Gout.

Principles of zoo hygiene, public health problems arising from zoos. Prevention, control and treatment of infectious, parasitic, nutritional and metabolic diseases in zoo and wild animals including exotic birds.

Aetiology, epidemiology, clinical manifestations, diagnosis, treatment, prevention and control of bacterial, fungal and rickettsial diseases of livestock: mastitis, hemorrhagic septicaemia, brucellosis, tuberculosis, Johne's disease, listeriosis, leptospirosis, campylobacteriosis, actinomycosis, actinobacillosis, bordetellosis, glanders, strangles, ulcerative lymphangitis, colibacillosis, fowl typhoid, pullorum disease, fowl cholera, avian mycoplasmosis, spirochaetosis, salmonellosis, swine erysipelas, contagious caprine pleuropneumonia, contagious bovine pleuropneumonia, anthrax, clostridial infections, ehrlichiosis, chlamydosis, Q fever, anaplasmosis, dermatophilosis, aspergillosis, candidiasis, histoplasmosis, sporotrichosis, coccidiodomycosis, mycotoxicosis and rhinosporidiosis.

Aetiology, epidemiology, clinical manifestations, diagnosis, treatment, prevention and control of viral and parasitic diseases of diseases of cattle, buffalo, sheep, goat, horse, pig, dog, cat and poultry: Foot and mouth disease, rinderpest, bovine viral diarrhoea, malignant catarrhal fever, infectious bovine rhinotracheitis, ephemeral fever, blue tongue, sheep pox, goat pox, PPR, classical swine fever, rabies, equine influenza, equine infectious anemia, equine rhinopneumonitis, canine distemper, infectious canine hepatitis, canine parvoviral disease, corona viral infection, adeno virus infection, feline rhinotracheitis, feline pan leucopenia, feline infectious peritonitis, avian influenza, New Castle disease, Marek's disease, avian leucosis, infectious bronchitis, infectious laryngotracheitis, avian encaphalomyelitis, chicken reo virus, fowl pox, infectious bursal disease, chicken infectious anemia, inclusion body hepatitis-hydropericardium syndrome, emerging and exotic viral diseases of global importance.

Parasitic diseases: Trematodes, cestodes, nematodes, protozoan infections and external parasites of clinical importance.

Legal duties of veterinarians, laws related to medicine, evidence, common offences against animals and laws related to these offences. Examination of living and dead animals in criminal cases. Legal aspects of: Examination of animals for soundness, examination of injuries and post-mortem examination. Collection and despatch of materials for chemical examination, detection of frauds-doping, alternation of description, bishop ing etc. Cattle slaughter and evidence procedure in courts. Provincial and Central Acts relating to animals. Livestock importation act, liability and insurance.

Animal welfare organizations and its role in animal welfare. veterinary disaster management, human−animal interactions, economics and animal welfare and veterinarians as animal welfare educators

VETERINARY PHARMACOLOGY

Sources and nature of drugs. Pharmacological terms and definitions, nomenclature of drugs. 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. Adverse drug reactions, drug interactions.

Neurohumoral transmission, Pharmacology of neurotransmitters. Adrenoceptors agonists and antagonists, adrenergic neuron blockers, cholinoceptor agonists and antagonists.

Autacoids: Histamine, histamine analogues and antihistaminic agents, 5-Hydroxytryptamine and its agonists and antagonists, eicosanoids, platelet activating factors, angiotensin, bradykinin.

Classification of drugs acting on CNS. History, mechanism and stages of general anaesthesia. Inhalant, intravenous and dissociative anaesthetics. Hypnotics and sedatives; psychotropic drugs, anticonvulsants, opioid analgesics, non-steroidal anti-inflammatory drugs, analeptics and other CNS stimulants. Drugs acting on somatic nervous system: Local anaesthetics, muscle relaxants. Euthanizing agents.

Drugs acting on digestive system: Stomachics, antacids and antiulcers, prokinetics, carminatives, antizymotics, emetics, antiemetics, purgatives, antidiarrhoeals, choleretics and cholagogues. Rumen pharmacology.

Drugs acting on cardiovascular system: Cardiotonics and cardiac stimulants, antiarrhythmic drugs, vasodilators and antihypertensive agents, haematopoietic drugs, coagulants and anticoagulants.

Drugs acting on respiratory system: Expectorants and antitussives, respiratory stimulants, bronchodilators and mucolytics.

Drugs acting on urogenital system: Diuretics, drugs affecting urinary pH and tubular transport of drugs, ecbolics and tocolytics.

Pharmacological basis of fluid therapy. Pharmacotherapeutics of hormones. Drugs acting on skin and mucous membranes: Emollients, demulcents and counter irritants.

Introduction and historical developments of chemotherapy. Antimicrobial agents: Classification, general principles in antimicrobial chemotherapy, antimicrobial resistance, combined antimicrobial therapy. Sulphonamides and their combination with diaminopyrimidines. Antifungal agents: Topical and systemic agents including anti-fungal antibiotics. Antiviral and anticancer agents. Anthelmintics:

General Toxicology: Definitions, history of toxicology, fundamentals and scope of toxicology. Sources and classification of toxicants, factors modifying toxicity, general approaches to diagnosis and treatment of poisoning.

Toxicity caused by metals and non-metals: Arsenic, lead, mercury, copper, molybdenum, selenium, phosphorus, fluoride, nitratesor nitrites, chlorate, common salt and urea.

Poisonous plants: Cyanogenetic plants, abrus, ipomoea, datura, nux vomica, castor, oxalate producing plants, plants causing thiamine deficiency, plants causing photosensitization and lathyrism, oleander, and cotton.

Toxicity caused by Agrochemicals: Insecticides - Chlorinated hydrocarbons, organophosphates, carbamates, pyrethroids, newer insecticides. Herbicides, fungicides and rodenticides.

Venomous bites and stings: Snake, scorpion, spider, bees and wasp, toad and fishes (puffer fish, shellfish). Toxicity caused by food additives and preservatives.

Module –VIII

Veterinary and Animal Husbandry Extension Education and Livestock Farm Practices

History of domestication and their social dimensions. Evolution and relationship between agriculture and animal husbandry. Farming and characteristics of farming in India. Classification of farming, types and systems. Peasant farming, cooperative farming, collective farming, contract farming, estate farming, organic farming, capitalistic farming, small-scale farming, large-scale farming, intensive, extensive farming, specialized, diversified, mixed, integrated and dry land farming. Role of animals in the contemporary society.

Early extension efforts in India. Types of education: Formal, non-formal and informal education. Extension education: Concept, levels, objectives and dimensions. Principles, philosophy and functions of extension education. Teaching-learning process and steps in extension teaching. Concept of need and its types. Rural development - Concept, significance and importance of rural development programmes for poverty alleviation. Problems and Issues in development. Panchayati Raj System.

Concept of sociology and rural sociology in animal husbandry extension. Culture: definition, elements, change, impact on production systems. Basic sociological concepts - society, community and association. Rural society: characteristics and differences among society, community and culture. Characteristics and differences among tribal, rural and urban communities.

Technology- Concept, generation process, application, merits and de-merits. Adoption and diffusion of innovations, stages of adoption, adopter categories, innovation decision process, attributes of innovations, diffusion process, factors affecting adoption and diffusion processes. Programme planning- principles, objectives and steps. Evaluation of extension programme, constraints in the adoption of scientific animal husbandry practices. Role of extension agents in diffusion of livestock innovations. Cattle and buffalo improvement programmes: Key Village Scheme, Intensive Cattle Development Project, Gosadan and Gaushala. Dairy development programmes: concept of cooperation, Rochdale principles of cooperation, objectives of cooperative, Amul pattern of dairy cooperative system and Operation Flood. Transfer of technology projects of Indian Council of Agricultural Research (ICAR): Krishi Vigyan Kendra (KVK), Agricultural Technology Information Centre (ATIC), Agricultural Technology Management Agency (ATMA), National Agricultural Innovation Project (NAIP), Rashtriya Krishi Vikas Yojana (RKVY) etc. Different ongoing central and state government animal husbandry development programmes being run related to sheep, goat, poultry, piggery, fodder production etc.

Communication and its functions. Basic concepts: communication fidelity, communication gap, time lag in communication, empathy, homophily and heterophily, propaganda, publicity, persuasion and development communication. Types of communication: Intrapersonal, interpersonal, verbal, non-verbal, vertical, horizontal, organizational communication etc. Elements of communication: Communicator, message, channel, treatment of message, audience, and audience response (feedback). Barriers of communication. Individual contact methods: Farm and home visit, farmer’s call, personal

letter, adaptive or mini kit trial, farm clinic etc. Group contact methods: Result demonstration, method demonstration, group meeting, training, field day or farmers' day, study tour etc. Mass contact methods: Farm publications (leaflet, folder, pamphlet, booklet, bulletin, farm magazine, newsletter etc.), mass meeting, campaign, exhibition, newspaper, radio, television, mobile short message service. Selection and use of extension teaching methods.

Introduction to Economics and Livestock Economics: definition and scope (production, consumption, exchange and distribution). Basic concepts- wants, goods, wealth, utility, price, value, assets, capital, money, income etc.

Definition of entrepreneur, entrepreneurship, enterprise and manager. Difference between entrepreneur and entrepreneurship, entrepreneur and enterprise, entrepreneur and manager. Theories of entrepreneurship: Sociological theory, economic theory, cultural theory, psychological theory. Types, characteristics and functions of an entrepreneur. Forms of entrepreneurship: (Sole proprietorship, partnership, corporation, cooperative, joint stock company, Private and Public Limited Company).

Strengths and limitations of ICTs application in livestock sector and farmers capacity building. Information kiosk, E-learning, CAD, virtual class room, virtual reality, multi-media etc. Cyber extension- problems and prospects in livestock extension.

Gender and animal husbandry- definition, difference between gender and sex, role of women in animal husbandry, gender sensitization, importance of gender sensitization in animal husbandry, need for gender analysis, gender budgeting and mainstreaming. Salient features of recent livestock census, livestock insurance scheme, national livestock mission. Animal welfare: Introduction to animal welfare, ethics and rights. Importance of animal welfare in the contemporary society. Expectations from veterinary professionals.

VETERINARY CLINICAL COMPLEX (VCC)

Orientation and understanding the working of Veterinary Clinics including hospital set up, administration and work force management. Doctor client interaction, Orientation to local language or dialector local terminology of the diseases. Registration, filling up registration cards, history taking, handling and restraining of animals. Preliminary clinical examination such as recording of temperature, respiration, pulse, motility of digestive system etc. Familiarization and practice of first aid procedures. Practice of collection, labelling, packaging and storage of laboratory samples. Preparation and sterilization of surgical packs, instruments, drapes and operation theaters. Familiarisation with antiseptic dressing techniques and bandaging.

Handling, examination, diagnosis and treatment of sick animals in the field conditions under the supervision of faculty. Ambulatory Clinics shall be operated by small groups of students and faculty of clinical departments through an equipped ambulatory mobile unit.

Diagnostic Laboratory Section:

Collection labelling, transportation, and preservation of body fluid samples, writing results and report. Interpretation of data in relation to specific diseases. Clinical significance and interpretation of serum glucose, lipids, proteins, blood urea nitrogen, creatinine, uric acid, ketone bodies, bilirubin and electrolytes from samples.

Clinical significance and interpretation of examination of urine samples. Clinical evaluation of blood (Haemoglobin, packed cell volume, total erythrocytic count, erythrocytic sedimentation rate, total leukocytic count and differential leukocytic count) from clinical samples. Evaluation of acid-base balance and interpretation.

Biochemical aspects of digestive disorders, endocrine functions. Liver, kidney and pancreatic function tests. Role of enzymes for detection of tissue or organ affection. Preparation of microscopic slides from tissue collected for diagnosis and its histopathological interpretation.

Examination of biopsy and morbid material for laboratory diagnosis. Laboratory evaluation and diagnosis of samples for parasitic diseases (routine faecal examinations- direct smear method, simple sedimentation and floatation methods, quantitative faecal examination, pastural larval counts). Examination of skin scrapings, examination of blood.

Orientation to a clinical Microbiology laboratory, collection, transport and processing of specimens from clinical cases for diagnosis of important bacterial, fungal and viral diseases. Isolation of bacteria from clinical samples, identification of bacteria by Grams staining and culturalor biochemical characteristics. Drug sensitivity and rationale for therapy. Diagnosis of diseases by employing tests like Agar Gel precipitation Test, ELISA etc.

LIVESTOCK FARM COMPLEX

Overall farm practices of livestock management including cleaning, feeding, watering, grooming, milking, routine health care, record keeping, sanitation, housing, fodder production, preparation of mineral mixture, cost economic of fodder production. Care of pregnant animals, management of parturition, care of neonatal and young stock. Management of broiler, layer farm and hatchery.

Module – IX

Veterinary Surgery and Radiology and Veterinary Clinical Practices

Definitions, classification of surgery, tenets of Halsted. Pre-operative, intra-operative and post-operative considerations: History taking, physical examination, clinico-pathological testing, intra-operative and postoperative care.

Sterilization and disinfection: Definitions, surgical sterilization, various methods of sterilization (Heat, chemical and radiations etc.), disinfections. Sutures: Definitions, suturing, factors influencing suturing, characteristics of an ideal suture material, types of suture material-absorbable and non-absorbable, surgical knots, various suture patterns-apposition, eversion, inversion and special. Treatment of acute and chronic inflammation: Use of anti-inflammatory drugs and proteolytic enzymes. Haemostasis (physical and chemical methods, systemic haemostats, surgical diathermy). Basic surgical affections: Definitions, classification, diagnosis and treatment of abscess, tumour, cyst, hernia, haematoma, necrosis, gangrene, burn and scald, frost bite and surgical affections of muscles, artery and vein, sinus and fistula.

Wounds: Definition, classification, examination and diagnosis, general principles for treatment

of aseptic, contaminated and septic wounds, healing and factors affecting wound healing, complications of wounds and their remedies. Surgical infection; their prevention and management: Classification of infection, Introduction to biomaterials and stem cell therapy in wound management. Management of surgical shock. Principles of fluid therapy in surgical patients.

Development of anaesthesiology, Terminology, classification and indications. General considerations of anaesthesia: Factors affecting anaesthesia and selection of anaesthetic technique, factors modifying uptake, distribution and elimination, patient evaluation, categories of patients according to physical status, selection of anaesthetic agent and patient preparation. Pain and its management in animals Local and regional anaesthesia: Definitions, local anaesthetics, mechanism of action Premedication, properties and use of different preanaesthetics: Uses of premedication.

Anticholinergic, sedatives and tranquilizers (Phenothiazine derivatives, Benzodiazepines, Butyrophenones, Narcotic analgesics, Alpha-2 agonists, dosage chart of all the drugs. General anaesthesia: Definitions, methods of induction of anaesthesia, Intravenous anaesthetics (Total intravenous anaesthesia), monitoring of anaesthesia.

Inhalation anaesthesia: Advantages of inhalant anaesthetics, types of inhalant anaesthetics their properties and effect on various systems, methods of administration of inhalant anaesthesia. Dissociative anaesthesia: Definition, drugs, clinical application, properties and effect on various body systems. Avian, wild, zoo, exotics and lab animal anaesthesia and capture myopathy. Anaesthetic emergencies and management, Toxicity, antidote and reversal agents.

Introduction to Radiology-General terminology of radiology, Radiation hazards and safety measures- Scattered radiation, Biological effects of radiation, Direct and indirect effects, Early and late effects, Radiation protection, General principles of radiation safety, Radiation monitoring devices, Requirement of an ideal radiographic section. Manual and digital processing of X-ray films, storage and retrieval system. Definition, indications, contraindications and types of contrast radiography, Different contrast materials and their use, Techniques of some selected contrast radiography in animals(Barium swallow, Retrograde urography etc) Diagnostic ultrasonography- Principles, indications, techniques and artifacts of ultrasonography.

Head and Neck: Affections of lips, cleft palate, tongue, cheek, and their treatment: General anatomical considerations, avulsion of lip, cleft lip ranula, neoplasm and traumatic injuries. Affections of teeth and jaws and their treatment: General anatomical considerations, Developmental abnormalities, dental tartar, periodontal disease, overgrown molars, fractures and luxations of jaw. Affections of nose, face, ear, head and horn and their treatment: General anatomical considerations.
Brachycephalic syndrome, Stenotic nostrils, nasal polyps, empyema of sinuses, fracture and avulsion of horn, horn cancer, aural haematoma, otitis. Affections of eye and their treatment: General anatomical considerations and examination of eye. Affections of guttural pouch, oesophagus and their treatment: General anatomical considerations. Empyema, tympanitis and Mycosis of guttural pouch, Yoke gall, yoke abscess, fistulous withers, poll evil, torticollis. Affections of larynx and Trachea: Tracheal collapse, stenosis, roaring in horses, dorsal entrapment of soft palate in horses and camels, emergency tracheotomy.

Thorax and Abdomen: Thoracic affections: Surgical approaches, perforated wounds, pyothorax, pneumothorax, pneumocele, Diaphragmatic hernia and traumatic pericarditis in cattle. Abdominal affections: Surgical approach to the abdomen in different animal species. Common surgical affections

of the stomach in dogs and their management: dilation and torsion of stomach, gastric ulcerations, foreign bodies in the stomach, pyloric stenosis. etc Surgical affections of the stomach in large animal and their management: Ruminal impaction, traumatic reticulitis, omasal and abomasal impaction and abomasal displacement. Surgical affections of small intestines and their management: Intestinal obstruction, intussusception and strangulation (volvulus). Techniques of intestinal anastomosis. Surgical affections of large intestine and their management: Caecal dilatation and torsion, rectal prolapse, rectal and perineal tear, recto-vaginal fistula. Surgical affections of anus and perineal region and their management: Atresia-ani, anal stenosis, anal sac impaction. Other surgical affections of abdomen and their management: Perforating wounds and fistulae of abdomen, umbilical hernia, ventral abdominal hernia, inguinal and scrotal hernia, perineal hernia. Urinary system: Urolithiasis and its management. Urolithiasis in small and large animals. Patent urachus, ectopic ureter. Surgical management of equine colic. Genital system: Surgical affections of male genital system and their management, prostatic enlargementor hyperplasiaor neoplasm, Phimosis, paraphimosis, preputial prolapse, penile amputation. Castration, vasectomy, scrotal ablation in large and small animals. Surgical affections of female genital system and their management: Canine transmissible venereal tumour. Ovariohysterectomy and caesarean section. Applications of rigid and flexible endoscopes in the management of surgical disorders. Integumentary system: Surgical affections of udder, teat and canine mammary neoplasms. Surgical affections of tail and tail docking.

Body conformation of the horse in relation to lameness (trunk, fore limb and hind limb).

Lameness: Its definition classification and diagnosis. General methods of therapy for lameness. Body and limb conformation in relation to lameness in equine.

Equine lameness: Shoulder slip (sweeny), bicipital bursitis, omarthritis, capped elbow, radial paralysis, carpitis. bent knee, and knock- knee. Hygroma of knee, open knee, blemished knee. Fracture of carpal bone, fracture of accessory carpal, contraction of digital flexors. Splints, sore shin, wind puffs, sesamoid iris Osstots, ringbone, quittor, side bone, Navicular disease, pyramidal disease. Laminitis, sand crack, seedy toe, fractures of third phalanx, pedal osteitis, and sole penetration. Canker, thrush and corn, Monday morning disease, cording up, myositis of psoas, Mac thrombosis, Crural paralysis, subluxation of sacroiliac joint rupture of round ligament trochantric bursitis. Upward fixation of patella, stringhalt, gonitis, chondromalacia of patella, rupture of tendoachilles, rupture of peroneus tertius, fibrotic myopathy and ossifying myopathy. Thoroughpin, bog spavin, spavin, curb, capped hock.

Canine lameness: Intervertebral disc diseases, elbow and hip dysplasia, rupture of cruciate ligament, elbow hygroma etc.; their management,

Bovine lameness: Contusion of sole, ulceration of sole, septic laminitis, avulsion of hoof and subluxation of patella, inter digital fibroma, cyst, sand crack, and hoof deformities.

Fracture: Definitions, classification, fracture healing and complications. The preliminary assessment and management of fractures. Techniques of external immobilization of fractures. Techniques of internal immobilization of fractures. Management of fracture complications

Luxation: Definition, signs, diagnosis. Management of common joint luxations in animals. Spinal trauma, diagnosis and its management. Rehabilitation and physiotherapy of orthopaedic patients

Module –X

Livestock Products Technology and Value addition

Retrospect and prospects of 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, UHT treatment, homogenization, bactofugation. Dried, dehydrated and fermented milk. Introduction to functional milk products and its preparation. Packaging, transportation, storage and distribution of milk and milk product*s*. Good manufacturing practices and implementation of HACCP in milk plant. Organic milk products. Food safety standards for milk and milk products. Cleaning and sanitation in milk plant. Dairy effluent management. Sampling of milk. Eestimation of fat, solid not fat (SNF) and total solids. Platform tests. Cream separation. Detection of adulteration of milk. Determination of efficiency of pasteurization.

Introduction to wool, fur, pelt and specialty fibers with respect to processing industry. Glossary of terms of wool processing. Layout and management of rural, urban and modern abattoirs. HACCP concepts in abattoir management. FSSA standards on organization and layout of abattoirs. Animal welfare and pre-slaughter care, handling and transport of meat animals including poultry. Procedures of Ante-mortem and post mortem examination of meat animals. Slaughtering and dressing of meat animals and birds. Emergency and casualty slaughter. Evaluation, grading and fabrication of dressed carcasses including poultry. Abattoir byproducts; rendering, meat, bone, glue, gelatin, fat and byproducts of pharmaceutical value. Management of effluent emanating from abattoir. Carcass evaluation. Determination of meat yield, dressing percentage, meat bone ratio and cut up parts.

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 poultry; drying, salting, curing, smoking, chilling, freezing, canning, irradiation and chemicals. Ageing of meat. Modern processing technologies of meat and meat products. Packaging of meat and meat products. Nutritive value, preservation, packaging of egg and egg products. Laws governing nationalorinternational trade in meat and meat products. Organic and genetically modified meat and poultry products.Packaging of meat, poultry and shell eggs and their products. Estimation of deteriorative changes in meat and meat products.

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper