organisms, thermophilic bacteria and yeast and mold count. Detection of organisms of public health significance from food products by techniques. Tests for detection of mastitic milk. Ante-mortem and post-mortem inspection of food animals. Demonstrationordetection of toxic chemicals and contaminants of public significance from milk and meat. Detection of antimicrobial residues in milk and meat by microbiological and analytical techniques. Demonstration of speciation of meat.

UNIT-2 (VETERINARY EPIDEMIOLOGY)

Sampling methods for epidemiological studies. Measurement of disease frequencies. Sources, storage, retrieval and representation of disease informationordata. Demonstration of selected software programmesor models. Evaluation of sensitivity and specificity of diagnostic tests by epidemiological methods. Determination of associations of disease and hypothesized causal factors. Survey of an animal disease on a farm. Epidemiological investigation of disease outbreaks.

UNIT-3 (ZOONOTIC DISEASES)

Detection, isolation and identification of important pathogens of zoonotic importance from animal, human and environmental sources including foods of animal origin. Detection of zoonotic diseases by serological, molecular and hypersensitivity tests. Study of probable association of human diasease conditions with animal diseases present in an area. Study of rural environment and health status of rural community.

UNIT-4 (ENVIRONMENTAL HYGIENE)

Sampling methods for testing quality of air, water, soil and other environmental sources. Physical, chemical and microbiological examination of water. Estimation of residual chlorine and chlorine demand. Isolation & identification of pathogens from air, water and other environmental sources. Disinfection of animal houses. Determination of efficacy of disinfectants – Phenol coefficient, MIC and MBC. Demonstrationorvisit to water purification system. Demonstration of various ventilation systems in animal houses and specialized laboratories. Demonstration of toxic residues in water and other environmental sources. Visit to local polluted site and documentation of local environmental problems – like dumping grounds, local slum areas, crowded localities etc.

ANNUAL EXAMINATION

PAPERS	UNITS	MAXIMUM MARKS	WEIGHTAGE
THEORY			
Paper-I	1 and 2	100	20
Paper-II	3 and 4	100	20
PRACTICAL			
Paper-I	1 and 2	60	20
Paper - II	3 and 4	60	20

(x) **DEPARTMENT OF VETERINARY PARASITOLOGY**

VETERINARY PARASITOLOGY **Credit Hours: 3+2**

THEORY

UNIT- 1 (GENERAL VETERINARY PARASITOLOGY)

Parasitology: Introduction, Important historical landmarks, importance of parasitology in veterinary curriculum. 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: Rules and regulations, Standard Nomenclature of Animal Parasitic Diseases (SNOAPAD). Immunity against parasitic infectionsorinfestations, 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. Characters of various phyla of parasites.

UNIT-2 (TREMATODES AND CESTODES OF VETERINARY IMPORTANCE)

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, Stilesia,Thysaniezia*). Dog tape worms (*Dipylidium, Taenia, Echinococcus*). Poultry tape worms (*Davainea, Cotugnia, Raillietina, Amoebotaenia, Choanotaenia* and *Hymenolepis.* Broad fish tapeworm (*Diphyllobothrium)* and *Spirometra.*

UNIT-3 (NEMATODES OF VETERINARY IMPORTANCE)

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.

UNIT-4 (ARTHROPODS OF VETERINARY IMPORTANCE)

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*, *Damalinia*, *Menopon*, *Lipeurus*, *Menacanthus* and *Heterodoxus*). Fleas (*Ctenocephalides*, *Echidnophaga, Xenopsylla, Pulex*). Arachnids : General account, soft ticks (*Argas*, *Ornithodoros* and *Otobius*). Hard ticks (*Hyalomma*, *Haemaphysalis*, *Rhipicephalus (Boophilus)*, *Dermacentor, Ixodes* and *Amblyomma*). Mites (*Dermanyssus*, *Ornithonyssus*, *Demodex*, *Notoedres*, *Sarcoptes*, *Psoroptes*, *Chorioptes, Cnemidocoptes* and *Otodectes*). Pentasomida (*Linguatula*). Study of insecticideoracaricide resistance.

UNIT-5 (PROTOZOA OF VETERINARY IMPORTANCE)

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.

PRACTICAL

UNIT- 1 (GENERAL VETERINARY PARASITOLOGY)

Demonstration of the types of final and intermediate hosts. Demonstration of different organsortissues of the hosts affected with endo-and ectoparasites. Visit to Post Mortem Hall to acquaint with different organs of animals affected with parasites. Demonstration of specific parasitic lesions caused by endo- and ectoparasites. Faecal examination techniques, egg counts, examination of faecal samples for the trematode, cestode, nematode eggs and protozoan cystsoroocystsortrophozoites. Demonstration of faecal culturing techniques. Methods of collection, fixation, preservation, staining and mounting of various types of parasites. Blood smear preparation: Wet, thin and thick smears. Staining of blood smears for demonstration of microfilariae and haemoprotozoan parasites. Collection and examination of skin scrapings for mites. Examination of urine samples and nasal washings for parasitic findings.

UNIT-2 (TREMATODES AND CESTODES OF VETERINARY IMPORTANCE)

Study of morphological characters of adults and developmental stages of the following trematodes and cestodes: *Fasciola, Fasciolopsis, Dicrocoelium, Opisthorchis, Schistosoma*, *Paragonimus, Prosthogonimus,* Echinostomes, Paramphistomes (*Paramphistomum, Cotylophoron, Gigantocotyle*, *Gastrothylax, Fischoederius, Gastrodiscus, Gastrodiscoides* and *Pseudodiscus*). *Anoplocephala, Paranoplocephala, Moniezia, Avitellina, Stilesia, Davainea, Cotugnia, Raillietina, Amoebotaenia*, *Choanotaenia, Hymenolepis, Dipylidium, Taenia, Echinococcus, Diphyllobothrium* and *Spirometra.* Demonstration of gross and microscopic lesions of parasites.

UNIT-3 (NEMATODES OF VETERINARY IMPORTANCE)

Study of morphological characters of adults and developmental stages of the following nematodes : *Ascaris, Parascaris, Toxocara, Toxascaris, Ascaridia*, *Heterakis, Oxyuris, Strongyloides, Strongylus, Chabertia, Syngamus* and *Oesophagostomum. Stephanurus, Dioctophyma, Ancylostoma, Bunostomum, Ostertagia, Trichostrongylus, Cooperia, Nematodirus, Haemonchus* and *Mecistocirrus. Habronema, Draschia, Thelazia, Spirocerca, Gongylonema, Physaloptera, Gnathostoma*, *Dirofilaria, Parafilaria, Onchocerca, Setaria, Stephanofilaria*, *Dictyocaulus, Muellerius, Protostrongylus, Metastrongylus, Dracunculus, Trichinella, Trichuris, Capillaria* and *Macracanthorhynchus.* Demonstration of gross and microscopic lesions of parasites.

UNIT-4 (ARTHROPODS OF VETERINARY IMPORTANCE)

Study of morphological characters of adults and life cycle stages of the following arthropods : *Culicoides, Simulium, Phlebotomus, Cimex, Culex, Anopheles, Aedes*, *Tabanus*, *Haematopota* and *Chrysops Musca, Stomoxys, Haematobia, Gasterophilus, Hypoderma, Oestrus ovis*, bottle flies, *Sarchophaga*, *Hippobosca, Melophagus* and *Pseudolynchia*. *Trichodectes, Menopon, Menacanthus, Lipeurus, Haematopinus, Linognathus* and *Damalinia Xenopsylla, Ctenocephalides* and *Echidnophaga.Argas, Ornithodoros, Otobius, Ixodes , Hyalomma, Rhipicephalus (Boophilus*), *Haemaphysalis, Dermacentor* and *Amblyomma*. *Dermanyssus, Ornithonyssus, Demodex, Notoedres, Sarcoptes*, *Psoroptes*, *Chorioptes, Cnemidocoptes, Otodectes* and *Pentastomida.* Demonstration of gross and microscopic lesions of parasites.

UNIT-5 (PROTOZOA OF VETERINARY IMPORTANCE)

Study of morphological characters of different stages of following protozoan parasites: *Leishmania, Trypanosoma, Trichomonas*, *Histomonas, Entamoeba, Balantidium, Giardia*, *Eimeria, Isospora, Sarcocystis , Toxoplasma* and *Cryptosporidium. Plasmodium, Haemoproteus* and *Leucocytozoon. Babesia, Theileria* and *Hepatozoon,* Rickettsial organism *Anaplasma* and *Ehrlichia*. Demonstration of formol ether and Ziehl-Neelson's staining techniques and other faecal examination techniques. Diagnosis of intestinal protozoan infections by iodine and eosin stain methods. Demonstration of gross and microscopic lesions due to protozoan parasites. Demonstration of *Haemoproteus columbae* in the blood. Demonstration of sporulation for diagnosis of coccidian parasites.

ANNUAL EXAMINATION

PAPERS	UNITS	MAXIMUM MARKS	WEIGHTAGE
THEORY			
Paper-I	1, 2 and 3	100	20
Paper-II	4 and 5	100	20
PRACTICAL			
Paper-I	1, 2 and 3	60	20
Paper - II	4 and 5	60	20

(xi) **DEPARTMENT OF LIVESTOCK PRODUCTS TECHNOLOGY**

LIVESTOCK PRODUCTS TECHNOLOGY **Credit Hours: 2+1=3**

THEORY

UNIT-1 (MILK AND MILK PRODUCTS TECHNOLOGY)

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