

1. **Lecture Schedule** – UG, PG , PhD - Theory / Practical Schedule – Approved by BoS – Subject wise

Veterinary Parasitology (as per 33 BOS 22.7.19 Change in Structure of lecture)

Theory lecture Schedule for Veterinary Parasitology offered in Third Year of B.V.Sc & A.H. Degree Program per the MSVE-2016

Sr. No.	Topics to be covered in Theory
1	Introduction to Parasitology, types of animal associations, parasite and types of parasitism (Commensalism, Symbiosis, Predatorism, Phoresis and Mutualism).
2	Types of Hosts (Final, intermediate, paratenic and reservoir), vector, natural and unnatural, host parasite relationship and types of parasites
3	Types of Hosts (Final, intermediate, paratenic and reservoir), vector, natural and unnatural, host parasite relationship and types of parasites continuation...
4	Effects of parasitism to their host, specificity of parasites in relation to species, breed, sex of host and location in the host (organ specificity)
5	Effects of parasitism to their host, specificity of parasites in relation to species, breed, sex of host and location in the host (organ specificity) continuation.....
6	Modes of transmission of parasites and methods of dissemination of infective stages of parasites
7	Resistance of host to parasitic infections/infestation. Complete, incomplete age and reverse age resistance
8	Immunity to parasitic infections (natural and acquired)
9	Nomenclature of parasites, standardized nomenclature of animal parasitic diseases (SNOAPAD)
10	General characters of Phylum: Platyhelminthes,
11	General characters of Phylum: Nematelminthes and Acanthocephala
12	General description of platy helminth parasites affecting domestic animals and birds. Classification of platyhelminth parasites
13 (U2)	General description of Nematelminth parasites affecting domestic animals and birds. Classification of Nematelminth parasites

14	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of liverfluke <i>Fasciolasp</i> .
15	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of liverfluke <i>Fasciolasp</i> . Continuation....
16	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of liver fluke <i>Dicrocoeliumsp.</i> , <i>Opisthorchis</i> spp. and Intestinal fluke <i>Fasciolopsis</i> spp.
17	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of lung flukes (<i>Paragonimus</i> spp.), oviduct fluke (<i>Prosthogonimus</i> spp.) and <i>Echinostome</i> spp.
18	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of Amphistomes, <i>Paramphistomum</i> , <i>Cotylophoron</i> , <i>Calicophoron</i> , <i>Gastrothylax</i> , <i>Fischoedirus</i> , <i>Carumyurus</i> , <i>Gastrodiscus</i> , <i>Gastrodiscoides</i> , <i>Psuedodiscus</i> and <i>Gigantocotyles</i> spp. and immature amphistomiosis
19	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of Amphistomes, <i>Paramphistomum</i> , <i>Cotylophoron</i> , <i>Calicophoron</i> , <i>Gastrothylax</i> , <i>Fischoedirus</i> , <i>Carumyurus</i> , <i>Gastrodiscus</i> , <i>Gastrodiscoides</i> , <i>Psuedodiscus</i> and <i>Gigantocotyles</i> spp. and immature amphistomiosis continuation.....
20	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of blood flukes <i>Schistosoma nasale</i> spp.
21	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of flukes causing cercarial dermatitis and visceral (hepato-intestinal) schistosomosis (<i>Schistosoma spindale</i> , <i>S.indicum</i> , <i>S.incognitum</i>)
22	Study on general characters of cestodes and larval metacestodes of tapeworms
23	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of equine tapeworms (<i>Anoplocephala</i> , <i>Paranoplocephala</i> spp.)
24	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of ruminant tapeworms (<i>Moniezia</i> , <i>Avitellina</i> , <i>Stilesia</i> & <i>Thysaneizias</i> spp.)
25	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of poultry tapeworms (<i>Davainea</i> , <i>Cotugnia</i> , <i>Raillietina</i> , <i>Amoebotaeina</i> , <i>Choanotaenia</i> & <i>Hymenolepis</i> spp.)

26	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of dog tapeworms (<i>Dipylidium</i> , <i>Taenia</i> spp.)
27	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of Human tapeworms (<i>Taenia saginata</i> and <i>Taenia solium</i>)
28	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of dog tapeworms (<i>Multiceps</i> , <i>Echinococcus</i> spp.)
29	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of Broad fish tapeworm (<i>Diphyllbothrium</i> , <i>Spirometr</i> spp.), Dwarf tapeworm (<i>Hymenolepis</i> spp.)
30 (U3	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of <i>Ascaris</i> spp.
31	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of <i>Parascaris</i> and <i>Oxyuris</i> spp.
32	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of <i>Toxocara</i> spp.
33	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of <i>Toxascaris</i> spp.
34	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of <i>Ascaridia</i> and <i>Heterakis</i> spp.
35	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of Bursate worms <i>Strongyloides</i> and <i>Strongylus</i> spp.
36	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of Bursate worms <i>Strongylus</i> spp.
37	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of Bursate worms <i>Strongylus contd.</i> , <i>Chabertia</i> and <i>Syngamus</i> spp.
38	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of Bursate worm <i>Oesophagostomum</i> spp.

39	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of kidney worm (<i>Stephanurus</i> spp., <i>Dioctyophymas</i> spp.)
40	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of hookworms (<i>Ancylostoma</i> spp., <i>Agriostomum</i> spp.)
41	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of hookworm <i>Bunostomum</i> spp., <i>Trichostrongylus</i> spp.
42	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of hookworm <i>Oestertagia</i> spp., <i>Cooperias</i> spp., <i>Nematodirus</i> spp.
43	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of stomach worms <i>Haemonchus</i> spp. <i>Mecistocirrus</i> spp.
44	Comprehensive study on GI nematodes of ruminants and their integrated management along with anthelmintic therapy
45	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of lung worms <i>Dictyocaulus</i> spp., <i>Mullerius</i> spp., <i>Protostrongylus</i> spp., <i>Metastrongylus</i> spp.
46	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of tissue round worms <i>Draschias</i> spp., <i>Habronemas</i> spp., <i>Theleziass</i> spp.
47	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of tissue round worms <i>Spirocerca</i> , <i>Gongylonema</i> , <i>Physaloptera</i> , <i>Gnathostoma</i> spp.
48	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of Filarial worms <i>Dirofilaria</i> , <i>Parafilarias</i> spp.
49	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of filarial worms <i>Onchocerca</i> , <i>Setaria</i> , <i>Stephanofilarias</i> spp.
50	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of guinea worm <i>Dracunculus</i> spp.
51	Salient morphological features of diagnostic importance, life cycle, transmission, pathogenesis, symptoms, epidemiology, diagnosis and general control measures including treatment of guinea worm <i>Trichinella</i> and <i>Trichuris</i> spp.

52	Study of <i>Capillaria, Acantocephala</i> & General principles of control of helminthic diseases by adapting physical, chemical, biological control (Integrated Parasite Control, IPC)
53	Antihelminthic resistance and its types
54	Antihelminthic resistance and its types continuation.....
55 (U4	General description and characterization of arthropods, Characterization of Class Insecta & Class Arachnida.
56	Classification of Insecta, Development of Insects, Metamorphosis, Types of Metamorphosis – Complete & Incomplete, Types of Larvae & Pupae
57	Study of <i>Culicoides</i> spp. , <i>Simulium</i> spp and <i>Phlebotomus</i> spp.:
58	Study of Characterization , Classification of Family <i>Culicidae</i> and <i>Culex Anopheles</i> & <i>Aedes</i> spp.
59	Study of <i>Tabanus, Haematopota</i> & <i>Chrysops</i> spp.
60	Study of <i>Musca, Stomoxys, Haematobia</i> & <i>Sarcophaga</i> spp.
61	Blow fly myiasis: Study of <i>Lucilia, Calliphora, Chrysomya</i> and <i>Phormia</i> spp.
62	Screw worm fly myiasis: Study of <i>Chrysomya</i> spp. & types of myiasis – Obligatory, Facultative & Accidental
63	Study of <i>Oestrus ovis, Gasterophilus, Cobboldia</i> & <i>Cephalopinnas</i> spp.
64	Study of <i>Hypoderma, Hippobosca, Pseudolynchias</i> spp. & <i>Melophagus ovinus</i> .
65	Study of Fleas – <i>Ctenocephalides</i> spp., <i>Pulex</i> spp., <i>Echidnophaga gallinacea</i> & <i>Xenopsylla</i> spp.
66	Study of Lice - Anopleura- <i>Haematopinus</i> spp., <i>Linognathus</i> spp. & <i>Mallophaga</i> – <i>Damalinia</i> spp., <i>Heterodoxus</i> spp. & <i>Trichodectes</i> spp. <i>Menopon gallinae</i> , <i>Lipeurus caponis</i> & <i>Menacanthus stramineus</i> & Bugs (<i>Cimex lectularius</i>)
67	Study of Gamasid mites – <i>Dermanyssus</i> spp., <i>Ornithonyssus</i> spp. & Soft ticks – <i>Ornithodoros</i> spp. & <i>Otobius</i> spp.
68	Study of <i>Argas persicus</i>
69	Study of hard ticks- <i>Boophilus, Rhipicephalus, Haemaphysalis, Hyalomma, Amblyomma, Ixodes</i> & <i>Dermacentor</i> spp.
70	Follicular Mange – <i>Demodex</i> spp.
71	Study of <i>Sarcoptes scabiei, Notoedres cati, Cnemidocoptes, Psoroptes, Otodectes, Chorioptes</i> spp.
72	Study of <i>Linguatula</i> spp. & acaricide and insecticide resistance
73 (U5	General description of protozoa, Differentiation from Protophyta
74	Nutrition, excretion, respiration & locomotion in protozoa
75	Reproduction in protozoa & classification of protozoa

76	Study of <i>Entamoeba</i> spp.
77	General features of Zoomastigophora, its Orders & Family <i>Trypanosomatidae</i> . Life-cycle stages of the family, Genera of <i>Trypanosomatidae</i> , pattern of developmental cycle of the members of the family
78	Genus <i>Trypanosoma</i> , Types of Development – Salivaria&Stercoraria – Subgenera & species of <i>Trypanosoma</i> , Study of cyclically transmitted Salivarian <i>Trypanosoma</i> spp.
79	Study of Stercorarian <i>Trypanosoma</i> spp. (<i>T. cruzi</i> & <i>T. theileri</i>)
80	Study of Mechanically transmitted <i>Trypanosoma evansi</i> :Life cycle pathogenesis and Symptoms
81	Study of Mechanically transmitted <i>Trypanosoma evansi</i> : Diagnosis, treatment and control and <i>Trypanosoma equiperdum</i>
82	Study of visceral leishmaniosis – <i>Leishmania</i> spp.
83	Study of cutaneous leishmaniosis – <i>Leishmania tropica</i> & <i>Giardia</i> spp.
84	Study of bovine trichomoniosis – <i>Tritrichomonas foetus</i>
85	Study of avian trichomoniosis – <i>Trichomonas gallinae</i> & <i>Histomonas meleagridis</i>
86	General features of Phylum Apicomplexa, Class Sporozoea, Subclass Coccidiia, Order Eucoccidiida&Piroplasmida. Suborders of Eucoccidiida – Eimerina, haemosporina&Adeilina. Family <i>Eimeriidae</i> & its Genera – <i>Eimeria</i> & <i>Isospora</i> spp.
87	General features of Phylum Apicomplexa, Class Sporozoea, Subclass Coccidiia, Order Eucoccidiida&Piroplasmida. Suborders of Eucoccidiida – Eimerina, haemosporina&Adeilina. Family <i>Eimeriidae</i> & its Genera – <i>Eimeria</i> & <i>Isospora</i> spp. Continuation...
88	General pattern of life-cycle of coccidia
89	Study of Poultry coccidiosis – <i>Eimeria tenella</i> & <i>Eimeria necatrix</i>
90	Study of Poultry coccidiosis – <i>Eimeria acervulina</i> , <i>Eimeria maxima</i> & <i>Eimeria brunetti</i>
91	Epidemiology, diagnosis, treatment, control & immunity of poultry coccidiosis
92	Study of bovine coccidiosis
93	Study of ovine, caprine, dog, cat and pig coccidia
94	Study of <i>Cryptosporidium</i> spp.
95	Study of <i>Neospora caninum</i>
96	Study of <i>Sarcocystis</i> spp.
97	Study of <i>Toxoplasma</i> spp.
98	Study of avian malaria – <i>Plasmodium gallinaceum</i> & <i>Plasmodium bubalis</i>

99	Study of <i>Haemoproteus columbae</i> & <i>Hepatozoon canis</i> .
100	General features of Babesia & Life-cycle patterns of <i>Babesia</i> spp.
101	In general pathogenesis of <i>Babesia</i> spp. & Study of bovine piroplasmosis- <i>Babesia bigemina</i> & <i>Babesia bovis</i>
102	Study of canine piroplasmosis (<i>Babesia canis</i> & <i>Babesia gibsoni</i>) & equine piroplasmosis (<i>Babesia caballi</i> & <i>Babesia equi</i>)
103	Study of <i>Theileria</i> spp.
104	Continuation of Theileriosis
105	Study of <i>Balantidium coli</i>
106	Study of <i>Ehrlichia</i> spp. and <i>Anaplasma</i> spp.
107	Protozoan Vaccines
108	Resistance to antiprotozoan drugs

Practical Schedule for Veterinary Parasitology offered in Third Year of B.V.Sc & A.H. Degree Program as per the MSVE-2016

	Topic to be covered in Practicals (Practical Schedule)
1	Introduction to Helminthology
2	Methods of collection, fixation, preservation and mounting of helminth parasites
3	Faecal samples analysis – Gross and Qualitative analysis
4	Faecal samples analysis – Gross and Qualitative analysis continuation....
5	Faecal sample analysis – Quantitative analysis
6	Faecal culture techniques
7	Micrometry - Measurement of microscopic object-Demonstration
8	Study of life cycle chart and life cycle stages of Digenetic trematodes and types of cercaria
9	<i>Study of Fasciola, Fasciolopsis</i> spp. and its intermediate host
10	<i>Study of Dicrocoelium, Opisthorchis, Paragonimus, Prosthogonimus, Echinostoma</i> spp. and its intermediate host
11	<i>Study of Paramphistomum, Cotylophoron, Calicophoron, Gigantocotyle, Gastrothylax, Fischoederius, Gastrodiscus, Pseudodiscus</i> spp. and its intermediate host
12	Study of <i>S.spindale, S.indicum, S.incognitum</i> & <i>Schistosoma nasalis</i>
13	Study of <i>Anoplocephala, Paranoplocephala</i> and <i>Moniezia</i> spp.

14	Study of <i>Avitellina</i> , <i>Stilesia</i> , <i>Thysaniezia</i> spp.
15	Study of <i>Davainea</i> , <i>Cotugnia</i> , <i>Raillietina</i> , <i>Amoebotaenia</i> , <i>Choanotaenia</i> , <i>Hymenolepis</i> spp.
16	Study of <i>Taenia</i> spp
17	Study of Bladder worms: <i>Cysticercus</i> , <i>Coenurus</i> , <i>Hydatid</i> , <i>Cysticercoid</i> , <i>Strobilocercus</i> spp.
18	Study of <i>Dipylidium</i> , <i>Echinococcus</i> , <i>Diphylobothrium latum</i> , <i>Spirometra</i> spp.
19	Study of <i>Ascaris</i> , <i>Parascaris</i> , <i>Toxocara</i> , <i>Toxascaris</i> spp
20	Study of <i>Ascaridia</i> , <i>Heterakis</i> <i>Oxyuris</i> spp.
21	Study of <i>Strongylus</i> and <i>Strongyloides</i> spp.
22	Study of <i>Stephanurus</i> , <i>Diocotophyma</i> , <i>Syngamus</i> , <i>Ancylostoma</i> , <i>Bunostomum</i> , spp.
23	Study of <i>Haemonchus</i> , <i>Mecistocirrus</i> , <i>Trichostrongylus</i> , <i>Ostertagia</i> , <i>Cooperia</i> and <i>Nematodirus</i> , spp.
24	Study of <i>Chabertia</i> , <i>Oesophagostomum</i> , <i>Dictyocaulus</i> , <i>Muellerius</i> , <i>Protostrongylus</i> and <i>Metastrongylus</i> spp.
25	Study of <i>Habronema</i> , <i>Draschia</i> , <i>Spirocercia</i> , <i>Gongylonema</i> , <i>Physaloptera</i> , <i>Gnathostoma</i> , <i>Thelazia</i> spp.
26	Study of <i>Dirofilaria</i> , <i>Parafilaria</i> , <i>Onchocerca</i> , <i>Setaria</i> and <i>Stephanofiliaria</i> spp.
27	Detection of microfilaria by wet blood smear and Knott's method
28	Study of <i>Trichuris</i> and <i>Trichinella</i> spp.
29	Visit to Slaughter house or necropsy/PM
30	Field Visit for deworming camp/ awareness camp/adopted village
31	Visit to Slaughter house or necropsy/PM
32	Screening of College farm for helminths
33	Screening of College farm for helminths
34	Visit to Poultry farm for screening of parasites
35	Antiparasitic drugs their formulations, methods of administration/application
36	Visit to Poultry farm for screening of parasites
37	Collection and preservation of arthropods.
38	Processing of arthropods
39	Proboscis of Cockroach, Mosquito, <i>Tabanus</i> , <i>Musca</i> , <i>Stomoxys</i> & <i>Hippobosca</i> spp.
40	Proboscis of bed bug, flea, biting lice, sucking lice and ticks
41	Study of Mosquitoes- <i>Culex</i> , <i>Anopheles</i> & <i>Aedes</i> spp.
42	Study of <i>Culicoides</i> spp., <i>Phlebotomus</i> spp. & <i>Simulium</i> spp.
43	Study of <i>Tabanus</i> spp., <i>Haematopota</i> , <i>Chrysops</i> spp.

44	Study of <i>Musca</i> , <i>Stomoxys</i> , <i>Haematobia</i> & <i>Sarcophaga</i> spp.
45	Study of <i>Lucilia</i> spp., <i>Calliphora</i> spp., <i>Chrysomyia</i> spp. <i>Phormia</i> spp.
46	Study of <i>Callitroga</i> spp., <i>Oestrus ovis</i> , <i>Gasterophilus</i> , <i>Cobboldia</i> , <i>Cephalopinna</i> & <i>Hypoderma</i> spp.
47	Study of <i>Hippobosca</i> , <i>Pseudolynchia</i> spp. & <i>Melophagus ovinus</i> .
48	Study of <i>Ctenocephalides</i> , <i>Pulex</i> spp., <i>Echidnophaga gallinacea</i> , <i>Xenopsylla</i> spp. & <i>Cimex lectularius</i>
49	Study of Avian lice
50	Screening of College farm for arthropods
51	Study of Mammalian lice
52	Study of <i>Dermanyssus</i> , <i>Ornithonyssus</i> spp. <i>Argas persicus</i> , <i>Ornithodoros</i> & <i>Otobius</i> spp.
53	Study of <i>Boophilus</i> spp., <i>Rhipicephalus</i> spp. & <i>Haemaphysalis</i> spp.
54	Study of <i>Hyalomma</i> spp., <i>Amblyomma</i> spp. <i>Dermacentor</i> spp. & <i>Ixodes</i> spp.
55	Skin Scraping Examination
56	Study of <i>Demodex</i> spp., <i>Sarcoptes scabiei</i> , <i>Notoedres cati</i> , <i>Psoroptes</i> , <i>Otodectes</i> , <i>Cnemidocoptes</i> & <i>Chorioptes</i> spp.
57	Diagnosis of protozoan infection Part I: Enteric and tissue dwelling protozoan infections.
58	Diagnosis of protozoan infection Part II: Haemoprotozoan infections.
59	Study of <i>Entamoeba</i> spp.
60	Study of <i>Trypanosoma</i> spp. and <i>Leishmania</i> spp.
61	Study of <i>Tritrichomonas</i> spp., <i>Trichomonas</i> spp. <i>Histomonas meleagridis</i> and <i>Giardia</i> spp.
62	Study of Life cycle of Poultry coccidia.
63	Study of oocysts of common species of coccidia of bovines, ovine, caprine, dog, cat and pig. Study of <i>Cryptosporidium</i> spp.
64	Technique for sporulation of coccidian oocysts.
65	Study of <i>Sarcocystis</i> spp. with its life cycle chart.
66	Study of <i>Toxoplasma gondii</i> & <i>Neospora caninum</i> with life cycle charts
67	Study of <i>Plasmodium gallinaceum</i> and its life cycle chart/ human and bubaline malaria
68	Study of <i>Haemoproteus columbae</i> , <i>Hepatozoon canis</i> and its life cycle chart.
69	Study of <i>Babesia</i> spp. of cattle and dog with life cycle chart
70	Screening of College farm for protozoa
71	Study of <i>Theileria</i> spp. with life cycle chart and <i>Balantidium coli</i>

Books for reference:

1. Helminths, Arthropods and protozoa of domestic animals- E.J.L. Soulsby latest edition
2. Textbook of Veterinary Parasitology- B.B. Bhatia *et al.* ;latest edition
3. Parasitology for Veterinarians- Georgi; latest edition
4. Appraisal of Veterinary Parasitology on Internet

Course Outline-cum-Lecture Schedule for Master Degree Programme

I. Course Title : Platyhelminthes-I

II. Course Code : VPA 501

III. Credit Hours : 1+1

IV. Aim of the course

To study the morphology, biology, pathogenesis and control measures for trematode parasites of veterinary importance

Lecture	Topic
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Theory

- | | |
|-------|--|
| 1-2 | Introduction, history, classification, general account and economic importance of trematodes |
| 3-4 | Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Dicrocoeliidae and Opisthorchiidae |
| 5-7 | Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Strigeidae and Fasciolidae |
| 8-9 | Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Echinostomatidae, Heterophyidae, Plagiorchiidae and Troglotrematidae |
| 10-11 | Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Prosthogonimidae, Nanophyetidae and Paragonimidae |
| 12-14 | Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Notocotylidae, Brachylemidae, and Paramphistomatidae |

15-16 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Cyclocoelidae and Schistosomatidae

17-18 Classification and characters of snails and Control strategies of molluscs of veterinary importance

Practicals

1-5 Collection, preservation/ processing and identification of trematode parasites; their eggs and intermediate hosts

6-11 Observation on parasitic stages in host tissues and associated pathological lesions caused by trematodes

12-18 Identification of molluscs of veterinary importance and examination of molluscs for various developmental stages of trematode parasites.

I. Course Title : Platyhelminthes-II

II. Course Code : VPA 502

III. Credit Hours : 1+1

IV. Aim of the course

To study the morphology, biology, pathogenesis and control measures for cestode parasites of veterinary importance

Lecture	Topic
Theory	
1-2	Introduction, history, classification, general account and economic importance of cestodes
3-4	Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to family: Diphyllbothriidae
5-6	Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to family: Mesocestoididae
7-10	Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to family: Taeniidae
11-12	Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to families: Davaineidae and Hymenolepididae
13-14	Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to families: Dipylidiidae and Dilepididae
15-16	Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to family: Anoplocephalidae
17-18	Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to family: Thysanosomidae
Practicals	
1-8	Collection, preservation/ processing and identification of cestode parasites; their eggs, larval stages and intermediate hosts.
9-16	Observation on parasitic stages in host tissues and associated pathological lesions

I. Course Title : Nematelminthes and Acanthocephala
II. Course Code : VPA 503
III. Credit Hours : 2+1

IV. Aim of the course

To study the morphology, biology, pathogenesis and control measures of nematodes and thorny-headed worms of veterinary importance

Lecture Topic

- 1-2 Introduction, history, classification, general account and economic importance of nematodes and thorny-headed worms
- 2-4 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to family: Ascarididae
- 5-6 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Anisakidae and Oxyuridae
- 7-8 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Heterakidae and Subuluridae
- 9-10 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Rhabditidae and Strongyloididae
- 11-14 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to family: Strongylidae.
- 15-16 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Trichonematidae and Amidostomidae
- 17-18 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Stephanuridae and Syngamidae
- 19-20 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to family: Ancylostomatidae.
- 21-22 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Filaroididae and Trichostrongylidae

- 23-24 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Ollulanidae, Dictyocaulidae and Metastrongylidae
- 25-26 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Spiruridae, Thelaziidae, Acuariidae, Tetrameridae, Physalopteridae, and Gnathostomatidae
- 27-28 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Filariidae, Setariidae, Onchocercidae and Dracunculidae.
- 29-30 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Trichinellidae and Trichuridae
- 31-32 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Capillariidae and Dioctophymatidae
- 31-32 Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Polymorphidae, Oligacanthorhynchidae and Gnathobdellidae.
- 33-34 Integrated parasite control (Physical + Biological +Chemical)

Practicals

- 1-18 Collection, preservation/ processing and identification of nematode parasites and thorny headed worms; their eggs and larvae and associated pathological lesions.

I. Course Title : Arthropod Parasites

II. Course Code : VPA 504

III. Credit Hours : 2 + 1

IV. Aim of the course

To study the morphology, biology, vector potential of the arthropods of veterinary importance and their control measures.

Lecture Topic

- 1-2 Introduction, classification harmful effects and economic importance of arthropod parasites.

Lecture	Topic
3-4	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, vector potential, economic significance and control of arthropods belonging to the family: Culicidae
5-6	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, vector potential, economic significance and control of arthropods belonging to the family: Ceratopogonidae
7-8	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, vector potential, economic significance and control of arthropods belonging to the families: Simuliidae and Psychodidae.
8-9	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, vector potential, economic significance and control of arthropods belonging to the families: Tabanidae and Gasterophilidae
10-11	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, vector potential, economic significance and control of arthropods belonging to the families: Muscidae, and Glossinidae
12-14	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, vector potential, economic significance and control of arthropods belonging to the families: Oestridae, Sarcophagidae, Calliphoridae and Hippoboscidae. Importance of blow flies in forensic entomology and treatment of wounds
15-18	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, economic significance and control of arthropods belonging to the families: Pediculidae, Haematopinidae, Linognathidae, Menoponidae, Philopteridae and Trichodectidae
19-20	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, economic significance and control of arthropods belonging to the order: Siphonaptera and families: Cimicidae and Reduviidae
21-25	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, vector potential, economic significance and control of arthropods belonging to the families: Argasidae and Ixodidae
26-30	Distribution, morphology, life cycle, seasonal pattern, pathogenesis, economic significance and control of acarines belonging to the families: Sarcoptidae, Psoroptidae, Demodicidae, Trombiculidae, Dermanyssidae. Cytoditidae and Linguatulidae.
31-32	Chemical, biological, immunological control measures. Detection and mechanisms of acaricidal resistance.

33-36 Integrated pest management - IPMC (Physical + Biological + Chemical)

Practicals

1-18 Collection, preservation/ processing, identification, differentiation of arthropod parasites and their developmental stages; associated lesions and skin scraping examination

I. Course Title : Parasitic Protozoa

II. Course Code : VPA 505

III. Credit Hours : 2+1

IV. Aim of the course

To study the morphology, life cycle, pathogenesis, diagnosis and control of protozoan parasites of veterinary importance.

Lecture Theory

- 1-3 Introduction, History, Classification and General account and economic importance of protozoan parasites.
- 4-8 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Trypanosomatidae
- 9-11 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Monocercomonadidae and Trichomonadidae
- 12-13 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Hexamitidae and Endamoebidae
- 14-15 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Endamoebidae
- 16-17 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Eimeriidae.
- 18-19 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Cryptosporidiidae.
- 20-23 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Sarcocystidae.

- 24 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Plasmodiidae.
- 25-28 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Babesiidae.
- 29-31 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Theileriidae.
- 32-33 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the family Haemogregarinidae and Balantidiidae
- 34-35 Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of Rickettsiales like *Anaplasma*, *Ehrlichia*, *Haemobartonella* and others.

36 Protozoan vaccines
Practicals

- 1-4 Collection, preservation/ processing, identification of protozoan parasites based on faecal examination.
- 5-9 Collection, preservation/ processing, identification of protozoan parasites based on blood examination.
- 10-13 Observations on parasite stages in host tissues and the attendant pathological lesions.
- 14-18 Diagnosis of protozoan parasites of Veterinary importance.

I. Course Title : Diagnostic Parasitology

II. Course Code : VPA 506

III. Credit Hours : 0+2

Aim of the course

To learn the techniques associated with isolation, identification and preservation of the endo and ectoparasites of veterinary importance and their vectors.

Lecture	Topic
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Practical

- 1-2 Microscopy and micrometry, Preparation of Romanowsky stain.
- 3-9 Collection, preservation, processing and examination of faecal and blood samples; lymph node biopsy, skin scrapings, nasal washings sputum, genital discharges/ washings and urine samples from animals for parasitological examinations.

Lecture	Topic
10-13	Quantitative faecal examination.
14-18	Maintenance of fly and tick colonies in laboratory for experimental purposes and testing of drugs; tick dissection for vector potential.
19-22	Collection of aquatic snails from field and their examination for the presence of different parasitic stages.
23-27	Collection, fixation, staining, whole mounts and identification of parasites.
28-32	Culturing techniques for important parasites, pasture larval count, worm count and assessment of worm burden.
33-36	Remote Sensing (RS) and Geographic Information System (GIS) as tools for mapping parasitic diseases.

I. Course Title : Clinical Parasitology

II. Course Code : VPA 507

III. Credit Hours : 1+1

IV. Aim of the course

Collection of clinical material, examination/ investigation and its preservation for interpretations.

Lecture	Topic
Theory	
1-4	Unit I: Collection, preservation and dispatch of clinical material to laboratory for diagnosis.
5-9	Unit II: History, clinical signs, gross and microscopic examination of diagnostic material.
10-11	Unit III: Animal sub-inoculation tests.
12-15	Unit III: Blood and biopsy smear examination.
16-18	Unit III: Histopathology of affected organs.
Practical	
1-8	Identification, observation of parasitic stages in host tissues, excretions, secretions and associated pathological lesions.

- 9-18 Special techniques for *Cryptosporidium* oocysts in faecal samples. Sporulation of coccidial oocysts.
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I. Course Title : Management of Parasitic Diseases

II. Course Code : VPA 508

III. Credit Hours : 1+1

IV. Aim of the course

To study the integrated approach for the control of helminths, arthropods and protozoan parasites of veterinary importance.

Lecture Topic

Theory

1-6 Unit I: Conventional and novel methods of control of helminth infection in livestock – anthelmintics, their mode of action, characteristic of an ideal anthelmintic drug, anthelmintic resistance, spectrum of activity, delivery devices, integrated control method. Immunological control. Deworming schedule. Snail and other intermediate host control.

7-13 Unit II: Conventional and novel methods of control of protozoan parasites– antiprotozoal drugs, their mode of action, integrated control method including immunological control.

14-18 Unit III Conventional and novel methods of control with insecticides/ acaricides. Methods of application, their mode of action, insecticide resistance, biological control, integrated control method, genetic control and immunological control.

Practical

1-8 In vivo detection of efficacy of and resistance to parasitocidal agents.

9-18 In-vitro detection of efficacy of and resistance to parasitocidal agent

I. Course Title : Immunoparasitology

II. Course Code : VPA 509

III. Credit Hours : 2+1

IV. Aim of the course

To study the host immune response against the endo and ectoparasites of veterinary importance with special reference to immunoprophylaxis and immunodiagnosis.

Lecture	Topic
Theory	
1-7	Unit I: Introduction, types of parasite-specific antigens and their characterization.
8-14	Unit II: Types of immunity in parasitic infections.
15-20	Unit III: Invasive and evasive mechanisms, immunomodulators and their uses.
21-30	Unit IV: Immune responses in helminths, arthropods and protozoa of veterinary importance.
31-36	Unit V: Immunological control against parasitic diseases
Practical	
1-9	Preparation of various antigens (somatic, and excretory-secretory) and their fractionation and characterization
0-16	Demonstration of various immunodiagnostic methods for the diagnosis of parasitic infection

I. Course Title	: Parasitic Zoonoses
II. Course Code	: VPA 510
III. Credit Hours	: 2+0
IV. Aim of the course	
To study important parasites of zoonotic significance.	

Lecture	Topic
Theory	
1-3	Unit I: Introduction to the concept of zoonotic infections
4-6	Unit I: Definition and various classifications of zoonoses.
7-11	Unit I: Host-parasite relationships, modes of infections, factors influencing prevalence of zoonoses.
12-20	Unit II: A detailed study of transmission, epidemiology, diagnosis and control of major protozoa of zoonotic importance.
21-28	Unit III: A detailed study of transmission, epidemiology, diagnosis and control of major helminths of zoonotic importance.

29-36 Unit IV: A detailed study of transmission, epidemiology, diagnosis and control of major arthropods of zoonotic importance.

I. Course Title : Parasites of Wildlife

II. Course Code : VPA 511

III. Credit Hours : 1+1

IV. Aim of the course

To study the biology and control measures for major parasitic diseases of zoo and wild animals.

Lecture

Theory

- 1-7 Unit I: A detailed study of protozoa of zoo and wild animals with particular emphasis on morphological features, geographical distribution epidemiology, diagnosis and management.
- 8-13 Unit II: A detailed study of arthropod parasites of zoo and wild animals with particular emphasis on morphological features, geographical distribution, epidemiology, diagnosis and management.
- 14-18 Unit III: A detailed study of helminth parasites of zoo and wild animals with particular emphasis on morphological features, geographical distribution, epidemiology, diagnosis and management

Practical

- 1-8 Methods for investigating parasitic diseases of captive and wild animals.
- 9-18 Collection and identification of parasites. Visits to zoos and biological parks/ sanctuaries
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**Course Title with Credit Load Ph.D. in
Veterinary Parasitology**

Course Code	Course Title	Credits Hours
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VPA 601	Advances in Helminthology-I	2+1
VPA 602	Advances in Helminthology-II	2+1
VPA 603	Entomology and Acarology	2+1
VPA 604	Advances in Protozoology	2+1
VPA 605	Immunology of Parasitic Diseases*	1+2
VPA 606	Molecular Diagnostics and Vaccine Development in Parasitology*	2+1
VPA 607	Host Parasite Interactions	2+0
VPA 608	<i>In-vitro</i> Cultivation of Parasites	1+2
VPA 609	Emerging and Re-Emerging Parasitic Diseases	2+0
VPA 610	Biology and Ecology of Parasites	3+0
VPA 611	Molecular Veterinary Parasitology	2+0
VPA 612	Parasite Epidemiology *	2+0
VPA 690	Special Problem	0+1
VPA 691	Doctoral Seminar-I *	1+0
VPA 692	Doctoral Seminar-II*	1+0
VPA 699	Doctoral Research	75

*Core courses

Course Outline-cum-Lecture Schedule Doctoral Degree Programme

I. Course Title : Advances in Helminthology-I

II. Course Code : VPA 601

III. Credit Hours : 2+1

IV. Aim of the course

Developments in the area of molecular biology, pathogenesis, diagnosis and control of trematodes and cestodes.

Lecture Topics

Theory

1-18 Unit I: Advanced studies on taxonomy, molecular biology, pathogenesis and immunology of trematodes and their larval stages.

19-36 Unit II: Advanced studies on taxonomy, molecular biology, pathogenesis and immunology of cestodes and larval stages.

Practicals

1-8 Morphological, pathological and immunological studies of trematode parasites.

9-18 Morphological, pathological and immunological studies of cestode parasites.

I. Course Title : Advances in Helminthology-II

II. Course Code : VPA 602

III. Credit Hours : 2+1

IV. Aim of the course

To study the recent developments in the area of molecular biology, pathogenesis, diagnosis of nematode parasites and thorny headed worms with an objective of better control.

Lecture Topics

Theory

- 1-32 Unit I: Advanced studies on taxonomy, molecular biology, pathogenesis and immunology of nematode parasites and their larval stages.
- 33-36 Unit II: Advanced studies on taxonomy, molecular biology, pathogenesis and immunology of thorny-headed worms.

Practicals

- 1-15 Morphological, pathological and immunological studies of various nematodes
- 16-18 Morphological, pathological and immunological studies of various thorny-headed worms

I. Course Title : Advances in Entomology and Acarology

II. Course Code : VPA 603

III. Credit Hours : (2+1)

IV. Aim of the course

To study the recent scientific developments on biology and control measures

for arthropods of veterinary importance.

Lecture Topics

Theory

- 1-5 Unit I: Origin, evolution, regional/ seasonal distribution and forecasting of insect and acarine population
- 6-15 Unit II: Population dynamics of insects and acarines in relation to biotic and abiotic factors
- 16-22 Unit III: Recent developments pertaining to insects of veterinary importance.
- 23-30 Unit IV: Recent developments pertaining to arachnids of veterinary importance
- 31-36 Unit V: Chemical, biological, herbal and immunological control measures and Integrated pest management. Modulation of vector competence to transmit parasitic infections using molecular genetics by developing transgenic vectors

Practicals

- 1-12 Collection and identification of arthropods; demonstration of the infective stages in vectors
- 13-18 Immunopathological changes produced in the host tissues due to the infestation of arthropods

I. Course Title	: Advances in Protozoology
II. Course Code	: VPA 604
III. Credit Hours	: (2+1)
IV. Aim of the course	
To study the recent developments in molecular biology, pathogenesis,	
diagnosis and control of protozoan parasites of veterinary importance.	
Lecture	Topics
Theory	
1-10	Unit I: Advanced studies on taxonomy, molecular biology, pathogenesis and immunology of intestinal protozoa
11-22	Unit II: Advanced studies on taxonomy, molecular biology, pathogenesis and immunology of haemoprotozoans
23-36	Unit III: Advanced studies on taxonomy, molecular biology, pathogenesis and immunology of tissue and other protozoa
Practicals	
1-18	Morphological, pathological and immunodiagnosis of protozoan diseases.

I. Course Title	: Immunology of Parasitic Diseases
II. Course Code	: VPA 605
III. Credit Hours	: (1+2)
IV. Aim of the course	
To study the immune mechanisms operating in different parasitic infections and	
to identify the immunodominant/ immunoprotective antigens for diagnosis and control of parasitic diseases.	

Lecture	Topics
Theory	
1-4	Unit I: To study the salient features of immune responses in relation to trematode, cestode, and nematode infections in livestock
5-7	Unit I: To study the salient features of immune responses to protozoan infections in livestock
8-9	Unit I: To study the salient features of immune responses to arthropod infestations

10-12 Unit II: Principles and applications of immunodiagnostic methods for parasitic diseases

13-14 Unit III: Standardization of immunodiagnostic methods for parasitic diseases

15-18 Unit IV: Identification of candidate antigens for diagnosis and vaccine development

Practicals

1-17 Methods for purification of antigens, fractionation and characterization of antigens, identification of candidate antigens as drug targets,

18-22 Raising of hyperimmune sera

23-36 Development and standardization of immunodiagnostic methods for

the diagnosis and control of parasitic infections

I. Course Title : Molecular Diagnostics and Vaccine Development for Parasitic Diseases

II. Course Code : VPA 606

III. Credit Hours : (2+1)

IV. Aim of the course

To understand the principles of development of sensitive molecular tools for rapid and field oriented tests. Identification of vaccine targets for control of parasites of livestock and pets.

Lecture Topics

Theory

1-3 Unit I: Introduction. Molecular taxonomy of parasites

4-8 Unit II: Genome organisation in parasites of veterinary importance. Structure and function of nucleic acids

9-15 Unit III: Basic plan of gene cloning, and expression in heterologous host. Production of recombinant protein and downstream processing for diagnostic/ prophylactic applications

16-18 Unit IV: General concept of protein synthesis. Identification and molecular characterization of proteins of diagnostic/ prophylactic relevance of parasitic origin

19-28 Unit V: Nucleic acid based techniques for genetic characterization and sensitive diagnosis of parasitic infections; PCR, LAMP, nucleic acid hybridization technique, pyrosequencing, real time

PCR, DNA microarray, microsatellite analysis, RNAi, reverse genetic approaches and their applications, etc.

29-31 Unit VI: Hybridoma technology. Principle of production of monoclonal antibody. The diagnostic application of monoclonal antibodies of parasitic infection

32-36 Unit VII: DNA vaccine, vector vaccine, recombinant protein based vaccine, subunit vaccine, principle and application

Practicals

Lecture Topics

1-11 Identification, characterization, and purification of recombinant protein antigens; SDS-PAGE and western blotting,

12-18 Extraction and quantification of nucleic acid and PCR

I. Course Title : Host Parasite Interactions

II. Course Code : VPA 607

III. Credit Hours : (2+0)

IV. Aim of the course

To study different level of host-parasite interactions/ association with an objective of efficient control.

Lecture Topics

Theory

1-7 Unit I: Introduction, distribution of parasites on/ in the host, morphological adaptation for better survival in/ on the host

8-16 Unit II: Behavioural defences, host immune responses and genetic resistance to parasites

17-29 Unit III Establishment of parasites in immune competent, susceptible, intermediate and abnormal hosts, chronicity of parasitic infections, immunoevasive strategies of the parasites and host-parasite equilibrium

30-36 Unit IV: Pathological consequences of host parasite interactions in relation to malnutrition and micronutrient metabolism

I. Course Title : *In-vitro* Cultivation of Parasites

II. Course Code : VPA 608

III. Credit Hours : (1+2)

IV. Aim of the course

Development and standardization of *in-vitro* techniques for parasite cultivation.

Lecture	Topics
Theory	
1-3	Unit I: Introduction, problems and goals of <i>in-vitro</i> cultivation of parasites
4-7	Unit II: <i>In-vitro</i> cultivation of genital, intestinal flagellates and intestinal ciliates
7-10	Unit III: <i>In-vitro</i> cultivation of intestinal protozoa
11-12	Unit IV: <i>In-vitro</i> cultivation of haemoprotozoa
13-14	Unit V: <i>In-vitro</i> techniques, media and tissue culture for cultivation of helminths and their larval stages
15-18	Unit VI: <i>In-vitro</i> mass rearing and colonization of ticks, flies and other insects
Practicals	
1-8	Preparation of media, sterilization methods and cultivation of genital, intestinal flagellates and intestinal ciliates
9-18	Preparation of media, sterilization methods and cultivation of intestinal and haemoprotozoa protozoa
Lecture Topics	
19-27	Preparation of media, sterilization methods and cultivation of helminths and their larval stages
28-36	Preparation of media, sterilization methods and cultivation of ticks, flies and other insects

I. Course Title : Emerging and Re-Emerging Parasitic Diseases

II. Course Code : VPA 609

III. Credit Hours : (2+0)

IV. Aim of the course

To study the emerging and re- emerging parasitic diseases.

Lecture	Topics
Theory	
1-11	Unit I: Emerging and re-emerging helminthic diseases
12-23	Unit II: Emerging and re-emerging protozoan diseases

I. Course Title : Biology and Ecology of Parasites

II. Course Code : VPA 610

III. Credit Hours : (3+0)

IV. Aim of the course

Study of the bionomics and ecology of the parasites.

Lecture Topics

Theory

- 1-5 Unit I: Ultrastructure, physiology, biochemistry and bionomics of trematodes of veterinary importance
- 6-11 Unit I: Ultrastructure, physiology, biochemistry and bionomics of cestodes of veterinary importance
- 12-22 Unit II: Ultrastructure, physiology, biochemistry and bionomics of nematodes of veterinary importance
- 23-33 Unit III: Ultrastructure, physiology, biochemistry and bionomics of important arthropod parasites
- 34-44 Unit IV: Ultrastructure, physiology, biochemistry and bionomics of important protozoan parasites
- 45-50 Unit V: Ecology related definitions, Environmental changes and ecological disturbances due to natural phenomenon and human interventions (demographic, societal and agricultural changes global warming, floods, hurricanes and pollution
- 50-54 Unit VI: Principles of Remote Sensing, GIS and their role in Veterinary Parasitology

I. Course Title : Molecular Veterinary Parasitology

II. Course Code : VPA 611

III. Credit Hours : (2+0)

IV. Aim of the course

To give a deep insight into molecular biology of parasites of veterinary importance,

their transmission and control. Molecular, immunological and genetic aspects of selected parasites of veterinary importance and vector-host-parasite interaction.

Lecture

Topics

Theory

- 1-2 Unit I: Introduction to molecular biology of parasites-Biological molecules (carbohydrate, protein and nucleic acid)
- 3-6 Unit I: Eukaryotic cell structure, cell membrane and organelles-kinetoplast, apicoplast, cilia, flagella biology
- 7-11 Unit I: Eukaryotic cell metabolism and cell respiration-Oxidative phosphorylation- anaerobic metabolism in parasites-fatty acid metabolism of parasites-cellular reproduction mendelian genetics in parasites and vectors
- 12-17 Unit I: Genome of parasites of veterinary importance, genome size- molecular taxonomy-DNA barcoding-phylogenetics
- 18-24 Unit II: Genetic code- Gene expression-Transcription and Translation-post translational modifications- RNA interference in parasites-CRISPR/ Cas9 in parasites
- 25-30 Unit II: Metagenome-microbiome-transcriptome of parasites-transgenic and para transgenic approach in parasites-drug resistance mechanism and genetics
- 23-36 Unit III: Molecular biology of selected helminth parasites (*Fasciola* spp, *Schistosoma* spp, *Taenia* spp, *Echinococcus* spp, *Toxocara* spp, *Haemonchus* spp, *Dictyocaulus* spp etc)
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I. Course Title	: Parasite Epidemiology
II. Course Code	: VPA 612
III. Credit Hours	: (2+0)

IV. Aim of the course

To study the disease and transmission characteristics, descriptive epidemiology of infectious agents.

Lecture Topics

Theory

- 1-4 Unit I: Introduction to epidemiological concepts-Definitions, aims and uses of epidemiological studies, approaches of epidemiology (descriptive, analytical and experimental), types of epidemiological studies along with their advantages and disadvantages, features of parasitic disease epidemiology
- 5-9 Unit I: Introduction to epidemiological concepts- Measures of disease frequency: Morbidity and mortality (Rate, Ratio, Proportional rate), Measures of morbidity (Cumulative incidence, Incidence rate, Attack rate, Prevalence-Point and Period) and mortality (Cumulative Mortality, Mortality rate, Death rate, Age/ Sex/ Breed death rate, Case fatality proportion, Cause specific death rate, etc.). The epidemiological triangle, iceberg concept, endemic stability, herd immunity concept, etc.
- 10-14 Unit II: Methods in epidemiology Cross-sectional, case control and cohort studies. Techniques of epidemiological surveys Types of sampling- Non-probability sampling (target sampling, choice sampling, etc.), Probability sampling (Random samples, systemic sampling, stratified sampling, cluster sampling, etc.). Sample size calculation for different epidemiological and experimental studies
- 15-18 Unit II: Methods in epidemiology Epidemiological Measures of Association-Strength of association (Relative risk, odds ratio), Effect of association (Attributable rate), effect/ importance of association
- 19-23 Unit III: Advances in Epidemiological techniques Sero-epidemiological methods used in important parasitic disease-Uses and limitations, properties and evaluation. Molecular epidemiology- Principles, laboratory methods, bioinformatics in molecular epidemiology
- 24-27 Unit III: Advances in Epidemiological techniques Serological and molecular epidemiology of important parasites. Remote

sensing and geographic information system- Scope and applications in Veterinary Parasitology

- 28-32 Unit IV: Epidemiology of Important Parasitic Diseases
Epidemiological factors affecting distribution and transmission of important parasitic diseases of animals and birds- Agent Factors/ Disease Patterns, Environment and Disease Patterns, Social Factors and Disease Patterns, etc.
- 33-36 Unit IV: Epidemiology of Important Parasitic Diseases Parasitic disease monitoring and evaluation, outbreak investigations and surveillance Forecasting of parasitic disease
-