(VETERINARY COUNCIL OF INDIA)
NOTIFICATION
New Delhi, the 6th August. 2008

The Veterinary Council of India, with the previous approval of the Central Government hereby makes the following regulations in suppression of the notification vide GSR 69(E) dated the 7th February, 1994, namely:-

PART I

PRELIMINARY

Short title and commencement:(1) These regulations may be called the Veterinary Council of India -Minimum Standards of Veterinary Education- Degree Course (B.V.Sc. & AH.) Regulations, 2008.

(2) They shall come in force on date of their publication in the official Gazette.

Definitions- In these regulations, unless the context otherwise requires-

(a) "Act" means the Indian Veterinary Council Act, 1984 (2 of 1964);
(b) 'course" means a teaching unit of a subject to be covered within a semester as prescribed in the syllabus;
(c) "credit hours' means the weekly unit of work recognized for any particular course as per the course catalogue issued by the University. A lecture class of one hour per week shall be counted as one credit whereas a practical class of two hours duration or **a** working period of three hours in the Teaching Veterinary Clinical Complex or Institution or Farm per week shall count as one credit;
(d) "degree course" means the course of study in Veterinary Science, namely Bachelor of Veterinary Sciences and Animal Husbandry (B.V.Sc. & A.H.); .
(e) 'First Schedule" and "Second Schedule" mean the First Schedule and Second Schedule respectively appended to the Act;
(f) guidelines" means*the guidelines/instructions issued by the Veterinary Council of India from time to time for uniform implementation of these Regulations;
(g "Inspector" means the Veterinary Inspector appointed under sub-section (1) of section 19 of the & Act;
(h) "President" means the President of the Veterinary Council of India;
(i) "qualifying examination" means Higher Secondary (10+2) examination or equivalent conducted by a State Board of Education or Central Board of Education.
(j) "Semester" means a period consisting of minimum one hundred instructional days**,** excluding Annual examination days **;**
(k) "Secretary" means the Secretary of the Veterinary Council of India appointed under section 11 of the Act,
(l) "syllabus" and 'curriculum" mean the syllabus and curriculum for courses of study as specified by the Veterinary Council of India;

(m) 'teaching experience* means experience of teaching in the subject concerned in a Veterinary College, or Animal Science or Allied subjects Institution, or Veterinary Hospital, or Institution recognized by the Veterinary Council of India;

(n) "Veterinary College" means an institution imparting veterinary education for the award of B.V.Sc.& A.H. degree having the required number of departments/units, infrastructure, manpower and other facilities as laid down in these Regulations under the overall administrative control of the Dean/Principal; *

(o) "Veterinary Hospital or Institution" means teaching and non-teaching Veterinary Hospital or Institution relevant to livestock health, production or technology by whatever name called;

(p) "Visitor" means a Visitor appointed under sub-section ***(i***) of section 20 of the Act.

PART II

COURSE OF STUDY

3. Description: A degree course of B.V.Sc. & A.H. shall comprise of a course of study consisting of curriculum and syllabus provided in regulations Part V (9) of these regulations spread over five complete academic years including a compulsory internship of six months duration undertaken after successful completion of all credit hours provided in the syllabus. During the course of study there shall be training in a teaching Veterinary hospital, livestock and poultry farms and field training in Veterinary Institution as part of the course.

4. Duration of Semester or academic year

(a) First semester in the respective academic year of B.V.Sc. & A.H. classes should commence preferably in July or August every year but not later than 31st October.

(b) The annual examination should be conducted prior to annual vacation for the year.

(c) It is essential that each academic year shall consist of at least 200 days of instruction excluding time spent for examinations.

5. Procedure to be adopted for imparting training in the veterinary hospitals or institutions or farms and internship with suitable adjustments at-

(1) **Teaching Veterinary Clinical Complex (TVCC)**

(a) The Teaching Veterinary Clinical Complex shall be a separate unit in every veterinary college under the independent charge of a Faculty Member of the rank of a Professor with specialization in any of the clinical subjects.

(b) Teaching Veterinary Clinical Complex shall be recognized only if it has an average minimum of 500 outdoor cases and 10 indoor cases in a month.

(c) In case-the Teaching Veterinary Clinical Complex does not have requisite number of out patient .and in-patient cases as prescribed in (b), the city veterinary hospitals of State Government/ nearest veterinary hospitals should be used and developed providing all the infrastructure prescribed for a teaching veterinary clinical

complex. The attached teaching veterinary hospitals should have properly built in-door wards, client accommodation, emergency service and the necessary facilities to conduct and demonstrate/ train all medical, surgical and gynaecological cases and separate "in Health" care facilities like artificial insemination, pregnancy diagnosis, health verification tests, prophylaxis etc.

(d) Being a round the clock service there shall be residential accommodation for clinical and hospital staff and suitable accommodation for students on emergency/night duties and cafeteria/canteen for staff, students and clients

(e) All the concerned staff on duty in the teaching veterinary hospital shall be responsible for the treatments and allied public services and would invariably attend the clinics including emergencies/ night duties and on Sundays/ holidays. The staff as well as students should be properly attired and equipped for the performance of clinical duties.

(f) The teaching institutions shall maximally utilize the animal/patient information observing ail the time the principles of animal welfare and ethics, and arrange:

i) The teaching material in the form of clinical cases in sufficient number, variety and species.

ii) Subsidized treatment to encourage larger attendance in teaching veterinary, hospitals.

iii) Procure or provide free maintenance to, cases of academic interest or typical' cases of teaching value so that students can benefit from them.

iv) In the case of death/ euthanasia detailed necropsy be demonstrated and specimens preserved.

(2) Instructional Livestock Farm Complex (I.L.F.C)

The Instructional Livestock Farm Complex shall be a separate unit in every veterinary college under the independent charge of a Faculty Member of tie rank of a Professor with specialization in any of the production subjects. The farm complex shall be for teaching in rearing of livestock species including poultry with the following facilities:

i) housing, feeding, breeding and management of large and small ruminant units, piggery, poultry and animals of regional interest
ii) record keeping
iii) storage facilities for feed and fodder
iv) production facilities for fodder crops
v) suitable- housing for managerial and technical staff

Being a round the clock service there shall be residential accommodation and suitable accommodation for staff and students on duties.

All the concerned staff on duty in the Instructional Livestock Farm Complex shall be responsible for management including emergencies of the animals in the livestock Farm. They shall arrange and supervise the routine managemental practices from time to time and shall maintain record for the same. They shall also be responsible for production activity in each of the units

PART III

ADMISSION TO THE B. V. Sc. & A.H. DEGREE COURSE

6. A candidate shall not be admitted to B.V.Sc. & A.H. degree course unless:-

(a) He/she has completed the age of 17 years on or before the 31st December of the year of his/her admission to the 1st year of B.V.Sc. & A.H. course; and

(b) He/ she has passed the qualifying examination as defined under these Regulations with the subjects of Physics, Chemistry. Biology and English as core course and obtained marks as specified under Regulations Part III (7) or an examination equivalent to intermediate Science examination of an Indian University/Board recognized by the Association of Indian Universities taking Physics, Chemistry and Biology including a practical test in each of these subjects and English.

SELECTION OF STUDENTS

7. (1) The selection of students for admission to B.V.Sc. & AH. Degree Course shall only be on the basis of merit through a competitive entrance examination to achieve a uniform evaluation, as there may be variation among students at qualifying examinations conducted by different agencies.

NOTE: To be eligible for competitive entrance examination, candidate must have passed any of the qualifying examinations as enumerated under the head, "Admission to B.V.Sc. & A.H. Degree Course* at Part III (6) above

(2) A candidate under General Category for admission to the B.V.Sc. & A.H. degree course must have passed in each of subjects of English, Physics, Chemistry and Biology, and obtained 50% marks In aggregate of these subjects, at the qualifying examination. Admission of students to B.V.Sc.& A.H. degree course shall be made only on the basis of his/her merit in the competitive entrance examination. No other merit/weightage shall be for admission to B.V.Sc. & A.H. degree course.

(3) In respect of candidates belonging to the Scheduled Castes/ the Scheduled Tribes or other special category of students as specified by the Government from time to time, marks required for admission shall be 10% less than that prescribed for general category. Where the seats reserved for the Scheduled Caste and the Scheduled Tribes students in any State cannot be filled for want of requisite number of candidates fulfilling the minimum requir prescribed from that State, then such vacancies shall be filled up on all India basis with students belonging to the Scheduled Castes and Scheduled Tribes getting not less than the minimum prescribed pass percentage.

(4) The students educated abroad seeking admission into veterinary colleges in India, must have passed the subjects of Physics, Chemistry, Biology and English up to the 12th Standard level with 50% marks in the individual subjects.

(5) Sponsored candidates shall have to qualify the admission procedures as laid down for the students under General category.

(6) Admission of candidates to B.V.Sc. & A.H. degree course under bilateral exchange programme shall be regulated by Veterinary Council of India.

(7) 15% of the total number of seats of each veterinary college shall be reserved to be filled on an All India basis through Common Entrance Examination (All India Pre-veterinary Test) to be conducted by the Veterinary Council of India.

(8) The candidates selected through this examination shall be admitted in various veterinary colleges as per the eligibility criteria prescribed in these regulations only and the last date for reporting of these candidates to the allotted University/Veterinary Institution shall be 31st August of that year irrespective of the closing date of admission of that University/Veterinary Institution for that year, if earlier.

(9) A candidate shall not be allowed admission to B.V.Sc. & A.H. degree course including those admitted under 15% reserved quota of Veterinary Council of India if he/she suffers disabilities in physical fitness as listed below:

a) disability of total body Including disability of chest/spine more than 50%,
b) disability of lower limb of more than 50%,
c) disability of upper limb, visually handicapped candidates and those with hearing disability,
f) candidates with progressive diseases like myopathies etc.
g).disabilities which otherwise would interfere in the performance of the duties of a veterinarian.

(10) The disability should be certified by a duly constituted and authorised Medical Board comprising of at least three specialists out of which two should be of the specialty concerned and the candidate has to present him/her- self before the Medical Board. The last valid disability certificate of the candidate from a Medical Board should not be more than three months old from the date of submitting his/her certificate for disabled candidates.

PART IV

VETERINARY CURRICULUM - STRUCTURING AND ORGANIZATION OF COURSE CURRICULUM

8(1) VETERINARY CURRICULUM –

(a) The veterinary curriculum is comprised of six components of study:

(i) Core Courses,
(ii) Tracking Programmes,
(iii) Study Circles,
(iv) Entrepreneurial Training,
(v) Internship, and
(vi) Competence in skills.

(b) The curriculum is meant to provide adequate emphasis on cultivating logical and scientific habits of thought clarity of expression, independence of judgment, ability to collect information and to correlate them, and develop habits of self education.

(c) A judicious balance has been ensured in distribution of course credits in theory and practical and sequence among basic, production, pre-clinical and clinical subjects including public health and livestock products technology.

(d) The educational process may be placed in a historic background as an evolving process and not merely as an acquisition of large number of disjointed facts without a proper perspective.

(e) Medium of instruction to B.V Sc.&A.H. degree course shall be English.

(f) Clinical practice shall be organized in small groups of 5-10 students so that each teacher can give personal attention to each student with a .view to improve his/her skill and competence in handling of the patients.

(g) Efforts be made to encourage students to participate in group discussions and seminars to enable them to develop personality, character expression and other faculties which are necessary for a veterinary graduate to function either in solo practice or as a team member when he/she begins his/her independent professional career. An appropriate time slot for this activity be provided in the student study time table.

(h) Practical training be imparted to produce a well balanced and all-rounder graduate. Continuing self-education among students for further development in different aspects of veterinary and animal science/technology be encouraged. Tutorials be organized for this activity.

(2) SUBJECTS TO COVERED IN THE B.V.Sc. & A.H. DEGREE COURSE

1. Veterinary Anatomy
2. Veterinary Physiology and Biochemistry
3. Veterinary Pharmacology and Toxicology
4. Veterinary Parasitology
5. Veterinary Microbiology
6. Veterinary Pathology
7. Veterinary Public Health and Epidemiology
8. Animal Nutrition
9. Animal Genetics and Breeding
10. Livestock Production Management
11. Livestock Products Technology
12. Veterinary Gynaecology and Obstetrics
13. Veterinary Surgery and Radiology
14. Veterinary Medicine
15. Veterinary and Animal Husbandry Extension Education

3. MIGRATION OR TRANSFER OF STUDENT FROM ONE RECOGNIZED VETERINARY COLLEGE OR INSTITUTION TO ANOTHER

(1) A student studying in a recognized veterinary college may be allowed to migrate/be transferred to another recognized veterinary college under another/same university.

(2) The migration/transfer may be allowed by the university concerned after passing 1st year of B.V.Sc. & A.H. degree course within one month of the start of academic session of 2nd year of the receiving college/university.

(3) Migration/ transfer of a student shall not be allowed during the middle of an academic year.

(4) The number of students migrating/ transferring from one veterinary college to another veterinary college during the period of one academic year will be kept to the maximum limit of 5% of the intake capacity of each of the veterinary colleges in one year.

(5) Cases not covered under such regulations, (1) to (4) may be referred to the Veterinary Council of India for consideration on merits.

(6) An intimation about the admission of migrated/ transferred students into any veterinary college should be sent to the Veterinary Council of India by the respective college/university.

PART V

SYLLABUS

9.(1).(a) The semester-wise distribution of theory and practical courses comprising of 177 credits (core courses) for B.V.Sc. & A.H. degree course are summarized below :-

Professional Year	Semester	Theory	Practical	Total
First	I	11	07	18
	II	12	08	20
Second	III	12	09	21*
	IV	12	09	21*
Third	V	12	07	19
	VI	13	08	21
Fourth	VII	10	10	20
	VIII	10	08	18**
Fifth	IX	09	10	19
		101	76	177

* 1 credit (0+1) each for two courses on Livestock Farm Practice (non credit) included.
** 1 credit (1+0) for Veterinarian in Society (non credit) included.

(b) In addition to the Core Courses above, a student has to successfully complete the Tracking Programmes, Study Circles, Entrepreneurial Training, Internship and Core Competence in Veterinary skills as has been detailed under Part IV (8)(1) of these regulations for the award of B.V.Sc. & AH. degree.

(c) Remount Veterinary Corps (RVC) Squadron/ National Cadet Corps (NCC)/ Equestrian/National Service Scheme (NSS)/ Sports and games shall be non-credit

training programmes one of which for a duration of minimum of two Professional Years shall be compulsory for the award of B.V.Sc. & A.H. degree. The performance of the students in these training programmes shall be assessed and graded as 'Satisfactory'or' Unsatisfactory'. A student has to obtain 'Satisfactory' grading for successful completion of course requirements.

NOTE: The Syllabus prescribed in sub-regulation is the minimum instructional syllabus and is illustrative of the course content for teaching different courses at the veterinary colleges in the country for B.V.Sc. & A.H. degree programme. However, there is scope for flexibility of addition of topics/courses in the programme as per need or regional/ institutional demand from time to time. Such changes should be non-violative and commensurate to the basic structure, curriculum and infrastructure prescribed in these regulations

(2) Tracking Programmes

These programmes have been developed to allow students to exercise more control over the specific direction of their profession and motivate them for self-teaming through virtual classroom, distant learning, internet etc. A student has to compulsorily take any two programmes of two credits each (2x2=4 credits) any time (one semester duration each) during second year to fifth year of B.V.Sc. & A.H. Degree Course under the supervision of one faculty member as designated by the Dean/Principal of the College for that programme. Evaluation of the students for this programme shall be done internally on Grade basis (A-Excellent. B-Good, C-Average). In case of unsuccessful candidates, the programme can be carried over to the next semester/year.

List of the Tracking Programmes is given below:

i) Feline Medicine
ii) Cryobiology of Gametes
iii) Neurosciences
iv) Clinical/ Interventional Nutrition
v) Dermatology/integument Science
vi) Alternate Veterinary Medicine
vii) Ophthalmology
viii) Anesthesiology
ix) Small Animal Critical Care
x) Non-Mammalian Medicine
xi) Sports Animal Medicine
xii) Drug designing
Xiii- xv)- To be decided by the college/university.

These will be Non-Credit courses but shaft be mentioned in the Degree Transcript along with the grades obtained.

(3) Study Circles

Each student of B.V.Sc. & A.H. degree course shall have to enroll himself/herself for at least two Study Circle activities daring the B.V.Sc. & A.H. degree course out of the proposed Study Circles-as listed below:

i) Livestock and Livelihood Study Circle
ii) Production Systems Study Circle
iii) Ecosystems and Livestock Study Circle
iv) Equine Study Circle
v) Canine Study Circle
vi) Diagnostic Study Circle
vii) Alternate Animal Use Study Circle
viii) Fun/Sport Animal Study Circle
ix) Law and Veterinary Science Study Circle

The College shall designate an Advisor for each of the above Study Circle activities who shall supervise, guide, monitor and evaluate the activities of the Study Circles. Each enrolled student shall have to present a Seminar on the topics of his/her Study Circle any time during the Semester. The date and time of the Seminar shall be notified inviting participation of all students. The Study Circle shall also put up news, wall papers, drawings, exhibits of their subject in the college. The Dean of the college shall coordinate the activities with the Advisors for each of the above Study Circles. The evaluation of the student for each of the registered Study Circles shall be done by the Advisor who will grade them as A-Excellent, B-Good, C-Average as per their performance. The same shall be recorded in the Degree Transcript along with the grades obtained. No student shall be allowed to change the Circles during the professional year.

(4) Entrepreneurial Training,-

Each student of B.V.Sc. & A.H. degree course shall be required to compulsorily undertake one of the activities of Entrepreneurial Training as listed below. This training is aimed at developing entrepreneurial skill for serf employment The university/college shall provide interest free loans out of a revolving fund (not less than Rs. 3.00 lakhs in a college) to students groups (team of up to five students), technical support and infrastructure for these activities. Inputs, day-to-day work and financial accounting shall be undertaken by the students. The profits/loss, if any, shall be kept/borne by the students. However, in case of loss, the Dean of the college through the Entrepreneurship Committee consisting of four faculty members (at least one subject matter specialist) may evaluate the reasons of such loss and provide compensation in case it is found that the loss has been inadvertent .Proposed List of 16 Entrepreneurial activities is as follows:

(i) Goat Production
(ii) Sheep Production
(iii) Pig Production
(iv) Broiler and Egg Production
(v) Pet Production
(vi) Dairy Production
(vii) Meat Production and Processing
(viii) Fish Production

(ix) Feed Production-Mineral Mixture
(x) Milk Products
(xi) Food safety-residue Analysis
(xii) Clinical Investigatory laboratory
(xiii) Quality Control-Evaluation (Microbial)
(xiv) Shoeing and Shoe Manufacture
(xv) Production of Diagnostic
(xvi) Pharmaceutical Formulations ,

Besides, the Colleges/Institutions may also offer the facilities for Entrepreneurial Training involving the activities of regional interest

(5) Internship.-

(a) As per regulation 3 of Part II of these regulations, every student of B.V.Sc. & A.H. degree course shall be required after passing the fifth annual examination to undergo compulsory rotating internship to the satisfaction of the University for a minimum period of six calendar months so-as to be eligible for the award of the degree of B.V.Sc & AH. and full registration with the Council.

(b) Compulsory rotating internship shall include a full time training in veterinary and animal husbandry services {including emergencies and night duties, Sundays and holidays). The intern will devote whole time to the training and will not be allowed to accept a whole time or part time appointment paid or otherwise,

(c) Internship shall be undertaken only after completion of all credit requirements of veterinary curriculum including Tracking Programmes, Study Circles, Entrepreneurial Training -and R.VC. Squadron/N.C.C./ Equestrian/N.S.S/Sports and games as prescribed under these regulations.

(d) The university shall issue a provisional course completion certificate of having passed all the professional examinations and having successfully completed course work.

(e) The State or Union Territory Veterinary Council or Veterinary Council of India will grant provisional registration to the candidate on production of provisional B.V.Sc. & A.H. course completion certificate. The provisional registration will be for a minimum period of six months and maximum of eight months.

(f) After provisional registration with the State or Union Territory Veterinary Council or Veterinary Council of India, the candidate shall register for internship of six calendar months.

(g) Interns will be actively involved in rendering veterinary service under the supervision of an experienced teacher.

(h) They shall assist the teacher in all activities of the units they are posted in.

(i) During the period of internship they shall be" provided accommodation/lodging and paid consolidated remuneration in the form of internship allowance as may be decided by the University/Institution from time to time.

(j) Attendance will be compulsory. The candidate will be entitled for 10 days casual leave. The leave cannot be claimed as a matter of right until and unless the sanctioning authority sanctions it. If an intern willfully absents from the training programme even if for part of a day or during off hours duty (including Sundays/holidays) he/ she may be treated absent for that day. The candidate will be required to undergo training

for the additional days in lieu of the absence period and internship allowance will not be paid for these additional days.

(k) The internship programme shall be monitored by a Committee constituted by the Dean under his/her chairmanship including among others the Head of TVCC and Head of ILFC as members. This Committee shall monitor effective implementation of the internship training programme from time to time.

(l) In case of unsatisfactory work/ performance and/or shortage of attendance, the period of compulsory rotating internship shall be extended by not more than two months by the appropriate authority If this period is more than two months, the intern has to re-register afresh for internship programme for entire six calendar months including registration with the State or Union Territory Veterinary Council.

(m) Internship allowance will be paid only for six calendar months. No internship allowance will be paid for the period of absence/unsatisfactory performance/extended period.

(n) The compulsory rotating internship for six calendar months shall be done in teaching and approved Veterinary Polyclinics/Veterinary Hospitals, Veterinary Biological Centres, Technology Centers, Farms and Veterinary Disease Investigation Centers. The internship programme can be undertaken at approved veterinary institutions in India,

(o) The compulsory rotating internship shall be in the following areas:

(i) Clinical training covering veterinary medicine, surgery and radiology, animal reproduction, gynaecology and obstetrics, clinical emergencies, indoor ward care, hospital management record keeping etc. for three months.

(ii) Livestock production and management training, covering farm routines of cattle and buffalo farms, piggery/rabbitary, sheep and goat farms, and equine/ camel unit etc. for one month.

(iii) Poultry production and management covering layer and broiler production, hatchery and chick management quail, turkey, duck units etc. as well as fishery or any other recycling unit where feasible, for one month.

(iv) Livestock technology and service' covering familiarization in biological product units, disease control campaigns (disease investigation and sample collection and dispatch, vaccination, mass testing etc.) in plant training in meat plants, milk plants, etc. training in zoo/ wild life center/ national parks, for one month.

(p) Details of day to day work, posting and duration needs to be worked out by the Veterinary Institution as per its needs and infrastructure facilities,

(q) Where an Intern is posted to a recognized Veterinary hospital for training, a representative of the college and the In-charge of the Veterinary hospital shall regulate the training of such interns,

(r) Every Intern shall render professional veterinary service, skill and knowledge under supervision and guidance of a registered veterinary practitioner working in the approved Veterinary Institution.

(s) Function, responsibilities and duties of Interns:

(i) Participation with clinical faculty in the hospital practice.

(ii) Shares the emergency and night duties on rotation in the larger and small ' animal hospitals including Sundays & holidays.

(iii) Participation with staff of the place of posting in Veterinary Practice (production or technology).

(iv) The intern responsibilities include hands-on diagnostic and treatment procedures for hospitalized cases under the supervision of the attending veterinarian.

(v) Participation in the tutorial instructional program of the Veterinary College.

(vi) The intern will administer primary care to emergency cases and participate in service such as anaesthesia, radiology, ultrasonography, endoscopy, laboratory and diagnostic procedures. Medicine and Surgery rounds are held periodically allowing the interns to present cases and participate in topic discussion.

(t) The training shall be supplemented by weekly sessions of clinical conference, farm operation and data analysis, preparation of feasibility reports, project report, campaigns/ discussions in, clinical training, farm training and technology and services respectively.

(u) For the purpose of internship all necessary inputs .like accommodation, transport, adequate clinical facilities etc. shall be provided.

(v) The intern shall maintain a log book of day to day work which may be verified & certified by the supervisor under whom he/she works. In addition the interns will prepare a brief project report on the basis of his/ her case study/ case analysis, survey reports etc. This shall be based on his/ her own study during the internship. Such reports can be supervised by more than one teacher, if required. The interns shall present such report in seminar organized for the purpose.

(w) The grading shall be based upon the evaluation of log book, their performance reports from all the minimum prescribed training postings, project report and comprehensive examination in core competence in veterinary skills conducted at the end of the programme by an Evaluation Committee comprising of the faculty representing the concerned departments appointed by the Dean for this purpose.

(x) Every Intern shall have to submit an Entrepreneurial Project during the Internship Programme.

(6) Comprehensive Examination on Core Competence in Veterinary skills:

The competence in veterinary skills examination shall be based on an evaluation of core competence in professional skills as detailed below;

(i) Restraint of cow, sheep, horse, dog and pig. Haltering, snaring, muzzling, tad switch, bandaging of horse for exercise and stable bandaging

(ii) Animal identification, Dentition and ageing of animals

(iii) Housing layout/requirements of livestock and poultry

(iv) Computation of ration of livestock of different breeds and age groups in health and disease

(v) Fodder management and interpretation of feed quality evaluation

(vi) Physical. evaluation of livestock health parameters (auscultation, percussion, recording of temperature, pulse, heart rate, respiration rate etc.)
(vii) Recording and interpretation of cardiovascular response
(viii) Testing of milk and milk products for quality, clean milk production
(ix) Carcass quality evaluation (ante-mortem & post-mortem examination)
(x) Specific diagnostic tests for zoonotic diseases
(xi) Sample collection, handling-and dispatch of biological materials for laboratory examination
(xii) Staining techniques for routine clinico- pathological examinations
(xiii) Relating post-mortem lesions to major livestock diseases
(xiv) Haematological evaluation (total leukocyte count, differential leukocyte count, haemoglobin, packed cell volume, erythrocyte sedimentation rate etc.) and interpretation
(xv) Tests and their interpretation for haemoprotozoan diseases
(xvi) Body fluids collection, examination and interpretation as an aid to diagnosis
(xvii) Urine evaluation procedures and interpretation as indicators for diagnosis of diseases
(xviii) Fecal examination- procedures and interpretation
(xix) Examination of skin scrapings and interpretation
(xx) Interpretation of blood chemistry profile in diseases
(xxi) Deworming procedures and doses for different species of animals/birds
(xxii) Managing an outbreak of infectious/contagious disease
(xxiii) Approach to diagnosis of a given disease condition
(xxiv) Pre-anesthetic administration and induction, maintenance of general anesthesia and dealing with anesthetic emergencies
(xxv) Local anesthetic administration
(xxvi) Nerve blocks-sites, functional application
(xxvii) Suture material, suture pattern and tying knots
(xxviii) Common surgical procedures including dehorning, docking, caesarian section, ovariohysterectomy, castration, rumenotomy
(xxix) Application of plaster cast/splint for fracture immobilization and other bandaging procedure in large and small animals.
(xxx) Soundness in horses
(xxxi) Rectal examination - palpation of pelvic/abdominal organs in cattle/ horses/ buffaloes,
(xxxii) Detection **of** oestrus, artificial insemination, pregnancy diagnosis,
(xxxiii) Management of vaginal/uterine prolapse and dystocia
(xxxiv) Andrological examination of bull, handing, preservation and evaluation of semen
(xxxv) Vaccination procedures, vaccination schedules and vaccine types for different diseases
(xxxvi) Handling of radiograph, interpretation of a given radiograph of large and small animals
(xxxvii) Client management
(xxxviii) Managing a clinical practice, ambulatory van, transporting a sick animal requirements, etc.

(xxxix) Dosage regimens of important drugs
(xl) Drug administration techniques in different species of animals- oral, parenteral, rectal, intra-peritoneal and intra-uterine
(xli) Identification of major livestock/poultry breeds
(xlii) Measuring climatic parameters and their interpretation
(xliii) Communication technology tools

There shall be no marks for this examination. Every intern shall be graded as 'Satisfactory' or as 'Unsatisfactory' based on the evaluation of this examination and submission of Entrepreneurship Project. The Dean shall then issue the certificate of satisfactory completion of internship training as prescribed by the Veterinary Council of India. In case of unsatisfactory performance in the comprehensive examination for core competence in professional skills, the candidate has to repeat the entire internship programme.

(7) The candidate will become eligible for registration with State/UT Veterinary Council only on the award of the B.V.Sc: & A.H. degree or production of a provisional degree certificate by the University.

EXAMINATION AND EVALUATION

10. (1) It shall be the responsibility of the teacher(s)/instructor(s) to ensure that the topics to be covered in the theory and practical in each course is recorded through a lecture/practical schedule and distributed to the students at the beginning of each course. The Head of the Department/ Dean shall ensure that the schedule is adhered to and alternate arrangements are made to cover up the loss in case of any eventualities of unavoidable reasons that lead to non-adherence of the above schedule.
(2) Work distribution chart of each teacher should be available with Dean's office for inspection of the Council. In each subject Professors and senior teachers must be actively involved in teaching, especially in conducting practical for degree course. The principle behind each practical, the objective of each practical level of competence expected from the students etc. should be clearly explained to them by senior teachers.
(3) The examination shall be to assess whether the student has been able to achieve a level of competence. For academic assessment, evaluation of practical aspects of the curriculum should receive much greater emphasis leading to separate examinations and requiring the student to secure a minimum of 50% marks, in theory as well as in practical, in each such examination.
(4) The weightage of Theory and Practical shall be in the ratio of 60:40 respectively in both internal and annual examinations.
(5) The distribution of marks for objective and subjective questions in each course/paper shall be in the ratio of 60: 40 respectively both in internal and annual examinations.
(6) The schedule of examination during B.V.Sc. & A.H. course shall consist of internal (semester) and external (annual) examinations: internal examination (theory and practical separately) for each course at the end of each semester; and external examinations (theory and practical separately) at the end of each academic year comprising of all the courses of a particular subject taught during that year.
(7) The internal assessment (Semester) shall be conducted in 50% of total marks in theory and practical separately and shall invariably be conducted on completion of the course as per lecture/practical schedule explained under sub-regulation (1) and shall be held without

any preparatory leave. It shall be the responsibility of the- University/College authorities to conduct these examinations without: loss of instructional days of a Semester. Internal Practical examination shall be conducted by a board of examiners consisting of Instructors) of the course and a representative of the head of the department. Evaluation of answer books shall be done by the concerned instructors). Marks obtained in theory and practical in the internal examinations would be recorded separately and submitted to the Dean/ Principal at the end of the particular semester.

(8) A composite Annual examination for a group of courses/ a course (if only a single course is involved in the paper) shall be conducted for the rest 50% marks in theory and practical separately as per schedule of examination. The annual theory examination(s) shall be conducted by inviting the question paper from appointed paper setters). A paper setter shall be provided the courses and syllabus prescribed by the VCI including detailed course outline. A paper setter shall be requested to prepare two sets of question papers, each for main examination and compartment examination (if any). Where necessary, more than one paper setter/ examiner can be appointed. The practical examinations shall be conducted by the Board of Examiners appointed by the university and shall consist of two or more internal (representing the subjects being examined) and one external examiner. Evaluation of answer books of annual examinations shall be done by the external examiner (s).

(9) Annual examinations shall be held on such dates, time and places as the university may determine and must be completed so that the results are announced before the onset of the ensuing semester.

(10) The schedule of examinations (internal/external) shall be adhered to strictly. No re-examination shall be allowed in events of students.-strike, boycott, walkouts, medical grounds or what-so-ever may be the reason.

(11) There shall be no supplementary (make up) examinations during the academic session. However, a candidate may be allowed to provisionally sit in the next class provided he/she has failed only in two papers. He/she cannot be promoted to next B.V.Sc. & A.H. class unless he/she has cleared the failed papers),

(12) The records of examination shall be made available to the Council, as and when required and the records of assessment may be retained till six months after the conduct of the Annual examination.

EXPLANATION 1: For the first B.V.Sc. & A.H. examination, the subject of Veterinary Anatomy, has one course in the first semester (VAN-111, 1+2=3) and one course in the second semester (VAN-121, 2+2=4). Internal evaluations for VAN-111 shall be conducted at the end of the 1^{a} semester and far VAN-121 the internal evaluation shall be conducted at the end of the 2nd semester. The marks obtained in <the examinations shall be recorded separately for theory and practical and sent to the concerned Registrar/ Controller of Examinations/ Dean. After the completion of courses in the second semester, a composite annual examination (for Veterinary Anatomy Paper-I) shall be conducted for the theory and practical of VAN-111 and VAN-121 giving due weightage to each course. The marks obtained in the theory and practical of internal and annual examination shall be added and the grade point calculated and recorded against Anatomy Paper-I. Similar pattern shall be followed for all other subjects of B.V.Sc. & A.H. Degree course. (Annexure I)

EXPLANATION 2: The teachers while evaluating practical, shall take into account the followings:-

(1) A record or log book maintained by each student as practical records.

(2) Observation and recording of the skill with which each student executes the practical.

(3) Assessment of the comprehensive skill and knowledge of each student through an oral examination (viva-voce).
(4) At least ten percent marks may be awarded to day to day records including record of case sheets etc.

NB: Practical manuals be prepared by the respective departments of each of the courses.

TEACHERS, EXAMINERS, PAPER SETTERS

11.(1) The persons with basic veterinary qualification (B.V.Sc/B.V.Sc. & A.H.) shall be recruited as teaching faculty in the Veterinary Colleges.
(2) Teachers in the disciplines of Biochemistry, Biotechnology, Biostatistics and Computer Application, Entrepreneurship, Extension and Economics may be recruited from the persons having qualifications other than the basic veterinary qualification only in case of non-availability of candidates with basic veterinary qualifications. Where candidates with basic veterinary qualification are available, they should be given priority in selector appointment over the candidates without basic veterinary qualification. Appointment of persons without the basic veterinary qualification as teachers in the aforesaid disciplines shall require prior approval of the Veterinary Council of India.
(3) The post of Head of Department in a Veterinary Cortege shall be filled up only with a teacher with basic veterinary qualification.
(4) A person possessing qualification included in the First or Second Schedule to the Act shall be generally appointed as examiner or paper setter for the conduct of a professional examination for the B.V.Sc. & A.H. course. However, a person without the qualifications mentioned above may also be appointed examiner in his/her concerned subject provided he/she possesses the doctorate degree in that subject and a minimum three years teaching experience.

Provided that-

(a) no such person shall be appointed as an external examiner unless he/she has at least three year's teaching experience;
(b) no person below the rank of Lecturer/Assistant Professor or equivalent shall be appointed as internal examiner
(c) no person shall be appointed as an external examiner in any Para-clinical / clinical subject unless he/she possesses a recognized veterinary qualification and hold a postgraduate degree and teaching experience In the subject concerned.
(d) persons working in Government/Semi Government or similar organizations may also be considered for appointment as external examiners provided they possess qualification and experience as laid down above.
(e) paper setter(s) cannot be appointed as practical examiner(s) in the same paper.
(f) local person(s) shall normally not be appointed as paper setter(s)/ external examiner(s) However, under exceptional circumstances or unavoidable exigencies arising at the time of examination (like hot arrival of appointed examiner/ non- receipt of question paper from paper setter etc.), the University may appoint any qualified

person for the purpose to avoid postponement/ cancellation of annual board examination

(5) Oral and practical examinations shall be conducted by the respective internal, and external examiners with mutual co-operation. They shall allot marks to the candidate appearing at the examination according to their performance and the marks sheet so prepared shall be signed by both the examiners.

(6) Every veterinary college shall provide all facilities to the internal and external examiners which are necessary for the conduct of examinations and the internal examiner shall make all preparations for holding the examinations.

(7) The external examiner shall have the right to communicate to the examining body his/ her views and observations about any short comings or deficiencies in the facilities provided by the Veterinary College with a copy to VCI, if he/she so desire.

(8) Verification of percentage of passing/failing and deviation from the normal curve of distribution will be subject to scrutiny/ enquiry by the examining body.

ATTENDANCE

12. (1) The required condition of attendance shall not be deemed to have been satisfied in respect of the course, unless the student has ordinarily attended all the scheduled theory and practical classes; however, the minimum requirement of attendance shall not be less than 75% (including attendance benefit, if any) of scheduled theory & practical classes separately on the basis of cumulative attendance of ail the courses grouped for a paper for annual examination.

(2) A candidate having attendance below- 75% in a paper will not be eligible to appear in the annual examination of that paper.

(3) The percentage of attendance of a student in a course/ paper shall be computed on the basis of the total number of theory and practical classes scheduled between the date of commencement of instructions and date of closing of instructions irrespective of the date of registration. However, for the students who are reverted- back owing to failure in the compartment examination, the attendance shall be counted from the date of declaration of result of compartment examination and the date of closing of instructions.

PROMOTIONS AND FAILURE

13. (1) Promotion or failure of a student in a professional year shall be decided only on the basis of aggregate marks of internal and annual board examinations.

(2) A student shall be promoted to next higher professional class only if he/she has passed in all the papers of his/her class by obtaining at least 50% marks in theory and practical separately (internal and external combined).

(3) A student should secure over all grade point average (OGPA) of 5.00 out of 10.00 at the end of degree programme to be eligible to get B.V.Sc. & AH. degree.

(4) A student may also be allowed provisional promotion to next higher class till the declaration of the result of the compartment examination (s). However, this promotion shall be subject to clearance in the compartment examination(s) of that/those paper (s) and shall be provisional. If the student fails in the compartment examination (s), he/she shall stand automatically reverted to the class from where he/she was allowed provisional promotion.

(5) Failed students shall register again for the entire professional class, they failed. Such students shall have to fulfill ail requirements of the class afresh.
(6) A student failing in the annual examination for three consecutive years in a professional year of B.V.Sc. & AH. degree programme, shall be finally dropped automatically from the University on account of poor academic performance
(7) In no case, a student shall be allowed to continue his/her B.V.Sc. & AH, studies beyond 8 academic years (16 semesters) in a Veterinary College.

COMPARTMENT EXAMINATION

14. (1) A student failing in a maximum of two papers only may be allowed once to appear in compartment examinations for those paper(s). Compartment examination shall comprise of the external component of both the theory and practical of the failed paper(s), which shall constitute the 100% weightage for that paper(s) and the marks of Internal examination shall not be considered for the evaluation of Compartment Examination.

(2) The compartment examinations shall be conducted within 20 calendar days after the date the results of the concerned professional year examination declared. The results of such compartment examination shall be declared within 5 days after the examination is conducted.
(3) In case of failure in any of the compartment paper(s), the student will be reverted back to the previous professional year and will be required to repeat all the requirements of that failed professional year.

SCRUTINY OF ANSWER BOOKS AND RECTIFICATION OF ERRORS

15. (1) There shall be no provisions of re-evaluation of answer book(s).

(2) A student, however, may be allowed to get his/her answer book(s) scrutinized, for which, the student shall have to apply to Controller of Examination/Coordinator of Examination within three days after the declaration of result and after paying prescribed fee.
(3) The Controller/Coordinator (Examination} shall arrange the scrutiny of answer book(s) by the Moderation Committee.
(4) Scrutiny means re-totaling of the marks, and examination of unmarked question(s), if any.
(5) The answer book(s) of annual examination shall not be shown to the student under any circumstances.
(6) In case, the total marks are found to be incorrect on scrutiny, the same will be corrected and the result shall be revised accordingly (even if it is towards lower side). If, however, any question is found to be unchecked by the Examiner, the answer book(s) shall be sent to the Examiner for doing the needful and the results) shall be revised accordingly if there occurs any change in the marks
(7) No representation by the students) shall be entertained regarding the outcome of the result after scrutiny.
(8) In case a student on the basis of the result of scrutiny becomes eligible for the compartment examination, he/she may apply to the concerned authority to appear in the compartment exam nation on the announced scheduled date. The scheduled date of the compartment examination shall under no circumstances be changed on this account.

MODERATION

16 (1) Question Paper:

The examining body may appoint a single moderator or a board of moderators not exceeding three in number. The moderators shall review the question papers on the day of examination after they have been distributed. Any corrections needed will be conveyed to the examinees and any discrepancy in the question paper in respect of syllabus noticed will be conveyed to the Controller/Coordinator of Examination in a written report.

(2) The Results:

The Controller/Coordinator of Examination in consultation with the Dean of the College shall form Committee of three members consisting of Dean of the College as Chairman and two other teaching faculty members to moderate the results-obtained at the annual board examination. This Committee shall review the results for the normal distribution of marks, the percentage of pass or failure. Any moderation suggested shall be uniformly applied to all students for that papers) without altering the merit of the passed candidates. Any moderation effected should not involve of enhancing of- more than total of 5 marks in a professional year for a particular candidate, and in no case more then 3 marks in one paper. The provisions for Moderation of results shall not apply to Compartment Examinations There shall be no provision for grace marks in any case.

GRADING AND GRADE POINT AVERAGE

17. (1) Grade Point (GP) in a course will be the total marks obtained by a student out of (100divided by 10
(2) Credit Pont (CP) in **a** course will be GP multiplied by the credit hours.
(3) Total Credit Points = Sum of the credit points secured.
(4) The Credit Points earned will be zero if the GP In a paper is less than 5.00
(5) Grade Point Average (GPA) = Sum of the Total credit Points earned divided by the sum of Credit Hours.
(6) The corresponding ranking of OGPA with respect to traditional scoring system of Division Ranking shall be as follows:
8.000 and above - First Division with Distinction
7.000 -7.999 - First Division
6.000 - 6.999 - Second Division
5.000 - 5.999 -Pass

Formats of Detailed Marks Certificate (DMC) and Degree Transcript are at Annexure II and III,

PART VI

SYLLABUS AND COURSES

SEMESTER WISE DISTRIBUTION OF COURSES

FIRST PROFESSIONAL

SEMESTER-I

VAN-111	Veterinary Gross Anatomy-I (Osteology, Arthology & Biomechanics)	1+2=3
VPB-111	Veterinary Physiology-I (Blood, Cardiovascular & Excretory Systems, Body Fluids)	2+1=3
VPB-112	General Veterinary Biochemistry	1+1=2
LPM-111	Livestock Production Management-I (General Principles and Ruminants)	3+1=4
AGB-111	Biostatistics and Computer Application	2+1=3
ANN-111	Principles of Animal Nutrition & Feed Technology	2+1=3
Total Credit		**11+7=18**

SEMESTER- II

VAN-121	Veterinary Gross Anatomy-II (Myology, Neurology, Angiology & Aesthesiology)	2+2=4
VPB-121	Veterinary Physiology-II (Neuromuscular, Digestive & Respiratory Systems)	2+1=3
VPB-122	Veterinary Intermediary Metabolism	2+1=3
LPM-121	Fodder Production & Grassland Management	1+1=2
LPM-122	Livestock Production Management-II (Monogastric and Laboratory Animals)	1+1=2
AGB-121	Principles of Animal Genetics and Population Genetics	2+1=3
ANN-121	Applied Animal Nutrition-I (Ruminants)	2+1=3
Total Credits		**12+8=20**

SECOND PROFESSIONAL

SEMESTER- III

VAN-211	Veterinary Histology & Embryology	2+2=4
VPA-211	General Veterinary Parasitology & Helminthology	3+1 =4
VPP-211	General Veterinary Pathology	1+1=2
VMC-211	General Veterinary Microbiology	1+1=2
LPM-211	Avian Production Management	1+1=2
ANN-211	Applied Animal Nutrition-II (Non-ruminants, Poultry& Laboratory Animals)	2+1=3

AGB-211	Livestock and Poultry Breeding	2+1=3
LFP-211	Livestock Farm Practice (Non-Credit)	0+1=1
	Total Credits	**12+9=21**

SEMESTER- IV

VAN-221	Veterinary Splanchnology & Applied Anatomy	1+1=2
VPB-221	Veterinary Physiology-III (Endocrinology, Reproduction Growth Environmental Physiology)	3+1=4
VPA-221	Veterinary Entomology & Acarology	1+1=2
VPA-222	Veterinary Protozoology	2+1=3
VMC-221	Veterinary Immunology and Serology	1+1=2
VPP-221	Systemic Veterinary Pathology	2+1=3
LPM-221	Commercial Poultry Production and Hatchery Management	1+1=2
LPM-222	Livestock Production Management-III (Regional interest)	1+1=2
LFP-221	Livestock Farm Practice (Non-Credit)	0+1=1
Total Credits		**12+9=21**

THIRD PROFESSIONAL

SEMESTER –V

VPT-311	General and Systemic Veterinary Pharmacology	2+1=3
VMC-311	Systematic Veterinary Bacteriology & Mycology	2+1=3
VPP-311	Special Veterinary Pathology	2+1=3
VPE-311	Milk and Meat Hygiene, Food Safety and Public Health	2+1=3
LPT-311	Milk and Milk Products Technology	1+1=2
LPT-312	Abattoir Practice and Animal Product Technology	1+1=2
VAE-311	Principles and Techniques of Veterinary and A H. Extension	2+1=3
Total Credits		**12+7=19**

SEMESTER-VI

VPT-321	Veterinary Neuropharmacology	2+1=3
VMC-321	Systematic Veterinary Virology	2+1=3
VPP-321	Avian Pathology	1+1=2
VPP-322	Aquatic Animal Diseases, Hearth Care and Management	1+1=2
VPE-321	Veterinary Epidemiology and Zoonosis	2+1=3
LPT-321	Meat Science	1+1=2
VPB-321	Animal Biotechnology	2+1=3
VAE-321	Livestock Economics, Marketing and Business Management	2+1=3
Total Credits		**13+8=21**

FOURTH PROFESSIONAL

SEMESTER- VII

VPT-411	Veterinary Chemotherapy	2+0=2
VSP.-411	General Veterinary Surgery, Anaesthesiology And Diagnostic Imaging	2+2=4
VGO-411	Veterinary Gynecology	2+1=3
VMD-411	Veterinary Clinical Medicine-I (General & Systemic)	2+1=3
VMD-412	Veterinary Preventive Medicine-I (Bacterial, Fungal& Rickettsial Diseases)	2+0=2
VLD-411	Veterinary Clinical Biochemistry and Laboratory Diagnosis-I	0+1=1
VCP-411	Veterinary Clinical Practice	0+5=5
Total Credits		**10+10=20**

SEMESTER-VIII

VPT-421	Veterinary Toxicology	2+0=2
VSR-421	Regional Veterinary Surgery	2+1=3
VGO-421	Veterinary Obstetrics	1+1=2
VMD-421	Veterinary Clinical Medicine-II (Metabolic & Deficiency Diseases)	2+0=2
VMD-422	Veterinary Preventive Medicine –II (Viral & Parasitic Diseases)	2+0=2
VLD- 421	Veterinary Clinical Biochemistry and Laboratory Diagnosis-II	0+1=1
VCP-421	Veterinary Clinical Practice	0+5=5
TVC-421	Veterinarian in Society (Non Credit)	1+0=1
Total: Credits		**10+8=18**

FIFTH PROFESSIONAL

SEMESTER- IX

VSR-511	Veterinary Orthopedics and Lameness	1+1=2
VMD-511	Animal Welfare, Ethics & Jurisprudence	2+0=2
VMD-512	Zoo/Wild Animal Breeding, Management, Nutrition and HealthCare	1+1=2
VMD-513	Pet Animal Breeding Management, Nutrition and HealthCare	1+1=2
VGO-511	Veterinary Andrology and Reproductive Techniques	1+1=2
VPE-511	Environment and Environmental Hygiene	2+1=3
VAE-511	Livestock Entrepreneurship	1+0=1
VCP-511	Veterinary Clinical Practice	0+5=5
Total Credits		**9+10=19**

SEMESTER-WISE DISTRIBUTION OF THEORY AND PRACTICAL

Professional Year	Semester	Theory	Practical	Total
First	I	11	7	18
	II	12	8	20
Second	III	12	9	21*
	IV	12	9	21*
Third	V	12	7	19
	VI	13	8	21
Fourth	VII	10	10	20
	VIII	10	8	18**
Fifth	IX	9	10	19
		101	76	177

* 1 credit (0+1) each for two courses on Livestock Farm Practice (non credit) included. ** 1 credit (1+0) for Veterinarian in Society (non credit) included.

Other Non-Credit Course (4 Credits)

Tracking Programmes - Two programmes of 2 Credits each = 4 Credits

SUBJECT-WISE COURSES AND CREDIT HOURS

COURSE NO.	COURSE TITLE	CREDIT HOURS	SEMESTER
1. Veterinary Anatomy			
VAN-111	Veterinary Gross; Anatomy-I (Osteology, Arthrology & Biomechanics)	1+2	I
VAN-121	Veterinary Gross Anatomy-ll (Myology, Neurology, Angiology & Aesthesiology)	2+2	II
VAN-211	Veterinary Histology & Embryology	2+2	III
VAN-221	Veterinary Splanchnology & Applied Anatomy	1+1	IV
Total Credits		**6+7=13**	
2. Veterinary Physiology and Biochemistry			
VPB-111	Veterinary Physiology-l (Blood, Cardiovascular & Excretory Systems and Body Fluids)	2+1	I
VPB-112	General Veterinary Biochemistry	1+1	I
VPB –121	Veterinary Physiology-II (Neuromuscular Digestive & Respiratory Systems)	2+1	II
VPB-122	Veterinary Intermediary Metabolism	2+1	II
VPB-221	Veterinary Physiology-III (Endocrinology, Reproduction Growth & Environmental Physiology)	3+1	IV
VPB- 321	Animal Biotechnology (To be taught Jointly with VMC & VGO)	2+1	VI
Total Credits		**12+6 =18**	

3. Veterinary Pharmacology & Toxicology

VPT-311	General and Systemic Veterinary Pharmacology	2+1	V
VPT-321	Veterinary Neuropharmacology	2+1	VI
VPT-411	Veterinary Chemotherapy	2+0	VII
VPT-421	Veterinary Toxicology	2+0	VIII
Total Credits		**8+2= 10**	

4. Veterinary Parasitology

VPA-211	General Veterinary Parasitology & Helminthology	3+1	III
VPA-221	Veterinary Entomology and Acarology	1+1	IV
VPA-222	Veterinary Protozoology	2+1	IV
Total Credits		**6+3=9**	

5. Veterinary Microbiology

VMC-211	General Veterinary Microbiology	1+1	III
VMC-221	Veterinary Immunology and Serology	1 + 1	IV
VMC-311	Systematic Veterinary Bacteriology and Mycology	2+1	V
VMC-321	Systematic Veterinary Virology	2+1	VI
Total Credits		**6+4=10**	

6. Veterinary Pathology

VPP-211	General Veterinary Pathology	1+1	III
VPP-221	Systemic Veterinary Pathology	2+1	IV
VPP-311	Special Veterinary Pathology	2+1	V
VPP-321	Avian Pathology	1 + 1	VI
VPP-322	Aquatic Animal Diseases, Health Care and Management	1+1	VI

(To be taught jointly with VMD and LPM)
Associated with the teaching of VLD-411, VLD-421, VMD-512 & VMD-513

Total Credits		**7+5=12**	

7. **Veterinary Public Health & Epidemiology**

VPE-311	Milk & Meat Hygiene, food safety and Public health	2+1	V
VPE-321	Veterinary Epidemiology and Zoonosis	2+1	VI
VPE-511	Environment and Environmental Hygiene	2+1	IX
Total Credits		**6+3=9**	

8. Animal Nutrition

ANN-111	Principles of Animal Nutrition & Feed Technology	2+1	I
ANN-121	Applied Animal Nutrition-I(Ruminants)	2+1	II
ANN-211	Applied Animal Nutrition-II (Non-ruminants, Poultry &Laboratory Animals)	2+1	III

Associated with the teaching of VMD-512 & VMD-513

Total Credits **6+3 =9**

9. Animal Genetics & Breeding

AGB-111	Biostatistics and Computer Application	2+1	I
AGB-121	Principles of Animal Genetics and Population Genetics	2+1	II
AGB-211	Livestock and Poultry Breeding	2+1	III

Associated with the teaching of VMD-512 & VMD-513

Total Credits **6+3= 9**

10. Livestock Production Management

LPM-111	Livestock Production Management-I (General Principles and Ruminants)	3+1	I
LPM-121	Fodder Production & Grassland Management	1+1	II
LPM-122	Livestock Production Management-II (Monogastric and Laboratory Animals)	1+1	II
LPM-211	Avian Production Management	1+1	III
LPM-221	Commercial Poultry Production and Hatchery Management	1+1	IV
LPM-222	Livestock Production Management (Regional interest) (Optional to be developed on the basis of regional interest)	1+1	IV

Associated with teaching of VPP-322,VMD-512& VMD-513

Total Credits **8+6 =14**

11. Livestock Products Technology

'LPT-311	Milk and Milk Products Technology	1+1	V
LPT-312	Abattoir Practice and Animal Product Technology	1+1	V
LPT-321	Meat Science	1+1	VI

Total Credits **3+3=6**

12. Veterinary Gynaecology & Obstetrics

VGO-411	Veterinary Gynaecology	2+1	VII
VGO-421	Veterinary Obstetrics	1+1	VIII
VGO-511	Veterinary Andrology & Reproductive Techniques	1 +1	IX

Total Credits **4+3= 7**

13. Veterinary Surgery & Radiology

VSR-411	General Veterinary Surgery, Anaesthesiology and Diagnostic Imaging	2+2	VII
VSR-421	Regional Veterinary Surgery	2+1	VIII
VSR-511	Veterinary Orthopedics and Lameness	1+1	IX

Associated with the teaching of VMD-512 & VMD-513)

Total Credits **5+4= 9**

14. Veterinary Medicine

VMD-411	Veterinary Clinical Medicine-I (General & Systemic)	2+1	VII
VMD-412	Veterinary Preventive Medicine -I (Bacterial, Fungal & Rickettsial Diseases)	2+0	VII
VMD-421	Veterinary Clinical Medicine -II (Metabolic & Deficiency Diseases)	2+0	VIII
VMD-422	Veterinary Preventive Medicine –II (Viral & Parasitic Diseases)	2+0	VIII
VMD-511	Animal Welfare, Ethics & Jurisprudence	2+0	IX
VMD-512	Zoo/Wild Animal Breeding, Management, Nutrition and Healthcare (To be taught jointly with AGB, LPM, ANN, VPP arid VSR)	1+1	IX
VMD-513	Pet Animal Breeding, Management Nutrition-and 'Hearth Care (To be taught jointly with AGB, LPM. ANN, VPP and VSR)	1+1	IX

Associated with the teaching of VPP-312

Total Credits **12+3=** 15

15. **Veterinary& Animal Husbandry Extension Education**

VAE-311	Principles & Techniques of Veterinary and A. H. Extension	2+1	V
VAE -321	Livestock Economics, Marketing and Business Management	2+1	VI
VAE-511	Livestock Entrepreneurship	1+0	IX

Total Credits **5+2=7**

16. Teaching Veterinary Clinical Complex

VCP-411	Veterinary Clinical Practice	0+5	VII
VCP-421	Veterinary Clinical Practice	0+5	VIII
VCP-511	Veterinary Clinical Practice	0+5	IX
VLD-411	Veterinary Clinical Biochemistry and Laboratory Diagnosis-I (To be taught jointly by VPB &VPP)	0+1	VII

VLD-421	Veterinary Clinical Biochemistry and Laboratory Diagnosis-II (To be taught by VPB. VPP, VMC &VPT)		0+1 VIII
TVC-421	Veterinarian in Society	(Non Credit)	1+0 VIII
Total Credits			**1+17= 18**

17. Instructional Livestock Farm Complex

LFP-211	Livestock Farm Practice (Non-Credit)	0+1=1 III
LFP-221	Livestock Farm Practice (Non-Credit)	0+1=1 IV
Total Credits		**0+2=2**

GRAND TOTAL Courses: 65
Credits: Core Courses: 177 (101+76)
Including Non Credit Courses: 1+O(Veterinarian in Society) and 2 credits (0+1) x 2 (Livestock Farm Practice) Non-Core Course: 4 credits (tracking programmes)

Group of subject-wise credit distribution:

1.	Basic Veterinary Subjects	23+15=38
2.	Production Subjects	23+15=38
3.	Pre-clinical Subjects	27+14=41
4.	Clinical Subjects	27+13=40
5.	Teaching Veterinary Clinical Complex	0+17 =17
	Total:	**100+74=174**

DEPARTMENT OF VETERINARY ANATOMY

SEMESTER- I

VETERINARY GROSS ANATOMY-I
(Osteology, Arthrology and Biomechanics)

VAN-111 **Credit hours 1+2=3**

THEORY

Osteology: Definition of the terms used in Veterinary Anatomy in general and osteology in particular. Classification, physical properties and structure of bones, Gross study of bones of appendicular and axial skeleton of Ox / Buffalo as type species and comparison with Sheep / Goat, Pig, Horse, Dog and Fowl with particular emphasis on their topography, contour, landmarks and functional anatomy from clinical and production point of view. Detail study of bones of head, neck, thorax, abdomen, pelvis, tail, fore limb and hind limb.

Arthrology: Classification and structure of joints. Articulation and ligaments of head, neck, thorax abdomen, pelvis, tail, fore limb and hind limb of Ox / Buffalo as type species, their structure, functional anatomy and comparison with other domestic animals from clinical and production point of view.

Biomechanics: Biomechanics and its application with reference to quadruped locomotion, kinetics of locomotion, stress and strains falling on locomotor apparatus, landmarks, angulation and weight bearing bones of ox, buffalo and comparison with other animals particularly horse and dog.

PRACTICAL

Comparative study of the bones of appendicular and axial skeleton, their structure, landmarks, angulation, weight bearing and function in Ox/Buffalo and comparison with that of Sheep/Goat, Pig, Horse, Dog and Fowl and relate them in live animals. Dissection of joints of all the body regions of Ox/Buffalo to study the structure and function and comparison with other domestic animals. Biomechanics and kinetics of locomotion.

SEMESTER-II

VETERINARY GROSS ANATOMY-II
(Myology, Neurology, Angiology and Aesthesiology)

VAN –121 **Credit Hours: 2+2=4**

THEORY

Myology: Structural and functional classification of muscles. Gross study of skeletal muscles of head, neck, thorax, abdomen, pelvis, tail, fore limb and hind limb with their origin, insertion and action and their structural and functional importance from clinical and production point of view in Ox / Buffalo as a type species. Comparative study of muscles in other domestic animals.

Neurology: Study of central, peripheral and autonomic nervous system Gross study of meninges, brain, spinal cord, cranial and spiral nerves and their functional importance from clinical and production point of view. Gross morphology and disposition of the nerves of head, neck, thorax, abdomen, pelvis, tail, forelimb and hind limb in Ox / Buffalo as a type and comparative study in other domestic animals. Angiology: Gross morphology of heart and disposition of arteries, veins and lymphatic of head, neck, thorax, abdomen, pelvis, tail, forelimb and hind limb in Ox / Buffalo as type and comparison with that of Sheep / Goat, Pig, Horse, Dog and Fowl. Their importance from clinical and production point of view. Anesthesiology: Gross morphological study of the eye, ear, nose, hoof, horn and skin in Ox / Buffalo. Their functional importance and comparative study in other domestic animals Computer simulation for dissection and study of body parts.
(Note: The general outline of muscular, circulatory and nervous system be taken up in the beginning of this course to be followed by gross disposition of group of muscles, arteries, veins and lymphatics simultaneously region-wise.)

PRACTICAL
Demonstration of embalming of the carcass and preservation. Dissection/computer simulation models for dissection and demonstration of body parts.
Dissection of muscles of all body regions of Ox/Buffalo, their location, functional role in the body and comparison with other species.
Study of brain and spinal cord in different domestic animals. Study of heart and major blood vessels in different species of animals Area of auscultation of heart.
Dissection of Wood vessels, lymphatics and nerves of head, neck, thorax, abdomen, pelvis, tail, forelimb and hind limb in Ox / Buffalo and comparative study in other domestic animals.
Demonstration of palpable Lymph nodes of the body. Study of the sites of cornual, auriculo palpebral, peterson's, infraorbital, radial**,** ulnar, median, paravertebral, epidural, pudendal, perineal and tibial nerve blocks and their clinical importance.
Dissection for study of eye, ear, nose, hoof and horn.

SEMESTER- III

VETERINARY HISTOLOGY AND EMBRYOLOGY

VAN -211 **Credit Hours 2+2=4**

THEORY
General Histology: Structure of animal cell and basic tissues and their functional activity. Epithelia and their modifications. Connective tissue and its components including blood and bone. Muscular tissue types and their functional peculiarities. Neuron, nerve fibre and ganglion.
Systemic Histology: Study of microscopic structure of the organs of digestive, respiratory, urinary, reproductive, nervous and cardiovascular systems, sense organs, endocrines and lymphoid organs, of domestic animals and birds.
Embryology: Gametogenesis, fertilization, cleavage, gastrulation, and the development of foetal membranes in birds and mammals. Structure and types of mammalian placenta. Development of the organs of digestive, respiratory, urogenital, cardiovascular, nervous and locomotor system and organs of special sense and endocrine glands. Fetal circulation.

PRACTICAL

Microscopy and micrometry. Comparison of light and electron microscopy. Histological techniques, Processing of tissues for paraffin sectioning and Haematoxylin and Eosin staining. Microscopic examination and identification of basic tissue and their components. Examination of histological sections of various organs/systems of domestic animals and birds. Study of structure of mammalian ova and spermatozoa and egg of fowl. Study of the whole mount and serial sections of avian and mammalian embryo / foetus at different stages of development Microscopic anatomy of fetal membranes and placenta of various domestic animals.

SEMESTER- IV

VETERINARY SPLANCHNOLOGY AND APPLIED ANATOMY

VAN-221 **Credit Hours 1+1=2**

THEORY

Gross morphological and topographical study of various organs of digestive, respiratory, urinary, male and female reproductive, lymphatic and endocrine systems, Pleura and Peritoneum in Ox Buffalo as type and their comparison with that of Sheep/Goat, Pig, Horse, Dog and Fowl.

Different Terminology used in applied Anatomy. Palpable Anatomical body structures and their use in health and disease.

PRACTICAL

Demonstration and description of palpable anatomical structures on the body surface of live animal (head, neck, thorax, pectoral bones, pelvic bones, limbs). Outline of body cavities and study of organs of digestive, respiratory, urinary, reproductive, lymphatic and endocrine systems of Ox /Buffalo and their comparative anatomy in other species. Pleural and peritoneal reflections. Comparative topographic anatomy in live animals. Nerve blocks and their sites.

Applied anatomy of sites for thoraco-centesis, auscultation, abdominocentesis. rumenotomy, laparotomy, splenectomy, enterotorny, palpation of anatomical structures in the abdominal and perineal regions. Radiographic visualisation of gross anatomical features of various regions of the body. (Note: Computer simulation model studies shall be used for better understanding of the subject.)

REFERENCE BOOKS

1. The Anatomy of the Domestic Animals-R. Nile, A. Schummer, E. Seiferle.
2. The Anatomy of the Domestic Animals-Septimus Sisson
3. Clinical Dissection Guide for Large Animals Horse and Large Ruminants- Georghe M. Contantinescu, Ileana A. Contantinescu
4. Primary Veterinary Anatomy- R.K. Ghosh.
5. Text Book of Veterinary Histology-H. Dieter Dellmann.
6. Atlas of Histology-Victor P. Eroschenko.
7. Human Embryology- Inderbir Singh.
8. Essentials of Veterinary Embryology-R. K. Ghosh.

9. Medical Embryology-Jan Langman
10. The Embryology of Domestic animals, developmental Mechanisms and Malformations-Drew M. Noden, Alexander Delahunta.
11. Developmental Biology-Scott F. Gilbert.
12. A colour Atlas of Avian Anatomy-J. Mc Lelland.
13. A colour Atlas of the Buffalo Anatomy-H. P. Singh & K. S. Roy, ICAR Publication.
14. A colour Atlas of Clinical Anatomy of the Dog & Cat-J. S. Boyd.
15. A colour Atlas of basic Histology-Irwin Berman.
16. A colour Atlas of Veterinary Anatomy of the Ruminants-Raymond, R. Ashdown, Stanley done.
17. Applied Veterinary Anatomy-Alexander De Lahunta, Robert E. Habel.
18. Applied Anatomy of the Domestic Animals-P. A. Ommer, K. R. Harshan.
19. Applied Veterinary Histology-William J. Banks.
20. Colour Atlas of Veterinary Histology-William J. Bacha, Jr. Linda M. Bacha.
21. Histology- A Text and atlas-Michael, H. Ross. Gordon I. Kaye, Wojciech Pawlina.
22. Atlas of Feline Anatomy for Veterinarians-Hudson/ Hamilton.
23. Veterinary Neuro Anatomy and clinical Neurology-De. Lahunta.
24. Histological & Histochimical Methods- Theory & Practice-J. A. Kiernan.
25. Anatomy and Physiology of Farm Animals-R. D. Frandson, W. Leewilke, Anna Dee Fails.
26. Text book of Veterinary Anatomy-Dyce . sack. Wensing
27. Comparative anatomy of the Vetebrates-George C. Kent.
28. Miller's Anatomy of the Dog
29. A colour atlas of Anatomy of small laboratory animals-P. popesko, V. rajtova, J. Horak.
30. Comparative Veterinary Histology-Elizabeth Aughey, Fredric L. Frye.
31. A Practical guide to Vertebrate Mechanics-Christopher Mc Gowan, Julian Mulock.
32. A Comparative Methids approach to the Study of Oocytes and Embryos-Joel. Richter.
33. Text book of Anatomy and Physiology-Anthony and Kolthoff.
34. Reproduction in Farm Animals-E. S. E. Hafez, B. Hafez.
35. Veterinary Obsterics and Genital diseases-Stephen J. Roberts.
36. Veterinary Surgical Techniques-Amresh kumar
37. Congenital Malformations in Laboratory and Farm Animals-Kalman T. Szabo.
38. Vertebrate Embryology- Robert S. McEWEN.
39. Essentials of bovine Anatomy-K. M. Dyce and C. J. Wensing.

DEPARTMENT OF VETERINARY PHYSIOLOGY AND BIOCHEMISTRY

SEMESTER -I

VETERINARY PHYSIOLOGY -I
(Blood, Cardiovascular, Excretory system and Body Fluids)

VPB –111 **Credit Hours: 2+1=3**

THEORY

Introduction to Blood; Properties of blood as a body fluid, metabolism and fate of R.B.C; Hemoglobin-chemical structure, synthesis, physiological functions, derivatives of hemoglobin; Anemia; Plasma proteins, lipids -origin and function; Coagulation mechanisms and regulation of haernostasis; fibronolysis; anticoagulation mechanism. Blood pH, Wood volume and their determination. Osmotic fragility, erythrocyte sedimentation rate, haemtocrit and haemolysis; Leucocyte- phagocytic and immunogenic functions.

Heart- morphological characteristic, systemic excitability conduction & transmission processes. Cardiac Cycle:-Regulation of cardiac output; coronary circulation; properties of pulse; metabolism & energetic of working myocardial cell, extrinsic and intrinsic regulation; ECG and its significance in Veterinary Sciences - Echocardiography.

Haemodynamics of circulation, circulatory mechanics, resistance to flow, vasoconstriction, nervous and circulating fluid volume controls of blood pressure, neurohormonal control of vascular smooth muscle. Circulatory controls- shock stresses, regional and fetal circulations. Capillary exchange, control of blood pressure. Adjustments of circulation during exercise.

Kidney:- Functional morphology of nephron, factors determining filtration pressure, determination of glomerular titration rate (GFR) and renal plasma flow -Reabsorption mechanisms for glucose, protein, amino acids, electrolytes; ammonium mechanism, glomerulotubular balance, methods of studying renal functions; urine concentration; micturition, uraemia.

Fluid, water balance, fluid therapy, dehydration, water concentration mechanisms. Acid base balance and H+ regulation, correction and evolution of imbalances, total osmotic pressure, potassium balance, electrolyte and water imbalances, thirst Formation and excretion of urine in Birds.

Cerebrospinal fluid, synovial fluids -composition, formation and flow; Joints. Regulations of bone metabolism and homeostasis.

PRACTICAL

Collection of blood samples - Separation of serum and plasma - Preservation of defribrinated blood -enumeration of erythrocytes, leucocytes - differential leucocytic count -platelet count - estimation of hemoglobin -haemotocrit - erythrocyte sedimentation rate - packed cell volume - coagulation time -bleeding time - Erythrocyte fragility and viscosity - blood grouping - recording of ECG -measurement of arterial blood pressure (Sphygmornanometry). Recording of cardiogram of frog heart- Study the effect of heat and cold on heat -effect of vagus stimuli on heat - vagal escape - factors affecting blood flow through blood vessels- urine analysis - physiological constituents, pathological determinates, determined of GFR. Titerable acidity, determination of inorganic phosphorus, urine ammonia and creatinine in urine.

SEMESTER- II

VETERINARY PHYSIOLOGY -II
(Neuromuscular, Digestive and Respiratory systems)

VPB-121 **Credit Hours: 2+1 =3**

THEORY

Muscle Physiology- basic muscle unit characteristic-electrical phenomenon in muscle cell - Membrane potential ionic basis of resting membrane potential, muscle action potential, excitation and propagation of impulse characteristics- latent period refractive ness, threshold level-all & none characteristics - contractile mechanism- excitation -contraction coupling-neuro-muscular transmission, types of muscle contraction, phenomenon of fatigue, rigor mortis.

Organization of nervous system- Mechanism of information processing, hierarchical control. Major functional system- sensory, consciousness, emotion, motor and visceral control and basic functional unit - neuron structure, type- functional characteristics of sub-units of neuron. Membrane potential- ionic basis of resting membrane potential (RMP) nerve action potential, excitation and propagation of impulse characteristics- latent period -refractive ness, threshold level-all & none characteristics. Degeneration and regeneration of nerve fibre. Synaptic and junctional transmission.

Functions of nervous system-reflexes-control of posture and movements, autonomic nervous system and visceral control. Neurotransmitter wakefulness, sleep cycle. Higher function of neurons system -learning memory. Familiarization with common equipments used in neurophysiology (oscilloscope, electroencephalography, machine stimulators etc).

Sense organs and receptors physiology of special senses - EYE: functional morphology, nourishment and protection neural pathway, receptors - optics, ocular muscles and movements, photochemistry, eye defects and eye examinations (as an aid to clinical evaluation). EAR: Physiology of hearing and common hearing impairment. Vestibule apparatus. Physiology of Olfaction And Taste.

Morphological characteristic of monogastric and poly gastric digestive system. Prehension, rumination; daefecation, vomition; regulation of secretory function of saliva, stomach, intestine, pancreas; bile secretion; hunger, appetite control, developmental aspects of digestion; luminous, membranous and microbial digestion in rumen and intestine; permeability characteristics of intestine, forces governing absorption, control intestinal transport of electrolyte and water, enzymatic digestion in monogastric and fermentative digestion in rumen, modification of toxic substances in rumen. Digestion in birds.

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. Frictional resistance to air flow, airways smooth muscle contraction, respiratory muscle work, panting, adaptation of respiration during muscles exercise high attitude hypoxia, Non-respiratory lung functions. Respiration in birds.

PRACTICAL

Counting of rumen motility, estimation of volatile fatty acids and ammonia in rumen. Bacterial and protozoa count *in-vitro* action of proteolytic enzymes - pepsin and trypsin.

Experimental physiology. Pithing of frog, preparation of nerve muscle-Recording of twitch response, effect of single stimulus- effect of heat and cold. Fatigue - summation, tetanus.
Recording of respiration, spirometry. Recording of volume and capacities in different physiological states including determination of vital capacities Recording of rumen / intestinal movements (Demonstration)

REFERENCE BOOKS

1. Dukes Physiology of Domestic animals – Edited by Melvin J Swenson.
2. Review of Medical Physiology – William Ganong.
3. Text book of Medical Physiology – Arthur C. Guyton.

SEMESTER- IV

VETERINARY PHYSIOLOGY - III
(Endocrinology, Reproduction, Growth and Environmental Physiology)

VPB-221 **Credit Hours: 3+1=4**

THEORY

Hormone cell interaction, sub-cellular mechanisms-metabolism of hormones-methods of study of endocrine system; Receptors- mechanism of regulation; Chemistry of hypothalamo - hypophyseal hormones, target organ, pineal, thyroid, thymus, pancreas, adrenal, prostaglandins, hormones of calcium metabolism, disorders, rennin-angiotensin system, atrial natriuretic factors, erythropoietin, GI hormones, pheromones.

Genetic & 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 & parturition, immunology of gestation, preparturient endocrine events.

Spermatogenic cycle and wave- function of Sertoli cell-leydig cell- semen - composition-evaluation; Testosterone - function and regulation - cryptorchidism. Puberty - photoperiod- uses of androgens, progestogens, estrogens.

Functional and metabolic organization of mammary glands -structure and development; effect of estrogens and progesterone; hormonal control of mammary growth; lactogenesis and galctogenesis; biosynthesis of milk constituents- secretion of milk, mastitis and metabolism, prolactin and mammary tumours.-lactation cycle.

Biochemical and genetic determinants of growth, regulation of growth, metabolic and hormone interactions, factors affecting efficiency of growth and production in ruminants and single stomach animals. Growth in meat producing animals & birds, growth curves. Recombinant gene transfer technologies for growth manipulation- advantages and limitations. Protein deposition in animals and poultry.

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 effect on endocrine -reproductive function, circadian rhythm.

Neurophysiology of behaviour, types of behaviour, communication, Learning and memory, behavioural plasticity.

PRACTICAL

Oestrus and phases of oestrous cycle in animals (vaginal mucus). Behavioural signs of oestrus. Bio-assay for trophic hormone. Demonstration of hormone estimation. Rectal palpation of reproductive organs. Sperm motility, sperm concentration - live and dead - abnormal sperm count. Measurement of growth in various species. Measuring surface area of animals. Health parameters of animals-body temperature, pulse, respiration and heart rate. Measurement of animal environmental conditions. Behaviour of animals- mating behaviour, milking behaviour, feeding behaviour (live/videographic/computer simulated demonstration)

REFERENCE BOOKS

1. Dukes Physiology of Domestic Animals – Edited by Melvin J Swenson.
2. Text book of Medical Physiology – Arthur C. Guyton.
3. Veterinary Endocrinology & Reproduction – by Mc. Donald.
4. Reproduction in Farm Animals – by E.S.E. Hafez.
5. Adaptation in Domestic animals - E.S.E. Hafez and B. Hafez.

SEMESTER- I

GENERAL VETERINARY BIOCHEMISTRY

VPB-112 **Credit Hours 1+1=2**

THEORY

Scope and importance of biochemistry. Structure of biological membranes and transport across membranes. Donnan membrane equilibrium. Dissociation of acids, pH, buffer systems, Henderson-Hasselbalch equation.

Biochemistry of carbohydrates: Biological significance of important Monosaccharides (ribose, glucose, fructose, galactose, mannose and amino sugars), Disaccharides (maltose, isomaltose, lactose, sucrose & cellobiose), Polysaccharides, (starch, dextrins, dextrans, glycogen, cellulose, insulin, chitin), and Mucopolysaccharides including bacterial cell wall polysaccharides.

Biochemistry of lipids: Properties and biological significance of simple, compound and derived lipids and lipoproteins. Structure and functions of prostaglandins. Chemistry of bile and bile acids.

Biochemistry of proteins: Structure, properties and biological significance of proteins. Amino acids: classification and structure of neutral, basic and acidic amino acids. Properties of amino acids: amphoteric nature, optical activity, and peptide bond formation. Chemical reactions of proteins.

Biochemistry of nucleic acids: Chemistry of purines, pyrimidines, nucleosides and nucleotides. Biological significance of nucleosides & nucleotides. Structures and functions of deoxyribonucleic acid (DNA) and a typical ribonucleic acid (RNA).

PRACTICAL

Concentration of solutions - System international (S.I.) Units. Preparation/standardization of acids & alkalies. Preparation of buffers and determination of pH. Titration curve of acid versus base. Reactions of mono-, di-, and polysaccharides and their identification. Estimation of lactose in milk Determination of acid number of an oil. Colour reactions of proteins. Precipitation reactions of proteins. Estimation of amino acids (Sorensen's method)

SEMESTER –II

VETERINARY INTERMEDIARY METABOLISM

VPB-122 **Credit Hours 2+1=3**

THEORY

Enzymes: Definition and classification, EC numbering of enzymes. Coenzymes, cofactors & iso-enzymes. Properties: Protein nature, enzyme-substrate complex formation, modem concept of the active center of enzyme. Specificity of enzyme action: Substrate specificity, group specificity, stereo or optical specificity. Factors influencing enzyme action: Effects of temperature, pH, concentration of substrate and enzyme.

Enzyme units: International Units, katal, turnover number & specific activity.

Enzyme inhibition: Competitive, non-competitive, uncompetitive inhibition & suicidal inhibition. Allosteric enzymes.

Biological oxidation: Enzymes and coenzymes involved in oxidation and reduction viz. Oxidoreductases, oxidases, oxygenases, dehydrogenases, hydroperoxidases & cytochromes.

Respiratory chain/ electron transport chain, oxidative phosphorylation, inhibitors, uncouplers and other factors influencing electron transport chain.

Carbohydrate metabolism: Glycolysis, Kreb's cycle, glyoxylate cycle, HMP shunt, gluconeogenesis, Cori cycle, glycogenesis, glycogenosis, hormonal control of carbohydrate metabolism & regulation of blood sugar Bioenergetics of carbohydrate metabolism

Lipid metabolism: Bete oxidation of fatty acids, ketone body formation, biosyntheses of fatty acids, triacylglycerol, phospholipids & Apoprotein metabolism. Bioenergetics of lipid metabolism.

Protein metabolism: Biosynthesis and degradation. Deamination, transamination and decarboxylation of amino acids. Ammonia transport and urea cycle

Nucleic acids: Metabolism of purines and pyrimidines. DNA & RNA biosynthesis.

Integration of metabolism. Metabolic functions of macro and micro nutrients, Metabolic functions of lipid and water soluble vitamins. Uses of isotopes in metabolic studies.

PRACTICAL

Effect of pH and temperature on enzyme activity. Estimation of normal / abnormal constituents of urine. Electrophoretic separation of proteins. Paper chromatography. Estimation of bilirubin, blood glucose, electrolytes and other metabolic intermediaries in blood (colorimetry/ spectrophotometry/ flame photometry).

SEMESTER- VI

ANIMAL BIOTECHNOLOGY

VPB-321 **Credit Hours 2+1=3**

THEORY:

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

Biotechnological application in animal improvements:

Embryo biotechniques, *in-vivo and in- vitro* embryo production and preservation, sexing, micromanipulation and cloning, transgenic animal and biopharming.

Mapping of genome and genome sequencing. Marker assisted selection. Gene banking.

Nutritional biotechnology including bioconversion of lignocellulose, genetic manipulation of microbes for improved feed utilization and health. Animal tissue culture, transformation and cell lines, tumor markers and acute phase proteins

Molecular diagnosis including PCR and DNA probes. Hybridoma and monoclonal antibodies. New generation vaccines: Subunit recombinant and recombinant vectored vaccines

Fermentation process and technologies for milk, meat and leather. Ethics arid regulatory issues in Biotechnology. IPR. Bioinfomnatics.

PRACTICAL

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

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

REFERENCE BOOKS

1. **Harper's Biochemistry**. XXV edition. 2002. Robert K. Murray; Daryl K Granner; Peter A. Mayes & Victor W. Rodwell. Published by McGraw – Hill Health professions Division, London.
2. **Textbook of Biochemistry.** IV edition. 1974. Edward Staunton West; Wilbert R. Todd; Howard S. Manson & John T. Van Brugeen. Published by Oxford and IBM publishing co. Pvt. Ltd., New Delhi.
3. **Biochemistry.** V edition. 2002. Jeremy M. Berg; John L. Tymoczko & Lubert Stryer. Published by W.H.Freeman & company, New York.
4. **Biochemistry – A concise text for Medical Students**. V edition. 1992. D. K. Apps; B. B. Cohen & C. M. Steel. Published by ELBS with Bailliere Tindall.
5. **Lehninger Princples of Biochemistry**. IV edition. 2005. David L. Nelson & Michael M. Cox. Published by Wily Freeman & Company, New York.
6. **Fundamentals of Biochemistry for Medical Students.** VII edition. 1998. Ambika Shanmugam. Published by the Author, Chennai.

7. **Introduction to Biotechniques – PCR.** II edition. 1997. C. R. Newton & A. Graham. Published by BIOS Scientific Publishers ltd. Oxford.
8. **Textbook of Medical Physiology.** X edition. 2000. Arthur C. Guyton & John E. Hall. Published by W. B. Sauders company – A Harcourt health Science company, Singapore.
9. **Biochemistry.**1993. S. C. Rastogi. Published by Tata McGraw-Hill Publishing company ltd., New Delhi.
10. **Biochemistry and Molecular Biology**. 1997. William H. Elliott & Daphne C. Elliott. Published by Oxford University press, Oxfor.
11. **Essentials of Molecular Biology.** II edition. 1993. David Freifelder & George M. Malacinski. Published by Panima publishing corporation, New Delhi.
12. **Trends in Molecular biology and Biotechnology.** 1996. Ed. By Sheela Srivastava; P. S. Srivastava & B. N. Tiwary. Published by CBS Publications & Distributors, New Delhi.
13. **Molecular and Cell Biochemistry – Molecular biology and Biotechnology**. 1991. Smith & Wood. Published by Chapman & Hall, Madras.
14. **Priniples of Gene Manipulation – An introduction to genetic Engineering**. V edition. 1994. R. W. Old & S. B. Primrose. Published by Blackwell Science ltd. Berlin.
15. **Methods in Biotechnology. Animal Cell Biotechnology – Methods & Protocols.** 1999. Ed. by. Nigel Jenkins. Published by Human Press Inc., New Jersey.

* Latest editions may be followed.

DEPARTMENT OF VETERINARY PHARMACOLOGY AND TOXICOLOGY

SEMESTER -V

GENERAL AND SYSTEMIC VETERINARY PHARMACOLOGY

VPT-311 **Credit Hours 2+1= 3**

THEORY

Historical development branches and scope of Pharmacology. Sources and nature of drugs. Pharmacological terms and definitions. Principles of drug activity: Pharmacokinetics - Routes of drug administration, absorption, distribution, biotransformation and excretion of drugs. Pharmacodynamics-Concept of drug and receptor, dose-response relationship, terms related to drug activity and factors modifying the drug effect and dosage. Fundamentals of drug-screening and assay of drugs. Adverse drug reactions, drug interaction, drug- designing and development, bio prospecting of drugs. Introduction to biopharmaceutics and gene therapy.

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

Drugs acting on Cardiovascular system: cardiac glycosides, antiarrhythmic drugs, vasodilators and antihypertensive agents, haematjnics, coagulants and anticoagulants.

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

Drugs acting on urogenital system: Diuretics, urinary alkalizers, and acidifiers, fluid therapy, ecbolics and tocolytics.
Pharmacotherapeutics of hormones and vitamins.
Drugs acting on skin and mucous membranes: Emollients, demulcents and counter irritants. Bio-enhancers, Immunostimulants and immunosuppressants. New drugs and drug formulations.

PRACTICAL

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

SEMESTER- VI

VETERINARY NEUROPHARMACOLOGY

VPT-321 **Credit Hours 2+1=3**

THEORY
Drugs acting on autonomic nervous system: Neurohumoral transmission, adrenoceptors agonists and antagonists, adrenergic- neuron blockers, cholinoceptors agonists and antagonists, ganglionic stimulants and blockers.
Autacoids: Histamine and antihistamine agents, 5-Hydroxytryptamine and its antagonists, prostaglandins, angiotensin and bradykinin.
Drugs acting on central nervous system (CNS): Pharmacology of neurotransmitters History of general anaesthetics and theories of anaesthesia. Inhalent, intravenous and dissociative anaesthetics; hypnotics and sedatives; tranquilizers, psychotropic drugs, anticonvulsants, opioid analgesic, nonsteroidal anti-inflammatory drugs, analeptics and other CNS stimulants, central muscle relaxants.
Drugs acting on somatic nervous system: Local anaesthetics and peripheral muscle relaxants. New drugs end drug formulations.

PRACTICAL
Demonstration of the effect of CNS depressants, analgesics, CNS stimulants, muscle relaxants, anticonvulsants, local anaesthetics in laboratory animals.
Demonstration of the action of adrenergic and cholinergic agonists and antagonists on isolated and intact preparations of the animals
Alternate use of animals as model for demonstration

SEMESTER- VII

VETERINARY CHEMOTHERAPY

VPT-411 **Credit Hours 2+0=2**

THEORY

Antibacterial agents: Classification, general principles in antibacterial chemotherapy, antibacterial resistance. Sulphonamides and their combination with diaminopyrimidines, sulfones, nitrofurans, nalidixic acid and fluoroquinolones.

Antibiotics: Penicillins and cephalopsorins, aminoglycosides, tetracyclines, chloramphenicol, macrolides, polypeptides. Miscellaneous agents: methenamine, bacitracin. Rifampin. novobiocin, viginamycin, lincosamides and vancomycin.

Antifungal agents: Topical and systemic agents including anti-fungal antibiotics.

Anthelmintics: Drugs used against cestodes, trematodes, nematodes, drug resistance, broad-spectrum anthelmintics.

Antiprotozoal agents: Drugs used in trypanosomosis, theileriosis, babesiosis, coccidiosis, amoebiosis, giardiosis and trichomonosis.

Ectoparasiticides, Antiviral and anticancer agents. Antiseptics and disinfectants. Growth promoters. Common indigenous drugs of plant origin with proven pharmacological and therapeutic efficacies in various animal ailments.

New drugs and drug formulations.

SEMESTER- VIII

VETERINARY TOXICOLOGY

VPT-421 **Credit Hours 2+0=2**

THEORY

General Toxicology: Definitions, fundamentals and scope of toxicology. Sources and mode of action of poisons. Factors modifying toxicity. General approaches to diagnosis and treatment of poisoning. Toxicity caused by metal and non-metals: Arsenic, lead, mercury, copper, selenium, molybdenum, phosphorus, nitrates and nitrites, common salt and fluoride.

Toxicity caused by plants and weeds: Cyanogenetic plants, abrus, lantana, ipomoea, nerium, datura, nux vomica, castor, selenium containing plants oxalate producing plants, plants causing thiamine deficiency. . Drug toxicity and toxicity caused by agrochemicals: organophosphates, carbamates, chlorinated hydrocarbons, pyrethroids. herbicides, fungicides, rodenticides and urea.

Residue toxicology: Hazards of residues, concepts of withdrawal time and MRLs, minimizing drug and toxic residues in animal products.

Venomous bites and stings: Snake bite, scorpion, spider, wasp stings and toad poisoning. Radiation hazards and industrial toxicants. Toxicity caused by food additives and preservatives.

REFERENCE BOOKS

1. Richard H. Adams.2001. Veterinary Pharmacology and Therapeutics. 8th Edition. IOWA State University Press, USA.
2. Brander, G.C., Pugh, D.N., Bywater, R.J. and Jenkins, W.L., 1991. Veterinary Applied Pharmacology and Therapeutics. Bailliere Tindal, London.
3. Prescott, J.F., Baggot, J.D. and Walker, R.D., 2005. Antimicrobial therapy in Veterinary Medicine. Blackwell Scientific Publications, IOWA, USA.
4. Tripathi, K.D., 2003. Essentials of Medical Pharmacology, Essentials of Medical Pharmacology, Jaypee brothers Medical Publishers (P) Ltd., New Delhi.
5. Rang, H.P., Dale, M.M., J.M. and Moore, P.K., 2003. Pharmacology, 5th Edition, Churchill Livingstone, Edinburgh, UK.
6. Sandhu, H.S. and Brar, R.S.,2000.Text book of Veterinary Toxicology, Kalyani Publishers, Ludhiana.
7. Garg, S.K., 2000. Veterinary Toxicology, CBS Publishers & Distributors, New Delhi.

DEPARTMENT OF VETERINARY PARASITOLOGY

SEMESTER -III

GENERAL VETERINARY PARASITOLOGY AND HELMINTHOLOGY

VPA- 211 **Credit Hours 3+1=4**

THEORY

Parasites and parasitism. Types of Parasitism. Commensalism, symbiosis and predatorism, Types of hosts: Final and Intermediate hosts, paratenic hosts and reservoir hosts, natural and unnatural hosts. Host- parasite relationship; mode of transmission of parasites and methods of dissemination of the infective stages of the parasite. Parasite specificity in relation to species, breed, sex and location. Tissue reactions caused by parasites to the host. Resistance of hosts to parasitic infections/infestations. Immunity against parasitic infections. Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD). General description of helminth parasites affecting domestic animals and birds.

Classification of helminths. Characteristics of phylum (Platyhelminthes, Nemathelminthes and Acanthocephala). Salient morphological features of diagnostic importance. Life cycle of the helminths in relation to transmission, pathogenesis, epidemiology, diagnosis, general control measures of following helminthes of animals and birds.

Trematodes:

Liver flukes (*Fasciola, Dicrocoelium* and *Opisthorchis*), intestinal flukes (*Fasciolopsis*), blood flukes (nasal schistosomosis), cercarial dermatitis (*Schistosoma* and *Ornithobilharzia*), visceral schistosomosis (*S. spindale, S. indica, S. incognitum*), Amphistomes/immature amphistomosis (*Paramphistomum, Cotylophoron, Gastrothylax, Gastrodiscus, Gigantocotyle, Gastrodiscoides, Pseudodiscus*), Lung flukes(*Paragonimus*) and oviduct flukes (*Prosthogonimus*),their importance in the diagnosis.

Cestodes:

Metacestodes (bladder worm), Ruminant tape worms (*Moniezia. Avitellina, Stiles*ia), Dog tape worms (*Dipylidium, Taenia, Multiceps* and *Echinococcus*), Equine tape worms

(*Anoplocephala, Paranoplocephala*), Poultry tape worms (*Davainea, Cotugnia, Raillietina, Amoebotaenia*) and Broad fish tape worm (*Diphyllobothrium*), Dwarf tape worm (*Hymenolepis*).

Nematodes:

Ascaris, Parascaris, Toxocara, Toxascaris, Ascaridia, Heterakis and Oxyuris.

Bursate Worms (*Strongyloides, Strongyles, Chabertia, Syngamus, Oesophagostomu*m), Kidney worms (*Stephanurus, Dioctophyma*), Hook worms (*Ancylostoma, Agriostomum, Bunostomum, Trichostrongylus, Ostertagia, Cooperia, Nematodirus*). Stomach worms (*Haemonchus, Mecistocirrus*). Tissue round worms (*Habronema, Thelazia, Spirocerca, Gongylonema*). Filarial worm *Dirofilaria, Parafilaria, Onchocerca, Setaria, Stephanofilaria*). Lung worms (*Dictyocaulus, Mullerius and Protostrongylus*). Guinea worms (*Dracunculus*).
International regulations for control of different helminthic diseases.

PRACTICAL

Methods of collection, fixation, preservation and mounting of helminth parasites. Study of morphological characters of adults and their larval stages and damages caused by them. Identification of important trematodes, cestodes and nematodes. Examination of faecal samples for eggs of trematodes, cestodes and nematodes. Demonstration of the life cycle and development of the type species of Trematode, Cestode and Nematode.

REFERENCE BOOKS

1. Helminths, Arthropods and Protozoa of Domesticated Animals - E.J.L. Soulsby.
2. Veterinary Parasitology - G.M. Urquhart *et. al.*
3. Introduction to Animal Parasitology - J.D. Smyth.
4. A Text Book of Veterinary Parasitology - B.B. Bhatia, K.M.L. Pathak. &D.P. Banerjee
5. Veterinary Helminthology – T. Kassai
6. General Veterinary Parasitology - P.C. Jain
7. Manual of General Veterinary Parasitology - S.S. Chaudhari & S.K. Gupta
8. Manual of Veterinary Helminthology – S.S. Chaudhari, *et. al.*
9. Introduction to Animal Parasitology – J.D. Smyth

SEMESTER- IV

VETERINARY ENTOMOLOGY AND ACAROLOGY

VPA-221 **Credit Hours 1+1=2**

THEORY

General description of insecta and arachnida affecting domestic animals and birds. Arthropoda as direct/indirect parasites. Classification, Life Cycle and vector potentiality in relation to disease transmission, pathogenesis and control of following arthropods affecting animals and birds.

The biting midges (*Culicoides*), buffalo gnats /Black fly, (*Simulium*), sandflies (*Phlebotomus*). The mosquitoes (*Culex, Anopheles* and *Aedes*). Horse fly (*Tabanus*), *Musca*,

*Stomoxy*s, *Sarcophaga*, Warbles (*Hypoderma*) and bots (*Gasterophilus*), Nasal bot (*Oestrus ovis*), Myiasis, Wingless flies (*Hippobosca*, *Melophagus*), bugs, lice (*Haematopinus*, *Linognathus*, *Trichodectus*, *Damalinia*, *Menopon*, *Lipeurus*, *Menacanthus* (Poultry lice). Fleas (*Pulex*, *Ctenocephalides*, *Echidnophaga*, *Xenopsylla*). Arachnids (Ticks and mites of Veterinary importance. Soft tick (Argasidae), (*Argas*, *Onirthodorus* and *Otobius*).

Hard ticks (*Boophilus*, *Hyalomma*, *Rhipicephalus*, *Haemaphysalis*, *Amblyomma*, *Ixodes*), Mites (*Demodex*, *Sarcoptes*, *Psoroptes*, *Notoedreus*, *Chorioptes*). Anti-tick immunoprophylaxis Damages to hide and skins due to ectoparasitic infestation.

PRACTICAL

Demonstration of the type representatives of various groups of insects, ticks and mites through charts, specimen and mounted slides - Demonstration of different characters of Insecta and Arachnida (Ticks and mites). Procedure for diagnosis of arthropod infestation to hides and skin. Demonstration of enteric myiasis, Procedures for the collection, fixation, preservation and mounting of arthropod parasites.

REFERENCE BOOKS

1. Helminths, Arthropods & Protozoa of Domesticated Animals - E.J.L. Soulsby.
2. Veterinary Parasitology - G.M. Urquhart *et. al*.
3. A Text Book of Veterinary Parasitology - B.B. Bhatia, K.M.L. Pathak. & D.P.Banerjee
4. Manual of Veterinary Entomology & Acarology – S.K. Gupta & Rajindra Kumar
5. Veterinary Ectoparasites:Biology, Pathology & Control-Richard Wall & David Shearer

SEMESTER- IV

VETERINARY PROTOZOOLOGY

VPA-222 **Credit Hours 2+1= 3**

THEORY

Introduction and general description to protozoa and their development. Differentiation from protophyta, bacteria and rickettsia, Classification. Life cycle in relation to transmission, pathogenesis, diagnosis and control of protozoa of veterinary importance.

Kala azar (visceral) and cutaneous leishmaniasis, Animal trypanosomosis (Surra), trypanosomosis (due to African *Trypanosoma*) in cattle and man.

Bovine and avian trichomonosis, black head in turkeys (*Histomonas*), Bovine amoebae (*Entamoeba*) *and Batantidium*, *Giardia* sp, Coccidia and coccidiosis of poultry and animals. Cryptosporidiosis, Cyst forming coccidian (*Toxoplasma, Sarcocystis*), *Neospora* (*Neospora caninum).* Malaria parasite of animals and poultry (*Plasmodium* and *Haemoproteus*), Piroplasmosis (*Babesia*), Theilerosis (*Theileria*),

Recent developments in protozoan vaccines for field use.

International regulations for control of different protozoan diseases.

PRACTICAL

Examination of faecal materials for identification of intestinal protozoa, coccidian and flagellates. Preparation of blood smears, their staining and examination of slides for haemoprotozoan parasites. Methods of collection, fixation, preservation and mounting of protozoan parasites. Identification of representative slides of protozoan parasites.

REFERENCE BOOKS

1. Helminths, Arthropods & Protozoa of Domesticated Animals - E.J.L. Soulsby.
2. Veterinary Parasitology - G.M. Urquhart *et. al*.
3. A Text Book of Veterinary Parasitology -B.B. Bhatia, K.M.L. Pathak & D.P. Banerjee
4. Text Book of Veterinary Protozoology - B.B. Bhatia
5. Protozoa and Protozoan diseases of Domestic Livestock - B.B. Bhatia & H.L. Shah

DEPARTMENT OF VETERINARY MICROBIOLOGY

SEMESTER-III

GENERAL VETERINARY MICROBIOLOGY

VMC-211 **Credit Hours 1+1=2**

THEORY

Introduction and history of Microbiology. Morphology, structure, growth and nutrition of bacteria.Classification and nomenclature of bacteria. Sources and transmission of infection. Pathogenicity, virulence and infection. Resistance and susceptibility of host bacteraemia, septicaemia, toxaemia. endotoxins and exotoxins; Bacterial genetics. Plasmids, Antibiotic resistance.

Introduction, morphology, growth, nutrition, reproduction in fungi, Classification of fungi.

Introduction to viruses: General properties, Replication, Cultivation and Purification of viruses. Cell-Virus interactions. Viral genetics. Interferon,

PRACTICAL

Equipment, Sterilization, disinfection and asepsis, Staining (simple & Grams, acid fast, lactophenol cotton blue), Special staining (metachromatic granules, capsular, spore). Bacterial motility, Preparation of culture media. Aerobic and anaerobic cultivation, Isolation of bacteria in pure culture, Morphological and cultural characteristics, biochemical characters, Antibiogram, Phenol coefficient test, Slide culture technique for fungus.

REFERENCE BOOKS

1. Microbiology – 4th ed. Prescott, Herley and Klein
2. Practical Medical Microbiology – Collee, Dugid, Frazer and Marnion
3. Veterinary Virology – Murphy, Gibbs, Horzineck and Studert

SEMESTER -IV

VETERINARY IMMUNOLOGY AND SEROLOGY

VMC- 221 **Credit Hours 1+1=2**

THEORY

Concepts in Veterinary and Medical Immunology. Immune system: organs, tissues and cells. Types of immunity. Development of humoral and cellular immune responses.

Antigens: definition, specificity, types and factors affecting immunogenicity, blood group antigens. Antibodies: Structure, properties and function of different classes of immunoglobulins, Site, mechanism and theories of antibody production, Monoclonal antibodies.

Major histocompatibility complex, Complement system; Cytokines: Major types and functions. Serological reactions: Agglutination, precipitation, haemagglutination; Phagocytosis, opsonic index, cytolysis; Complement fixation, neutralization, toxin and antitoxin reaction, immunofluorescence; Hypersensitivity: classification and mechanism of induction. Autoimmunity and immunotolerance. Immunisation of animals.

Biologicals: Role of conventional and modem vaccines in immunoprophylaxis. Adjuvants. Quality control of biologicals.

PRACTICAL

Preparation of antigen, Raising of antisera, Concentration of Immunoglobulins, Agglutination (plate, tube). Precipitation {Agar gel precipitation test (AGPT), Crossed immunoelectrophoresis (CIE), Rocket Immunoelectrophoresis (RIE), Indirect agglutination (Latex co-agglutination, Passive haemagglutination (PHA), Reversed passive haemagglutrnarion (RPHA)}, Haemagglutination, Complement fixation test, immunoperoxkJase test (IPT), Fluorescent antibody technique (FAT), Enzyme linked immunosorbent assay (ELISA), Cell mediated immune (CMI) response. Veterinary biologicals (visits and appraisal).

REFERENCE BOOKS

1. Veterinary Immunology – 7th ed. Tizard
2. Immunology – Janus Kuby
3. Immunology – Ivan Roitt

SEMESTER- V

SYSTEMATIC VETERINARY BACTERIOLOGY AND MYCOLOGY

VMC- 311 **Credit Hours 2+1=3**

THEORY

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

Bacteria: *Staphylococcus, Streptococcus, Bacillus, Clostridium, Mycobacterium, Enterobacteriaceae (E.coii, Salmonella, Yersinia, Klebsiella and Proteus), Campylobacter, Brucella, Pasteurella and Mannheimia, Pseudomonas and Burkholderia, MoraxeUa, Haemophilus and Taylorella, Listeria, ActtnobacHius. Actinomyces. Arcanobacterium and Corynabactehum, Nocardia, DermatophHus, Spirochetes, Gram negative anaerobes. Mycoplasma, Rickettsia, Chlamydia and ChlamydophHa.* Fungi: Dermatophytes, *Rhinosporidium, Sporothchum, Candida,* Mycetomal fungi. *Cryptococcus, Aspergillus,* Zygomycetes and Dimorphic fungi. Mycotic mastitis and abortion. Mycotoxicoses.

PRACTICAL

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

REFERENCE TEXTBOOKS

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

SEMESTER- VI

SYSTEMATIC VETERINARY VIROLOGY

VMC- 321 **Credit Hours 2+1=3**

THEORY

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

PRACTICAL

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

REFERENCE BOOKS

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

DEPARTMENT OF VETERINARY PATHOLOGY

SEMESTER -III

GENERAL VETERINARY PATHOLOGY

VPP-211 **Credit Hours 1+1=2**

THEORY

Introduction and scope of Veterinary Pathology, Brief outline of major intrinsic and extrinsic causes of disease. Pathology of hyperaemia, congestion, haemorrhage, edema, thrombosis, embolism, infarction and shock.

Acute cellular swelling and its variants. Glycogen overload and fatty change. Heat shock proteins and lysosomal storage diseases.

Causes and mechanism of reversible and irreversible cell injury, necrosis and its types, apoptosis, differences between post-mortem autolysis and necrosis. Gangrene. Major exogenous and endogenous pigments. Metastatic and dystrophic calcification.

Jaundice in animals. Photosensitizational dermatitis. Aplasia, hypoplasia, atrophy, hypertrophy, hyperplasia, metaplasia and dysplasia. Inflammation: definitions, classification, various cell types and their functions, mediators, cardinal signs and systemic effects.

Cell cycle and cyclins, soluble and insoluble mediators (including growth factors).

Wound healing by primary and secondary intention. Pathology of autoimmune diseases and amyloidosis.

Definitions, general characteristics and classification of neoplasms. Differences between benign and malignant tumours, etiology and spread of neoplasms, immunity and neoplasia, effects and diagnosis of neoplasia, stages and grades of neoplasms.

PRACTICAL

Study of gross pathological specimens and recognition of pathological lesions. Post-mortem (P.M.) techniques. Collection of morbid materials for pathological diagnosis. Techniques for preservation and despatch of materials. Section cutting, staining and identification of

microscopic lesions. Examination of slides depicting changes in cells and tissues. Study of histopathological slides showing haemorrhage, congestion, oedema, infarction, hyperplasia, metaplasis, hypertrophy, necrosis, cloudy swelling, amyloid degeneration, fatty changes, calcification . infiltration etc. Examination and interpretation of oncological tissue slides.

SEMESTER - IV

SYSTEMIC VETERINARY PATHOLOGY

VPP-221 **Credit Hours 2+1=3**

THEORY

Pathological changes including neoplasms in non-infectious disease conditions affecting Digestive System (mouth, pharynx, salivary glands, oesophagus, stomach, intestines, liver, gall bladder, pancreas), Respiratory System (nasal cavity, larynx, bronchi, trachea, lungs and pleura), Musculoskeletal System (muscle, bone, joints, ligaments, tendons), Cardio-vascular System (pericardium, myocardium, epicardium, endocardium, arteries, veins), Haematopoietic System (bone marrow), Lymphoid System (lymph nodes, vessels and spleen), Urinary System (kidneys, ureter, bladder and urethra), Reproductive System (male and female genital organs), Nervous System (brain, spinal cord and peripheral nervous system), Endocrine System (adrenal, thyroid, thymus, pituitary, parathyroid and pancreas). Skin and Appendages (hoof and horn), Ear and Eye.

PRACTICAL

Post-mortem examination of large and small animals, recording of gross lesions and compiling the postmortem report (including vetero-legal cases), despatch of morbid material in vetero-legal cases, study of gross specimens and histopathological slides pertaining to systemic pathology. Collection and examination of clinico-pathological specimens (blood, urine, body fluids, etc.) for diagnosis of systemic affections.

SEMESTER- V

SPECIAL VETERINARY PATHOLOGY

VPP- 311 **Credit Hours 2+1=3**

THEORY

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

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

General pathology of mycoplasmal, chlamydial and rickettsial infections and their differentiation. Pathogenesis, gross and microscopic pathology of contagious bovine pleuropneumonia (CBPP), contagious caprine pleuropneumonia (CCPP), porcine enzootic pneumonia, chlamydial group of diseases and anaplasmosis, Q-fever and ehrilichosis.

General pathology of mycotic infections. Pathogenesis, gross and microscopic pathology of superficial and .deep mycoses - ringworm, favus, aspergillosis, zygomycosis, histoplasmosis, cryptococosis and candidiasis.

General pathology of helminthic and protozoal infections. Pathogenesis, gross and microscopic pathology of fascioliasis, amphistomiasis, ascariasis, strongylosis, hemonchosis, spirocercosis, filariasis, hookworm, tapeworm infections, coccidiosis, toxoplasmosis, babesiosis, theileriasis and trypanosomiasis. Pathogical changes in nutritional and metabolic diseases: (deficiency/excess of carbohydrates, proteins, fats, minerals and vitamins and in conditions like milk fever, pregnancy toxaemia, post-parturient haemoglobinuria, ketosis, hypomagnesemic tetany, azoturia, piglet anaemia and sway back/enzootic ataxia and Rheumatism like syndrome).

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

PRACTICAL

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

SEMESTER -VI

AVIAN PATHOLOGY

VPP-321 **Credit Hours 1+1=2**

THEORY

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

Bacterial Diseases: Pathogenesis, gross and microscopic pathology of Colibacillosis (colisepticaemia, yolk sac infecion, egg peritonitis, coligranuloma). infectious coryza, clostridial diseases (botulism, necrotic enteritis, gangrenous dermatitis, ulcerative enteritis),

salmonellosis (Pullorum disease, fowl typhoid, paratyphoid infection), fowl cholera, tuberculosis and spirochaetosis
Mycoplasmal and Chlamydial Diseases: Pathogenesis, gross and microscopic pathology of Mycoplasma gallisepticum infection (chronic respiratory disease), Mycoplasma synoviae infection, Avian chlamydiosis (psittacosis).
Fungal Diseases: Pathogenesis, gross and microscopic pathology of aspergillosis, thrush and favus. Mycotoxicosis: Pathogenesis, gross and microscopic pathology of Aflatoxicosis, ochratoxicosis and trichothecenes.
Parasitic Diseases: Pathogenesis, gross and microscopic pathology of Helminthic diseases (flukes, cestodes, nematodes), protozoal diseases (coccidiosis, histomoniasis), ectoparasites, Avian malaria Nutritional and metabolic diseases: Pathogenesis, gross and microscopic pathology of major diseases due to deficiency/excess of carbohydrates, proteins, minerals and vitamins in poultry Vices and Miscellaneous Diseases: Pathology of important vices and miscellaneous conditions. Pathology of exotic and emerging poultry diseases.

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

SEMESTER- VI

AQUATIC ANIMAL DISEASES, HEALTH CARE AND MANAGEMENT

VPP-322 **Credit Hours 1+1=2**

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

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

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

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

REFERENCE BOOKS

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

DEPARTMENT OF VETERINARY PUBLIC HEALTH AND EPIDEMIOLOGY

SEMESTER- V

MILK AND MEAT HYGIENE, FOOD SAFETY AND PUBLIC HEALTH

VPE-311 **Credit Hours 2+1=3**

THEORY

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

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

PRACTICAL

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

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

SEMESTER -VI

VETERINARY EPIDEMIOLOGY AND ZOONOSES

VPE- 321 **Credit Hours 2+1 =3**

THEORY

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

Definition, history and socio-economic impact of zoonotic diseases. Classification of zoonoses and approaches to their management. New, emerging, re-emerging and occupational zoonoses. . Role of domestic, wild, pet and laboratory animals and birds in transmission of zoonoses. Zoonotic pathogens as agents of bio-terrorism. Reservoirs, clinical manifestations

in animals and humans, and the management of the following zoonoses: rabies, Japanese encephalitis, Kyasanur forest disease, influenza, anthrax, brucellosis, tuberculosis, leptospirosis, listeriosis, plague, rickettsiosis, chlamydiosis and dermatophytosis. Food borne zoonoses: salmonellosis, staphylococcosis, clostridial food poisoning, campylobacteriosis, helmintrrosis.toxoplasmosis and sarcocystosis. Veterinary Public Health Administration.

PRACTICAL

Collection of epidemiological samples. Measurement of disease: determination of morbidity and mortality rates/ratios. Generation of epidemiological protocols and reports. Demonstration of selected software programmes/models e.g. EPIZOO, HandiSTATUS and India-Admas-EPITRAK. Evaluation of vaccines and diagnostic tests. Determination of Associations and risks: relative risk, Odd's ratio and attributable risk. Survey of an animal disease on a farm.

Field survey of zoonotic diseases. Concurrent isolation and identification of important pathogens of zoonotic importance from animal and human sources including foods of animal origin and their interpretation. Study of rural environment and health status of rural community. Visit to primary health centre/human hospital and study of the common diseases affecting rural/urban population, and probable relationships of these human disease conditions with animal diseases present in the area.

SEMESTER- IX

ENVIRONMENT AND ENVIRONMENTAL HYGIENE

VPE-511 **Credit Hours 2+1=3**

THEORY

Definition, scope and importance. Ecosystem: types, structure and functions. Food chains. Bio-diversity uses, threats and conservation. Natural resources: forest, mineral, soil and water-their uses and abuses. Environmental pollution-causes, and effects. Control measures of air, water, soil, marine, thermal and noise pollution. Nuclear hazards. Bio-safety and risk assessment Environment Protection Acts and related issues. Disaster management

Sources of water supply and water quality, Sources of water contamination. Bacteriology of water. Physical, chemical, microbiological and biological evaluation of water. Water purification. Disposal of sewage and farm wastes. Health implications of farm wastes. Sanitation and disinfection of animal houses. Recycling of farm wastes. Sources of air pollution within animal houses and its effect on animal health and production Ventilation and ventilation systems within animal houses and specialized laboratories. Prevention and control of air and water-borne diseases. Problems of atmospheric pollution (acid rah, depletion of ozone layer, methane production, green house effect and global warming). Tannery, wool, bone and blood meal industry pollution and its control. Stray and fallen animal management Pollution due to industrial wastes.

PRACTICAL

Sampling of water for sanitary examination. Physical examination of water estimation of colour, turbidity, total hardness, solids, alkalinity and acidity of water. Chemical and Microbiological evaluation of water quality. Disinfection of animal houses. Determination of the efficacy of disinfectants. Demonstration of water purification system. Disposal of

carcasses, Pathogenic microbes in air. Demonstration of various ventilation systems in animal houses. Demonstration of toxic residues in water and air. Visit to local polluted sites and documentation of local environmental problems.

REFERENCE BOOKS

1. Text book of Preventive and Social Medicine*- K.Park
2. Dairy Microbiology*- Anandakrishnan C.P., Singh R.B and Padmanabhan P.N
3. Fundamentals of Dairy Microbiology*- Prajapathy, J B
4. The technology of food preservation- Norman W. D., and James N.D
5. Environmental Pollution: Impact of technology on Quality of life- Ray,M.
6. Environmental Hazards and Human Health- Richard B.Philp
7. Wilsons' Practical Meat Inspection- Wilson W.G
8. Food Microbiology*- Frazier V. and Westhoff D.C.,
9. Food safety and Quality Assurance-Foods of Animal Origin- Hubbert W.T
10. Food safety-Contaminants and Toxins- D'Mello J.P.F
11. Methods of Analysis and Analysis- James P.L. and Je.
12. Review of Parasitic Zoonosis- Parija S.C
13. Industrial Hygiene Evaluation Methods- Bisese S and James P.K.
14. Health and health care in Third world- Phillips D.R
15. Infectious Waste Management-A practical guide.-Garvin M. L.
16. Hand book of Biomedical Instrumentation- Khandpur
17. Veterinary Preventive Medicine- White E.C. and Jardan FTW
18. A textbook of Preventive Medicine- Chakrabarti.A
19. Meat Hygiene*- Gracy, Collins and Huey
20. Meat Hygiene*- Joshi.B.P
21. A colour Atlas of Meat Inspection- Durao.G
22. Manual on simple methods of Meat preservation- FAO Manual No. 79
23. Poultry Meat Hygiene and Inspection - Bremner.A and Jhonston M
24. Diseases of Animals Transmissible to Man- Thapliyal D.C.
25. Zoonoses* - Mahendra Pal
26. Fundamentals of Parasitic Zoonoses- Pathak K.M.L
27. Zoonoses: Recognition Control and Prevention- Martin.E., Jones.E.H., Hubbart,W.T and Hagstard H.V
28. Zoonoses: Infectious diseases Transmitted from Animals to Human Being Krauss H
29. Dogs Zoonoses and Public Health- Calum N.L., Macpharson, Fracois,X., Moslin and Wandeler,A.
30. CRC handbook series in Zoonoses- Steele J.L.
31. Zoonoses*- Palmer, Soulsby and Simpson
32. Applied Dairy Microbiology- Marth.E.H. and Steele J.L.
33. Modern Food Microbiology- Jay. M.J
34. Handbook of milk Microbiology- Srivatava.M.L.
35. Basic Food Microbiology- Banwart.G.J.
36. Industrial Microbiology- Prescott and Ponn
37. Urban Health Research in Developing Countries- Atkigson.S., Sangsore,J and Werns,E.
38. Safety Evaluation of Environmental Chemicals- Dikshith, T.S.S.
39. Influence and Removal of Organics in Drinking Water- Mallevilla,Suffet and Chan

40. Manual of Aquatic Sediment Sampling.- Murdoch,A Asane J.M.
41. Text book of Medical Parasitology- Parija S.C.
42. Worms and Human Disease- Muller
43. Food Borne Pathogens*- Varnem and Evans
44. Gradwohls' Clinical Lab Methods and Diagnosis- Sonnenwirth and Jarett
45. Fish Disease and Disorders – Viral Bacterial and Fungal Infections.
Wro and Bruno
46.Epidemiology, Diagnosis and Management of Zoonoses*- Narayan K.G.
47 Outline of Dairy Technology- Sukumar De
48. Textbook of Human Nutrition- Bamji.M.S., Rao,N.P and Reddy V
49. Principles and Practice of Animal Health and Hygiene- Prasad. J., and Neeraj
50. Veterinary Epidemiology- Thrushfield. M.
51. Fundamentals of Animal Hygiene and Epidemiology*- Thapliyal D.C.
52. Communicable disease Epidemiology and Control- Webber,R.
53. Veterinary Epidemiology-Principles and Methods*- Willeberg,M.
54.Medical Parasitology- Parija S.C.
55. Veterinary Medicine- Radostits,O.M, Gay C.C, Douglas,C, Blood.C and Kenneth W.H.
56. Practical Medical Microbiology*- Mackie and Mc.Cartney
57. Helminthes, Arthropods and Protozoa of Domesticated Animals- Soulsby.J.L.
(* indicates books which can be used for under graduate reference)

DEPARTMENT OF ANIMAL NUTRITION

SEMESTER -I

PRINCIPLES OF ANIMAL NUTRITION AND FEED TECHNOLOGY

ANN-111 **Credit Hours 2+1=3**

THEORY

Importance of nutrients in animal production and health. Composition of animal body and plants. Nutritional terms and their definitions. 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, metabolisable 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. Various physical, chemical and biological methods of feed processing 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; Antibiotics and hormonal compounds and other growth stimulants, and their uses.

PRACTICAL

Familiarisation of various feed stuff, fodders and their selection. Preparation and processing of samples for chemical analysis - herbage, faeces, urine and silages. Weende's System of analysis - Estimation of dry matter, total ash, acid insoluble ash, crude protein, ether extract crude fibre, nitrogen free extract, Calcium and phosphorus in feed samples. Demonstration of detergent methods of forage analysis. Qualitative detection of undesirable constituents and common adulterants of feed. Demonstration of laboratory ensiling of green fodders. Silage pit preparation.

SEMESTER II

APPLIED NUTRITION-l (RUMINANTS)

ANN –121 **Credit Hours 2+1=3**

THEORY

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. Nutrient requirements of livestock-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, milk, meat, wool and work. Balanced ration and its characteristics. General principles of computation of rations. Formulation of rations and feeding of dairy cattle and buffaloes during different phases of growth, development and production (neonate, young, mature, pregnant, lactating and dry animals; breeding bull and working animals). Formulation of ration and feeding of sheep and goat during different phases of growth, development and production (milk, meat and wool). Use of NPN compound for ruminants.

PRACTICAL

Demonstration of conducting digestion trial in ruminants. Calculation of nutritive value of different feed stuffs in terms of digestible crude protein (DCP), total digestible nutrient (TDN), Nitrogen retention (NR) and starch equivalent (SE). Calculation of requirements of nutrients in terms of DCP, TDN and metabolisable energy (ME) for maintenance, growth, and other types of production like meat, milk, wool, reproduction and work. Formulation of rations for different categories of livestock under different conditions. Demonstration of the methods for improving the nutritive quality of straws and other crop residues. Formulation of rations for feeding of livestock during scarcity periods. Visit to feed factories.

SEMESTER- III

APPLIED NUTRITION-II

(NON-RUMINANTS, POULTRY AND LABORATORY ANIMALS)

ANN- 211 **Credit Horns: 2+1=3**

THEORY

Factors affecting digestibility of a feed. Nutrient requirements in poultry, swine and equine - Energy and protein requirement for maintenance and production. Methods adopted for arriving at energy and protein ~~r~~requi~~r~~reme~~nts~~ for maintenance and production in terms of growth, reproduction and production (egg, meat and work). Formulation of rations as per Bureau of Indian Standards (BIS), National Research Council (NRC) and Agricultural Research Council (ARC) specifications. Feeding standards, their uses and significance, merit and demerits of various feeding standards with reference to monogastric animals and poultry. Feeding of swine (Piglets, Growers, Lactating and pregnant sows, Breeding boar, Fattening animals), equine (foal, yeaning, broodmare, stallion and race horses) and poultry (Starter, Growers, Broilers, Layers) with conventional and unconventional feed ingredients. Feeding of ducks. Laboratory Animal Nutrition: Nutrient requirements of mice, rat, rabbit and guinea pig. Significance of carbohydrates, lipids, proteins and amino acids, minerals arid vitamins in lab animal nutrition. Diet formulation and preparation and feeding practices. Feed supplements.

PRACTICAL

Calculation of requirements of nutrients in terms of DCP, TDN and ME for maintenance, growth, reproduction and other types of production like egg and meat. Formulation of rations for poultry and swine with conventional and unconventional feed ingredients. Principles of compounding and mixing of feeds. Visit to poultry farms.

REFERENCE BOOKS

1. Principles of Animal Nutrition and Feed Technology - by D.V. Reddy.

2. Animal Nutrition (Livestock, Poultry, Pet, Rabbit and Laboratory Animal Nutrition) - by D.V. Reddy.

3. Feeds and Principles of Animal Nutrition – by G.C. Banerjee.

DEPARTMENT OF ANIMAL GENETICS AND BREEDING

SEMESTER- I

BIO-STATISTICS AND COMPUTER APPLICATION

AGB-111 **Credit Hours 2+1=3**

THEORY

A. Basic Statistics:
Introduction and importance. Statistics, parameters, observation, recording and graphical representation of data Probability and probability distributions: binomial, Poisson and normal. Measures of central tendency and measures of dispersion (simple and grouped data). Moments and skewness to kurtosis. Correlation and regression. Tests of hypothesis and t Z, X^2 and F tests of significance and their interrelationship. Livestock census procedure and census. Introduction to sample survey methods for livestock and livestock products. Bioassay - meaning and uses.

B. Experimental designs:
Completely Randomized Design (CRD.) and Randomized Block Design (R,B.D). Analysis of variance.

C. Computer application:
Computer and its components; Types of computers; Hardware, software, human ware and firm ware. Type of memories. Computer languages and their scope and limitations. Computer programming : Data types: Constants, variables, expressions, operations, functions, flow charts, commands, simple programs and their execution- scope and limitations. Data base management system: Storage of data, filing, retrieving, reproduction. Use of computer in animal husbandry and veterinary practices.

PRACTICAL
Systematic approach of data, tabulation, simple probability problems. Estimation of measures of central tendency (mean, median, mode) and estimation of measures of dispersion (variance, standard deviation, standard error and coefficient of variation): for simple and grouped data. Graphical representation of data. Tests of significance -t Z. X^2 and F tests. Estimation of correlation. Estimation of regression. Analysis of variance: CRD., R.B.D. Computer basics and components of computer. Simple operations: Entering and saving biological data, database management systems. MS-Office. Spread sheet Internet e-mail and geographic Information system (GIS).

DEMONSTRATION

Use of word processor and spreadsheet Graphics and their uses. Data retrieving and analysis through computer (Data base). Use of local area network (LAN) and other network systems. Retrieving library information through network. G.I.S. and Its use.

REFERENCE BOOKS

1. Statistical methods – Snedecor & Cochran
2. Fundamentals of Statistics – S.C. Gupta
3. Fundamentals of applied statistics – Gupta & Kapur
4. Statistical Methods for Biological workers – Pillai & Sinha
5. Biostatistical Analysis – Zar
6. Fundamentals of Biostatistical Analysis – Rosner

SEMESTER- II

PRINCIPLES OF ANIMAL GENETICS AND POPULATION GENETICS

AGB-121 **Credit Hours: 2+1=3**

THEORY

History of Genetics. Chromosome numbers and types in livestock and poultry. Mitosis, Meiosis and gametogenesis. Overview of Mendelian principles; Modified Mendelian inheritance: gene interaction; multiple alleles; lethals; sex-linked, sex limited and sex influenced traits; linkage and crossing over, Mutation, Chromosomal aberrations; Cytogenetics, Extra-chromosomal inheritance. Gene concept -classical and molecular.

Population genetics: Genetic structure of population: Gene and genotypic frequency: Hardy - Weinberg law and its application; Forces {eg Mutation, migration, selection and drift) changing gene and genotypic frequencies.

Quantitative genetics: Nature and properties; Values and means. Components of phenotypic and genotypic variance; Concept of genotype and environment interaction, Resemblance between relatives; Heritability, repeatability, genetic and phenotypic correlations.

PRACTICAL

Demonstration of karyotype of Farm animal species; Solving problems on inheritance of Mendelian traits. Linkage and Crossing over. Calculation of gene and genotypic frequencies, Testing a population for Hardy-Weinberg equilibrium; Calculation of effects of various forces that change gene frequencies, Computation of population mean; Estimation of heritably, repeatability, Most probable producing ability (MPPA), genetic and phenotypic correlations.

REFERENCE BOOKS

1. Genetics by Monroe W. Strickberger
2. Principles of Geneetics by Gardner/Simmons/Snustad
3. Introduction to Quantitative Genetics by D.S. Falconer
4. Concepts f Genetics by Klug and Cummings
5. Textbook of Population Genetics (Volume I and Volume II) by Sukhvir Singh Tomar
6. Textbook of Animal Breeding by S.S.Tomar

SEMESTER -III

LIVESTOCK AND POULTRY BREEDING

AGB-211 **Credit Hours 2+1=3**

THEORY

History of Animal Breeding; C~~lassifica~~tion of breeds; Economic characters of livestock and poultry and their importance; Breeding/Selection techniques for optimal production. Selection: Response to selection and factors affecting it; Bases of selection individual, pedigree, family, sib, progeny and combined; Indirect selection; Multitrait selection.

Classification of mating systems; Inbreeding and out breeding-genetic and phenotypic consequences viz., inbreeding depression and heterosis: Systems of utilization of heterosis; Selection for combining ability; Breeding methods for the improvement of dairy cattle and buffaloes {crossbreeding, sire evaluation, field progeny testing, open nucleus breeding system (ONBS)}, sheep, goat, swine and poultry; Breed development; Conservation of germplasm, Current livestock and poultry breeding programmes in the state and country.

PRACTICAL

Description and measurement of economic traits of Livestock & poultry. Standardization of performance records, Computation of selection differential, generation interval and expected genetic gain; Construction of selection index; Sire indices. Measurement of inbreeding and relationship coefficients; Estimation of heterosis.

REFERENCE BOOKS

1. “Introduction to Quantitative Genetics” by D.S. Falconer
2. “Dairy Bovine Production” by C.K. Thomas and N.S.R. Sastry
3. Handbook of Animal Husbandry Sciences by Amalendu Chakraborti
4. Genetics and Breeding of Farm Animals by D. P. Mukherjee and G.C. Banergee
5. Understanding Animal Breeding by Richard M. Bourdon
6. Animal Breeding by Gerald Weiner
7. Veterinary Genetics by F.W. Nicholas
8. Handbook of Animal Husbandry 0 ICAR publication
9. Principles and Practice of Poultry Husbandry by Tom Newman
10. Textbook of Animal Breeding by S.S. Tomar
11. Dalton’s Introduction to Practical Animal Breeding by Malcolm B. Willis
12. Genetics of Livestock Improvement by John F. Lasley
13. Breeding and improvement of farm animal by Warwick, E.J. and Legates, J.E.

DEPARTMENT OF LIVESTOCK PRODUCTION MANAGEMENT

SEMESTER- I

LIVESTOCK PRODUCTION MANAGEMENT-I
(GENERAL PRINCIPLES AND RUMINANTS)

LPM-111 **Credit Hours 3+1=4**

THEORY

Livestock in India- association of livestock to Indian society during vedic, medieval and modern era. Demographic distribution of livestock and role in economy. Animal holding and land holding patterns in different agro-ecologies.

Introductory animal husbandry. Common animal husbandry terms. Body conformation and identification. Dentition and ageing of animals. Transport of livestock by rail, road, air and on foot. Common farm management practices including disinfection, isolation, quarantine and disposal of carcass. Introduction to methods of drug administration. Common vices of animals, their prevention and care. Livestock production systems of different agro-climatic zones. Livestock resources and resources management Livestock produce and products and their availability and their role in rural/urban hearth/economy. Organic livestock production.

General principles affecting the design and construction of building for housing for various livestock species. Selection of site. Arrangements of the building with special reference to Indian conditions.

Utilisation of local materials. Building materials used for construction of wall, roof and floor of animal houses, their characteristics, merits and demerits.

Demography of cattle and buffalo population. Breeds and breed descriptors of important breeds. Important traits of cattle and buffaloes. General management and feeding practices of calves, heifers, pregnant, lactating and dry animals in bulls and working animals. Draught ability of cattle and buffaloes. Raising of buffalo mates for meat production. Housing systems, layout and design of different biddings for dairy animals inducing backyard dairy and mixed farms. Routine dairy farm operations and labour management Methods of milking and precautions. Factors affecting quality and quantity of milk production. Clean max production. Dairy farm accounts and records. Concepts of input and output cost of dairy farming (small and large holdings).

Demography of sheep and goat population and their rote in economy. Breeds and breed descriptors. Important bans for meat milk and fibre. General management and feeding-practices during different stages of growth, development and production (milk, meat and wool) in small and large holdings. Breeding schedule and management of ram and buck. Weaning and fattening of lambs and kids. Glossaries of terms In wool industry. Shearing of sheep. Physical and chemical properties of wool. Impurities in wool Factors influencing the quality of wool grading. Recovery of wool wax and its use. Housing systems, layout and design of different buildings for small ruminants Judging for the quality and confirmation of body parts of cattle, buffalo, sheep and goat Culling of animals. Preparation of animals for show.

Problems and prospects of dairy, meat and wool industry in India. Animal and animal products market and marketing. Animal Fairs and Melas. Animal pounds and Goshalas.

PRACTICAL

Identification of various breeds of cattle, buffalo, sheep and goat Familiarization with body points of animals. Approaching, handling and restraining of cattle, buffalo, sheep and goat Clipping, shearing, dipping, spraying and spotting sick animals. Detection of vices. Feeding of animals. Methods of identification (marking, tattooing, branding, tagging and electronic chip). Determination of age. Determination of body weight using different measurements. Preparation of animals for show and judging. Layout plans for dairy and sheep/goat farms. Familiarization with routine farm operations. Selection and culling of animals. Milking of dairy animals. Training of breeding mates. Detection of heat Identification and care of pregnant animals. Care of neonatal and young stock. Maintenance, cost accounting, economic analysis and preparation of balance sheet of dairy and sheep/goat farm records. Structure of wool and its differentiation from hair fibre. Determination of staple length, crimps, diameter and strength of wool fibre. Sorting, packaging and grading of wool. Recovery of wax from wool. Scouring and carbonisation of wool. Visit to different animal farms/ demonstration centres/ individual rural, urban and peri-urban animal units/ wool production centres & industries/ wool, meat and live animal markets. Preparation of project proposals.

REFERENCE BOOKS

1. Sastry, N.S.R. and Thomas, C.K. (2005) Livestock Production Management 4th Ed.
2. Thomas, C.K. and Sastry, N.S.R (1991)Dairy Bovine Production
3. Cockrill, R.W. (1974)The Husbandry and Health of the Domestic Buffalo
4. Ensminger, M.E. (2002)Sheep and Goat Science, 6th Ed.
5. Clutton Brock, J.(2004)A Natural History of Domesticated Mammals, 2nd Ed.
6. Watson, J.A.S. and Mills, W.J. (2005)Farm Animals and their Management
7. Taylor, R.E. and Field, T.G. (1977) Scientific Farm Animal Production
8. Pagot, J. (1992)Animal Production in the Tropics and Sub-tropics
9. Mason, I.L. (1988)World Dictionary of Livestock Breeds, 3rd Ed.
10. Anderson, R.H. and Edney, A.T.B. (1991)Practical Animal Handling

SEMESTER- II

FODDER PRODUCTION AND GRASSLAND MANAGEMENT

LPM -121 **Credit Hours 1+1=2**

THEORY

Importance of grasslands and fodders in-livestock production. Agronomical practices for production of leguminous and non-leguminous fodders in different seasons. Soil and water conservation and irrigation drainage for fodder production. Farm, power and agro-energy. Farm machinery and equipment Harvesting and post harvest techniques "for fodder preservation. Storage of feeds and fodders. Scarcity fodders. Feed and fodder management for individual animals. Fodder production for small units through inter cropping or back yard cultivation. Recycling of animals washings and wastes in fodder production.

PRACTICAL

Visit to the fodder farm. Familiarisation with the various types of fodder crops utilised in the state and the samples of fodder in India. Fodder cropping routines - familiarisation. Collection, preservation and storage of feed and fodder; possible damages/loss and methods to prevent them. Cost calculations of fodder production. Familiarisations with the back yard fodder cropping and intercropping of fodder.

Livestock waste utilisation and recycling. Calculation on the economic aspects of fodder cropping and procurement of feed.

REFERENCE BOOKS

1. Pathak, N.N. and Jakhmola, R.C. Forages and Livestock Production
2. Chatterjee, B.N. and Das, P.K.Forage Crop Production
3. Reddy, D.V.Fodder Production and Grassland Management for Veterinarians
4. I.C.A.R.Handbook of Agriculture
5. Merkel, J.Managing Livestock Wastes
6. Wiseman, Finch and Samuel.Crop Husbandry including Grassland
7. Sastry, N.S.R. Thomas, C.K. and Singh, R.A.Livestock Production Management
8. Humphreys, L.R.Tropical Forages
9. I.C.A.R Grasses and Legumes
10. Ranjan, S.K.Animal Nutrition in the Tropics

SEMESTER- II

LIVESTOCK PRODUCTION MANAGEMENT II (MONOGASTRIC AND LABORATORY ANIMALS)

LPM-122 **Credit Hour: 1+1=2**

THEORY

Introduction and scope of swine farming in the country. Demography of swine population. Breeds and their role in economy. Management of different categories of swine for optimal production: breeding and pregnant sows; sows at farrowing and after farrowing: pig-Ms, growing stock, lactating sows, feed lot stock. Mating technique in swine. Housing of swine. Swine feeds and feeding. Economics of pig fanning. Equine population of India. Horses, donkeys and mules and their utility. Identification of breeds of horses. Dentition and ageing of horses. Handing, restraining, care and routine management of equines including grooming, saddling and exercise. Stable and Its management Feeding routine for horse, donkeys and mules. Vices of horses. Care of stallion. Mating of Horses broodmare and its care. Foaling and care of newborn. Breeding mules. Care of race horses and preparing horses for show. Doping and its detection. Visit to races, polo, horse show.

Importance of laboratory animal breeding care and housing standards of mice, rats and guinea pigs. General considerations on feeding and breeding of laboratory animals. Prophylactic measures for commonly occurring laboratory animal diseases. Concept of production of specific pathogen tree (SPF) and germ free laboratory animals.

Scope of rabbit farming in the country, breeds and their distributions In India and abroad. Limitation of rabbit animal production. Selection, care , and management of breeding stock for commercial purpose. Identification. Care and management of landing animals and kindling. Care of new born, growing stock. Harvesting of products. Breeding and selection techniques for optimal production. Feeds and feeding for rabbit production- Housing of rabbit Shearing/slaughtering and preservation of products. Diseases and parasite control, hygienic care. Disposal, utilization and recycling of wastes etc. Economic aspects of rabbit production, accounting their expenditure, income, etc. Manpower- requirements and personnel/labour management Preparing projects for micro (backyard) mini, and major rabbit farms.

PRACTICAL

Identification of Indian and exotic breeds of swine; handling of swine; Routine inspection . Identification of diseases, examination and control of parasites, vaccination, Identification of pregnant animals. Care during pregnancy, isolation and care of farrowing sows, care of pig lings, Castration, culling, tooth cutting. Calculation of profits and preparation of feasibility reports and projects for piggery. Layout plans of swine houses; routine operations of swine farms. Marketing of swine.

Feeding of swines. Preparation of swines for show and judging.

Identification of body parts and handling of laboratory animals. Housing system and space requirements for ~~la~~boratory animals. Weighing, sexing and weaning of laboratory animals. Marking for identification of laboratory animals for purpose of their individual recording. Computation and compounding of balanced diet for laboratory animal mainly Mice, Rats, Guinea -pigs and Rabbits.

Feeding schedule of laboratory animals for high breeding efficiency. Maintenance of breeding records of laboratory animals. Prophylactic measures against common disease of lab animate. Hygienic care and control of parasites (routines).

Visit to the University Rabbitary. Handing and restraint Body parts. Identification of breeds. Judging. Feeds and feeding. Housing requirement and equipment Farrowing. Care of newly born young ones-tagging, tattooing for identification. Shearing. Dressing of carcass.

Horse riding: walking, trotting, cantering and galloping. Preparation of equines for show and judging. Layout plans for stables.

REFERENCE BOOKS

1. Sastry, N.S.R. and Thomas, C.K. (2005)-Livestock Production Management 4th Ed.
2. Anderson, R.S. and Edney, A.T.B (1991)-Practical Animal Handling
3. Warren, M.D. (2002)Small Animal Care and Management, 2nd Ed. Poole. T. (1994)The UFAW Handbook on the Care and Management of Laboratory Animals, 6th Ed.
4. Lebas, F; Coudert, P; Rouvier, R and Rochambean, H. (1986). The Rabbit – Husbandry, Health and Production
5. Brega, J. (1996)The Horse – Breeding and Young Stock
6. Fielding, D. Tropical Agriculturist – Rabbits
7. Wolfenson. S and Lloyd, M. (1994)Handbook of Laboratory Animal Management and Welfare
8. Holness. D.H. (1993)The Tropical Agriculturist – Pigs
9. Sharda, D.P.(2005)Swine Production

SEMESTER- III

AVIAN PRODUCTION MANAGEMENT

LPM- 211 **Credit hours 1+1=2**

THEORY

Indian Poultry industry-brief outline of the different segments-poultry statistics.

Classification of poultry, common breeds of poultry including duck, quail, turkey & guinea fowl and their descriptions. Description of indigenous fowls.

Reproduction in fowl, male and female reproduction systems, formation of eggs, structure of eggs. Important economic traits of poultry, egg production, egg weight egg quality, growth, feed consumption and feed efficiency, fertility and hatchability, plumage characteristics and comb types. Scavenging system of management raising of chicks, scavenger feed base of village. Low input technology; backyard and semi intensive unit of various sizes; their description, management and economic achievements.

New colored feathered birds developed in public and private sectors for meat and egg production for rural poultry; their acceptability and assimilation in rural eco-system.

Mixed farming and poultry raising. Concept of self-local market unit

Brooding and rearing practices used for chicken, duck, quail, turkey and guinea fowl.

Economic production of chicken and other classes of poultry.

Hatching and feeding norms for different species of poultry. Marketing of poultry and poultry products. Setting of farms for different classes of poultry. Organic and hill farming.

PRACTICAL

Morphological description of common exotic poultry breeds like White Leghorn (WLH), Rhode Island Red (RIR), Plymouth Rock, Cornish and New Hampshire. Diagrammatic illustration of body parts of chicken, duck, quail, guinea fowl and turkey. Descriptive specialties of indigenous birds, listing of its advantageous value in rural areas. Diagrammatic representation of scavenging, backyard and semi intensive units; with habitats, feed base and shelter. Conservation of indigenous germ plasm; listing of conservation techniques. Demonstration of newly developed breeds in rural environment Housing, equipments, nesting and brooding requirements. Vaccination, medication and incubation requirements. Preparation of projects for rural people on poultry and other species (duck, quail, guinea fowl and turkey).

SEMESTER- IV

COMMERCIAL POULTRY PRODUCTION AND HATCHERY MANAGEMENT

LPM –221 **Credit hours 1+1=2**

THEORY

HOUSING - Location of poultry. Types of poultry houses. Different types of rearing-advantages and disadvantages. Space requirement for different age groups under different rearing systems. Environmentally controlled housing. BROODING MANAGEMENT-Brooding: Types of brooders; preparation of shed to receive chicks; importance of

environment (temperature, humidity and ventilation). Feeding and vaccination in early stage of chicks.

REARING AND MANAGEMENT- Care and management of growing, laying/broiler birds of both breeders and commercial categories of poultry. Battery cage management different types and sizes. Poultry judging.

LITTER MANAGEMENT- Litter materials, litter-borne diseases and control; potential for poultry litter used as fertilizers; recycling for livestock feeding and power generation; Special management care in adverse weather conditions/ stress; summer management modification of housing light reflectors; insulators, sprinklers, loggers and other methods; dietary modification to minimize heat stress; special management during rainy and winter season; other stress management- vices in poultry and its remedial measures.

WATER MANAGEMENT- Standard for drinking water in terms of total solids. pH, minerals levels, sanitizers and water sanitations, diseases spread through water contamination-prevention.

BIOSECURITY- Proactive measures to minimize entry of infections in farm premises-farm fencing, disinfectant pits, personnel management restriction of movement etc. Poultry welfare and behaviour.

FEEDING- digestive system and digestion in chicken. Classification, selection of common feed ingredients and their nutrient composition. Nutrient requirement for different age groups. Feed formulations, economics of feed formulation-cost/, unit nutrient Feeding systems and feeding management economization of poultry feeding. Feed restriction, separate male feeding, non-nutrient feed additives including herbal bio-enhancers; anti-nutritional factors and toxins.

HEALTH CARE- Common poultry diseases: bacterial, viral, fungal, parasitic and nutritional deficiencies. Vaccination schedule for commercial layers and broilers: factors that govern vaccination schedule; vaccination principles type, methods, pre and post vaccination care. Medication: Types of administration-general principles and precautions with emphasis on administering medication through water and feed; commonly used drugs in poultry diseases. Disinfection: Types of disinfectants; mode of action; recommended procedure; precaution and handling.

ECONOMICS- Economics of layer and broiler production; Projects reports layer in different systems of rearing. Projects reports for broilers.-Feasibility studies on poultry rearing- in context of small units and their profitability. Designer meat and egg production. Export/import of poultry and poultry products.

BREEDER FLOCK MANAGEMENT- Layer and broiler breeder flock management housing & space requirements. Different stage of management during life cycle; Light management during growing and laying period, Artificial insemination.

Feeding: Feed restriction, separate male feeding. Nutrient requirement of layer and broiler breeders of different age groups. Healthcare: vaccination of breeder flock; difference between vaccination schedule of broilers and commercial birds. Common diseases of breeders (Infectious and metabolic disorders)-prevention. Fertility disorder- etiology, diagnosis and corrective measures. Selection and culling of breeder flocks. Economic parameters on returns from breeders- for example saleable chick/hen/production cycle etc.

HATCHERY PRACTICES - Management principles of incubation. Factors affecting fertility and hatchability. selection, care and incubation of hatching eggs. Fumigation; sanitation and hatchery hygiene. Disposal of hatchery waste; Sexing, grading, packing and dispatch of day old chicks. Economics of hatchery business; Trouble shooting hatch failure: importance of

hatchery records, break even analysis of unhatched eggs. Biosecurity in the hatchery. Computer applications for hatchery management

PRACTICAL

Male and female reproductive system. Artificial insemination. Selection of breeder flock. Working of hatchery Incubation requirement; incubators working, care. Hatchery layout and equipments. Handing of eggs prior and during incubation. Candling. Fumigation. Project reports of setting up a hatchery. Hatchery records and maintenance.

Exposure to commercial broiler and layer farms-different system of housing.

Demonstration of litter and cage rearing systems. Feed equipments and maintenance; hammer mill, mixture, pellet mill-types, principle of working, comparison of different types, premix preparations, quality control of raw materials. Feed mill operation. Demonstration of different types of feeder, waterer, fogger, sprinklers etc. Maintenance of farm records. Medication-demonstration of routinely employed methods of administration.

Vaccination practice in general and demonstration of different roots of administration in particular.

REFERENCE BOOKS (LPM 211 and LPM 221)

1. Scanes, C.G.; Brant, G and Ensminger, M.E. (2004) Poultry Science, 4th Ed.
2. Sreenivasaiah, P.V. (2006)Scientific Poultry Production – a unique encyclopedia, 3rd Ed.
3. Jull, M.A. (2003)Successful Poultry Management
4. Sainsbury, D. (1984)Poultry Health and Management
5. Roberts, V. (2003)British Poultry Standards
6. Leeson, S and Summers, J.D. (1993)Commercial Poultry Production
7. North, M.O and Bell, D.D. (1990)Commercial Chicken Production Manual, 4th Ed.
8. Murd, L.M. (2003)Modern Poultry Farming
9. Leeson, S and Summers, J.D. (1993)Commercial Poultry Nutrition
10. Johari, D.C.and Hussain, K.Q. (1996)Commercial Broiler Production

SEMESTER-IV

LIVESTOCK PRODUCTION MANAGEMENT (REGIONAL INTEREST)

LPM- 222 **Credit Hours: 1+1=2**

Course Contents to be developed by the University/Veterinary College on the basis of regional interest.

DEPARTMENT OF LIVESTOCK PRODUCTS TECHNOLOGY

SEMESTER- V

MILK AND MILK PRODUCTS TECHNOLOGY

LPT- 311 **Credit Hours 1+1=2**

THEORY

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

PRACTICAL

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

REFERENCE BOOKS

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

SEMESTER-V

ABATTOIR PRACTICES AND ANIMAL PRODUCTS TECHNOLOGY

LPT-312 **Credit Hours 1+1=2**

THEORY

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

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

PRACTICAL

Methods of ritual and humane slaughter, flaying and dressing of food animals including poultry. Carcass evaluation. Determination of meat yield, dressing percentage, meat bone ratio and cut up parts. Preparation of different abattoir byproducts. Visit to leather processing unit and slaughterhouses/meat
plants.

Woof sampling techniques, determination of fleece density, fiber diameter, staple length, crimp and modulation percentage, scouring/clean fleece yield. Visit to wool production/ processing centre.

SEMESTER -VI

MEAT SCIENCE

LPT-321 **Credit Hours 1+1 = 2**

THEORY

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

PRACTICAL

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

REFERENCE BOOKS

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

DEPARTMENT OF VETERINARY GYNAECOLOGY AND OBSTETRICS

SEMESTER -VII

VETERINARY GYNAECOLOGY

VGO-411 **Credit Hours 2+1=3**

THEORY

Clinical evaluation and abnormalities of reproductive tracts in domestic animals. Delayed Puberty and sexual maturity. Estrus detection. Aberrations of estrus and estrous cycle. Seasonal breeding. Pregnancy diagnosis- different methods- in different species. Superfoetation and Superfecundation. Fertility, Infertility & sterility- Anatomical, hereditary, nutritional, managerial, hormonal and infectious causes. Anoestrus, ovulatory defects and cystic ovarian degeneration. Repeat breeding: Fertilization failure, early embryonic mortality. Specific & non- specific infections affecting genital organs-endometritis, cervicitis, vaginitis. Fertility parameters. Sexual hearth control and reproductive hearth management. Clinical use of hormones in female infertility. Breeding management mismating, psuedopregnancy, transmissible venereal tumor-(TVT) in bitches

Induction of estrus, Synchronization of estrus, Follicular Dynamics, Ovulation, Superovulation, and Embryo Transfer Technology. Immune-modulation for enhancement of fecundity

PRACTICAL

Study of female genitalia and its biometry. Methods of estrus detection in farm and companion animals including vaginal cytology. Collection and examination of vaginal mucus by various techniques. Demonstration of different hormonal preparations and their uses. Different protocols for induction and Synchronization of estrus, superovulation and embryo transfer. Pregnancy diagnosis and its differential diagnosis. Use of gynaecological instruments and appliances. Evaluation of female animals for breeding soundness. Demonstration of reproductive pathological conditions using museum specimens. Sexual health control, life history card for the female, recording system for reproductive performance. Demonstration of ultrasonographic imaging of reproductive organs and pregnancy. Oocyte collection and grading.

REFERENCE BOOKS

1. Reproduction in Farm Animals by Hafez & Hafez
2. Arthur's Veterinary Reproduction & Obstetrics by Noakes et al
3. Diagnostic & Therapeutic Techniques in Animal Reproduction by Zemjanis Veterinary Obstetrics & Genital Diseases by S.J.Roberts

SEMESTER- VIII

VETERINARY OBSTETRICS

VGO 421 **Credit Hours 1+1=2**

THEORY

Types and functions of placenta in different species. Diseases & accidents during gestation-Abortion in domestic animals-diagnosis & control. Dropsy of fetal membranes and fetus. Fetal "mummification, maceration, pyometra and mucometra. Prolonged gestation. Teratology. Premature birth. Uterine torsion.

Cervico-vaginal prolapse. Termination of pregnancy. Parturition. Puerperium and involutionofuterusindomestic animals. Care and management of dam and newborn.

Dystocia- Types of dystocia - maternal & fetal- approach, diagnosis and treatment Epidural & other anesthesia in obstetrical practice. Obstetrical operations- rnutation, forced extractions, fetotomy and cesarean section. Injuries and diseases in relation to parturition.

Postpartum diseases and complications: uterine prolapse, retention of fetal membranes, metritis, postpartum paraplegia.

Animal birth control- ovariohysterectomy and non surgical interventions

PRACTICAL

Study of pelvis and Pelvimety. Assessment of fetal age. Demonstration of different types of placenta. Use of obstetrical instruments. Epidural and other obstetrical anaesthesia. Manipulation of fetal malpresentation in Phantom Boxes. Approach and treatment of obstetrical cases. Handling of prolapse of genitalia-application of. vulvar sutures. Foetotomy. Caesarean section Post operative care and management of obstetrical cases. Demonstration of ovariohysterectomy

REFERENCE BOOKS

1. Veterinary Obstetrics & Genital Diseases by S.J.Roberts
2. Arthur's Veterinary Reproduction & Obstetrics by Noakes et al
3. Diagnostic & Therapeutic Techniques in Animal Reproduction by Zemjanis Veterinary Obstetrics by Benesch
4. Fleming's Veterinary Obstetrics by Graig

SEMESTER- IX

VETERINARY ANDROLOGY AND REPRODUCTIVE TECHNIQUES

VGO-511 **Credit Hours 1+1=2**

THEORY

Introduction to Andrology. Development of male genitalia and gonads. Puberty, sexual maturity, sexual behaviour and libido. Factors affecting maturity and sex drive in bulls. Forms of male infertility. Factors causing infertility in male, its diagnosis and treatment Abnormalities, malformations, diseases of male genitalia and coital injuries, their diagnosis and treatment. Testicular hypoplasia and degeneration. Diseases of the accessory sex glands. Introduction, history, development, advantages and limitations of artificial insemination (A.I.). Methods of semen collection in various species. Factors affecting qualify and quantity of semen. Macroscopic/physical, microscopic, biochemical and biological tests for evaluation of semen. Extenders used for semen preservation. Extension of semen, preservation of semen at different temperatures. Storage and shipment of semen. Technique of A.I.

PRACTICAL

Planning and organization of A.I. Centre. Selection, care, training and maintenance of breeding bulls for A.I. Andrological investigations for breeding soundness of bulls. Castration in different species, preparation of teaser bulls. Care, sterilization, storage and upkeep of equipments used for artificial Insemination. Preparation of A.V Collection of semen. Evaluation of semen (Macroscopic/physical, microscopic, biochemical and biological tests). Preparation of extender and Extension of semen. Preservation techniques at different temperatures. Freezing of semen. Insemination techniques for chilled and frozen semen. Recording Systems. Handling and shipment of frozen semen and liquid nitrogen containers at field level.

REFERENCE BOOKS

1. Physiology of Reproduction and A I of Cattle by Salisbury
2. Text Book of Veterinary Andrology by Sahni & Varma
3. Semen of Animals and it’s use for A I by Anderson & James
4. Breeding problems &Artificial Insemination by Renseberg
5. Veterinary Obstetrics & Genital Diseases by S.J.Roberts
6. Arthur’s Veterinary Reproduction & Obstetrics by Noakes et all

DEPARTMENT OF VETERINARY SURGERY AND RADIOLOGY

SEMESTER -VII

GENERAL VETERINARY SURGERY, ANESTHESIOLOGY AND DIAGNOSTIC IMAGING

VSR-411 **Credit Hours 2+2=4**

General Surgery

THEORY

Introduction, history, classification, surgical terminology and development of veterinary surgery. Asepsis-antisepsis, their application in veterinary surgery. Surgical risk and judgment. Management of shock, haemmorrhage. Principles of fluid therapy in surgical patients. Differential diagnosis and surgical treatment of abscess, tumors, cyst haematoma, necrosis, gangrene, bum. Wound: classification, symptoms, diagnosis and treatment; complications, their treatment and prevention.

PRACTICAL

Surgical instruments and equipment Operation theatre routines. Surgical pack'
Preparation, sterilization and handling. Familirisation with suture materials, surgical knots, suture patterns and their use. Familirisation to live surgery haemostasis.

Anaesthesiology

THEORY (Region specific)

Preanaesthetic considerations and preanaesthetics. Anaesthesia, local analgesia /anaesthesia, General anaesthesia, anaesthetic agents (like barbiturates, dissociative agents). Inhalation anaesthesia and agents, maintenance and monitoring of general anaesthesia. Anaesthetic emergencies and their management Only awareness of neuroleptanalgesia, electro-anaesthesia, acupuncture, hypothermia, muscle relaxants. Post operative pain management General principles of chemical restraint of wild / zoo animals and anaesthesia of lab animals.

PRACTICAL

Familirisation with anaesthetic apparatus, endotracheal tubes. Laryngoscope, gadgets for monitoring. Pre anaesthetic preparation, induction of general anaesthesia in small and large animals and endotracheal intubation in dogs.
Demonstration of inhalant anaesthesia, monitoring of general anaesthesia and the management of anaesthetic emergencies: Use of artificial / assisted respiration. Various methods of local infiltration anaesthesia and regional block, for surgical procedures of different regions of body in Large and Small animals. Chemical restraint of lab and wild animals (Visit of a wild animal facility and audiovisual aids).

Diagnostic Imaging

THEORY

Production and properties of X-rays. Factors influencing production of X-ray.

Principles of viewing and interpreting X-ray films, classification of radiographic lesions. Contrast radiography: classification, materials, uses, indications and contra indications.

Biological effects of radiation, radiation hazards and their prevention by adoption of safety measures. Principles of ultrasonography and its applications in veterinary practice. Awareness on principles of radiation therapy, Isotopes and their uses in diagnosis and therapy; Principles and application of CT scan, MRI, echocardiography, scintigraphy, gamma camera, xeroradiography and Doppler.

PRACTICAL

Familiarization with operation of the X-ray equipment X-ray accessories and adoption of safety measures in radiography. Dark room equipments, X-ray film and its processing. Intensifying screen and its uses. Radiographic technique-positioning of small and large animals. Handing, viewing and interpretation of X-ray firms.

Familiarization with film contrasts, density and detail, common defects of X-ray films. Radiographic anatomy and interpretation of radiographic lesions. Demonstration of contrast technique in small animals. Familiarization with ultrasonography of small and large animals (demonstration).

SEMESTER- VIII

REGIONAL VETERINARY SURGERY

VSR- 421 **Credit Hours 2+1=3**

THEORY

Head and Neck

Affections of the lips and cheek and their treatment Affections of the tongue and their treatment. Treatment of cleft palate. Nasal polyps Affections and treatment of Guttural pouch, empyema, chondroids, tympanitis. Sinusitis, pus in the sinus. Affections of the horn and their treatment (avulsion of the horn, fracture of the horn, horn cancer and fissure in horn). Debudding and amputation of the hors-. Affections of the teeth and their treatment congenital abnormalities, irregular molars.(shear mouth, sharp teeth, wave form mouth, step formed mouth) dental tartar and dental caries, dental tumor and periodontal disease. Bishoping. Affections of safvary glands and their treatment (Trauma, sialoliths, salivary cysts, salivary fistula). Affections of the upper and lower jaw and treatment Affections of the ear and their treatment (haematoma and chronic otorrhoea). Eye: Csnical examination of the eye. Surgical affections of the eye: Entropion, ectropion, tumor of eye. Conjunctiva: Conjunctivitis, occlusion of nasolacrimal duct squint Eyeball: affections of the eye: hydropthalmia, glaucoma, tumors of eye, panopthalmia, injuries and infections of anterior and posterior chambers. Worm in the eye. Affections of esophagus: choke, esophageal stenosis, dilation and diverticulum. Tracheal injuries and tracheal collapse. Affections of pharynx and larynx. Foreign bodies (Oral cavity).

Thorax and Abdomen

Fracture of rib. Perforated wounds, sternal fistula, pneumocele, traumatic pneumothorax Hernia: classification, etiology, diagnosis and treatment (urnbical, ventral, inguinal, perineal, diaphragmatic). Surgical affections of the stomach in dogs {cardia, pyloric stenosis, torsion).' Surgical affections, diagnosis and treatment of stomach in ruminants (ruminal impaction, traumatic reticulitis, diaphramatic hernia abomasal displacement, omasal impaction). Surgical affections of intestines: intestinal obstruction, intussusception, strangulation (volvulus) in

large and small animals. Caecal dilation, torsion. Affections of rectum: prolapse, rectal tear, anal adenitis. Congenital anomalies of colon, rectum, anus. Surgical affections of fiver, spleen. Surgical affections of kidney,ureters, urinary bladder. Urolithiasis and urethral stenosis their sequlae and surgical treatment Surgical affections of penis and sheath, affections of testicle, scrotum. Surgical affections of udder and teat Canine mammary neoplasms.

PRACTICAL

Head and Neck

Demonstration of following: Examination of oral cavity. Location of trephining of sinus in equines. Bovine: Amputation of horn, Debudding. Ligation of Stenson's duct Tooth rasping / floating, otoscopy in dogs, ear haematoma, tracheotomy, tracheostomy, oesophagotomy. Opthalmoscopy, tests for blindness, operation for ectropion, and entropion, enucleation / extirpation of the eye

Thorax and Abdomen

Demonstration of followings: Surgical approaches to the thorax and abdomen in animals with landmarks for approach to various organs. Thoracocentesis. abdominocentesis.Rurnenotomy,gastrotomy,eneterotomy.eneteroanastomosis, urethrotomy, vasectomy, ovariohysterectomy, spaying, cystotomy and cystorrhaphy. Caesarean section. Amputation of tail.

SEMESTER-IX

VETERINARY ORTHOPAEDICS AND LAMENESS

VSR-511 **Credit Hours 1+1=2**

THEORY

Body conformation of the horse in relation to lameness (trunk, fore limb and hind limb) Lameness, definition, classification and diagnosis. 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, thresh and com, Monday morning disease, cording up, myositis of psoas, Mac thrombosis, Crural paralysis, subluxation of sacroiliac joint rupture of round ligament trochantric bursitis. Upward luxation 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. Bovine lameness: contusion of sole, ulceration of sole, septic laminitis. avulsion of hoof and subluxation of patella. Interdigital fibroma, cyst sand crack, hoof deformities. Speckle joint disease (septic arthritis, osteochondritis dessicans, degenerative joint disease) in large animals and their treatment. Specific joint disease in dogs and their treatment. (Intervertebral disc protrusion, spondylosis) elbow and hip dysptasta Rupture of cruciate ligament. Fracture and dislocation. Classification and general principles or fracture repair. Application of external and internal immobilization for different bone fractures in small and. large animals. Complications of fracture healing. Affections of tendon,

tendon sheath, bursa and ligaments. Principles of physiotherapy, classification, scope and limitations.

PRACTICAL

Examination of the horse for confirmation of body (head, trunk, fore limbs and hind limbs) and diagnosis of lameness. Demonstration of equine shoeing. First aid in orthopaedic patients (splint application, Robert Jones's bandage) Plaster of paris cast- application in dogs and carves. Hanging pin and transfixation pinning (demonstration) Intra medullary pinning in dogs (demonstration). Diagnostic nerve block in equine(demonstration) Demonstration of: daw trimming of bovine foot neurological examination for evaluation of spinal trauma, tenectomies of lateral digital extensor tendon, medial patellar desmotomy Techniques and application of diathermy, electrical stimulators, ultrasonic, therapy, infra red and ultra- violet rays.

(Courses on Zoo/Wild Animal Breeding, Nutrition, Management and Health Care under VMD - 512 (2+1) and Pet/Companion Animal Breeding, Feeding, Management and Health Care under VMD- 513 (1+1) shall be taught jointly by Departments of Veterinary Medicine, Livestock Production Management Animal Genetics and Breeding, Animal Nutrition, Veterinary Pathology, and Veterinary Surgery and Radiology).

REFERENCE BOOKS

1. Veterinary Surgical techniques by Amresh Kumar
2. Dollar's Veterinary Surgery by O'connor
3. Veterinary Radiology by A.P. Singh & Jit Singh
4. Veterinary anesthesia by Hall and Clarke
5. Adam's lameness in horses by Stashak, Ted.S
6. Ruminants surgery by R.P.S. Tyagi & Jit Singh
7. Veterinary anesthesia 10th Edition by L.W. Hall, K.W. Clarke, C.M. Trim
8. Atlas of approaches for general surgery of dog and cat by Mark, M. Smith, Don.R.Waldras
9. Textbook of small animal surgery – 2nd Edition Vol.I and Vol.II by Douglas Slatter, W.B. Saunders Co.
10. Lameness in cattle by P.R. Greenough.

DEPARTMENT OF VETERINARY MEDICINE

SEMESTER- VII

VETERINARY CLINICAL MEDICINE-I (GENERAL & SYSTEMIC)

VMD-411 **Credit Hours 2+1=3**

THEORY

History and scope of Veterinary Medicine, Concept of animal diseases. Concepts of diagnosis, differential diagnosis and prognosis. General systemic, states, hyperthermia, hypothermia, fever, septicemia, toxemia, shook and dehydration. Aetiology, clinical

manifestations, diagnosis, differential diagnosis, treatment prevention and control of the following diseases of cattle,- buffalo sheep/goat equine, pig and pet animals. Diseases of digestive system with special reference to rumen dysfunction and diseases of stomach In non-ruminants. Affections of peritoneum, liver and pancreas. Diseases of respiratory and cardiovascular systems including blood and blood forming organs. Diseases of uro-genital system & lymphatic system. Emergency medtelne and critical care.

PRACTICAL

Clinical examination and diagnosis: Methods of clinical examination of individual ailing animals including history taking. Examination of animal inducting behaviour and general appearance: demeanour, voice, eating, drinking, defecation, urination, posture, gait condition of skin and body coats. Inspection of body: examination of head and neck, thorax, respiratory rates, rhythm, respiratory depth, type of respiration, cardiac sounds, chest symmetry, abdomen, external genitalia, mammary glands and limbs. Physical examination: temperature taking, palpation, percussion, auscultation. Examination of ears, eyes, conjunctiva, eye balls, mouth, submaxillary and other superficial lymph nodes, jugular furrow, oesophagus, trachea. Passing of stomach tuba for locating obstruction if any. Examination of specific condition of thorax pneumothorax, haemothorax and hydrothorax Percussion/ auscultation of lung and cardiac areas. Examination of abdomen: ruminal mortility, consistency, microbial population and their motility in ruminal fluid, use of trochar and canula. Examination of liver and kidneys. Liver and kidney function tests.

SEMESTER-VII

VETERINARY PREVENTIVE MEDICINE-I (BACTERIAL, FUNGAL& RICKETTSIAL DISEASES)

VMD-412 **Credit Hours 2+0=2**

THEORY

Clinical manifestation, diagnosis, prevention and control of infectious diseases, namely mastitis, haemorrhagic septicaemia, brucellosis, tuberculosis, Jobne's disease. black quarter, tetanus, listeriosis, leptospirosis, campylobacteriosis, actinomycosis, actinobacillosis, enterotoxaemia, glanders, strangles, ulcerative lymphangitis, colibacillosis, fowl typhoid, putiorum disease, fowl cholera, avian mycoplasmosis, sppiroc~~ha~~eto~~sis~~, salmonellosis, swine erysipelas. Other important bacterial diseases of regional importance (e.g. contagious caprine pleuropneumonia, contagious bovine pleuropneuonia etc.). Bacterial diseases of bio terrorism Instance - anthrax, botulism etc Chlamydosis, Q fever, anaplasmosis, Dermatphillosis, aspergillosis (brooders pneumonia), candidiasis, histoplasmosis, sporotrichosis, coccidiodomycosis, mycotoxicosis, etc

SEMESTER VIII

VETERINARY CLINICAL MEDICINE -II
(METABOLIC & DEFICIENCY DISEASES)

VMD-421 **Credit Hour 2+0=2**

THEORY

Aetiology, clinical manifestations, diagnosis, differential diagnosis, treatment prevention and control of metabolic disorders/ production diseases. Milk fever, acute parturient hypocalcaemia in goats, sows and bitches, osteodystrophy fibrosa, lactation tetany in mares, downer cow syndrome, ketosis, hypomagnesaemia in cattle and buffalo, azoturia in equines, hypothyroidism and diabetes in dogs. Diagnosis and management of diseases caused by deficiency of iron, copper, cobalt zinc, manganese, selenium, calcium, phosphorus, magnesium, vitamin A, D, E, B. complex, K and C in domestic animals and poultry. Nutritional haemoglobinuria. Diseases of neonates. Diseases of skin, musculo-skeletal system, nervous system and sense organs of domestic animals. Management of common clinical poisonings. Rote of alternative/integrated/ethno veterinary medicine in animal disease management.

SEMESTER- VIII

VETERINARY PREVENTIVE MEDICINE-II
(VIRAL & PARASITIC DISEASES)

VMD-422 **Credit Hours 2+0=2**

THEORY

Clinical manifestation, diagnosis, prevention and control of infectious diseases, namely foot and mouth disease, rinderpest bovine viral diarrhoea, malignant catarrhal fever, Infectious bovine rhinotracheitis, enzootic bovine leucosis, ephemeral fever, blue tongue, sheep and goat pox, PPR, classical swine fever. Important exotic diseases for differential diagnosis - African swine fever, swine vesicular disease, vesicular stomatitis, Rift valley fever, Aujeezky's disease. Rabies, African horse sickness, equine influenza, equine infectious anaemia, equine rhinopneumonitis, canine distemper, Infectious canine hepatitis, canine parvoviral disease. Highly pathogenic avian influenza, Newcastle (Ranikhet) disease, Merek's disease. avian leucosis, Infectious bronchitis, infectious larynotracheitis, avian encaphalomyelitis, fowl pox, infectious bursal disease, Inclusion body hepatitis-hydropericardlum sypdrome. Other emerging and exotic viral diseases of global importance. Amphistomosis, fascioliosis, {Gastrointestinal nematodiasis, schistosomosis, echinococcosis, tapeworm infestations (cysticercosis), verminous broochitis, coeneurosis, trichomonosis, blood protozoan infections (trypanosomosis. theileriosis. babesiosis etc.). canine eperythrozoon infection, coccidiosis.

SEMESTER- IX

ANIMAL WELFARE, ETHICS AND JURISPRUDENCE

VMD-511 **Credit Hours 2+0=2**

THEORY

Definition of animal welfare and ethics. Human and animal welfare in relation to ecosystem and environmental factors. Role of veterinarians in animal welfare. Animal welfare organisations, Animal Welfare Board of India - their role, functions and current status. Rules, regulations, laws on animal welfare. 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. Protection and welfare of performing animals. Welfare of animals during transportation. Animal welfare in commercial livestock farming practices. Protection and welfare of working animate. Pet and companion animal welfare. Animal welfare during natural calamities and disaster management Legal duties of veterinarians, Forensic and State Medicine laws. Common offences against animals and laws related to these offences. Examination of living and dead animals in criminal cases. Cruelly to the animals and bestiality. Legal aspects of: Examination of animals for soundness, examination of Injuries and post-mortem examination. Causes of sudden death in animals. Collection and despatch of materials for chemical examination, detection of frauds-doping, alternation of description, bishoping etc. Cattle slaughter and evidence procedure in courts. Provincial and Central Acts relating to animals. Glanders and Farcy Act 1899 (13 of 1899). Dourine Act 1910 (5 of 1910), Laws relating to offences affecting Public Hearth. Laws relating to poisons and adulteration of drugs. Livestock Importation Act Evidence, liability and insurance. Code of Conduct and Ethics for veterinarians - the Regulations made under Indian Veterinary Council Act, 1984.

SEMESTER- IX

ZOO/WILD ANIMAL BREEDING, NUTRITION, MANAGEMENT AND HEALTH CARE

VMD-512 **Credit Hours 1+1=2**

THEORY

Taxonomy of various genera of wild/zoo animals of India along with their descriptions. Ethology of wild life species. Basic principles of habitat and housing of various classes of wild and zoo animals. Population dynamics of wild animals, effective population size of wild animals in captivity/zoo/natural habitats. Planned breeding of wild animals. Controlled breeding and assisted reproduction. Breeding for conservation of wild animals.

Feeding habits, feeds and feeding schedules of zoo animals. Nutrient requirements of wild animals, Diet formulation and feeding of various age groups, sick and geriatric animals.

Restrain, capture, handling, physical examination and transport of wild and zoo animals. Principles of anaesthesia, anaesthetics, chemicals of restraining, common surgical Interventions. Capture myopathy. 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. Acts and Rules related to Zoo and wild animals. National

and international organisations and institutions interlinked to wild and zoo animals - rote and functioning.

PRACTICAL

Visit of nearby wild life sanctuary/zoo/wild animal centres to study the care and management, restraint, examinations, administration of medicines etc. in zoo animals. To study the housing, feeds and feeding schedule of zoo animals.

To study the implementation of various Acts and Rules related to Zoo animals care and management Post mortem examination of wild and zoo animals. Handling, processing and interpretation of pathological materials from zoo and wild animals. Attending to common surgical interventions on zoo and wild animals.

Planning for balanced feeding. Diet charts, preparation of balanced diet for new bone, growing and sick animals as oral and intravenous feeds. Preparation of modified diet under selected conditions. Hygienic preparation, preservation and storage of foods.

(This course shall be taught jointly with the Departments of Livestock Production Management, Animal Nutrition, Animal Genetics and Breeding, Veterinary Pathology, and Veterinary Surgery and Radiology)

SEMESTER- IX

PET/ ANIMAL BREEDING, MANAGEMENT, NUTRITION AND HEALTH CARE

VMD- 513 **Credit Hours 1+1= 2**

THEORY

Breeds of dogs- international pedigree breeds and those commonly seen in India. Pedigree sheet and major breed traits. Detection of oestrus and Breeding of dogs. Selecting a breed to keep, selection of a pup.

Feeding of dogs- nutritional requirements of important breeds and different age groups. Management of dogs-kennels, care of pups and pregnant bitch. Dog shows- preparation for the shows, kennel clubs, important characters for judgment. Whelping. Utility of dogs- guarding, defense, patrolling, riot control, scouting, espionage, mine detection, tracking, guiding, hunting, races, retrieving, rescue, and other uses. Principles of training of dogs.

Common diseases affecting dogs (bacterial, viral, parasitic, fungal, nutritional etc.) - their clinical manifestations, diagnosis, treatment and control. Vaccination/ deworming schedules. Common surgical interventions in dogs- docking, ear cropping, nail cutting, sterilization. Common anaesthetics and anaesthesia in dogs.

Common breeds of cats, their habits, feeding, breeding and management. Common diseases of cats-their diagnosis, treatment and control. Common surgical interventions in cat.

Common pet birds seen in India. Introduction to their caging, breeding, feeding, management, disease control and prevention.

PRACTICAL

Recognising various breeds. Handling of dogs. Types and use of leads and collars. Brushing/grooming and bathing of dogs. Restraining of dogs for examination/medication.

Detection of oestrus, mating, whelping (through demonstration). Care of pups, weaning, administration of medicine. Nail and tooth care, clipping of hairs for show purposes. Hygiene of kennel/pens, feeding utensils. Visit to dog show. Vaccination and surgical interventions (nail clipping, docking, sterilization).
Common breeds of cats, handling, restraint, examination, medication and surgical intervention in cats and kittens.
Identification of common pet birds. Handling of pet birds, their examination and administration of medicines.
(This course shall be offered jointly by the Departments of Veterinary Medicine, Livestock Production Management, Animal Nutrition. Animal Genetics and Breeding. Veterinary Pathology, and Veterinary Surgery and Radiology).

REFERENCE BOOKS

1. Radostitis, O.M., Gay, C.C., Blood, D.C. and Hinchcliff, K.W. 2000. *Veterinary Medicine.* A textbook of the disease of Cattle, Sheep, Pigs, Goats and Horses.IX edn. Book Power – WB Saunders, London, U.K.
2. Geo. F. Boddie. 2000. Diagnostic Methods in Veterinary Medicine.5th edn.Greenworld Publishers, Lucknow.
3. Craig. E. Greene. 1998. Infectious Diseases of the Dog and Cat.2nd edn. W.B. Saunders Company, London, U.K
4. Ettinger, S. J and Feldman E.C .2000. Textboob of Veterinary Internal Medicine.5th Edn. Vol1. W.B. Saunders, London,U.K
5. Amalendu chakrabarti. 1988. A textbook of Preventive Veterinary Medicine. Kalyani Publishers,New Delhi.

DEPARTMENT OF VETERINARY & ANIMAL HUSBANDRY EXTENSION EDUCATION

SEMESTER- V

PRINCIPLES AND TECHNIQUES OF VETERINARY AND ANIMAL HUSBANDRY EXTENSION

VAE- 311 **Credit Hours 2+1=3**

THEORY

Concept of Sociology. Wan-animal relationship (Society. Community, Association, institutions). Difference in livestock production practices of rural, urban and tribal communities including rearing patterns. Social change and factors of change. Social groups, its types and functions. Social transformation in relation to animal rearing.
Evolution of veterinary and animal husbandry extension in India. Extension education: definition, philosophy and principles. Concept of Community development Teaching learning process, steps of teaching. Extension teaching methods; their classification and use. Information delivery system in Veterinary and Animal Husbandry extension. Information communication technology.
Role of animals in economy, health and socio-psychology of rural, semi urban and urban society. Client and stakeholder dealings: techniques and procedures including tools for data

collection, analysis, history taking, follow-up and appraisal on prognosis. Adoption and diffusion of livestock innovations. Leadership and role of leaders in animal husbandry extension.

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

Information communication technologies. Virtual .class room and self learning. E-learning. Information kiosks. Agriculture portals. E-commerce- scope and local application. Computer aided teaching/learning, web-sites dedicated to veterinary and animal sciences education, web directories and virtual learning institutions (e-institutions).

PRACTICAL

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

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

REFERENCE BOOKS

1. **Adams, M. E.** 1982. Agricultural Extension in developing countries. ELBS with Longman & Scientific and Technical , Essex, England

2. **Falvey, L and Chantalakhana, C.** (eds).1999. Small Holder Dairying in the Tropics, ILRI (International Livestock Research Institute), Nairobi, Kenya

3. **Jerving, C.** 1996. Managing a Veterinary Practice. W. B. Saunders Company Ltd. London

4. **Kulandaiswamy, V.** 1986. Co-operative Dairying in India. Rainbow Publications, Coimbatore.

5. **Oakley, P and Garforth, C.** 1985. Guide to Extension Training. FAO of the United Nations, Rome

6. **Ramkumar, S., Garforth, C., Rao S.V.N. and Waldie, K (**eds).2001. Landless Livestock Farming : Problems and prospects. *Proceedings of the Workshop* held on 29 January 2001, RAGACOVAS, Pondicherry

7. **Sandhu, A.S.**1993. Textbook on Agricultural Communication : Process and methods. Oxford and IBH Publishing Co. Pvt. Ltd.

8. **Sastry, N.S.R, Reddy, D.P.R. and Hermon,R.R.** 1993. Planning for Development of Animal Husbandry Sector. National Institute of Rural Development, Hyderabad

9. **Sastry, N. S. R** and **Thomas, C. K**. 2005. Livestock Production Management, Kalyanai Publishers, Ludhiana: Chapters on " *Extension and livestock development, Livestock Extension, Participatory and Rapid Rural Appraisal*"

10. **Swanson, B.E.** (ed)**,** 1993. Agricultural Extension- A Reference Manual. FAO of The United Nations, Rome

11. **Van den Ban A. W & Hawkins. H. S**. 1996. Agricultural Extension. Blackwell Sciences, Oxford.

12. **Waldie,K. and Ramkumar. S.** 2002. Landless women and dairying: the opportunities for development within a poverty perspective".RAGACOVAS, Pondicherry

13. **Chitambar, J.B** (1993). Introductory Rural Sociology.

14. **Kuppuswamy,B**. (1994). Social Change in India

15. **Indian Society of Agricultural Economics** (1989). Livestock Economy of India.

16. **Dahama, O.P & O.P.Bhatnagar** (1994). Education and Communication for development.

17. **Hans Raj** (1992). Theory and Practice in Social Research.

18. **Directorate of Extn. Govt. of India** (1961). Extension Education in Community development

SEMESTER- VI

LIVESTOCK ECONOMICS, MARKETING AND BUSINESS MANAGEMENT

VAE-321 **Credit Hours 2+1=3**

THEORY

Economics:

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

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

Marketing:

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

Resource Management- Organizational aspects of livestock farms, sources and procurement of inputs and financial resources. Break- even - analysis. Personnel (Labour) Management- Identification of work and work (job) analysis/division of labour.

Accounting:

Definition, objectives, common terms. Different systems of book keeping- single and double entry system. Various types of account books including books of original entry. Classification

of accounts and rules of debit and credit Recording of business transactions. Analysis of financial accounts- income and expenditure accounts, trading account, profit and loss accounts.

PRACTICAL

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

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

REFERENCE BOOKS

1. **Acharya, S. S & Agarwal N.L** (1994) Agriculture marketing in India, Oxford.

2. **Johl, S. S.& Kapur, T.R.** (2005) Fundamentals of farm business management

3. **Indian Society** (1989) Livestock Economy of India Agricultural Economics: Oxford and IBH Publications

4. **Sadhu & Singh** (1989) Fundamentals of Agricultural Economics: Himalaya Publishing House.

5. **Singh, G.N. Singh .D.S & Ram Iqbal Singh** (1987) Agricultural Marketing in India: Chugh Publications

6. **Maheswari & Maheswari** (1993) Advanced Accountancy 5th ed. Volume –I

7. **Seth. M.L.** (1994) Micro Economics 12th Ed.

8. **Dewitt, K.K**. (1984) Modern Economic Theory 21st Edition.
9. **James, A.F.Stoner & Charles Wankel** (1988) Management 3rd Edition

SEMESTER- IX

LIVESTOCK ENTREPRENEURSHIP

VAE-511 **Credit Hours 1+0=1**

THEORY

Livestock Entrepreneurship. Avenues of entrepreneurship/employment in private and public sectors. Key concepts and theories of self-employment and entrepreneurship. Essential criteria for development of entrepreneurship in livestock sector - basic requirements for entrepreneurship initiatives in livestock and allied sectors (i.e. techno economic feasibity of the enterprises under different conditions, training and management skills, business acumen,

business communication, inter-personnel skills for establishing an enterprise, etc.). Entrepreneurial training/development programmes at the State and National level. Animal Insurance. Bank support for entrepreneurship. Financial credit and financial management-general Principles and practices, analysing project appraisals and reports, capital, expenditure decisions, reinvestment and payback. Preparing projects for bank appraisal, banking requirements. Assessing project profits. Procurement management quality issues, standardisation, grading and packaging. Marketing channels. Retail marketing, sales operations and management advertising, marketing of services. Expectations from a Veterinary professional. Eco-jobs and sustainable development through livestock. Approach to preparation of Entrepreneurial Project on livestock.

REFERENCE BOOKS

1. **Alan ,L. Carsrnd & Malin ,E. Brannback** (2007) Entrepreneurship : Greenwood Publishing group

2. **Peter Ducker** Innovation and Entrepreneurship : Harper Bus. Publisher.

3. **Null** Successful Entrepreneurs Guide book: Manotar Publishers

4. Entrepreneur Starter Kit six cds : Coach series

5. **Miner John, B.** The 4 steps to Entrepreneurial success: Berett – ICO

6. **Birley Sre** Masteries Entrepreneurship, Financial Publishers

TEACHING VETERINARY CLINICAL COMPLEX (TVCC)

A. VETERINARY CLINICAL PRACTICE

VCP-411(Semester-VII) Credit Hour- 0+5=5

VCP-421(Semester-VIII) Credit Hour- 0+5=5

VCP-511 (Semester-IX) Credit Hour- 0+5=5

Total: 15

The students shall be Imparted the trainings on rotation basis in the following sections of Teaching Veterinary Clinical Complex (TVCC):

1. **Ambulatory Section:**

Handling, examination, diagnosis and treatment of sick animals under field conditions under the supervision of faculty designated for Ambulatory Clinical activity. Ambulatory Clinics shall be operated by small groups of students and faculty through an equipped mobile unit in which the departments of Veterinary Medicine, Veterinary Gynaecology and Obstetrics and Veterinary Surgery and Radiology shall be involved.

2. Diagnostic Laboratory Section:

The Clinical Diagnosis Laboratory will form an important component of Teaching Veterinary Clinical Complex. The Diagnostic Laboratory will impart training to groups of students for laboratory evaluation and interpretation of clinical samples leading to diagnosis/comparative diagnosis of diseases. This activity will involve training in examining clinical samples (biochemical, toxicological, pathological, parasitological and bacteriological) at the clinical complex, analyzing and correlating with clinical findings and interpreting the results.
Note: The Laboratory shad be run in collaboration with the Department of Pathology.

3. Medicine Section:

Orientation to Veterinary Clinics including hospital set up, administration and functioning. Methods of record keeping. Retrieval, processing, analysis and interpretation of data. Hospital management involving out patient department (OPD), Indoor patient, Critical care/intensive care unit, sanitation, up keeping, practice management etc. Doctor client interaction: Orientation to local language/dialect/ local terminology of the diseases.
Registration, filling up registration cards, history taking. Relating generic and trade names of drugs along with their doses, indications and contraindications to prescribed treatment regimens. Familiarization and practice of first aid procedures and emergency medicine. Practice of collection, labeling, packaging and evaluation of laboratory samples.
Clinical practice comprising of clinical examination of the patient, with emphasis on history taking, examination techniques- palpation, percussion and auscultation, systematic examination of various systems, recording of clinical observations viz. temperature, respiration, pulse, cardiac sounds, cardiac
function, pulmonary function, functional motility of digestive system, routes and techniques of administration of medicaments. Diagnosis and treatment of common clinical cases like pharyngitis, laryngitis, stomatitis, indigestion, ruminal impaction, tympany, enteritis, traumatic reticulo-peritonitis, traumatic pericarditis, pneumonia, haemoglobinurea. haematuria. milk fever, ketosis, rickets, osteomalacia, common poisoning, and others.
Collection of materials like urine, faeces, skin scraping, blood, milk and other body fluids for laboratory tests. Preparation of case records; follow-up records etc. Treatment of causalities and other emergencies. Screening of livestock/poulty through tests, mass diagnostic campaigns. Vaccination and other disease prevention and control programmes in the field.
Practice of feeding of sick animals. Acts and regulations pertaining to generation and disposal of biomedical wastes in veterinary institutions. Biomedical waste generation, handling, storage, sorting, coding, transportation and disposal. Hazards of biomedical waste, and impact of biomedical waste on the environment.

4. Gynecology & Obstetrics Section:

Practice of pregnancy diagnosis, examination of cases of anoestrus, silent oestrus and conception failure. Treatment of cases of metritis, cervicitis and vaginits. Handling of case of retention of placenta. Management of Ante and post partum prolapse of vagina. Examination and preliminary handling of dystocia cases, faetotomy, caesarian . operation Castration of male carves. Breeding soundness evaluation of bulls. Collection of cervical and vaginal mucus for cytology. Rectal examination of genitalia, vaginal examination. Familiarization

with common drugs & hormones used in reproductive disorders, epidural and local anaesthesia for gynaecological cases. Filling of clinical case records and their maintenance.

5. **Surgery & Radiology Section:**

Familiarization with equipments used in different sections of the Hospital. Restraining and positioning of different species of animals for examinations, diagnosis and surgical treatment Prescription of common drugs, their doses and uses in clinical surgical practice. Filling of clinical case records and their maintenance. Preparation of surgical packs, sterilization procedures for surgical instruments, drapes, operation theaters. Passing oi' stomach tube and gastric tube. Catheterization and urine collection.

Techniques of examination of neuromuscular and skeletal functions, Familiarisation with antiseptic dressing techniques, bandaging, abdomino-centesis, thoracocentesis. Topography anatomy of Cattle, Horse and Dog. Radiographic positioning and terminology.

Treatment and Management of inflammation, wounds, abscess, cysts, tumors, hernia, haematoma hemorrhage, sinus, fistula, necrosis, gangrene, bum, sprain and tendinits. First aid in fractures and dislocations and other affections of joints, facial paralysis, Eye worm & other minor affections of Eye. irregular teeth and their rasping, tail amputation, knuckling, upward fixation of patella (medical patellar desmotomy) etc.

Familiarisation with the landmarks for the approach to various visceral organs, thoraco-centesis, abdominocentesis. Laparotomy, palpation and visualisation of viscera. Urethrotomy, castration, vasectomy, caudectomy, ovaiio-hysterectomy, thoracotomy, cystotomy, cystorraphy and spleenectomy. Examination of horse for soundness and preparation of certificate for soundness. Tenotomies, suturing of tendon, shortening of tendon.

Note: The skills required for the Comprehensive Examination of Core Competence to be held for the purpose of assessment/evaluation of Internship shall be imparted under these courses.

SEMESTER- VII

VETERINARY CLINICAL BIOCHEMSITRY AND LABORATORY DIAGNOSIS –I

B. 1. VLD-411 **Credit Hours 0+1 = 1**

Training in examining clinical samples (biochemical, pathological, parasitological and bacteriological). Analysing and correlating with clinical findings and interpreting the results. Collection, labeling, transportation, and preservation of body fluid samples. Writing results and report Interpretation of date in relation to specific diseases.

Clinical significance and interpretation of serum glucose, lipids, proteins, blood urea nitrogen, creatinine, uric acid, ketone bodies, bilirubin & 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 leococytjc count) from clinical samples. Laboratory evaluation and diagnosis of samples for parasitic diseases (routine faecal examinations- direct smear method, simple sedimentation and floatation methods, Quantitative faecal examination, pastoral larval counts). Examination of skin scrapings, examination of blood smear/blood for diagnosis of blood protozoan diseases.

SEMESTER VIII

VETERINARY CLINICAL BIOCHEMISTRY AND LABORATORY DIAGNOSIS-II

B. 2. VLD-421 Credit Hours 0+1=1

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 / organ affections.

Preparation of microscopic slides from tissue collected for diagnosis and its' histopathological interpretation. Examination of biopsy and morbid material for laboratory diagnosis, 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 cultoral/btochemical characteristics. Drug sensitivity and rationale for therapy. Diagnosis of diseases by employing tests like Agar Gel precipitation Test Enzyme linked immunosorbent assay. Dot immunoassay, tube agglutination test, slide agglutination tests etc.

Practice for separation of toxic materials from samples. Detection of arsenic, lead, antimony, mercury, copper, zinc, fluorides. Nitrates/nitrites cyanides and tannins in body fluids/tissues of animals. Evaluation of samples of toxic residues. Appreciation and differentiation of symptoms caused by various types of toxic materials including agrochemicals plants and drugs.

SEMESTER- VIII

VETERINARIAN IN SOCIETY

C. TVC-421 Non-Credit Course: 1 +0=1

Man-Animal and Society. Social - ecological Interactions in animal rearing. Client oriented approach to physical examination of animals. Concepts in interaction with animal owner/clients. Bio-medical ethics and clinical evaluation. Communication skills. Anima/owner information management Human-animal bonds. Hearth maintenance in individual animals and population. Veterinary public health as component of society. Professional development Societal responsibilities of veterinarians. Societal responsibilities with respect to Private and Public Hospital and practice management Social conduct and personality profiles in management of clinical practice. Veterinary professional interactions with Health Authorities, Drug and Food Regulatory Authorities, Zoo/Animal Welfare organisations and Civil Administration. Role of Veterinarian in Natural Calamities and Disaster Management.

SEMESTER- III and IV

D. INSTRUCTIONAL LIVESTOCK FARM COMPLEX

Non-Credit Course: (0+1)X2=2 Credits
LFP- 21 l and LFP-221

Hands on training of the students on the overall farm practices of livestock management including cleaning, feeding, watering, grooming, milking, routine health care, record keeping, sanitation, housing, fodder production.

These courses shall be non-credit courses and the performance of students shall be assessed and recorded as grades: A- Excellent, B- Good, C- Average and recorded on the Degree Transcript

PART VII
MINIMUM STANDARDS OF VETERINARY EDUCATION - MINIMUM STANDARD REQUIREMENTS FOR A VETERINARY COLLEGE FOR 60 ADMISSIONS ANNUALLY

I. Departments
II. Accommodation in the Veterinary College and its associated teaching hospital/farms:
III. Staff, teaching, technical
IV. Equipment in the College departments and the hospitals

I. DEPARTMENTS: Each Veterinary College shall have the following Departments, Teaching Veterinary Clinical Complex and Instructional Livestock Farm Complex under the administrative control of the Dean/Principal/Associate Dean.

(1) Veterinary Anatomy
(2) Veterinary Physiology and Biochemistry
(3) Veterinary Pharmacology and Toxicology
(4) Veterinary Parasitology
(5) Veterinary Microbiology
(6) Veterinary Pathology
(7) Veterinary Public Health and Epidemiology
(8) Animal Nutrition
(9) Animal Genetics and Breeding
(10) Livestock Production Management
(11) Livestock Products Technology
(12) Veterinary Gynaecology and Obstetrics
(13) Veterinary Surgery and Radiology
(14) Veterinary Medicine
(15) Veterinary and Animal Husbandry Extension Education
(16) Teaching Veterinary Clinical Complex
(17) Instructional Livestock Farm Complex

II. ACCOMMODATION:

2. Common facilities

1. Every Veterinary College shall have its own building and land for running various departments with an attached Teaching Veterinary Clinical Complex (TVCC), Instructional Livestock Farm Complex (ILFC), College Library, Central Instrumentation Facility (CIF), a disease investigation unit and post mortem facility at an accessible distance.

2. The TVCC shall also have well equipped outdoor and indoor patient sections and client
accommodation facilities. The complex shall have medical, surgical, Gynecological, diagnostic and ambulatory clinical sections. The ILFC shall have Livestock Units and infrastructure for maintenance of livestock, animals of different species, storage facilities for feed and fodder and fodder production area.

3. In addition to the accommodation mentioned above the College building complex shall provide the following:

(i) Dean/Principal's office room with attached toilet room and retiring room 300sq.ft.
(ii) Visitor's room. 300 sq.ft.
(iii) Committee room. 600 sq.ft.
(iv) Office room accommodating office staff of General, Academic (Admission & Examination), Accounts and Establishment Sections. 1000sq.ft.
(v) Central store room.
(vi) Personal Staff room with attached toilet facilities 300 sq.ft.
(vii) Toilet facilities for visitors and office staff
(viii) Record room
(ix) Typing, Duplicating and Photocopying facilities
(x) Canteen.
(xi) Library with reading room and arrangement for staff and students with adequate seating accommodation. The Library at the College level should be provided with adequate books/journals/periodicals; reprographic and duplication facilities; internet connectivity and manpower (at least one Assistant Librarian with supporting staff) in case the College is located away from the university/centralized library.
(xii) A Conference hall with facility for visual demonstrations and projections.
(xiii) Seminar Room of 40-60 capacity.
(xiv) Five lecture halls each with a seating capacity for 60 to 100 students with the facilities of audio-visual aids
(xv) Examination Hall(s)
(xvi) Toilets (Gents & Ladies)
(xvii) Drinking water facility
(xviii) College auditorium
(xix) Play grounds with games and sports facilities including indoor games facilities.
(xx) Hostels for boys and girls (including Interns) with common room, mess etc.
(xxi) Animal houses for small, large, laboratory animals and poultry as per need.
(xxii) Instructional livestock and poultry farms.
(xxiii) Central Computer lab.

(xxiv) Central College Diagnostic lab.
(xxv) Microphotography and processing unit
(xxvi) Transport faculties including bus, minibus, staff car, ambulatory van & mobile diagnostic unit.
(xxvii) Artificial Insemination Centre
(xxviii) Health Unit for student & staff
(xxix) Cold room facility

NOTE:- These are minimum general requirements for Veterinary Institution imparting education leading to B.V.Sc. & A.H. degree. However, Institution/colleges having additional departments; special infra structural and academic facilities would be encouraged to enlist them as desirable facilities keeping in view the demands and advances in the discipline/ sub-discipline concerned.

4.	General accommodation facilities to be provided in each departments/units	
(i)	Chamber of HOD	200 sq.ft.
(ii)	Office for the each teaching staff	100 sq.ft.
(iii)	Office of the department	200 sq.ft.
(iv)	Store	150 sq.ft.

(1) VETERINARY ANATOMY

(i)	Osteology and Arthrotogy lab. Attached store for bone sets (There should be separate provision for macerating and cleaning bones).	900 sq.ft.
(ii)	Dissection hall (There should be provision for Cold room, Embalming Room, Cadaver room, Tanks, washing tubs for cadaver. Fly proofing and cooling facility should be ensured (when temp, is beyond 20° C)	1200 sq.ft.
(iii)	(a) Histology and Embryology lab.	900 sq.ft.
	(b) Tissue preparation room	200 sq.ft.
(iv)	Museum	200 sq.ft.

(2) VETERINARY PHYSIOLOGY & BIOCHEMISTRY

(i)	Facilities at TVCC shall be utilized	
(ii)	Physiology lab	900 sq.ft
(iii)	Biochemistry lab	900 sq.ft
(iv)	Biotechnology lab	900 sq.ft
(v)	Analytic equipment and maintenance laboratory	600 sq.ft

(3) VETERINARY PHARMACOLOGY AND TOXICOLOGY

(i)	Experimental Pharmacology Lab	900 sq.ft.
(ii)	Pharmacology and Toxicology Lab	900 sq.ft.

(4) VETERINARY PARASITOLOGY

(i)	Helminthology Lab cum Museum	900 sq.ft
(ii)	Entomology & Protozoology lab	900 sq.ft

(5) VETERINARY MICROBIOLOGY

(i)	Bacteriology and Mycology lab.	900 sq.ft
(ii)	Virology lab. (with tissue culture lab., egg inoculation booth, air conditioned)	200 sq.ft.
(iii)	Veterinary Immunology lab.	600 sq.ft.
(iv)	Sterilisation room	200 sq. ft.
(v)	Cleaning and washing room	100 sq. ft
(vi)	Media and preparation room	100 sq. ft.

(6) VETERINARY PATHOLOGY

(i)	Histopathology lab	900 sq.ft.
(ii)	Clinical Pathology lab	900 sq.ft
(iii)	Tissue processing facility	600 sq.ft
(iv)	Museum	1200 sq.ft
(v)	Post -mortem room for large animals and poultry With carcass and other waste disposal facilities with floor area at an accessible distance.	1200 sq.ft

(7) VETERINARY PUBLIC HEALTH & EPIDEMIOLOGY

(i)	Zoonoses- cum- Epidemiology lab	600 sq.ft
(ii)	Milk Hygiene Lab	600 sq.ft
(iii)	Meat Hygiene Lab	600 sq.ft

(8) ANIMAL NUTRITION

(i)	Feed processing and mixing plant (desirable)	
(ii)	Feed/fodder analysts and Energy Metabolism laboratory	1200 sq.ft
(iii)	Metabolic stall / Boxes (desirable)	

Note: Feed Mixing. Hay and silage preparation etc. for the farm will be undertaken through this Department

(9) ANIMAL GENETICS AND BREEDING

1)	U.G. Lab with Computer and statistical analysis facilities	1200 sq.ft
2)	U.G. Laboratory	900 sq.ft

(10) LIVESTOCK PRODUCTION MANAGEMENT

(i)	Handling room (amphitheatre type)	1200 sq. ft.
(ii)	Museum for breed charts, animal house and housing material models-cum-U.G. Lab.	1200 sq. ft.

(11) LIVESTOCK PRODUCTS TECHNOLOGY

(i)	*Slaughtering-Unit with carcass utilization and waste management unit.	
(a)	Mini slaughter house for 5 to 10 animals of sheep/goat and pig (if relevant) sections with ante-mortem room, pre-slaughter wash, fly proofing, slanted platform, blood collections, skin treatment, offal collection and disposal etc. (preferably with a waste/dung gas unit).	
(b)	Poultry slaughter unit for 50 to 100 birds.	
(ii)	Meat processing and examination lab	1200 sq.ft.
(iii)	Dairy technology lab	1200 sq. ft
(iv)	Cold storage, product store; (sale section**)	300 sq. ft.

* Would serve Veterinary Public Health Dept. also. ** Desirable

(12) VETERINARY GYNAECOLOGY AND OBSTETRICS

(i)	Semen/Androtogy tab	900 sq. ft
(ii)	Museum- cum-Phantom hall and palpation room	
(iii)	Artificial Insemination Centre with semen storage and trevis facility.	

(13) VETERINARY SURGERY AND RADIOLOGY

(i)	Practice hall for training in anaesthesia and operation theatre routines, X Ray and Imaging Facilities.	900 sq.ft
(ii)	Small animal operation theatre (practical) with preparation room.	600 sq.ft
(iii)	Large animal operation theatre cum preparation room	1200 sq.ft
(iv)	Sterilisation, instrument and surdry room.	400 sq ft

(14) VETERINARY MEDICINE

(i)	Clinical Medicine Lab	600 sq.ft
(ii)	Preventive Medicine/ Disease Investigation Lab	600 sq.ft
(iii)	Mobile Diagnostic lab (Part of TVCC)	200 sq.ft
(iv)	Museum cum projection room	600 sq.ft

(15) VETERINARY AND ANIMAL HUSBANDRY EXTENSION EDUCATION

(Being a department engaged in public relation, livestock Centre at the entrance/in front of the college)

(i)	Audio-visual technology laboratory	600 sq.ft

(ii)	Photography-cum-graphic unit, projection unit etc.	600 sq.ft
(iii)	Group discussion chambers/mini seminar room	600 sq.ft
(iv)	Museum-cum-live-stock advisory unit	600 sq.ft

(16) TEACHING VETERINARY CLINICAL COMPLEX (TVCC)

NOTE: This is the unit from where the following departments will be operating their training and services. The departments of Veterinary Medicine, Veterinary Surgery and Radiology, Veterinary Gynaecology and Obstetrics, the departments of Veterinary Pathology, Veterinary Microbiology, Veterinary Parasitology and Veterinary Physiology and Biochemistry will also help in providing their services to the TVCC for the respective courses/services.

(i) Reception
- a. Waiting hall for large animals.
- b. Waiting hall for small animals.
- c. Registration counter/record room
- d. Dispensary, drug store etc.

(ii) Animal examination section - fitted with chutes
- a. Large animals
  - I. Medical unit
  - II. Surgical unit
  - III. Gynaecology unit
- b. Small animal (same as above with animal examination table)

(iii) Operation theatre:
(a) Equine surgery
(b) Bovine surgery (standard surgery) with surgical chute (Uthrecht pattern preferable)
Bovine surgery (standing surgery) with surgical chute (Uthrecht pattern preferable)

(iv) Infectious and contagious disease wards.
(a) Rabies ward
(b) Equine isolation ward
(c) Bovine isolation ward
(d) Skin ward.

(v) Recovery room for large animals, slings, hoist head protectors, hobbles, twitch, blinkers etc

(vi) Intensive- care unit for small animal.

(vii) Veterinary Diagnostic laboratory with the facilities for activities of 4 departments viz. Veterinary Pathology, Veterinary Microbiology, Veterinary Parasitology, and Veterinary Physiology and Biochemistry

(viii) Indoor ward along with client/farmers room (separate for large and small animal owners).

(ix) Ambulatory unit (complete with diagnostic and therapeutic equipments).

(x) Animal transport facility (desirable)

(xi) Night duty section with facilities for, technicians, residents and students rooms and vehicle to transport doctors during emergencies
(xii) Residential accommodation for staff of clinical departments and specialized services
xiii) Dark room film room interpretation room
(xiv) Physiotherapy room
(xv) Loading and unloading platform

(17) INSTRUCTIONAL LIVESTOCK FARM COMPLEX (ILFC)

Note : This Unit of Veterinary College shall provide the services of teaching in rearing of livestock species including poultry with the facilities of housing, feeding, breeding and management of large and small ruminant units, piggery, poultry and animals of regional interest record keeping ; storage facilities for feed and fodder; production facilities for fodder crops; suitable housing for managerial and technical staff.

All the concerned staff on duty in this Unit shall be responsible for management including emergencies of me animals in the Livestock Farm. They shall arrange and supervise the routine managemental practices from time to time and shall maintain records for the same. They shall also be responsible for production activity in each of the units and these animals shall be utilized as instructional farms for student teaching.

ILFC shall have the following farm units/land for fodder production:

A. Animal Production Management

(i) Handling Room (Amphitheatre type) 1200 sq. ft.
ii) Cattle and buffalo farm of 50 animals with followers
iii) Sheep and Goat farm having 50-100 animals each
iv) Piggery farm with 50-100 stock (where relevant)
v) Horse (if there is no remount Veterinary Core Unit at least two horses be made available for teaching/training. Camel/Yak (optional).
vi) Rabbitary (optional)
vii) Fodder production and grassland management facility.

B. Avian Production Management

i) Poultry farm (as per need)
ii) Models of various systems, Pens, Cages, Runs, Equipment etc.
iii) Sample stock of various breeds of poultry and other avians,
iv) Hatchery and chick pens.
v) Brooders.

C. Fish Production Management

i) Fish ponds
ii) Hatchery

D. Fodder Production Management

i) 25-50 acres of land sufficient to meet the requirement for fodder for the ILFC
ii) The housing should be as per Animal welfare requirements. All animals reared exclusively for the conduct of practical be stationed and managed in a separate section.
iii) Farm data room taking care of pedigree charts, stud books and other farm biodata, farm account on income and other farm expenditure, balance sheets etc. shall be available as teaching material, preferably in computer terminals/floppy.

III. STAFF:

1. General Remarks:

a) Emphasis of veterinary education being on practical, instruction and demonstration must be carried out in small groups of 5-10 students: the number of teachers must be adequate for such instructions to be carried out effectively.

b) The teaching staff of the departments in a veterinary college shall be whole- time teachers.

c) The number of teachers shown below is the minimum/critical number in each Department for imparting undergraduate teaching leading to B.V.Sc & A.H.degree. The departments having extension & other services attached, shall have additional faculty members.

d) To ensure exposure of under-graduate students to experienced teachers, it is essential to provide adequate number of senior posts (Professor, Associate Professor/Reader) in every department. No department shall function without at least one Professor.

e) In view of acute shortage of faculty members in different veterinary colleges as well as the situation anticipated to prevail for some more time, it is suggested/recommended that in order to overcome the situation, meritorious persons possessing BV.Sc &A.H. degree may be recruited as Teaching Associate/Assistant/Demonstrator as stop-gap arrangement However, such arrangements should be restricted to a maximum of one person in each department for a maximum period of five years within which the faculty positions prescribed in these Regulations should be filled up.

2. Positions

(A) **Dean's Office*****
(i) The Dean
(ii) Administrative Assistant/A.A.O.
(iii) P.A./P.S
(rv) Academic section staff (admission, examination, Record)
(v) Account section staff

(vi) Purchase & Store section staff
(vii) Typing, duplicating/photocopier staff

*** The institutions may provide the requisite office staff as per norms of the state/territory, needed for efficient working. The positions like driver, gardener, mechanic, instrumentation technicians etc. must be included as per need and as per norms for the purpose.

(B) **Departments**

Minimum secretarial/supportive/account staff should be made available to each Department/Unit in a Veterinary College as per workload and tor smooth independent functioning.

(1) VETERINARY ANATOMY

i.	Professor	1
ii.	Associate Professor	1
Hi.	Assistant Professor	2
iv.	Curator cum museum/specimen technicians	1
v.	Laboratory technicians	1
vi.	Laboratory assistant/Attendants	2
vii.	Animal attendant-cum-macerator/embalmer	2
viii.	Sweeper-cum-Attendant	1

(2) VETERINARY PHYSIOLOGY & BIOCHEMISTRY

i.	Professor	1
ii.	Associate Professor (1- Physiology, 1-Biochemsitry)	2
iii.	Assistant Professor (2-Physiology, 2-Biochemistry)	4
iv.	Laboratory technicians	2
v.	Laboratory Assistant/Attendants	3
vi.	Animal attendant	1
VII.	Sweeper-cum-attendant	1

Staff for clinical and service jobs has to be added as per work load and nature of work.

(3) VETERINARY PHARMACOLOGY AND TOXICOLOGY

i)	Professor	1
ii)	Associate Professor	1
iii)	Assistant Professor	2
rv)	Laboratory technicians	2
v)	Laboratory assistant/Attendants	2
vi)	Animal attendant	1
vii)	Sweeper-cum-attendant	1

Staff for toxicological work/service has to be added as per work load and nature of work.

(4) VETERINARY PARASITOLOGY

i.	Professor	1
ii.	Associate Professor	1
iii.	Assistant Professor	2

iv.	Laboratory technicians	2
v.	Laboratory assistant/Attendants	2
vi.	Animal attendant	1
vii.	Sweeper-cum-attendant	1

viii. Staff for conical jobs has to be added as per work load and nature of work.

(5) VETERINARY MICROBIOLOGY

i.	Professor	1
ii.	Associate Professor	1
iii.	Assistant Professor	2
JV.	Laboratory technicians	2
v.	Laboratory assistant/Attendants	2
vi.	Animal attendant	2
vii.	Sweeper-cum-attendant	1

6) VETERINARY PATHOLOGY

i)	Professor	1
ii)	Associate Professor	2
iii)	Assistant Professor	3
iv)	Laboratory technicians/Specimen Curator	2
v)	Laboratory assistant/Attendants	2
vi)	Post Mortem/Animal attendant	2
vii)	Sweeper-cum-attendant	1
viii)	Staff for clinical and Post Mortem jobs has to be added as work load and nature of work.	

(7) VETERINARY PUBLIC HEALTH AND EPIDEMIOLOGY

i.	Professor	1
ii.	Associate Professor	1
iii.	Assistant Professor	2
iv.	Laboratory technicians	2
v.	Laboratory assistant/Attendants	2
vi.	Animal attendant	1
vii.	Sweeper-cum-attendant	1

(8) ANIMAL NUTRITION

i.	Professor	1
ii.	Associate Professor	1
iii.	Assistant Professor	2
iv.	Laboratory technicians	2
v.	Laboratory assistant/Attendants	1
vi.	Animal attendant	3
vii.	Sweeper-cum-attendant	1
viii	Machine operators/feed plant technicians (as per need)	
ix	Staff for Consultancy/feed analysis jobs has to be added as per work load and nature of work	

(9) ANIMAL GENETICS AND BREEDING

i.	Professor	1
ii.	Associate Professor	1
iii.	Assistant Professor	2
iv.	Computer Programmer	1
v.	Laboratory technicians	1
vi.	Laboratory assistant/Attendants	1
vii.	Data and Console Operator	1
viii.	Sweeper-cum-attendant	1
	Staff needed for data analysis or similar service has to be added as per need	

(10) LIVESTOCK PRODUCTION MANAGEMENT

i.	Professor	1
ii.	Associate Professor	2
iii.	Manager Farm Operations	3
iv.	Rest of the posts of LPM Department have been shown against Instructional Livestock Farm Complex.	
v.	Farm Assistant	

(11) LIVESTOCK PRODUCTS TECHNOLOGY

i.	Professor	1
ii.	Associate Professor	1
iii.	Assistant Professor	2
iv.	Laboratory technicians	1
v.	Laboratory assistant/Attendants	1
vi.	Butchers/skilled assistants for processing/waste management etc. as per work load.	
vii.	Sweeper-cum-attendant	1

Staff for commercial production, quality control, meat testing, Consultancy etc. has to be added as per work load and nature of work.

(**12) VETERINARY GYNAECOLOGY AND OBSTETRICS**

i.	Professor	1
ii.	Associate Professor	2
iii.	Assistant Professor	3
iv.	Laboratory technicians/Compounders /Stock-men	2
v.	Laboratory assistant/Attendants	2
vi.	Animal Attendant	1-3
vii.	Sweeper-cum-attendant	1
	Staff for Clinical and Service Jobs as to be added as per Work load and nature or work (One post of Assistant Professor has been shown against TVCC)	

(13) VETERINARY SURGERY AND RADIOLOGY

i.	Professor	1
ii.	Associate Professor	2
iii.	Assistant Professor	3
iv.	Operation Theatre Masters/Technicians	2
v.	Operation Theatre assistant	2
vi.	Imaging Technicians	1
vii.	Animal Attendant	2
viii.	Sweeper-cum-attendant	1

Staff for clinical and service jobs has to be added as per work load and nature of work.

(One post of Assistant Professor has been accommodated/shown against TVCC)

14.VETERINARY MEDICINE

i.	Professor	
ii.	Associate Professor	
iiii	Assistant Professor	3
iv	Lab. Technicians/ Compounders	2
v.	Laboratory assistant/Attendants	2 .
vi.	Animal Attendant	2
vii	Sweeper-cum-attendant	1

Staff for clinical and service jobs has to be added as per work load and nature of work.

(Two posts of Assistant Professor has been accommodated/shown against TVCC)

(15) VETERINARY AND ANIMAL HUSBANDRY EXTENSION EDUCATION

i)	Professor	1
ii)	Associate Professor	1
iii)	Assistant Professor	2
iv)	Audio-visual Technician	1
v)	Artist-cum-Photographer	2
vi)	Driver-cum-Operator	1
vii)	Art room attendants	2
viii)	Sweeper-cum-Attendant	1

(16) TEACHING VETERINARY CLINICAL COMPLEX (TVCC)

i.	Head of Department-Clinics (Professor rank with specialization in any of the clinical subjects)	1
ii)	Hospital Superintendent (Associate Professor rank with specialization in any of the clinical subjects)	1
iii.	Assistant Professors for Medicine(2*), Surgery (1), Gynecology (1), Clinical Pathology/Biochemistry/ Parasitology/Microbiology (1)	5

All the faculty of the TVCC shall also participate in the teaching programmes of their respective ©departments * One for Ambulatory Clinical Service

Record Keeper cum Data Operator	1
Registration Assistant	1
In-charge medical store	1
Compounder/Pharmacist	2
Laboratory Technician	1
Laboratory Assistant/Attendant	1

Sweeper-cum-attendant (as per work load)

(17) INSTRUCTIONAL LIVESTOCK FARM COMPLEX (ILFC)

i. Head of Department. Instructional Livestock Farm Complex (Professor rank with specialization in any of the production subjects) 1

ii. Farm Manager (Associate Professor rank with specialization in any of the production subjects) 1

iii. Assistant Professors for Breeding (1). Nutrition (1), LPM (2*), Agronomy (1) * One for Poultry Production Management 5

All the faculty of the Instructional Livestock Farm Complex shall also participate in the teaching of their respective departments

iv) Manager Farm Operations 2

v) Farm Assistant 2

vi) Animal Attendants 4

vii) Farm labourers/casual labourers (as per work load and as per economic viability- except in units exclusively reserved for experimentation)

viii) Sweeper-cum-Attendant (as per unit size and work requirements).

ix) Machine Operator/Tractor Driver Mechanics etc. (as per need.)

Staff for Consultancy, planning, analysis etc. has to be added as per work load and nature of work.

The posts at Sl. No. (iv) to (ix) above have been shown as transferred from the Department of Livestock Production Management.

IV. EQUIPMENT

1. Common Facilities

A. Five lecture halls fitted with audio-visual projection system
B. Conference Hall with multimedia projection system
C. Distillation/Deionizer plants
D. Photography Unit with all facilities
E. Central Instrumentation Facility (CIF)

2. Department

(1) DEPARTMENT OF VETERINARY ANATOMY

I. Work-tops tables fitted with 5 amp. plug points for 20 pairs of students. 1
II. Lab-stools
III. Black board (sliding)

IV.	Almirah for bone-sets	6
V.	Almirah for microscopes	2
VI.	Steel Racks for bones store	20
VII.	Whatnots	10
VIII.	Glass almirah	4
IX.	Show-cases (Glass paneled)	15
X.	Marble-top/Stainless Steel Top Tables (with drainage)	10
XI.	Tissue disposal Buckets	10
XII.	Steel racks for wet specimens	40
XIII.	Whatnots do	40
XIV.	Large tubs with over flows for washing specimens/limbs	10
XV.	Steel frames with hooks etc.	4
XVI.	Articulated skeleton one for Ox, Horse, Sheep, Goat, Buffalo, Pig, Dog, Cat Camel Fowl, Rabbit Duck	As per need
XVII.	Embalmed specimen for surface anatomy one each	
XVIII.	Embalmed hollow organs	One set each
XIX.	Embalmed specimen with viscera in situ'	
XX.	Slide cabinets-50000 slides	2
XXI.	Binocular microscopes	10
XXII.	Dissection microscopes	10
XXIII.	Automatic slide projector	1
XXIV.	Microslide projector	1
XXV.	Projection screen	1
XXVI.	Overhead projector	1
XXVII.	Specimen slides of histology & embryology 5 sets each	
XXVIII.	Specimen of some rajor Zoo Animals (skeleton etc.)	
XXIX.	Post-mortem sets	2
XXX.	Scissors-straight	6
XXXI.	Scissors curved	6
XXXII.	Hand-saw	2
XXXIII.	Rib cutter	4
XXXIV.	Rib-shear	4
XXXV.	Forceps Large	6
XXXVI.	Forceps Small	6
XXXVII.	Artery Forceps	6
XXXVIII.	Tennaculum	6
XXXIX.	B.P. Handle	6
XL.	Vacuum Pump for embalming	1
XLI.	Bucket fitted with taps etc. for embalming	2
XLII	Meat Saw	2
XLIII.	Plastic drums with cover	20
XLIV.	Plastic Buckets with cover	30
XLV.	Enameled Iron buckets	20
XLVI.	Enameled trays	10
XLVII.	Enameled Basins	20
XLVIII.	Enameled Mugs	5
XLIX.	Autoclave	1
L.	pH meter	1

LI.	Oven for paraffin embedding	2
LII	Slide warmers	2
LIII.	Rotary Microtome	2
LIV.	Tissue floatation bath	4
LV.	Hot Air Oven	2
LVI.	Refrigerator (double door)	1
LVII,	Automatic Tissue Processor	1
LVIII,	Automatic Knife Sharpener	1
LIX.	Microtome Knives	6
LX.	Hone With Surfaces	4
LXI.	Stropping Leather	1
LXII.	Slide Box 100 slides	20
LXIII.	Slide Cabinet 5000 Slides	4
LXIV.	Analytical Balance	2
LXV.	Monopan Balance	1
LXVI.	Ice-Box	2
LXVII.	Staining Jars	20
LXVIII.	Coupling Jars	20
LXIX.	SS Staining Trays	20
LXX	Animal Cages	As per need
LXXI.	Glass wares	As per need
LXXII	Electric Pointers	

(2) DEPARTMENT OF VETERINARY PHYSIOLOGY & BIOCHEMISTRY

1). Work table / lab table with sink, water source, chemical racks etc. for analytical experiments, for 20 pair students
2). Work tables / lab tables with electric points and other controls for animal experiments, for 20 pair students
3). Compound microscopes (with eye pieces and objectives etc. complete) 20
4). Haemocytometer sets 30

5) Haemoglobinometer sets	30
6) MicRohematocrit	2
7) Microhematocrit tubes	As per need
8) Centrifuge 1000 RPM	2
9) Wintrobes sets	20
10) Calorimeter	2
11) Flowmeter	2
12) Haemagglutination plate	10
13) Kymograph with accessories	10
14) Spirometer	2
15) Stimulators	5
16) Tissue chamber	20
17) Isolated organ bath	2
18) Dissecting sets	10
19) Manometers (mercury)	5

20) Sphigmo manometers (dial type)	2
21) Catheters (silastic)	10
22) Catheters (portable)	1
23) Flame photometers	1
24) Spectra photometer	1
25) Common Balance	5
26) Mono pan digital balance	1
27) Glass ware	As per need
28) Refrigerator	1
29) Microkjeldahl set	1
30) Digestion set	1
31) Refractometer	1
32) Student's Microscope	10
33) Column chromatography set	1
34) T.L.C.	1
35) Hot air oven	1
36) Photoelectric Colorimeter	1
37) *Electophoresis apparatus	1
38) Micro Haematocrit centrifuge	1
39) *Blood Analyser (Automatic)	1
40) *pH meter	1

*Prefer latest time saving models (automatic etc.) with uninterrupted power supply (UPS). Burettes, Pipettes of different volume, volumetric flasks, measuring cylinders, test tubes, slides, etc. Biotechnology equipment like PCR is required as there is a course in Biotechnology.
(These equipment have been included under this Department from the Department of Veterinary Biochemistry)

(3) DEPARTMENT OF VETERINARY PHARMACOLOGY AND TOXICOLOGY

1. Demonstration table with electrical points, drainage, steriotaxic control etc.	1
2. Kymograph with complete accessories, electric recording drum etc	5
3. Respiration pump, endotracheal tube, mouth gag, spirometer etc.	1
4. Isolated tissue bath with accessories	15
5. Observation cages for rats and mice	25
6. Tuberculin syringe	15
7. Common balance	5
8. Monopan electronic balance	1
9. Aerator	10
10. Binocular microscopes	2
11. Spctrophotometer	1
12. Centrifuge (1000RPM)	1
13. Dispensing scales with metric and apothecaries WL	25
14. Marble slab	25

15. Spatula (iron, plastic and ebonite)	25
16. Mortar and pestle (porcelain and glass)	25
17. Measuring glasses, cylinders of various sizes	25
18. pH meter (digital)	1
19. Manometers, catheters etc.	2
20. ECG apparatus (portable)	1
21. Electronic stimulator	1
22. Surgical instruments for a pack	2

(4) DEPARTMENT OF VETERINARY PARASITOLOGY

1. Autoclave	1
2. Hot air oven	1
3. Incubator	1
4. Refrigerator	1
5. Microscope with high power (HP) Oil immersion	12
6. Microscope Phase contrast	1
7. Centrifuge	2
8. Micrometers (stage and eyepiece)	2
9. Warning Blender	1
10. Steriliser Unit	1
11. Distillation set	1
12. Eyepiece double demonstration	2
13. Eyepiece comparison	2
14. Hair Hygrometer	1
15. Vernier calipers	3
16. Slide cabinet	2-3
17. Slide Boxes	10-20
18. Desiccators	3
19. Water bath	2
20. Overhead Projector	1
21. Slide Projector	1
22. Total counter	2
23. Table Counter	2
24. Dissection Set	5
25. Dissection Microscope	4

(5) DEPARTMENT OF VETERINARY MICROBIOLOGY

1. Worktable / lab table with power points & water source tec. For 20 pair of students	
2. Lab stools (revolving)	40
3. Autoclave horizontal	1
4. Autoclave	1
5. Hot-air Oven	2
6. Instrument sterilizers	2
7. Seitz filter assembly including Seitz filter, vacuum pressure pump etc	1
8. Other filters (bake field, Chamber land and membrane filters)	
9. Students Microscopes	20

10. Ultra-violet microscope with U.V. assembly	1
11. Dark-field microscope with light source	1
12. Phase-contrast microscope built-in light	1
13. Stage and ocular micrometer (for measurement of bacteria)	8
14. Hanging drop preparation slides with cover-slips	30
15. Petri-dishes 3" and 4"	As per need
16. Platinum loops	As per need
17. Bunsen burners	60
18. Mc'intosh and field's anaerobic jar	2
19. Hydrogen gas cylinder	1
20. C02 gas cylinders	1
21. Incubator	2
22. C02 Incubator	1
23. Biological Oxygen Demand (B.O.D.) Incubator	1
24. Water bath	2
25. Deep-freeze 20° C	1
26. Deep-freeze 70° C	1
27. Petroff-Hauser counter	10
28. Micro-kjeldhal	2
29. Photo Colorimeter	2
30. Ultra-violet Lamp	2
31. Laminar flow cabinet	2
32. Tripple - distillatory	2
33. Metal disttillatory	2
34. Colony Counter	2
35. Perspex plates for HA. tests	6
36. ELISA test reader	2
37. Boards/inoculation boxes (for restraining mice, gunea pig. etc.)	As per need
38. Cages syringes etc.	As per need
39. Surgical instrument	As per need
40. McFariands Nephlometer (for vaccine prep.)	4
41. Gel chromatography aptus	4
42. Immuno electrophoresis apparatus	2
43. Centrifuge bucket type	2
44. High-speed centrifuge (16,000 to 20,000 rpm)	1
45. Refrigerated centrifuge	1
46. Ultra centrifuge (60,000 RPM)	1
47. Replica Plates	1
48. Freeze Dryer	1
49. Inoculation cabin (room)	
50. Cubicles for virological work	
51. Dental drill (for egg inoculation)	
52. Post-mortem tables (trolleys) for small animals	
53. Automatic pipette washer	2
54. Air-conditioners	As per need
55. Glass-ware, cottons wool, syringe, media, sugars, etc.	As per need

(6) DEPARTMENT OF VETERINARY PATHOLOGY

1). Lb. table/work table complete with racks, sinks, taps etc. for 20 pair of students
2). Laboratory stools (revolving) 40
3). Students microscopes (complete with eye pieces and objectives) 30
4). Binocular microscopes 5
5). Dark field illumination with projecting units 1
6). Phase contrast microscopes 1
7). Immuno-fluorescent 1
8). Black board cum display boards etc. 2
9). Automatic slide projector 1
10). Overhead Projector 1
11). Display boards, chart boards etc. (as per need)
12). Specimen slides of various histopathological lesions.
13). Set of transparencies of various H.P. & gross lesions
14). Rotary microtomes, AO 30 Spencer type with thin sectioning facility
15). Paraffin floatation bath (temp, control 55-65° C 2
16). Paraffin bath oven 2
17). Refrigerator 1
18). Automatic tissue processor 1
19). Slide cabinet 1000 capacity 4
20). Slide boxes -100 capacity 100
21). Staining jars, coupling jars etc. As per need
22). Tissue cutting boards 5
23). Racks for specimen jars, bottles etc. 10
24). Scalpels (assorted) 10
25). Containers, specimen jars, wide-mouthed bottle As per need
26). Cryostat (microtome) 1
27). Hot Air Oven (Temp. 2 50° C) 2
28) L'moulds & bocks (for embedding) 20
29). Auto staining unit 1
30). Microtome knife sharpener - To and fro with side-shifting arrangement 1
31). Autopsy table for birds (S.S top with drain) 1
32). Autopsy table for small animals 1
33). Specimen cutting table 1
34). Autopsy knives 30
35). Post-Mortem sets (with chisels, saw rib cutter, shears, bone cutter, saw, sharpener, etc.)-5
36). Bone-cutting saw electric 1
37). Heavy-duty rotary saw for large animal P.M. 1
38). Protective wear (gloves, rubber apron, goggles, gum-boots, marks & cap 10
39). Carcass trolley/carcass van (fully covered) 1
40). Hoist with over head railings 1
41). Captive bolt pistols for euthanasia 1
42). Platform balance (large and small) l each
43). Skinning equipments 2
44). Monopan digital balance 2
45). Washing and disinfecting facility, aerosols etc.
46). Specimen washing sinks (with hot & cold water) 5

47). Knife sharpener (mechanical or power) 2
48). Plastic tubs & buckets with lid for specimen collection and transport 20
49). Specimen bottles, jars etc.
50). Large E.I Trays & dissection boards for bird P.M.
51). Incinerator unit Double combustion, smokeless oil burned / electric (pollution free)
52). Cold room unit
53). Freezer unit for small animals and specimens
54). Rabies P.M. unit
55). Sterilisation unit
56). High-pressure hydrant
57). Centrifuge 3000 RPM
58) Spectrophotometer 1
59). Wintrobe pipettes 1
60). Haemocytometer 10
61) Haemoglobinometer 20

(7) DEPARTMENT OF VETERINARY PUBLIC HEALTH & EPIDEMIOLOGY

1) A running table (worktable) with cup-boards, racks, wash basins, water source & shelves for
20 pairs of students
2) Stools (revolving) 40
3) Black board-ciim-display-board 1
4) Steel almirahs 4
5) Almirahs/cupboards 2
6) Monocular students microscopes 25
7) Fluorescent microscope 1
8) Binocular microscope 5
9) Serologic water baths 4
10) pH-meter (digital) 2
11) Spectrophotometer 1
12) High-speed Centrifuge 1
13) Cooling high-speed Centrifuge 1
14) Gerbers' Centrifuge 1
15) Colony counter 2
16) Burners 25
17) Test-tube racks 30
18) Balance chainomatck 1
19) Electronic moropan balance 2
20) Micrometer 1
21) Staining racks, coupling jars, staining trays etc. 30 sets
22) Autoclave 1
23) Hot-air Oven 2
24) B.O.D. Incubators 2
25) Incubators 3
26) Cages for Lab. Animals 10
27) Micro-diluters 25

28) Microplates	60
29) Micro-pipettes (and tips as required)	12
30) Slide-projector	1
31) Slide cabinet	1
32) Slide Boxes	30
33) Deep-freeze	1
34) Laminar-flow Vertical	1

Data Processing and Programming unit for retrospective and prospective epidemiology.

Facilities for preparation of charts/maps etc for preparation of important animal diseases at the State/Regional and National levels.

Mobile van (s) for field visit - collection of data, material for control of diseases including reagents / antigens / vaccines to be carried in the Refrigerator in the van.

The filed activity has to be carried out in close collaboration with the 'Teaching Veterinary Clinical Complex, allied departments of the college and veterinary officers of the Animal Husbandry Department.

(8) DEPARTMENT OF ANIMAL NUTRITION

1. Slide Projector	1
2. Distillation set	2
3. Chemical balance	5
4. Hot air oven	2
5. Single pan balance	1
6. Electronic monopan balance	2
7. Muffle furnace	1
8. Desicator	5
9. Suction Pump	1
10. Digestion set	2
11. Kjeldahl apparatus	2
12. Micro Kjeldahl set	1
13. Soxhlet apparatus set	1
14. Water bath	1
15. Water still	1
16. Flame photometer	1
17. Spectrophotometer	1
18. Warburgh apparatus	1
19. Haldens Gas Analyser	1
20. Spiro meter	1
21. Gas collection bags	6
22. Chromatography unit	1

(9) DEPARTMENT OF ANIMAL GENETICS AND BREEDING

1. Work table for 30 units	
2. Stools	60
3. .Black board	1
4. Projection screen	1
5. Slide projector	1
6. Personal computer	As per need*
7. Microscopes	20
8 Slide Boxes	As per need
9. Transparencies Boxes	As per need
10. Specimen racks, almirahs	
Storage boxes for charts, diagrams etc.	As per need

*Can be a common facility.

(10) DEPARTMENT OF LIVESTOCK PRODUCTION MANAGEMENT

1. Over head projector	1
2 Slide projector	1
3. Sprayer	1
4. Shearing and clipping equipment	1 set
5. Debeaking equipment	1
6. Tattooing set tags etc.	1
7. A.I. equipment (different species)	1 set each
8. Egg Candler	1
9. Incubator (Hatchery)	1
10. Battery Brooder	1
11. Trap nest	5
12. Egg Grading Machine	1
13. Making Machine Set	1
14. Chick sexing machine	1
15. Automatic scalder	1
16. Vernier Callipers	5
17. Screw Gauge	5
18. Maximum-Minimum Thermometer	2
19. Psychro-meter	1
20 Hair Hygrometer	1
21. Milking cans	2
22. Making piles	2
23. Milk measures	1
24. Cream seperater	1
25. Butter chums	1
26. Branding set	1
27. Castrator (for different species)	1
28. Electric clipper	1
29. Garter's centrifuge	1

Housing models, dairy models, photographs of different breeds, models of silo pits, chart, photographs showing different points of body of various species / breeds, models of drainage, models of water troughs for different species, samples of feeds and fodders. Registers / Account procedures.

(11) DEPARTMENT OF LIVESTOCK PRODUCT TECHNOLOGY

1. Refrigerator	1
2. Deepfreeze	1
3. Electronic monopan balance	1
4. Balance for weighing birds	1
5. Large animal balance (weigh bridge type)	1
6. Bone cutting machine	1
7. Incubator	1
8. Hot air oven	1
9. Spring balance	1
10. Stunning machine (for different species)	1
11. Automatic scaler	1
12. Feather plucking machine	1
13. Student's microscope	10
14. L.T.C. set	1
15. Meat mincing machine	1
16. Sausage maker	1
17. Smoking unit	1
18. Salting instruments	1
19. Meat slicer	1
20. Butchering sets (Knives etc¯)	2
21. Packing unit	1
22. Lactometer	5
23. Butyro refrectometer	1
24. Butter moisture balance	1
25. Gerber's centrifuge	1
26. Gerber's tubes	20
27. Vacuum pump	1
28. Melting point apparatus	1
29. Warning blunder	1
30. Homogenizer	1
31. pH meter	1
32. Microscope binocular	1
33. Flame photometer	1
34. Spectrophotometer	1
35. Freeze drying unit	1
36. Rotary Milk evaporator	1
37. Defreeze drying unit	1
38. Cream separator	1
39. Butter Workers	1
40. Butter churners	1
41. Butter print	1

42. Steel utensils for ghee, curd, khoa	2 each
43. Richmend's scale	1
44. Hand sealing machine for bottle, cans, plastic, bags	1

Charts and Models of different meat cuts, slaughter house

(12) DEPARTMENT OF VETERINARY GYNAECOLOGY AND OBSTETRICS

1. Work table / lab table (with sinks water source light points etc.) for 20 pairs of students	
2. Lab stools (revolving)	40
3. Compound microscopes (complete with objectives eye pieces and other accessories) (one projection / Close circuit television attachment be procured)	25
4. Binocular microscopes	5
6. Haemocytometers	25 sets
7. Travis (examination)	1
8. Travis (service)	1
8. Phantom boxes	5
9. Palpation tables	5
10. Embroyotomy sets	5
11. Kelver training cow for IU therapy. A.I etc	1
12. Electroejaculator	1
13. Artificial Vaginas (assort)	2 each
14. Oscilloscope for measuring sperm motility	1
15. Autoclave	2
16. Mono pan balance	1
17. Instrument cabinets	5
18. Obstetrical sets	2
19. Whelping sets	2
20. Surgical instruments	4
21. Holmes needles	5
22. Vaginal clamps (large & small)	10
23. Vaginal speculum (cow, goat, dog, cat)	3 each
24. Automatic pipette washer	1
25. Incubator	1
26. Semen shippers	4
27. Thermos flasks	2
28. Insemination catheters	As per need
29. Storage tubes (cylinders)	4
30. Stands for storage cylinders	2
31 Swab holders	10
32. Instrument sterilizers	4
33 Record syringes	5
34. Injection cannula	5
35. Rinsing cans1-2 lit	1
36. Nose Tongs	2
37. Protective clothes	5 sets
38. Latex lining for assorted A.V.	5 each

39. Latex funnel	4 each
40. Insulating bags	4
41. Metal funnel	2
42. Measures	2
43. Drop pipettes with nibber nipples	20
44. Filter papers	As per need
45. Water suction pump	2
46. Autoclave	1 each
47. Glass-ware	As per need

(13) DEPARTMENT OF VETERINARY SURGERY AND RADIOLOGY

1. Operation table for small animals stainless steel top (Hydraulic or pinion type)	8
2. Small animal preparation tables stainless steel top	2
3. Foot operated waste bins	8
4. Dressing drums (small)	8
5. Dressing drums (large)	4
6. Instrument/syringe sterilizers	3
7. Enameled iron trays 12"x15"x/15"x18"	8
8. Enameled iron trays 8'x10'	8
9. Scissors 8"/10" dipping	2
10. Scissors dressing	4
11. Forceps cheatle	8
12. Lamps (shadow4ess)	4
13. Screens (ward)	4
14. Intravenous drip stands	8
15. Foot operated dressing drum stands	4
16. Foot/Elbow soap dispenser	4
17. Gray's mouth gag	10
18. Endotracheal tubes (cuffed and non-cuffed)	4 each
19. Boyles' Anaesthesia apparatus (major) with ether, halothance, circle absorber and methoxyfluorance evaporator	1
20. Ambu's respirator	2
21. Electrocardiogram battery operated/portable	1
22. Catheters, manometers etc.	As per need
23. Cotton tapes for control of animals	
24. Sand bags for positioning	
25. Surgical pack for small animals	4
26. Surgical pack for large animals	4
27. Gloves and other rubber wares	10
28. Trevis for calves, adults, horse etc.	10
29. Large animal trolley-cum-operation tables	As per need
30. Operation tables for calves with drain	6
31. Rope. E.I. buckets, irrigators etc.	As per need
32. Autoclave horizontal with S.S.jacket 16" dia./rectangular with descalor (BlS-marked)	1

33.	Autoclave	2
34.	Instrument cabinets	6
35.	Orthopaedic instruments	
36.	Opthalmic instruments/scopes etc.	
37.	Dental instruments for Large and small animals	
38.	Teat and udder instruments	
39.	Endoscope	
40.	Refrigerator	1
41.	Weighing instruments/scale	1
42.	Biopsy instruments	2
43.	Electro surgery (diathermy) units	1
44.	Cautery sets	2
45.	Electric stimulators/glavenine, faredic etc.	1 each
46.	Short-wave/micro-wave diathermy unit with disc, pad and coil electrodes	1
47.	Ultra-sonic stimulators/ therapy units	1
48.	X-ray unit 500 Ma, 150 Kvp over- head model	1
49.	X-ray unit trolley model with 'C'arms fluoroscope, image-intensifier, spot-films, video-recording and image freezing facility	1
50.	Ultra-sonic diagnostic unit with video recorder	1
51.	Ultraviolet lamp	1
52.	Infra-red lamps	2
53.	X-ray accessories, cassettes, film-carrier, dividers, grids, intensifying screens (rare-earth preferred.)	
54.	Protection gadgets (film-badges, lead gloves, lead aprons, goggles, lead screens)	
55.	Dark-room accessories (processing tank, dryer, hangers, safety lamps, film storage box, film-exchange windows, speaking grill, dark-room exhaust etc.	
56.	Animal transport trolley for large animals	1
57.	Stretcher for small animals	2
58.	Glass-ware, syringes, drugs, medicine, etc.	As per need
59.	X-ray film viewers	6
60.	Sport film viewer	1
61.	X-ray film museum, with film record-racks	
62.	Different equipment for restraining of animals including capture gun	1 set
63.	Shoes and shoeing equipment	1 set

(14) DEPARTMENT OF VETERINARY MEDICINE

1.	Black boards-cum-display boards	4
2.	Lab stools	40
3.	Microscopes	20 sets
4.	Microscopes-binocular	5sets
5.	Centrifuges	4
6.	Common balances	5
7.	Electronic monopan balance	1
8.	Distillation units	4
9.	Digital pH meters	
10.	Spectrophotometers(digital preferred)	2

11.	Microhaematocrits	2
12.	Incubators	4
13.	Hot-air Ovens	4
14.	Water baths	2
15.	Dark field microscope	1
16.	Autoclave	1
17.	Autoclave(vertical)	2
18.	B.O.D Incubator	1
19.	Microscope with attachment for microphotographs	1
20.	Stethoscopes with multiple ear-pieces	3 sets
21.	Glass-ware	As per need

(15) DEPARTMENT OF VETERINARY AND ANIMAL HUSBANDRY EXTENSION EDUCATION

1.	Conference / discussion table (preferably) round tables of 4-6 ca	12
2.	Chairs	60
3.	Drawing boards, T-scales, drawing sets etc.	20 sets
4.	Work table to accommodate 40 students	1 set
5.	Black boards, display boards, chart stands etc	2 sets
6.	Projection screens (fixed & portable)	2
7.	Epidiascope	1
8.	Overhead projector	1
9.	Slide projectors (automatic & manual)	2
10.	Amplifiers (2 models)	2
11.	Stage mikes A.S.M. 7	11
12.	Horns	4
13.	Unit	4
14.	Hooters	2
15.	Generators (a) 2.5 Kv (b) 0.5 Kv	1 each
16.	Television (coloured)	1
17.	Video Cassette Recorder	1
18.	Video Cassette Player with recording facility	1
19.	Video camera (complete set)	1
20.	Camera 35 mm (with assorted lenses, filters etc.)	1
21.	Enlarger	1
22.	Dark room set (safe light, process unit, film store, film dryer, cutter etc.)	
23.	Display boards (assorted models, with accessories	
24.	Panel boards	
25.	Tents, campers ropes, pegs, threads etc	
26.	Wood cutting machine	1 set
27.	Stencils, felt pens, drawing sets	20 sets
28.	Film cutter, scissors, tin cutters etc.	
29.	Work tools	2 sets

(16) TEACHING VETERINARY CLINICAL COMPLEX

The TVCC should have the following common facilities to be used by other departments for the purpose of offering heir respective courses:

1. Phonandoscopes	6
2. Pleximeters and percussion-hummers	10 sets
3 Electronic stethoscope	1
4. Ophthalmoscopes	3 sets
5. Electrocardiograms (portable model)	1
6. Blood-pressure monitors	3 sets
7. Otoscopes	3 sets
8. Laryngoscopes	3 sets
9. Oesophagoscopes	3 sets
10 Tracheo-scopes	3 sets
11. Fibroptic endoscopy desirable)	1
12 Blood-Analyser	1
13. Haemocytometers	30
14. Haemoglonbinometers	30
15. Glass-ware	As per need
16. Small animal examination table (Hydraulic or pinion type)	4
17. Instrument Trolleys	6
18. Travis with noise protection	3
19. Travis (service)	1
20. Travis (examination)	1

(17) INSTRUCTIONAL LIVESTOCK FARM COMPLEX

1. Sprayer	1
2. Shearing and clipping equipment	1 set
3. Debeaking equipment	1
4. Tattooing set tags etc	1
5: AI equipment (different species)	1 set each
6. Egg Candler	1
7. Incubator (Hatchery)	1
8. Battery Brooder	1
9. Trap nest	5
10. Egg Grading Machine	1
11. Milking Machine Set	1
12. Chick sexing machine	1
13. Automatic scalder	1
14. Vernier Callipers	5
15. Screw Gauge	5
16. Maximum-Minimum Thermometer	2
17. Psychro-meter	1
18. Hair Hygrometer	1
19. Milking cans	2

20. Milking piles 2
21. Milk measures 1
22. Cream separator 1
23. Butter chums 1
24. Branding set 1
25. Castrator (for different species) 1
26. Electric clipper 1
27. Tractor, Farm Equipment and Implement, Machinery as per requirement

Annexure – I

Method of calculation and recording of grade points

Course No.	Credit Hours	*Marks obtained*				Total (100)	Grade point (10 Point Basis)	Credit Points	Total Credit Points
		Internal		*External*					
		Theory (30)	Practical (20)	Theory (30)	Practical (20)				
Veterinary Anatomy Paper I (Credit Hours 7)									
VAN-111	1+2	24.5	16.5	22.5	17.5	81.0	8.10	24.36	56.90
VAN-121	2+2	25.5	16.0	23.5	16.5	81.5	8.15	32.60	
Veterinary Physiology- Paper I (Credit Hours-6)									
VPB-111	2+1	26.0	18.0	23.5	16.5	84.0	8.40	25.20	49.80
VPB-121	2+1	25.0	16.0	23.5	17.5	82.0	8.20	24.60	
Veterinary Biochemistry- Paper I (Credit Hours- 5)									
VPB-112	1+1	28.5	18.5	20.0	18.5	85.5	8.55	17.10	43.35
VPB-122	2+1	28.0	16.0	25.5	18.0	87.5	8.75	26.25	
Animal Genetics and Breeding- Paper I (Credit Hours-6)									
AGB-111	2+1	24.5	18.0	21.5	20.0	84.0	8.40	25.20	49.05
AGB-121	2+1	25.5	15.0	21.0	1S.0	79.5	7.95	23 85	
Livestock Production Management- Paper I (Credit Hours-8)									
LPM-111	3+**1**	28.0	16.0	21.5	20.0	85.5	8.55	34.20	67.50
LPM-121	l + l	.23.0	16.0	27.5	18.0	84.5	8.45	16.90	
LPM-122	1+1	26.0	16.0	23.0	17.0	82.0	8.20	16.40	
Animal Nutrition- Paper 1 (Credit Hours-6)									
ANN-111	2+1	26.0	18.5	24,5	19.5	88.5	8.85	26.55	51.30
ANN-121	2+1	25.0	16.5	22.5	18.5	82.5	8.25	24.75	

Current: total Credit Hours: 38 Total Credit Points Earned: 317.90 GPA 8.365

Results: 1. Pass with Grade Point Average (GPA) of 8.365/10.000

2. Eligible for Compartment Examination in the Paper (s)

3. Fail

Annexure - II

Serial No **Admn. No** **Roll No**

SEAL

DETAILED MARKS CERTIFICATE
FIRST PROFESSIONAL B.V.SC. & A.H.

Name: Father's Name:

Mother's Name: Batch

Course No.	Credit Hours	***Marks obtained***				Total (100)	Grade point (10 Point Basis)	Credit Points	Total Credit Points
		Internal		***External***					
		Theory (30)	Practical (20)	Theory (30)	Practical (20)				
Veterinary Anatomy Paper I (Credit Hours 7)									
VAN-111	**1+2**	24.5	16.5	22.5	17.5	81.0	8.10	24.36	56.90
VAN-121	**2+2**	25.5	16.0	23.5	16.5	81.5	8.15	32.60	
Veterinary Physiology- Paper I (Credit Hours-6)									
VPB-**111**	**2+1**	26.0	18.0	23.5	16.5	84.0	8.40	25.20	49.80
VPB-12I	**2+1**	25.0	16.0	23.5	17.5	82.0	8.20	24.60	
Veterinary Biochemistry- Paper I (Credit Hours- 5)									
VPB-**112**	**1+1**	28.5	18.5	20.0	18.5	85.5	8.55	17.10	43.35
VPB-**122**	**2**+1	28.0	16.5	19.0	19.0	82.5	8.25	24.75	
Animal Genetics and Breeding- Paper I (Credit Hours-6)									
AGB-111	2+**1**	24.5	18.0	21.5	20.0	84.0	8.40	25.20	49.05
AGB-**121**	**2+1**	25.5	15.0	21.0	18.0	79.5	7.95	23 85	
Livestock Production Management- Paper I (Credit Hours-8)									
LPM-111	3+**1**	28.0	16.0	21.5	18.0	85.5	8.55	34.20	67.50
LPM-121	l + l	23.0	16.0	27.5	18.0	84.5	8.45	16.90	
LPM-122	1+1	26.0	16.0	23.0	17.0	82.0	8.20	16.40	

Animal Nutrition- Paper 1 (Credit Hours-6)									51.30
ANN-111	2+1	26.0	18.5	24,5	19.5	88.5	8.85	26.55	
ANN-121	**2+1**	25.0	16.5	22.5	18.5	82.5	8.25	24.75	
NCC/ NSS/ CCA	**0=1 (NC)**	Satisfactory							

Current: total Credit Hrs: 38 Total Credit Points Earned 317.90 GPA: 8.365

Results: 1. Pass with Grade Point Average (GPA) 8.365/10.000
2. Eligible for Compartment Examination in (he Paper.
3. Fail

Signature with seat

Annexure - III

Serial No **Admission No.**

SEAL

Photo

TRANSCRIPT

Name: Father's Name: Mother's Name:

Name of College: College of Veterinary Sciences,
Name of University:
Degree Programme: Bachelor or Veterinary Sciences and Animal Husbandry (B.V.Sc. & A.H.)

Admitted in : Month & Year Completed in : Month & Year Last Institution Attended:

Sl. No.	Course No.	Title of the Paper	Credits Hrs.	Credit Point
FIRST PROFESSIONAL YEAR: Pass Total Credits: 38 Total Points: ---GPA---				
1	VAN-111,121	Veterinary Anatomy Paper-I	7	
2	VPB-111,121	Veterinary Physiology Paper-I	6	
3	VPB-112, 122	Veterinary Biochemistry Paper-I	5	
4	LPM-111,121,122	Livestock Production Management Paper-I	8	
5	AGB-111,121	Animal Genetics and Breeding Paper-I	6	
6	ANN-111,121	Animal Nutrition Paper-I	6	
SECOND PROFESSIONAL YEAR: Pass Total Credits: 40 Total Points:-GPA-				
1	VAN-211,221	Veterinary Anatomy Paper-II	6	
2	VPB-221	Veterinary Physiology Paper-II	4	
3	VPA-211,221,222	Veterinary Parasitology Paper-I	9	
4	VMC-211,221	Veterinary Microbiology Paper-I	4	
5	VPP-211,221	Veterinary Pathology Paper-I	5	
6	LPM-211,221,222	Listock Production Management Paper-II	6	
7	AGB-211	Animal Genetics and Breeding Paper-II	3	
8	ANN-211	Animal Nutrition Paper-II	3	
THIRD PROFESSIONAL YEAR: Pass Total Credits: 40 Total Points: -GPA-				
1	VPT-311,321	Veterinary Pharmacology Paper-I	6	
2	VMC-311,321	Veterinary Microbiology Paper-II	6	
3	VPP-311,321,322	Veterinary Pathology Paper-II	7	
4	VPE-311,321	Veterinary Public Health &	6	

		Epidemiology Paper-I		
5	VPB-321	Veterinary Biochemistry Paper-II	3	
6	VAE-311,321	Veterinary and A.H. Extension Paper-I	6	
7	LPT-311,312,321	Livestock Product Technology Paper-I Education Paper-I	6	
FOURTH PROFESSIONAL YEAR: Pass Total Credits: 37 Total Points:-GPA-				
1	VPT-411,421	Veterinary Pharmacology Paper-II	4	
2	VSR-411,421	Veterinary Surgery & Radiology Paper-I	7	
3	VGO-411,421	Veterinary Gynaecology & Obstetrics Paper-I	5	
4	VMD-411,421	Veterinary Clinical Medicine Paper-I	5	
5	VMD-412,422	Veterinary Preventive Medicine Paper-I	4	
6	VLD-411,421	Veterinary Clinical Biochemistry and Laboratory Diagnosis Paper-I	2	
7	VCP-411,421	Veterinary Clinical Practice Paper-I	10	
8	TVC-421	Veterinarian in Society	1	
FIFTH PROFESSIONAL YEAR: Pass Total Credits: 37 Total Points:-GPA-				
1	VSR-511	Veterinary Surgery&Radiology Paper-II	2	
2	VGO-511	Veterinary Gynaecology & Obstetrics Paper-II	2	
3	VMD-511,512,513	Veterinary Clinical Medicine Paper-II	6	
4	VPE-511	Veterinary Public Health & Epidemiology Paper-II	3	
5	VAE-511	Veterinary and A.H. Extension Paper-II	1	
6	VCP-511	Veterinary Clinical Biochemistry and Laboratory Diagnosis Paper-II	5	

Enterpreneurial Training: Name Activity Grade (A/B/C):
Tracking Programme: Names: 1 2 Grade (A/B/C):
Study Circles: Names: 1 2 Grade (A/B/C):
Internship: Grade Satisfactory/Unsatisfactory
Grand Total of Credit Hours: Grand Total of Credit Points
Over All Grade Point Average (OGPA): Percentage of Marks:
RESULT: PASSED WITH ------- DIVISION CONDUCT. SATISFACTORY
DATE: Official Signatory
Seal

Annexure - IV

LIST OF PAPERS & CONSTITUENT COURSES FOR ANNUAL EXAMINATION

FIRST PROFESSIONAL	**CONSTITUENT COURSES**
Vety. Anatomy Paper-1	VAN-111 & VAN-121
Vety. Physiology Paper-1	VPB-111 & VPB-121
Vety. Biochemistry Paper-I	VPB-112 & VPB-I22
Animal Genetics & Breeding Paper-I	AGB-1I1 & AGB-121
Livestock Production Management Paper-1	LPM-111 LPM-121 & LPM-122
Animal Nutrition Paper**-I**	ANN-111 & ANN-121
SECOND PROFESSIONAL	**CONSTITUENT COURSES**
Vety. Anatomy Paper-II	VAN-2I1 & VAN-221
Vety. Physiology Paper**-**II	VPB-221
Vety. Parasitology Paper-I	VPA-211, VPA-221 & VPA-222
Vety. Microbiology Paper**-**I	VMC-211 & VMC-221
Very. Pathology Paper-I	VPP-211 & VPP-221
Livestock Production Management Paper-II	LPM-211, LPM-221 & LPM-222
Animal Genetics & Breeding Paper-II	AGB-211
Animal Nutrition Paper**-**II	ANN-211
THIRD PROFESSIONAL	**CONSTITUENT COURSES**
Vety. Pharmacology Paper**-**I	VPT-311 & VPT-321
Vety. Microbiology Paper**-**II	VMC-311 & VMC-321
Vety Pathology Paper-II.	VPP-311, VPP-321 *&* VPP-322
Very. Public Health &. Epidemiology Paper**-**I	VPE-311 & VPE-321
Vety. Biochemistry Paper**-**II	VPB-321
Livestock Products Technology Paper-I	LPT-311, LPT-312 & LPT-32I
Vety. & A.H. Extension Paper**-**I	VAE-311 *&* VAE-321
FOURTH PROFESSIONAL	**CONSTITUENT COURSES**
Vety. Pharmacology Paper-II	VPT-411 & VPT-421
Vety. Surgery & Radiology Paper-I	VSR-111 & VSR-421
Vety. Gynaecology & Obstetric Paper-I	VGO-411 & VGO-421
Vety. Clinical Medicine Paper-1	VMD-41I & VMD-421
Vety. Preventive Medicine Paper-I	VMD-412 & VMD-422
Very. Laboratory Diagnosis Papsr-I	VLD-411 & VLD-121
Veterinary Clinical Practice Paper-I	VCP-411 & VCP-421
FIFTH PROFESSIONAL	**CONSTITUENT COURSES**
Vety. Surgery & Radiology Papsr-II	VSR-511
Vety. Gynaecology & Obstetrics Paper-II	VGO-511
Vety. Clinical Medicine Paper-II	VMD -511, VMD -512 & VMD-513
Vety. Public Health &. Epideminlogy Paper-II	VPE-511
Vety. &. A.H. Extension Paper-II	VAE-511
Veterinary Clinical Practice Paper-II	VCP-511

Total External Papers: 34
Total Courses: 65

Annexure – V

List of courses of Bachelor of Veterinary and Animal Husbandry (B.V.Sc. & A.H.)

VAN-111	Veterinary Gross Anatomy-I (Osteology, Arthology & Biomechanics)	VPT-311	General and Systemic Veterinary Pharmacology
VAN-121	Veterinary Gross Anatomy-II (Myology, Neurology, Angiology & Aesthesiology)	VPT-321	Veterinary Neuropharmacology
VAN-211	Veterinary Histology & Embryology	VPT-411	Veterinary Chemotherapy
VAN-221	Veterinary Splanchnology & Applied Anatomy	VPT-421	Veterinary Toxicology
VPB-111	Veterinary Physiology-I (Blood, Cardiovascular & Excretory Systems, Body Fluids)	VPE-311	Milk and Meat Hygiene, Safety and Public Health
VPB-112	General Veterinary Biochemistry	VPE-321	Veterinary Epidemiology and Zoonosis
VPB-121	Veterinary Physiology-II (Neuromuscular, Digestive & Respiratory Systems)	VPE-511	Environment and Environmental Hygiene
VPB-122	Veterinary Intermediary Metabolism	VAE-311	Principles and Techniques Veterinary & A.H. Extension
VPB-221	Veterinary Physiology-III (Endocrinology, Reproduction, Growth Environmental Physiology)	VAE-321	Livestock Economics, Marketing and Business Management
VPB-321	Animal Biotechnology	VAE-511	Livestock Enterpreneurship
LPM-111	Livestock Production Management-I (General Principles and Ruminants)	LPT-311	Milk and Milk Products Technology
LPM-121	Fodder Production & Grassland Management	LPT-312	Abattoir Practices and Animal Product Technology
LPM-122	Livestock Production Management-II (Monogastric and Laboratory Animals)	LPT-321	Meat Science
LPM-211	Avian Production Management	VSR-411	General Veterinary Surgery, Anaesthesiology and Diagnostic Imaging
LPM-221	Commercial Poultry Production and Hatchery Management	VSR-421	Regional Veterinary Surgery
LPM-222	Livestock Production Management (Regional interest)	VSR-511	Veterinary Orthopedics and Lameness

AGB-111	Biostatistics and computer Application	VGO-411	Veterinary Gynaecology
AGB-121	Principles of Animal Genetics and Population Genetics	VGO-421	Veterinary Obstetrics
AGB-211	Livestock and Poultry Breeding	VGO-511	Veterinary Andrology and Reproductive Techniques
ANN-111	Principles of Animal Nutrition and Feed Technology	VMD-411	Veterinary Clinical Medicine – I (General and Systemic)
ANN-121	Applied Nutrition – I (Ruminants)	VMD-412	Veterinary Preventive Medicine (Bacterial, Fungal & Richettsial Diseases)
ANN-211	Applied Nutrition – II (Non-Ruminants, Poultry & Laboratory Animals)	VMD-421	Veterinary Clinical Medicine-II (Metabolic & Deficiency Diseases)
VPA-211	General Veterinary Parasitology & Helminthology	VMD-422	Veterinary Preventive Medicine –I (Viral & Parasitic Diseases)
VPA-221	Veterinary Entomology & Acarology	VMD-511	Animal Welfare, Ethics and Jurisprudence
VPA-222	Veterinary Protozoology	VMD-512	Zoo/Wild Animal Breeding, Management, Nutrition & Health care
VMC-211	General Veterinary Microbiology	VMD-513	Pet Animal Breeding, Management, Nutrition care and Health care
VMC-221	Veterinary Immunology and serology	VLD-411	Veterinary Clinical Biochemistry and Laboratory Diagnosis-I
VMC-311	Systematic Veterinary Bacteriology and Mycology	VLD-421	Veterinary Clinical Biochemistry and Laboratory Diagnosis-II
VMC-321	Systematic Veterinary Virology	VCP-411	Veterinary Clinical Practice
VPP-211	General Veterinary Pathology	VCP-421	Veterinary Clinical Practice
VPP-221	Systemic Veterinary Pathology	VCP-511	Veterinary Clinical Practice
VPP-311	Special Veterinary Pathology	TVC-421	Veterinarian in Society
VPP-321	Avian Pathology		Internship Programme in Xth Semester for six calendar months
VPP-322	Aquatic Animal Diseases, Health Care and Management		

Calculation of Overall Grade Point Average (OGPA)

OGPA= Total Points earned divided by sum of Paper credits

The points awarded in paper will be the total marks obtained by a student out of 100 divided by 10.

* Points secured in a paper will be Points in a paper multiplied by credits of the paper
* Total Points earned = sum of the points secured.
* The points earned will be zero if the points in a paper are less than 5.000.
* Percentage of Marks= OGPA multiplied by 100 then divided by 10

NOTE:

1. Evaluation

Overall performance of the student in various examinations including the internal and annual/ board examination by procuring 50% in theory and practical separately shall be the criterion of passing or failing in a paper and not in the internal examination conducted in each semester. A student is required to secure an aggregate of 50% marks in theory and an aggregate of 50% marks in practical to be declared to have passed in a paper. If a student fails in one paper only, he/she is eligible to appear in the compartment examination of that paper which includes external theory and practical examination

2. Division

Pass	OGPA	5 000 and above
Second Division	OGPA	6.000 - 6.999
First Division	OGPA	7.000 - 7 999
First Division with Distinction	OGPA	8.000 and above

3. In case a student has passed a course through Compartment Examination, the same be mentioned against the particular course in the Transcript.

GUIDE LINES TO PAPER SETTER

Course wise distribution of marks (Objective & Subjective) for a theory paper is given in the annexure – VI

1. Each Theory question paper should be of 100 marks for three hours duration.

2. Paper having one course should be 60 marks of objective and 40 marks of subjective.

   Example- Animal Genetics & Breeding Paper-II (AGB-211)

3. Paper having two course should be set as per the theory credit hours

   Example -Veterinary Pathology Paper – I (VPP-211 & VPP-221)

   VPP- 211- Objective 20 marks and Subjective-15.0 marks- Total- 35.0
   VPP-221- Objective 40 marks and Subjective - 25.0 marks- Total- 65.0

4. Paper having three courses should be set as per the theory credit hours

   Example Veterinary Parasitology Paper-I

   VPA-211- Objective 30 marks and Subjective 20 marks - Total- 50.0
   VPA-221- Objective 10 marks and Subjective 05 marks - Total- 15.0
   VPA-222- Objective 20 marks and Subjective 15 marks - Total- 35.0

5. Objective
   i. Should be set for 60% from each course
   ii. Each bit should carry 0.5 marks.
   iii. Should be of one hour& 15 minutes
   iv. Question may be of fill in the blanks, multiple choices, matching, true or false or any other types.

6. Subjective
   i. Should be 1 hour and 45 minutes.
   ii. It should be set for 40% marks.
   iii. Choice should be given to the extent of 20%.

7. Paper should cover entire syllabus

Annexure – VI

Guidelines for Pondicherry University

Setting of question paper for the Annual Board Examination of B.V.Sc. & A.H. degree programme of the Rajiv Gandhi College of Veterinary & Animal Sciences, Puducherry

THEORY

FIRST PROFESSIONAL YEAR

		Objective(60%)	**Subjective(40%)**	**Total(100%)***
Veterinary Anatomy – Paper I				
VAN-111	(1 credit)	20 Marks	15.0 Marks	35.0 Marks
VAN-121	(2 credits)	40 Marks	25.0 Marks	65.0 Marks
Veterinary Physiology – Paper I				
VPB-111	(2 credit)	30 Marks	20 Marks	50.0 Marks
VPB-121	(2 credits)	30 Marks	20 Marks	50.0 Marks
Veterinary Biochemistry – Paper I				
VPB-112	(1 credit)	20 Marks	15.0 Marks	35.0 Marks
VPB-122	(2 credits)	40 Marks	25.0 Marks	65.0 Marks
Animal Genetics and Breeding – Paper I				
AGB-111	(2 credit)	30 Marks	20 Marks	50.0 Marks
AGB-121	(2 credits)	30 Marks	20 Marks	50.0 Marks
Livestock Production Management – Paper I				
LPM-111	(3 credits)	36 Marks	24 Marks	60.0 Marks
LPM-121	(1 credit)	12 Marks	8 Marks	20.0 Marks
LPM-122	(1 credit)	12 Marks	8 Marks	20.0 Marks
Animal Nutrition – Paper I				
ANN-111	(2 credits)	30 Marks	20 Marks	50.0 Marks
ANN-121	(2 credits)	30 Marks	20 Marks	50.0 Marks

***Marks to be proportionately converted to 30 for each course**

SECOND PROFESSIONAL YEAR

		Objective(60%)	Subjective(40%)	Total(100%)*
Veterinary Anatomy – Paper II				
VAN-211	(2 credits)	40 Marks	25.0 Marks	65.0 Marks
VAN-221	(1 credit)	20 Marks	15.0 Marks	35.0 Marks
Veterinary Physiology – Paper II				
VPB-221	(3 credits)	60 Marks	40 Marks	100.0 Marks
Veterinary Parasitology – Paper I				
VPA-211	(3 credits)	30 Marks	20.0 Marks	50.0 Marks
VPA-221	(1 credit)	10 Marks	05.0 Marks	15.0 Marks
VPA- 222	(2 credits)	20 Marks	15.0 Marks	35.0 Marks
Veterinary Microbiology – Paper I				
VMC-211	(1 credit)	30 Marks	20 Marks	50.0 Marks
VMC-221	(1 credit)	30 Marks	20 Marks	50.0 Marks
Veterinary Pathology – Paper I				
VPP-211	(1 credit)	20 Marks	15.0 Marks	35.0 Marks
VPP-221	(2 credits)	40 Marks	25.0 Marks	65.0 Marks
Livestock Production and Management – Paper II				
LPM-211	(1 credit)	20 Marks	15.0 Marks	35.0 Marks
LPM-221	(1 credit)	20 Marks	15.0 Marks	35.0 Marks
LPM-222	(1 credit)	20 Marks	10.0 Marks	30.0 Marks
Animal Genetics and Breeding – Paper II				
AGB211	(2 credits)	60 Marks	40 Marks	100.0 Marks
Animal Nutrition – Paper II				
ANN211	(2 credits)	60 Marks	40 Marks	100.0 Marks

***Marks to be proportionately converted to 30 for each course**

THIRD PROFESSIONAL YEAR

		Objective(60%)	Subjective(40%)	Total(100%)*
Veterinary Pharmacology – Paper I				
VPT-311	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
VPT-321	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
Veterinary Microbiology – Paper II				
VMC-311	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
VMC-321	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
Veterinary Pathology – Paper II				
VPP-311	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
VPP-321	(1 credit)	15 Marks	10.0 Marks	25.0 Marks
VPP-322	(1 credit)	15 Marks	10.0 Marks	25.0 Marks
Veterinary Public Health and Epidemiology – Paper I				
VPE-311	(2 credits)	30 Marks	20 Marks	50.0 Marks
VPE-321	(2 credits)	30 Marks	20 Marks	50.0 Marks
		Veterinary Biochemistry – Paper II		
VPB-321	(2 credits)	60 Marks	40.0 Marks	100.0 Marks
Livestock Products Technology – Paper – I				
LPT-311	(1 credit)	20 Marks	15.0 Marks	35.0 Marks
LPT-312	(1 credit)	20 Marks	15.0 Marks	35.0 Marks
LPT-321	(1 credit)	20 Marks	10.0 Marks	30.0 Marks
Veterinary & A.H. Extension – Paper I				
VAE-311	(2 credit)	30 Marks	20.0 Marks	50.0 Marks
VAE-321	(2 credit)	30 Marks	20.0 Marks	50.0 Marks

***Marks to be proportionately converted to 30 for each course**

FOURTH PROFESSIONAL YEAR

		Objective(60%)	Subjective(40%)	Total(100%)*
Veterinary Pharmacology – Paper II				
VPT-411	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
VPT-421	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
Veterinary Surgery & Radiology – Paper I				
VSR-411	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
VSR-421	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
Veterinary Gynaecology & Obstetrics – Paper I				
VGO-411	(2 credits)	40 Marks	25.0 Marks	65.0 Marks
VGO-421	(1 credit)	20 Marks	15.0 Marks	35.0 Marks
Veterinary Clinical Medicine – Paper I				
VMD-411	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
VMD-421	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
Veterinary Preventive Medicine – Paper I				
VMD-412	(2 credits)	30 Marks	20 Marks	50.0 Marks
VMD-422	(2 credits)	30 Marks	20 Marks	50.0 Marks

*Marks to be proportionately converted to 30 for each course

FIFTH PROFESSIONAL YEAR

		Objective(60%)	Subjective(40%)	Total(100%)*
Veterinary Surgery & Radiology – Paper II				
VSR-511	(1 credit)	60 Marks	40.0 Marks	100.0 Marks
Veterinary Gynaecology & Obstetrics – Paper II				
VGO-511	(1 credit)	60 Marks	40.0 Marks	100.0 Marks
Veterinary Clinical Medicine – Paper II				
VMD-511	(2 credits)	30 Marks	20.0 Marks	50.0 Marks
VMD-512	(1 credit)	15 Marks	10.0 Marks	25.0 Marks
VMD-513	(1 credit)	15 Marks	10.0 Marks	25.0 Marks
Veterinary Public Health & Epidemiology – Paper II				
VPE-511	(2 credits)	60 Marks	40 Marks	100.0 Marks
Veterinary & Animal Husbandry Extension – Paper II				
a) VAE511	(1 credit)	60 Marks	40 Marks	100.0 Marks

***Marks to be proportionately converted to 30 for each course**

B.V.Sc. & A.H. Degree Programme

(Semester System)

Revised Academic Rules, Regulations & Syllabus (2009-10 onwards)

(As per Veterinary Council of India Regulation) 2008

Rajiv Gandhi College of Veterinary and Animal Sciences,
Kurumbapet, Puducherry – 605 009.
(Affiliated to Pondicherry University)

The Rajiv Gandhi College of Veterinary & Animal Sciences (RAGACOVAS) was established by the Pondicherry Veterinary College Society (PVCS), a Society registered under Societies Registration Act by the Government of Puducherry. This college one of its kind fully funded by the Government of Puducherry and administered by a Governing Body with the Chief Secretary to the Government of Puducherry as its Chairman and Secretary, Animal Husbandry as its Vice Chairman and Dean of the College as Member Secretary.

The College offers a ten semester (5 year) under graduate programme as per the minimum standards of Veterinary Education, Degree Course – B.V.Sc. & A.H. Regulations, 1993 prescribed by the Veterinary Council of India (VCI), the Statutory Body which governs the Veterinary Education in the country. RAGACOVAS, since the day it came into its existence on 14th October, 1994 is adopting the course curriculum, syllabus and regulations laid down by the VCI. The College was recognized by the VCI in 1999. RAGACOVAS is permanently affiliated to Pondicherry University.

The semester wise syllabus, rules and regulations conforming to the standards prescribed by VCI are compiled in 1994 and revised in 2008, to serve as a reference manual for the faculty, students and academic authorities of the Pondicherry University.