।। सा विद्या या विमुक्तये ।।

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपूरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

ACADEMIC (1-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील तृतीय वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२१–२२ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, मा. विद्याशाखेने **दिनांक ३१ मे २०२१ रोजीच्या बैठकीतील केलेल्या शिफारशीप्रमाणे व दिनांक १२ जून २०२१ रोजी संपन्न झालेल्या ५१ व्या मा. विद्या परिषद बैठकीतील विषय क्र. २६/५१–२०२१**च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील तृतीय वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२१–२२ पासून लागू करण्यात येत आहेत.

1. B.Sc.-III Year-Biophysics
2. B.Sc.-III Year-Bioinformatics
3. B.Sc.-III Year-Biotechnology
4. B.Sc.-III Year-Biotechnology (Vocational)
5. B.Sc.-III Year-Botany
6. B.Sc.-III Year-Horticulture
7. B.Sc.-III Year-Agro Chemical Fertilizers
8. B.Sc.-III Year-Analytical Chemistry
9. B.Sc.-III Year-Biochemistry
10. B.Sc.-III Year-Chemistry
11. B.Sc.-III Year-Dyes & Drugs Chemistry
12. B.Sc.-III Year-Industrial Chemistry
13. B.C.A. (Bachelor of Computer Application)-III Year
14. B.I.T. (Bachelor of Information Technology)-III Year
15. B.Sc.-III Year-Computer Science
16. B.Sc.-III Year-Network Technology
17. B.Sc.-III Year-Computer Application (Optional)
18. B.Sc.-III Year-Computer Science (Optional)
19. B.Sc.-III Year-Information Technology (Optional)
20. B.Sc.-III Year-Software Engineering
21. B.Sc.-III Year-Dairy Science
22. B.Sc.-III Year-Electronics
23. B.Sc.-III Year-Environmental Science
24. B.Sc.-III Year-Fishery Science
25. B.Sc.-III Year-Geology
26. B. A./B.Sc.-III Year-Mathematics
27. B.Sc.-III Year-Microbiology
28. B.Sc.-III year Agricultural Microbiology
29. B.Sc.-III Year-Physics
30. B. A./B.Sc.-III Year Statistics
31. B.Sc.-III Year-Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.: शैक्षणिक–१/परिपत्रक/पदवी–सीबीसीएस अभ्यासक्रम/२०२१–२२/७५

दिनांक : १२.०७.२०२१.

स्वाक्षरित
सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :
१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.
७) अधीक्षक, परिक्षा विभाग विज्ञान व तंत्रज्ञान विद्याशाखा प्रस्तुत विद्यापीठ.

SWAMI RAMANAND TEERTH

MARATHWADA UNIVERSITY

NANDED

SYLLABUS

Of

DAIRY SCIENCE

B.Sc. Third Year
CHOICE BASED CREDIT SYSTEM
(CBCS)
Semester Pattern

Effective from June 2021

Distribution of credits for B.Sc. Dairy Science (optional)
Under the Faculty of Science
B.Sc. Syllabus Structure semester pattern Effective from June 2021
Subject: Dairy Science

Semester	Course No.	Name of the Course	Instruction Hrs. / week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
V	**DSEDS I (Section A)**	**Animal Nutrition (P-XII)**	03	45	10	40	50	2
	DSEDS I [(Section B) Elective]	**Reproduction in Farm Animals (P-XIII)**	03	45	10	40	50	2
	CCDSP II [DSEDS I& II (Section A)]	**Practical's based on (P- XII & PXIV) P-XVI**	03	20 Practical	10	40	50	2
	DSEDS II [SECDS III& IV (Section A)]	**SEC III (1 Skill/ optional)**	03	45	25	25	50	(02)*
VI	**DSEDS II (Section A)**	**Forage Production, Feeds and Feeding (P-XIV)**	03	45	10	40	50	2
	DSEDS II [(Section-B) Elective]	**Animal Genetics and Breeding (P-XV)**	03	45	10	40	50	2
	CCDSP III [DSEDS I & II (Section B)]	**Practical's based on(P- XIII & P-XV) P-XVII**	03	20 Practical	10	40	50	2
	DSEDS II [SECDS III& IV (Section B)])	**SEC IV/ (Project))**	03	45	25	25	50	(2)*
Total credits semester V and VI								12(04)*

*Note: ESE of CCDSPII, CCDSPIII & SECDS III& IV, DSEDS I, II should be evaluated at annual Skill Enhancement Course: One skill for each semester from any optional subject.
CCDS = Core Course Dairy Science
CCDSP= Core Course Dairy Science Practical
ESE= End of Semester Examination
CA= Continuous Assessment.

A) Theory Papers (Test / Seminar / Assignment)

B) Practical Paper (Record book & Submission / Excursion Report/ Visit Report

Swami Ramanand Teerth Marathwada University, Nanded
B. Sc. Third Year DAIRY SCIENCE
Choice Based Credit System (CBCS) - Semester Pattern

The Silent Features of the Course:

I. Livestock plays an important role in Indian economy. Livestock farming provides livelihood to two-third of rural community. There is lot of scope for generation of good self-employment in dairying.
II. Livestock farming is the most prolific segment of our Indian dairy industry.
III. Cattle and buffalo farming served as a cultural link with the modern dairy industry provide a technological base for diversification and dairy industry economically strong.
IV. Economic livestock production achieved by feeding of least cost rations and balanced rations.
V. The nature and quality of ration/diet required to the livestock for maintaining different body systems along-with requirement of ration for production.
VI. Goat rearing has been recommended as the best choice for the rural people in our country.
VII. India Ranks first for goat genetic resources. India's vast genetic resources in sheep reflected by the presence of number of breeds of sheep.
VIII. Buffaloes are reared for a verity of purposes and can be maintained under diverse environmental conditions.
IX. Animal breeding can be made a profitable business. Success or failure with farm animal depends upon animal breeder himself.
X. Dairy farmers keep livestock and are an integral part of Indian dairying the farm's system – providing manure to support arable crop growth.

Learning Objectives:

The course is framed for getting the students acquainted with the breeding and nutritional aspects of important livestock and to provide students opportunities to learn about:

- The anatomy and physiology of digestive system
- Role of various nutrients in animal nutrition.
- To introduce learners to key concepts of feeds and cultivation practices of various fodders.
- To enlighten the student about processing and preservation Technology of feeds and fodders
- The basic genetic principles applied in breeding of animals to increase their productivity.
- The knowledge of reproduction and different breeding systems along-with application of bio-techniques will be provided to the students.

Utility of the Course:

- After completing one can work as a livestock supervisor in a various well established dairy farm and animal breeding farm.
- Understanding concept of cattle and buffalo breeding.
- Understanding concept of conservation of Animal Genetic Resources.
- Job Opportunities as wage employment in Veterinary Assistant/Livestock assistant/Dairy farm assistant, Artificial insemination assistant/inseminator/Farm supervisor/Farm assistant, Fodder production assistant/Supervisor/LSS.
- Self-Employment as Dairy farm owner , Fodder producer , Cattle feed , Artificial insemination centre owner

Prerequisites:

1. The new courses introduced will require additional infrastructure in terms of equipment for conducting the practical classes.
2. New technologies and new instrumental techniques will be indispensable in implementation of the new curricula.
3. To know the basic knowledge of Animal nutrition and animal breeding.
4. Sound demonstrable knowledge and skills pertinent to the animal science
5. To calculate feed and fodder requirement for different classes of animals.
6. To prepare quality feeds.
7. To diagnose heat period.
8. Artificial insemination techniques and pregnancy diagnosis.
9. Production of fodder crops.
10. Operation and maintenance of audio-visual aids.

Swami Ramanand Teerth Marathwada University, Nanded
CHOICE BASED CREDIT SYSTEM (CBCS)
Semester Pattern Dairy Science
B.Sc. Third Year
DSEDS I and Semester - V
SECTION – A
Title: Animal Nutrition
Theory Paper No. XII

Marks – 50 /Credits – 0 2 **3 Periods per week**

UNIT – I **No. of periods 10**

- Introduction to Animal Nutrition: Nutritional terms and their definitions.
- Anatomy of Ruminant's digestive system
- Study of Digestive system of Poultry.
- Rumen ecosystem and Rumen manipulation.

UNIT – II **10**

- Definition, classification of nutrients, Importance of nutrients in animal nutrition: Water, Carbohydrates, Proteins, Lipids, Minerals and Vitamins.

UNIT – III **13**

- Digestion, absorption, metabolism of carbohydrates, proteins, lipids
- Digestibility – Digestibility of nutrients, Digestion trials, factors affecting digestibility.

UNIT – IV **12**

- **Evaluation of energy value of feed –**
  GE, DE, ME, NE, SE, TDN, HI, NR
- **Estimation of energy Value of feeds by –**
  - C N Balance technique
  - Bomb Calorimeter
  - Calculation of TDN by digestion trials
  - Chemical composition
- **Estimation of Protein value of feeds by –**
  - PER, B.V., Net protein utilization
  - DCP estimation by digestion trials
  - Nitrogen Balance experiments
  - NPN substances as a source of proteins

Swami Ramanand Teerth Marathwada University, Nanded

Choice Based Credit System (CBCS)

B.Sc. Third Year Dairy Science

DSEDS I and Semester – V

Section – B (Elective)

Title: Reproduction in farm animals

Theory Paper No. XIII

Max. Marks 50/ Credits – 0 2	**3 periods per week**

UNIT – I	**No. of periods 07**

- Introduction to Animal Reproduction.
- Anatomy of Reproductive system of cattle.
- Study of Gametogenesis.
  Maturation of Sperm and Ovum.

UNIT – II	**10**

- Study of Puberty and factors affecting on puberty.
- Oestrus cycle and its phases.
- Fertility, breeding efficiency and factors affecting on breeding efficiency.
- Sterility and causes of sterility.

UNIT – III	**14**

- Fertilization, pregnancy, parturition in cow and buffalo.
- AI -Time and Technique, Advantages and disadvantages.
- Semen collection, evaluation, freezing, handling and transport.

UNIT – IV	**14**

- Bio techniques are animal reproduction.
- Oestrus synchronization.
- E.T.T., cloning.
- Super ovulation, Superfoetation.

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS)
Semester Pattern
B.Sc. Third Year Semester V Dairy Science
DSEDS - II and Semester – VI
Section – A
Title: Fodder production, feeds and feeding

Theory Paper No. XIV

Max. Marks 50 /Credits – 0 2 **3 periods per week**

UNIT – I	**No. of periods 10**

- Classification of feeds.
- Importance of concentrates and roughages.
- Feed additives, feed supplements.
- Antibiotics and Growth Promoters.
- Probiotics in Animal Nutrition.
- Hormones and Hormonal preparations.

UNIT – II	**13**

- Cultivation of green forages, their nutritional characteristics and importance in animal Nutrition.
- Cultivation of Legumes-Lucerne, Berseem, Cowpea, Subabul.
- Cultivation of Non Legumes-Jowar, Maize, Oat, Bajra.
- Cultivation of Grasses-Napier, Para grass, Gajraj, Stylo.

UNIT-III	**12**

- Ration – Definition, types of ration.
- Feeding practices for different categories of animals - Dry, Pregnant, Lactating cow and buffalo, breeding bull.
- Processing of feeds and fodders – Physical and Chemical treatment.

UNIT-IV	**10**

- Significance of fodder preservation.
  - **Silage making:** Principles and steps is silage making. Ensiling, Bio-chemical changes during ensiling, Quality and characteristics of silage.
  - **Hay Making:** Principles, types, curing of hay, quality, and characteristics of hay.
- Pasture management and grazing systems.

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS)
Semester Pattern
B.Sc. Third Year Semester V Dairy Science
DSEDS - II and Semester – VI
Section – B (Elective)
Title: Animal Genetics and Breeding
Theory Paper No. XV

Max. Marks 50/ Credits – 0 2 **3 periods per week**

UNIT – I **No. of periods 10**

- Introduction to Animal Genetics.
- Animal genetic resources, conservation and approach related to regional aspect.
- Gene, its function.
- Mendel's laws of inheritance.
- Random mating, Hardy Weinberg equilibrium.

UNIT – II **10**

- Qualitative and quantitative traits.
- Variation and causes of variation.
- Sex linked inheritance.
  Sex influenced inheritance and sex limited inheritance.
- Genotypic and phenotypic parameters in cattle.
- Factors to be considered while preparing Breeding plans.

UNIT-III **13**

- Systems of animal breeding.
- Inbreeding – Methods, effects on growth, production.
- Out breeding – Methods, effects on growth, production.
- Buffalo breeding in India.
- Review of cattle crossbreeding policy in India.

UNIT – IV **12**

- Selection
- Choosing traits for selection
- Heritability of traits
- Selection methods: Performance method, Pedigree selection, Progeny testing, Tandem method.
- Effects of selection.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
Choice Based Credit System (CBCS) Semester Pattern DAIRY SCIENCE
B. Sc. Third Year
CCDSP II [DSEDS - I&II (SECTION A) Annual Pattern
Practical's based on Theory paper (XII & XIV)
Practical Paper No. XVI

Max. Marks 50 /Credits – 0 2 **One practical of 3 periods per week**

01. General precautions in Nutrition laboratory.
02. Collection of fodder samples and preparation of samples for chemical analysis.
03. Proximate principles of feeds.
04. Determination of DM and Moisture content in feeds.
05. Determination of ether extract.
06. Determination of crude fiber.
07. Determination of Nitrogen and crude Protein.
08. Determination of Ash.
09. Silage Making.
10. Hay Making.
11. Feed preparations processing and atomization in animal feeding.
12. Feeding standards and nutrient requirement to different categories of livestock, feed formulations
13. Computation of ration for different categories of animals.
14. Preparation of UMMB, UROMOL.
15. Preparation of calf starter, milk replacer and mineral mixture.
16. Preparation of cropping scheme of fodder crops.
17. Feeds and fodder collection.
18. Visit to feed factory,

    Visits to – animal farms, Agriculture College, veterinary colleges. Agro Industries.

    BAIF Urulikanchan & Chitale dairy farm etc.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

CHOICE BASED CREDIT SYSTEM (CBCS) SEMESTER PATTERN

B Sc. Third Year Dairy Science **DSEDS-II (SECDS III & IV) and Semester-V**

Skill Enhancement Course work III

Credits – 0 2 /Marks 50 **3 Lectures per Week/**

Total Periods 45

Skill Enhancement Course SECDS-III (A)

Feed processing and preparation

1. Classification of feeds 10
2. Feeding stuff and their nutritive value
3. Comparative Study of
    - Roughages and Concentrates
    - Succulent and non-succulent fodders
    - Cereal and Leguminous roughages
    - Conventional and Non-conventional feeds
4. Ration - 10
    - Types
    - Principles of rationing
    - Computation of ration
5. Feed Processing – 10
    - Importance and significance
    - Physical Treatment
    - Chemical Treatment
    - Microbiological Treatment
6. Preparation of Feeds – 10
    - Concentrate mixture
    - Calf starter
    - Milk replacer
    - Feed supplements, feed additives
    - Non-conventional feeds
    - Feed mixtures with non-conventional Agro industrial by products
7. Visit to Feed Processing Plants, Feed factory. 05

-OR-

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

CHOICE BASED CREDIT SYSTEM (CBCS) SEMESTER PATTERN

B Sc. Third Year Dairy Science DSEDS-II (SECDS III & IV) and Semester-V

Skill Enhancement Course work III

Credits – 0 2 /Marks 50 **3 Lectures per Week/**

Total Periods 45

Skill Enhancement Course SECDS-III (A)

Conservation of Greens

1. Principles of conservation. 10
2. Significance.
3. Suitable crops for conservation and stage of harvesting.
4. Silage making - 15
    - Definition, Standards of Silage.
    - Types of silo pits and their dimensions.
    - Ensiling, care during and after ensiling.
    - Chemical changes during ensiling.
5. Hay Making – 10
    - Definition.
    - Characteristics of good quality hay.
    - Curing of hay (Hay making process)
    - Factors affecting quality of hay.
6. Visit to silage and hay making unit. 10

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
Choice Based Credit System (CBCS) Semester Pattern DAIRY SCIENCE
B. Sc. Third Year
CCDSP III [(DSEDS I &II (SECTION B)] Annual Pattern
Practical's based on Theory paper (XIII & XV)
Practical Paper No. XVII

Max. Marks 50 **One practical of 3 periods per week**

1. Study of reproductive organs of cattle on Charts / Models /Specimens.
2. Estimation of gene frequency.
3. Estimation of genotype frequency.
4. Estimation of most probable producing ability in cow.
5. Estimation of breeding efficiency of the cow.
6. Study of section slides – spermatogenesis, oogenesis, maturation of sperm, ovum.
7. Judging of dairy cattle.
8. Preparation of heat expectancy chart.
9. Estimation of sire index.
10. Assembling and preparation of artificial vagina, collection of Semen by AV method.
11. Macroscopic examination of semen.
12. Microscopic Examination of normal spermatozoa in cattle and buffalo.
13. Bacteriological examination of semen.
14. Estimation of pH of semen.
15. Enumeration of the total sperms per unit volume of semen.
16. Preparation of semen extenders.
17. Determination of mobility of spermatozoa.
18. Study of AI equipments and insemination of cow in oestrus.
19. Pregnancy diagnosis in cow and buffalo.
20. Visit to – Cattle and Buffalo breeding farms.
    Slaughterhouse
    AI Center
    Semen collection center.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

CHOICE BASED CREDIT SYSTEM (CBCS) SEMESTER PATTERN

B Sc. Third Year Dairy Science DSEDS II and Semester-VI

Skill Enhancement Course work IV

Credits – 0 2 /Marks 50 **3 Lectures per Week**

Total Periods 45

Skill Enhancement Course SECDS-IV (B)
Artificial Insemination

1. Study of male and female reproductive system	05
2. Garnetogenesis, oestrus cycle	05
3. Semen Definition Collection by AV method Collection technique Evaluation Freezing, Handling & Storage	10
4. Heat detection	03
5. Study of AI Equipments	05
6. Time and Technique of AI	02
7. Pregnancy diagnosis.	05
8. Visits to VET Hospitals and AI centre.	10

-OR-

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

CHOICE BASED CREDIT SYSTEM (CBCS) SEMESTER PATTERN

B Sc. Third Year Dairy Science DSEDS II and Semester-VI

Skill Enhancement Course work IV

Skill Enhancement Course SECDS-IV (B)

Title: Reproduction in Sheep, Goat, Poultry and Pig

Marks – 50/ credit-2 **3 Periods per week**

Total periods -45

UNIT – I **No. of periods 10**

- Study of male reproductive system of sheep
- Study of female reproductive system of sheep
- Study of symptoms of heat in sheep and goat
- heat detection in sheep and goat

UNIT – II **10**

- pregnancy,lambing, kidding
- Pregnancy diagnosis in goat
- A.I. Techniques in sheep and goat
- Limitations of A.I. in sheep and goat

UNIT – III **10**

- Reproduction in Poultry
- Reproductive systems of poultry
- Breeding methods in poultry
- Hatchery management in poultry
- Management of layer and grower.

UNIT – IV **10**

- Reproductive system of pig
- Breeding methods in pig
- Adaptability of crossbreeding in tropics
- A.I. Techniques in pig
- Visits: goat and sheep breeding farm **05**
  Poultry farm, hatchery farm
  Pig farm

LIST OF EQUIPMENT'S

1. A.I Set
2. AV Set
3. Bacteriological incubators
4. Bombs calorimeter
5. Calorimeters
6. Digestion Flask
7. Distillation units
8. Equipment for preparation of unconventional feeds
9. Feed processing equipment's
10. Fiber estimation apparatus
11. Heating units, heat exchangers
12. Hot air oven
13. Kjeldahl apparatus
14. Laboratory glassware's and required chemicals
15. Microscope, Colony counter, Inoculation chamber
16. Models of Cattle, Buffalo, Digestive system
17. Models of Cattle, Buffalo, Reproductive system
18. Muffle furnace
19. Silage making equipment's
20. Soxhlet extraction apparatus
21. Spermoscope
22. Stainless steel and iron pans, Laddle, spoons, scrapers
23. Various types of brushes
24. Weighing scales, balances

LIST OF REFERENCE BOOKS.

1. Reproduction in farm animals - C.N. Sane & Others
2. Animal nutrition & feeding practices in India. - S.K. Ranjhan
3. Hand book of Indian dairy farmers - Patrick John.
4. A Textbook of genetics - Dalela R.C. & S.R. Verma
5. A textbook of animal husbandry - G.C.Banerjee
6. Feeds and Feeding - G.B. Morrison
7. Livestock production and management. - NSR Sastri & Thomas
8. A textbook of animal nutrition - G.C. Banerjee
9. Genetics and Breeding in farm animals - Banerjee & Mukhargee
10. Reproduction in farm animals – Hafeez
11. Animal Nutrition - Maynord & Loosli.
12. Handbook & physiology of farm animals - R.D. Frandson.
13. Anatomy & Physiology of farm animals - R.D. Frandson.
14. Principles and practices of dairy farm management - Jagdish Prasad
15. Modern dairy cattle management - Wiltam N. Etgas
16. A textbook of animal Husbandry & Dairy Science - Jagdish Prasad.
17. Dairy Cattle feeding & Management - Wiltam N. Etgas.
18. Handbook of animal husbandry sciences - Amlendy Chakrabarti.
19. Livestock feeding & management - Sing & Moor.
20. Laboratory manual for nutrition research - S.K. Rajan & Gopal Krishna.
21. The science of animal Husbandry - Balkely & Bade.
22. Principles of Dairy Science - G.H. Schmidt, L.D. Vleck
23. Dairy Cattle: Principles, practices, Problems & profits. - Donald L Bata, Frank
24. Milk Production in Tropics - A. Chemberlin
25. Analytical Techniques in animal nutrition research - N. N. Pathak, D.N. Kansra,

    R. C. Jakhmola
26. Analytical Techniques in animal nutrition - P.C. Gupta, V.A. Sharma, A.B. Maudar.
27. Animal Nutrition - Cramptom and Harris

28. Applied Nutrition - D.V. Reddy
29. Nutritional microbiology of farm animals - D.N. Karma, N.N. Pathak
30. Genes and Evolution – JHA
31. Cattle Embrayo Transfer Procedure – Curtis
32. Genetics of Livestock improvement - John F. Lasley
33. An introduction to Genetics - B.K. Jain
34. A Test book of Animal Nutrition - D.N. Verma

Dr. A S. Hembade
BOS Chairman

Swami Ramanand Teerth Marathwada University Nanded
B. Sc. Third year CBCS and Annual Pattern
Practical question Paper Proforma
Laboratory Course
(Annual pattern) Paper- XVI

Time : 3 Hrs. **Marks : 40**

Q. 1.	Computation of ration / Cropping Scheme.	10
Q. 2.	Spotting – Laboratory equipment's, Glassware's used in analysis, Digestive system, Feeds and Fodders. (ANY TEN SPOTS)	10
Q.3.	Proximate analysis DM/EE/CF/CP/NFE/Ash. OR Silage making / Hay making.	10
Q.4.	UMMB / UROMOL/ Calf starter/ Milk replacer / Mineral mixture	10

Internal/C.A.: Record book, viva-voce and Excursion / visit report
Collection of feeds and fodders. 10

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B. Sc. Third year CBCS and Annual Pattern
Practical question Paper Proforma
Laboratory Course
(Annual pattern) Paper- XVII

Time : 3 Hrs.	**Marks : 40**

Q.1.	Spotting – Reproductive organs, Equipments of AI and AV Section. Slides (ANY TEN SPOTS)	10
Q.2.	Estimation of gene frequency / Genotype frequency / sire index/ Pregnancy Diagnosis /Estimation of Breeding Efficiency of the cow/ Preparation of Heat expectancy chart / Estimation of Most Probable Producing Ability in the cow.	10
Q.3.	Estimation of pH of semen / Bacteriological Examination of semen / Preparation of semen extender / assembling and preparation of AV.	10
Q.4.	Macroscopic examination of semen / Enumeration of the total sperm/ sperm count per unit volume of semen / Determination of mobility of Spermatozoa.	10

Internal / C.A. : Record book, viva-voce and Excursion / visit report. 10

Swami Ramanand Teerth Marathwada University Nanded Semester Pattern
Curriculum under Choice Based Credit System (CBCS) Pattern
For Faculty of Science Under Graduate (U.G.) Programmes
Subject: Dairy Science
Skill Enhancement Course Dairy Science (SECDS) III & IV
End of Semester Examination (ESE)
Maximum Marks 25

SEAT NO.

MARK HEET

Sr. No.	End of Semester Examination (CA) (ESE)	Maximum Marks	Obtained Marks
1.	Skill Work report	10	
2.	Skill Work Presentation	10	
3.	Submission, Viva voce & others if any	05	
4.	Total Marks	25	

Name & Signature of

Examiner 1:

Examiner 1 :

Continues Assessment (CA)

Maximum Marks 25

SEAT NO.

MARK HEET

Sr. No.	End of Semester Examination (CA) (ESE)	Maximum Marks	Obtained Marks
1.	SKILL WORK REPORT SEMINAR		
2.	PRACTICAL SKILL TEST		
3.	TOTAL MARKS		