



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

Course Detail and Evaluation Scheme (Effective from the Session 2015-16)

B. Sc.Agriculture (Honours)
1st YEAR, SEMESTER-I

S.No.	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	BSA-101	Principles of Agronomy and Agricultural Meteorology	3	0	0	20	20	60	100	3
2.	BSA -102	Principles of Genetics	3	0	0	20	20	60	100	3
3.	BSA -103	Introduction to Soil Science	2	0	0	20	20	60	100	2
4.	BSA -104	Fundamentals of Soil and Water Conservation Engineering	2	0	0	20	20	60	100	2
5.	BSA -105	Plant Pathogens and Principles of Plant Pathology	3	0	0	20	20	60	100	3
6.	BSA -106	Production technology of fruit crops	3	0	0	20	20	60	100	3
7.	BSA -107	Introductory Agriculture (Ancient Heritage, Agriculture Scenario and Gender Equity in Agriculture)	2	0	0	20	20	60	100	2
PRACTICAL										
8.	BSA-151	Principles of Agronomy and Agricultural Meteorology (Lab)	0	0	1	30	20	50	100	1
9.	BSA -152	Introduction to Soil Science (Lab)	0	0	1	30	20	50	100	1
10.	BSA -153	Production technology of fruit crops (Lab)	0	0	1	30	20	50	100	1
			18	0	3	230	200	570	1000	21

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

- Attendance: 5 Marks
- Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

- First Mid Term Examination: 10 marks
- Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- Course with practical components only**



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For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

- a. First Mid Term Examination: 10 marks
- b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

Signature: 1..... 2..... 3.....
Name :
Date : **(Convener)**

External Members:

Signature: 1..... 2..... 3.....
Name :
Date :



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

Course Detail and Evaluation Scheme (Effective from the Session 2015-16)

B. Sc. Agriculture (Honours)
1st YEAR, SEMESTER-II

S.No.	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	BSA-208	Introductory Nematology	2	0	0	20	20	60	100	2
2.	BSA-209	Water Management including micro irrigation	3	0	0	20	20	60	100	3
3.	BSA-210	Principles of Seed Technology	1	0	0	20	20	60	100	1
4.	BSA-211	Dimensions of Agricultural Extension	1	0	0	20	20	60	100	1
5.	BSA-212	Protected cultivation and Post Harvest Technology	2	0	0	20	20	60	100	2
6.	BSA-213	Introduction to Computer Application	1	0	0	20	20	60	100	1
7.	BSA-214	Soil Chemistry, Soil Fertility and Nutrient Management	3	0	0	20	20	60	100	3
8.	BSA-215	Principles of Plant Breeding	2	0	0	20	20	60	100	2
9.	BSA-216	Comprehension and Communication Skills in English	1	0	0	20	20	60	100	1
PRACTICAL										
10.	BSA-254	Protected cultivation and Post Harvest Technology	0	0	1	0	0	20	20	1
11.	BSA-255	Introduction to Computer Application	0	0	1	0	0	20	20	1
12.	BSA-256	Principles of Plant Breeding	0	0	1	0	0	20	20	1
13.	BSA-257	Comprehension and Communication Skills in English	0	0	1	0	0	20	20	1
14.	BSA-258	Principles of Seed Technology	0	0	1	0	0	20	20	1
TOTAL			16	0	5	180	180	640	1000	21

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination
Evaluation Scheme:

- Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

3. Attendance: 5 Marks

4. Assignments/ Quiz / Seminar/Term paper /Project :15Marks



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MTE - Mid Term Examination: 20 Marks

- a. First Mid Term Examination: 20 marks
- b. Second Mid Term Examination: 20 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

- a. First Mid Term Examination: 20 marks
- b. Second Mid Term Examination: 20 marks

ETE - End Term Examination: 40 Marks

Internal Members:

Signature: 1..... 2..... 3.....

Name :

Date : **(Convener)**

External Members:

Signature: 1..... 2..... 3.....

Name :

Date :



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

Course Detail and Evaluation Scheme (Effective from the Session 2016-17)

B. Sc.Agriculture (Honours) 2nd YEAR, SEMESTER-III

S.No.	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	BSA-317	Field Crop I (Kharif)	2	0	0	20	20	60	100	2
2.	BSA-318	Insect Morphology and Systematics	2	0	0	20	20	60	100	2
3.	BSA-319	Principles of Agriculture Economics	2	0	0	20	20	60	100	2
4.	BSA-320	Farm Power and Machinery	1	0	0	10	10	30	50	1
5.	BSA-321	Agriculture Microbiology	1	0	0	10	10	30	50	1
6.	BSA-322	Statistics	1	0	0	10	10	30	50	1
7.	BSA-323	Production Technology of Vegetables and Flowers	2	0	0	20	20	60	100	2
8.	BSA-324	Livestock production and Management	2	0	0	20	20	60	100	2
PRACTICAL										
9.	BSA-359	Field Crop I (Kharif) Lab	0	0	1	0	0	50	50	1
10.	BSA-360	Insect Morphology and Systematics Lab	0	0	1	0	0	50	50	1
11.	BSA-361	Farm Power and Machinery Lab	0	0	1	0	0	50	50	1
12.	BSA-362	Agriculture Microbiology	0	0	1	0	0	50	50	1
13.	BSA-363	Statistics Lab	0	0	1	0	0	50	50	1
14.	BSA-364	Production Technology of Vegetables and Flowers Lab	0	0	1	0	0	50	50	1
15.	BSA-365	Livestock production and Management Lab	0	0	1	0	0	50	50	1
		TOTAL	13	0	7	130	130	740	1000	20

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination
Evaluation Scheme:

- Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

5. Attendance: 5 Marks
6. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

- a. First Mid Term Examination: 10 marks
- b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- Course with practical components only**



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For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks
a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

Signature: 1..... 2.....
3.....

Name :

Date : **(Convener)**

External Members:

Signature: 1..... 2..... 3.....

Name :

Date :



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Course Detail and Evaluation Scheme (Effective from the Session 2016-17)

B. Sc.Agriculture (Honors) 2nd YEAR, SEMESTER-IV

S.No.	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	BSA-425	Field Crop II (Rabi)	2	0	0	20	20	60	100	2
2.	BSA-426	Manures, Fertilizers and Agro-Chemicals	3	0	0	20	20	60	100	3
3.	BSA-427	Insect Ecology and Integrated Pest management including beneficial insects	3	0	0	20	20	60	100	3
4.	BSA-428	Agriculture finance and co-operation	1	0	0	10	10	30	50	1
5.	BSA-429	Diseases of field crops and their management	2	0	0	20	20	60	100	2
6.	BSA-430	Production Technology of spices, aromatics, medicinal and plantation crops	2	0	0	20	20	60	100	2
7.	BSA-431	Breeding of field crops	2	0	0	20	20	60	100	2
8.	BSA-432	Processing of milk and milk Products	1	0	0	10	10	30	50	1
PRACTICAL										
9.	BSA-466	Field Crop II (Rabi)	0	0	1	0	0	50	50	1
10.	BSA-467	Agriculture finance and co-operation	0	0	1	0	0	50	50	1
11.	BSA-468	Diseases of field crops and their management	0	0	1	0	0	50	50	1
12.	BSA-469	Production Technology of spices, aromatics, medicinal and plantation crops	0	0	1	0	0	50	50	1
13.	BSA-470	Breeding of field crops	0	0	1	0	0	50	50	1
14.	BSA-471	Processing of milk and milk Products	0	0	1	0	0	50	50	1
		TOTAL	16	0	6	140	140	720	1000	22

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

7. Attendance: 5 Marks

8. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks



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ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

Signature: 1..... 2..... 3.....

Name :

Date : **(Convener)**

External Members:

Signature: 1..... 2..... 3.....

Name :

Date :



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

Course Detail and Evaluation Scheme (Effective from the Session 2017-18)

B. Sc. Agriculture (Honours)
3rd YEAR, SEMESTER-V

S. No.	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	BSA-533	Farming Systems and Sustainable Agriculture	1	0	0	10	10	30	50	1
2.	BSA-534	Biochemistry	2	0	0	20	20	60	100	2
3.	BSA-535	Crop Pests and Stored grain pests and their management	2	0	0	20	20	60	100	2
4.	BSA-536	Agricultural marketing trade and prices	1	0	0	10	10	30	50	1
5.	BSA-537	Fundamental of Agri-business management (including product development , appraisal and monitoring)	1	0	0	10	10	30	50	1
6.	BSA-538	Fundamentals of Rural Sociology and Educational Psychology	2	0	0	20	20	60	100	2
7.	BSA-539	Post-harvest management and value addition of fruits and vegetables	1	0	0	10	10	30	50	1
8.	BSA-540	Disease of Horticultural Crops and their management	2	0	0	20	20	60	100	2
PRACTICAL										
9.	BSA-572	Farming Systems and Sustainable Agriculture	0	0	1	0	0	50	50	1
10.	BSA-573	Biochemistry	0	0	1	0	0	50	50	1
11.	BSA-574	Crop Pests and Stored grain pests and their management	0	0	1	0	0	50	50	1
12.	BSA-575	Agricultural marketing trade and prices	0	0	1	0	0	50	50	1
13.	BSA-576	Post-harvest management and value addition of fruits and vegetables	0	0	1	0	0	50	50	1
14.	BSA-577	Fundamental of Agri-business management (including product development , appraisal and monitoring)	0	0	1	0	0	50	50	1
15.	BSA-578	Disease of Horticultural Crops and their management	0	0	1	0	0	50	50	1



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16.	BSA-579	Practical Crop Production I (Cereals, pulses and fodder crops)	0	0	1	0	0	50	50	1
		TOTAL	12	0	8	140	140	760	1000	20

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

9. Attendance: 5 Marks

10. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks

b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

Signature: 1..... 2..... 3.....

Name :

Date : **(Convener)**

External Members:

Signature: 1..... 2..... 3.....

Name :

Date :



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**Course Detail and Evaluation Scheme
(Effective from the Session 2017-18)
B. Sc. Agriculture (Honours)
3rd YEAR, SEMESTER-VI**

S. No.	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	BSA-641	Production Economics and Farm Management	1	0	0	20	20	60	100	1
2.	BSA-642	Extension Methodologies for Transfer of Agricultural Technology	1	0	0	20	20	60	100	1
3.	BSA-643	Principles of Plant Bio-Technology	2	0	0	20	20	60	100	2
4.	BSA-644	Entrepreneurship Development and Communication Skills	2	0	0	20	20	60	100	2
5.	BSA-645	Organic Farming	3	0	0	0	20	60	100	3
6.	BSA-646	Environmental Science	2	0	0	20	20	60	100	2
7.	BSA-647	Weed Management	1	0	0	10	10	30	50	1
8.	BSA-648	Renewable Energy	2	0	0	20	20	60	100	2
PRACTICAL										
9.	BSA-680	Production Economics and Farm Management	0	0	1	0	0	50	50	1
10.	BSA-681	Extension Methodologies for Transfer of Agricultural Technology	0	0	1	0	0	50	50	1
11.	BSA-682	Principles of Plant Bio Technology	0	0	1	0	0	50	50	1
12.	BSA-683	Weed Management	0	0	1	0	0	50	50	1
13.	BSA-684	Practical Crop Production II (Oilseed and commercial crops)	0	0	1	0	0	50	50	1
		TOTAL	14	0	5	110	110	780	1000	19

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

• **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

11. Attendance: 5 Marks

12. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks



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b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**
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Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

- a. First Mid Term Examination: 10 marks
- b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

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1st Year, SEMESTER-I

BSA 101- Principles of Agronomy and Agricultural Meteorology

L T P
3 0 1

Credit:4

Unit- I: Agronomy and its Scope

Agronomy- definition ,meaning and Scope of Agronomy, Relation of agronomy to other sciences.Role of agronomist,Agroclimatic zones of India and Uttar Pradesh by Planning Commission, Classification by ICAR. Agroecological zones of India. Boundaries and scale. National and International Research Institutions in India.

Unit-II: Earth and Atmosphere

Earth's atmosphere, composition and structure, Solar radiation, nature, properties, depletion, solar constant and energy balance, Atmospheric temperature, factors affecting, horizontal and vertical Distribution , variations and global warming

Unit-III: Agriculture Practices

Definition, objectives and classification of tillage and tillage implements, Crops stand establishment Planting geometry and its effect on growth and yield of the crop. Cropping systems and types of cropping system, Cropping patterns, Crop Rotation. Farming system, Cropping Scheme, Cropping intensity, Mixed Farming, Harvesting and Harvesting Index,

Unit-IV: Agriculture Meteorology

Agriculture Meteorology -weather and climate, micro-climate, weather elements, Air pressure variation Wind : factors affecting, cyclones and anticyclones and general circulation Atmospheric humidity, vapour pressure and saturation, process of condensation, formation of dew, fog, mist, snow, rain and hail Formation and classification of clouds. Introduction to monsoon, basics of weather forecasting.

Recommended Text Books

1. Principles of Agronomy- S.R. Reddy(1999) Kalyani Publications , New Delhi.
2. Agriculture Meteorology - GSLHV Prasad Rao

Recommended Reference Books

1. Hand book of Agriculture – ICAR Publication (2000)
2. Introduction to Agronomy and Soil and Water management – V.G. Vaidya and K.K. Sahatrabudhe
3. Climatology - Lal, D.S. (1997), Sharda, Pustak Bhawan Publication, Allahabad
4. A practical guide on Agrometeorology - A.P K.K. Agrawal and. Upadhyay
5. Basic Principles of agriculture Meteorology - V. Radha Krishna Murthy



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA 151- Principles of Agronomy and Agricultural Meteorology Lab

List of Experiments :

1. Study of tillage implements
2. Study of seeding equipments
3. Study of methods of sowing of field crops.
4. Study about manures, fertilizers and green manure crops / seeds (including calculation)
5. Methods of fertilizer application
6. Study of intercultivation implements and practices
7. Study of temperature, wind , rainfall and evaporation equipments.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

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1st Year, SEMESTER-I BSA-102 Principles of Genetics

LT P
3 0 0

Credit:3

Unit- I: Genetics and Gene action

Definition of Genetics and its importance, Mendel's laws of inheritance and exceptions to the laws. Types of gene action. Multiple alleles, Pleiotropism, Penetrance and expressivity Quantitative traits, qualitative traits and differences between them. Multiple factor hypothesis, Cytoplasmic inheritance, its characteristics features and difference between chromosomal and cytoplasmic inheritance.

Unit-II : Cell structure and cell multiplication

Definition ,Ultra structure of cell and cell organelles an their functions. Mitosis and meiosis, their significance and differences between them.

Unit –III: Gene and Chromosome

Lac operon and fine structure of gene. Study of chromosome structure, morphology, number and types, Karyotype and Idiogram, DNA and its structure, function, types, modes of replication and repair RNA and its structure, function and types. Transcription, Translation, Genetic code and outline of protein synthesis. Crossing over and factors affecting it, Mechanism of crossing over and Cytological proof of crossing over Structural chromosomal aberrations. Numerical chromosomal aberrations (Polyploidy) and evolution of different crop species like Cotton, Wheat, Tobacco, Triticale and Brassicas.

Unit-IV: Mutation

Definition and its characteristics features, Methods of inducing mutations and CIB technique, gene expression and differential gene activation.

Recommended Text Books-

1. Fundamentals of Genetics – B.D. Singh, Kalyani Publisher
2. Elements of Genetics – Phundan Singh, Kalyani Publisher

Recommended Reference Books-

1. Manual of Practical genetics – Singh, Chouhan and Katiyar Kalyani Publisher
2. Cytogenetical practices – Choubey and Bhardwaj, Kalyani Publisher.



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1st Year, SEMESTER-I BSA-103 Introduction to Soil Science

L T P
3 0 0

Credit:3

Unit-I: Soil and its Properties

Soil Pedological and Edaphological concepts, Origin of the earth, Earth's crust. Elementary knowledge of soil, classification and soils of India. Composition: rocks and minerals weathering. Soil formation factors and processes, Components of soils. Soil profile description. Diagnostic horizons. Soil physical properties, Soil texture, Textural classes, Particle size analysis. Soil structure classification, soil aggregates, their significance in crop production. Soil consistency, soil crusting, soil compaction, soil colors. Bulk density and particle density of soils and porosity, their significance and manipulation.

Unit-II: Factors affecting soil

Soil water, Retention and potentials, soil moisture constants. Movement of soil water, infiltration, percolation, permeability, drainage. Methods of determination of soil moisture. Thermal properties of soils, Soil temperature. Soil air, Gaseous exchange, Influence of soil temperature and air on plant growth. Soil colloids, properties, nature, types and significance. Layer silicate clays, their genesis and sources of charges. Adsorption of ions, Ion exchange, CEC and AEC. Factors influencing ion exchange and its significance.

Unit-III: Soil and organic matters

Soil organic matter, composition, Decomposability, Humus Fractionation of organic matter. Carbon cycle, C:N ratio. Soil biology, Biomass, Soil organisms and their beneficial and harmful roles.

Recommended Text Books-

1. Fundamentals of Soil Science – ICAR Publication, New Delhi
2. The Nature and Properties of Soil – Brady, N.C. & Weil, R.R., Macmillan

Recommended Reference Books-

1. Soil Physics – M.C. Oswal, Oxford & IBH Publishing Co.
2. Soil Physics – Marshall, T.J., Holmes, J.W. & Rose, C.W., Cambridge Univ. Press
3. Text Book of Soil Physics – A.K. Saha, Kalyani Publication, New Delhi.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

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BSA-152 Introduction to Soil Science Lab

List of Experiments:

1. Study of a soil profile – Identification of rocks and minerals
2. Determination of bulk density and particle density.
3. Soil moisture determination, soil moisture constants – Field capacity infiltration rate, water holding capacity.
4. Soil temperature.
5. Collection and processing of soil for analysis – Organic carbon, pH, EC, soluble cations and anions.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-I

BSA-104 Fundamentals of Soil and Water Conservation Engineering

**LT P
2 0 0**

Credit: 2

Unit-I: Irrigation and its Importance.

Definition, Importance of irrigation and water resources of the country, Flow irrigation and lift irrigation, Irrigation projects – classification and main irrigation projects of the country, Irrigation methods – surface methods, Irrigation methods – drip and sprinkler irrigation, Water conveyance systems – open channel and pipeline, Measurement of irrigation water – Basic terminology and units, volume time and velocity area method. Measurement of irrigation weirs, – water flumes and orifices/interceptor and relief drains Water lifting devices ,Centrifugal pump, Centrifugal pump – Installation, selection and power requirement, Operation and maintenance of centrifugal pump.

Unit-II: Soil Survey

Introduction to surveying and leveling. Survey equipment and chain survey. Cross staff survey and plotting procedure. Calculation of area of regular and irregular fields. Levelling - Terminology and equipment, Types of levels – Dumpy level, Calculation of reduced levels, Various types of leveling, Contour and contour survey, Plotting and interpretation of contours

Unit-III: Soil Erosion and Conservation

Soil erosion – Introduction and types of soil erosion, Water erosion – Factors affecting, Wind erosion – Factors affecting, Control measures to soil erosion – vegetative, Engineering measures to soil erosion.

Recommended Text Books-

1. Principles of Agricultural Engineering Vol. II – Dr. A.M. Michael and Dr. T.P. Ojha
2. Irrigation – Theory and Practice – Dr. A.M. Michael
3. Surveying and Leveling – B.C. Punamia



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-I

BSA-105 Plant Pathogens and Principles of Plant Pathology

L T P

3 0 0

Credit: 3

Unit-I: Introduction of Plant Pathology

Introduction, Importance of Plant Pathology in Agriculture. Nomenclature, Binomial System of nomenclature Definition and objectives of Plant Pathology, History of Plant Pathology, Terms and Concepts in Plant Pathology. Survival of Plant Pathogens., Dispersal of Plant Pathogens.

Unit-II: Microorganisms and Prokaryotes

Definition, Different groups of microorganisms : Fungi, Bacteria Fastidious Vesicular bacteria phytoplasmas, Spiroplasmas Viruses, Virioids, Algae, Protozoa, and Phanero-gamic Parasites with examples of diseases caused by them. Prokaryotes : Classification of Prokaryotes according to Bergey's Manual of Systematic Bacteriology. General Characters of fungi. Definition of fungus, somatic structures. Fungal tissues, modification of fungus thallus. Reproduction in fungi (Sexual and Asexual), Classification of fungi. Key to divisions and sub divisions. Phenomenon of infection – Pre penetration and post-penetration.

Unit-III: Plant disease and management

Pathogenesis – Role of enzymes, toxins, growth regulators and polysaccharide. Plant disease epidemiology, plant disease forecasting, remote sensing. General principles of Plant disease mgmt, importance and general principles. Avoidance, exclusion, protection, Plant quarantine, and inspection Quarantine rules and regulations. Cultural Methods – Rougeing, eradication of alternate and collateral hosts, crop rotation, manure and fertilizer management, mixed cropping, sanitation hot weather ploughing, soil amendments, time of sowing, seed rate and plant density, irrigation and drainage. Role and mechanisms of bio control and PGPR, Physical methods – Heat and Chemical methods, Methods of application of fungicides. Host Plant resistance – Application of biotechnology in Plant disease management, Development of disease resistant transgenic plants through gene cloning. Integrated plant disease management (IDM) – Concept, advantages and importance.

Recommended Text Books-

1. Introduction to Principles of Plant Pathology - R.S. Singh
2. Fungicides in Plant Disease Control - Y.L. Nene and P.N. Thapaliyal

Recommended Reference Books-

1. Plant Pathology- E.N. Agrios
2. Plant Pathology- R.S. Mehrotra
3. A text book of modern Plant Pathology- Bilgramie and Dubey
4. Essentials of Plant Pathology- V.N Pathak
5. Introductory Plant Pathology- M.N. Kamath



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-I BSA-106 Production Technology of Fruit Crops

L T P
3 0 1

Credit:4

Unit-I: Introduction of Horticulture

Definition and importance of Horticulture, Divisions of Horticulture, Climatic zones of Horticultural Crops in India and U.P. Area and production of important fruit crops in India and U.P.

Unit-II : Techniques used in Horticulture

Propagation methods and use of root stocks, Training and pruning methods. Use of growth regulators in fruit production, Establishment of orchard (selection of site, fencing, planning and layout, wind breaks, planting systems) high density planting.

Unit-III: Study about different Fruit Crops

Package of practices for cultivation of major fruit crops (Mango, Guava, Citrus, Banana, Grapes, Papaya, Sapota, Custard apple, Ber, Pomegranate, Jackfruit. Litchi, Apple, Pineapple, Falsa, Fig, Pear, Plum.

Recommended Text Books-

1. Fruits : Tropical and Subtropical – Bose and Mitra
2. Plant propagation practices – Hortmann and Kester

Recommended Reference Books-

1. Fruit culture in India – Sham Singh
2. Udhyan Vigyan – S.S. Shrivastava
3. Plant propagation – M.K. Sadhu
4. Fruit growing – J.S. Bal
5. Basic Horticulture – Jitendra Singh
6. Fruit growing in India – W.B. Hayes



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-153 Production Technology of Fruit Crops Lab

List of Experiments:

1. Study of horticultural tools and implements and their uses
2. Methods of pruning and training.
3. Layout and planting systems (traditional system and high density planting methods)
4. Description and identification of mango, guava, grape, papaya aonla and jackfruit.
5. Description and identification of banana, lemon, pomegranate, ber.
6. Irrigation methods in fruit crops including drip-micro irrigation methods of establishment of orchard



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-I

BSA-107 Introductory Agriculture

(Ancient Heritage, Agriculture Scenario and Gender Equity in Agriculture)

L T P

2 0 0

Credit:2

Unit-I: Indian Agriculture

Introductory Agriculture (Ancient Heritage, Agriculture Scenario and Gender Equity in Agriculture), Development of agriculture education, research and extension in India. Global issues related to agriculture (Food security, efficient use of natural resources, efficient use of knowledge of agricultural sciences, development of new plant types, multiple resistance crop varieties, commercialization of agriculture, sustainable agriculture and organic farming). Risk management in Indian agriculture (Production risks, marketing risks and financial risk Diversity of physiography, soil groups, marine, livestock, soil factors, weather factors, economic ecology, farming system approach, dry and irrigation agriculture. Value addition (Post harvest management and requirements of new technology. Crop Production as a basic component in Agriculture. Crop production as an art, science and business. Factors (environment and management) affecting crop production.

Unit-II: History of Agriculture Development

Ancient Indian Agriculture in civilized era (Agriculture in pre historic era) - Conservation of describable plants, collection and preservation of seeds, sowing of seeds, tilling of lands, shifting cultivation, weed control, fallowing of lands, the use of domestic wastes as plant nourishment and practice of green manuring and crop-rotation. History of Indian agriculture (Chronological agricultural technology development in India). Development of agriculture before independence. Development of agriculture after independence.

Unit-III: Modern Agriculture

Modern Indian Agriculture-Development of ideo plant types improved production technologies, intensive cropping systems, minimum/zero tillage, dryland agriculture, utilization of problematic and waste lands maintenance of soil-health and ecological balance and precision farming.

Unit-IV: Women In Agriculture

Manifested roles and task, work stress factors, nutritional and rural life standards, role of house hold in design making, drudgery reduction for farm women, women friendly agricultural technology, empowerment of women, group dynamics for farm women, rural women - the nucleus of agricultural extension and training.

Recommended Text Book-

1. A History of Agriculture in India- M.S. Randhawa Vol. IV , ICAR New Delhi
2. The Role of women in Indian Agriculture in the globalize era.

Recommended Reference Book-

1. Principles of Agronomy- S.R. Reddy, Kalyani Publication, New Delhi.
2. Agricultural Economy - S. Sankaran, S. Chand and Company Publication.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-II BSA-208 Introductory Nematology

L T P
1 0 1

Credit: 2

Unit-I: Nematodes

Introduction, Nematodes, habitat and diversity. History of Phytonematology, early and modern history, Land Mark historical events. Economic importance of plant parasitic nematodes and their general characteristics. Nematode general morphology and biology, shape, size, body organization and Symmetry. Outer body wall (Cuticle, Hypodermis, Musculature), Alimentary canal (Inner body tube) male and female reproductive systems, Nervous and excretory systems.

Unit-II: Biology of nematode

Biology of nematode life cycle, Embryo-genesis, hatching, moulting, feeding reproduction and biological races. Classification of nematodes up to family level with emphasis on groups containing economically important plant parasitic nematodes up to generic level with the help of keys and description. Above ground and below ground symptoms caused by nematodes. Interaction between plant parasitic nematodes and disease causing fungi bacteria and viruses.

Unit-III: Nematode Management

Different methods of nematodes management

- a) Cultural methods - crop rotations, fallowing, flooding, propagation through healthy planting material, removal of infected plants, organic amendments, trap crops, time of sowing.
- b) Physical methods: soil solarization and hot water treatment
- c) Biological methods and chemical control.
- d) Regulatory methods and integrated control.
- e) Host resistant

Recommended Text Books

1. Introductory Nematology - R.K. Walia and H.K. Bajaj
2. Plant Nematology - Pathak and B.S. Yadav
3. Plant Diseases - D.R. Dasgupta, Gopal Swaroop and P.K. Koshi



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-II BSA-209 Water Management including Micro irrigation

L T P
2 0 1

Credit: 3

Unit- I: Irrigation

Definition and objectives. Water resources and irrigation development in India and U.P. Soil-Plant-Water relationships Methods of soil moisture estimation, evapo-transpiration and crop water requirement. Effective rainfall, scheduling of irrigation. Methods of irrigation (Surface, sprinkler and drip irrigation).

Unit-II: Water efficiency

Irrigation efficiency and water use efficiency, Conjunctive use of water, Irrigation water quality and its management, Water management of rice, wheat, maize, groundnut, sugarcane, mango, banana and tomato. Agricultural drainage.

Recommended Reference Books

1. Irrigation - Theory and Practices - Michael, A.M.
2. Water Management - Principles and - Singh, R.A. and Singh, S.R.C. Practices
3. Engineering - Michael, A.M. and Ojha, T.P. (1996), Vol. II, Jain Publication
4. Introduction to Agronomy, Soil and - Vaidya, V.G. and Sahatrabudhe, Water Management K.R.
5. Irrigation and Drainage - Lank, D., Kalyani Publisher,
6. Manual on Irrigation Agronomy - Ahmed, M. and Mishra, R.D. (1987), Oxford and IBH Publication, New Delhi



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-II BSA-210 Principles of Seed Technology

L T P
1 0 1

Credit:2

Unit-I: Seed Technology

Introduction of seed production : importance of seed production, seed policy, seed demand forecasting and planning for certified, foundation and breeder seed production. Deterioration of crop varieties, factors affecting deterioration and their control, maintenance of genetic purity during seed production. Seed quality, definition, characters of good quality seed. Different classes of seed, production of nucleus and breeder's seed, maintenance and multiplication of pre-release and newly released varieties in self and cross pollinated crops

Unit-II: Seed production

Seed production : foundation and certified seed production in Maize (varieties, hybrids, synthetics and composites), Rice (varieties and hybrids), Sorghum and bajra (varieties, hybrids, synthetics and composites), Cotton and sunflower (varieties and hybrids), Castor (varieties and hybrids), Tomato and brinjal (varieties and hybrids) Chillies and bhendi (varieties and hybrids), Onion, bottle gourd and ridge gourd (varieties and hybrids).

Unit-III: Seed Certification

Seed certification : phases of certification, procedure for seed certification, field inspection and field counts etc. Seed Act and Seed Act enforcement : Central Seed Committee, Central Seed Certification Board, State Seed Certification Agency, Central and State Seed Testing Laboratories, Duties and powers of seed inspectors, Offences and penalties. Seed control order : Seed Control Order 1983, Seed Act 2000, other issues related to seed quality regulation, intellectual property rights, patenting, WTO, plant breeders rights Varietal identification- Grow-out test, electrophoresis.

Unit-IV: Drying of Seeds

Seed Drying : Forced air seed drying, principle, properties of air and their effect on seed drying, moisture equilibrium between seed and air, heat air drying, building requirements, types of air distribution system for seed drying, selection of crop dryers and systems of heated air drying, recommended temperature and depth of the seeds, management of seed drying, Seed processing plant : Planning and layout, establishment. Seed processing : Air screen machine and its working principle, different upgrading equipments and their use, establishing a seed testing laboratory, seed testing procedures for quality assessment

Unit-V: Seed treatment

Seed treatment : importance of seed treatment, types of seed treatment, equipment used for seed treatment (slurry and mist-O-matic treater), Seed packing and seed storage : stages of seed storage, factors affecting seed longevity during storage, conditions required for good storage, general principle of seed storage, constructional features for good seed warehouse, measures for pest and disease control, temperature control. Seed marketing : Marketing structure, marketing organization, sales generation activities, promotional media, pricing policy, factors affecting seed marketing.

Recommended Text Books

1. Seed Technology – Harpal Singh Tomar, Publisher of Agra
2. Seed Technology – R.L. Agrawal, Kalyani Publisher



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-258 Principles of Seed Technology Lab

List of Experiments:

1. Seed sampling principles and procedures
2. Physical purity analysis of Field and Horticultural crops
3. Germination analysis of Field and Horticultural crops
4. Moisture tests of Field and Horticultural crops
5. Viability test of Field and Horticultural crops
6. Seed health test of Field and Horticultural crops
7. Vigour tests Field and Horticultural crops
8. Seed dormancy and breaking methods
9. Grow, out tests and electrophoresis for varietal identification
10. Visit to seed production plots of Maize, Sunflower, Bajra, Rice, Sorghum, Cotton, Chillie and Vegetables (add or delete crops of the region)
11. Visit to Seed processing plants
12. Visit to Seed testing laboratories
13. Visit to Grow out testing farms
14. Visit to Hybrid Seed Production farms
15. Varietal identification in seed production plots
16. Planting ratios, isolation distance, roughing etc.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-II BSA-211 Dimensions of Agricultural Extension

L T P
1 0 1

Credit: 2

Unit- I: Extension Education

Meaning and Definition of Education, Formal, Informal and Non-formal education and their characteristic. Meaning, definitions, concept, objectives of Extension Education/Agricultural Extension, Principles of Extension Education. Meaning, definition and concept of Rural Development, Objectives of Rural Development. Importance of rural development, Problems in rural development.

Unit-II: Development programmes of pre and post-independence era

Pre-Shriniketan and Marthandam Project

Gurgaon Project and Gandhian Constructive Programme

Post- Firka Development Programme

Etawah-Pilot Project and Nilokheri Experiment Project

Community Development Programme- Meaning, definition, concepts, philosophy, principles and objectives.

Differences between community development and extension education. National Extension Service – Meaning and objectives. Panchyati Raj System – Meaning of democratic decentralization of power, three tiers of Panchyati Raj System, Organizational setup. Powers, Functions of Panchayati Raj System.

Unit –III: Agriculture Development Programme

Agriculture Development Programme with reference to year of start, objectives and salient features

Intensive Agricultural District Programme (IADP)

High Yielding Varieties Programme (HYVP)

Institution Village Linkage Programme (IVLP)

Watershed Development Programme (WDP)

National Agricultural Technology Project (NATP)

Agricultural Technology and Management Agency (ATMA)

Agricultural Technology Information Centre (ATIC).

Unit-IV: Social Justice and Poverty Alleviation Programmes

Integrated Tribal Development Agency (ITDA)

Integrated Rural Development Programme (IRDP)

Swarna Jayanti Gram Swarajgar Yojana (SGSY)

Prime Minister Employment Yojana (PMEY)

New trends in extension, privatization.

Unit-V: Women Development Programmes

Development of Women and Children in Rural Areas (DWCRA)

Rashtriya Mahila Kosh (RMK)

Integrated Child Development Scheme (ICDS)

Mahila Samridhi Yojana (MSY)

Reorganized Extension System (T&V system) – salient features. Fortnight meetings, Monthly workshops, linkages, merits and demerits. Emergence of Broad Based Extension (BBE).



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

Recommended Text Books-

1. Extension Education in Community – Directorate of Extension, Development Ministry of Agriculture, Govt. of India
2. Education and Communication for – Dhama, O.P. and Bhatnagar, Development O.P., Oxford and IBH Publicity Co. New Delhi
3. An Introductory of Agricultural Extension – Mosher, A.T.
4. Extension Communication and Management - Ray G.L., Naya Prakashan 206 Bidhan Sarani,
5. Calcutta-6
6. Rural Development – Principles, Policies and Management – Singh, Katar, Sage Publications, New Delhi
7. Dimensions of Agriculture Extension – Singh, A.K. and K. Roy Burman, Aman Publication, Meerut
8. Text Book of Extension Education – Singh, Ranjeet, Oxford & IBH
9. Extension Education – Reddy, A.V.V., Laxmi Press, Bapala (AP)
10. An Introductory to Extension Education – Supe, S.V., Oxford & IBC Published Co. New Delhi



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-II

BSA-212 Protected Cultivation and Post-Harvest Technology

L T P
2 0 0

Credit: 2

Unit-I: Green House

History of green house. Types of green house. Planning of green house. Design of green house. Cooling and warming of green house. Principles of operation of the equipments used in green house. Low cost material of construction for green house. Construction of traditional green house.

Unit-II: Temperature maintenance in Green house

Solar heat transfer in green house. Generation of hot air currents and convective heat transfer. Irrigation system and equipment in green house. Cost estimation and economic analysis of cultivation in green house. Construction of green house.

Unit-III: Soil conditions in Green house

Soil type required flooding and leaching. Soil pasteurization, peat mass, mixtures, rock film nutrient film technique. Selection of crops for cultivation in green house.

Unit-IV: Post harvest Implements

Threshers Type of Threshers. Multi crop threshers and their construction features. Thresher fault and their remedies. Maintenance of threshers. Winnowers, their working. Effect of speed on cleaning (winnowing) efficiency. Groundnut decorticator – working and construction features. Hand operated groundnut decorticator. Power operated groundnut decorticator. Different parts of “Power operated groundnut decorticator”. Sheller’s and their working principle. Rubber rolls Sheller’s. Maize Sheller, their working and construction features. Maintenance of shellers.

Unit-V: Drying of Grains and storage

Drying thin layer and deep bed. E.M.C. Moisture content (db) and Moisture content (wb) concept. Drying front. Different type dryers. Mixing type dryers. on mixing type dryers. LSU dryer. RPEC dryer. Storage Phenomenon. Changes in grain during storage. Effect of moisture and R.H. on stored grain. Bag and Bulk storage. Modification in traditional storage. deep and shallow bin. Bin design. Cleaning and grading. Cleaners and graders. Fruit grader – Principle. Effect of slope of grading bed on efficiency of grader

Recommended Text Books

1. Green house management for Horticultural Crops – S. Prasad/U. Kumar, Agrobio (India)
2. Unit operations of Agricultural Processing – K.M. Sahay and K.K. Singh, Vikas Publishing House, Pvt. Ltd.
3. Post-Harvest Technology of Cereals, Pulses and Oilseeds – Dr. A. Chakraverty, Oxford & IBH Publishing Co. Pvt. Ltd.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-254 Protected Cultivation and Post-Harvest Technology Lab

List of Experiments:

1. Study/visit to functional and commercial green house.
2. Planning of green house under given requirement.
3. Study of the equipments used in green house.
4. Measurements of heat and moisture transfer in green house.
5. Preparation of estimates for construction of green house.
6. Study of the construction and their renewal
7. Identification of soil and preparation of nutrient film.
8. Study of maize Sheller.
9. Study of thresher.
10. Study of winnowers and cleaners.
11. Study of groundnut decorticator.
12. Study of Rice Sheller's.
13. Study of dryers.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-II BSA-213 Introduction to Computer Application

L T P
1 0 1

Credit: 2

Unit-I: Computer Applications

Introduction to Computers, Input and output Devices, Units of Memory Hardware, Software and Classification of computers. Types of processors. Booting of Computers, warm and cold booting, computer viruses, worms and vaccines

Unit-II: Operating Systems

DOS and DOS commands. Operating system WINDOWS and its elements. MS-WORD, features of word processing. Creating, Editing document in word. MS-EXCEL-Electronic spreadsheet, concept, packages Creating, editing and saving a spread sheet .Editing cell contents. Commands for work sheet. Use of in-built Statistical and other functions and writing expressions. Use of Data Analysis tools, correlation and Regression Entering expressions, creating graphs. t-test for two samples and ANOVA with one way classification Introduction to MS Power Point, features of power point package. Creating new presentation, power point views. Introduction to MS Access, concept of data base, creating data base. Creating tables in data base

Unit-III: Flow Charts and Internet

Principles of programming, flow charts, Algorithms, illustration through examples. Introduction to Internet World Wide Web, information retrieval. Introduction to electronic mail .Advantages of E-mail.

Recommended Text Books

1. Microsoft DOS – Peter Norton’s Techmedia
2. Microsoft Office – Complete reference – BPB publication



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-255 Introduction to Computer Applications Lab

List of Experiments:

1. Study of computer components
2. Practice of DOS commands
3. Practicing windows operating system
4. Creating folders, copy and paste
5. Creating a document, saving and editing
6. Formatting document
7. Creating a table, merging of cells
8. Creating spread sheet and formatting
9. Entering expressions through formula tool bar and use of in-built functions, SUM, AVERAGE, STDEV etc.
20. Creating Graphs in MS Excel
11. Preparing power point slides
12. Creating Data database
13. Creating tables in data base
14. Transforming the data of WORD, EXCEL and ACCESS to other formats
15. Internet browsing
16. Creating E-mail



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-II

BSA-214 Soil Chemistry, Soil Fertility and Nutrient Management

L T P
2 0 1

Credit: 3

Unit-I: Soil Nutrients

Soil as a source of plant nutrients. Essential and beneficial elements, criteria of essentiality. Forms of nutrients in soil, mechanisms of nutrient transport to plants Functions of N and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of N to plants and Nitrogen use efficiency (NUE). Functions of P and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of P to plants and Phosphorus use efficiency (PUE) .Functions of K and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of K to plants and Potash use efficiency (PUE).

Unit-II: Micro Nutrients

Functions of S and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of S to plants and sulphur use efficiency (SUE). Functions of Ca and Mg and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of other Ca and Mg to plants. Functions of Fe and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of Fe to plants and Iron use efficiency (IUE) Functions of Zn and measures to overcome deficiencies and toxicities Factors affecting nutrient availability of Zn to plants and Zinc use efficiency (ZUE).

Unit-III: Functions of micronutrients

Functions of micronutrients and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of other micronutrients to plants. Problem soils – acid, salt affected and calcareous soils, characteristics, nutrient availabilities. Reclamation – mechanical, chemical and biological methods. Fertilizer and insecticides and their effect on soil water and air

Unit-IV: Irrigation Water and soil testing

Irrigation water – Quality of irrigation water and its appraisal. Indian standards for water quality. Use of saline water for agriculture. Soil fertility – Different approaches for soil fertility evaluation methods, soil testing – chemical method. Critical levels of different nutrients in soil. Plant analysis – DRIS methods, critical levels in plants. Rapid tissue tests. Indicator plants. Biological method of soil fertility evaluation. Soil test based fertilizer recommendations to crops. Source, method and scheduling of nutrients for different soils and crops grown under rainfed and irrigated conditions.

Recommended Text Books-

1. Soil Fertility and Fertilizer – Samuel Tisdale & Werner nelson
2. Introductory Soil Science – D.K. Das
3. Manures and Fertilizers – K.S. Yawalkar, J.P. Agrawal and S. Bokde



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER-II BSA-215 Principles of Plant Breeding

L T P
2 0 1

Credit: 3

Unit-I: Plant Breeding

Classification of plants, botanical description, floral biology, emasculation and pollination techniques in cereals, millets, pulses, oil seeds, fibres, plantation crops etc. Aims and objectives of plant breeding Modes of reproduction, sexual, asexual, apomixis and their classification; significance in plant breeding. Modes of pollination, genetic consequences, differences between self and cross pollinated crops.

Unit-II: Methods of Breeding

Methods of breeding-introduction and acclimatization, selection, mass selection Johansson's pure line theory, genetic basis of pure line selection. Hybridization, aims and objectives, types of hybridization. Methods of handling of segregating generations, pedigree method, bulk method, back cross method and various modified methods. Incompatibility and male sterility and their utilization in crop improvement.

Unit-III: Heterosis and Improvement of varieties

Heterosis, inbreeding depression, various theories of heterosis, exploitation of hybrid vigour development of inbred lines, single cross and double cross hybrids. Population improvement programmes, recurrent selection, synthetics and composites. Methods of breeding for vegetatively propagated crops. Clonal selection. Mutation breeding. Ploidy breeding. Wide hybridization, significance in crop improvement.

Recommended Text Books

1. Plant Breeding – B.D. Singh
2. Principles and Practices of Plant Breeding – J.R. Sharma
3. Breeding field crops – J.M. Poehlman and D.A. Sleper
4. Principles of Plant Breeding – R.C. Choudhary



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-256 Principles of Plant Breeding Lab

List of Experiments:

1. Botanical description and floral biology
2. Study of megasporogenesis and microsporogenesis
3. Fertilization and life cycle of an angiospermic plant
4. Plant Breeder's kit
5. Hybridization techniques and precautions to be taken
6. Floral morphology, selfing, emasculation and crossing techniques
7. Study of male sterility and incomparability in field crops: Rice and Sorghum, Maize & Wheat
Bajra and Ragi, Sugarcane & coconut, Groundnut, Castor, Safflower and Sesamum, Red Gram
Bengal gram and Green gram, Soybean and Black gram.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

1st Year, SEMESTER- II

BSA- 216 Comprehension and Communication Skills in English

L T P
1 0 1

Credit:2

Unit-I: English Learning

Comprehension - English Language and Indian Culture. Vocabulary - Synonyms – Antonyms, Idioms. Words Often Confused Homonyms and Homophones

Unit-II: Functional Grammar

Functional Grammar - Subject and Predicate, Tense, Usages of Tenses. Voice and their usages. Narration and their usages. Verb and its agreement with subject. Phrases and clauses.

Unit-III: Written Skills

Written Skills - Letter – Writing, types of letter – Business and Personal correspondence. Preparation of curriculum vitae. Job Applications. Professional Writing. Precise writing. Synopsis Writing. Interviews

Recommended Text Books-

1. English Language and Indian Culture – Tribhuwan Nath Shukla
2. English Conversation Practice – Grant Taylor
3. A Course in Phonetics and Spoken English – J. Sethi and P.V. Dhamija
4. Objective English – Hari Mohan Prasad
5. High School English Grammar – Wren and Martinin



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA- 257 Comprehension and Communication Skills in English Lab

List of Experiments:

1. Listening Comprehension
 - Short Talks
 - Lectures
 - Speeches
2. Communication
 - Spoken English
 - Oral Communication
 - Stress and Intonation
3. Presentation of Reports
 - Seminars and conferences
 - Physical Appearance
 - Body Language Posture
 - Features of Oral Presentation
 - Individual Presentation
4. Conversation
 - Face to face conversation
 - Reading Skills
 - Use of Dictionary
 - Telephonic Conversation



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER- III BSA-317 Field Crops I (Kharif)

L T P
2 0 1

Credit: 3

Unit-I: Cereal and Pulses Crops

Different Kharif crops mentioned below will be taught under the following heads:

1. Origin, history, distribution and economic importance
2. Soil and climatic requirement
3. Agronomic characteristics of the important varieties suitable for the various farming situations of the state
4. Land preparation and sowing management: selection of seeds, seed rate, plant population, planting geometry, seed treatment and seed inoculation, sowing depth, suitable sowing methods, gap filling and thinning, watching of sown seeds and germinating seedlings
5. Application of manures and fertilizers: time and method of application
6. Interculture and weeding: earthing, hoeing, control of weeds by agronomical and chemical means, critical period of weed control
7. Irrigation: methods of irrigation and critical growth stages of crops for irrigation
8. Plant protection measures: insect pests and diseases causing damage to the crops and remedial measures to control them
9. Judging of maturity stage of crop and method of harvesting.
10. Efficient and suitable method of winnowing, cleaning, grading and measurement of yield
11. Proper storage of produce at suitable moisture content in grains, protection against insect pest and moisture
12. Suitable crop rotation and crop mixtures
Cereals – rice, maize, sorghum, pearl millets and minor millets (*kodo, kutki, ragi, sawan, cheena and kangni*)
Pulses – pigeon pea, mung bean and urd bean

Unit-II: Oilseed, Fodder and Forage Crops

Different Kharif crops mentioned below will be taught under the following heads:

1. Origin, history, distribution and economic importance
2. Soil and climatic requirement
3. Agronomic characteristics of the important varieties suitable for the various farming situations of the state
4. Land preparation and sowing management: selection of seeds, seed rate, plant population, planting geometry, seed treatment and seed inoculation, sowing depth, suitable sowing methods, gap filling and thinning, watching of sown seeds and germinating seedlings
5. Application of manures and fertilizers: time and method of application
6. Interculture and weeding: earthing, hoeing, control of weeds by agronomical and chemical means, critical period of weed control
7. Irrigation: methods of irrigation and critical growth stages of crops for irrigation
8. Plant protection measures: insect pests and diseases causing damage to the crops and remedial measures to control them
9. Judging of maturity stage of crop and method of harvesting
10. Efficient and suitable method of winnowing, cleaning, grading and measurement of yield
11. Proper storage of produce at suitable moisture content in grains, protection against insect pest and moisture
12. Suitable crop rotation and crop mixtures.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

Oilseeds – groundnut Sesamum and soybean

Fiber crops – cotton

Unit-II: Fodder and Forage Crops

Different Kharif crops mentioned below will be taught under the following heads:

1. Origin, history, distribution and economic importance
2. Soil and climatic requirement
3. Agronomic characteristics of the important varieties suitable for the various farming situations of the state
4. Land preparation and sowing management: selection of seeds, seed rate, plant population, planting geometry, seed treatment and seed inoculation, sowing depth, suitable sowing methods, gap filling and thinning, watching of sown seeds and germinating seedlings
5. Application of manures and fertilizers: time and method of application
6. Interculture and weeding: earthing, hoeing, control of weeds by agronomical and chemical means, critical period of weed control
7. Irrigation: methods of irrigation and critical growth stages of crops for irrigation
8. Plant protection measures: insect pests and diseases causing damage to the crops and remedial measures to control them
9. Judging of maturity stage of crop and method of harvesting
10. Efficient and suitable method of winnowing, cleaning, grading and measurement of yield
11. Proper storage of produce at suitable moisture content in grains, protection against insect pest and moisture
12. Suitable crop rotation and crop mixtures.

Forage crops – sorghum, maize, cowpea, and cluster bean and Napier grass.

Recommended Text Books-

1. Scientific crop production (1&2) – C. Thakur
2. Hand Book of Agriculture (IV edition 2006) – ICAR Publication
3. Field Crops – Y.M. Iyyer
4. High Yielding Varieties of Crops – Mahabal Ram
5. Principal of Cereal Crop Production - Mahendra Pal, Deka and R.K. Rai
6. Cereal Crop – W.H. Leonard and J.H. Martin
7. Crop Production – B.M. Paugh
8. Text Book of Field Crops – Rajendra Prasad, ICAR Publication
9. Krishi Vishwa (Hindi) – JNKVV, Jabalpur



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-351 Field Crops I (Kharif) Lab

List of Experiments:

1. Identification of different Kharif crops and their associated weeds
2. Nursery bed preparation for rice and transplanting/seed bed preparation and sowing of Kharif crops
3. Calculation of seed rate, plant population, fertilizer requirement and herbicide requirement for the crop
4. Sowing of soybean, pigeon pea, mung bean, maize, ground nut and cotton
5. Study the effect of sowing depth and seed size on germination of soybean
6. Top dressing of nitrogen in rice and maize
7. Study of yield attributing characters, yield calculations and yield estimation of rice, maize, ground nut, cotton and jute
8. Study of crop varieties and visit of important agronomic experiments and forage experiments.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-III
BSA-318 Insect Morphology and Systematic

L T P
2 0 1

Credit: 3

Unit-I: Entomology and Classification of insects

History of Entomology in India and factors of insect abundance. Classification of Phylum Arthropoda up to classes. Characters of Phylum Arthropoda and their classes. Relationship of class Insecta with other classes.

Unit-II: Morphology of Insects

Structure of insect body segmentation, Head, thorax and abdomen Structure and functions of insect cuticle and its moulting. Structure and modifications of antennae of insects Structure and modification of mouth parts of insects. Structure and modifications of legs of insects. Wing venation, modifications and wing coupling apparatus of insects. Structure of male and female external genitalia of insects. Types of sensory organs and their functions in insects. Structure and functions of digestive system in insects. Structure and functions of circulatory system in insects. Structure and functions of excretory system in insects. Structure and functions of Respiratory system in insects. Structure and functions of Nervous system in insects. Structure and functions of reproductive system (male and female) of insects. Types of reproductions in insects. Types of endocrine glands in insects. Metamorphosis and their types and diapauses in insects. Types of larvae and pupae.

Unit-III: Taxonomy

Taxonomy – importance, history, development and binomial nomenclature. Definition of bio-types, genus, species, sub species, family and orders. Classification of class insecta upto orders. Order-orthoptera – Acrididae, Dictyoptera – Mantodea, Odonata – Libellulidae, Isoptera – Termitidae, Neuroptera – Chrysopidae, Thysanoptera – Thripidae, Hemiptera – Pentatomidae Coreidae, pyrrhocoridae, Lygacidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae, Pseudococcidae. Lepidoptera – Noctuidae, Sphingidae, Pyralidae, Gelechiidae and Arctidae, Coleoptera – Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae and Scharabidae. Order Hymenoptera – Tenthredinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae. Diptera – Cecidomyiidae, Trypetidae, Tephritidae, Agromyziidae.

Recommended Text Books

1. Imms general text book of Entomology – Richards, O.W. and Davies, E.C.
2. Text Book of Entomology – Pruthi, H.S.
3. Agricultural Entomology for Indian – Khanna, S.S. Students
4. General and Applied Entomology – Nayar, K.K., Ananthakrishnan, T.N. and David, B.V.
5. The Insect Structure and function – Chapman, R.F.
6. The science of Entomology – Romoser, W.S. (1981), II & III edition Macmillan Publishing Company, New York
7. An introduction to Entomology (1997) – Shrivastava, P.D. and Singh, R.P., Concept Publishing Company, New Delhi 1



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-352 Insect Morphology and Systematic Lab

List of Experiments:

1. Distinguishing characteristics of insects, External features of cockroach, sutures, sclerites of head capsule and types of head
2. Structure of antennae and its modifications
3. Biting and chewing type of mouthparts of cockroach
4. Sucking type of mouth parts of Mosquito and bug
5. Structure of typical wing and its modifications
6. Structure of typical leg and its modifications
7. Dissection of cockroach to study internal organs – Salivary glands, Alimentary canal and Nervous system (central)
8. Study of main types of larvae and pupae
9. Distinguishing characters, collection and preservation of the following orders– Isoptera, Orthoptera, Thysanoptera, Hemiptera, Coleoptera, Diptera, Lepidoptera and Hymenoptera.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-III BSA-319 Principles of Agricultural Economics

L T P
2 0 0

Credit: 2

Unit-I: Economics Introduction

Meaning, Definition, Subject Matter, Division of Economics, Importance of Economics, Basic concept-Goods, Service, Utility, Value, Price, Wealth, Welfare. Wants: Classification and Characteristics. Theory of Consumption. Law of diminishing marginal utility – meaning, definition, assumption, limitation and importance. Consumer surplus – Meaning, definition, importance.

Unit-II: Demand

Demand –meaning, definition, kinds of demand, demand schedule. Demand Curve, Law of demand. Extension and Contraction v/s increase and decrease in demand. Elasticity of demand, type of elasticity of demand. Degrees of price elasticity of demand, methods of measuring elasticity. Factors influencing elasticity of demand, Importance of elasticity of demand.

Unit-III: Welfare Economics

Welfare Economics – Meaning, Pareto's optimality. National income – concept, measurement. Public finance-Meaning, Principles. Public resource – Meaning. Service tax – Meaning. Classification of Taxes – Cannons of Taxation Public expenditure – Meaning, principles. Inflation – Meaning, definition, kinds of inflation.

Recommended Text Book-

1. Elements of Economic Theory – K.K. Dewett and J.P. Verma
2. Indian Economy – S.K. Mishra and V.K. Puri, Himalayan Publication Pvt. Ltd.
3. Indian Economy – S.K. Mishra and V.K. Puri, Himalayan Publication Pvt. Ltd., New Delhi
4. Fundamentals of Agricultural Economics – K.N. Sandhu & Amarjeet Singh, Himalayan Publication Pvt.Ltd, New Delhi
5. Agricultural Economics – S. SuBSA Reddy and P.Raghuram, Oxford and IBH Publication Co. Pvt. Ltd., New Delhi
6. An Introduction to Agricultural Economics – Bilgram



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-III BSA-320 Farm Power and Machinery

L T P
1 0 1

Credit: 2

Unit-I: Farm Machinery working

Sources of Farm Power in India. Engine brief, classification of IC, Engines, Difference between 2 stroke and 4 stroke cycle engines, Difference between diesel and petrol engines. I.C. Engine components and system's components of an IC.Engine. Working of two stroke petrol engines. Working of four stroke cycle petrol engines and diesel engines. I.C. Engine terminologies.

Unit-II: Engines

Numerical on engine terminologies. Fuel supply system of petrol engine. Fuel supply system of diesel engine. Cooling systems of diesel engine. Lubrication system of diesel engine. Air intake and exhaust system, Valve operating system.

Unit-III: Tractors

Tractors Definition, Classification and systems. Selection of a tractor. Operating cost of a tractor. Tillage, objectives of tillage. Tillage implements – Primary and secondary tillage tools and implements (Bullock Drawn and Tractor Drawn)

Unit-IV: Farm Implements

Description of Indigenous plough, MB plough, Types of shares and M.B. Description of Disc Plough and other ploughs. Description of harrows (BD & TD). Description of Disc harrow. Description of intercultural operations implements (cultivators). Descriptions of Hand Hoes. Description of Seed and Seed cum fertilizer drills. Calibration of seed drill. Description of paddy transplanter. Description of sprayers. Description of dusters. Description of harvesting equipments – Mowers. Description of harvesting equipments – Combines. Bullock drawn implements for land development.

Recommended Text Books-

1. Elements of Agricultural Engineering – Dr. Jagdishwar Sahay
2. Principle of Agricultural Engineering Vol. I – T.P. Ojha, A.M. Michael
3. Elements of Agricultural Engineering – Dr. O.P. Singhal



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-353 Farm Power and Machinery Lab

List of Experiments:

1. Study of different components of an I.C. engine.
2. Study of working of 2 stroke petrol engine.
3. Study of working of 4 stroke diesel engine.
4. Study of working of 4 stroke petrol engine.
5. Study of working of a farm tractor.
6. Study of working of power tiller.
7. Learning of Tractor driving – Forward.
8. Learning of Tractor driving – Reverse.
9. Hitching of implements to a tractor.
10. Study of M.B. plough and its adjustments.
11. Study of Disc plough and its adjustments.
12. Study of Disc harrows and its adjustments.
13. Study of seed cum fertilizers and calibration of seed drill
14. Study of mowers and its adjustments.
15. Study of sprayers and Dusters and its adjustment.
16. Study of paddy transplanter.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER- III
BSA-321 Agriculture Microbiology

L T P
2 0 1

Credit:3

Unit-I: History of Microbiology

Spontaneous generation theory and germ theory . Protection against infection. Applied areas of microbiology and fermentation.

Unit-II: Applied areas of microbial metabolism

Microbial ATP generation through different metabolic pathways – glycolysis. Embden-Meyerhop pathway, pentose cycle, Entner-Doudoroff pathway, and phosphodeloase pathway. Microbial fermentation – some major pathways of fermentation viz., ethanol and lactic acid fermentation. Microbial respiration – aerobiosis and anaerobiosis.

Unit-III: Bacteriophages

Structure and properties of bacterial viruses (bacteriophages), existence of bacteriophages-lytic and lysogenic phages/cycles. Some specific forms of viruses – virioids and prions. Bacterial genetics -

- a.) Genetic expression
 1. Genetic control of metabolism
 2. Protein synthesis
- b.) Genetic recombination (recombination in bacteria)
 1. Transformation, transduction and conjugation
- c.) Genetic engineering
 1. Basic principles and techniques in genetic engineering
 2. Genetic transposable elements in bacteria – plasmids, episomes, IS and Tn elements
 3. Genetic manipulation and genetically modified organism

Unit-IV: Soil microbiology

Microbial groups in soil-bacteria, actinomycetes, fungi, algae, and protozoa – their characteristic morphology, significance and environmental influences. Microbial transformations of nutrients in soil – cycles of carbon, nitrogen, phosphorus and sulfur. Biological nitrogen fixation – symbiotic and non-symbiotic, microorganisms involved and their biochemistry. Microbiology of water (drinking water). Microbiology of food- Microbes important in foods. Principles of food preservation – heat treatment, low temperature preservation, drying, preservation by additives. Microbial spoilage of foods – thermophilic and mesophilic organisms.

Unit-V: Beneficial microorganisms in Agriculture

Biofertilizers – classification, physiological relationships, principles of isolation, purification and maintenance of strains. Production, application, precautions in handling and benefits from their uses. Biopesticide-classification, basic modes of action. Production (small and large scale), application, and precautions in handling. Microbiology of waste disposal and recycling - Sewage disposal , Solid waste recycling (composting), Biogas production, Biodegradation of decomposable plastic.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

Recommended Text Books-

1. Agricultural Microbiology – Rangaswami and Bhagyaraj
2. Soil Microbiology – N.S. Subbarao
3. Agricultural Microbiology – N. Mukherjee and T. Ghosh
4. Biofertilizers – L.L. Somani, S.C. Bhandari, S.N. Saxena
5. Introduction to Soil Microbiology – M. Alexander
6. An Introduction to Microbiology – P. Tauro, K.K. Kapoor and K.S. Yadav



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-362 Agriculture Microbiology Lab

List of Experiments:

1. General instructions: Familiarization with laboratory microbiological instruments materials, glassware etc.
2. Practice of aseptic methods: Evaluation of aseptic technique with nutrient agar plate.
3. Evaluation of aseptic technique with nutrient broth tubes.
4. Methods of sterilization and preparation of media:
 - a.) Preparation of nutrient broth, nutrient agar plate's, nutrient agar and slant and nutrient agar stablign II
 - b.) Sterilization of glassware by dry heating
 - c.) Sterilization of nutrient broth by filtration planting method for isolation and purification of bacteria
5. Isolation of bacteria by streak plate method
6. Isolation of aerobic spores forming bacteria by enrichment using streak plate method
7. Checking of purity of a bacterial culture by streak planting method
8. Identification of bacteria by staining method and biochemical test
9. Morphological examination of bacteria by simple and differential staining
10. Different biochemical tests for identification of bacterial culture; Enumeration of bacteria by stain slide method.
11. Enumeration of bacteria by most probable number methods
12. Enumeration of bacteria stains slide method by pour plate method and spread plate method.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-III BSA- 322 Statistics

L T P
1 0 1

Credit: 2

Unit-I: Central Tendency

Introduction: Definition of Statistics and its use and limitations; Frequency. Distribution and Frequency Curves. Measures of Central Tendency: Characteristics of ideal Average, Arithmetic mean, Median, Mode, Merits and Demerits of Arithmetic Mean. Measures of Dispersion: Variance Standard deviation, and Coefficient of Variation.

Unit-II: Probability and Hypothesis

Probability: Concept of probability definition and; Normal Distribution and its properties. Introduction to Sampling: Random Sampling; the concept of Standard Error. Tests of Significance – Types of Errors, Null Hypothesis, Level of Significance and Degrees of Freedom, Steps involved in testing of hypothesis; Large sample Test: SND test for means, Single Sample and Two. Samples (all types); Small Sample Test for means; Students t-test for Single. Sample, Two Samples and Paired t test. F test: Chi-Square Test in 2X2Contingency Table, Yate's Correction for continuity.

Unit-III: Correlation, Regression and designs

Correlation: Types of Correlation and identification through Scatter Diagram, Computation of Correlation Coefficient 'r' and its testing. Linear Regression: Of Y on X and X on Y, Inter-relation between 'r' and the regression coefficients, fitting of regression equations. Experimental Designs: Basic Designs, Completely Randomized Design.(CRD), Layout and analysis with equal and unequal number of observations, Randomized Block Design (RBD), Layout and analysis, Latin Square Design(LSD), Layout and analysis.

Recommended Text Books-

1. Fundamentals of Mathematical Statistics – S.C. Gupta and V.K.Kapoor
2. Basic Statistics – B.L. Aggrawal
3. Design and Analysis of Experiments for – B.L. Mishra Agriculture workers
4. Theory of Sample Surveys and Statistical Decisions – K.S.Kushwaha and Decisions Rajesh Kumar



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA- 355 Statistics Lab

List of Experiments:

1. Construction of Frequency Distribution Tables and Frequency Curves
2. Computation of Arithmetic Mean for Un-Grouped and Grouped data
3. Computation of Median for Un-Grouped and Grouped data
4. Computation of Mode for Un-Grouped and Grouped data
5. Computation of Variance Standard Deviation and coefficient of variation for Un-Grouped and Grouped data
6. (SNI) test for means, single sample; SND test for mean, two samples
7. Student's t-test for single sample; student's t-test for two samples; Paired Ttest and F test
8. Chi-Square Test in 2x2 Contingency Table, Yate's Correction for continuity
9. Computation of Correlation Coefficient 'r' and its testing
10. Fitting of regression equations-Y on X and X on Y
11. Analysis of Completely Randomized Design (CRD)
12. Analysis of Randomized Block Design (RBD)
13. Analysis of Latin Square Design (LSD)



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-III

BSA-323 Production Technology of Vegetables and Flowers

L T P
2 0 1

Credit: 3

Unit-I: Vegetable Classification

Importance and scope of olericulture. Types of vegetable gardens. Classifications of vegetable

Unit-II: Package of practices for vegetable production

Origin, area, production, varieties, package of practices for fruit vegetables

- (a) Tomato, brinjal, chilli, okra
- (b) Cucurbitaceous vegetables – cucumber, ridge gourd, ash gourd, snake gourd, bottle gourd, bitter gourd, watermelon, musk melon
- (c) Cole crops – cauliflower, cabbage, knol-khol
- (d) Bulb crops – onion and garlic
- (e) Beans – French bean, cluster bean, dolichos bean and cowpea
- (f) Peas
- (g) Tuber crops – potato, sweet potato, colocasia, tapioca, yams
- (h) Root crops – carrot, radish, turnip, beet root
- (i) Leafy vegetable – palak, amaranthus
- (j) Perennial vegetables – drumstick, curry leaf

Package of practices (cultivation) of knol-khol, cluster bean, tapioca, yams, beet root, curry leaf, to be taught in brief.

Unit-III: Gardens and ornaments of garden

Importance and planning of ornamental gardens. Types and styles of ornamental gardens. Different uses of trees, shrubs, climbers, palms, houseplants and seasonal flowers in gardens. Package of practices for Rose, Marigold, Tuberose, Jasmine, Chrysanthemum.

Recommended Text Books

1. Vegetable crops in India – T.K. Bose and M.G. Som
2. Production Technology – S.P. Singh of Vegetable crops
3. Production Technology – K.G. Shanumughavelu of Vegetable crops
4. Complete Gardening in India – K.S. Gopal Swamiyanger
5. Floriculture in India – G.S. Randhawa and A.Mukhopadhyay
6. Commercial Flowers – T.K. Bose
7. Progressive Floriculture – I.S. Yadav and M.L. Choudhary



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-356 Production Technology of Vegetables and Flowers Lab

List of Experiments:

1. Layout planning of kitchen garden
2. Identification of important vegetable seeds and plants
3. Raising of vegetable nurseries
4. Identification of ornamental plants – Trees, shrubs, climbers, seasonal, palm etc.
5. Development of garden features
6. Transplanting of seedlings
7. Layout planning of lawns and maintenance
8. Seed extraction of tomato and brinjal.
9. Depotting, repotting and maintenance of house plants
10. Visit to different vegetable farms
11. Training and pruning of roses, pinching and disbudding of Chrysanthemum
12. Layout planning of gardens and garden design for public and private areas
13. Intercultural operations and seed production in vegetables
14. Harvesting indices of different vegetable crops, grading and packaging of vegetables.
15. Prolonging the shelf life of cut flowers



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-III BSA-324 Livestock Production and Management

L T P
2 0 1

Credit: 3

Unit-I: Livestock in India

Role of Livestock in National economy. Different Livestock development programmes of Govt. of India. Important Indian breeds of cattle, buffalo, sheep, goat and swine. Important exotic breeds of cattle, buffalo, sheep, goat and swine. Measures and factors affecting fertility in Livestock. Reproductive behavior like oestrus parturition and farrowing etc.

Unit-II: Milk and its components

Mechanism of milk secretion. Clean and hygienic milking of animals. Factors affecting milk yield and their composition. Selection and breeding of livestock for higher milk production. Selection and breeding of livestock for meat production.

Unit-III: Livestock Management

Feeding and management of calves, growing heifers and milch animals another types of animals. Housing principles space requirements for different species of livestock. Disease control measures, sanitation and care. Breeding, feeding and production records.

Unit-IV: Poultry

Breed characteristics of poultry, Methods of rearing of poultry. Breeding of poultry, Feeding and Management of poultry. Structure and keeping quality of eggs. Incubation and hatching management Brooding. Vaccination schedules for prevention of poultry disease. Preservation of eggs. Marketing of eggs Economics of layer production. Cost of milk production. Economical unit of dairy. Economical unit of Goatery. Economical unit of Piggery.

Recommended Text Books-

1. Livestock Production Management – Dr. N.S.R. Shastry, Dr. R.A.Singh and Dr. Thomas
2. A Text Book of Animal Husbandry – Dr. G.C. Banerjee
3. Poultry Production – Dr. R.A. Singh and others
4. Animal Husbandry and Draining – Dr. Jagdish Prasad
5. Animal Husbandry – Dr. Harbansh Singh & Dr. Moor



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-357 Livestock Production and Management Lab

List of Experiments:

1. Visit to Livestock farms.
2. Study of external body parts of Livestock species.
3. Identification methods for different livestock species.
4. Handling and restraining of animals.
5. Judging and culling of dairy animals.
6. Feeding and ration formulation.
7. Incubation and hatchery maintenance and their management.
8. Housing of animals.
9. Management of poultry.
10. Economics of livestock production



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-IV
BSA-425 Field Crops II (Rabi)

L T P
2 0 1

Credit: 3

Unit-I: Field Crops

1. Cereals – Wheat and barley
2. Pulses – Chickpea, lentil, peas and French bean
3. Oilseeds – Rapeseed and mustard, sunflower, safflower and linseed
4. Sugar crops – Sugarcane and sugar beet
5. Commercial crops – Potato and tobacco
6. Forage crops – Berseem, Lucerne and Oats

Different Rabi crops mentioned above will be taught under the following heads:

1. Origin, history, distribution and economic importance
2. Soil and climatic requirement
3. Agronomic characteristics of the important varieties suitable for the various farming situations of the state.
4. Land preparation and sowing management: selection of seeds, seed rate, plant population, planting geometry, seed treatment and seed inoculation, sowing depth, suitable sowing methods, gap filling and thinning, watching of sown seeds and germinating seedlings
5. Application of manures and fertilizers: time and method of application
6. Interculture and weeding: earthing, hoeing, control of weeds by agronomical and chemical means, critical period of weed control
7. Irrigation: methods of irrigation and critical growth stages of crops for irrigation
8. Plant protection measures: insect pests and diseases causing damage to the crops and remedial measures to control them
9. Judging of maturity stage of crop and method of harvesting
10. Efficient and suitable method of winnowing, cleaning, grading and measurement of yield
11. Proper storage of produce at suitable moisture content in grains, protection against insect-pest and moisture
12. Suitable crop-rotation and crop mixtures.

Recommended Text Books-

1. Scientific crop production (1&2) – C. Thakur
2. Handbook of Agriculture (IV edition 2006)– ICAR Publication
3. Field Crops – Y.M. Iyyer
4. High Yielding Varieties of Crops – Mahabal Ram
5. Principal of Cereal Crop Production – Mahendra Pall, Deka & R.K. Rai
6. Cereal Crop – W.H. Leonard and J.H. Martin
7. Crop Production – B.M. Paugh
8. Text Book of Field Crops – Rajendra Prasad, ICAR Publication
9. Cultivation of Medicinal and Aromatic – A.A.Faruqui & B.S.Crops Shreeramu
10. Krishi Vishwa (Hindi) – JNKVV, Jabalpur



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-458 Field Crops II (Rabi) Lab

List of Experiments:

1. Identification of different Rabi crops and their associated weeds
2. Calculation of seed rate, plant population, fertilizer requirement and herbicide requirement for the crop
3. Top dressing of nitrogen in wheat and study of fertilizer experiment on wheat and mustard
4. Application of herbicide in wheat and grain legumes
5. Study of morphological characters of wheat, sugarcane chickpea and mustard
6. Yield attributing characters of wheat, gram. Calculation of yield estimation of sugarcane, potato and wheat etc.
7. Yield and quality analysis of sugarcane
8. Visit to important agronomic experiments and research station related to Rabi crops



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-IV

BSA-426 Manures, Fertilizers and Agro-Chemicals

L T P
2 0 1

Credit: 3

Unit- I: Manures and Fertilizers

Manures: Introduction, Raw materials, Bulky and concentrated composition. FYM: Composts, Different methods of composting mechanical compost plants, vermicomposting, green manures, oil cakes, sewage and sludge. Biogas plant slurry, plant and animal refuges. Fertilizers: Classification of fertilizers, process of manufacturing major nitrogenous, (Ammonium Sulphate, Urea, Calcium Ammonium Nitrate. Ammonium Nitrate and Ammonium Sulphate Nitrate) fertilizers and properties, manufacturing of phosphatic fertilizers (Single Super Phosphate, Enriched Super Phosphate, Diammonium Phosphate and Ammonium Polyphosphate) Manufacturing of potassic and complex fertilizers their fate and reactions in the soil.

Unit-II: Nutrients

Nutrients, secondary and micronutrients fertilizer, Amendments, Fertilizer control order and fertilizer storage. Biofertilizers, types of biofertilizers, advantages of biofertilizers. Organic chemistry as a prelude to agro-chemicals, diverse types of agrochemicals.

Unit-III: Insecticides

Bioinsecticides (botanical) neem, pyrethrum and Synthetic pyrethroids. Synthetic organic insecticides, major classes, properties and use of some important insecticides under each class Classification of insecticides, herbicides-major classes, properties and uses of 2,4-D, atrazine, glyphosate, butachlor and benthocarb. Fungicides – major classes of fungicides, properties and uses of Carbendazim, Carboxin, Captan, tridemorph and copper oxychloride. Insecticide Act. Plant growth regulators.

Recommended Text Books

1. The Nature Properties of Soil – Brady, N.C. & Weil R.R.
2. Fundamentals of Soil Science
3. Soil Fertility and Fertilizers – Nelson Tisdale
4. Methods of Soil Fertilization – A.J. Peters
5. Organic Farming Theory and Biofertilizers in agriculture – N.S. Subbarao



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-IV BSA-427 Insect Ecology & Integrated Pest Management including beneficial insects

L T P
2 0 1

Credit: 3

Unit-I: Ecology of Insects

Insect ecology: Introduction, environment and its components. Effect of abiotic factors-temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance. Concepts of balance of life in nature. Biotic potential and environmental resistance. Causes for outbreak of pests in agro-ecosystem. Pest surveillance and pest forecasting. Categories of pests. IPM, Introduction, importance, concepts. Principles and tools of IPM-Host plant resistance, Cultural method, Mechanical and physical control methods. Legislative control.

Unit-II: Methods of control

Biological (parasites, predators and transgenic plant pathogens such as bacteria, fungi and viruses) methods of control. Chemical control – importance, hazards and limitation. Classification of insecticides. Toxicity of insecticides and formulations of insecticides. Study of important insecticides. Botanical insecticides –neem based product. Cyclodine organophosphates. Carbamates, synthetic pyrethroids Novel insecticides, Pheromones, Nicotinylinsecticides.Chitin synthesis inhibitors, Phenyl pyrazoles, Avermectins. Macrocyclic lactones, Oxadiazimes, Thioureaderivatives.Pyridine azomethines, pyrroles etc. Nematicides.

Unit-III: Pest Control

Rodenticides, acaricides.Fumigants.Recent methods of pest control, repellents, antifeedants, Hormones. Attractants, gamma radiation and genetic control. Practices, scope and limitations of IPM.Insecticides Act 1968 – Important provisions. Application techniques of spray fluids. Phytotoxicity of insecticides. Symptoms of poisoning, first aid and antidotes. Beneficial insects: parasites and predators used in pest Control. Mass multiplication techniques.

Unit-IV: Microorganism

Important groups of micro-organisms, bacteria, viruses and fungi used in pest control and their mass multiplication techniques. Important species of pollinators, weed killers and scavengers, their importance Non insect pests – mites, Nematology. Rodents and birds, Vermiculture.

Recommended Text Book-

1. Plant Protection Techniques – P.B. Chatterjee
2. Text Book of Agricultural Entomology – H.S. Pruthi
3. General and Applied Entomolog – K.K. Nayar, T.N. Ananthkrishnan and B.V. David
4. Insect Pests of Field Crops – S. Pradhan
5. Introduction of Plant Quarantine – AbhishekShukla and O.P. Veda



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-IV

BSA-428 Agricultural Finance and Cooperation

L T P
1 0 1

Credit: 2

Unit- I: Agricultural Finance

Agricultural Finance – nature and scope. Time value of money. Compounding and discounting Agricultural Credit: meaning, definition, needs. Classification of credit. Credit analysis – 4 R's of credit. 5 C's of credit. 7 P's of credit. Repayment plans of credit. History of financing agriculture in India

Unit-II: Banks in India

Commercial banks, nationalization of commercial banks. Lead bank scheme, Regional Rural Banks, Scale of finance. Higher financing agencies – RBI, NABARD and AFC. Asian Development Bank, World Bank. Insurance and Credit Guarantee Corporation of India. Assessment of crop losses. Determination of compensation. Crop insurance, advantages and limitations in application, estimation of crop yields.

Unit-III: Cooperation in agriculture

Agricultural Cooperation – Philosophy and Principles. History of Cooperative movement – Pre independence and post-independence periods, cooperation in different plan periods. Cooperative Credit structure – PACS, FSCS. Reorganization of cooperative credit structure in Andhra Pradesh and single window system. Successful cooperative system in Gujarat, Maharashtra, Punjab etc.

Recommended Text Book-

1. An Introduction to Agricultural Finance – U.K. Pandey, Himalayan Publication Ltd., New Delhi.
2. Agricultural Finance - Theory and Practical – J.P. Singh
3. Agricultural Finance - Theory and Practical – Kahlon and Tyagi
4. Agricultural Finance and Management – S. SuBSA Reddy and P.Raghuram



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-461 Agricultural Finance and Cooperation Lab

List of Experiments:

1. Factors governing use of capital and identification of credit needs
2. Time value of money, compounding and discounting
3. Tools of financial management, balance sheet, income statement and cash flow analysis
4. Estimations of credit needs and determining unit costs
5. Preparations and analysis of loan proposals
6. Types of repayment loans
7. Study of financial institutions: PACS, DCCB, Apex Banks, RRBs, CBs, NABARD



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER- IV BSA-429 Diseases of Field Crops and their Management

L T P
2 0 1

Credit: 3

Unit-I: Study of diseases

Study of following diseases with reference to their economic importance, symptoms, causal organism, etiology, epidemiology, diseases cycle and integrated management.

1. Rust diseases of wheat, groundnut, sunflower, soybean, tea.
2. Smuts of paddy, sorghum, bajra
3. Whip smut of sugarcane
4. Loose smut of wheat
5. Wilt of sugarcane, cotton, red gram, black gram, green gram and Bengal gram
6. Leaf blights of wheat and maize
7. Bacterial blight and streak of rice
8. Blast of paddy
9. Brown spot of paddy

Unit-II: Plant Diseases

10. Sheath blight of paddy
11. Leaf spot of sorghum (*Gloeocercospora*, *Colletotrichum*, *Helminthosporium*, *Ascochyta*)
12. Downy mildew of Bajra
13. Ergot of sorghum and Bajra
14. Ear cockle and yellow ear rot of wheat
15. Karnal bunt of wheat
16. Grassy shoot of sugarcane, Leaf spot of turmeric

Unit-II: Plant Diseases

17. Tikka disease of groundnut (early and late leaf spot)
18. Collar rot of groundnut
19. Root rots (dry, wet, black) of gram, cotton
20. Phyllody of Sesamum
21. Bacterial leaf spot of Sesamum, *Cercospora* leaf spot of Sesamum
22. Phytophthora blight of arhar, *Alternaria* leaf spot of sunflower
23. Angular leaf spot of cotton, *Ramularia* leaf spot of cotton
24. Bacterial pustule of soybean
25. *Myrothecium* leaf spot of soybean, Anthracnose of soybean
26. Mosaic of soybean, Sterility mosaic of arhar

Recommended Text Books-

1. Plant Pathology - G.N. Agrios
2. Plant Diseases - R.S. Singh
3. Plant Pathology - P.D. Sharma
4. Diseases of crop plants in India - G. Rangaswami
5. Practical manual of Plant Pathology - V.N. Pathak
6. Essentials of Plant Pathology - V.N. Pathak



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-462 Diseases of Field Crops and their Management Lab

List of Experiments:

1. Study of symptoms, etiology, host-parasite relationship and specific control measures of the following crop diseases. Presentation of disease samples survey and collection:
2. Diseases of rice, sorghum.
3. Diseases of wheat, Bajra and maize.
4. Diseases of sugarcane, turmeric and tobacco.
5. Diseases of groundnut, castor and sunflower.
6. Diseases of Sesamum and cotton.
7. Diseases of red gram, green gram, black gram, Bengal gram and beans.
8. Field visits at appropriate time during the semester.

Note: Students should submit 50 pressed, well mounted diseased specimens in three installments during the semester.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER- IV BSA-430 Production Technology of Spices, Aromatics, Medicinal and Plantation crops

L T P
2 0 1

Credit: 3

Unit-I: Spices Crops

Importance, scope and definitions of spices, aromatic, medicinal and plantation crops. Production technology of spices – Ginger, turmeric, Black Pepper, Cardamom, Coriander, Cumin, Fenugreek.

Unit-II: Aromatic plants

Production Technology of Aromatic Plants-Lemon grass, Citronella, Palmarosa, Geranium, Dawana, Vetiver.

Unit-III: Plantation Crops

Production Technology of plantation crops-Coconut, Arecanut, Betelvine, Cashew nut, Cocoa, Coffee, Oil Palm

Unit-IV: Medicinal Plants

Production Technology of Medicinal plants –Dioscoria, Rauvulfia, Opium, Aloe, Guggul, Ocimum, Perwinkle, Belladonna, Nuxvomica, *Solanum khasiamum*, Aonla, Senna, Plantago, Stevia, Coleus,

Recommended Text Books

1. Fruit in India, Tropical and Subtropical – T.K. Bose
2. Medicinal, Aromatic, Plantation and Spices – N. Kumar
3. A hand book of medicinal plants – N.D. Prajapati
4. Medicinal plant cultivation – S.S. Purohit
5. Minor spices – J.S. Purthi
6. Spices – V.B. Singh and K. Singh



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-463 Production Technology of Spices, Aromatics, Medicinal and Plantation crops Lab

List of Experiments:

1. Botanical description and identification of aromatic plants
2. Identification of spices, medicinal, plantation crops with their varieties
3. Propagation techniques in aromatic and spices
4. Selection of mother palm, seed nuts in coconut and oil palms
5. Identification and distillation procedures for aromatic crops
6. Propagation techniques in plantation crops
7. Propagation and planting methods of Turmeric, Ginger
8. Harvesting methods of aromatic plants
9. Processing and curing of Ginger, Turmeric and Black pepper
10. Training methods on betelvine
11. Rejuvenation practices in cashew nut
12. Products, byproducts of spices and plantation crops
13. Procedures for oleoresin extraction
14. Visit of local commercial seed spices, plantation, medicinal and aromatic plant nurseries and fields



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-IV
BSA- 431 Breeding of Field/Horticultural Crops

L T P
2 0 1

Credit: 3

Unit-I: Breeding Objectives

Breeding objectives and important concepts of breeding self-pollinated cross pollinated and vegetatively propagated crops. Hardy-Weinberg Law

Study in respect of origin, distribution of species, wild relatives and forms

- a) Cereals (rice, wheat, maize, millets, sorghum Bajra, ragi)
- b) Pulses (red gram, green gram, black gram, soybean)
- c) Oilseed (groundnut, sesame, sunflower, safflower, castor, mustard etc.)
- d) Fibers (cotton, kenaf, Roselle, jute) etc.
- e) Vegetables (tomato, bhindi, chilli, cucumbers)
- f) Flowers crops (chrysanthemum, rose, galardia, gerbera, marigold)
- g) Fruits crops (aonla, guava, mango, custard apple, banana, papaya)

Unit-II: Breeding Procedures

Major breeding procedures for development of hybrids/varieties of various crops. Plant genetic resources their conservation and utilization in crop improvement. Ideotype concept in crop improvement. Breeding for resistance to biotic and abiotic stresses variability in pathogens and pests. Mechanisms of resistance in plant to pathogens and pest. Genetic basis of adaptability to unfavorable environments

Unit-III: Variability

Definition of biometrics, assessment of variability i.e. additive, dominance and epistasis and their differentiation Genotype x environment interaction and influence on yield/performance, IPR and its related issues.

Recommended Text Books-

1. Plant Breeding – B.D. Singh
2. Principles and Practices of Plant Breeding – J.R. Sharma
3. Breeding of field crops – J.M. Poehlman and D.A.Sleper
4. Principles of Plant Breeding – R.C. Choudhary
5. Elementary Principle of Plant Breeding – H.K. Choudhary
6. Breeding Technologies of Crop Production – A.K. Sharma
7. Plant Breeding Theory and Practical – Stoskopt



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA- 464 Breeding of Field/Horticultural Crops Lab

List of Experiments:

1. Emasculation and Hybridization techniques
2. Handling of segregating generations, pedigree methods
3. Handling of segregating generation bulk methods
4. Handling of segregating generation, back cross methods
5. Field layout of experiments
6. Field trials, maintenance of records and registers
7. Estimation of Heterosis and inbreeding depression
8. Estimation of Heritability, GCA and SCA
9. Estimation of variability parameters
10. Parentage of released varieties/hybrids
11. Problems on Hardy, Weinberg Law
12. Study of quality characters
13. Sources of donors for different characters
14. Visit to seed production and certification plots
15. Visit to AICRP trials and programmes
16. Visit to grow out test plots
17. Visit to various research stations
18. Visit to other institutions.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

2nd Year, SEMESTER-IV
BSA- 432 Processing of Milk and Milk Products

L T P
1 0 1

Credit: 2

Unit-I: Milk Composition

Composition of milk and its characteristics, Clean milk production, Microbiology of milk, Filtration clarification, Bactofugation, Pasteurization, UHT treatment, Homogenization and sterilization. Common adulterants and preservatives used in milk and its detection.

Unit-II: Milk Products

Composition and method of manufacturing of cream, butter, dahi, ghee, khoa, chenna, paneer, Ice cream and condensed milk.

Unit-III: Dairy Equipments

Cleaning and sanitization of dairy equipments, Storage of milk and milk products, nutritive value of milk products.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA- 465 Processing of Milk and Milk Products Lab

List of Experiments:

1. Sampling of milk
2. Determination of specific gravity
3. Fat in milk, S.N.F. and TS
4. Acidity in milk
5. Common milk adulterants in milk and milk products
6. Demonstration of cream separation
7. Preparation of Chennna, Paneer, Ice-Cream and Dahi.
8. Calculation on Ice Cream mix standardization of milk and cream and over run in butter.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-V BSA- 532 Farming Systems and Sustainable Agriculture

L T P
1 0 1

Credit: 2

Unit-I: Sustainable agriculture

Introduction and definition, Sustainable agriculture: Goal and current concepts. Factor affecting ecological balance. Ameliorative measures for ecological balance. Land degradation. Conservators of natural resources LEIA & HELA. Irrigation problems. Wastelands and their development

Unit-II: Organic Farming and Farming Systems

Definition, principles and components. Farming systems: definition, principles and components. Integrated Farming System models for wetland situation. Integrated Farming System models for irrigated dryland situation. Integrated Farming System models for dryland situation.

Recommended Text Books

1. Cropping and Farming system – S.C. Panda, Agrobios Publication
2. Proceeding of Symposium on Efficient Cropping System Agronomy–Indian Society of Cropping System, New Delhi
3. Principles and Practices of Agronomy – S.S. Singh, Kalyani Publication
4. Farm Management – S.K. Tondon and S.P. Dondhyal



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA- 551 Farming Systems and Sustainable Agriculture Lab

List of Experiments:

1. Preparation of cropping scheme for irrigated situations
2. Preparation of cropping scheme for dryland situations
3. Study of existing farming systems in nearby villages
4. Preparation of integrated farming system models for wetlands
5. Preparation of integrated farming system models for drylands
6. Preparation of enriched Farm Yard Manure
7. Preparation of vermicompost
8. Visit to urban waste recycling unit
9. Study of profitable utilization of agricultural wastes
10. Visit to poultry units to study resource allocation, utilization and economics
11. Visit to dairy units to study resource allocation, utilization and economics
12. Visit to an organic farm to study various components and utilization
13. Study of degraded lands



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-V
BSA-534 Biochemistry

L T P
2 0 1

Credit: 3

Unit- I: Biochemistry of Plants

Introduction and importance of Biochemistry. Plant cell, cell wall and its role in plant and animal food and paper industries. Bio molecules - structure, properties and applications. Amino acids, peptides and proteins - plant proteins and their quality. Enzymes - factors affecting the activity, classification, immobilization and other industrial application. Lipids - acyl lipids, their industrial application in soaps, detergents, paints, varnishes, lubricants, adhesives, plastics, nylon, bio-diesel, biodegradable plastics. Carbohydrates. Nucleotides and nucleic acids.

Unit-II: Metabolism and Glycolysis

Metabolic energy and its generation - Metabolism, basic concepts. Glycolysis, citric acid cycle, pentose phosphate pathway, oxidative phosphorylation. Fatty acid oxidation. General reaction of amino acid degradation.

Unit-III: Biosynthesis

Biosynthesis - carbohydrates, lipids, proteins and nucleic acids. Metabolic regulation. Secondary metabolites, terpenoids, alkaloids, phenolics and their applications in food and pharmaceutical industries.

Recommended Text Books

1. Outlines of Biochemistry - Conn and Stumpt
2. Essentials of Biochemistry - M.C. Pant
3. Biochemistry - U. Satyanarayana
4. Biochemistry - Dasgupta
5. Chemistry of natural products - O.P. Aggrawal
6. Text book of Biochemistry - AVSS Rama Rao



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-552 Biochemistry Lab

List of Experiments:

1. Amino acid models (atomic)
2. Paper electrophoresis for the separation of plant pigments.
3. Protein denaturation - heat, pH, precipitation of proteins with heavy metals.
4. Protein estimation by Lowry's method
5. Enzyme kinetics - competitive inhibition, enzyme immobilization
6. Extraction of nucleic acids
7. Column chromatography of RNA hydrolysate
8. Characterization of lipids by TLC
9. Extraction of oil from oil seeds
10. Estimation of fatty acids by GLC
11. Models of sugars, sucrose and starch
12. Quantitative determination of sugars
13. Paper chromatography for the separation of sugars
14. Determination of phenols



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-V

BSA-535 Crop Pests and Stored Grain Pests and their Management

L T P
2 0 1

Credit: 3

Unit- I: Stored Grains and their Pest

Study of stored grain pests of order coleopteran their biology and damage pulse beetle, red flour beetle, khapra beetle and rice weevil. Study of stored grain pests of order Lepidoptera their biology and damage – rice moth Study of preventive and curative methods against stored grain pest.

Unit-II: Pests in Grain crops

Distribution, biology, nature and symptoms of damage of insect pests of

Rice, Hipsa, grass hopper, rice leaf roller, brown plant hopper, green leaf hopper, white backed plant hopper rice gundhi bug

Sorghum and maize, Sorghum shoot fly, maize stem borer, cob borers-ear head caterpillar, army worm green sting bug

Ragi, Stem borer, web worm

Wheat, Termite

Sugarcane, Early shoot borer, top shoot borer; Pyrilla, white fly, mealy bug and scale insect

Cotton, Cotton aphid, white fly, red cotton bug, Jassid and Thrips pink boll worm, spotted boll worm, American boll worm and tobacco caterpillar, leaf roller and mealy bug. Non Pests-Mites

Mesta and Sunhemp – Red hairy caterpillar, capsule borer and Bihar hairy caterpillar

Pulses – Tobacco caterpillar, jassid, aphid green stink bug. Green gram, black gram lentil, Rajmas and Lytherie

Pigeon pea – Aphid, Thirps, and Pod fly and Pod bug, Plume moth

Chickpea – Cut worm, gram pod borer

Pea – Pea leaf miner and pea pod borer

Soybean – Girdle beetle, stem fly and tobacco caterpillar

Groundnut – White grub and red hairy caterpillar

Castor – Castor semilooper

Gingerly/Sesame – Leaf roller and capsule borer, Til hawk moth

Safflower – Aphid, capsule fly

Mustard – Aphid, sawfly, flea beetle, painted bug

Sunflower – Head capsule borer (Helicoverpa)

Unit-III: Pests in Vegetable Crops

Brinjal – Shoot and fruit borer

Bhindi – Shoot and fruit borer, jassid

Tomato – Gram pod borer

Cruciferous – Diamond back moth, tobacco caterpillar

Cucurbitace – Red pumpkin beetle, fruit fly, spotted leaf beetle, blister beetle

Potato – Potato tuber moth, Cut worm

Colacasia – Tobacco cater pillar

Sweet potato – Sweet potato weevil

Moringa (Drumstick) – Bark eating caterpillar

Amaranthus – Leaf caterpillar

Chilli – Thrips, chilli budfly



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

Non pest – Chilli mite

Unit-IV: Pests in Fruit crops

Mango – Leaf hopper, mealy bug, fruit fly, nut weevil (stone weevil)

Citrus – Lemon butter fly, citrus cilla, leaf miner, white fly, fruit sucking moth

Grapevine – Termite, vine borer, vine girdler, fruit sucking moth

Banana – Rizome borer, Pseudostem borer, aphid

Guava – Bark eating caterpillar, white grub, fruit borer, fruit fly, fruit sucking moth

Sapota – Leaf webber, fruit borer, anar butterfly

Ber – Ber fruit fly, leaf webber, mealy bug

Unit-V: Pests in Medicinal, Aromatic and Plantation Crops

Tobacco – Tobacco caterpillar, cut worm, gram pod borer

Turmeric – Banana lacewing bug, Bihar hairy caterpillar

Betelvine – White fly, betelvine scale

Onion/Garlic – Thrips

Coriander – Aphid

Curry leaf – Citrus butterfly, leaf roller

Pepper – Pollu beetle

Ginger – Fly maggot

Cashew nut – Shoot borer, stem borer, shoot tip and inflorescence caterpillar

Pomegranate – Anar butter fly, bark eating caterpillar, anar fruit borer

Apple – Apple wooly aphid, san jose scale, flower thrips

Coconut – Termite, aphid, scale insect, nut borer

Coffee – White fly, mealy bug, green plant bug, leaf miner

Tea – Jassid / Aphid

Ornamental plants

Rose – Scale insects, bark caterpillar

Chrysanthemum – Aphid, gram pod borer

Marigold – Leaf miner, gram pod borer

Recommended Text Books

1. Storage Pest Management – Sharma, S. and Choudhary, A.
2. Management of Insect Pests of Horticultural Crops– Gupta, H.C.L.
4. Text book of Entomology – Pruthi, H.S.
5. Cotton pests and Bio control agents – Sathe, T.V.
6. Economic and Applied Entomology – Ashok Kumar and Prem Mohan Nigam
7. A Test book of Applied Entomology (Vol. II) – K.P. Shrivastava



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-553 Crop Pests and Stored Grain Pests and their Management Lab

List of Experiments:

Identification of pests, their damage symptoms and management

1. Rice
2. Sorghum
3. Maize
4. Wheat
5. Sugarcane
6. Cotton
7. Pulses
8. Cruciferous vegetables
9. Malvaceous vegetables
10. Cucurbitaceous vegetables
11. Chilli
12. Solanaceous vegetables
13. Citrus
14. Sapota
15. Mango
16. Banana



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rdYear, SEMESTER-V

BSA-536 Agricultural Marketing, Trade and Prices

L T P
1 0 1

Credit: 2

Unit- I: Agricultural Marketing

Agricultural Marketing- Concepts and Definition, Scope and subject matter, Market and Marketing: meaning, definition, components of a market. Classification of market. Market structure, conduct and performance, marketing structure. Market functionaries or agencies

Unit-II: Market Strategy

Producer's surplus: Meaning, types of producers surplus, marketable surplus, marketed surplus, importance, factors affecting marketable surplus. Marketing channels: Meaning, definition, channels for different products. Market integration, meaning, definition, types of market integration. Marketing efficiency- Meaning, definition, marketing costs, margins and price spread, factors affecting the cost of marketing, reasons for higher marketing costs of farm commodities, ways of reducing marketing costs.

Unit-III: International Trade

Theories of International Trade: Domestic trade, Free trade, International trade. GATT, WTO, implications of AOA, Market access, domestic support, export subsidies. EXIM policy and ministerial conferences Cooperative marketing. State Trading, Ware Housing Corporation; Central and State, objectives, functions, advantages.

Unit-IV: Food corporations

Food Corporation of India: Objectives and functions, Quality control, Agricultural products, AGMARK. Price characteristics of agricultural products process, Meaning, Need for Agricultural Price Policy. Risk in marketing: Meaning and importance, types of risk in marketing, speculations and hedging, futures trading, contract farming.

Recommended Text Books-

1. Agricultural Marketing in India – S.S. Acharya and N.L. Aggrawal, Oxford and IBH Publication Co. Pvt. Ltd., New Delhi
2. An introduction to Marketing – Amarchand, D. and B. Vardhajan, Vikash Publication House Pvt. Ltd., New Delhi
3. Export Marketing – Balagopal
4. Agricultural Marketing and – L.K. Wader and C. Murty, ICAR, New Delhi



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-554 Agricultural Marketing, Trade and Prices Lab

List of Experiments:

1. Identification of marketing channels
2. Study of Rythu Bazars, Regulated markets
3. Study of unregulated markets
4. Study of livestock markets
5. Price spread analysis
6. Visit to market institutions, NAFED
7. Study of SWS, CWC and STC
8. Analysis of information of daily prices
9. Marketed and marketable surplus of different commodities



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-V

BSA-537 Fundamentals of Farm Business Management (including Project Development, Appraisal and Monitoring)

L T P
1 0 1

Credit: 2

Unit-I: Agribusiness

Meaning, definition, structure of agribusiness (input, farm product sectors), importance of agribusiness in the Indian economy. Agricultural Policy. Agribusiness Management-Distinctive features, importance of good management, definitions of management. Management functions.

Unit-II: Planning

Planning, meaning, definition, types of plans (Purpose or mission, goals or objectives, strategies, policies procedures, rules, programmes, budget), characteristics of sound plan, steps in planning. Organization staffing, directing, motivation, ordering, leading, supervision, communications, control. Capital Management. Financial management of Agribusiness: Importance of Financial statements, Balance sheet, Profit and loss statement, Analysis of financial statements

Unit-III: Agro-based industries

Agro-based industries: Importance and needs, classification of industries, Types of agro based industries. Institutional arrangement, procedure to set up agro based industries. Constraints in establishing agro-based Industries. Marketing Management: Meaning, definitions, marketing mix, 4Ps of marketing, Mix, market segmentation, Methods of market, Product life cycle.

Unit-IV: Price Policy and Project

Pricing policy, meaning, pricing method. Prices at various stages of marketing. Project: Definitions, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Appraisal and evaluation techniques, NPW, BCR, IRR, N/K ratio, Sensitivity analysis. Characteristics of agricultural projects Preparation of project reports for various activities in agriculture and allied sectors: Dairying, poultry, fisheries, agro-industries etc.

Recommended Text Books-

1. Agribusiness Management – W. David Downey and Steven P.Erickson
2. Introduction of Agricultural Business Management – Davis, J. and Gold Berg
3. Project Management and Control – Rao
4. Project Management – S. Choudhary, Hill Publication Company, New Delhi
5. Project Management – Nagaraja
6. Agri. Business Management – Broadway, Himalaya Publication House, New Delhi
7. Project Planning, Analysis, Selection, Implementation and Review – Chandra



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-555 Fundamentals of Farm Business Management (including Project Development, Appraisal and Monitoring) Lab

List of Experiments:

1. Study of input markets: seed, fertilizers, pesticides
2. Study of output markets: grains, fruits, vegetables, flowers
3. Study of product markets, retails trade commodity trading, and value added products
4. Study of financing institutions-Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD
5. Preparations of projects, Feasibility reports; Projects appraisal techniques; Case study of agro-based industries



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-V BSA-538 Fundamentals of Rural Sociology and Educational Psychology

L T P
2 0 0

Credit: 2

Unit-I: Extension Education

Introductory lecture, Meaning and definition of extension education and agriculture extension. Scope and importance of sociology in agriculture extension and interrelationship between rural sociology and agriculture extension, Meaning of rural sociology and its important characteristics. Difference and relationship between rural and urban societies. Meaning and Definition of social group and its classification, Factors considered in formation and organization of a group, Motivation in group formation and role of social group in agricultural extension. Meaning, definition and functions of social stratification, Basis of stratification, forms of social stratification, characteristics and differences between class and caste system. Concept of culture.

Unit-II: Sociality

Meaning and definition of custom, folkways, mores and taboos, rituals and traditions, Role of social norms in agricultural extension. Meaning and definition of social values and attitudes, Types and role of social values and attitudes in agriculture extension. Meaning and definition of social institution and major institutions in rural society, Function and role of major institutions in agriculture extension. Meaning and definition of social organization and types of organizations, Role of social organization in agriculture extension. Meaning and definition of social control, Need and means of social control. Meaning, definition and nature of social change, Dimension and factors responsible for social change.

Unit-III: Leadership and Training

Meaning, definition and classification of leadership, Roles of leader in agriculture extension, Different methods of selection of professional and lay leaders, advantages and limitations in use of local leaders in agriculture extension. Meaning and definition of training, Training of leaders, Methods of training.

Unit-IV: Psychology and personality

Meaning and definition of psychology and educational psychology, Scope and importance of educational psychology in agriculture extension. Meaning and definition of intelligence and its types, Factors affecting intelligence and its importance in agriculture extension. Meaning and definition of personality and its types, Factors influencing the personality and its role in agriculture extension. Meaning and definition of teaching and learning process, Learning experience and learning situation. Elements of learning situation and its characteristics, Principles of learning, Implications of learning principles for teaching.

Recommended Text Books-

1. Introductory Rural Sociology – Chitambar, J.B., Wiley Eastern Private Limited, New Delhi
2. Education and communication for development – Dahama O.P. and Bhatnagar, O.P., Oxford and IBH Publishing Co. New Delhi
3. Rural Sociology in India – Desai, A.R., Popular Prakashan, Bombay
4. Educational Psychology – Jitendra Mohan, Wiley Eastern Limited, New Delhi
5. Educational Psychology – Rai, B.C., Prakashan Kendra, Lucknow



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-V

BSA-539 Post Harvest Management and Value Addition of Fruits and Vegetables

L T P
1 0 1

Credit: 2

Unit-I: Post-harvest technology

Importance of post-harvest technology in horticultural crops. Maturity indices, harvesting, post-harvest handling of fruits and vegetables. Maturity and ripening process, factors affecting ripening in fruits and vegetables. Pre harvest factors affecting quality on post-harvest shelf life of fruits and vegetables. Chemicals used for harvesting, delaying in ripening of fruits and vegetables.

Unit-II: Storage of fruits and Vegetables

Methods of storage – precooling, pre storage treatments, and low temperature storage controlled atmospheric storage, irradiation, low cost storage structures. Various methods of packing, packaging materials and transport, packing techniques for export. Fabrication of types of containers, cushioning materials, vacuum packing, poly shrink packing, specific packing for export of mango, banana, grapes, kinnow, mandarin and sweet orange.

Unit-III: Fruits and Vegetable preservation

Importance and scope of fruits and vegetable preservation. Principles of preservation by heat, low temperature, chemicals and fermentation. Unit layout-selection of site, precautions for hygienic conditions of unit. Preservation through, canning, bottling, freezing, drying, dehydration, ultraviolet and ionizing radiations. Preparation of jams, jellies, marmalades, candies, crystallized, glazed fruits, preserves, chutney, pickle, ketchup, sauce, puree, syrups, juices, squashes and cordials. Spoilage of canned products, biochemical, enzymatic and microbial spoilage. Preservatives, colours permitted and prohibited in India.

Recommended Text Books-

1. Principles and Practices of Post-Harvest Technology – P.H. Pandey
2. Post-Harvest Technology of Fruits and Vegetables – L.R. Verma and V.K. Joshi
3. Post-Harvest Technology of Horticultural Crops – K.P. Sudheer
4. Post-Harvest Management of Horticultural Crops – M.A. Mir
5. Marketing of Processed, Fruits and Vegetables – M. Choudhary
6. Fruits and Vegetable preservation – Girdharilal, G.S. Sidhappa and G.L. Tondan



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-556 Post Harvest Management and Value Addition of Fruits and Vegetables Lab

List of Experiments:

1. Practice in judging the maturity of fruits and vegetables
2. Conservation of zero energy cool chambers for on farm storage
3. Determination of physiological loss in weight, total soluble solids, total sugars, acidity, ascorbic acids contents in fruits and vegetables
4. Types, methods of packing and importance of ventilation, pre-cooling packing methods for export
5. Methods of prolonging storage life
6. Effect of ethylene on ripening of Banana, Sapota, Mango
7. Identification of equipment and machinery used in preservation of fruits and vegetables
8. Preservation by drying and dehydration
9. Preparation of jam, jelly, marmalades, squash, cordials, syrups, chutney, pickles, sauces, ketchup
10. Visit to local processing unit, markets, cold storage units and packing industry



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-V

BSA- 540 Diseases of Horticultural Crops and their Management

L T P
2 0 1

Credit: 3

Unit-I: Study of diseases I

Study of following diseases with reference to their economic importance, symptoms, causal organism, etiology, epidemiology, diseases cycle and integrated management.

1. Rust diseases of Rose, Beans, Coffee, Tea, Mulberry and Jasmine.
2. White rust of crucifers
3. Leaf blight of Mango (twig die back), Brinjal (phomopsis), Potato (early and late), Tomato (early)
4. Bacterial blight of Betelvine, Mulberry, Mango
5. Bacterial leaf spot of pomegranate
6. Leaf spot of Banana (sigatoka diseases), Sapota (*Phaeophleospora indica*), Grapevine (*Cercospora viticola*), Crucifers (*Alternaria brassicicola*), Mulberry (*Cercospora moricola*), Jasmine (*Alternaria jasmini*)

Unit-II: Study of diseases II

7. Powdery mildew of Mango, Grapevine, Apple, Cucurbits, Rose, Mulberry, Chrysanthemum
8. Downy mildew of Grapevine, Crucifers, Cucurbits, Onion
9. Anthracnose of Papaya, Mango, Citrus, Grapevine, Guava, Chilli, Cucurbits, Beans
10. Bacterial wilt of Banana, Guava, Brinjal
11. Fungal wilt of Bhindi, Chrysanthemum, Banana (panama disease)
12. Fruit rot of Pomegranate (*Phomopsis* sp.), Banana (*Macrophomina musae*), Citrus (Gummosis), Tomato, Oil palm (*Mafasmiium palmivora*) Rotting of grape berries
13. Damping off of Papaya, Tomato
14. Collar rot of Papaya, Apple, Brinjal, Chrysanthemum (Stem rot)
15. Root rot of Apple, Chrysanthemum
16. Onion smut
17. Foot and leaf rot of Betelvine

Unit-III: Study of diseases III

18. Citrus canker, Stem canker of Mango
19. Bud rot of Coconut, Oil palm, stem bleeding of coconut
20. Purple blotch and blast of onion
21. Blister blight of Tea
22. Mango malformation and black tip
23. Citrus gummosis and greening
24. Black rot of Crucifers
25. Little leaf of brinjal
26. Leaf curl of Chilli, Potato, Tomato

Unit-IV: Study of Diseases IV

27. Mosaic of Papaya, Beans
28. Bunchy top of banana, little leaf of brinjal
29. Flat limb of Sapota
30. Black mold of onion, Sooty mould of Sapota



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31. Root knot of Bhindi, Citrus nematode
32. Brown rot of Apple, Pink disease of Apple - Apple Scab

Recommended Text Books-

1. Diseases of Vegetable crops - R.S. Singh
2. Diseases of Plantation crops and their management - Kulkarni
3. Diseases of Fruits and Plantation crops and their management, A modern perspective- Jahagirdar Shamora
4. Diseases of Plantation Crops - V.K. Gupta
5. Diseases of Vegetable Crops - J.C. Walker
6. Diseases of Fruit Crops - V.K. Gupta



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA- 557 Diseases of Horticultural Crops and their Management Lab

List of Experiments:

1. Diseases of beans, citrus, guava and Sapota
2. Diseases of papaya, banana, pomegranate and Ber
3. Diseases of mango, grapes and apple; Diseases of chilli, brinjal and bhindi
4. Diseases of potato, tomato and crucifers;
5. Diseases of cucurbits, onion and betelvine;
6. Diseases of oil palm, coconut, tea, coffee and mulberry,
7. Diseases of rose, chrysanthemum and jasmine.

Note: Field visit at appropriate time during the semester.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-558 Practical Crop Production I (Cereals, Pulses and Fodder Crops) Lab

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Credit: 1

Practice of raising 8-10 prevailing *Kharif* crops of the agro-climatic zones will be done by the student. One crop will be grown by a student or group of 2-4 students depending upon the strength of students in the class, on a minimum of 100 m² area. Following practices will be performed by the student(s) for raising the allotted crop to them separately, besides observing the practices performed by other students in their plots for raising the crops.

Practical

S.No.	Exercise	No. of classes
1	Crop planning for raising <i>Kharif</i> -crops	2
2	Field preparation and preparation of nursery beds for crop	1
3	Seed treatment, seed inoculation and sowing of crop	2
4	Fertilizer application (basal, top dressing and foliar spray) in crop	2
5	Water management (irrigation & drainage) in crop	1
6	Weed management (cultural/mechanical/chemical) in crop	1
7	Management of insect pests and diseases in crop	1
8	Harvesting, drying, and tying bundles and transport to threshing floor of crop.	1
9	Threshing, winnowing and drying of produce	1
10	Storage and marketing	1
11	Preparation of balance sheet including cost of cultivation and value of produce.	2



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-VI BSA-641 Production Economics and Farm Management

L T P
1 0 1

Credit: 2

Unit- I: Production Economics

Production Economics: Meaning, definition, nature and scope of agricultural production economics. Basic concepts and terms. Concepts of production. Production Functions: Meaning, definition, types.

Unit-II: Law of Returns

Laws of returns: Increasing, constant and decreasing. Factor product relationship, determination of optimum input and output. Factor relationship. Product relationship. Types of enterprise relationships. Returns to scale: Meaning, definition, importance.

Unit-III: Farm Management

Farm Management. Economic principles applied to the organizations of farm business. Types and systems of farming. Farm planning and budgeting. Risk and uncertainty. Linear Programming: Assumptions, advantages and limitations of linear Programming.

Recommended Text Books-

1. Elements of Farm Management – I.J. Singh and V.K. Puri
2. Economics of Farm Management – A.S. Kahlon and Karam Singh
3. Farm Business Management – S.S. Johl and T.R. Kapoor
4. Farm Management – S.P. Dondyal.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-659 Production Economics and Farm Management Lab

List of Experiments:

1. Computation of cost concepts
2. Methods of computation of depreciation
3. Analysis of net worth statement; Farm inventory analysis
4. Preparation of farm plans and budgets
5. Types of farm records and accounts
6. Preparation of profit and loss account
7. Break-Even analysis
8. Economic analysis of different crop and livestock enterprises
9. Application of farm management principles



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-VI

BSA-642 Extension Methodologies for Transfer of Agricultural Technology

L T P
1 0 1

Credit: 2

Unit-I: Communication skills

Meaning, definition and genesis of term communication. Different important models of communication – Aristotle model, Shannon and Weaver model, Berlo model and Leagans model. Elements of communication and their characteristics, Types of communication and barriers of communication.

Unit-II: Planning in Extension

Extension Programme Planning – Meaning, concept and definition of programme planning, Project and its Importance. Principles of programme planning and Steps of programme planning. Definition of evaluation, Difference between evaluation and monitoring. Meaning and definition of extension teaching, Methods and their classifications, Functions of Extension Teaching Methods.

Unit-III: Contact Methods

Individual contact methods-Farm and home visit, result demonstration, Field trials – Meaning, objectives, steps, merits and demerits. Group contact methods-Group discussion, method demonstration, Field trips meaning, objectives, steps, merits and limitations. Small group discussion techniques-Lecture, Symposium, Panel, Discussion, Debate, Forum, Buzz group, Workshop, Brain storming, Seminar and Conference. Mass contact methods-Campaign, Exhibition, Kisan Mela, Radio and T.V. talk - Meaning, Importance, Steps, and merits and limitations. Factors influencing in selection and use of Extension teaching methods and combination (Media Mix) important Steps, merits and limitations.

Unit-IV: Information

Innovative information sources-concept and importance of innovative information sources like internet, cyber cafes, videos and tele conferences. Concept of Kisan call centers and consultancy clinics, scope and definition of Agricultural clinics. Agricultural Journalism-meaning, scope and importance. Different sources of news and types, Merits and limitations of agricultural journalism. Meaning, definition, Process of diffusion and elements of diffusion.

Unit-V: Adoption

Meaning, definition of adoption process, stages of adoption. Meaning, definition and characteristics of Innovation. Adopters categories and their characteristics, important factors influencing adoption process. meaning of capacity building, Meaning and definition of training, Different types of training. Development and execution of training programmes to farmers, farm women and rural youth. Functions of Farmers Training Center and Krishi Vigyan Kendra

Recommended Text Book-

1. Education and Communication for Development – O.P. Dahama and O.P. Bhatnagar
2. Extension Communication and Management – G.L. Ray
3. A Text Book of Agricultural Communication – A.S. Sandhu
4. Diffusion of Innovation – E.M. Rogers



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-660 Extension Methodologies for Transfer of Agricultural Technology Lab

List of Experiments:

1. Simulated exercises on communication. Identifying the problems, fixing the priorities and selecting a most important problem for preparation of a project
2. Developing a project based on identified problems in a selected village
3. Organization of Group Discussion and Method demonstration
4. Visit to KVK/FTC
5. Planning and writing of scripts for radio and television
6. Audio-Visual aids-Meaning, Importance and Classification
7. Selection, Planning and Preparation. Evaluation and Presentation of visual aids
8. Planning and preparation of visual aids-Charts, Posters, Over Head Projector (OHP), Transparencies, Power Point Slides
9. Planning and preparation of Agricultural Information materials-Leaflet, Folders, Pamphlet, News Stories, Success Stories
10. Handling of Public Address Equipments (PAE) System, Still camera, Video Camera and Liquid Crystal Display (LCD) projector



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-V
BSA- 643 Principles of Plant Biotechnology

L T P
2 0 1

Credit: 3

Unit-I: Plant Biotechnology

Concepts of Plant Biotechnology: History of Plant Tissue Culture and Plant Genetic Engineering. Scope and importance in Crop Improvement.

- (a) Totipotency and Morphogenesis,
- (b) Nutritional requirements of in-vitro cultures

Unit-II: *In vitro* Cultures

Techniques of *In vitro* cultures

- (a) Micro propagation
- (b) Anther culture
- (c) Pollen culture
- (d) Ovule culture
- (e) Embryo culture
- (f) Test tube fertilization
- (g) Endosperm culture
- (h) Factors affecting above in vitro culture
- (i) Applications and achievements

Unit-III: Somaclonal Variation

Somaclonal variation, types, reasons, Somatic embryogenesis and synthetic seed production technology
Protoplast isolation

- (a) Culture, manipulation and fusion
- (b) Products of somatic hybrids and cybrids, applications in crop improvement

Unit-IV: Genetic Engineering

Genetic engineering

- (a) Restriction enzymes
- (b) Vectors for gene transfer
- (c) Gene cloning
- (d) Direct and indirect method of gene transfer
- (e) Transgenic plants and their applications

Blotting techniques-DNA finger printing, DNA based markers-RFLP, AFLP, RAPD, SSR and DNA probe
Mapping QTL – future prospects, MAS, and its application in crop improvement.

Recommended Text Book-

1. Plant Biotechnology – H.S. Chawala
2. Biotechnology – B.D. Singh
3. Element of Biotechnology – Prof. P.K. Gupta
4. Plant Biotechnology – Dr. S.S. Purohit



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA- 661 Principles of Plant Biotechnology Lab

List of Experiments:

1. Requirements for Plant Tissue Culture Laboratory
2. Techniques in Plant Tissue Culture
3. Media components and preparations
4. Sterilization techniques and inoculation of various explants
5. Aseptic manipulation of various explants
6. Callus induction and Plant Regeneration
7. Micro propagation of important crops
8. Anther, Embryo and Endosperm culture
9. Hardening/Acclimatization of regenerated plants
10. Somatic embryogenesis and synthetic seed production
11. Isolation of protoplast
12. Demonstration of culturing of protoplast
13. Demonstration of Isolation of DNA
14. Demonstration of Gene transfer techniques, direct methods
15. Demonstration of Gene transfer techniques, indirect methods
16. Demonstration of Confirmation of Genetic transformation
17. Demonstration of gel-electrophoresis techniques



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-VI

BSA-644 Entrepreneurship Development and Communication Skills

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Credit:2

Unit-I: Entrepreneurship

Entrepreneurship development – Historical perspective, assessing overall business environment in the Indian Economy. Concept, need, scope and prospects of entrepreneurship development. Globalization and the emerging business/entrepreneurial environment. Entrepreneurial and managerial characteristics. Managing an enterprise. Motivation and entrepreneurship development.

Unit-II: Entrepreneurship development programmes

Importance of planning, monitoring, evaluation and follow up. Managing competition and entrepreneurship development programmes viz IRDP, JRY, TRYSEM, SGSY, SWOT analysis.

Unit-III: Commercialization and industrialization

Generation, incubation and commercialization of ideas and innovation. Government schemes and incentives for promotion of entrepreneurship. Government policy on small and medium enterprises (SME's)/SSIs. Export and Import policies relevant to agriculture sector. Venture capital, contract farming and joint ventures, public-private partnership. Overview of agri inputs industry. Characteristics of Indian agricultural processing and export industry. Social responsibility of business.

Unit-IV: Communication Skills

Communication skills-structural and functional grammar-meaning and process of communication. Verbal and non-verbal communication. Listening and note taking, writing skills and oral presentation skills. Field diary and lab record, indexing, foot note and bibliographic procedures. Reading and comprehension of general and technical articles. Precise writing, summarizing, abstracting. Individual and group presentations. Importance (Extempore speech) of presentation, public speaking group discussion. Organizing seminars and conferences.

Recommended Text Books-

1. Trainer's Manual on Developing Entrepreneurial Motivation – Akhori, M.M.P., Mishra, S.P. and Sengupta, Rita (1989), NIESBUD
2. Entrepreneurial Development – Khanka, S.S., S. Chand Co. Ltd. Ramnagar, New Delhi
3. Fundamental of Entrepreneurship – Aggrawal R.C., Laxmi Narayan Aggrawal, Agra (U.P.)
4. Dynamics of Entrepreneurial – Desai, Vasant, Himalayan Publication House, New Delhi
5. Farm Communication through Mass – Samant, A.G., Associated Media in the New Millennium Publishing Company, Karol Bag, and New Delhi
6. Entrepreneurship Development Programme in India and its relevance – Patel, V.G.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-662 Entrepreneurship Development and Communication Skills Lab

List of Experiments:

1. Listening and note taking, writing skills
2. Oral presentation skills
3. Field diary and lab record, indexing, footnote and bibliographic procedures
4. Reading and comprehension of general and technical articles
5. Precis writing, summarizing, abstracting
6. Individual and group presentations



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

**3rd Year, SEMESTER-VI
BSA-645 Organic Farming**

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Credit: 3

Unit-I: Organic farming introduction

Introduction of Organic Farming (OF)

- (a) Importance of requirement of foods and fodder in the nation.
- (b) OF in relevance to quality foods and fodder
- (c) Meaning of OF and its basic tools

Concept of OF and objectives of OF

- (a) OF in relevance to Indian and global agriculture in present context
- (b) OF in relevance to sustainable agriculture and farming systems

Organic production requirements

- (a) What to do and what not to do in OF and conversion of land for organic agriculture
- (b) Organic soil with organic nutrition - organic matter and its role in plant nutrition
- (c) Organic sources of plant nutrition

Unit-II: Nutrient management

Biological intensive nutrient management

- (a) Organic manures-Farmyard manure (preparation, composition and availability)
- (b) Composts and composting-aerobic and anaerobic composting, microbial cultures for hastening composting, preparation of composts from rural and urban wastes, phospho-composts, NADEP-composts
- (c) Vermicompost-role of earthworms in composting, method of vermicomposting, vermiculture, vermi-wash, qualities of vermicompost
- (d) Green manuring and its advantages, green manure crop (leguminous and non-leguminous), ideal green manuring crops and type of green manuring.
- (e) Crop and weed residues and its recycling, farm residues, mulching of residues, use of press mud, biogas slurry and oilcakes
- (f) Biodynamic farming, *Amritpani*, Homa farming

Unit-III: Biofertilizers

Biofertilizers (nitrogenous, phosphorus and compost), Azolla, blue green algae and mycorrhizae their applications.

Unit-IV: Disease and Pest Management

Disease and pest management in OF - Integrated disease and pest management and key steps for biological control of diseases and pests

- (a) Use of bio-control agents (parasitoids and predators), and biopesticides (bacterial, fungal and viral pesticides)
- (b) Use of pheromone traps, trap crops, bird-perches, botanic, cultural practices and ITKs (indigenous technical knowledge)

Unit-V: Weed management

Weed management

- (a) Cultural and physical methods of weed control
- (b) Biological methods of weed control using natural enemies and pathogens.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

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Quality considerations

- (a) Concepts of standards and various standards of OF
- (b) Accreditation and functions of accreditation agencies
- (c) Inspection and certification - accredited inspection and certification agencies, and procedures of inspection and certification
- (d) Labeling, logo, transport, storage, marketing and export.

Recommended Text Books-

1. Organic Food Production in India - Bhattacharya, P. 2003, Agribios- Status, Strategy and Scope (India) Jodhpur
2. Organic Farming-Theory and - Palanniappan, S.P. and Anandurai, Practices K 1999, Scientific Publisher, Jodhpur
3. Organic Farming - Lumpkin, N. 1990, Farming Press Books, IPSWITCH, U.K.
4. Hand Book of Organic Farming - Sharma, A.K. 2001, Agribios (India), Jodhpur
5. Organic Farming - Gupta, M.K. 2002, Moraka Foundation, Jodhpur
6. Organic Farming for - Parvatha Reddy, P, Agribios (India), Sustainable Horticulture Jodhpur
7. Emerging Trends in Biological - Ananthakrishnan, T.N. 1992, Oxford Control of Phytophageous Insects & IBH, New Delhi



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA-663 Organic Farming (Lab)

List of Experiments:

1. Raising of vegetable crops through organic nutrients, diseases and pest management
2. Raising of nursery for vegetable crops and ornamentals
3. Macro quality analysis
4. Grading and packaging
5. Post-harvest management



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER- VI BSA-646 Environmental Science

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Credit: 2

Unit-I: Environmental Science

Scope and importance of environmental studies. Multidisciplinary nature of environmental studies and need for public awareness. Natural resources - Renewable and non-renewable resources: Natural resources and associated problems.

- (i) Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
- (ii) Water resources: Use and over utilization of surface and ground water, floods, drought, conflict over water, dams benefits and problems.
- (iii) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- (iv) Food resources: World food problem, changes caused by agriculture and over-grazing, effect of modern agriculture, fertilizer-pesticides problem, water logging, salinity, case studies.
- (v) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources, case studies.
- (vi) Land resources: Land as resources, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable life style.

Unit-II: Ecosystem

Ecosystem: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chain, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem: Crop and ecosystem, Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem (Ponds, streams, lakes, rivers, oceans estuaries).

Unit-III: Bio-diversity

Bio-diversity and its conservation

- (i) Introduction - Definition, genetic, species and ecosystem diversity.
- (ii) Bio-geographical classification of India.
- (iii) Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values.
- (iv) Biodiversity: at global national and local level
- (v) India as a mega-diversity nation.
- (vi) Hot-spot of biodiversity
- (vii) Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- (viii) Endangered and endemic species of India
- (ix) Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-IV: Pollution

Environmental pollution:

- (i) Definitions cause effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and nuclear hazards.



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- (ii) Solid waste managements: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.
- (iii) Disaster management: floods, earthquake, cyclone and landslides.

Unit-V: Environment and social issues

Social issues and the Environments:

- (i) From unsustainable to sustainable development.
- (ii) Urban problems related to energy.
- (iii) Water conservation, rain water harvesting, watershed management.
- (iv) Resettlement and rehabilitation of people: its problems and concerns.
- (v) Environmental ethics: issues and possible solutions.
- (vi) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.
- (vii) Wasteland reclamation.
- (viii) Consumerism and waste products.

Unit-VI: Protection Acts for Environment and Human rights

The Environment protection Act.

The Air (Prevention and Control of Pollution) Act.

The Water (Prevention and Control of Pollution) Act.

The Wildlife Protection Act.

The Forest Conservation Act.

Issues involved in enforcement of environmental legislation Public awareness. Human population and Environment

- (a) Women and Child Welfare.
- (b) HIV/AIDS.
- (c) Role of Information Technology in Environment and human health
- (d) Population growth, variation among nations
- (e) Population explosion - Family Welfare Programme
- (f) Environment and human health. Human Rights, Value Education

Recommended Text Books-

1. Principles of Agricultural Ecology - G.S. Dhaliwal & G.S. Klear
2. Fundamentals of Environmental Biology - K.C. Aggrawal
3. Ecology and Environment - P.D. Sharma
4. A Test book of Environmental Science - V. Subramaniam
5. Ecology and Environmental Biology - Purohit, S.S. and Aggrawal, A.K.
6. Environmental Studies - S. Singhal and N. Singhal
7. Essentials of Environmental Science - Dhaliwal, G.S. and Kukal, S.S.
8. Environmental Biology - P.D. Sharma
9. Environmental Studies - Rajesh Dharkar



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Faculty of Engineering and Technology

BSA-664 Environmental Science Lab

List of Experiments:

1. Collection, processing and storage of effluents sample.
2. Determination of Bio-chemical Oxygen Demand (BOD) in effluents sample.
3. Determination of Chemical Oxygen Demand (COD) in effluents sample
4. Determination of Oxygen Demand (OD) in effluents sample.
5. Determination of sound level by using sound level meter.
6. Estimation of respirable and non respirable dust in the air by using portable dust samples.
7. Determination of Total Dissolved Solids (TDS) in effluents sample.
8. Estimation of species abundance of plants.
9. Estimation of nitrate contamination in ground water.
10. Analysis of temporary and total hardness of water sample by titration.
11. Estimation of pesticides contamination in Agro-Ecosystem.
12. Crop adaptation to environmental variable, soil conditions.
13. Study of transpiration and water balance in plants.
14. Assessment of chlorophyll content of fresh water ecosystem.
15. Visit to local polluted sites : Observation and remedial measures.
16. Visit to social service organization/Environmental Education Center.



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

3rd Year, SEMESTER-VI
BSA- 647 Weed Management

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Credit: 2

Unit-I: Weeds

Weeds: Introduction, harmful and beneficial effect. Classification, propagation and dissemination. Weed biology and ecology. Crop-weed association. Crop-weed competition and allelopathy.

Unit-II: Weed Control and Herbicides

Concepts of weed prevention, eradication and control. Method of weed control: physical, cultural, chemical and biological. Integrated weed management. Herbicides: Advantages and limitation of herbicide usage in India Herbicides classification and formulation. Methods of herbicide application. Introduction to adjuvant and their use in herbicides. Introduction to selectivity of herbicides.

Unit-III: Weed Management

Compatibility of herbicides with other agro-chemicals. Weed management in major field and horticultural crops Shift of weed flora in cropping systems. Aquatic and problematic weeds and their control

Recommended Text Books-

1. Principal of Weed Science – V.S. Rao (1994), Oxford & IBH Publication, New Delhi.
2. Weed Management – Walia, U.S. (2003), Kalyani Publication, New Delhi
3. Weed Management-Principles and – Gupta, O.P. (2000), Agrobios practices Publication, India
4. A Manual of Weed Control – Kewat, M.L. and Sharma, R.S. (2007), Department of Agronomy, College of Agriculture Jabalpur Publication
5. All about Weed Control – Subramaniam, S., Ali, A.M. and Kumar, R.J. (1977), Kalyani Publication, New Delhi
6. Weed Science: Basics and Applications – T.K. Das (2008), Jain Brother Publication



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

BSA- 665 Weed Management Lab

List of Experiments:

1. Identification of weeds
2. Survey of seeds on crop fields and other habitats
3. Preparation of herbarium of weeds
4. Calculations on weed control efficiency and weed index
5. Herbicide label information
6. Computation of herbicides doses
7. Demonstration of methods of herbicides application
8. Preparation of list of commonly available herbicides
9. Study of phytotoxicity symptoms of herbicides in different crops
10. Biology of nut sedge, Bermuda grass, parthenium, celosia
11. Economics of weed control practices
12. Visit of weed infested/problematic areas



RAMA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Engineering and Technology

**3rd Year, SEMESTER-VI
BSA-648 Renewable Energy**

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Credit: 2

Unit-I: Energy Resources

Introduction to energy sources. Biomass conversion processes. Biogas production and application. Types of biogas plants and constructional details. Agricultural wastes and their characteristics. Principles of combustion, pyrolysis and gasification. Process of biomass gasification and types of gasifiers. Producer gas and its applications. Bio-mass briquetting machines types, uses of briquettes, shredders.

Unit-II: Solar energy

Introduction to solar energy, solar flat plate and focusing plate collectors. Solar air heaters, solar space heating and cooling. Solar cookers, solar water heating systems, solar grain dryers. Solar refrigeration system, solar ponds, solar photo voltaic system. Solar street light, solar fencing, solar pumping system.

Unit-III: Wind Energy

Wind energy, types of wind mills, constructional details and application of windmills. Production process of Liquid Bio Fuels (Bio diesel and Ethanol).

Recommended Text Books-

1. New and Renewable Energy Sources – A.N. Mahur, N.S. Rathore
2. Bio-gas Technology – K.C. Khandelwal and S.S. Mandi
3. Renewable Energy Sources – J.N. Twivell and A. Weir
4. Bio-mass Combustion Technologies – FAO 1988
5. Advances in biogas technologies – O.P. Chawala
6. Solar Energy – S.P. Sukhatme
7. Non-conventional Sources of Energy – G.D. Rai



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BSA-666 Renewable Energy Lab

List of Experiments:

1. Study of constructional details of KVIC and Janta type biogas plants.
2. Study of Deen Bandhu type biogas plants.
3. Field visit to biogas plants
4. Study of different types of gasifiers.
5. Operation of gasifiers.
6. Briquette preparation from biomass
7. To study the efficiency of solar cooker
8. To study the construction and operation of solar still
9. To study the construction and operation of solar dryer.
10. To study the construction and operation of solar photovoltaic pumping system.
11. To study the construction and operation of domestic solar water heater.
12. To study the construction and operation of solar lantern.
13. To study the construction and operation of solar street light.
14. To study the construction and operation of different types of wind mills.
15. Field visit to windmills.
16. To study the processing of bio-diesel production from Jatropha.



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3rd Year, SEMESTER-VI

BSA-667 Practical Crop Production II (Oil seeds and commercial crops)

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Credit: 1

Practice of raising 8-10 prevailing *Rabi* crops of the agro-climatic zone will be done by the student. One crop will be grown by a student or group of 2-4 students depending upon the strength of students in the class, on a minimum of 100 m² area. Following practices will be performed by the student(s) for raising the allotted crop to them separately, besides observing the practices performed by other students in their plots for raising the crops.

Practical

S.No.	Exercise	No. of classes
1	Crop planning for raising Rabi-crops	2
2	Field preparation and preparation of nursery beds for crop	1
3	Seed treatment, seed inoculation and sowing of crop	2
4	Fertilizer application (basal, top dressing and foliar spray) in crop	2
5	Water management (irrigation & drainage) in crop	1
6	Weed management (cultural/mechanical/chemical) in crop	1
7	Management of insect pests and diseases in crop	1
8	Harvesting, drying, and tying bundles and transport to threshing floor of crop.	1
9	Threshing, winnowing and drying of produce	1
10	Storage and marketing	1
11	Preparation of balance sheet including cost of cultivation and value of produce	2
12	Determination of net monetary returns per student or per group of students and benefit cost ratio	1

Total 16

Note: Final report of raising the crop will be submitted by the student or group of students for evaluation



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Course Detail and Evaluation Scheme (Effective from the Session 2018-19)

B. Sc. Agriculture (Honours)

4th Year, SEMESTER-VII

BSA 701- Rural Agricultural Work Experience Programme (RAWE)

Credit: 20

Rama University, Kanpur, has introduced Rural Agricultural Work Experience programme as an essential requirement for B.Sc. (Ag) degree. The committee in order to make higher agricultural education relevant to present day changing needs, and develop professionalism felt for reorienting agricultural education. In view of globalization and development of new technologies, it is essential that the students meet international quality standards. One of the pillars for quality assurance in agricultural education is the curriculum, which takes care of contemporary needs, provides for analytical skill, students will be placed in the villages for intensive training and field experience with farm families. During stay in the villages, they will get an opportunity to study the different the problems and suggest the appropriate measures to solve them for improvement in the existing practices. Students will also develop confidence in applying the knowledge gained during the course of the studies and fine-tune their skill with the experience and knowledge of host farmers. Under this programme, RAWE model first has been adopted in the University.

Objectives

1. To understand of rural community life and the current situation prevailing in villages with special reference to agriculture and allied enterprises.
2. To familiarize with the socio-economic conditions of farmers and their problems with reference to agricultural development.
3. To make students understand farm technologies as adopted by farmers and also to help farmers to prepare sound farm plans matching to available resources.
4. To facilitate development of communication skills in students through use of extension teaching methods for transfer of technology.
5. To acquaint the students with the on-going extension and rural development programmes and to understand the activities of Krishi Vigyan Kendra.
6. To develop confidence and competence in students for solving teaching problems related to agriculture and allied enterprises.
7. To develop understanding regarding high-tech agricultural technology and factors affecting in the adoption of modern methods of agriculture by the farmers.

Registration

The students shall register for RAWE programme during VII semester in B.Sc.(Agri.) degree programme.

Eligibility for registration and other requirements

1. Students who have completed all the prescribed courses up to VIth semester for B.Sc. (Agri.) degree will be eligible for registration.
2. Students will be required to devote whole time to RAWE programme.
3. Eighty per cent attendance is compulsory for students registered for RAWE programme failing which they will have to repeat the programme at their own cost. The students shall maintain good conduct and discipline during RAWE activities. The students registered for RAWE are not allowed to leave the venue of their placement without written permission of the Coordinator RAWE/Dean, College of Agriculture, Permission will be granted only under emergency.



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Monitoring and evaluation

1. The advisory committee for monitoring and evaluation of RAWE programme will comprise of the following members) Senior Scientist/Programme Coordinator of concerned station (Chairman)
b) Dean's nominee (Dean will be the overall in-charge of the programme).
c) Head/representative of the departments involved in the RAWE programme.
2. Students will be required to submit a final comprehensive report on or before the date specified in the academic calendar.
3. The students will be required to maintain a daily diary as per the prescribed proforma. They shall produce their diary to the visiting teachers for inspection and for recording their observations and suggestions. The visiting teachers shall verify the work and sign the diary.
4. The Chairman of the committee shall monitor daily activities of individual student.

Evaluation of Performance

The performance of a student will be evaluated component wise as shown below. The 50 marks allotted to each component marks will be awarded by considering the performance of student viz. work done respective subject with the host farmer, observation of the teacher recorded during the visits, punctuality, Enthusiasm, rapport with the host farmer and any other significant achievement of the student. All the course teachers will evaluate the comprehensives report submitted by the student and conduct the via voce examination as per their course.

S.No.	Components	Credit	Maximum Marks
1.	Crop production	0+5	50 -20+15+10+5
2.	Crop protection	0+4	50 -20+15+10+5
3.	Rural Economics	0+3	50 -20+15+10+5
4.	Extension Programme	0+4	50 -20+15+10+5
5.	Attachment to the Research Station/KVK	0+4	50 -20+15+10+5
6.	Comprehensive report & Viva-voce		50 -50
	Total	0+20	300 marks

Thus, a student registered for RAWE will have to obtain at least 150 marks to pass RAWE; OGPA will be worked put following prescribed procedures. In case a student failed to secure the required marks will have to repeat the programme at his own cost.

Implementation of the Programme

The students from each College will be divided into small groups; each group will be allotted to a Krishi Vigyan Kendra/Research Station under the jurisdiction of JNKVV.

Norms for Allotment of Villages

1. The students will be allotted to KVK or Research Station and they will be equally distributed in different villages depending on availability of enterprising and innovative host-farmers. The Senior Scientist/Training Organizer must satisfy themselves with regard to suitability of selected Farmers/villages for fulfilling the overall objectives of RAWE programme.
2. From among the students placed in a village, one student nominated by station in-charge will function as a student group leader and coordinate the activities in the assigned village.



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Orientation

Students have to report to the in-charge RAWE programme in their respective colleges as per the prescribed schedule of work for orientation immediately after registration. They will undergo training on crop production, plant protection, rural economics, extension programme and attachments to KVK/Research Station. This will be of 2 weeks duration. The Heads of concerned departments will ensure that the students are well exposed to the latest practices/technologies available in their respective fields.

Programme of Work

The RAWE programme consists of 20 credits and comprises of six components as under:

1. Crop Production 5 Credit

The students shall involve themselves in actual day-to-day agricultural operations along with their host farmers. He/she will also involve in production technology and management of various crops. The student shall maintain a record of work done in prescribed proforma. In fruits and vegetables crops, the students shall involve themselves in field operations viz., seedbed preparation, nursery management, propagation etc. along with their host farmers. The student shall maintain a record of work done and will submit it at the end of the semester.

2. Crop Protection 4 Credit

Under this the students are exposed to various plant and soil disorders and learn to diagnose major plant diseases, insect-pests, and nutrient deficiency, soil related constrains, physiological disorders and prescribe remedial measures.

3. Rural Economics 3 Credit

The students shall take-up tech-economic survey of the village as per the prescribed questionnaire. The students shall be required to collect the data on economic condition of village, resource endowment and its utilization, problems of labour and employment and other important economic aspects detailed in the schedule. The student shall also conduct a farm survey and workout the cost of cultivation of principal crops grown on the farm allotted to them. He will also maintain a farm record book and analyze the data. On the basis of the results students will formulate a number of alternative plans in consultation with the farmers and the advisor for reorganization of the farm business for optimal net returns.

4. Extension Programme 4 Credit

The students shall involve themselves in the following extension education programmes –

- I. Identification of agricultural problems of the village and training needs of the farmers.
- II. Conducting method demonstrations of improved practices.
- III. Organization of short duration farmers training, camps, field visits and agricultural exhibitions.
- IV. Study of the on-going extension programmes in the villages.
- V. Arrange farmers meeting the discuss agricultural aspects.
- VI. Visit to village institutions and study their role in development programmes and other extension activities.
- VII. Motivate farmers through different extension teaching methods.
- VIII. Documentation of success stories.

Each student will prepare a report with respect to the activities indicated above and submit it to the Chairman of Advisory Committee for its evaluation. The students shall be given an opportunity to acquaint themselves with ongoing programmes and activities of research, development, marketing,



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extension agencies and organizations in the village. The students will submit report on the institutions he/she has visited.

5. Attachment to the Research Station/KVK 4 Credit

Student will conduct the bench mark survey & PRA of KVK villages. Assisting in conducting F.L.D., organizing farmers meeting Kisan mela, Exhibition, Monthly Workshop, Organizing field visits. Training programmes for farmers and farm women, study of crop cafeteria, visit of line departments viz., Agriculture, Horticulture Dairy, Poultry etc. to enquire about farmers welfare about respective department and visit of digentic team.



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4th Year, SEMESTER-VIII BSA-802 Courses for Experiential Learning

Credit: 20

A student has to register 20 credits with major load in one area of electives and rest from among one/two areas of electives in the eighth semester.

Sr.	Title of the module	Credit
I Crop Production		
1	Seed production Technology	3(1+2)
2	Remote Sensing GIS and Land Use Planning	3(1+2)
3	Integrated Farming System	3(1+2)
4	Water Management (Watershed Micro-irrigation Problematic Water)	4(1+3)
5	Soil Management (conservation problematic soil, soil quality)	4(1+3)
II Crop Protection		
1	IPM and IDM (Pest Disease Scouting)	4(2+2)
2	Management of Post Harvest insect-pests and diseases	3(1+2)
3	Non-insect pests and their management	3(1+2)
4	Apiculture	2(0+2)
5	Mushroom (cultivation)	2(0-2)
6	Bio-control agencies and bio-pesticide (mass multiplication and uses)	3(1+2)
7	Pesticides and Plant Protection equipment	3(1+2)
III Horticulture		
1	Commercial Vegetable Production	3(1+2)
2	Commercial Floriculture	3(1+2)
3	Commercial Fruit Production	3(1+2)
4	Nursery management of horticultural crops	4(1+3)
5	Protected cultivation of horticultural crops and Seed production of vegetables and flowers	4(1+3)
6	Processing and value addition of horticultural crops	3(1+2)
IV Post Harvest Technology and Value addition		
1	Post harvest technology of Horticultural crops	3(1+2)
2	Unit operation for quality value addition processing and development of new products	4(1+3)
3	Post harvest technology of spices, plantation crops, medicinal and aromatic crops	4(1+3)
4	Integrated storage management of fruits, flowers and vegetables	3(1+2)
5	Post harvest handling of cut flowers and dry flowers	3(1+2)
6	Processing of cereals, pulses and oilseed crops including biodiesel	3(1+2)



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V Agri-Business Management

1	Information and Communication Management	3(1+2)
2	Management of Agro-based industry	4(1+3)
3	Marketing Management (Agricultural Import-Export Policy of Govt. of India & Business Laws)	3(1+2)
4	Financial Management of Agri-Business	4(1+3)
5	Natural Resources Economics and Management	3(1+2)
6	Project formulation, Evaluation and Monitoring	3(1+2)

VI Social Sciences

1	Agricultural Journalism	3(1+2)
2	Visuals and Graphic Communications	3(1+2)
3	Cyber Extension	2(1+1)
4	Behavioral Skills	3(1+2)
5	Livestock, Poultry and Fish Marketing	3(1+2)
6	Farm Planning and Budgeting	3(1+2)
7	Government Policies and Programmes Related to Agriculture	3(1+2)

VII Basic Sciences

1	Molecular Breeding	3(1+2)
2	Plant tissue culture	4(1+3)
3	Recombinant DNA Technology	3(1+2)
4	Bio informatics	3(1+2)
5	Microbial and Environmental Technology	4(1+3)
6	Molecular Diagnostics	3(1+2)

VIII Commercial Agriculture

1	Commercial Floriculture	3(0+3)
2	Commercial fruit production	3(0-3)
3	Nursery management of horticultural crops	3(1+2)
4	Cultivation of commercially important medicinal and aromatic plants	2(1+1)
5	Commercial spices production	3(1+2)
6	Production technology of economic forest plants	3(1+2)
7	Commercial seed production technologies	3(1+2)