## Course Layout

### Minimum Credit Requirements

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject</th>
<th>Minimum credit(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Major</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Minor</td>
<td>09</td>
</tr>
<tr>
<td>3.</td>
<td>Supporting</td>
<td>06</td>
</tr>
<tr>
<td>4.</td>
<td>Seminar</td>
<td>01</td>
</tr>
<tr>
<td>5.</td>
<td>Research</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>56</strong></td>
<td></td>
</tr>
</tbody>
</table>

Compulsory Non Credit Courses: 06

### A) Major subjects (Min. 20 credits)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AG.ECON-501</td>
<td>Micro Economic Theory And Applications</td>
<td>2+0=2</td>
</tr>
<tr>
<td>2</td>
<td>AG.ECON-502</td>
<td>Macro Economics And Policy</td>
<td>2+0=2</td>
</tr>
<tr>
<td>3</td>
<td>AG.ECON-503</td>
<td>Evolution Of Economic Thought</td>
<td>1+0=1</td>
</tr>
<tr>
<td>4</td>
<td>AG.ECON-504</td>
<td>Agricultural Production Economics</td>
<td>1+1=2</td>
</tr>
<tr>
<td>5</td>
<td>AG.ECON-505</td>
<td>Agricultural Marketing &amp; Price Analysis</td>
<td>2+1=3</td>
</tr>
<tr>
<td>6</td>
<td>AG.ECON-506</td>
<td>Research Methodology For Social Sciences</td>
<td>1+1=2</td>
</tr>
<tr>
<td>7</td>
<td>AG.ECON-507</td>
<td>Econometrics</td>
<td>2+1=3</td>
</tr>
<tr>
<td>8</td>
<td>AG.ECON-508</td>
<td>Linear Programming</td>
<td>1+1=2</td>
</tr>
<tr>
<td>9</td>
<td>AG.ECON-509</td>
<td>Agricultural Finance And Project Management</td>
<td>2+1=3</td>
</tr>
</tbody>
</table>
### B) Minor Subjects (Min. 09 credits)

<table>
<thead>
<tr>
<th>No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Contact Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AG.ECON-517</td>
<td>Computer Applications For Agril. Economics</td>
<td>2+1=3</td>
</tr>
<tr>
<td>2</td>
<td>EXT 503</td>
<td>Diffusion And Adoption Of Innovations</td>
<td>2+1=3</td>
</tr>
<tr>
<td>3</td>
<td>Ext 507</td>
<td>Human Resource Development</td>
<td>2+1=3</td>
</tr>
</tbody>
</table>

### C) Supporting Subjects (Min. 06 credits)

<table>
<thead>
<tr>
<th>No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Contact Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AG.STAT-501</td>
<td>Mathematical Methods For Applied Sciences</td>
<td>3+0=3</td>
</tr>
<tr>
<td>2</td>
<td>AGSTAT-511</td>
<td>Statistical Methods For Applied Sciences</td>
<td>2+1=3</td>
</tr>
</tbody>
</table>

### D) Seminar (01 credit)

<table>
<thead>
<tr>
<th>No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Contact Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>AG.ECON-591</td>
<td>Seminar</td>
<td>0+1=1</td>
</tr>
</tbody>
</table>

### E) Master's Research (20 credits)

<table>
<thead>
<tr>
<th>No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Contact Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>AG.ECON-599</td>
<td>Research Work</td>
<td>0 + 20=20</td>
</tr>
</tbody>
</table>

### F) Non Credit Compulsory Courses

<table>
<thead>
<tr>
<th>No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Contact Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PGS 501</td>
<td>Library And Information Services</td>
<td>0+1=1</td>
</tr>
<tr>
<td>2</td>
<td>PGS 502</td>
<td>Technical Writing and Communications Skills</td>
<td>0+1=1</td>
</tr>
<tr>
<td>3</td>
<td>PGS 503</td>
<td>Intellectual Property and Its Management</td>
<td>1+0=1</td>
</tr>
<tr>
<td>4</td>
<td>PGS 504</td>
<td>Basic Concept In Laboratory Techniques</td>
<td>0+1=1</td>
</tr>
<tr>
<td>5</td>
<td>PGS-505</td>
<td>Agricultural Research, Research Ethics and Rural Development Programmes</td>
<td>1+0=1</td>
</tr>
<tr>
<td>6</td>
<td>PGS 506</td>
<td>Disaster Management</td>
<td>1+0=1</td>
</tr>
</tbody>
</table>
## Course Contents

### A) Major Subjects:

**Course No.**: AG ECON 501  
**Course Title**: Micro Economic Theory and Application  
**Credit**: 2+0=2  
**Semester**: I

#### Theory Syllabus:

**UNIT I**

**UNIT II**

**UNIT III**

**UNIT IV**

#### Suggested Readings:

Course No. : AG ECON 502
Course Title : Macro Economics
Credit : 2+0=1
Semester: I

Theory Syllabus :

UNIT I

UNIT II
Consumption function- Investment and savings - Concept of Multiplier and Accelerator - Output and Employment - Rate of interest - Classical, Neo classical and Keynesian version- Classical theory Vs Keynesian theory - Unemployment and Full employment.

UNIT III

UNIT IV
IS & LM frame work - General Equilibrium of product and money markets - Monetary policy - Fiscal policy- Effectiveness of Monetary and Fiscal policy - Central banking.

UNIT V
Business cycles - Balance of Payment - Foreign Exchange Rate determination.

Suggested Readings:

Course No. : AG ECON 503  
Course Title: Evaluation of Economic Thought  
Credit : 1+0=1  
Semester : II  
Theory Syllabus :  

UNIT I  

UNIT II  

UNIT III  

UNIT IV  
The Era of globalization – Experiences of developing world - Rigidity of the past vs. emerging realism – The changing path of international Institutions to economic growth and development approaches.  

UNIT V  
Economic Thought in India – Naoroji and Gokhale – Gandhian Economics - Economic thought of independent India – Nehru’s economic philosophy - Experiences of the Structural adjustment programmes of the post liberalization era.  

Suggested Readings:  
Course No. : AG ECON 504  
Course Title: Agricultural Production Economics  
Credit : 1+1= 2  
Semester : II  

Theory Syllabus :  

UNIT I  

UNIT II  
Factors of production, classification, interdependence, and factor substitution - Determination of optimal levels of production and factor application -Optimal factor combination and least cost combination of production - Theory of product choice; selection of optimal product combination.

UNIT III  
Cost functions and cost curves, components, and cost minimization -Duality theory – cost and production functions and its applications -Derivation of firm’s input demand and output supply functions -Economies and diseconomies of scale.

UNIT IV  
Technology in agricultural production, nature and effects and measurement – Measuring efficiency in agricultural production; technical, allocative and economic efficiencies - Yield gap analysis- concepts-types and measurement - Nature and sources of risk, modeling and coping strategies.

Practical Syllabus:  
Different forms of production functions-specification, estimation and interpretation of production functions – returns to scale, factor shares, elasticity of production - physical optima-economic optima-least cost combination- optimal product choice- cost function estimation, interpretation- estimation of yield gap - incorporation of technology in production functions- measuring returns to scale-risk analysis through linear programming.

Suggested Readings:  
### Theory Syllabus:

**UNIT I**

**UNIT II**

**UNIT III**
Role of Information Technology and telecommunication in marketing of agricultural commodities - Market research-Marketinformation service electronic auctions (e-bay), e-Chaupals, Agmarket and Domestic and Export market Intelligence Cell (DEMIC) – Market extension.

**UNIT IV**

**UNIT V**

### Practical Syllabus:
commodity outlook - Technical Analysis for important agricultural commodities - Fundamental Analysis for important agricultural commodities - Presentation of the survey results and wrap-up discussion.

Suggested Readings:


Course No. : AG ECON 506
Course Title: Research Methodology for Social Sciences
Credit: 1+1= 2
Semester: I

Theory Syllabus

UNIT I
Importance and scope of research in agricultural economics. Types of research - Fundamental vs. Applied. Concept of researchable problem–research prioritization – selection of research problem. Approach to research – research process.

UNIT II
Hypothesis – meaning - characteristics - types of hypothesis – review of literature– setting of Course Objective and hypotheses - testing of hypothesis.

UNIT III
Sampling theory and sampling design – sampling error - methods of sampling – probability and non-probability sampling methods - criteria to choose. Project proposals – contents and scope – different types of projects to meet different needs– trade-off between scope and cost of the study. Research design and techniques – Types of research design.

UNIT IV

UNIT V
**Practical Syllabus:**


**Suggested Readings:**


**Course No.** : AG ECON 507  
**Course Title:** Econometrics  
**Credit** : 2+1= 3  
**Semester** : II  
**Theory Syllabus :**

**UNIT I**
Introduction – relationship between economic theory, mathematical economics, models and econometrics, methodology of econometrics-regression analysis.

**UNIT II**
Basic two variable regression - assumptions estimation and interpretation- approaches to estimation  
- OLS, MLE and their properties - extensions to multi variable models-multiple regression estimation and interpretation.

**UNIT III**
Violation of assumptions – identification, consequences and remedies for Multicollinearity, heteroscedasticity, autocorrelation – data problems and remedial approaches - model misspecification.
UNIT IV
Use of dummy variables-limited dependent variables – specification, estimation

UNIT V
Simultaneous equation models – structural equations - reduced form equations - identification and approaches to estimation.

Practical Syllabus:
Single equation two variable model specification and estimation - hypothesis testing- transformations of functional forms and OLS application-estimation of multiple regression model- hypothesis testing –testing and correcting specification errors - testing and managing Multicollinearity - testing and managing Heteroscedasticity - testing and managing autocorrelation
- Estimation of regressions with dummy variables - estimation of regression with limited dependent variable - identification of equations in simultaneous equation systems.

Suggested Readings:

Course No. : AG ECON 508
Course Title: Linear Programming
Credit: 1+1= 2
Semester : III
Theory Syllabus :

UNIT I
Decision Making- Concepts of decision making, introduction to quantitative tools, introduction to linear programming, uses of LP in different fields, graphic solution to problems, formulation of problems.

UNIT II
Simple Method: Concept of simplex Method, solving profit maximization and cost minimizations problems. Formulation of farms and nonfarm problems as linear programming models and solutions.
UNIT III
Extension of Linear Programming models: Variable resource and price programme transportation problems, recursive programming, and dynamic programming.

UNIT IV
Game Theory- Concepts of game theory, two person constant sum, zero sum game, saddle point, solution to mixed strategies, the rectangular game as Linear Programme

Practical Syllabus:
Graphical and algebraic formulation of linear programming models. Solving of maximization and minimization problems by simplex method. Formulation of the simplex matrices for typical farm situations.

Suggested Readings:

Course No. : AG ECON 509
Course Title : Agricultural Finance and Project Management
Credit : 2+1= 3
Semester : II
Theory Syllabus :

UNIT I
Role and Importance of Agricultural Finance. Financial Institutions and credit flow to rural/priority sector. Agricultural lending – Direct and Indirect Financing - Financing through Co-operatives, NABARD and Commercial Banks and RRBs. District Credit Plan and lending to agriculture/priority sector. Micro-Financing and Role of MFI’s - NGO’s, and SHG’s.

UNIT II
Lending to farmers – The concept of 3 C’s, 7 P’s and 3 R’s of credit. Estimation of Technical feasibility, Economic viability and repaying capacity of borrowers and appraisal of credit proposals. Understanding lenders and developing better working relationship and supervisory credit system. Credit inclusions – credit widening and credit deepening.

UNIT III
UNIT IV


UNIT V


Practical Syllabus:

Development of Rural Institutional Lending - Branch expansion, demand and supply of institutional agricultural credit and Over dues and Loan waiving- An overview, Rural Lending Programmes of Commercial Banks, Lead Bank Scheme- Preparation of District Credit Plan, Rural Lending Programmes of Co-operative Lending Institutions, Preparation of financial statements using farm/firm level data, Farm credit appraisal techniques and farm financial analysis through financial statements, Performance of Micro Financing Institutions - NGO’s and Self-Help Groups, Identification and formulation of investment projects, Project appraisal techniques – Undiscounted Measures and their limitations. Project appraisal techniques – Discounted Measures, Network techniques – PERT and CPM for project management, Case Study Analysis of an Agricultural project,


Suggested Reading:


B) Minor Subjects

Course No. : AG ECON 517
Course Title : Computer Application for Agricultural Economics
Credit : 2+1= 3
Semester : I
Theory Syllabus :

Unit I

Unit II
Data and Information- Data Definition, Data Processing Systems, Data Type and various file formats- Numeric, Alphabetic, Audio, Graphic, and Video and their presentation. Data Processing- Introduction to Data Processing, Computer as a tool for Data Processing, Data Processing Cycle, Data Processing techniques, Data Analysis, Data Inputs and Outputs, Data Processing management, Data Security.

Unit III

Unit IV
Data Analysis Software: Use of various management software’s like SPSS. Data analysis on packages like MS-Excel, Open Stat and Gnumeric.

Unit V
**Practical Syllabus:**


**Suggested Readings:**


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**Course No.** : EXT 503  
**Course Title** : DIFFUSION AND ADOPTION OF INNOVATIONS  
**Credit** : 2+1= 3  
**Theory Syllabus** :

<table>
<thead>
<tr>
<th>UNIT I</th>
<th>Diffusion – concept and meaning, elements; traditions of research on diffusion the generation of innovations; innovation-development process; tracing the innovation-development process, converting research into practice.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIT II</td>
<td>The adoption process- concept and stages, dynamic nature of stages, covert and overt processes at stages, the innovation-decision process – a critical appraisal of the new formulation.</td>
</tr>
<tr>
<td>UNIT III</td>
<td>Adopter categories – Innovativeness and adopter categories, adopter categories as ideal types, characteristics of adopter categories; Perceived attributes of Innovation and their rate of adoption, factors influencing rate of adoption.</td>
</tr>
<tr>
<td>UNIT IV</td>
<td>Diffusion effect and concept of over adoption, Opinion leadership- measurement and characteristics of opinion leaders, monomorphic and polymorphic opinion leadership, Multi-step flow of innovation; Concepts of homophily and heterophily and their influence on flow of innovations; Types of innovation-decisions – Optional, Collective and Authority and contingent innovation decisions; Consequences of Innovation-Decisions – Desirable or Undesirable, direct or indirect, anticipated or unanticipated consequences; Decision making – meaning, theories, process, steps, factors influencing decision – making.</td>
</tr>
</tbody>
</table>
**Practical:**
- Case studies in adoption of an innovation
- Review of adoption studies
- Identification of opinion leaders
- Use of sources of information for farm technology
- Study of factors promoting or retarding the rate of adoption
- Presentation of reports on adoption and diffusion of innovations

**Suggested Readings:**

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**Course No.**: EXT 507  
**Course Title**: HUMAN RESOURCE DEVELOPMENT  
**Credit**: 2+1= 3

**Theory Syllabus**

<table>
<thead>
<tr>
<th>UNIT I</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resource Development – Definition, Meaning, Importance, Scope and Need for HRD</td>
<td>Conceptual frame work, inter disciplinary approach, function systems and case studies in HRD;</td>
<td>HRD Interventions – Different Experiences; Selection, Development &amp; Growth- Selection</td>
</tr>
<tr>
<td>Recruitment, Induction Staff Training and Development, Career planning</td>
<td>Social and Organizational Culture: Indian environment perspective on cultural process and social structure, society in transition</td>
<td>Organizational and Managerial values and ethics, organizational commitment</td>
</tr>
<tr>
<td>Motivation productivity - job description – analysis and evaluation; Performance Appraisal.</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT II</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inter-Personal Process, Helping Process – communication and Feedback and interpersonal styles</td>
<td>Group processes : Inter and Intra</td>
<td>Organizational communication, Team building Process and functioning, Conflict management, Collaboration and Competition</td>
</tr>
<tr>
<td>HRD &amp; Supervisors: Task Analysis</td>
<td>Capacity Building – Counseling and Mentoring</td>
<td></td>
</tr>
<tr>
<td>Role of a Professional Manager: Task of Professional Manager – Responsibility of Professional Manager; Managerial skills and Soft skills required for Extension workers</td>
<td></td>
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<tr>
<td>---------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision Making: Decision Making models</td>
<td></td>
<td></td>
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<tr>
<td>Management by Objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UNIT III</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training – Meaning, determining training need and development strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training types, models, methods and evaluation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilities for training – Trainers training – techniques for trainees participation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research studies in training extension personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main issues in HRD: HRD culture and climate – organizing for HRD – emerging trends and prospects.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Practical:**

- Visit to different training organizations to review ongoing activities & facilities;
- Analysis of Training methods followed by training institutions for farmers and extension workers;
- Studies on evaluation of training programmes;
- Study of HRD in organization in terms of performance, organizational development, employees welfare and improving quality of work life and Human resource information, Presentation of reports.

**Suggested Readings:**

C) Supporting Subjects

Course No.: STAT-501
Course Title: Mathematical Methods for Applied Sciences
Credit: 3+0

Theory

Unit I
Variables and functions, Limit and continuity, specific functions. Differentiation, theorems of differentiation, differentiation of logarithmic, trigonometric, exponential and inverse functions, function of function, derivative of higher order, partial derivatives, Application of derivatives in agricultural research, determination of points of inflection, maxima – minima in optimization, etc.

Unit II
Integration as a reserve process of differentiation, methods of integration, reduction formula, definite integral; Application of integration in agriculture research with reference to economics and genetics, engineering etc.

Unit III
Vector and vector spaces, Matrices, notation and operations, law of matrix algebra, transpose and inverse of Matrix, Eigen value and Eigen vectors, determinants, evaluation and properties of determinants. Application of determinants and matrices in solution of equations for economic analysis.

Unit IV
Set theory- set operations, finite and infinite sets, operations of set, function defined in terms of sets.

Suggested Readings Books

Course No.: STAT-511

Course Title: Statistical Methods for Applied Sciences

Credits: 2+1

Theory

Unit I
Classification and tabulation of data. Descriptive Statistics, Exploratory data analysis. Theory of probability: random variable and mathematical expectation

Unit II
Discrete and Continuous probability distribution: Binomial, Poisson, Normal, and their application. Concept of sampling distribution: Chi-square, t, and F distribution. Test of significance based on Normal, Chi-square, t and F distribution. Large sample theory (Z-test).

Unit III

Unit IV
Non-parametric tests: sign, Mann-Whitney U test, Run test, Median test.

Practical:
Calculation of mean, median, mode, variance and standard deviation etc. Fitting of Binomial, Poisson and Normal distributions, Large sample test, t, F and Chi-square test, Correlation, Partial and multiple correlation, Rank correlation and linear, multiple and non-linear regression, Path analysis, Non-parametric tests.

Suggested Readings:
D) Seminar

AG.ECON : 591
Course title: Seminar
Credit : 0+1

E) Masters’ Research

AG.ECON : 599
Course title: Research work
Credit : 0+20

F) Compulsory Non Credit Courses

Course No.         : PGS 501
Course Title        : LIBRARY AND INFORMATION SERVICES
Course Credits   : 0+1=1
Practical :

<table>
<thead>
<tr>
<th>Exercise No.</th>
<th>Title of the exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Introduction to library and its services; types of library.</td>
</tr>
<tr>
<td>3</td>
<td>Role of libraries in education, research and technology transfer;</td>
</tr>
<tr>
<td>4</td>
<td>Classification systems and organization of library;</td>
</tr>
<tr>
<td>5-6</td>
<td>Sources of information- Primary sources, secondary sources and tertiary sources;</td>
</tr>
<tr>
<td>7-9</td>
<td>Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABs reference sources;</td>
</tr>
<tr>
<td>10</td>
<td>Literature survey;</td>
</tr>
<tr>
<td>11</td>
<td>Citation techniques/Preparation of bibliography;</td>
</tr>
<tr>
<td>12</td>
<td>Use of CD-ROM Databases,</td>
</tr>
<tr>
<td>13</td>
<td>Online Public Access Catalogue and other computerized library services;</td>
</tr>
<tr>
<td>14-15</td>
<td>Use of Internet including search engines and its resources;</td>
</tr>
<tr>
<td>16</td>
<td>e-resources access methods.</td>
</tr>
</tbody>
</table>

Course No.         : PGS 502
Course Title        : TECHNICAL WRITING AND COMMUNICATIONS SKILLS
Course Credits   : 0+1=1
Practical :

<table>
<thead>
<tr>
<th>Exercise No.</th>
<th>Title of the exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Various forms of scientific writings- theses, technical papers, reviews, manuals, etc</td>
</tr>
<tr>
<td>2</td>
<td>Various parts of thesis and research communications (title page, authorship, content</td>
</tr>
</tbody>
</table>
page, preface, introduction, review of literature, material and methods, experimental results and discussion);

3 Writing of abstracts, summaries, précis, citations etc.;

4 Commonly used abbreviations in the theses and research communications;

5 Illustrations, photographs and drawings with suitable captions;

6 Pagination, numbering of tables and illustrations;

7 Writing of numbers and dates in scientific write-ups;

8 Editing and proof-reading;

9 Writing of a review article.

10-11 Grammar (Tenses, parts of speech, clauses, punctuation marks);

12 Error analysis (Common errors);

13 Concord; Collocation; Phonetic symbols and transcription; Accentual pattern:

14 Weak forms in connected speech:

15 Participation in group discussion: Facing an interview;

16 Presentation of scientific papers.

Suggested Readings:

-----------------------------------------------
Course No.       : PGS 503
Course Title      : INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE
Course Credits  : 1+0=1
Theory

<table>
<thead>
<tr>
<th>Lecture No.</th>
<th>Topics to be covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Historical perspectives and need for the introduction of Intellectual Property Right regime</td>
</tr>
<tr>
<td>3-4</td>
<td>TRIPs and various provisions in TRIPS Agreement</td>
</tr>
<tr>
<td>5</td>
<td>Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs</td>
</tr>
<tr>
<td>6</td>
<td>Indian Legislations for the protection of various types of Intellectual Properties</td>
</tr>
<tr>
<td>7-9</td>
<td>Fundamentals of patents, copyrights, geographical indications, designs and layout</td>
</tr>
</tbody>
</table>
Protection of plant varieties and farmers’ rights and biodiversity protection

Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection

National biodiversity protection initiatives

Convention on biological diversity

International Treaty on Plant Genetic Resources for Food and Agriculture

Licensing of technologies, Material transfer agreements, Research Collaboration Agreement, License Agreement

Suggested Readings:

Course No. : PGS 504
Course Title : BASIC CONCEPTS IN LABORATORY TECHNIQUES
Course Credits : 0+1=1

Practical:

<table>
<thead>
<tr>
<th>Exercise No.</th>
<th>Title of the exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Safety measures while in Lab;</td>
</tr>
<tr>
<td>2</td>
<td>Handling of chemical substances;</td>
</tr>
<tr>
<td>3</td>
<td>Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vaccupets;</td>
</tr>
<tr>
<td>4</td>
<td>washing, drying and sterilization of glassware;</td>
</tr>
<tr>
<td>5</td>
<td>Drying of solvents/chemicals.</td>
</tr>
<tr>
<td>6</td>
<td>Weighing and preparation of solutions of different strengths and their dilution;</td>
</tr>
<tr>
<td>7</td>
<td>Handling techniques of solutions;</td>
</tr>
<tr>
<td>8</td>
<td>Preparation of different agro-chemical doses in field and pot applications;</td>
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<tr>
<td>9</td>
<td>Preparation of solutions of acids;</td>
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<tr>
<td>10</td>
<td>Neutralization of acid and bases;</td>
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<tr>
<td>11</td>
<td>Preparation of buffers of different strengths and pH values.</td>
</tr>
<tr>
<td>12</td>
<td>Use and handling of microscope, laminar flow, vacuum pumps, viscometer, thermometer, magnetic stirrer, micro-ovens, incubators, sand bath, water bath, oil bath;</td>
</tr>
</tbody>
</table>
13 Electric wiring and earthing.
14 Preparation of media and methods of sterilization;
15 Seed viability testing, testing of pollen viability;
16 Tissue culture of crop plants;
17 Description of flowering plants in botanical terms in relation to taxonomy

Suggested Readings:

Course No. : PGS 505
Course Title : AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES
Course Credits : 1+0=1

Theory

<table>
<thead>
<tr>
<th>Lecture No.</th>
<th>Topics to be covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>History of agriculture in brief;</td>
</tr>
<tr>
<td>2</td>
<td>Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment;</td>
</tr>
<tr>
<td>3</td>
<td>National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions;</td>
</tr>
<tr>
<td>4</td>
<td>Consultative Group on International Agricultural Research (CGIAR): International Agricultural Research Centres (IARC), partnership with NARS,</td>
</tr>
<tr>
<td>5</td>
<td>role as a partner in the global agricultural research system, strengthening capacities at national and regional levels;</td>
</tr>
<tr>
<td>6</td>
<td>International fellowships for scientific mobility.</td>
</tr>
<tr>
<td>7</td>
<td>Research ethics: research integrity, research safety in laboratories,</td>
</tr>
<tr>
<td>8</td>
<td>Welfare of animals used in research,</td>
</tr>
<tr>
<td>9</td>
<td>Computer ethics,</td>
</tr>
<tr>
<td>10</td>
<td>Standards and problems in research ethics.</td>
</tr>
<tr>
<td>11</td>
<td>Concept and connotations of rural development,</td>
</tr>
<tr>
<td>12-13</td>
<td>rural development policies and strategies.</td>
</tr>
<tr>
<td>14</td>
<td>Rural development programmes: Community Development Programme, Intensive Agricultural District Programme, Special group – Area Specific Programme, Integrated Rural Development Programme (IRDP), Panchayati Raj Institutions, Cooperatives, and Voluntary Agencies/Non R Governmental Organizations.</td>
</tr>
<tr>
<td>15</td>
<td>Critical evaluation of rural development policies and programmes.</td>
</tr>
<tr>
<td>16</td>
<td>Constraints in implementation of rural policies and programmes.</td>
</tr>
</tbody>
</table>

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<tr>
<td>1-3</td>
<td>To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards and risks, vulnerability; and capacity building.</td>
</tr>
<tr>
<td>4-5</td>
<td>Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold waves</td>
</tr>
<tr>
<td>6-7</td>
<td>Climatic Change: Global warming, Sea level rise, Ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents</td>
</tr>
<tr>
<td>8-10</td>
<td>Disaster Management- Efforts to mitigate natural disasters at national and global levels.</td>
</tr>
<tr>
<td>11-12</td>
<td>International Strategy for Disaster reduction. Concept of disaster management, national disaster management framework, financial arrangements; role of NGOs, Community-based organizations, and media. Central, State, District and local Administration; Armed forces in Disaster response. Disaster response: Police and other organizations.</td>
</tr>
</tbody>
</table>

**Suggested Readings:**