



M.Sc. (Agri.) Economics
Teaching Scheme & Curriculum
Semester 1

Subjects				Contact Hours/Week			Theory Marks		Practical/Viva Marks		Total Marks
Sr.	Name	Type	Credit	Lect	Tut	Lab	T	T	P	P	
1	Microeconomics Theory and Applications	Major	3	3	-	0	50	50	-	-	100
2	Indian Economy: History and Contemporary Issues	Major	2	2	-	0	50	50	-	-	100
3	Econometrics	Major	3	2	-	2	50	50	-	-	100
4	Gender Mainstreaming	Minor	3	2	-	2	50	50	-	-	100
5	Natural Resource and Environmental Economics	Minor	2	1	-	2	50	50	-	-	100
6	Experimental Designs	Supporting	3	2	-	2	50	50	-	-	100
7	Library and Library Information Services	Non-Gradual	1	0	-	2			-	100	100
8	Basic Concepts in Laboratory Techniques	Non-Gradual	1	0	-	2			-	100	100
Total			19	12	-	12					800

Lect - Lecture, **Tut** - Tutorial, **Lab** - Lab, **T** - Theory, **P** - Practical

Theory Passing % : 60 Practical Passing % : 60



Prerequisite	Students should possess foundational knowledge of basic economic principles, market structures, demand and supply analysis, and introductory quantitative methods at the undergraduate level.
Rationale	Micro Economic Theory and Applications provides a conceptual and analytical foundation for understanding individual consumer and producer behaviour, resource allocation, pricing decisions, and market efficiency. The course equips students with advanced theoretical tools and practical applications necessary for economic analysis, policy formulation, agricultural decision-making, and research in contemporary economic environments.
Course Title	Micro Economic: Theory and Applications
Credits	3 (3+0)
Objectives of the course	1. To develop an advanced understanding of consumer behaviour, producer equilibrium, and market structures. 2. To explain price determination and resource allocation under different market conditions. 3. To analyse welfare economics, market failures, and economic efficiency using microeconomic tools. 4. To apply microeconomic theories in solving real-world agricultural and business economic problems.
Syllabus	
Theory	Unit 1: Introduction to micro-economics Basic Concepts: A review Scarcity and Choice; Production possibility frontier, Positive and normative economics; concepts of opportunity cost, Demand and Supply: determinants of individual demand/supply; demand/ supply schedule and demand/ supply curve; market versus individual demand/ supply; shifts in the demand/ supply curve Unit 2- Insight of consumer, production and cost involved Consumer Choice Cardinal Utility Approach – Ordinal Utility Approach -Budget sets and Preferences under different situations – Hicks and Slutsky income and substitution effects – Applications of Indifference curve approach – Revealed Preference Hypothesis – Consumer surplus – Derivation of Demand curve – Elasticity of demand – Demand and supply together; how prices allocate resources; controls on prices – price floor and price ceiling – applications in agriculture. Production and Cost Production functions: single variable - average and marginal product, variable proportions, stages of production. Two variables - isoquants, returns to scale and to a factor; factor prices; Technical progress; cost minimization and output maximization; Elasticity of substitution. Expansion path and the cost function Concept of economic cost; Short run and long run cost curves; increasing and decreasing cost industries; envelope curve; L-shaped cost curves; economies of scale; revenue and expenditure, elasticity and marginal revenue; Firm equilibrium and profit.



	Unit 3: Overview of market Market Forms Behavior of profit maximizing firms and the production process- Perfect competition: Equilibrium of the market. Long run industry supply, applications: effects of taxes and subsidies; Monopoly: Equilibrium; supply; multi-plant firm; monopoly power; deadweight loss; price discrimination; Monopolistic Competition: Product differentiation; equilibrium of the firm in the industry-with entry of new firms and with price competition. Comparison with pure competition. Duopoly: Cournot model and reaction curves; Stackelberg's model, Bertrand model; Oligopoly. Factor Markets Labour and land markets - basic concepts (derived demand, productivity of an input, marginal productivity of labour, marginal revenue product); demand for labour; input demand curves; shifts in input demand curves; competitive labour markets; Economic rent and quasi rent.
Practical	
Course Outcomes	CO1: Analyze consumer behaviour, demand functions, and elasticity concepts to interpret economic decision-making in different market situations. CO2: Evaluate production functions, cost structures, and producer equilibrium to assess firm-level resource allocation and profitability. CO3: Compare and interpret pricing and output decisions under various market structures including perfect competition, monopoly, monopolistic competition, and oligopoly. CO4: Apply welfare economics and factor pricing theories to examine market efficiency, externalities, and agricultural policy issues.
Suggested Readings	1. Ahuja HL. <i>Advanced Economic Theory</i>. S. Chand & Company. 2. Koutsoyiannis A. <i>Modern Microeconomics</i>. Macmillan Press. 3. Varian HR. <i>Intermediate Microeconomics: A Modern Approach</i>. W.W. Norton. 4. Pindyck RS and Rubinfeld DL. <i>Microeconomics</i>. Pearson Education. 5. Mansfield E and Yohe G. <i>Microeconomics: Theory and Applications</i>. W.W. Norton. 6. Salvatore D. <i>Microeconomic Theory and Applications</i>. Oxford University Press. 7. Nicholson W and Snyder C. <i>Microeconomic Theory: Basic Principles and Extensions</i>. Cengage Learning. 8. Dwivedi DN. <i>Microeconomics: Theory and Applications</i>. Pearson Education.



Prerequisite	Students should possess basic knowledge of Indian economic history, economic development, and contemporary economic issues at the undergraduate level.
Rationale	Understanding the historical evolution and present structure of the Indian economy is essential for analyzing contemporary development challenges and policy interventions. The course provides insight into economic transformation, sectoral changes, reforms, poverty, unemployment, globalization, and sustainability issues influencing India's development process.
Course Title	Indian Economy: History and Contemporary Issues
Credits	2 (2+0)
Objectives of the course	1. To understand the historical evolution of the Indian economy. 2. To study sectoral development and structural transformation in India. 3. To analyze contemporary economic issues and development challenges. 4. To examine the impact of economic reforms and globalization on the Indian economy.
Syllabus	
Theory	Unit 1- History of Indian Economy India from Independence to Liberalization An overview of the economic developments during the period 1947-1980; Objectives and strategies of planned economic development and the role of the State; Sectoral growth performance; savings and investment; Demographic trends and issues; education; health and malnutrition; Trends and policies in poverty; inequality and unemployment. India Since 1980's (Liberalization And Beyond): Overview Policy Changes since 1980s. The 1990 Crisis. Causes and Effects of liberalization. Regional differences: infrastructure, primary, secondary and tertiary sector. Macro Trends Since 1990 Growth; Savings and Investment, Employment; productivity; diversification; Agro-based industries; competition policy; foreign investment, Regional differences. Unit 2- Contemporary Issues Unit 1: Contemporary Issues Monetary and Financial trends- areas of government spending in India, Capital expenditure, revenue expenditure, plan expenditure, non-plan expenditure, Deficits (fiscal, primary, revenue), impact of fiscal deficit on economy, Capital receipts, revenue receipts, tax and non-tax revenue, direct and indirect taxes, need to rationalize tax structure. Goods and Services Tax (GST). Union Budget, Zero base budgeting, Gender budgeting, Fiscal devolution and centre state financial relations in India, WPI, CPI implicit deflators. Foreign Trade policy.
Practical	
Course	CO1: Explain the historical evolution and structural changes of the Indian



Outcomes	economy before and after independence. CO2: Examine sectoral development and the contribution of agriculture, industry, and services to the Indian economy. CO3: Evaluate contemporary economic issues such as poverty, unemployment, inequality, and sustainability in India. CO4: Formulate policy perspectives on economic reforms, globalization, and sustainable development in the Indian economy.
Suggested Readings	1. Datt R and Sundaram KPM. <i>Indian Economy</i>. S. Chand & Company. 2. Mishra SK and Puri VK. <i>Indian Economy</i>. Himalaya Publishing House. 3. Jalan B. <i>The Indian Economy: Problems and Prospects</i>. Penguin Books. 4. Ahluwalia IJ and Little IMD. <i>India's Economic Reforms and Development</i>. Oxford University Press. 5. Uma Kapila. <i>Indian Economy Since Independence</i>. Academic Foundation. 6. Bardhan P. <i>The Political Economy of Development in India</i>. Oxford University Press. 7. Government of India. <i>Economic Survey</i> (Latest Issues).



Prerequisite	Students should possess basic knowledge of economic theory, statistics, mathematics, and regression analysis at the undergraduate level.
Rationale	Development of analytical skills is imperative to make students proficient in conducting quality research work. The knowledge of variables, their models, and problems encountered when dealing with variables will build up compatibility with analytical aspects.
Course Title	Econometrics
Credits	3 (2+1)
Objectives of the course	1. To understand the relationship between economic theory, mathematical economics, and econometrics. 2. To develop knowledge of regression models and econometric estimation techniques. 3. To identify and resolve econometric problems in cross-sectional and time series data. 4. To apply econometric tools for economic analysis and research.
Syllabus	
Theory	Unit 1: Introduction to Econometrics Introduction Relationship between economic theory, mathematical economics, models and econometrics, methodology of econometrics-regression analysis. Unit 2: Classical Regression Classical Linear Regression Basic two variable regression – assumptions estimation and interpretation approaches to estimation – OLS and their properties – extensions to multi-variable models-multiple regression estimation and interpretation. Breaking down of Classical assumptions Violation of assumptions – identification, consequences and remedies for Multi-collinearity, heteroscedasticity, autocorrelation – data problems and remedial approaches – model misspecification. Unit 3: Qualitative Variables Qualitative variables and simultaneous equation models Use of dummy variables- Introduction to simultaneous equations-identification problem
Practical	➤ Single equation two variable model specification and estimation ➤ Hypothesis testing transformations of functional forms and OLS application ➤ Estimation of multiple regression model ➤ Testing and correcting specification errors ➤ Testing and managing Multicollinearity ➤ Estimation of regressions with dummy variables
Course Outcomes	CO1: Describe the relationship between economic theory, mathematical economics, and econometric modeling in empirical research. CO2: Estimate and interpret simple and multiple regression models using econometric techniques. CO3: Analyze econometric issues such as multicollinearity,



	heteroscedasticity, autocorrelation, and model misspecification in regression analysis. CO4: Develop econometric models using dummy variables and simultaneous equation approaches for economic research and policy analysis.
Suggested Readings	1. Dorfman R. 1996. <i>Linear Programming and Economic Analysis</i>. McGraw Hill. 2. Greene WH. 2002. <i>Econometric Analysis</i>. Pearson Education. 3. Johnston J and Dinardo J. 2000. <i>Econometric Methods</i>. McGraw-Hill. 4. Koutseyianis A. 1997. <i>Theory of Econometrics</i>. Barner & Noble. 5. Maddala GS. 2002. <i>Econometrics</i>. McGraw-Hill. 6. Pindyck RS and Rubinfeld DL. 1990. <i>Econometric Models and Econometric Forecasts</i>. McGraw Hill.



Prerequisite	Basic understanding of gender concepts, social systems, and development processes.
Rationale	The course aims to develop students' understanding of gender mainstreaming approaches and strategies for promoting gender equity and inclusion in policies, programs, institutions, and development interventions.
Course Title	Gender Mainstreaming
Credits	3 (2+1)
Objectives of the course	1. To understand the concepts, principles, and importance of gender mainstreaming in development. 2. To analyze gender roles, relations, and inequalities in social and institutional contexts. 3. To develop skills in integrating gender perspectives into policies, programs, and projects. 4. To enhance competencies in designing gender-sensitive interventions and evaluation frameworks.
Syllabus	
Theory	UNIT I Historical perspective of gender: Feminism and emergence of gender as a concept, Scope of gender studies in agriculture and rural development UNIT II Agrarian Importance of Gender: Understanding the importance of gender in national and global agriculture-Key gender issues and challenges in agriculture - Gender and value chain- Global actions to address gender-needs and strategies to address gender and women empowerment. UNIT III Gender related concepts and divides: Understanding of the concepts of gender, gender equality and equity, gender balance, gender blindness, gender relations, gender neutrality, gender bias and discrimination, gender rights, gender roles and responsibilities. Gender budgeting, Gender divides and their implications such as gender digital divide, gender access to resources and inputs divide, gender mobility divide, gender wage divide, Gender needs: practical and strategic. UNIT IV Gender analysis: Importance, usage, prerequisites, techniques of gender analysis- Tools for gender analysis UNIT V Gender and technology: How gender and technology impact each other, Gender neutral technology, Gender sensitive technology, Gender supportive assistance in technology adoption-Gender in agricultural research and extension. UNIT VI Gender mainstreaming: Importance of gender mainstreaming in agriculture, EXtension strategies to address gender issues such as gender and health, nutrition, gender in agricultural value chains, gender and climate change adaptation, gender and globalization& liberalization for mainstreaming gender concerns into the national programmes and policies.



	UNIT VII Women Empowerment: Importance of women empowerment, Current national women empowerment and gender indices. Women empowerment approaches (technological, organizational, political, financial, social, legal and psychological), Case studies based on eXperiences and learning from various development and rural development programmes UNIT VIII Global Best Practices, Policies and Frameworks: Global best practices, women empowerment and gender mainstreaming models and frameworks for addressing gender concerns in agriculture, approaches of various organizations: gender mainstreaming and special women focused programmes in agriculture and rural development. UNIT IX Entrepreneurship development for women: Women entrepreneurship development in agriculture and agro processing: current status, women led enterprises, supporting organizations and schemes, Govt. policies, entrepreneurship development programme and process for women in agriculture.
Practical	➤ Visit to a village for understanding rural gender roles and responsibilities as groups, followed by class presentation by groups ➤ Exercise for capturing shifts in gender roles and responsibilities ➤ Conducting gender analysis in a village using gender analysis techniques ➤ Visit to agencies supporting women empowerment followed by report presentation. Each student to visit a different organization such as State Rural Livelihood Mission, Women Development Corporation, Department of Agriculture, Important NGOs working for women empowerment ➤ Exercise for identification and prioritization of issues affecting/needs for women empowerment ➤ Interaction with a successful women entrepreneur/ SHG
Course Outcomes	CO1: Explain the concepts, approaches, and significance of gender mainstreaming in development processes. CO2: Analyze gender disparities and their implications in social, economic, and institutional settings. CO3: Apply gender analysis tools and frameworks for planning and implementing inclusive programs. CO4: Design and evaluate gender-sensitive policies, projects, and development interventions.
Suggested Readings	➤ AGRIPROFOCUS 2014. Gender in value chains Practical toolkit to integrate a gender perspective in agricultural value chain development https://agriprofocus.com/upload/ToolkitENGGender_in_Value_ChainsJan2014compressed1415203230.pdf ➤ Christine J, Nafisa F and Taylor DS. 2014. Gender and Inclusion Toolbox: Participatory Research in Climate Change and Agriculture. Global Forum for Rural Advisory Services, Switzerland.



	http://www.gfras.org/en/component/phocadownload/category/17-gender.html?download ➤ Colverson KE. 2015. Gender into Rural Advisory Services. Global Forum for Rural Advisory Services, Switzerland. http://www.gfras.org/en/good-practice-notes/integrating-gender-into-rural-advisory-services.html#SNote1 ➤ Gap in Agricultural Extension and Advisory Services: How to find the best fit for men and women farmers MEAS Discussion Paper 2, Modernizing EXtension and Advisory Services. https://meas.illinois.edu/wp-content/uploads/2015/04/Manfre-et-al-2013-Gender-and-EXtension-MEAS-Discussion-Paper.pdf ➤ Fanzo, J., Marshall, Q., Wong, J., Merchan, R., Haber, M., Souza, A. & Verjee, N. 2015. The Integration of Nutrition into Extension and Advisory Services: A Synthesis of Experiences, Lessons, and Recommendations. Food and Nutrition Bulletin 36(2): 120-137. https://journals.sagepub.com/doi/10.1177/0379572115586783 ➤ FAO. 2011. Gender and agricultural value chains A review of current knowledge and practice and their policy implications. ESA Working Paper No. 11-05 (March 2011) http://www.fao.org/docrep/013/am310e/am310e00.pdf ➤ GFRAS. 2013. Gender equality in Rural Advisory Services, Towards a Common Understanding.
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Prerequisite	Students should possess basic knowledge of economics, environmental studies, resource management, and agricultural development at the undergraduate level.
Rationale	Sustainable development is the need of the hour. Economic activities affect not only society but also the environment, and every activity has its social cost. The course enables students to understand the economic aspects of environmental issues and resource utilization.
Course Title	Natural Resource and Environmental Economics
Credits	2 (1+1)
Objectives of the course	1. To understand the concepts and problems of natural resource and environmental economics. 2. To study theories related to optimal extraction and management of natural resources. 3. To analyze market failures, environmental issues, and regulatory mechanisms. 4. To examine sustainability aspects and environmental accounting approaches.
Syllabus	
Theory	Unit 1- Introduction to natural resource and environmental economics Basic Foundation Concepts, Classification and Problems of Natural Resource Economics – Economy Environment interaction – The Material Balance principle, Entropy law-Resources Scarcity - Limits to Growth - Measuring and mitigating natural resource scarcity – Malthusian and Recardian scarcity – scarcity indices – Resource Scarcity and Technical Change. Unit 2- Insights of the subject Theories and economics of natural resources Theory of optimal extraction renewable resources –economic models of oil extraction efficiency - time path of prices and extraction - Hotelling’s rule, Solow-Harwick’s Rule. Theory of optimal extraction exhaustible resources – economic models of forestry and fishery. Functioning of Market Efficiency and markets – market failures - externalities – types - property rights – transaction costs – Coase’s theorem and its critique - public goods – common property and open access resource management - Collective action. Unit 3- Dealing with the issues and sustainability Environmental Issues Environmental perspectives - biocentrism, sustainability, anthropocentrism - Environmental problems and quality of environment - Sources and types of pollution -air, water, solid waste, land degradation – environmental and economic impacts - Economics of pollution control - efficient reduction in environmental pollution. Regulations Environmental regulation – economic instruments - pollution charges –



	Pigovian tax - tradable permits – indirect instruments – environmental legislations in India. Sustainability aspects Concept of sustainable development – Economic Perspective – Indicators of sustainability Relation between development and environment stress- Environmental Kuznet's curve Environmental Accounting – resource accounting methods – International Environmental Issues – climate change – likely impacts – mitigation efforts and international treaties.
Practical	➤ Exhaustible resource management – optimum rate of oil extraction. ➤ Renewable resource management – optimum harvest of Forestry/fishery. ➤ Exercise on pollution abatement-I. ➤ Exercise on pollution abatement-II. ➤ Concepts in valuing the environment. ➤ Taxonomy of valuation techniques. ➤ Productivity change method – substitute cost method – Hedonic price method – Travel cost method – Contingent valuation methods. ➤ Discount rate in natural resource management. ➤ Environment impact assessment ➤ Visit to Pollution Control Board.
Course Outcomes	CO1: Explain the concepts, principles, and problems associated with natural resource and environmental economics. CO2: Apply economic theories and models for optimal extraction and management of renewable and exhaustible resources. CO3: Analyze market failures, environmental externalities, and pollution control mechanisms affecting environmental quality. CO4: Formulate sustainable environmental strategies using regulatory instruments and environmental accounting approaches.
Suggested Readings	1. Hackett SC. 2001. <i>Environmental and Natural Resource Economics: Theory, Policy and the Sustainable Society</i>. M.E. Sharpe, Armonk, NY. 2. Hartwick JM and Olewiler ND. 1998. <i>The Economics of Natural Resource Use</i>. 2nd Ed. Addison-Wesley Educational Publications. 3. Kerr JM, Marothia DK, Katar Singh, Ramasamy C and Bentley WR. 1997. <i>Natural Resource Economics: Theory and Applications in India</i>. Oxford & IBH. 4. Pearce DW and Turner K. 1990. <i>Economics of Natural Resources and the Environment</i>. John Hopkins University Press. 5. Prato T. 1998. <i>Natural Resource and Environmental Economics</i>. Iowa State University Press. 6. Sengupta R. 2000. <i>Ecology and Economy, an Indian Perspective</i>. Oxford University Press. 7. Tietenberg T. 2003. <i>Environment and Natural Resource Economics</i>. 6th Ed. Addison Wesley.



Prerequisite	Students should have basic knowledge of statistics, data analysis, and elementary mathematical concepts at the undergraduate level.
Rationale	Experimental design is a fundamental component of scientific research in agricultural and allied sciences. Proper planning, layout, and statistical analysis of experiments improve precision, reduce experimental error, and ensure reliable interpretation of research findings. This course provides essential knowledge of experimental designs and analysis techniques widely used in agricultural research.
Course Title	Experimental Designs
Credits	3(2+1)
Objectives of the course	1. To impart knowledge on the principles and importance of experimental design in scientific research. 2. To explain different experimental designs and their statistical analysis procedures. 3. To develop understanding of factorial experiments, confounding, covariance analysis, and incomplete block designs. 4. To provide practical exposure in layout planning, analysis, and interpretation of experimental data.
Syllabus	
Theory	Unit I Need for designing experiments; characteristics of a good design; basic principles of experimental design – randomization, replication and local control. Unit II Uniformity trials; size and shape of plots and blocks; analysis of variance; Completely Randomized Design (CRD), Randomized Block Design (RBD) and Latin Square Design (LSD). Unit III Factorial experiments (symmetrical as well as asymmetrical); orthogonality and partitioning of degrees of freedom; concept of confounding. Unit IV Split plot and strip plot designs; analysis of covariance and missing plot techniques in randomized block and Latin square designs; transformations; Balanced Incomplete Block Design (BIBD), resolvable designs and their applications; lattice design and alpha design – concepts, randomization procedures, analysis and interpretation of results; response surface methodology; combined analysis.
Practical	➤ Analysis of uniformity trial data ➤ Formation of plots and blocks ➤ Fairfield Smith Law ➤ Analysis of data obtained from CRD, RBD and LSD ➤ Analysis of factorial experiments ➤ Analysis with missing data ➤ Analysis of split plot and strip plot designs
Course Outcomes	CO1: Explain the need, principles, and characteristics of experimental designs used in agricultural and applied science research.



	CO2: Apply appropriate experimental designs such as CRD, RBD, LSD, factorial, split plot, and strip plot designs for research experiments. CO3: Analyze experimental data using ANOVA, covariance analysis, confounding techniques, and incomplete block designs. CO4: Interpret experimental results and perform practical data analysis for scientific research and decision-making.
Suggested Readings	1. Experimental Designs. 1957. 2nd Ed. John Wiley. 2. Design and Analysis of Experiments. 1999. Springer. 3. Design and Analysis of Experiments. 2012. 8th Ed. John Wiley. 4. Experimental Designs. 1985. MacMillan. 5. Design and Analysis of Experiments. 1953. Oliver & Boyd. 6. Handbook on Analysis of Agricultural Experiments. 1979. IASRI Publications. 7. The Agricultural Field Experiment. 1983. John Wiley. 8. ICAR Directorate of Research Services



Prerequisite	Students should possess basic knowledge of academic communication, information resources, and computer applications. Familiarity with internet usage and elementary research methodology will facilitate effective understanding of library systems and information retrieval techniques.
Rationale	The course is designed to acquaint students with modern library systems, information sources, and digital resource management essential for higher education and research. It enables learners to develop competencies in literature search, referencing, citation practices, and utilization of electronic information resources. The course also promotes information literacy skills necessary for academic writing, research documentation, and efficient access to scientific knowledge in the digital era.
Course Title	Library and Information Services
Credits	1(0+1)
Objectives of the course	1. To familiarize students with the structure, functions, and services of libraries in education and research. 2. To develop understanding of various information sources, indexing, and abstracting services used in scientific research. 3. To enhance skills in literature survey, citation techniques, bibliography preparation, and information retrieval. 4. To enable students to effectively use digital library resources, online databases, internet tools, and e-resources for academic purposes.
Syllabus	
Theory	-
Practical	Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/ Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; resources access methods.
Course Outcomes	CO1: Explain the role, functions, and organization of libraries and classify different sources of scientific information. CO2: Describe abstracting, indexing, and citation services and interpret their significance in academic and research activities. CO3: Apply literature survey methods, reference management techniques, and bibliography preparation in scholarly work. CO4: Demonstrate the use of digital library tools, online databases, internet search engines, and e-resource access methods for efficient information retrieval.
Prerequisite	Students should possess basic knowledge of laboratory practices, elementary chemistry, biology, and plant sciences acquired at the undergraduate foundation level. Familiarity with common laboratory instruments, solution preparation, and safety protocols will facilitate



	effective understanding of practical laboratory operations and experimental techniques.
Rationale	This course is designed to develop essential laboratory competencies and technical skills required in agricultural and biological sciences. It provides hands-on training in laboratory safety, handling of chemicals and instruments, preparation of solutions and media, sterilization techniques, and basic biotechnological procedures. The course enhances students' practical proficiency, accuracy in experimentation, and scientific handling of laboratory resources necessary for research and field applications.
Course Title	Basic Concepts in Laboratory Techniques
Credits	1(0+1)
Objectives of the course	1. To familiarize students with laboratory safety procedures and proper handling of chemicals, glassware, and scientific instruments. 2. To develop practical skills in preparation of solutions, buffers, media, and agro-chemical formulations for laboratory and field applications. 3. To impart knowledge and hands-on training in sterilization techniques, viability testing, and tissue culture methods in crop plants. 4. To enable students to apply standard laboratory methodologies and botanical terminology in scientific experimentation and plant description.
Practical	➤ Safety measures while in Lab; ➤ Handling of chemical substances; ➤ Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vaccupets; ➤ Washing, drying and sterilization of glassware; ➤ Drying of solvents/ chemicals; ➤ Weighing and preparation of solutions of different strengths and their dilution; ➤ Handling techniques of solutions; ➤ Preparation of different agro-chemical doses in field and pot applications; ➤ Preparation of solutions of acids; ➤ Neutralisation of acid and bases; ➤ Preparation of buffers of different strengths and pH values; ➤ Use and handling of microscope, laminar flow, vacuum pumps, viscometer, ➤ thermometer, magnetic stirrer, micro-ovens, incubators, sandbath, waterbath, oilbath; ➤ Electric wiring and earthing; ➤ Preparation of media and methods of sterilization; ➤ Seed viability testing, testing of pollen viability; ➤ Tissue culture of crop plants; ➤ Description of flowering plants in botanical terms in relation to taxonomy.
Course Outcomes	CO1: Explain laboratory safety measures, chemical handling procedures, and the operational principles of common laboratory instruments and



	equipment. CO2: Demonstrate the preparation, dilution, neutralization, and handling of chemical solutions, buffers, acids, and agro-chemical doses using standard laboratory techniques. CO3: Apply sterilization methods, media preparation techniques, seed and pollen viability testing, and tissue culture practices in laboratory experiments. CO4: Analyze and interpret botanical characteristics of flowering plants using standard taxonomic terminology and scientific laboratory practices.
Suggested Readings	1. Furr AK. 2000. <i>CRC Hand Book of Laboratory Safety</i>. CRC Press. Common Academic Regulations for PG and Ph.D. Programmes Restructured and Revised Syllabi of Post-graduate Programmes Vol. 2 2. Gabb MH and Latchem WE. 1968. <i>A Handbook of Laboratory Solutions</i>. Chemical Publ. Co.