RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Agriculture Technology, V-Semester

AT-5001 Agriculture Economics

Unit 1: Nature and Scope of Economics

Nature and scope of economics: Importance – Subject matter, science vs. art, positive vs. normative science - deductive and inductive methods - Different economic systems: merits and demerits - Definitions of Economics: Wealth, welfare, scarcity and growth definitions - Divisions of Economics – Micro and Macro economics - Agricultural Economics: definition and scope - Basic concepts: Goods, Service, Value, Cost, Price, Wealth, Welfare - Wants: Characteristics and classification.

Unit 2: Theory of Consumption Utility:

Definition, Measurement - Cardinal and ordinal utility - Marginal utility - Law of Diminishing Marginal Utility & Law of Equi-marginal Utility: Definition – Assumptions - Limitations and Applications - Demand: Definition - Kinds of demand, Demand schedule, Demand curve, Law of demand, Determinants of demand - Extension and Contraction Vs Increase and decrease in demand - Elasticity of Demand: Types, Degrees of price elasticity of demand, Methods of measuring elasticity, Factors influencing elasticity of demand - Importance of Elasticity of demand - Engel's law of family expenditure - Consumer's surplus: Definition – Importance.

Unit 3: Theory of Production Concept of production

Factors of production – Land and its characteristics - Labour – Division of labour - Malthusian theory and modern theory of population - Capital – characteristics of capital - capital formation – Entrepreneur, characteristics and functions of entrepreneur - Supply definition – law of supply – factors influencing supply - elasticity of supply.

Unit 4: Theory of Distribution

Pricing of factors of production – rent and Ricardian theory of rent – quasi rent - wage – real wage and money wage – marginal productivity theory of wage - Interest – liquidity preference theory – profit – Risk bearing theory of profit.

Unit 5: Macroeconomic Concepts

National Income: Concepts – GNP, GDP, NNP, Disposable income and Per capita income-Measurement of National Income - Public Finance: Meaning, Principles. Public Revenue: Meaning, Classification of taxes - service tax - Cannons of taxation, public expenditure: principles - Inflation: Meaning, definition, kinds of inflation - Welfare Economics: Meaning, Pareto's optimality – Millennium Development Goals (MDG). Practical Law of Diminishing Marginal Utility - Law of Equi Marginal Utility - Individual and market demand - Indifference curve analysis and consumer equilibrium - Measurement of arc elasticity and point elasticity of demand - own price elasticity, income and cross elasticity of demand - consumer surplus - law of diminishing marginal returns – relationship between TPP, APP and MPP - Cost concepts and graphical derivation of cost curves - Population growth and food grain production - Supply elasticity - Causes of inflation and control measures – Consumer price 35 index and wholesale price index - Types and functions of money - Computation of National Income - Study of structural changes in the economy - welfare indicators.

Learning Outcome:

On completion of this the students will understand the basics of agricultural economics demand-supply chain, production, consumption and distribution patterns of agricultural commodities and the terminology associated with national income.

Reference Books

Dewett, K.K. 2002. Modern Economic Theory, Syamlal Charitable Trust, New Delhi.

Samuelson, P. 2004. Economics, (18/e), Tata Mcgraw-Hill, New Delhi.

Koutsoyiannis,A. 1983.Modern Microeconomics, The Macmillan Press Ltd., Hongkong

Varian, H. R. 1987. Intermediate Microeconomics, WW Norton & Company, New Delhi

Seth, M.L. 2000. Principles of Economics, Lakshmi Narain Agarwal Co., Agra. New Delhi

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Agriculture Technology, V-Semester

AT-5002 Soil Mechanics and Foundation Engineering

Unit I Geology
Geology-Earth Evolution and composition-Petrology- Rock cycle-Rock formation, nature and classification -Igneous rocks, Sedimentary rocks and metamorphic rocks- Physical properties of mineralsStructural Geology-fold, strike, dip, fault and joints.

Unit II – Permeability
Permeability - Darcy's law-discharge velocity – validity of Darcy's law- seepage velocity - Factors affecting permeability - Hydraulics of laminar flow through soils-Seepage - Drainage - Flow net construction-characteristics.

Unit III – Compaction
Compaction – objectives -relationship with water content- the Standard Proctor compaction test – factors affecting compaction-methods of compaction in field - Compressibility - coefficient of Compressibility - Consolidation of soils –stages of consolidation.

Unit IV – Strength of soils
Shear strength –concept of shearing resistance and shearing strength - Coulomb's law - Mohr's circle of stresses - Earth pressure at rest - active pressure - passive pressure - Stability of slopes - Stability of earthen embankments - Bearing capacity of soils – testing the bearing capacity of soils – method of improving the bearing capacity of soils.

PRACTICALS
Determination of Hydraulic Conductivity by Constant Permeameter-Variable Head Permeameter-Field method of determination of Coefficient of Permeability-Proctor Compaction test of soils-Consolidation test of soils-Direct Shear Test-Vane Shear Test of soils-Problems on Weight - Volume Relationships- Permeability- Compaction and Compressibility - Bearing Capacity- Field visit for Landslides areas and control measures.

Learning Outcome:
The students will understand the geology of soil, flow through porous media, strength of soils and the governing laws upon completion of this Chapter.

References:
Murthy, V.N.S.2006. "A textbook of Soil Mechanics and Foundation Engineering", Sri Kripa Technical Consultants, Bangalore.

Modi, P.N.2010."Soil Mechanics and Foundation Engineering", Rajsons publication, Standard book house, New Delhi.

Bharat Singh, 2006. "A text book of soil mechanics", Nem chand and Bros, Roorkee
Garg, S.K. 2005. "Soil mechanics", Khanna publishers, New Delhi.

Sehgal, S.B., 2006."A text book of soil mechanics", CBS publishers and Distributors, New Delhi.

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Credit Based Grading System

Agriculture Technology, V-Semester

AT-5003 Farm Machinery -II

Unit I- Tractor and tractor systems

Classification of tractors and IC engines. Review of thermodynamic principles of IC (CI & SI) engines and deviation from ideal cycle. General energy equation and heat balance sheet. Study of mechanical, thermal and volumetric efficiencies. Study of engine components their construction, operating principles and functions. Study of engine strokes and comparison of 2-stroke and 4-stroke engine cycles and CI and SI engines. Types of tractors – functional requirement and constructional details. Study of need for transmission system in a tractor. Transmission system – types, major functional systems. Study of clutch – need, types, functional requirements, construction and principle of operation. Familiarization with single plate, multi-plate, centrifugal and dual clutch systems. Study of Gear Box – Gearing theory, principle of operation, gear box types, functional requirements, and calculation for speed ratio. Study of differential system – need, functional components, construction, calculation for speed reduction. Study of need for a final drive. Study of Brake system – types, principle of operation, construction, calculation for braking torque. Study of steering system – requirements, steering geometry characteristics, functional components, calculation for turning radius. Familiarization with Ackerman steering. Steering systems in track type tractors. Study of Hydraulic system in a tractor – Principle of operation, types, main functional components, functional requirements. Familiarization with the Hydraulic system adjustments and ADDC. Study of tractor power outlets – PTO. PTO standards, types and functional requirements.

Unit II – Traction and tractor-implement system

Traction terminology. Theoretical calculation of shear force and rolling resistance on traction device. Study of wheels and tyres – Solid tyres and pneumatic tyres, tyre construction and tyre specifications. Study of traction aids-ballasting the tractor. Tractor-implement hitching system, single point hitch, three point hitch system, different categories of three point hitch system, Study of tractor mechanics – forces acting on the tractor-implement combination. Determination of CG of a tractor and tractor-implement combination. Determination and importance of moment of inertia of a tractor. Study of tractor static equilibrium, tractor stability especially at turns. Determination of maximum drawbar pull. Familiarization with tractor as a spring-mass system.

Unit III- Power tiller and other farm power sources

Power tiller as source of power, engine and transmission system in power tiller- types, construction, major functional requirement, hitching system in power tillers. Implements suitable for power tiller hitching.

Unit IV Testing and safety with tractor and power sources

Introduction to tractor and power tiller testing. Deciphering the engine test codes. Ergonomical considerations and operational safety in operating the tractor controls.

Practical

Introduction to transmission systems and components; Study of clutch functioning, parts and design problem on clutch system; Study of different types of gear box, calculation of speed ratios, design problems on gear box; Study on differential and final drive and planetary gears; Study of brake systems and some design problems; Steering geometry and adjustments; Study of hydraulic systems in a tractor, hydraulic trainer and some design problems; Appraisal of various controls in different makes tractors in relation to Operators seat and body dimensions of the operators. Determination of location of CG of a tractor, Moment of Inertia of a tractor. Traction performance of a traction wheel.

Learning Outcome:

This Chapter helps the students in understanding the tractor and power systems, selection of matching implements, hitching mechanisms, safety standards of different power unit operations.

References:

Liljedahl J B and Others. Tractors and Their Power Units.
Rodichev V and G Rodicheva. Tractors and Automobiles.
Singh Kirpal. Automobile Engineering – Vol I.
Heitner Joseph. Automotive Mechanics: Principles and Practices.
C.B.Richey. Agricultural Engineering Handbook.
John Deere. Fundamentals of Service Hydraulics.
Relevant BIS Test Codes for Tractors.

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Credit Based Grading System

Agriculture Technology, V-Semester

AT-5004 Unit Operation in Post Harvest Management

Unit I Introduction
Post harvest management introduction –objectives –post harvest losses of cereals, pulses and oilseeds – importance - optimum stage of harvest. Threshing – traditional methods mechanical threshers – types-principles and operation-moisture content –measurement – direct and indirect methods – moisture meters – equilibrium moisture content.

Unit II Psychrometry and Drying
Psychrometry – importance – Psychometric charts and its uses – Drying – principles and theory of drying – thin layer and deep bed drying – Hot air drying – methods of producing hot air – Types of grain dryers – selection – construction, operation and maintenance of dryers – Design of dryers

Unit III Cleaning and grading
Principles - air screen cleaners – adjustments - cylinder separator-spiral separator – magnetic separator-colour sorter-inclined belt separator – length separators - effectiveness of separation and performance index.

Unit IV Shelling and handling
Principles and operation – maize sheller, husker sheller for maize – groundnut decorticator – castor sheller – material handling –belt conveyor –screw conveyor – chain conveyor – bucket elevators – pneumatic conveying.

Unit V Paddy and crop processing
Paddy processing – parboiling of paddy – methods – merits and demerits – dehusking of paddy – methods – merits and demerits – rice polishers –types – constructional details – polishing –layout of modern rice mill - wheat milling – pulse milling methods – oil seed processing.

Practicals:
Determination of moisture content – determination of engineering properties of grain- testing of paddy thresher-paddy winnower. Testing of groundnut decorticator-maize Sheller - evaluation of thin layer drier- study of LSU drier. Determination of oil content of oilseeds Determining the efficiency of bucket elevator and screw conveyor-study of paddy parboiling drum-evaluation of shelling efficiency of rubber roll sheller-study of cone polisher-visit to modern rice mill – visit to pulse milling industry.

Learning Outcome:
On completion of this chapter the students will understand different post harvest losses of agricultural and horticultural crops, their prevention and different unit operations involved after harvest for value addition to the produce.

References:

Chakraverty, A.2000.Third Edition, Post harvest technology for Cereals, Pulses and oilseeds. Oxford &IBH publication Pvt Ltd, New Delhi

Sahay, K.M., and Singh, K.K. 1994. Unit operations of Agricultural Processing. Vikas publishing house Pvt. Ltd., New Delhi.

Pande, P.H. 1994. Principles of Agriculture Processing. Kalyani Publishers, Ludhiana

Mohsenin, N.N.1970. Physical properties of plant and animal materials Grodon and Breach publishers, Ludhiana

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Credit Based Grading System

Agriculture Technology, V-Semester

Elective I -AT- 5005 (1) Operations Research

Unit-I: Linear Programming techniques
Linear programming –Introduction- Problem Formulation - Graphical method –Limitations. General Linear programming problem-Canonical and Standard forms of LPP-Simplex Method. Computational Procedure –Artificial variable technique - Big M- Method.

Unit-II: Transportation and Assignment Models
Transportation Problem –Mathematical form of TPP-Methods of finding initial basic feasible solutions- North West - Corner Rule. Row Minimum - Column Minimum- Matrix Minimum - Vogel's Approximation Method (VAM)- Optimal Solution – Modified distribution Method (MODI Method). Assignment Problem –Mathematical form- Hungarian Method.

Unit-III: Integer Programming
Integer Programming Problems-definitions –General form- Gomory's Algorithm –All Integer Cutting Plane Algorithm- Gomory's mixed integer method.

Unit-IV: Network Scheduling by PERT /CPM
Introduction –Network and basic components –construction and time calculation in network. Critical path method (CPM). Programme Evaluation and Review Technique (PERT) calculation – advantages in network

Unit-V: Inventory model
Inventory control - selective control techniques – economic lot size problems – problem of EOQ with and without shortage- EOQ problems with price Breaks. Inventory control techniques – uncertain demand and stochastic problems.

PRACTICALS
Problems in Formulation of Linear programming Problem - Graphical method –Simplex Method- Big M- Method. Transportation Problem - North West - Corner Rule. Row Minimum - Column Minimum- Matrix Minimum - Vogel's Approximation Method (VAM)- Optimal Solution – Modified distribution Method (MODI Method). Assignment Problem – Hungarian Method. Integer Programming Problems-Gomory's Algorithm –All Integer Cutting Plane Algorithm- Gomory's mixed integer method. Construction of Network and time calculation in network. Critical Path Method (CPM). Programme Evaluation and Review Technique (PERT) calculation. Problems in Inventory model - selective control techniques – economic lot size problems – problem of EOQ with and without shortage- EOQ problems with price Breaks- Inventory control techniques – uncertain demand and stochastic problems.

References:

Kanti Swarup, P.K Gupta, Man Mohan (2005)-Operations Research - Sultan Chand and Sons educational publisher, New Delhi.

G.V. Shenoy, U.K.Srivastava & S.C. Sharma(2002)-Operations Research for Management-New Age International (P) Ltd., publishers, New Delhi.

V.K.Kapoor and Sumant Kapoor(2003)- Operations Research Technique for Management-S. Chand and Sons, New Delhi

Hamdy A. Taha (2000) -Operations Research -Prentice Hall of India Publisher, New Delhi

Ravindran, Don.T.Phillips and James .J.Solberg(2001)-Operations Research-John Willey and Sons, Singapore.

S.J.Venkatesan(1999)-Operations Research- JS Publishers, Cheyyar.

Prem Kumar Gupta & D.S. Hira (2001)-Operations Research- Sultan Chand and Sons educational publisher, New Delhi.

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Credit Based Grading System

Agriculture Technology, V-Semester

Elective I -AT- 5005 (2) Fundamental of Agriculture Extension

Unit I Communication and Programme Planning

Communication – meaning – definition – models – elements and their characteristics – types and barriers in communication. Programme planning – meaning, definition, principles, steps in programme development process, monitoring and evaluation of extension programmes.

Unit II Extension Teaching Methods
Extension teaching methods - Audio-Visual aids – definition – classification – purpose, planning and selection, combination and use – individual, group and mass contact methods – merits and demerits.

Unit III Modern Communication Gadgets Modern communication sources – internet, video and teleconferencing, Interactive Multimedia Compact Disk (IMCD), village kiosks, Kissan Call Centre (KCC), mobile phone

Unit IV Diffusion and Adoption

Diffusion – meaning and elements. Adoption – meaning –adopter categories and factors influencing adoption, stages of adoption, Innovation decision process and attributes of innovation consequences of adoption.

Unit V Capacity building Capacity building of extension personnel and farmers – meaning – definition, types of training, training to farmers, farm women and rural youth, FTC & KVK.

Practicals

Communication pattern in TOT organizations – ongoing agricultural and rural development/TOT programmes, ATMA and SHGs – preparation of visual aids – extension literature – news stories, feature stories – interview articles – photo journalism – activities of Directorate of ODL / Educational Media Centre – activities of Community Radio Centre – writing script for radio and television – spread and acceptance of farm technologies at village level.

References:
Ray, G.L., 1999. Extension Communication and Management, Naya Prokash, 206, Bidhan Sarani, Calcutta.
Rogers, E.M. 1995. Diffusion of Innovations, The Free Press, Newyork
Sandhu, A.S. 1996. Extension Programme Planning, Oxford & IBH Publishing Co. pvt. Ltd, New Delhi
Sandhu, A.S. 1996. Agricultural Communication: Process and Methods, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.

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Credit Based Grading System

Agriculture Technology, V-Semester

Elective I -AT- 5005 (3) Organic Farming

Theory

Introduction, concept, relevance in present context; Organic production requirements; Biological intensive nutrient management-organic manures, vermicomposting, green manuring, recycling of organic residues, biofertilizers; Soil improvement and amendments; Integrated diseases and pest management – use of biocontrol agents, biopesticides pheromones, trap crops, bird perches; Weed management; Quality considerations, certification, labeling and accreditation processors, marketing, exports.

Practicals

Raising of vegetable crops organically through nutrient, diseases and pest management; vermicomposting; vegetable and ornamental nursery raising; macro quality analysis, grading, packaging, postharvest management

References:

A.K.Dahama. 2007. Organic farming for sustainable agriculture. Agrobios (India), Jodhpur.

Arun. K. Sharma. 2011. Handbook of Organic farming. Agrobios (India), Jodhpur.

S.P. Palaniappan and K.Annadurai. 2010. Organic farming – Theory and Practice. Scientific Publishers. Jodhpur.

U.Thapa and P. Tripathy. 2006. Organic farming in India- Problems and Prospects. Agrotech publishing agency, Udaipur.

G.K.Veeresh. 2006. Organic farming. Foundation Books. New Delhi.

Purshit, S.S. 2006. Trendsin Organic Farmingin India. Agros Bios (INDIA), Jodhpur. y Thampan, P. K. 1995.

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Credit Based Grading System

Agriculture Technology, V-Semester

AT-5006 Engineering Properties of Soil & Agriculture Materials

PRACTICALS

Determination of Field Density by Core cutter and Sand Replacement methods-Mechanical analysis of Soil Sieving-Hydrometer analysis for Grain Size Distribution-Determination of Atterberg's Limits of Soil Consistency. Experiments for the determination of physical properties like, length, breadth, thickness, surface area, bulk density, porosity, true density, coefficient of friction, angle of repose and colour for various food grains, fruits, vegetables, spices and processed foods, aerodynamic properties like terminal velocity, lift and drag force for food grains, firmness and hardness of grain, fruits and stalk.

Learning Outcome:

The students will learn about the different engineering properties of soil and agricultural materials which will be useful for design of soil engaging tools and also in the design of storage & value addition tools and equipment.

References:

Mohsenin, N.N. 1970. Physical properties of plant and animal materials Grodon and Breach publishers, Ludhiana

Singhal, O.P. and Samuel, D.V.K. 2011. Engineering properties of biological materials. Saroj Prakashan, Allahabad. ISBN: 8170976253.

Kachra, R.P., Gupta, R.K. and Alam, A. 1994. Physico- chemical constituents and engineering properties of food crops. Scientific publishers, Jodhpur. ISBN: 9788172330835.

Rao, M. A. and Rizvi, S.S.H. 1986. Engineering properties of foods. Marcel deker, New York. ISBN: 9780824775261

Punmia B C, Jain A K and Jain A K. 2005. Soil Mechanics and Foundations. Laxmi Publications (P) Ltd. New Delhi.

Ranjan Gopal and Rao A S R. 1993. Basic and Applied Soil Mechanics. Welley Easters Ltd., New Delhi.

Singh Alam. 1994. Soil Engineering Vol. I. CBS Publishers and Distributions, Delhi.