P.G. DEPARTMENT OF AGRICULTURE

SYLLABUS FOR THE BATCH FROM THE YEAR

2024 TO YEAR 2026

Programme Code: MAGE-1968

Programme Name: M.Sc. Ag. (Agricultural Economics)

(Semester I-II)

Examinations: 2024-25

Khalsa College Amritsar

M.Sc. Ag. (Agricultural Economics) 2024-26

SEMESTER-I

Course Code	Course Title	Credit Hours	Marks Theory + Practical + I. Assessment	Total Marks	Page No.
AEC-511	Micro Economics Theory and Application	3(3+0)	75+0+25	100	6
AEC-512	Agricultural Production Economics	3 (2+1)	50+25+25	100	7-8
AEC-513	Natural Resources and Environment Economics (Minor)	3 (2+1)	50+25+25	100	9-10
STAT-511	Statistical Methods for Applied / social sciences	4 (3+1)	57+18+25	100	11-12
*PGS-511	Technical Writing & Communication Skills	1(0+1)	100 (Pr)	100	13
*PGS-512	Library and Information Services	1(0+1)	100 (Pr)	100	14
*AEC-599	Master's Research	5 (0+5)		S/US	15
Total		**20 (13+7*)**			

* Non-credit course

Total Internal Assessment = 25% (House Test - 10%; Attendance - 10%; Conduct & Academic, Extra Curricular Activities - 5%)

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SEMESTER-II

Course Code	Course Title	Credit Hours	Marks	Total Marks	Page No
			Theory + Practical + I. Assessment		
AEC-521	Agricultural Marketing and Price Analysis	3 (2+1)	50+25+25	100	16-17
AEC-522	Macro Economics and policy	3 (3+0)	75+0+25	100	18
AEC-523	Research Methodology for social sciences	3 (2+1)	50+25+25	100	19
AEC-524	Agricultural Development and Policy Analysis (Minor)	3 (3+0)	75+0+25	100	20
*PGS-521	Agricultural Research and Publication Ethics	1 (1+0)	100 (Th)	100	21
*AEC-599	Master's Research	5 (0+5)		S/US	22
Total		**18(12+6 *)**			

* Non-credit course

Total Internal Assessment = 25% (House Test - 10%; Attendance - 10%; Conduct & Academic, Extra Curricular Activities - 5%)

M.Sc. Ag. (Agricultural Economics) 2024-26

Semester-III

Course Code	Subject	Credit hours per week	Marks Theory + Practical + I. Assessment	Total Marks	Page No.
AEC-531	Econometrics	3 (2+1)	50+25+25	100	23-24
AEC-532	Agricultural Finance and project Management	3 (2+1)	50+25+25	100	25-26
STAT-531	Designs of Surveys	3(2+1)	50+25+25	100	27-28
AEC-591	Credit Seminar	1 (1+0)	100	100	29
*PGS-531	Intellectual Property & its Management in Agriculture	1 (1+0)	100 (Th)	100	30
*AEC-599	Master's Research	10(0+10)		S/US	31
Total		**21(10+11*)**			

*Non-Credited

Total Internal Assessment to be given=25% (House Test-10%; Attendance-10%; Conduct & Academic, Extra Curricular Activites-5%)

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SEMESTER-IV

Course Code	Subject	Credit hours per week	Marks Theory + Practical + I. Assessment	Total Marks	Page No.
AEC-541	Linear Programming	2(1+1)	38+37+25	100	32
AEC-542	Indian Economy: History and Contemporary issues (Minor)	1 (1+0)	75+0+25	100	33
*PGS-541	Disaster Management	1 (1+0)	100 (Th)	100	34
*AEC-599	Master's Research	10(0+10)		S/US	35
Total		**14(3+11*)**			

*Non-Credited

Total Internal Assessment to be given=25% (House Test-10%; Attendance-10%; Conduct & Academic, Extra Curricular Activites-5%)

M.Sc. Ag. (Agricultural Economics) 2024-26

SEMESTER-I

AEC-511 Micro Economics Theory and Application

Time: 3 Hours **Credit hours: 3(3+0)**

Max. Marks: 100

Theory: 75

Internal assessment: 25

Instructions for the papers Setters

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. In all nine questions should be asked, of which first question of 15 marks (Comprising of 10 short answer type questions covering 1.5 marks each of the whole syllabus) will be compulsory.
4. Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (15).

Theory

Section A: Theory of consumer behavior – Cardinal Utility Approach, Ordinal Utility Approach, Applications of Indifference Curve Approach, Revealed Preference Hypothesis. Demand theory, elasticity of demand, Consumer surplus.

Section B: Theory of the firm. Theory of Production – Production functions, Returns to scale and economies of scale. Theory of Costs – Cost curves, Profit maximization and cost minimization.

Section C: Law of Supply, Producers' surplus Price determination under various market situations – Monopoly, Monopolistic competition, Oligopoly.

Section D: Theories of distribution, General Equilibrium Theory, Welfare Economics.

Suggested Readings

H L Ahuja. (2021). *Principles of Microeconomics*. S. Chand & Co.
T.R Jain and A.S Sandhu. (2020). *Mircoeconomics*. VK Global Publications Pvt. Ltd., New Delhi.
H L Ahuja. (2021). *Advanced Economic theory: Micoeconomics Analysis*. S.Chand& Co.
R Pindyck and D Rubinfeld. (2017). *Microeconomics*. Pearson Edu. India.
M.K David. (2020). *A Course in Microeconomic Theory*. Princeton University Press.
K.K Dewitt K.K. (2020). *Modern Economic Theory*. S Chand & Co.
Koutsoyiannis A. (2003). *Modern Microeconomics*. The Macmillan Press.

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SEMESTER-I

AEC-512 Agricultural Production Economics

Time: 3 Hours **Credit hours: 3(2+1)**

Max. Marks: 100

Theory: 50

Practical: 25

Internal assessment: 25

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. In all nine questions should be asked, of which first question of 10 marks (Comprising of 10 short answer type questions covering the whole syllabus) will be compulsory.
4. Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (10).

Theory

Section A: Nature, scope and significance of agricultural production economics- Agricultural Production processes, character, Centrality of production functions, assumptions of production functions, commonly used forms - Properties, limitations, specification, estimation and interpretation of commonly used production functions.

Section B: 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

Section C: Cost functions and cost curves, components, and cost minimization -Duality theory, cost and production functions and its applications -Economies and diseconomies of scale.

Section D: Technology in agricultural production, nature and effects and measurement - Measuring efficiency in agricultural production; technical, allocative and economic efficiencies - Yield gap analysis-concepts-types.

Practical

Different forms of production functions, Specification, estimation and interpretation of production functions, Returns to scale, factor shares, elasticity of production, Physical optima-economic optimal, 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.

Suggested Readings

Beattie BR & Taylor CR. 1985. *The Economics of Production*. John Wiley & Sons.

Doll JP & Frank O. 1978. *Production Economics - Theory and Applications*.John Wiley & Sons.

Gardner BL & Rausser GC. 2001. *Handbook of Agricultural Economics*. Vol. I. *Agricultural Production*. Elsevier.

Heady EO. *Economics of Agricultural Production and Resource Use*. Prentice-Hall.

Sankayan PL. 1983. *Introduction to Farm Management*. Tata Mc Graw Hill.

SEMESTER-I

Natural Resources and Environmental Economics (Minor)

AEC-513

Time: 3 Hours **Credit Hours: 3(2+1)**

Max. Marks: 100

Theory: 50

Practical: 25

Internal assessment: 25

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. In all nine questions should be asked, of which first question of 10 marks (Comprising of 10 short answer type questions covering the whole syllabus) will be compulsory.
4. of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (10).

Theory

Section A: 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 .

Section B: Theory of optimal extraction renewable resources, Theory of optimal extraction exhaustible Efficiency and markets – market failures - externalities – types - property rights– Coase's theorem and its critique - public goods – common property and open access resource management - Collective action

Section C: 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- pollution charges – Pigovian tax - tradable permits – environmental legislations in India.

Section-D: Concept of sustainable development – Economic Perspective – Indicators of sustainability Relation between development and environment stress-–International Environmental Issues – climate change – likely impacts – mitigation efforts and international treaties.

Practical

Exhaustible resource management, 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.

Suggested Reading

Pearce DW and Turner RK. *Economics of Natural Resource and Environment*
• Kwak J. *Economism: Bad Economics and the Rise of Inequality*
• Tietenberg T and Lewis L. *Environmental and Natural Resource Economics*
• Schwarz PM. *Energy Economics*

SEMESTER-I

STAT-511 Statistical Methods for Applied Sciences

Time: 3 Hours **Credit Hours: 4(3+1)**
Max. Marks: 100
Theory: 57
Practical: 18
Internal assessment: 25

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. In all nine questions should be asked, of which first question of 9 marks (Comprising of 9 short answer type questions covering the whole syllabus) will be compulsory.
4. Out of remaining eight questions, two questions should be asked from each section, out of which the candidates are required to attempt one question from each section. All question will carry equal marks (12).

Theory

Section-A: Box-plot, Descriptive statistics: - measures of central tendency, dispersion, Theory of probability: - types and introduction, Introduction to Random variable and Mathematical expectation and their properties.

Section-B: Discrete and continuous probability distributions: - Binomial, Poisson, Normal distribution and their applications. Concept of sampling distribution: chi-square, t and F distributions. Tests of significance based on Normal, chi-square, t and F distributions.

Section-C: Simple and multiple correlation coefficient, partial correlation, rank correlation, Simple and multiple linear regression model, test of significance of correlation coefficient and regression coefficients, Coefficient of determination.

Section-D: Non-parametric tests: - sign, Mann-Whitney U-test, Run test for the randomness of a sequence, Median test: - introduction and their applications. Introduction to ANOVA: One way and Two Way, Introduction to Sampling Techniques: - SRS, cluster, stratified, systematic sampling: - introduction and their applications, Transformation of Data.

Practical:

Fitting of distributions ~ Binomial, Poisson, Normal. Large sample tests, testing of hypothesis based on exact sampling distributions ~ chi-square, t and F. Correlation and regression analysis. Non-parametric tests. ANOVA: One way, Two Way.

Suggested Reading:

1. Goon A.M, Gupta M.K and Dasgupta B. 1977. An Outline of Statistical Theory. Vol. I. The World Press.
2. Goon A.M, Gupta M.K. and Dasgupta B. 1983. Fundamentals of Statistics. Vol. I. The World Press.

3. Hoel P.G. 1971. Introduction to Mathematical Statistics. John Wiley.
4. Hogg R.V and Craig T.T. 1978. Introduction to Mathematical Statistics. Macmillan.
5. Morrison D.F. 1976. Multivariate Statistical Methods. McGraw Hill.
6. Hogg RV, McKean JW, Craig AT. 2012. Introduction to Mathematical Statistics 7th Edition.
7. Siegel S, Johan N & Casellan Jr. 1956. Non-parametric Tests for Behavior Sciences. John Wiley.
8. Anderson TW. 2009. An Introduction to Multivariate Statistical Analysis, 3rd Ed. John Wiley
9. http://freestatistics.altervista.org/en/learning.php.
10. http://www.statsoft.com/textbook/stathome.html.

SEMESTER-I

***PGS-511 Technical Writing & Communications Skills**

Time: 3 Hours **Credit Hours: 1(0+1)**
Max. Marks: 100
Practical: 100

Instructions for the Paper Setters:

1. The question paper will consist of nine skill-oriented questions.
2. The first 5 questions carry 8 marks each. There will be internal choice wherever possible. The answer should be in 50-80 words. (5×8=40 Marks)
3. There will be four essay type questions from the entire syllabus. There will be internal choice wherever possible. The answer should be in 250 words. (4×15= 60 Marks)

Practical:

Various forms of scientific writings- theses, technical papers, reviews, manuals etc.; Various parts of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts, summaries, précis, citations, etc.; Commonly used abbreviations in the theses and research communications; Illustrations, photographs and drawings with suitable captions; pagination numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups. Editing and proof-reading. Writing of a review article; Communication Skills - Grammar (Tenses, parts of speech, clauses, punctuation marks); Error analysis (Common errors), Concord, Collocation, Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech; Participation in group discussion; Facing an interview; Presentation of scientific papers.

Suggested Reading:

1. Barnes and Noble. Robert C. (Ed.). 2005. Spoken English: Flourish Your Language.
2. Chicago Manual of Style. 14th Ed. 1996. Prentice Hall of India.
3. Collins' Cobuild English Dictionary. 1995.
4. Harper Collins. Gordon HM and Walter JA. 1970. Technical Writing. 3rd Ed.
5. Holt, Rinehart and Winston. Hornby AS. 2000. Comp. Oxford Advanced Learner's Dictionary of Current English. 6th Ed. Oxford University Press.
6. James HS. 1994. Handbook for Technical Writing. NTC Business Books.
7. Joseph G. 2000. MLA Handbook for Writers of Research Papers. 5th Ed. Affiliated East-West Press.
8. Mohan K. 2005. Speaking English Effectively. MacMillan India.
9. Richard WS. 1969. Technical Writing.
10. Sethi J and Dhamija PV. 2004. Course in Phonetics and Spoken English. 2nd Ed. Prentice Hall of India.
11. Wren PC and Martin H. 2006. High School English Grammar and Composition.S. Chand & Co.

SEMESTER-I

***PGS-512 Library and Information Services**

Time: 3 Hours **Maximum marks: 100**
Practical: 100
Credit hours: 1(0+1)

Instructions for the Paper Setters:

1. The question paper will consist of nine skill-oriented questions.
2. The first 5 questions carry 8 marks each. There will be internal choice wherever possible. The answer should be in 50-80 words. (5×8=40 Marks)
3. There will be four essay type questions from the entire syllabus. There will be internal choice wherever possible. The answer should be in 250 words. (4×15= 60 Marks)

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; e- resources access methods.

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SEMESTER-I

***AEC-599** **Masters' Research**

S/US

Credits hours:5(0+5)

SEMESTER-II

AEC-521 Agricultural Marketing and Price Analysis

Time: 3 Hours **Credit hours: 3(2+1)**

Max. Marks: 100

Theory: 50

Practical: 25

Internal assessment: 25

Instructions for the Paper Setters:

1.Question paper should be set strictly according to the syllabus.

2.The language of questions should be straight & simple.

3.In all nine questions should be asked, of which first question of 10 marks (Comprising of 10 short answer type questions covering the whole syllabus) will be compulsory.

4.Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (10).

Theory

Section-A: Market structure, conduct and performance analysis. Problems in Agricultural Marketing from Demand, Supply and Institutions sides. Market intermediaries and regulation. Marketable &Marketed surplus estimation. Marketing Efficiency. Vertical and Horizontal integration.

Section-B: Marketing Co-operatives – APMC, Direct marketing, Contract farming and Retailing. Supply Chain Management - State trading, Warehousing and other Government agencies. Performance and Strategies -Market Infrastructure needs, performance and Government role. Value Chain Finance.

Section-C: Role of information technology and telecommunication in marketing of agricultural commodities - Market research, Market information service, electronic auctions (e-bay), e-Chaupals, Agmarket, Domestic and Export market Intelligence Cell (DEMIC). Market extension.

Section-D: Spatial and temporal price relationship – price forecasting, time series analysis, time series models, spectral analysis. Price policy and economic development – Non-price instruments. Theory of storage - Introduction to Commodities markets and future trading, basics of commodity futures, Operation Mechanism of Commodity markets, Price discovery, Hedging and Basis, Fundamental analysis, Technical Analysis. Role of Government in promoting commodity trading and regulatory measures.

Practical:

Training of supply and demand elasticities, price spread, price forecasting, concentration ratios and marketing efficiency analysis. Marketing structure analysis of regulated market and marketing societies. Analysis on contract farming and supply chain management. Chain Analysis

- quantitative estimation of supply chain efficiency. Online searches for market information sources and interpretation of market intelligence reports. Technical and fundamental Analysis for important agricultural commodities- presentation of the survey results and wrap-up discussion.

Suggested Readings:

S.S Acharya and N.L Agarawal2004.*Agricultural Marketing in India.* Oxford and IBH Publishing company Pvt. Ltd. New Delhi.

S S Acharya and N.L Agarawal.1994. Agricultural Prices Analysis and Policy. Oxford and IBH Publishing company Pvt. Ltd. New Delhi.

R.L.Kohls and J.U Uhj. 2012. *Marketing of Agricultural products*.

SEMESTER-II

AEC-522: Macro Economics and Policy

Time: 3 Hours **Credit hours: 3(3+0)**
Max. Marks: 100
Theory: 75
Internal Assessment=25

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. In all nine questions should be asked, of which first question of 15 marks (Comprising of 15 short answer type questions covering the whole syllabus) will be compulsory.
4. Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (15).

Theory:

Section-A: Nature and Scope of Macro Economics. National Income - concepts and measurement. Classical theory of Employment and Say's Law. Modem theory of Employment and Effective Demand.

Section-B: 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.

Section-C: Money-Classical theories of Money and Price. Keynesian theory of money. Supply of Money. Demand for Money. Inflation nature, effects and control. IS & LM framework - General Equilibrium of product and money markets.

Section-D: Monetary policy. Fiscal policy. Effectiveness of Monetary and Fiscal policy. Central banking. Business cycles. Balance of Payment. Foreign Exchange Rate determination.

Suggested Readings

H.L Ahuja (2021). *Macroeconomics: Theory and Policy*. S. Chand & Co.

D.D Chatirvedi and A Mittal (2018). *Macroeconomics.* International Book House Pvt. Ltd., New Delhi.

E Shapiro (2013). *Macroeconomic Analysis.*Galgotia Publication Pvt. Ltd., New Delhi.

A Gardner (2017). *Macro Economic: Theory and Policy*. Collier Macmillan.

R Dornbusch and S Fischer (2018). *Macroeconomics*. McGraw Hill Publication.

R T Frogen (2018). *Macro Economic: Theory and Policies*. 6th Ed. Prentice Hall.

Semester-II

AEC-523: Research Methodology for Social Sciences

Time: 3 Hours **Credit hours: 3(2+1)**

Max. Marks: 100

Theory: 50

Practical: 25

Internal assessment: 25

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. In all nine questions should be asked, of which first question of 10 marks (Comprising of 10 short answer type questions covering the whole syllabus) will be compulsory.
4. Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (7).

Theory:

Section-A: Importance and scope of research in social sciences. Concept and characteristics of social research, Types of research, Fundamental vs. Applied, Concept of researchable problem – research prioritization, research process.

Section-B Hypothesis – meaning, characteristics, types and testing. Review of literature. Development of theoretical orientation of the research problem, Concept, construct, variables and their measurement.

Section-C: Sampling design, sampling error and methods of sampling. Research design and techniques. Types of data collection tools and testing their reliability and validity. Scaling techniques. Coding, editing, tabulation and validation of data.

Section-D: Tools of data analysis. Statistical package for social sciences, interpretation of results, preparing research report / thesis. Writing of articles. Universal procedures for preparation of bibliography.

Practical:

Selection and formulation of research problem, objectives and hypothesis. Selection of variables and their operationalization, Developing conceptual framework of research. Development of data collection tools and measuring their validity and reliability. Data processing, tabulation and analysis. Formulation of secondary tables. Writing of thesis and research articles. Presentation of reports.

Suggested readings-

Basics of Research Methodology 2015. Edition by A P Kulkarni, Paras Medical Book
Research Methodology Methods Tools And Techniques by Shashi K. Gupta ,

Praneet Rangi Research Methodology by T Bhaskar Rao

SEMESTER-II

AEC-524 Agricultural Development and Policy Analysis (Minor)

Time: 3 Hours **Credit hours: 3(3+0)**

Max. Marks: 100

Theory: 75

Internal assessment: 25

Instructions for the Paper Setters:

1.Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
In all nine questions should be asked, of which first question of 15 marks (Comprising of 10 short answer type questions covering the whole syllabus) will be compulsory.
Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (15).

Theory

Section A: Role of agriculture in economic/ rural development – Evolution of thinking on agriculture and development; Agricultural development – meaning, stages and determinants – Population and food supply – need for sound agricultural policies

Section B: Resource exploitation model- Conservation Model-Diffusion model- High pay-off input model-Induced Innovation Model- Agricultural R&D

Section C: Agrarian structure and land relations; trends in performance and productivity; agrarian structure and technology; credit, commerce and technology; capital formation; subsidies; pricing and procurement; Post Green Revolution agriculture; Production and productivity crisis in agriculture; Regional differences; Food Security, PDS system and Malnutrition.

Section D: Instruments of Agricultural Policy; Process of agricultural policy formulation, implementation, Monitoring and Evaluation in India; critical review of various elements of Indian agricultural policy-resource policies – credit policies – input and product marketing policies – price policies; WTO – Agreement on Agriculture; Planning models. Planning for utilization of resources and Indian Five-Year Plans.

Suggested Readings:

1.M.L .Jhingan , *The economics of development and planing*,Vrinda publications,2011

2.R.N.Soni and Sangeeta Malhotra, *Leading Issues in Agricultural economics* ,Vishal Publishing Co,

3. Albert O. Hirschman 1958. *Strategy of Economic Development.* New Man Yale University
4. Simon Kuznets 1965. *Economic Growth and Structures.* Oxford New Delhi.
5. Das Gupta AK. 1965. *Planning and Economic Growth.* George Allen and Unwin London
6 Robert E. Baldwin 1966. *Economic Development and Growth*. John Willey, New York

SEMESTER-II

***PGS-521- Agricultural Research and Publication Ethics**

Time: 3 Hours **Credit hours: 1(1+0)**

Max. Marks: 100

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of five questions, out of which first question of 20 marks (Comprising of 10 short answer type questions of 2 marks each) covering the whole syllabus will be compulsory.
4. Out of remaining eight questions, two questions should be asked from each section, out of which the candidates are required to attempt one question from each section. All question will carry equal marks (20).

Theory:

Section A: History of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR):

Section B: International Agricultural Research Centres (IARC), partnership with NARS, role as a partner in the global agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility. Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.

Section C: Concept and connotations of rural development, rural development policies and strategies. Rural development programmes: Community Development Programme, Intensive Agricultural District Programme, Special group – Area Specific Programme,

Section D: Integrated Rural Development Programme (IRDP) Panchayati Raj Institutions, Co-operatives, Voluntary Agencies/ Non-Governmental Organizations. Critical evaluation of rural development policies and programmes. Constraints in implementation of rural policies and programmes.

Suggested Readings:

1. Bhalla GS and Singh G. 2001. Indian Agriculture - Four Decades of Development. Sage Publ.
2. Punia MS. Manual on International Research and Research Ethics. CCS Haryana Agricultural University, Hisar.
3. Rao BSV. 2007. Rural Development Strategies and Role of Institutions - Issues, Innovations and Initiatives. Mittal Publ.

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SEMESTER-II

***AEC-599** **Masters' Research**

S/US
Credits hours: 5(0+5)

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SEMESTER-III

AEC-531 **Econometrics**

Time: 3 Hours **Credit hours: 3(2+1)**

Max. Marks: 100

Theory: 50

Practical: 25

Internal assessment: 25

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3.In all nine questions should be asked, of which first question of 10 marks (Comprising of 10 short answer type questions covering the whole syllabus) will be compulsory.
4. Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (10).

Theory

Section-A: Introduction – relationship between economic theory, mathematical economics, models and econometrics, methodology of econometrics-regression analysis. Basic two variable regression - assumptions estimation and interpretation approaches to estimation - OLS, MLE and their properties

Section-B: Multi variable models-multiple regression estimation and interpretation. Violation of assumptions – identification, consequences and remedies for Multicollinearity, heteroscedasticity.

Section-C: Autocorrelation – data problems and remedial approaches - model misspecification, Use of dummy variables-limited dependent variables – specification, estimation and interpretation.

Section-D: Simultaneous equation models – structural equations - reduced form equations - Identification and approaches to estimation.

Practical:

Practicals on single equation two variable model specification and estimation, hypothesis testing, transformations of functional forms and OLS application. Estimation of multiple regression models - hypothesis testing, testing and correcting specification errors, testing and managing multicollinearity, heteroscedasticity, autocorrelation. Estimation of regressions with dummy variables

Suggested Readings:

Dorfman R. 1996. *Linear Programming and Economic Analysis*. McGraw Hill.

• Greene WH. 2002. *Econometric Analysis*. Pearson Education.
• Johnston J and Dinardo J. 2000. *Econometric Methods*. Mc Graw-Hill.
• Koutseyianis, A. 1997. *Theory of Econometrics*. Barner & Noble.
• Maddala GS. 2002. *Econometrics*. Mc Graw-Hill.
• Pinndyck RS and Rubinfeld DL. 1990. *Econometric Models and Econometric Forecasts*. McGraw Hill.

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SEMESTER-III

AEC-532: Agri. Finance and Project Management

Time: 3 Hours **Max marks: 100**

Theory: 50

Practical: 25

Internal assessment: 25

Credit hours: 3(2+1)

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. In all nine questions should be asked, of which first question of 10 marks (Comprising of 10 short answer type questions covering the whole syllabus) will be compulsory.
4. Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (10).

Theory

Section A: 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.

Section B: Micro-Financing and Role of MFI's -NGO's, and SHG's. 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.

Section C: Financial Decisions – Investment, Financing, Liquidity and Solvency. Financial statements - Balance Sheet, Cash Flow Statement and Profit and Loss Account. Ratio Analysis. Project Approach in financing agriculture. Financial, economic and environmental appraisal of investment projects. Identification, preparation, appraisal, financing and implementation of projects.

Section D: Project Appraisal techniques – Undiscounted measures. Time value of money. Use of discounted measures - B-C ratio, NPV and IRR. Agreements, supervision, monitoring and evaluation phases in appraising agricultural investment projects. Net work Techniques – PERT and CPM. Risks in financing agriculture. Risk management strategies and coping mechanism. Crop Insurance programmes – review of different crop insurance schemes – yield loss and weather-based insurance and their applications.

Practical:

Estimation of demand and supply gaps of institutional agricultural credit. Preparation of farm credit plan and 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 agricultural investment projects. Practical training of project appraisal techniques. – Undiscounted and Discounted Measures along with their limitations. Case Study Analysis of an Agricultural project, Financial Risk and risk management strategies.

Suggested readings

S Subba Ready & P Raghu Ram. Agricultural Finance and Management. Oxford and IBH Publishing Co Ltd.

E Die Sollem H and Heady EO. (Ed.). *Capital and Credit Needs in Changing Agriculture*, Bauman.

Hopkins A Barry, Peter Jo and Baker CB. *Financial Management in Agriculture*.

Murray WG and Nelson AG. 1960. *Agricultural Finance.* Iowa State University

Chanona C. 1969. *Agricultural Finance in India: Role of Commercial Banks*. Marketing and Economics Research Bureau, New Delhi.

Gittinger JP. 1972. *Economic analysis of agricultural projects*, John Hopkins Univ. Press, Baltimore.

Little IMD and JA Mirrless. 1974, *Project appraisal and planning for developing countries*, Oxford and IBH publishing Co. New Delhi.

Arnold CH. 1972. *Project Evaluation, collected papers*, Macmillan.

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SEMESTER-III

STA-531:

Designs of Surveys

Time: 3 Hours **Max. Marks: 100**

Theory: 50

Practical: 25

Internal assessment: 25

Credit hours 3(2+1)

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. In all nine questions should be asked, of which first question of 10 marks (Comprising of 10 short answer type questions covering the whole syllabus) will be compulsory.

4. Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (15).

Theory

Section A: Importance of sample surveys, Census and Sample Survey, Principal steps in a Sample Survey, Prerequisites in planning a Sample Survey, Designing of a survey, Preparation of questionnaire, Sampling and Non- Sampling errors.

Section B: Probability and Non-Probability Sampling, Sampling from finite population: simple random sampling with (SRSWR) and without replacement (SRSWOR); Determination of sample size. Probability proportional to size sampling, Stratified sampling: cumulative cube root method.

Section C: Systematic sampling; Linear systematic sampling, Circular systematic sampling, Cluster sampling; estimation of mean/ total using simple random sampling, Multistage sampling; estimation of mean/total PPSWR and SRSWOR.

Section D:

Ratio, product and regression method of estimation; Double sampling. Successive sampling, Randomized response technique.

Practical:

Sample selection in various sampling schemes. Estimation of parameters in simple random sampling. Probability proportional to size sampling. Stratified sampling. Systematic sampling. Cumulative cube root method. Multistage sampling. Ratio, product and regression method of estimation. Double Sampling.

Suggested Reading:

Berger J.O. 1993. *Statistical Decision Theory and Bayesian Analysis*. Sringer.

• Bolfarine H and Zacks S. 1992. *Prediction Theory for Finite Population Sampling*. Springer.
• Cassel C.M., Sarndal C.E and Wretman J.H. 1977. *Foundations of Inference in Survey Sampling*. John Wiley.
• Des Raj and Chandhok P. 1998. *Sample Survey Theory*. Narosa Publ.
• House. Ghosh M and Meeden G. 1997. *Bayesian Method for Finite Population*
• *Sampling*. *Monograph on Statistics and Applied Probability*. Chapman and Hall.

SEMESTER-III

CREDIT SEMINAR

AEC-591

Credit points: 100
Credits hours: 1(1+0)

SEMESTER-III

***PGS-531 Intellectual Property & its Management in Agriculture**

Time: 3 Hours **Credit hours: 1(1+0)**

Max. Marks: 100

Theory: 100

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.

2. The language of questions should be straight & simple.

3. There will be total of five questions, out of which first question of 20 marks (Comprising of 10 short answer type questions of 2 marks each) covering the whole syllabus will be compulsory.

4. Out of remaining eight questions, two questions should be asked from each section, out of which the candidates are required to attempt one question from each section. All question will carry equal marks (20).

Theory:

Section A: Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs.

Section B: Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and biodiversity protection.

Section C: Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity.

Section D: International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.

Suggested Readings:

1. Erbisch FH and Maredia K.1998. Intellectual Property Rights in Agricultural Biotechnology. CABI.
2. Ganguli P. 2001. Intellectual Property Rights: Unleashing Knowledge Economy. McGraw-Hill.
3. Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC and Aesthetic Technologies.
4. Ministry of Agriculture, Government of India. 2004. State of Indian Farmer. Vol. V. Technology Generation and IPR Issues. Academic Foundation.
5. Rothschild M and Scott N. (Ed.). 2003. Intellectual Property Rights in Animal Breeding and Genetics. CABI.
6. Saha R. (Ed.). 2006. Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies. Daya Publ. House.

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SEMESTER-III

AEC-599 ***Masters' Research**

S/US

Credits hours: 10(0+10)

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SEMESTER-IV

AEC-541 **Linear Programming**

Time: 3 Hours **Max. Marks: 100**

Theory: 38

Practical: 37

Internal assessment: 25

Credit hours 2(1+1)

Instructions for the Paper Setters:

1.Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of five questions, out of which first question of 10 marks (Comprising of 10 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Out of remaining eight questions, two questions should be asked from each section, out of which the candidates are required to attempt one question from each section. All question will carry equal marks (7).

Theory

Section A: 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.

Section B: Simplex Method: Concept of simplex Method, solving profit maximization and cost minimizations problems. Formulation of farms and non-farm problems as linear programming models and solutions.

Section C: Extension of Linear Programming models: Variable resource and price programming, Transportation problems, recursive programming, dynamic programming.

Section D: Game Theory- Concepts of game theory, two-person constant sum, zero sum game, saddle point, solution to mixed strategies, the rectangular game as Linear Programming.

Practical

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

Saul I. Gass. Linear programming. Methods and Applications

SEMESTER-IV

AEC-542 Indian Economy: History and Contemporary issues (Minor)

Time: 3 Hours **Max. Marks: 100**

Theory: 75

Internal assessment: 25

Credit hours 1(1+0)

Instructions for the papers Setters

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. In all nine questions should be asked, of which first question of 15 marks (Comprising of 10 short answer type questions covering 1.5 marks each of the whole syllabus) will be compulsory.
4. Of the remaining eight questions, two questions should be asked from each section, of which the candidates are required to attempt one question from each section. All questions carry equal marks (15).

Theory

Section –A 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.

Section-B: Policy Changes since 1980s. The 1990 Crisis. Causes and Effects of liberalization. Regional differences: infrastructure, primary, secondary and tertiary sector.

Section-C Growth; Savings and Investment, Employment; productivity; diversification; Agro-based industries; competition policy; foreign investment, Regional differences.

Section-D Monetary and Financial trends- areas of government spending in India, Capital expenditure, revenue expenditure, Deficits (fiscal, primary, revenue), impact of fiscal deficit on economy, direct and indirect taxes, need to rationalize tax structure. Goods and Services Tax (GST), Zero base budgeting, Gender budgeting, Fiscal devolution and centre state financial relations in India, Foreign Trade policy.

Suggested Reading

• Dutt and Sundaram. *Indian Economy*

SEMESTER-IV

PGS-541 **Disaster Management**

Time: 3 Hours **Credit hours: 1(1+0)**

Max. Marks: 100

Theory: 100

Instructions for the Paper Setters:

1.Question paper should be set strictly according to the syllabus.

2.The language of questions should be straight & simple.

3. There will be total of five questions, out of which first question of 20 marks (Comprising of 10 short answer type questions of 2 marks each) covering the whole syllabus will be compulsory.

4. Out of remaining eight questions, two questions should be asked from each section, out of which the candidates are required to attempt one question from each section. All question will carry equal marks (20).

Section A: Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-made disasters, earthquakes, floods drought, landside, land subsidence, cyclones, volcanoes, tsunami, avalanches, global climate extremes. Man-made disasters: Terrorism, gas and radiations leaks, toxic waste disposal, oil spills, forest fires.

Section B: Earthquakes and its types, magnitude and intensity, seismic zones of India, major fault systems of India plate, flood types and its management, drought types and its management, landside and its managements case studies of disasters in Sikkim (e.g) Earthquakes, Landside). Social Economics and Environmental impact of disasters.

Section C: Basic principles of disasters management, Disaster Management cycle, Disaster management policy. National and State Bodies for Disaster Management, Early Warming Systems, Building design and construction in highly seismic zones, retrofitting of buildings.

Section D: Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management, Mini project on disaster risk assessment and preparedness for disasters with reference to disasters in Sikkim and its surrounding areas.

Suggested readings:

Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)

Damon, P. Copola, (2006) Introduction to Intonational Disaster Management, Butterworth Heineman.

Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.

Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi

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SEMESTER-IV

***AEC-599** ***Masters' Research**

S/US

Credits hours: 10(0+10)