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THANJAVUR – 613 403 - TAMILNADU

SCHOOL OF AGRICULTURE

MINUTES OF THE MEETING

The Meeting of Board of Studies in School of Agriculture was held on 28th July 2020 Tuesday at 11.00 a.m (online) under the chairmanship of Dr.B.Chandrasekaran

The following Members were present for the meeting.

Name and Designation

1. Dr. B. Chandrasekaran
   Dean, Chairman
2. Dr. A. Sathiyavelu
   Professor, Member
3. Prof. N. Ilanchezhian
   Professor,Member
4. Dr. P. Selvaraj
   Professor, Member
5. Dr. K. Kumarakuru
   Assistant Professor, Member
6. Mr. S. Tamilcovane
   Assistant Professor, Member
7. Dr. R. Rajendran, Ph. D.,
   Dean, Agricultural College & Research Institute,
   Eachankottai, 614 902, Thanjavur.
   Academic Expert – External Member
8. Dr. K. Natarajan,
   Former Prof & Head (SS & AC, TNAU CBE)
   Technical Advisor,
   M/s. Skying Bio Tech, Kumbakonam.

Industrial Expert – External Member

The Chairman, Board of Studies in the School of Agriculture welcomed the members and briefed about the existing curriculum and syllabi for B.Sc. Agri.(Hons) programme.

After thorough review of the existing curriculum and syllabi for B.Sc. Agri. (Hons) programme offered by the School and also the feedback on curriculum collected from various stakeholders during 2019-20, the members of the Board of Studies have unanimously passed the following resolutions:

1. Resolved to approve the newly introduced B.Sc. Agri. (Hons) programme with specialization in Internet of Things in collaboration with IBM-ICE (with effect from 2020-21) as given **Annexure I.**
2. Resolved to approve the syllabus for the newly introduced Post Graduate Programme M.Sc. Agri.(Agronomy) with effect from 2020-21, as given in **Annexure II**
3. Resolved to approve the syllabus for the newly introduced Post Graduate Programme M.Sc. Agri.(Agricultural Economics) with effect from 2020-21, as given in **Annexure III**
4. Resolved to approve the syllabus for the newly introduced Post Graduate Programme M.Sc. Agri.(Agricultural Extension) with effect from 2020-21, as given in **Annexure IV**
5. In view of COVID-19 pandemic and because the seventh semester encompass Rural agricultural work experience (RAWE) program which invloves students village stay and industrial tie up besides all India tour for 3 months, it is resolved to recommend to the academic council to make a change of the subjects to be conducted during VII semester to be switched over to VIII semester and vice versa**.** The details of the subjects to be conducted in seventh and eighth semester are furnished in **Annexure V**.
6. In the presently given syllabus of 2018 regulation the subjects 18 AGR 302 – Practical crop production I kharif crops and 18 AGR 304- Practical crop production II rabi crops has credit

hours of 1+1 which comprises one theory and one practical. As per the Fifth Deans Committee and ICAR syllabus the above subject has credit hours of 0+2 comprising two practicals. Therefore it is resolved to approve the changes in the 2018 regulation as cited in **Annexure VI**.

The cited resolutions are submitted for the kind perusal and approval by the esteemed academic council.

The members of the board also scrutinized and updated the panel of examiners and recommended to the Academic Council for its approval.

The meeting was concluded with thanks from the Chairman of Board of Studies

Dean (Academic)
School of Agriculture

ANNEXURE I

IBM – Internet of things

Specialization in Internet of Things							
S. No.	**Year**	**Semester**	**Course Name**	**L**	**T**	**P**	**C**
1	**1st**	**II**	**IT Infrastructure Landscape Overview**	2	0	0	2
2	**1st**	**II**	**Introduction to Internet of Things (IOT)**	3	0	0	3
3	**2nd**	**III**	**Python Programming**	3	0	2	4
4	**2nd**	**III**	**Sensor Technology & Instrumentation**	3	0	2	4
5	**2nd**	**IV**	**Wireless Sensor Networks (WSN) &IoT Standards**	3	0	2	4
6	**3rd**	**V**	**Embedded Technology for IOT**	3	0	2	4
7	**3rd**	**VI**	**Analytics for IOT**	3	0	2	4
8	**3rd**	**VI**	**IOT Enterprise Solution Architecture**	3	0	4	5
9	**4th**	**VII**	**IOT for Industries (Use Case Scenarios)**	3	0	2	4
	4th	**VIII**	**Project**				

ANNEXURE II

M.Sc. (AG.) AGRONOMY

SEMESTER – WISE DISTRIBUTION

S.No.	Course No.	Courses	Credit Hours
FIRST SEMESTER			
1.	AGR 611	Modern concepts in crop production	2+0
2.	AGR 612	Principles and practices of weed management	2+1
3.	AGR 613	Agro meteorology and crop weather forecasting	2+1
4.	AGR 614	Agronomy of cereals, pulses, fodders and green manure crops	1+1
5.	STA 611	Statistical Methods and Design of Experiments	2+1
6.	COM 611	Computer Applications for Agricultural Research	1+1
7.	AGR 011	Research	0+1
8	PGS 611	Agriculture research ethics and methodology (0+1)	-
9	PGS 612	Technical writing and communication skills (0+1)	-
		Total	**10+6=16**
SECOND SEMESTER			
1.	AGR 621	Principles and practices of water management	2+1
2.	AGR 622	Principles and practices of soil fertility and nutrient management	2+1
3.	AGR 623	Agronomy of oilseed, fibre, sugar, tuber and narcotic crops	1+1
4.	AGR 624	Farming system for Sustainable Agriculture	1+1
4.	OPC- GPB 621	Concepts of crop physiology	2 +1
5.	AGR 021	Research	0+2
6.	**PGS 623 ***	Basic concepts in laboratory techniques (0+1)	-
7.	**PGS 624 ***	Library and information services (0+1)	-
		Total	**8+7=15**
THIRD SEMESTER			
1.	OPC-XXX 711	Minor Course – Related subject	2+1
2.	OPC-XXX 712	Minor Course - Related subject	2+1
3.	AGR 031	Research	0+8
4.	AGR 032	Seminar	0+1
5.	**PGS 715* e-course**	Intellectual property and its management in agriculture (1+0)	-
6.	**PGS 716* e-course**	Disaster management (1+0)	-
		Total	**4+11 =15**
FOURTH SEMESTER			
1.	AGR 041	Research	0 + 9
		Total	**0 + 9**
		Grand Total	**22+33 = 55**

AGR 611 - MODERN CONCEPTS IN CROP PRODUCTION (2+0)

Objective

This course is scheduled to study the advanced concepts of crop growth and productivity.

Unit I - Climate change and crop production

Agronomic aspects in food security - Basic concepts in growth and growth analysis-Crop growth and production in relation to climate change- Climate resilient farming- climate ready crops - Physiological basis for crop yield differences - Mechanism for carbon assimilation - Respiration and photo respiration- Agro biodiversity. Stress physiology - crop response to abiotic and biotic stresses – ecological risk assessment for innovations in crop production.

Unit II - Importance of tillage, plant population and farm mechanization

Modern concepts in tillage - zero, minimum and conservation tillage - Seed priming – Plant population and crop geometry in relation to soil fertility, solar radiation and available moisture regimes -Farm mechanization - Indigenous technological knowledge (ITK).

Unit III - Recent trends in Crop production

Biotechnology in Agriculture - GM crops and Eco restoration- Integrated Natural Resource Management (INRM) - Balanced nutrition - Integrated Nutrient Supply System (IPNS) - Improved crop nutrition practices - Soil Health Care (SHC) - Efficient Post Harvest Management (EPHM) - organic farming - principles and components of organic farming -Ever green revolution - Sustainable agriculture - Vermi-technology - resource conservation technology - Agroforestry enrichment – Nano-technology.

Unit IV – Plant ideotypes and yield maximization

Plant ideotypes – Concept of potential yield - High Yielding Varieties (HYV) - Stability in yield – Yield maximization - Interaction of inputs on growth and yield attributes of crops - plant growth regulators.

Unit V - Remote sensing and precision agriculture

Precision agriculture - concepts and approach - remote sensing- GIS, GPS, VAT based precision farming - Yield mapping with remote sensing for precision agriculture - Use of hyperspectral data and GI based nutrient delivery systems in precision agriculture - Information technology - GPS and Drone technology.

Theory Lecture schedule

1. Population, food requirement and agronomic techniques for food security, basic concepts in growth and growth analysis, growth curves.
2. Analysis of crop growth: LAI, CGR, RGR, NAR and LAD. Effect of climate change on crop production and climate resilient crops.
3. Physiological basis for crop yield differences.
4. Assimilation - respiration and photorespiration.
5. Agro biodiversity.
6. Stress physiology-crop response to abiotic and biotic stresses.
7. Ecological risk assessment for innovations in crop production.
8. Modern concepts in tillage - zero, minimum and conservation tillage.

9. Seed priming– concept, importance and use in crop production. Plant population and crop geometry in relation to soil fertility.

10. Solar radiation and available moisture regimes.
11. Farm mechanization.
12. Biotechnology in Agriculture -GM crops- Eco restoration.
13. Role of Indigenous Technological Knowledge (ITK) in sustainable agriculture.
14. Integrated Natural Resource Management (INRM).
15. Balanced nutrition-Integrated nutrient supply system (IPNS).
16. Improved crop nutrition practices- Soil Health Care (SHC).
17. Efficient Post Harvest Management (EPHM).
18. Mid semester examination
19. Organic Farming - principles and components of organic farming.
20. Ever green revolution-sustainable agriculture-vermi-technology.
21. Resource conservation technology- Agro-forestry enrichment.
22. Nano-technology and its applications in agriculture.
23. Concept of potential yield- High Yield Varieties (HYV).
24. Yield maximization- stability and high yielding varieties.
25. Concept of ideal plant type and crop modeling for desired crop yield.
26. Interaction of inputs on growth and yield attributes of crops.
27. Plant growth regulators and growth retardants.
28. Precision agriculture- definition, basic concepts, scope and approaches.
29. Remote sensing in precision farming.
30. GIS, GPS, VAT based precision farming.
31. Yield mapping with remote sensing for precision agriculture.
32. Use of hyperspectral data and mapping techniques for precision farming.
33. GI based nutrient delivery systems in precision agriculture.
34. Information technology- GPS and Drone technology.

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4. Palaniappan, SP and Sivaraman, K. 2006. Cropping system in the tropic, principles and management. New Age International (P) Ltd., New Delhi.
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2. http://www.ifad.org/pub/enviorn/EnvironENG.pdf
3. http://www.nabuur.com/files/attach/2008/07/task/doc_471edf36a1483

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4. o.org/docrep/fao/010/a0869t/a0869t04.pdf

AGR 612 - PRINCIPLES AND PRACTICES OF WEED MANAGEMENT (2 + 1)

Objectives

To offer an exposure with the concepts and principles of weed management and to equip the students with scientific advancements in the field of weed science.

Unit I - Weed Biology and Ecology

Weeds – definition and concepts – characteristics - classification – economic uses of weeds and losses caused by weeds. Weed seed dissemination – dormancy and germination. Perennation of weeds. Crop – weed interactions – competition – allelopathy.

Unit II - Weed Control Principles

Methods of weed control – preventive and curative. Mechanical, cultural, biological and chemical control of weeds. Integrated Weed Management - Control of aquatic, parasitic and problematic weeds. Control of weeds in field crops, cropping systems and non-cropped areas - Efficiency indices of weed management techniques. Cost benefit analysis of weed management.

Unit III - Herbicide physiology

Herbicides - Introduction and history of their development; Classification of herbicides based on application, chemical and physiological - Herbicide structure - activity relationship - factors affecting the efficiency of herbicide - Herbicide formulation - components and adjuvants. Herbicide mixtures - herbicide rotation - herbicide interaction with other inputs. Mode of action of herbicides – absorption, translocation and mechanism of action of herbicides. Herbicide persistence in soil and plant – Herbicide application techniques – equipments.

Unit IV - Selectivity, safety and compatibility of herbicides

Basis for herbicide selectivity – metabolism of herbicide – carry over effect – Herbicide residue management. Herbicide toxicology and regulatory aspects. Compatibility of herbicide with other agrochemicals. Decision Support System for weed management.

Unit V - Biotechnology in weed management

Herbicide resistance in weeds and crops – Herbicide resistance management. Weed shift and invasive alien species – Weed Risk Assessment (WRA). Bio control of weeds using plant products, insects and fungi.

Practical

Collection and identification of weeds associated in different ecological situations – Weed survey in crops and cropping systems – Preparation of weed herbarium – Weed seed characters – implements used for weed control – Classification, identification and study of characteristics of important herbicides – Herbicide spraying equipments – formulation of herbicides - Economics of
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herbicides application – Herbicides residue determination – Bio-assay – Weed control indices – complimentary weed control – Bioagents and natural products for weed control – Weed research methodology- Phytotoxic injury of herbicides.

Theory Lecture Schedule

1. Definition – characteristics and classification of weeds.
2. Losses caused by weeds on crops, aquatic ecosystem and non cropped field and economic values of weeds.

3. Survival mechanism of weeds – Biology of weeds, Weed migration, Weed seed distribution in different ecosystems.
4. Weed seed dormancy, germination, establishment and perennation of weeds in different ecosystems.
5. Crop - weed competition.
6. Allelopathy – concepts, allelochemicals, ways of releasing, types, stimulatory effects and use of allelopathy in agriculture.
7. Principles of weed management- preventive measures.
8. Cultural methods of weed management.
9. Mechanical methods of weed management.
10. Biological method of weed control, bio-herbicides, mycoherbicides and allelochemicals.
11. Integrated weed management in major field crops.
12. Management of perennial, noxious and problematic weeds.
13. Management of parasitic and aquatic weeds.
14. Weed management in different cropping systems.
15. Weed management in non-cropped areas
16. Evaluation of efficiency indices of weed management
17. Cost-benefit analysis of integrated weed management in different ecosystems.
18. Mid semester examination
19. History and development of herbicides.
20. Classification and characteristics of herbicides.
21. Herbicide formulations and its suitability.
22. Herbicides and herbicide mixtures and their compatibility and efficiency.
23. Adjuvants, herbicide protectants and antidotes.
24. Low dose herbicides and nano herbicides.
25. Mode of action of herbicides and their selectivity.
26. Herbicide persistence and degradation in plants and soils. Herbicide residues and their management.
27. Herbicide rotation and its significance on weed management.
28. Herbicide application techniques and equipment.
29. Herbicide selectivity and compatibility.
30. Herbicide toxicology. Herbicide registration and regulation - Decision support system.
31. Herbicide resistant weeds and their impact on weed management.
32. Development of transgenic herbicide resistant crops.
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33. Weed shift and Invasive alien species.
34. WRA, natural products and biotechnology in weed management.

Practical Schedule

1. Identification, characterization and classification of terrestrial weeds.
2. Identification, characterization and classification of aquatic weeds.
3. Phytosociological survey of weeds.
4. Assessment of weed seed bank and seed production potential of weeds.
5. Working out herbicides and spray fluid requirements.
6. Herbicide application techniques and equipment.
7. Use of herbicides with different formulations in the field to various crops.

8. Working out economics of herbicide application.
9. Working out weed control efficiencies of different weed management practices.
10. Study on the influence of herbicides on soil microflora.
11. Study on complementary weed control through cultural practices like mulching and intercropping.
12. Identification and use of bioagents for weed control.
13. Identification and use of natural products for weed control.
14. Methodology for weed research – competition studies and control.
15. Scoring for phyto-toxic injury of herbicides and bioassay of herbicide residues.
16. Studies and analysis of herbicide residue with Gas chromatography, HPLC etc.
17. Weed management for different farming systems and crops.

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4. https://www.ipm.iastate.edu>files>
5. www.dwr.org.in > Downloads>weed identification

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AGR 613 - AGRO METEOROLOGY AND CROP WEATHER FORECASTING (2+1)

Objective

To impart knowledge about agro-meteorology and crop weather forecasting to meet the challenges of aberrant weather conditions.

Theory

Unit I - Introduction to agro meteorology

Agro meteorology - aim, scope and development in relation to crop environment. Branches of meteorology, Status of meteorology and agricultural meteorology in India- Composition of atmosphere, distribution of atmospheric pressure and wind.

Unit II - Solar radiation and rainfall

Characteristics of solar radiation - energy balance of atmosphere system - radiation distribution in plant canopies, energy budget of plant canopies -

photosynthesis and radiation utilization efficiency by field crops - Rainfall, rainfall variation and its effect on crop production.

Unit III - Temperature and relative humidity

Temperature profile in air, soil, crop canopies – Influence of soil and air temperature on plant processes - atmospheric moisture and relative humidity, vapor pressure and their relationships for better crop production - evaporation and evapo-transpiration and meteorological factors determining evapo-transpiration.

Unit IV - Monsoons

Modification of plant environment in open and controlled conditions - artificial rain making: heat transfer, controlling heat load, heat trapping and shading - protection from cold, sensible and latent heat flux, controlling soil moisture - monsoon and their origin, characteristics of monsoon - onset, progress and withdrawal of monsoon. Weather hazards, drought monitoring and planning for mitigation. Principles and systems of climatic classification, different types of clouds and micro-climatology.

Unit V - Weather forecasting

Weather forecasting in India - short, medium and long range; meteorological service organizations - benefits of weather services to agriculture. Remote sensing application in agro-meteorology and its present status in India. Forecasting of destructive frost, soil moisture forecast, phenological stages and crop yield. Crop yield forecasting and its implications in policy decision. Atmospheric pollution and its effect on climate and crop production; climate change, climate variability and its impact on agriculture - green house effect, carbon sequestration and carbon trading. Crop weather modeling , weather in relation to pest and disease management. Crop weather calendar.

Practical

Visit to agro-meteorological observatory and to record sun-shine hours, wind velocity, wind direction, relative humidity, soil and air temperature, evaporation, precipitation and atmospheric pressure. Measurement of solar radiation outside and within plant canopy. Measurement/estimation of evapo-transpiration by various methods. Measurement/estimation of soil water balance. Rainfall variability analysis. Determination of heat - unit requirement for different crops. Measurement of crop canopy temperature. Measurement of soil temperatures at different depths.

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Remote sensing and familiarization with agro-advisory service bulletins. Study of synoptic charts and weather reports, working principle of Automatic Weather Station (AWS). Verification of forecast products.

Theory Lecture Schedule

1. Agro meteorology- aim, scope and development in relation to crop environment.
2. Composition of atmosphere.
3. Distribution of atmospheric pressure and wind.
4. Solar radiation – characteristics.
5. Energy balance of atmospheric system.
6. Radiation distribution in plant canopies, radiation utilization by field crops.
7. Photosynthesis and efficiency of radiation utilization by crops.
8. Energy budget of plant canopies.

9. Environmental temperature – soil, air, canopy temperature.
10. Environmental temperature - Temperature profile in air, soil, crop canopies.
11. Soil and air temperature effects on plant processes.
12. Regulation of air, soil temperature for protection against frost and hot winds
13. Environmental moisture and evaporation – measures of atmospheric moisture, temperature.
14. Environmental moisture and evaporation - measures of relative humidity, vapour pressure and their relationship.
15. Evapotranspiration and meteorological factors deciding evapotranspiration.
16. Modification of plant environment.
17. Artificial rain making.
18. Mid-semester examination
19. Controlling heat load, heat trapping and shading.
20. Protection from cold , reduction in sensible and latent heat flux.
21. Monsoon and their origin, characteristics of monsoon.
22. Onset, progress and withdrawal of monsoon.
23. Weather forecasting in India: short, medium and long range forecasting.
24. Benefits of weather services to agriculture.
25. Forecasting of destructive frost and soil moisture.
26. Phonological forecast, crop yield forecast etc.
27. Aero space science and remote sensing – application in agriculture, present status of remote sensing in India.
28. Atmospheric pollution and its effects on climate and crop production.
29. Climate change, climate variability and its impact on agriculture.
30. Green house effect.
31. Carbon sequestration and carbon trading.
32. Crop weather modeling.
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33. Weather in relation to pest and diseases.
34. Crop weather calendar.

Practical Schedule

1. Visit to agro-meteorological observatory
2. Measurement of air, soil temperature and grass minimum temperature and drawing isoline for weather interpretation
3. Measurement of sunshine hours and solar radiation outside and within plant canopy
4. Humidity measurements – use of wet and dry bulb, Assmann psychrometer
5. Measurement of wind direction and wind speed
6. Measurement of rainfall - Ordinary and self-recording rain gauges and Dew - dew gauge
7. Measurement of atmospheric pressure - barograph
8. Measurement of Evaporation - Open pan evaporimeter- application of evaporation data
9. Measurement/estimation of evapo-transpiration by various methods

10. Measurement/estimation of soil water balance
11. Rainfall variability analysis
12. Determination of heat-unit requirement for different crops
13. Measurement of crop canopy temperature and soil temperatures at different depths
14. Remote sensing and familiarization with agro-advisory service bulletins
15. Study of synoptic charts and weather reports and preparation of crop weather calendar. Working principle of Automatic Weather Station (AWS)
16. Visit to nearby IMD station.
17. Weather forecasting

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2. http://www.fao.org/docrep/x5672e/x5672e09.htm
3. http://www.fao.org/nr/climpag/pub/Agricultural%20and %20Forest %20 Meteorology

AGR 614 - AGRONOMY OF CEREALS, PULSES, FODDERS AND GREEN MANURE CROPS (1+1)

Objective

To impart knowledge on agronomy of crops viz., cereals millets, pulses and fodder crops

Theory

Unit - I

Cereals – Rice, Maize, Wheat, Barley, Oats, Rye and Triticale

Unit - II

Millets - Sorghum, Cumbu, Finger Millet and Minor millets

Unit - III

Pulses – Pigeon pea, Green gram, Black gram, Chick pea, Cowpea, Soybean, Peas and Horse gram

Unit - IV

Fodders – Cereal, legume and tree fodder – Green manures : Daincha, Sunhemp, Sesbania, Glyricidia, Pillipesara and Cluster bean

Unit - V

Value addition - low cost technologies. Problems and prospects of cereals and pulse production-future thrust - physiological aspects of yield formation, approaches for breaking yield barrier and the role of agronomic practices.

Practical

Laying out observation plots with popular varieties of cereals, millets and pulses - observation on - phenological studies, intercultural operations at different crop growth stages in cereals - millets - pulses - working out growth indices (LAI, CGR, RGR, NAR, LAD). Estimation of quality parameters in cereals and pulse - Assessing of physiological maturity in cereals, millets and pulses - visit to field experiments on cultural, fertilizer, weed control and water management aspects in cereals and pulses - working out harvest index of major crops in cereals, millets and pulses - determination of cost of cultivation of major crops in cereals and pulses - study of seed production techniques in cereals, millets and pulse crops - Estimation of crop yield on the basis of yield attributes for major cereals and pulses - Observation of growth and yield parameters of green manures/ green leaf manures, area, production and its productivity - Silage and hay making – quality and preservation of fodder. Visit to crop research stations and farmer fields.

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Theory Lecture Schedule

Origin, history, area and production, classification, prominent and latest varieties, climate, soil, water and cultural requirements, cropping systems, nutrition and quality component, post harvest handling and processing , by-products, value addition and scope for mechanized cultivation. Recent advances in research on cereals, millets, pulses and fodder crops as follows

1. Rice.
2. Rice.
3. Maize.
4. Wheat.
5. Barley and Oats, Rye, Triticale.
6. Sorghum and Cumbu.
7. Finger millet and Minor millets.
8. Chick pea and Peas.
9. Mid semester examination
10. Horse gram and Pigeonpea.
11. Green gram and Blackgram .
12. Cowpea and Soybean.
13. Green manure and green leaf manures: Production technologies for Daincha, Sesbania, Sunnhemp, Tephrosia and Cluster bean and seed production techniques.
14. Forage crops : Scope and importance – definition of fodders and forages – classification – constraints in forage production – production technologies

for forage cereals – Sorghum, Maize, Oats and Pearl millet – Forage grasses Perennial grass - Cumbu Napier hybrid grass, Guinea grass, Para grass and Cenchrus – annual grasses – Deenanath, Marvel, Anjan and Setaria grass.

15. Legume forages – production technologies for Alfalfa, Cluster beans, Sweet clover, Desmanthus, Stylosanthus, Berseem, Cowpea and Minor legumes – Pillipesara and Siratro - Cutting management, nutritive and quality management – cropping system.

16. Tree – fodders – Agroforestry – Ley farming - quality characters of tree fodder - silvipastures - nutritive value and quality aspects of forage crops.

17. Present trends and future thrust in cereal and pulse production - Low cost and cost effective technique in cereal production

Practical Schedule

1. Planning and layout of field experiments in cereals, millets and pulses.
2. Sowing of certain crops for observations on growth and yield parameters in sole and intercrop situations.
3. Practicing nursery field preparation for different crops.
4. Phenological studies, intercultural operations at different crop growth stages in cereals.
5. Phenological studies, intercultural operations at different crop growth stages in millets and pulses.

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6. Working out growth indices (LAI, CGR, RGR, NAR, LAD).
7. Assessing of physiological maturity in cereals, millets and pulses.
8. Working out harvest index of major crops in cereals, millets and pulses through estimation of yield parameters.
9. Working out cost of cultivation of major cereal, millet and pulse crops.
10. Study of seed production techniques in cereal, millet and pulse crops.
11. Study of seed production techniques in green manure and fodder crops
12. Estimation of crop yield on the basis of yield attributes for major cereals and pulses
13. Estimation of biomass and seed yield of green manures/ green leaf manures.
14. Practicing of silage and hay making.
15. Estimation of quality parameters in cereals, millets and pulses.
16. Insitu incorporation techniques for green manure crops in different farming systems.
17. Visit to nearby crop research stations and farmers field.

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AGR 621 - PRINCIPLES AND PRACTICES OF WATER MANAGEMENT (2+1)

Objective

To impart water management principles and practices to increase water use efficiency and enhance crop productivity.

Theory

Unit I - Water resources and irrigation development

History of irrigation in India - water resources of India and Tamil Nadu - Major and minor irrigation projects of India and Tamil Nadu - Scope for water conservation and storage in India and Tamil Nadu.

Unit II - Soil-water-plant relationship

Water and its properties - soil water concepts - classification of soil water - water movement in soils and plants - absorption and conductance by plants - soil moisture depth concepts.

Unit III - Crop water requirement and irrigation scheduling

Water Requirement (WR) of crops - factors affecting WR - methods of estimation of WR of crops - Gross and Net irrigation requirement concepts- scheduling irrigation based on different approaches - frequency of irrigation.

Unit IV - Methods of irrigation and water use efficiency

Irrigation methods - surface, sub-surface and pressurized systems - suitability of crops - Design and layout of irrigation systems - WUE - methods to improve WUE - units of expression.

Unit V - Integrated water management

Water management for different crops under excess water and deficit conditions - understanding quality parameters of irrigation water and its management by agronomic practices, management of problems soils - drainage methods.

Practical

Analysis of quality of irrigation water for important salts, determination of soil water constants, estimation of basic and cumulative infiltration rate of different

soils, determination of hydraulic conductivity, soil moisture estimation by gravimetric and improved devices, working out irrigation efficiency parameters, calculations on fertigation, working out economics of different method of irrigation and visit to important institutes of irrigation.

Lecture schedule

1. History of irrigation - water resources of India and Tamil Nadu - occurrence of ground water – aquifers.
2. Major and minor irrigation projects of India and Tamil Nadu
3. Scope for water conservation and storage in Indian and Tamil Nadu.
4. Water, its properties and role in plants.
5. Soil water potential concepts.
6. Relationship between different potentials-units of expression.
7. Factors influencing Soil water potential.
8. Physical classification of water.
9. Soil moisture constants - ASM - RAW and MAD concepts - response of various soil types.

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10. Soil water movement - mechanisms of absorption and conductance in plants - factors responsible.
11. Effective root zone depth - Moisture extraction pattern.
12. Loss of water from soil and plant - evaporation – transpiration.
13. Evapotranspiration - factors affecting ET.
14. Water needs of crops - NIR, GIR, NWIR, GWIR concepts.
15. Factors affecting WR of crops.
16. Methods of estimating WR of crops.
17. Scheduling of irrigation by various approaches - ETO - ETC - KC factors.
18. Mid semester examination
19. Methods of irrigation - surface - sub surface - advantages and shortcomings - suitable crops.
20. Pressurized systems - advantages and shortcomings - suitable crops.
21. Fertigation - concepts - suitable fertilizers and crops - advantages and limitations.
22. WUE - factors affecting.
23. Agronomic management practices to increase WUE.
24. Water management for crops and cropping systems.
25. Soil moisture stress - symptoms - plant response to water stress.
26. Crop adaptation mechanisms - and practices to overcome soil moisture stress.
27. Management of water under constraint situation.
28. Command area development and on farm water management practices.
29. Quality of irrigation water - criteria for determination.
30. Influence of quality irrigation water on plant growth - tolerant crops.
31. Management of saline and brackish water.
32. Water management of problem soils.
33. Excess soil water - factors responsible for water stagnation - remedial measures.
34. Drainage methods - concepts, design, layout and spacing.

Practical schedule

1. Determination of soluble salts and Ca2+, Mg2+ in irrigation water.
2. Determination of CO3- and HCO3- and Na in irrigation water.
3. Estimation of soil moisture constants for light soils.
4. Estimation of soil moisture constants for heavy soils.
5. Standardizing soil moisture curves using different devices viz, tensiometer, pressure plate apparatus.
6. Water flow measurement using different devices at field level.
7. Determination of infiltration rate of soil.
8. Determination of hydraulic conductivity of soil.
9. Determination of soil moisture depletion.
10. Assessment of plant water status - RWC by direct method.
11. Determination of irrigation requirement of crops.
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12. Computation of water requirement of important crops using modified Penman method.
13. Working out various irrigation efficiencies using formulae.
14. Calculation on fertigation for important crops based on its water requirement.
15. Economics of various irrigation systems.
16. Field drainage.
17. Visit to important irrigation institutions.

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AGR 622 - PRINCIPLES AND PRACTICES OF SOIL FERTILITY AND NUTRIENT MANAGEMENT (2+1)

Objective

To impart knowledge of fertilizers and manures as sources of plant nutrients and appraise about the integrated approach of plant nutrition and sustainability of soil fertility.

Theory

Unit I - Soil fertility and productivity

Soil - origin, formation, dispersion – retundant – features of good soil management. Soil health- Problem of supply and availability of nutrients - relationship between nutrient supply and crop growth. Soils of India - soil fertility and productivity – definition and importance.

Unit II – Essentiality of plant nutrients

Mineral nutrition of plants – criteria of essentiality of nutrients - essential plant nutrients – their functions, nutrient deficiency symptoms, nutrient movement and uptake - major plant nutrients in soil and plant. Soil pHand CEC – importance of plant nutrients and its availability - IPNS - importance and essentiality - Problem soils and their management.

Unit III – Nutrient budgeting

Methodologies for soil fertility assessment - approaches for fertilizer scheduling – significance - CNC, CNR, DRIS, inverse yield nitrogen law - Mitscherlich yield equation, its interpretation and applicability – Baule Unit and crop logging - Maintenance of soil fertility - Determining the nutrient needs for yield potentiality of crops – Concept of balanced nutrition – INM. IPNSS - Recycling of organic wastes and residue management.

Unit IV – Fertilizer and fertilization

Commercial fertilizers - solid and liquid composition– fertilizer mixture and grades –crop response to different nutrients - residual effects and fertilizer use efficiency - different methods of estimating and increasing FUE - nutrient availability– soil moisture and nutrient interaction.

Unit V – Methods of fertilization

Time and methods of manures and fertilizers application; foliar application and its concept - fertigation - soluble nutrients - chelated nutrients- fertilizer related environmental and ground water pollution - carbon sequestration.

Practical

Determination of soil pH, EC, organic C, total N, available N, P, K and S in soils. Determination of total N, P, K and S in plants. Interpretation of interaction effects and computation of economic and yield optima. Nutrient budgeting. Diagnosis of nutrient deficiencies and remedial measures.

Theory Lecture Schedule

1. Soil: orgin, formation, dispersion- factors influencing soil formation.
2. Physico- chemical properties of the soil.
3. Problems of supply and availability of nutrients and features of good soil

management.
4. Factors influencing nutrient supply and crop growth.
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5. Different soils of India- characteristics and functions
6. Soil fertility and crop productivity- definition and concepts-Agronomic significance for sustainable crop production.
7. Availability of plant nutrients in soil - micro and macro nutrients - criteria of essentiality of nutrients.
8. Essential plant nutrients – their functions- macronutrients – N, P, K.
9. Essential plant nutrients – their functions – secondary and micronutrients.
10. Identification of nutrient deficiency and its symptoms – critical levels.
11. Transformation and dynamics of plant nutrients – nitrogen.
12. Transformation and dynamics of phosphorus and potassium.
13. Soil pHand CEC – Importance in availability of plant nutrients.
14. IPNS- importance and essentiality - crops and cropping system.
15. Soil health and its importance.
16. Problem soils and their management.
17. Methodologies for soil fertility assessment - approaches for fertilizer scheduling.
18. Mid semester examination
19. CNC, CNR, DRIS - significance - crop logging.
20. Composting techniques-composition, C: N ratio-availability and crop response.
21. Recycling of organic wastes and residue management.
22. Organic farming - basic concepts and definitions - organic farming in crops and cropping system.
23. Commercial fertilizers - solid and liquid composition – relative fertilizer value and cost.
24. Crop response to different nutrients.
25. Residual effects and fertilizer use efficiency
26. FUE-Agronomic, chemical and physiological methods of estimating FUE.
27. FUE-Techniques for increasing FUE.
28. Fertilizer mixtures and grades – their composition- uses.
29. Nutrient availability – soil moisture and nutrient interaction.
30. Time and methods of manures and fertilizer application - Foliar nutrition-application and its concept - uses.
31. Fertigation - soluble and chelated nutrients - application, concept - uses.
32. Fertilizer related environmental and ground water pollution.
33. Nutrient budgeting-imbalances - concepts – crops and cropping system.
34. Carbon sequestration - concepts – essentiality - different methods.

Practical Schedule

1. Collection of soil and plant samples for analysis.
2. Estimation of pH, EC in soils.
3. Determination of organic carbon of soil.
4. Determination of total N of soil.
5. Determination of available N in soil.
6. Determination of available P2O5 in soil.
7. Determination of available K2O in soil.

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8. Determination of available sulphur in soil.
9. Working out C: N ratio and fertilizer schedule for different cropping systems.
10. Determination of total N in plants.
11. Determination of total P plants.
12. Determination of total K plants
13. Interpretation of interaction effects.
14. Computation of economic and yield optima.
15. Nutrient budgeting.
16. Diagnosis of nutrient deficiencies for major nutrients and remedial measures.
17. Diagnosis of nutrient deficiencies for minor nutrients and remedial measures.

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AGR 623 - AGRONOMY OF OILSEED, FIBRE, SUGAR, TUBER AND NARCOTIC CROPS (1+1)

Objective

To impart knowledge on agronomy of crops viz., oilseed, fibre, sugar, narcotics and tuber crops.

Theory

Origin, history, area and production, classification, prominent and latest varieties, climate, soil, water and cultural requirements, nutrition and quality component, post harvest handling and processing , by-products, value addition and scope for mechanized cultivation - recent advances in research on commercial crops.

Unit - I

Major Oilseeds: Groundnut, Sesame, Coconut, Rapeseed and Mustard

Unit - II

Minor Oilseeds : Sunflower, Safflower, Linseed, Niger, Castor, and Jatropha

Unit - III

Fibre crops : Cotton, Jute, Sunhemp, Mesta and Agave

Unit - IV

Sugar crops: Sugarcane, Sugar beet and Sweet sorghum

Unit - V

Tuber and narcotic crops : Tapioca, Sweet potato, Potato and Tobacco

Practical

Identification of latest crop varieties - Establishing crop cafeteria plots - phenological study of different crops- seed and sett treatment methods - Nursery management for crops - input application to different crops - Determination of oil content in oilseeds and computation of oil yield – practice on sugarcane cultivation from nursery to harvest – quality parameters of sugarcane juice – Assessing maturity of crops - Harvest index - Intercultural operations in different crops - Working out canopy measurement and growth indices (LAI, CGR, RGR, NAR, LAD) - Working out cost of cultivation of different crops - Estimation of crop yield on the basis of yield attributes – Studies on value addition of different oilseeds, fibres, sugars and tuber crops - Study of seed production techniques in various crops - Visit to field experiments, Farmer's fields/ Research institutes.

Theory Lecture Schedule

Origin, history, area and production, classification, prominent and latest varieties, climate, soil, water and cultural requirements, cropping systems, nutrition and quality component, post harvest handling and processing , by-products, value addition and scope for mechanized cultivation. Recent advances in research on commercial crops for the following crops:

1. Oilseeds : Introduction -constraints in oil seed production and measures to improve productivity
2. Groundnut
3. Sesamum
4. Rapeseed and mustard
5. Coconut
6. Sunflower and safflower
7. Linseed, Niger, castor and Jatropha
8. Introduction and economic importance and role of fibre crops -Area, production, productivity, - classification - Demand, supply and marketability of fibre crops
9. Mid semester examination
10. Cotton
11. Jute, Mesta, Sunnhemp and Agave
12. Sugarcane: Ruling varieties – nursery techniques – SSI – methods of planting – after cultivation practices- weed management and irrigation.
13. Sugarcane, crop logging, cane ripeners, Sugarcane based cropping system, Harvesting and scope for mechanized cultivation and ratoon management techniques

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14. Sugar beet and Sweet sorghum.
15. Tapioca
16. Potato and Sweet potato
17. Tobacco

Practical schedule

1. Planning and layout of field experiments.
2. Sowing of certain crops for observation on growth and yield parameters.
3. Study of seed treatment and nursery management for different crops.
4. Study of phenology and growth characters in groundnut, sesame and sunflower.
5. Study of phenology and growth characters in sugarcane and cotton.
6. Cutting of sugarcane setts, its treatment, methods of planting .
7. On plant inter-cultivation technologies in sugarcane.
8. Determination of cane maturity, calculation on purity percentage, recovery percentage and sucrose content in cane juice, at different growth stages of crop
9. Working out growth indices (LAI, CGR, RGR, NAR, LAD).
10. Judging of physiological maturity in different crops and working out harvest index.
11. Working out cost of cultivation of different crops with intercropping situations.
12. Estimation of crop yield on the basis of yield attributes and Harvest index (HI).
13. Determination of oil content in oilseeds and computation of oil yield.
14. Estimation of quality of fibre for different fibre crops.
15. Study of seed production techniques in various crops.
16. Studies on value addition of different oilseeds, fibres, sugars and tuber crops
17. Visit to field experiments/Research stations/farmers field to acquire practical knowledge on cultural, fertilizer, weed control and water management aspects.

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AGR 624 - FARMING SYSTEMS FOR SUSTAINABLE AGRICULTURE (1 +1)

Objective

To offer an understanding on cropping and farming system as a tool for enhancing farm productivity and to incorporate scientific principles of sustainability in low input farming.

Unit I - Farming system

Farming system - integrated farming system, alternate farming system - meaning and scope - recycling and crop residue management - natural farming - concept and components - Organic farming - Crop diversification – principles, types and needs - sustainable agriculture - definition, scope and objectives - Socio-economic constraints in adoption of systems approach - location specific IFS models - Crop diversification for sustainability.

Unit II - Cropping system

Cropping system – Definition – scope and importance – intensive agriculture – principles – ecological interactions among crop communities – competition, annidation and allelopathy – resource competition and management in cropping systems. Types of multiple cropping – sequential, relay, inter, mixed and multi-storied - evaluation indices for farming and cropping systems

Unit III - Dryland farming

Definition, concept, significance and dimensions of dryland farming in Indian agriculture, characteristics and classification of dryland farming - delineation of dry farming areas on the basis of moisture deficit index and their characteristics - constraints limiting crop production in dry land areas; drought management strategies – contingency crop planning for aberrant weather conditions - dry land crop production technologies for sustainable agriculture.

Unit IV - Sustainability through systems Approach

Sustainability concepts in cropping and farming systems – Development, management and allocation of resources – low input sustainable agriculture – 1190

Water harvesting- its concepts, techniques and practices - Watershed management-definition, objectives, concepts, problems, approach for sustainable farming - Natural resources - characterization and management for crop planning - Sustainable cropping and farming systems in agriculture in relation to environmental degradation - alternate land use pattern.

Unit V - Farming for environmental conservation

Impact of agro inputs – biotechnology – GMO's and invasive alien species on farm productivity. Environmental pollutants abatement and farming – Restoration of degraded and wastelands – WTO - Farming systems and agro industries, value addition in farm products - Bioremediation and Bio-scavenging.

Practical

Preparation of cropping scheme for different agroclimatic zones – Designing of cropping system based on rainfall analysis – working out input requirement for crops, cropping systems – preparation of calendar of operation for wetland, irrigated upland and dry land cropping system – working out indices for evaluation of cropping system – study on evaluation indicators on farming system – preparation of integrated farming system models for different eco – systems – on farm field visit – analysis of farming system models.

Theory Lecture Schedule

1. Scope of Farming systems and factors influencing the choice of component elements.
2. Integrated Farming Systems – prospects, constraints, resource recycling and crop residue management.
3. Alternate farming system - natural farming - organic farming - definition, scope, objectives, concept and components.
4. Multiple cropping and crop diversification – scope and importance of cropping system and intensive agriculture.
5. Plant interactions – Competition, annidation and allelopathy / teletoxicity.
6. Evaluation of farming and cropping systems based on various indices .
7. Socio- economic constraints for adoption of cropping systems.
8. Resource management and crop planning - Alternate land use systems.
9. Mid semester examination
10. Dry land farming - definition, concept, significance and dimensions of dryland farming in Indian agriculture, and characteristics and classification of dryland farming.
11. Delineation of dry farming areas on the basis of drought indices and their characteristics and constraints limiting crop production in dry land areas.
12. Drought management strategies, contingency crop planning and preparation of crop plans for dry land areas.
13. Dry land crop production technologies for sustainable agriculture.
14. Inputs management and cost reduction strategies for sustainable agriculture.
15. Watershed management and water harvesting- its concepts, techniques.
16. Biotechnology – GMO's and invasive alien species on farm productivity.
17. Restoration of degraded and wastelands and bioremediation and Bio-scavenging

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Practical Schedule

1. Preparation of cropping scheme for different agro climatic zones.
2. Review of cropping system experiments in India and Tamilnadu.
3. Study on Indices for biological and economic evaluation of cropping system.
4. Assessing risks and opportunities with component elements dairy, fishery, poultry, goat rearing, piggery etc.
5. Formulation of Integrated Farming Systems for wetlands.
6. Formulation of Integrated Farming Systems for garden land and dry lands.
7. Assessment of Organic recycling in Integrated Farming Systems.
8. Tracing the role of farming elements in reducing inputs and agrochemical use.
9. Preparation of cropping scheme for different farming systems and working out input requirement.
10. Calendar of operations for wet land and irrigated upland cropping system.

11. Working out indices for evaluating the farming and cropping system - land use, yield advantage, Economics, sustainability.
12. Analysis and interpretation of weather data – initial and conditional probabilities.
13. Working out moisture availability index based on rainfall and ET.
14. Determination of Agricultural drought.
15. Designing of cropping system based on rainfall analysis.
16. Visit to watershed and study of various technologies.
17. Visit to dry land agricultural research stations.

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MINOR COURSES OFFERED BY DEPARTMENT OF AGRONOMY

OPC - AGR 711 - ORGANIC FARMING AND PRECISION AGRICULTURE (2+1)

Objectives

To impart knowledge on the concepts and importance of organic agriculture, precision agriculture and to equip the students with geostatistical techniques and variable crop yield mapping.

Theory

Unit I - Importance of Organic farming

Organic farming – current status of organic farming in India and Tamil Nadu – Potential resources for nutrient supply in organic farming – Prospects and
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limitations of organic farming in field and horticultural crops - ITK in organic agriculture

Unit II - Soil health and organic certification

Organic farming in relation to soil health and quality organic farming in relation to insect and disease management – organic manures, bio-fertilizers, blue green algae and vermicompost in organic farming - Trade, industry and certification in organic farming – certification standards - Procedures and regulatory mechanisms in organic agriculture – Government policies towards research and development of organic farming in India.

Unit III - Precision farming

Precision farming – concept and approach – Application of precision concept in INM of field crops – Land information for precision agriculture – Remote sensing – GIS and GPS – VAT based precision farming. Scope of precision farming in agriculture, horticulture and plantation crops.

Unit IV - Yield mapping techniques

Potential and limitation of satellite remote sensing in precision agriculture – yield mapping with remote sensing for precision agriculture – precise water

management in agriculture using spatial hydrological methods and remote sensing – use of hyperspectral data for precision farming – soil survey and mapping techniques for precision farming.

Unit V - Application of GIS and decision support system tool

GIS based nutrient delivery systems – Development of sensors and their evaluation – remote sensing and GIS applications for management of land and water resources on watershed framework – Decision support system tool for impact assessment of saline and sodic environment – geo-statistical techniques for precision farming – Spatial and temporal variability of soil physical parameters – DSSAT for variable crop yield mapping – Farm machinery for precise input application.

Practical

Aerobic and anaerobic methods of making compost, making vermicompost – Efficient use of biofertilizers – techniques of treating legume seeds with Rhizobium cultures, use of Azotobacter, Azospirillum, and PSB cultures in field - Visit to an organic farm – bio – dynamic farm – Quality standards, inspection, certification and labeling and accreditation procedures for farm produce from organic farms. Visual image interpretation, Spectral Indices, Thermal indices derived from remote sensing data, Spectroradiometer data analysis, IR thermometer principles and working, Map projection system. Digital image processing, ERDAS imaging, ARC view, Satellites, Sensors and platforms, Satellite data acquisition and dissemination, Principles of crop modeling.

Theory lecture Schedule

1. Organic Farming – definition, concepts, prospects, opportunities and priorities.
2. Current status of Organic Farming in India and Tamil Nadu.
3. Resources for nutrient supply in organic farming – Bio and industrial wastes.

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4. Role of Indigenous technological knowledge (ITK) in organic agriculture.
5. Prospects and limitations of organic farming in field crops – Cereals, millets, and pulses.
6. Prospects and limitations of organic farming in field crops – Oilseeds and commercial crops.
7. Prospects of organic farming in agriculture and horticultural crops – Vegetables, fruits, spices and plantation crops.
8. Organic farming in relation to soil health and quality.
9. Organic farming in relation to insect and disease management.
10. Organic manures, bio-fertilizers, blue green algae and vermicompost for organic farming.
11. Government policies towards development of organic farming in India.
12. Trade, industry and certification in organic farming – Certification standards, procedures and regulatory mechanisms.
13. Precision farming – concept, approach and relevance to Indian Agriculture.
14. Application of precision concept in INM of field crops.
15. Precision agriculture and cropping system.
16. Soil and land information of precision agriculture.
17. Remote sensing – GIS and GPS – VAT based precision farming.

18. Mid Semester Examination.
19. Scope of precision farming in horticulture / plantation crops.
20. Potential and limitation of satellite remote sensing for precision farming.
21. Yield mapping with remote sensing for precision agriculture.
22. Precise water management in agriculture using spatial hydrological models and remote sensing.
23. Use of hyperspectral data for precision farming.
24. Soil survey and mapping techniques for precision farming.
25. GIS based nutrient delivery systems.
26. Development of sensors and their evaluation.
27. Remote sensing and GIS applications for management of land and water resources on watershed framework.
28. Decision support system tool for impact assessment of saline/sodic environment.
29. Geostatistical techniques for precision farming.
30. Spatial and temporal variability of soil physical parameters.
31. DSSAT for variable crop yield mapping.
32. Farm machinery for precise input application.
33. Precision farming in agroforestry.
34. Weather forecast – A decision tool for precision farming.

Practical Schedule

1. Practicing aerobic methods of making compost.
2. Practicing anaerobic methods of making compost.
3. Practicing vermicomposting methods.

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4. Techniques of treating legume seeds with Rhizobium cultures, use of Azotobacter, Azospirillum and PSB cultures in field.
5. Role of Indigenous Technological Knowledge (ITK) in weed, insect and disease management.
6. Visit to sugar industry to study the by-products composting.
7. Visit to an organic farm.
8. Visit to biodynamic farm.
9. Quality standards, inspection, certification and labelling and accreditation procedures for farm produce from organic farms.
10. Visual image interpretation, spectral indices, thermal indices derived from remote sensing data.
11. Spectro radiometer data analysis.
12. Study of IR thermometer principles and working.
13. Practicing map projection system.
14. Practicing digital image processing.
15. ERDAS imaging, ARC view, satellites.
16. Study of sensors and platforms.
17. Satellite data acquisition and dissemination and crop modeling studies.

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OPC - AGR 712 - DRY FARMING AND WATERSHED MANAGEMENT (2+1)

Objective

To impart scientific knowledge on concepts and practices of dry farming, soil moisture conservation and watershed management.

Theory

Unit I - Principles of dry land agriculture

Dry farming - Definition, concept, characteristics and classification - Significance and dimensions of dry farming in Indian agriculture - Production constraints in dry farming areas - Rainfall characterization in dry lands.

Unit II - Drought and mitigation strategies

Drought and its classification - Drought resistance in crops - Mechanism for drought tolerance and crop adaptability to drought situations - Drought tolerant crops and their varieties, plant ideotypes for dry land areas - ephemerals - shoot and root growth characteristics – preparation of appropriate crop plans for dry land areas - midseason correction for aberrant weather situation - contingent crop

planning .

Unit III - Soil moisture conservation techniques in drylands

Soil moisture conservation techniques - Agronomic, Engineering and Biological methods - Moisture retention and availability concepts - Length of Growing Period (LGP) - Water absorption by crop plants under stress conditions - Water loss through evaporation and transpiration and its management under stress conditions - effectiveness and economics - Management of soil constraints.

Unit IV - Approaches for Integrated dry farming technology

Agricultural implements and machineries for dry farming - Tillage - Soil and crop management techniques: seed hardening and efficient fertilizer use - Integrated dry farming technology - Cropping systems, integrated farming systems, organic farming and alternative land use systems.

Unit V - Watershed management

Watershed management - concepts, approaches and components - Water harvesting techniques - Scope and application - Rain water management in watershed - pre and post sowing conservation technologies - Role of organization in promoting watershed - Selection of crops and cropping systems based on rainfall 1196
and socio - economic factors – Land capability classification - Rehabilitation of degraded lands in watershed .

Practical

Mapping of arid and semiarid zones of India and agro - climatic zones of India and Tamil Nadu - study of moisture profiles of soils - Rainfall analysis and interpretation – Use of mulches and antitranspirants - seed hardening techniques - germination and crop establishment in relation to moisture stress – Estimation of moisture index, aridity index and Water-Use Efficiency - Plant root growth studies with reference to stress management - farm mechanization in dry farming - Collection and interpretation of data for water balance equations - Estimation of run-off and soil moisture loss - Crop planning for different drought conditions – Preparation of model watershed programme - Visit to dry farming research experiments / exposure visits to research institutes/ stations and watersheds.

Theory lecture schedule

1. Dry farming- Definition, concept, characteristics.
2. Dimensions of dry land farming in Indian agriculture.
3. Dry farming- classification - significance and dimensions of dry farming in India.
4. Production constraints in dry farming areas.
5. Rainfall characterization and behaviours.
6. Delineation of dry farming areas on the basis of drought indices and their characteristics.
7. Drought and its classification.
8. Drought management strategies and preparation of crop plans for dry land areas.
9. Dry land crop production technologies for sustainable agriculture.
10. Methods of controlling runoff and its significance.
11. Evaporation, evapo-transpiration, mulching, antitranspirants and antievaporants.
12. Drought resistance in crops - Mechanism for drought tolerance and crop

adaptability to drought situations.
13. Drought tolerant crops and their varieties.
14. Plant ideotypes for dryland areas - shoot and root growth characteristics.
15. Preparation of appropriate crop plans for dryland areas.
16. Midseason correction for aberrant weather situation.
17. Contingent crop planning to mitigate drought.
18. Mid-semester examination
19. Soil moisture conservation techniques - Agronomic, Engineering and Biological.
20. Moisture retention and availability concepts - Length of Growing Period (LGP) - Water absorption by crop plants under stress conditions.
21. Water loss through evaporation and transpiration and its management under stress conditions - effectiveness and economics- management of soil constraints.
1197
22. Agricultural implements and machineries for dry farming.
23. Tillage - Soil and crop management techniques - seed hardening and efficient fertilizer use.
24. Integrated dry farming technology - Cropping systems.
25. Integrated farming systems – significance - location specific IFS – models for wetlands, garden lands and drylands.
26. Organic farming and alternative land use systems.
27. Watershed management: Definition, concepts, problems, approaches and components of watershed.
28. Problems, approach components, development of cropping systems for watershed areas.
29. Resource management and crop planning – alternate land use pattern
30. Water harvesting techniques - Scope and application - Rain water management in watershed.
31. Pre and post sowing conservation technologies.
32. Role of organization in promoting watershed.
33. Selection of crops and cropping systems based on rainfall and socio economic factors.
34. Classification of land based on LCC and rehabilitation of degraded lands in watershed

Practical schedule

1. Mapping of arid and semiarid zones of Tamilnadu and India.
2. Study of moisture profiles of soils.
3. Rainfall analysis and interpretation.
4. Designing cropping systems based on rainfall analysis
5. Use of mulches and antitranspirants.
6. Seed treatment techniques –hardening, seed priming.
7. Estimation of moisture index, aridity index and water-use efficiency.
8. Plant root growth studies with reference to stress management.
9. Study of farm implements in dry farming.
10. Estimation of run-off and soil moisture loss.
11. Collection and interpretation of data for water balance equations.
12. Preparation and methodology for implementation of watershed projects.

13. Preparation of model watershed programme.
14. Visit to nearby watershed.
15. Visit to dry land agricultural and horticultural research stations.
16. Crop planning for different drought conditions.
17. Assessment of biomass production under watershed area.

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ANNEXURE III

M.SC (AG.) AGRICULTURAL EXTENSION

SEMESTER WISE DISTRIBUTION

S.No.	Course No.	Courses Credit	Hours
FIRST SEMESTER			
1.	AEX 611	Advances in Communication and Extension Management	2+1
2.	AEX 612	Programme Planning, Diffusion and Adoption of Innovations	2+1
3.	AEX 613	Cyber Extension for Farm Technologies	2+1
4.	STA 611	Statistics for Social Sciences	2+1
5.	COM 611	Computer Applications for Agrl. Research	1+1
6.	AEX 011	Research	0+1
7	PGS 611	Research Ethics (0+1)	-
8	PGS 612	Technical Writing and Communication Skills (0+1)	-
		Total	**9+6=15**
SECOND SEMESTER			
1.	AEX 621	Methods and Designs in Behavioural Science Research	2+1
2.	AEX 622	Perspectives of Human Resource Management	2+1
3.	AEX 623	Entrepreneurship Development and Management	2+1
4.	AEX 624	Gender Sensitization and empowerment	2+0
4.	OPC-AEC 621	Natural Resource and Environmental Economics	2 +1
5.	AEX -021	Research	0+2
6.	PGS 623	Laboratory Techniques for Audio and Video Production(0+1)	-
7.	PGS 624	Library and Information Services (0+1)	-
		Total	**10+6=16**
THIRD SEMESTER			
1.	OPC XXX 711	Minor Course - Related discipline	2+1
2.	OPC XXX 712	Minor Course - Related discipline	2+1
3.	AEX-031	Research	0+8
4.	AEX-032	Seminar	0+1
5.	PGS 715 **e-course**	Intellectual property and its management in agriculture (1+0)	-
6.	PGS 716 **e-course**	Disaster management (1+0)	-
		Total	**4+11 =15**

FOURTH SEMESTER			
1.	AEX 041	Research	0 + 9
		Total	**0 + 9**
		Grand Total	**23+32 = 55**

AEX 611 - ADVANCES IN COMMUNICATION AND EXTENSION MANAGEMENT (2 +1)

Objectives

• To understand various advances in agricultural communication
• To analyze the different extension communication methods
• To develop skills for using ICT tools in extension communication
• To understand various management techniques in extension organization

Theory

Unit I – COMMUNICATION

Communication – meaning - concept and definitions – characteristics, functions – types – elements – models and barriers in communication – credibility, fidelity, empathy and feedback in communication, agricultural communication – TOT, REC linkage, components, organizational communication - meaning and definition, characteristics, elements, models, need and importance– types of communication in organization –principles of communication - barriers to organizational communication.

Unit II - EXTENSION COMMUNICATION METHODS AND AUDIO VISUALS AIDS

Extension communication methods – meaning, types and classification. traditional media for communication in development programmes Radio, T.V and print media in communication. Audio visual aids – meaning and classification, selection, use and production, advances in audio – visual aids – LCD projector, interactive white board, multi-media projectors, digital photography and smart T.V.

Unit III – ICT IN EXTENSION

IT and ICT – concept, definition – unique features and need of ICT in agriculture Role and Scope of ICT in agricultural extension - Types of ICT tools – ICT for agriculture extension initiatives in India – National Policy on ICT in agricultural extension – success stories of ICT use in Rural India - barriers for agricultural extension initiatives -– Technology Parks - Extension next – social media in agricultural extension.

Unit IV – MANAGEMENT IN EXTENSION ORGANIZATION

Concept and principles of administration and management, schools of management thought – interpersonal and interpersonal communication skills, virtual organization, - personnel management - national institute of agricultural extension and management (MANAGE), NIRD & PR, EEI and NAARM. corporate management in agriculture sector – POSDCORB functions of management – planning, organizing, staffing, directing and leading, controlling, coordinating, reporting and budgeting. case studies and success stories in agricultural extension management.

Unit V – EXTENSION MANAGEMENT PRACTICES AND TECHNIQUES

Management by objectives (MBO) – Total Quality Management (TQM), Project

evaluation and review technique (PERT) – Critical Path Method (CPM) – Logical Frame working Analysis (LFA) – Project Management Techniques – Monitoring, evaluation and impact analysis of extension programmes - critical analysis of organizational set up of extension administration at various levels – Information Technology Parks – Management Information System – Management of Agricultural Knowledge Systems (MAKS).

Practical

Communication networks and communication methods followed in extension organization - communication pattern - business letters in corporate
1520
communication - advances in photography - e-resources – power point presentation - video conferencing - research project in agribusiness management - time management - organizational climate - corporate management practices.

Lecture Schedule

1. Communication – meaning, concept, definitions, credibility, fidelity, empathy and feedback in communication, characteristics
2. Different types communication, elements
3. Models in communication and barriers in Communication
4. Agricultural communication – TOT, REC linkage, components
5. Organizational communication - meaning and definition, characteristics, elements
6. Need and importance, Types of communication in organization
7. Principles and barriers in organizational communication
8. Extension communication methods – meaning, types and classification
9. Traditional media, Radio, Television and Print media use in communication
10. Audio visual aids – meaning and classification, selection, use and production
11. Advances in audio visual aids – LCD projector, interactive white board
12. Multi-media projector, digital photography and smart TV
13. IT and ICT – concept, definition – unique features and need of ICT in agriculture
14. Role and Scope of ICT in agricultural extension - Types of ICT tools
15. ICT for agricultural extension initiatives in India – National Policy on ICT in agricultural extension
16. Success stories of ICT use in Rural India
17. Mid Semester Examination
18. Impact of ICT for agricultural extension initiatives
19. Barriers for agricultural extension initiatives
20. Technology Parks - Extension next – social media in agricultural extension.
21. Concept and principles of administration and management
22. Schools of management thought, virtual organization.
23. Personnel management - Interpersonal and Interpersonal communication skills.
24. National Institute of Agricultural Extension and Management (MANAGE), NIRD & PR, EEI and NAARM.
25. Corporate management in agriculture sector
26. POSDCORB functions of management: planning, organizing, staffing, directing and leading

27. POSDCORB functions of management: controlling, coordinating, reporting and budgeting
28. Case studies and success stories in agricultural extension management
29. Management by objectives (MBO) and Total Quality Management(TQM)
30. Project evaluation and review technique (PERT) Critical Path Method (CPM) and Logical Frame Working (LFW)
1521
31. Project Management Techniques – Monitoring, evaluation and impact analysis of extension programmes
32. Critical analysis of organizational set up of extension administration at various levels
33. Information Technology Parks
34. Management Information System (MIS) and Management of Agricultural Knowledge Systems (MAKS).

Practical Schedule

1. Construction of questionnaire to study the communication networks and communication methods followed in extension organization
2. Studying about the communication pattern followed among the farm scientists of the KVK
3. Practicing skill to write business letters in corporate communication
4. Role playing to understand superior – subordinate relationship
5. Studying about the advances in photography at a digital studio
6. Studying about the Central Library to know about the e-resources
7. Preparation of power point slides
8. Practicing power point presentation
9. Participation and interaction through video conferencing
10. Studying about an E-Extension centre.
11. Studying about the Doordharsan Kendra, Puducherry.
12. Studying about the organizational climate at JDA office.
13. Studying about organizational climate at ADA office.
14. Stress management of agriculture extension personnel.
15. Conducting case studies on management information system of an NGO.
16. Practicing training game on time management to understand skills of productivity efficacy.
17. Studying about an agricultural corporate industry and its management practices.

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1522

AEX612 PROGRAMME PLANNING, DIFFUSION AND ADOPTION OF INNOVATIONS (2+1)

Objectives

• To learn about the principles and steps in programme planning and about development programmes for women and youth

• To learn about the various concepts related to diffusion and adoption of innovations.

• To understand the adoption process, stages of adoption and innovation decision process, adopter categories, opinion leaders, attributes of innovations and factors influencing adoption.

Theory

Unit I –PROGRAMME PLANNING AND DEVELOPMENT PROGRAMMES

Programme planning – Concept, meaning, definition, principles and theories of programme planning, Th eor etical models of programme planning. Steps in programme planning. Monitoring and evaluation –concept, significance, types, methods and tools. Analysis of ATMA, MGNREGA, Magalir Thittam and ARYA programmes.

Unit II - DIFFUSION AND ADOPTION OF INNOVATIONS

Diffusion – concept and meaning, elements, Innovation-development process, adoption for social change. The adoption process- concept and stages, dynamic nature of stages, covert and overt processes at stages. The innovation-decision process – Types of innovation - decisions – Optional, collective and authoritative and contingent innovation decisions; A critical appraisal of the new formulation. Models of diffusion and adoption.

Unit III - ADOPTER CATEGORIES AND RATE OF ADOPTION

Adopter categories – Innovativeness and adopter categories, adopter categories as ideal types, characteristics of adopter categories; Perceived attributes of Innovation and their rate of adoption, factors influencing rate of adoption- barriers in adoption process.

Unit IV - OPINION LEADERSHIP

Diffusion effect and concept of over adoption, opinion leadership- measurement and characteristics of opinion leaders, monomorphic and polymorphic opinion leadership, multi-step flow of innovation, concepts of homophily and heterophily and their influence on flow of innovations.

Unit V - CONSEQUENCES OF INNOVATIONS AND DECISION MAKING

Consequences of Innovation-Decisions – Desirable or Undesirable, direct or indirect, anticipated or unanticipated consequences; Decision making – meaning, nature, theories, process, steps, factors influencing decision – making.

Practical

Visit to study about the ongoing development programmes viz., ATMA, Magalir Thittam and ARYA programmes. Case studies of individual adoption process, Identification of adopter categories on a selected technology, study of attributes of

current farm technologies, Identification of opinion leaders, Sources of information utilized at different stages of adoption on a selected technology, study of factors increasing or retarding the rate of adoption, presentation of reports on adoption and diffusion of innovations.

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Lecture Schedule

1. Programme planning – Concept, meaning, definition, principles of programme planning and Steps in programme planning
2. Theories of programme planning, Th eor etical models of programme planning .
3. Monitoring and evaluation –Concept, significance, types, methods and tools
4. Analysis of ATMA, MGNREGA, Magalir Thittam and ARYA programmes.
5. Diffusion – Concept and meaning and elements of diffusion process
6. Innovation Development process and adoption for social change
7. Adoption meaning, definition and adoption process
8. & 9. Different stages of adoption: dynamic nature of stages, covert and overt processes
10. Innovation decision process
11. & 12 Types of innovation decisions-Optional, collective, authoritative and contingent innovation decisions
13. Critical appraisal of the new formulations and models of diffusion and adoption
14. & 15. Adopter categories: innovativeness and adopter categories, adopter categories as ideal type
16. Characteristics of adopter categories
17. Mid- Semester Examination
18. Attributes of innovation
19. Rate of adoption of innovation and barriers in adoption process
20. Factors influencing rate of adoption
21. Diffusion effect and concept of over adoption
22. Opinion leadership- Measurement and characteristics of opinion leaders
23. Monomorphic and polymorphic opinion leadership
24. Multi step flow of innovation
25. Concept of homophily and heterophily and their influence on flow of innovation
26. & 27. Consequences of innovation decisions-Desirable or undesirable, direct or indirect, anticipated or unanticipated consequences
28. & 29. Decision making-Meaning, definition and nature of decision making
30. Theories of decision making
31. & 32. Process and steps in decision making
33. & 34. Factors influencing decision making

Practical Schedule

1. Studying ongoing development programmes in a village.
2. Construction of an interview schedule to study about the different stages of diffusion of selected agricultural innovations and the information sources.
3. Visit to a village to collect data on different stages of diffusion of selected agricultural innovations and the information sources.

4. Tabulation of collected data.
1524
5. Analysis and Interpretation
6. Presentation of report.
7. Construction of an interview schedule to study about the extent of adoption of selected agricultural innovations and the reasons of non adoption.
8. Visit to a village to collect data on extent of adoption of selected agricultural innovations and the reasons of non adoption.
9. Tabulation of collected data.
10. Analysis and Interpretation.
11. Presentation of report.
12. Construction of an interview schedule to study about the different adopter categories.
13. Visit to a village to collect data on the different adopter categories.
14. Data analysis, interpretation and presentation.
15. Construction of an interview schedule to identify the opinion leaders.
16. Visit to a village for data collection to identify the opinion leaders.
17. Case studies of individual adoption process.

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AEX 613 – CYBER EXTENSION FOR FARM TECHNOLOGIES (2+1)

Objectives

• To acquaint the students with overall understanding of extent of utility and relevance of ICT in agriculture and allied sectors.
• To gain knowledge and skills in understanding the concepts of Information and communication technologies.
• To know how ICT tools can be used for various fields of extension education.
• To be familiar with various ICT projects which are successful in delivering the services to the agro-based clientele.

Theory

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Unit - I CONCEPT OF ICTs

ICTs - Concept, definition and role of ICT in agriculture and rural development. – Reorganizing the extension efforts using ICTs – advantages, limitations and opportunities – Networking system of information and challenges in the use of ICT.

Unit - II ICT TOOLS

ICT tools – print and electronic media – e-mail – Internet – use of mobile phony – web, tele and video conferencing – computer assisted instructions – touch screens – micro-computers – web technologies and information kiosks – e – learning – information resources, sharing and networking – Types of network – PAN, LAN, WAN, Internet, AGRINET, AKIS – Indian National Agricultural Research database.

Unit - III DIFFERENT APPROACHES AND METHODS OF ICTs

ICTs projects – case studies in India and world – Different approaches (models) to ICTs – Use of ICT in the field of extension – Expert systems on selected crops and enterprises – Self learning CDs on package of practices, diseases and pest management – Agricultural web sites and portals related to crop production and marketing etc., Crop doctor – Cloud based extension approaches – Blog extension practices –voice enabled extension services.

Unit - IV ICT IN AGRICULTURAL EXTENSION

Community Radio – Knowledge management – Multimedia and its uses – Online, Offline Extension – Knowledge centres – ICT Extension approaches – pre - requisites, information and science needs of farming community – Need integration – Human resource information Intermediaries – Basic e-extension training issues – ICT enabled extension pluralism – Emerging issues in ICT.

Unit - V ICT PROGRAMMES IN AGRICULTURAL EXTENSION

ICT programmes in agriculture, livestock and fisheries development – Problems and prospects of ICTs in agriculture, livestock and fisheries development – Digitisation – Simulation models – Utilization of Internet for promoting advanced agriculture, livestock and fisheries practices – Communication with rural, semi-urban and urban farmers and livestock owners.

Practical

Visit to various centers like Internet Centre, Innovation Centre, Department of Computer Engineering, Information Service centre, National Informatics Centre (NIC), Collectorate, KVK, Community Radio station, Village Knowledge Centre, Directorate of Agriculture, Veterinary institution, FM Radio, Kisan Call Centre, Publications, All India Radio, Doordarshan kendra, Computer hardware/software industry.

Lecture Schedule

1. ICTs - Concept, definition and role of ICT in agriculture and rural development
2. Reorganizing the extension efforts using ICTs
3. Advantages, limitations and opportunities of ICTs
4. Networking system of information and challenges in the use of ICT
5. ICT tools- print and electronic media, e-mail, Internet
6. Use of mobile phony, web, tele and video conferencing

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7. Computer-assisted instructions - touch screens, micro-computers, web technologies
8. Information kiosks and e-learning

9. Information resources, sharing and networking.
10. Types of network – PAN, LAN, WAN, Internet, AGRINET, AKIS, Indian National Agricultural Research database
11. ICTs projects, case studies in India
12. ICTs projects, case studies of the world.
13. Different approaches (models) to ICTs.
14. Use of ICT in the field of extension
15. Expert systems on selected crops and enterprises
16. Self-learning CDs on package of practices, diseases and pest management
17. Mid Semester Examination
18. Agricultural web sites and portals related to crop production and marketing, Crop doctor
19. Cloud based extension approaches
20. Blog extension practices and voice enabled extension services
21. Community Radio –operational guidelines and functions
22. Knowledge management through ICTs
23. Multimedia – Concept, content and creation, use of multimedia
24. Online (technology delivery) and Offline (technology dissemination) Extension
25. Knowledge centres
26. ICT Extension approaches-pre-requisites, information and science needs of farmers and livestock owners
27. Need integration
28. Human resource information intermediaries and basic e-extension training issues.
29. ICT enabled extension pluralism
30. Emerging issues in ICT
31. ICT programmes in agriculture, livestock and fisheries development.
32. Problems and prospects of ICTs in agriculture, livestock and fisheries development
33. Digitisation and simulation models.
34. Utilization of Internet for promoting advanced agriculture, livestock and fisheries practices; communication with rural, semi-urban and urban farmers and livestock owners.

Practical Schedule

1. Studying the Internet Centre - Central Library of the Annamalai University to study about different academic portals and websites
2. Studying the Internet Centre - Central Library of the Annamalai University to study about different agricultural portals and websites
3. Studying the Innovation Centre of the Annamalai University to study about data base management

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4. Studying the Department of Computer Engineering of the Annamalai University to study about the networking
5. Studying an Information Service centre for farmers
6. Studying the National Informatics Centre (NIC), at the Collectorate.
7. Studying the KVK to study about the mobile advisory services to farmers
8. Studying a Community Radio station

9. Studying a Village Knowledge Centre
10. Studying the Directorate of Agriculture to study about AGRISNET
11. Studying a veterinary institution to study about the use of ICT tools in livestock sector.
12. Studying FM Radio
13. Studying Kisan Call Centre,
14. Visit to a Publications, to study about the ICT tools used in print media
15. Visit to All India Radio, to study about the ICT tools used in electronic media
16. Visit to Doordarshan to study about the ICT tools used in electronic media
17. Visit to computer hardware/software industry.

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AEX 621 METHODS AND DESIGNS IN BEHAVIOURAL SCIENCE RESEARCH (2+1)

Objectives

• To gain knowledge and skills in methods of behavioural sciences research
• To help the students to learn the Statistical Package for Social Sciences (SPSS)
• To enable the students to choose appropriate statistics tools for data analysis.

Theory

Unit I – CONCEPT OF RESEARCH

Research – meaning, importance, characteristics. behavioural sciences research –meaning, concept, principles, approach and problems in behavioural sciences research. types and methods of research – fundamental, applied and

action research, exploratory, descriptive, diagnostic, evaluation, experimental, analytical, historical, survey and case study. Review of literature – need, search procedure, sources of literature, planning the review work. Research problem – selection and identification of research problem, factors and criteria in selection of research problem, statement of research problem and development of theoretical orientation of the research problem.

Unit II – HYPOTHESIS, RELIABILITY AND VALIDITY

Objectives – meaning, types and criteria for judging the objectives. concept and

construct – meaning, role of concepts in research. Variable – meaning, types and their role in research. hypothesis – meaning, importance, testing of hypothesis, types of hypothesis, Measurement – meaning, postulates and levels of measurement, use of appropriate statistics at different levels of measurement. Importance of measurement in research. Validity – meaning and methods of testing. Reliability – meaning and methods of testing.

Unit III – SAMPLING AND RESEARCH DESIGNS

Sampling – universe, sample and sampling- meaning, basis for sampling, advantages and limitations, size and factors affecting the size of the sample and sampling errors – methods of elimination and minimizing, MAX-MINCON principle, sampling – methods of sampling and sampling procedures. research designs – meaning, purpose and criteria for research design, concept, types, field studies, survey methods, advantages and limitations of each design. Experimental design, ex-post facto design – advantages and limitations.

Unit IV - DATA COLLECTION

Data collection methods - interview – meaning, purpose, types, techniques of interviewing and advantages and limitations. questionnaires – meaning, difference between schedule and questionnaire, types of questions to be used, rating scales – meaning, types, advantages and limitations in its use. ranking scales – meaning, objectives, advantages and limitations. Observation – Meaning, types, advantages and limitations. Case studies – Meaning, types, advantages and limitations. Scalogram analysis, Q sort techniques.

Unit V - DATA PROCESSING AND REPORT WRITING

Data processing –meaning, coding, preparation of master code sheet, statistical package for social sciences (SPSS) statistical tests, normal distribution, tests of significance, ANOVA, correlation, regression. Choosing appropriate statistics for data analysis based on the level of measurement of variables. Interpretation, report writing – meaning, guidelines to be followed in scientific report writing, references in reporting. participatory approaches, PRA, RRA, PEM, PLAM and PTD.

Practical

Selection and formulation of research problem - formulation of objectives and hypothesis-selection of variables based on objectives-developing the conceptual framework of research. operationally defining the selected variables-development of data collection devices.-testing the validity and reliability of the data collection instruments.- pre-testing of the data collection instrument-techniques of interviewing and collection of data using the data collection instruments-data

processing, hands on experiences on SPSS, coding, tabulation and analysis. Formulation of secondary tables based on objectives of research. writing report, writing of thesis and research articles-presentation of reports.

Lecture schedule

1. Research – Meaning, importance, characteristics. Behavioural sciences research –Meaning, concept
2. Principles and approach in behavioural science research and problems in behavioural science research.
3. Types and methods of Research – Fundamental, Applied and Action research
4. Exploratory, Descriptive, Diagnostic, Evaluation, Experimental, Analytical,

Historical, Survey and Case Study.
5. Review of literature – Need, Search Procedure, Sources of Literature, planning the review work.
6. Research problem – Guiding and principles in the choice of research problem, Factors and criteria in selection of research problem.
7. Statement of research problem and development of theoretical orientation of the research problem.
8. Objectives – Meaning, types and criteria for judging the objectives.
9. Concept and Construct – Meaning, role of concepts in research.
10. Variable – Meaning, types and their role in research. Definition – Meaning, characteristics of workable definitions, types and their role in research.
11. Hypothesis – Meaning, importance.
12. Types of hypothesis.
13. Measurement – Meaning, postulates and levels of measurement
14. Use of appropriate statistics at different levels of measurement, criteria for judging the measuring instrument and importance of measurement in research.
15. Validity – Meaning and methods of testing.
16. Reliability – Meaning and methods of testing.
17. Mid Semester Examination
18. Sampling – Universe, Sample and Sampling, Methods of sampling and sampling procedure
19. Meaning, basis for sampling, advantages and limitations, size and factors affecting the size of the sample and sampling errors.
20. Research Designs – Meaning, purpose and criteria for research design, Types, advantages and limitations of each design. Experimental design – Advantages and limitations.
21. Data Collection methods - Interview – Meaning, purpose, types, techniques of interviewing - advantages and limitations.
22. Enquiry forms and Schedules – Meaning, types of questions used, steps in construction - advantages and limitations in its use.
23. Questionnaires – Meaning, difference between schedule and questionnaire, types of questions to be used.
24. Rating scales – Meaning, types, advantages and limitations in its use.
25. Ranking Scales – Meaning, objectives, advantages and limitations.
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26. Observation – Meaning, types, advantages and limitations. Case studies – Meaning, types, advantages and limitations.
27. Scalogram analysis, Q sort techniques.
28. Data processing – Meaning, coding, preparation of master code sheet.
29. Statistical tests, normal distribution, tests of significance.
30. ANOVA, correlation, regression.
31. Statistical Package for Social Sciences (SPSS) choosing appropriate statistics for data analysis based on the level of measurement of variables.
32. Report writing – Meaning, guidelines to be followed in scientific report writing.
33. References in reporting.
34. Participatory approaches – PRA,RRA,PEM,PLAM and PTD.

Practical schedule

1. Selection and formulation of research problem.
2. Formulation of objectives and hypothesis.
3. Selection of variables based on objectives.
4. Developing the conceptual framework of research.
5. Defining the selected variables.
6. Development of data collection instruments.
7. Testing the validity and reliability of the data collection instruments.
8. Pre-testing of the data collection instrument.
9. Techniques of interviewing.
10. Data collection.
11. Coding, tabulation, preparation of master code sheet.
12. Formulation of secondary tables based on objectives of research.
13. Data processing, hands on experiences on SPSS.
14. Writing report.
15. Writing of thesis and research articles.
16. Presentation of reports.
17. Presentation of reports.

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AEX 622 - PERSPECTIVES OF HUMAN RESOURCE MANAGEMENT (2+1)

Objectives

• To orient the students about key concepts and growth & development of human resource development.
• To understand the subsystems of human resource development for extension organization and process of HRD.

Theory

Unit I – INTRODUCTION TO HRM

Human resources, concept, importance of human resources in agriculture development–human resource management, concept, meaning, importance scope, objectives, functions.

Unit II – RECRUITMENT AND SELECTION

Recruitment, concept, importance, factors influencing recruitment, recruitment process, sources of recruitment, methods, selection, definition,

meaning, steps in selection process, selection methods, factors affecting selection, induction, concept, content, advantages.

Unit III - TRAINING

Training, meaning, concepts, types – importance, training models, phases of training, training needs, concept, meaning, identifying training needs, training requirements, developing training modules. designing training programmes. – factors influencing the selection of training methods, training evaluation – concept, meaning, types, levels, principles, techniques, impact assessment. capacity building in relation to agriculture and allied industries.

Unit IV - ORGANIZATIONAL BEHAVIOUR

Organizational behavior, organizational behaviour as facilitators of HRD, stress, meaning, causes, stress management, concept, causes, consequences, stress management techniques, importance. job description, job analysis, job evaluation, motivation, concept, importance, techniques of motivation.

Unit V - ORGANIZATIONAL DEVELOPMENT

Organizational effectiveness, organizational climate, organizational development, job satisfaction, problem solving techniques, Time management. performance appraisal, meaning, concept, methods, organizational climate, team building, process and strategies at organizational and village levels, mobilization, concept, skills and strategies.

Practical

Preparation of an interview schedule to study the training needs of farmers, visit to a village to study the training needs of farmers, visit to an organization to study their recruitment and selection patterns and organizational structure. practicing lecture, demonstration, case method, group brain storming, syndicate, business games, simulation exercise, in-basket exercise, programmed instruction, sensitivity training, T group, fish bowl exercise. Visit to KVK to analyze the training methods followed for training the farmers. Visit to JDA/ADA office to study the training methods followed for training the farmers.

Lecture Schedule

1. Human resources, concept, meaning, importance in agriculture development.
2. Human resource management, concept, meaning, objectives, importance scope functions.

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3. Recruitment, concept, meaning, importance.
4. Factors influencing recruitment, recruitment process, sources of recruitment.
5. Selection, definition, meaning, steps in selection process.
6. Selection methods, factors affecting selection.
7. Introduction, concept, content, advantages.
8. Training, meaning, concept, importance, types of training.
9. Training models.
10. Phase of training, pre-training, training, post-training.
11. Training needs, meaning, concept, identifying training needs, training requirements.
12. Setting training objectives.
13. Developing training modules.
14. Planning training sessions.

15. Training methods, factors influencing the selection of training methods.
16. Training evaluation, meaning, concept, types, levels.
17. Mid Semester Examination
18. Training evaluation, principles, techniques.
19. Impact assessment.
20. Capacity building in relation to agriculture and allied industries.
21. Organizational behaviour
22. Organizational behaviour as facilitators of HRD.
23. Stress, meaning, causes, stress management, importance, techniques.
24. Job description, job analysis, job evaluation.
25. Motivation, concept, theories, importance, techniques of motivation.
26. Organizational effectiveness.
27. Organizational climate.
28. Organizational development.
29. Job satisfaction.
30. Problem solving techniques.
31. Time management.
32. Performance appraisal, concept, meaning, methods.
33. Team building, process and strategies at organizational and village levels.
34. Mobilization skills, concept, strategies.

Practical Schedule

1. Preparation of an interview schedule to study the training needs of farmers.
2. Visit to a village to study the training needs of farmers.
3. Visit to an organization to study their recruitment and selection patterns and organizational structure.
4. Practicing lecture
5. Practicing demonstration.
6. Practicing case method.
7. Practicing group brain storming.
8. Practicing syndicate.

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9. Practicing simulation exercise.
10. Practicing in-basket exercise.
11. Practicing programmed instruction.
12. Practicing sensitivity training.
13. Practicing T group
14. Practicing fish bowl exercise.
15. Visit to KVK to analyze the training methods followed for training the farmers.
16. Visit to JDA/ADA office to study the training methods followed for training the farmers.
17. Visit to an organization to study the performance appraisal techniques adopted.

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AEX 623. ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT (2+1)

Objectives

• To understand the concepts of entrepreneur entrepreneurship and Agripreneurship.
• To gain expertise on small business management.
• To gain knowledge on training programme for entrepreneurship development.
• To understand the role of various institutions in entrepreneurship development.

Theory

Unit – I Entrepreneur and Entrepreneurship

Entrepreneur and Entrepreneurship – concept, meaning and definition, scope of entrepreneurship development. Theories of entrepreneurship. Agripreneurship - concept, definition, scope and importance of developing agriculture based enterprises. Agri clinics and agri business centers. Characteristics of ideal entrepreneurs. Types of entrepreneurs. Entrepreneurship development process.

Unit – II Enterprise Management

Enterprise – meaning, definition, characteristics, and types of enterprises – Stages of establishing enterprises. Profitable Agri enterprises in India – Steps in 1534
setting up a small enterprise. SWOT analysis of agri based enterprises. Management of small business, Project management and Appraisal - market, technical, economic and financial appraisal of projects.

Unit – III Micro finance and Entrepreneurial motivation

Micro finance – meaning, definition, importance of micro finance for promoting entrepreneurship in rural areas – sources of micro finance, mobilization of micro finance - Self help groups – concept, meaning, definition, organizing and functioning of SHGs for empowerment and sustainability - Entrepreneurial motivation - need and importance – motives for entrepreneurship.

Unit – IV Product idea, Technology, Marketing and Record keeping

Product idea – meaning, definition, sources and techniques of generating product idea / business idea. Technology – meaning, characteristics and importance – Identification and accessing of technology. Manufacturing – meaning, definition, characteristics. Marketing – meaning, definition, importance, market strategy, market segmentation, market survey, target marketing, market positioning, marketing mix, product mix. Pricing – meaning, definition, types of pricing. Importance of personnel management in enterprises. Record keeping – definition, importance, types.

Unit – V Entrepreneurship Development Training and Women Entrepreneurship

Entrepreneurship Development Training Programmes (EDPs) – objectives,

importance and phases of EDPs. Types and Techniques of entrepreneurial training. Organizations imparting EDPs. Institutions supporting small business enterprises – NABARD, SIDBI, NIC, KVIC, SIDCO, SIDO, NSIC, DICs, SFCs and other financial institutions. Role of NGOs in promoting entrepreneurship. Women entrepreneurship – meaning, importance, problems of women entrepreneurs, opportuties for women in entrepreneurship – organizational support for women owned enterprises.

Practical

Formulation of project proposal – Preparation of project profiles for some agro – based enterprises. Financial analysis – working out benefit cost ration (BCR), Break Event Analysis (BEP), Practicing EMT techniques – Test for achievement planning, tower building. Field visit to successful enterprises. Exercise on market survey. Visit to DIC and NGO to study their entrepreneurship development activities. Study and evaluation of women owned enterprises in agriculture. Case studies of successful enterprises.

Theory Schedule

1. Entrepreneur and Entrepreneurship – concept, meaning and definition, scope of entrepreneurship development.
2. Theories of entrepreneurship.
3. Agripreneurship - concept, definition, scope and importance of developing agriculture based enterprises.
4. Agri clinics and agri business centers.
5. Characteristics of ideal entrepreneurs and types of entrepreneurs.
6. Entrepreneurship development process.
7. Enterprise – meaning, definition, characteristics and types of enterprises.

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8. Stages of establishing enterprises.
9. Profitable Agri enterprises in India.
10. Steps in setting up a small enterprise.
11. SWOT analysis of agri based enterprises.
12. Management of small business.
13. Project management and Appraisal - market, technical, economic and financial appraisal of projects.
14. Micro finance – meaning, definition, importance of micro finance for promoting entrepreneurship in rural areas
15. Sources of micro finance, mobilization of micro finance.
16. Self help groups – concept, meaning, definition, organizing and functioning of SHGs for empowerment and sustainability.
17. Mid Semester Examination.
18. Entrepreneurial motivation - need and importance – motives for entrepreneurship.
19. Product idea – meaning, definition, sources and techniques of generating product idea / business idea.
20. Technology – meaning, characteristics and importance. Identification and accessing of technology.
21. Manufacturing – meaning, definition, characteristics.
22. Marketing – meaning, definition, importance, market strategy, market segmentation.

23. Market survey, target marketing, market positioning, marketing mix, product mix.
24. Pricing – meaning, definition, types of pricing.
25. Importance of personnel management in enterprises.
26. Record keeping – definition, importance, types.
27. Entrepreneurship Development Training Programmes (EDPs) – objectives, importance and phases of EDPs.
28. Types and Techniques of entrepreneurial training.
29. Organizations imparting EDPs.
30. Institutions supporting small business enterprises – NABARD, SIDBI, NIC, KVIC
31. SIDCO, SIDO, NSIC, DICs, SFCs and other financial institutions.
32. Role of NGOs in promoting entrepreneurship.
33. Women entrepreneurship – meaning, importance, problems of women entrepreneurs, opportunities for women in entrepreneurship.
34. Organizational support for women owned enterprises.

Practical Schedule

1. Formulation of project proposal.
2. & 3. Preparation of project profiles for some agro – based enterprises.
4. Working out benefit cost ratio (BCR) for any agro – based enterprise.
5. Break even analysis (BEP) for any agro – based enterprise.
6. & 7. Capital budgeting for agro based enterprises.

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8. Practicing Test for achievement planning.
9. Practicing tower building.
10. & 11. Field visit to successful enterprises.
12. Exercise on market survey.
13. Visit to DIC to study about its entrepreneurship promotion activities.
14. Visit to NGOs to study about its entrepreneurship promotion activities.
15. Study and evaluation of women owned enterprises in agriculture.
16. & 17. Case studies of successful enterprises.

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AEX 624 - GENDER SENSITIZATION AND EMPOWERMENT (2+0)

Objectives

• To understand the concepts of gender and gender sensitization.
• To gain expertise on empowerment of women.
• To gain knowledge on gender based laws.

Theory

Unit I –Gender Concepts and Roles

Gender – Femininity – masculinity - Gender discrimination - Gender inequality. Gender Sensitization – concept, need and focus on gender sensitization. Gender in community diversity - Gender roles - matriarchy - patriarchy. Implications for empowerment.

Unit II – Gender Perspectives and Women Development

Gender perspectives – development of women in sociol - economical perspectives social characteristics of women - role and responsibilities of women in society – resource management of women – constraints in women development.

Unit III – Gender Based Laws for empowerment

Legal issues and opportunities – educational and economical parameters. Empowerment – dimensions and methodologies for empowerment – importance for empowering women, specific laws for women empowerment - Legal provisions for women empowerment – Government polices and schemes for women empowerment.

Unit IV – Gender tools and methodologies

Gender mainstreaming – tools and techniques for gender mainstreaming. Gender budgeting – gender analysis. Importance Gender analysis frame works; context, activities and resources – programme action profile of gender analysis.

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Unit V – Gender Technologies and Gender Issues

Gender specific technologies – house hold technologies interface – socio cultural interface. Women as consumer of technologies – Empowerment of women in Agriculture – Women oriented technologies in agriculture. Gender issues and development in health and nutrition – governance – education – violence. nature, victims, causes, impact, role of media in gender sensitization.

Lecture Schedule

1. Gender, femininity and masculinity.
2. Gender discrimination and Gender inequality.
3. Gender Sensitization – concept, need and focus on gender sensitization.
4. Gender in community diversity.
5. Gender roles - matriarchy and patriarchy.
6. Implications for empowerment.
7. Gender perspectives.
8. Development of women in social - economical perspectives.
9. Social characteristics of women.
10. Role and responsibilities of women in society.
11. Resource management of women and constraints in women development.
12. Legal issues and opportunities – educational and economical parameters.
13. Empowerment – dimensions and methodologies for empowerment.
14. Importance for empowering women.
15. Specific laws for women empowerment.
16. Legal provisions for women empowerment.
17. Mid Semester Examination.
18. Government polices and schemes for women empowerment.

19. Gender mainstreaming.
20. Tools and techniques for gender mainstreaming.
21. Gender budgeting.
22. Gender analysis and its importance.
23. Gender analysis frame works.
24. Context, activities and resources for gender analysis.
25. Programme action profile of gender analysis.
26. Gender specific technologies – house hold technologies interface and Socio cultural interface.
27. Women as consumer of technologies.
28. Empowerment of women in Agriculture.
29. Women oriented technologies in agriculture.
30. Gender issues and development in health and nutrition.
31. Gender issues and development in governance.
32. Gender issues and development in education.
33. Violence-Nature of violence, victims, causes of violence and impact of violence.
34. Role of media in gender sensitization.

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OPC-AEX 711 FARM JOURNALISM (1+1)

Objectives

• To impart knowledge on Agricultural Journalism and its role in agricultural development
• To inculcate skills in script writing for different media.

Theory

Unit I – PRINT MEDIA

Journalism, Concept, Types, Principles, Scope, Importance, elements, qualities of News. Script writing for print media – News stories, news, success stories, features. Nature and characteristics of Newspaper – Readers' perception – Photo journalism – importance and functions.

Unit II – MAGAZINES

General magazines – basics of writing farm articles – contents – target readers

– language – writing style – pictures and illustrations – features and special articles – Tamil Agricultural Magazines.

Unit III – RADIO

Nature and characteristics of Radio – Radio for information, education and entertainment – News headlines and highlights – News features – talk shows, interviews – Radio audiences – audience participation – language and style – target audience – script writing for radio.

Unit IV - TELEVISION

Nature and characteristics of television – audio and visual elements – script writing television – time factor – information and educational programmes – general and special audience programmes – language and style of presentation – entertainment programmes – audience participation.

Unit V – WEB WRITING

Understanding and using the Internet - Online journalism – Agricultural News – Agricultural technology – Newspapers online - e-journals and e-magazine – textual – language and style - multimedia support – contents online: informational and educating market information. content developing using links and text.

Practical

Writing for the print media Preparing and Editing news items for News papers. Practicing photography and videography, Visit to a newspaper organization. 1539

Preparation of leaflets and folders. Designing a cover for farm magazine. Preparing the radio script, Practicing the radio script, Visit to FM radio station. Practicing the script writing for television. Designing visuals, graphics and Illustrations for television. Designing a programme on Interview with farmer. Preparation of short film, Visit to local TV channel, Visit to Doordharsan Kendra. Preparation of Interview Schedule to study the preference of farmers towards mass media.

Lecture schedule

1. Journalism, Concept, Types, Principles, Scope, Importance,
2. Elements / qualities of News.
3. Script writing for print media – News stories, news, success stories, features.
4. Nature and characteristics of Newspaper – Readers' perception.
5. Photo journalism – importance and functions.
6. General magazines – basics of writing farm articles, Contents – target readers – language.
7. Writing style – pictures and illustrations – features and special articles – Tamil Agricultural Magazines.
8. Nature and characteristics of Radio – Radio for information, education and entertainment.
9. Mid Semester Examination
10. News headlines and highlights – News features – talk shows, interviews.
11. Radio audiences – audience participation – language and style – target audience – script writing for radio.
12. Nature and characteristics of television – audio and visual elements.
13. Script writing television – time factor – information and educational programmes – general and special audience programmes.
14. Language and style of presentation – entertainment programmes –

audience participation.
15. Understanding and using the Internet - Online journalism
16. Agricultural News – Agricultural technology – Newspapers online - e-journals and e-magazine – textual – language and style
17. Multimedia support – contents online: informational and educating market information. content developing using links and text.

Practical schedule

1. Writing for the print media
2. Preparing and Editing news items for News papers.
3. Practicing photography.
4. Practicing videography
5. Visit to a newspaper organization.
6. Preparation of leaflets and folders.
7. Designing a cover for farm magazine.
8. Preparing the radio script
9. Practicing the radio script
10. Visit to FM radio station.
11. Practicing the script writing for television.

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12. Designing visuals, graphics and Illustrations for television.
13. Designing a programme on Interview with farmer.
14. Preparation of short film
15. Visit to local TV channel
16. Visit to Doordharsan Kendra.
17. Preparation of Interview Schedule to study the farmer preference towards mass media.

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OPC- AEX 712 INTRODUCTION TO VISUAL COMMUNICATION AND ADVERTISING TECHNOLOGIES (2+1)

Objectives

- To learn about the principles and concepts of visual communication
- To learn the scope, concept and trends of advertising
- To learn various formats of advertising

Theory

Unit I - VISUAL COMMUNICATION

Need for and the Importance of Visual Communication. Communication as an expression, skill and process, Understanding Communication – Message, Meaning, Connotation, Denotation, Codes - Levels of communication: Technical, Semantic, and Pragmatic. The semiotic landscape: language and visual communication, narrative representation

Unit II - COLOUR PSYCHOLOGY AND TYPES OF MEDIA

Principles of Visual and other Sensory Perceptions. Colour psychology and theory - Optical / Visual Illusions - Types of Media – Print media, Electronic media and recent media in communication

Unit- III - GRAPHIC DESIGN

Basic of Graphic Design, Definition, Elements of Graphic Design. The process of developing ideas – Verbal, Visual, Combination and thematic, visual thinking, design execution and presentation.

Unit IV - IV ADVERTISING

Definition, Nature & Scope of advertising, Roles of Advertising; Societal, Communication, Marketing & Economic functions of advertising. Advertising based 1541

on target audience, geographic area, Corporate and Promotional Advertising. Web Advertising.

Unit V - TRENDS AND TYPES OF ADVERTISING

Latest trends in advertising– Advertisement agency & its types, functions, services- Legal aspects & ethical issues. Communication Plan, Brand management – Positioning, Brand personality, Brand image, Brand equity. Conceptualization & Ideation, Visualization, Designing & Layout, Copy writing – Types of headlines, body copy base lines, slogans. Logos & trademarks. Typography, Writing styles, Scripting. Story board. Advertising campaign-from conception to execution

Practical

Geometrical Shapes - Perspectives - Light and shade - Story Board Colours - Visit to an advanced digital studio - Design ear panels - Design a visual dominant advertisement - Design a souls advertisement - Design an advertisement for a consumer product - Design a corporate advertisement - Design a public service advertisement - Design a testimonial advertisement - Design a comparative advertisement - Design an advertisement for brand promotion - Design an advertisement with emotional appeal- . Design an advertisement with fear appeal - Design an advertisement with humor appeal

Lecture Schedule

1. Need for and the Importance of Visual Communication.
2. Communication as an expression, skill and process, Understanding Communication
3. Message, Meaning, Connotation, Denotation, Codes
4. Levels of communication, Technical, Semantic and Pragmatic
5. The semiotic landscape: language and visual communication, narrative representation
6. Principles of Visual and other Sensory Perceptions.
7. Colour psychology and theory
8. Optical / Visual Illusions
9. Types of Media

10. Print media, Electronic media
11. Recent media in communication
12. Basics of Graphic Design. Definition, Elements of Graphic Design
13. Design process-research, a source of concept, the process of developing ideas
14. Verbal, visual, combination and thematic
15. Visual thinking, associative techniques, materials, tools
16. Design execution, and presentation.
17. Mid semester Examination
18. Definition, Nature & Scope of advertising
19. Roles of Advertising
20. Societal, Communication, Marketing & Economic functions of advertising
21. Advertising based on target audience, geographic area
22. Corporate and Promotional Advertising
1542
23. Web Advertising
24. Latest trends in advertising
25. Advertisement agency & its types, functions, services
26. Leagal aspects & ethical issues in advertising
27. Communication Plan and Brand management
28. Positioning, Brand personality, Brand image, Brand equity
29. Conceptualization, Ideation, Visualization designing and layout
30. Copy writing – types of headlines
31. Slogans– types of slogans
32. Logos and Trade marks
33. Typography and Writing styles, Scripting and Story board
34. Advertising campaign-from conception to execution

Practical Schedule

1. Practicing Geometrical Shapes in visual designs
2. Practicing Perspectives in visual designs
3. Practicing Light and shade in visual designs
4. Practicing Story Board Colours in visual designs
5. Visit to an advanced digital studio
6. Design ear panels
7. Design a visual dominant advertisement
8. Design a souls advertisement
9. Design an advertisement for a consumer product
10. Design a corporate advertisement
11. Design a public service advertisement
12. Design a testimonial advertisement
13. Design a comparative advertisement
14. Design an advertisement for brand promotion
15. Design an advertisement with emotional appeal
16. Design an advertisement with fear appeal
17. Design an advertisement with humorous appeal

References

1. Visual Communications, Hasan Siddiqui, Anmol Publications Pvt Ltd, 2011
2. Visual Communications, Paul Martin, Bio Green Books, 2016

3. Practice of Advertising, Adrian R Mackay, Reed Elsevier India Pvt.Ltd, 2005
4. Handbook of Advertising, Christopher Jones, Nabu Press, 2010
5. Advertising Handbook, Alistair Paterson, Routledge, 2002
6. www.iadtdesign.com
7. www.pinterest.com
8. www.vcgcorporate.com
9. www.blog.bannersnack.com
10. www.wordstream.com

ANNEXURE IV

M.SC. (AG.) AGRICULTURAL ECONOMICS

SEMESTER – WISE DISTRIBUTION

S. No.	Course Code	Title	Credit Hours
First Semester			
1.	AEC 611	Micro Economic Analysis	2+1
2.	AEC 612	Macro Economics Analysis	2+0
3.	AEC 613	Agricultural Marketing and International Trade	2+1
4.	AEC 614	Research Methodology for Social Sciences	1+1
5.	STA 612	Statistics for Social Sciences	2+1
6.	COM 611	Computer Applications for Agricultural Research	1+1
7.	AEC 011	Research	0+1
8.	PGS 611	Research Data Analysis	0+1
9.	PGS 612	Technical Writing and Communication Skills	0+1
		Total	**10+6 = 16**
Second Semester			
1.	AEC 621	Agricultural Production Economics	1+1
2.	AEC 622	Agricultural Finance and Project Management	2+1
3.	AEC 623	Basic Econometrics	2+1
4.	AEC 624	Agricultural Development Policy Analysis	2+0
5.	OPC AEC 621	Natural Resource and Environmental Economics	2+1
6.	AEC 021	Research	0+2
7.	PGS 623	Basic Analytical Techniques	0+1
8.	PGS 624	Library and Information Services	0+1
		Total	**9+6 = 15**
Third Semester			
1.	OPC XXX 711	Minor Course - Related discipline	2+1
2.	OPC XXX 712	Minor Course - Related discipline	2+1
3.	AEC 031	Research	0+8
4.	AEC 032	Seminar	0+1
5.	PGS 715 (e-course)	Intellectual Property and its Management in Agriculture	1+0
6.	PGS 716 (e-course)	Disaster Management	1+0
		Total	**4+11 = 15**
Fourth Semester			
1.	AEC 041	Research	0+9

		Total	**0+9 = 9**
		Grand Total	**23+32 = 55**

AEC 611 MICRO ECONOMIC ANALYSIS (2+1)

Objectives

To introduce the basic concepts of microeconomics to the students and teach their applications in agriculture.

Theory

Unit-I - Consumer behaviour

Meaning and nature of microeconomics - economic systems - methods of economic analysis. Theory of consumer behaviour - cardinal utility theory - ordinal utility theory - income effect and substitution effect - revealed preference hypothesis. Consumer's surplus. Theory of demand - derivation of demand curve - elasticity of demand.

Unit-II - Theory of production

Theory of production - production functions - returns to scale and economies of scale - technical progress. Theory of costs - cost curves - envelope curve - profit maximization and cost minimization. Derivation of supply curve - law of supply - producers' surplus.

Unit-III - Market equilibrium

Market equilibrium - behaviour of firms in competitive markets - perfect competition - short run and long run equilibrium - monopoly - bilateral monopoly - price discrimination - monopolistic competition - duopoly (Cournot, Stackelberg's models) - oligopoly (Kinked demand model).

Unit-IV - Factor pricing

Factor pricing in perfect and imperfect competitive markets - factor pricing and income distribution.

Unit-V - Welfare economics

General equilibrium theory - interdependence in the economy - general equilibrium and allocation of resources. Welfare economics - Pareto criterion - The Kaldor-Hicks compensation criterion. Social welfare functions.

Practical

Theory of consumer behaviour - discussion and exercises in demand analysis - derivation of elasticity of demand - estimation of various demand functions - equilibrium price analysis - production function analysis - analysis of short run and long run costs - profit function - analysis and discussions of market structure - performance under various parameters of imperfection through graphical and mathematical means - cost function - economies of size and scale - price discrimination - factor pricing analysis - income distribution analysis - discussion of economic rent - Pareto optimality concept - models on partial and general equilibrium.

Theory schedule

1. Meaning and nature of microeconomics
2. Economic systems
3. Methods of economic analysis
4. Theory of consumer behaviour
5. Cardinal utility theory

6. Ordinal utility theory - income effect and substitution effect
7. Revealed preference hypothesis
1546
8. Consumers' surplus
9. Theory of demand - derivation of demand curve
10. Elasticity of demand
11. Theory of production
12. Production functions
13. Return to scale and economies of scale
14. Technical progress
15. Theory of costs - cost curves - envelope curve
16. Profit maximization and cost maximization
17. Mid semester examination
18. Derivation of supply curve - law of supply - producer's surplus
19. Market equilibrium - behaviour of firms in competitive markets
20. Perfect competition - short run and long run equilibrium
21. Monopoly - bilateral monopoly - price discrimination
22. Monopolistic competition
23. Duopoly (Cournot, Stackelberg's models)
24. Oligopoly (Kinked demand model)
25. Factor pricing in perfect competitive markets
26. Factor pricing in imperfect competitive markets
27. Factor pricing and income distribution
28. General equilibrium theory
29. Interdependence in the economy
30. General equilibrium and allocation of resources
31. Welfare economics
32. Pareto criterion
33. The Kaldor-Hicks compensation criterion
34. Social welfare functions

Practical schedule

1. Theory of consumer behaviour
2. Demand analysis - elasticity of demand
3. Estimation of demand functions
4. Equilibrium price analysis
5. Production function analysis
6. Analysis of short run costs
7. Analysis of long run costs
8. Price determination under perfect market situation
9. Price determination under imperfect market situation
10. Cost function
11. Economies of size and scale
12. Exercises on monopolistic competition
13. Price discrimination
14. Factor pricing analysis
15. Income distribution analysis
16. Partial and general equilibrium theory
17. Pareto optimality criteria

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Reference books

1. Barthwal, R.R., 2005. Microeconomic Analysis, Wiley Eastern, New Delhi.
2. Hal R. Varian, 1999. Microeconomic Analysis, W.W. Norton and Company, New York.
3. Henderson, J.M. and R.E. Quandt, 2000. Microeconomic Theory: A Mathematical Approach, Tata McGraw Hill, New Delhi.
4. Koutsoyiannis, A., 2003. Modern Microeconomics, The Mac Millan Publication, London.
5. Dewitt K.K., 2002. Modern Economic Theory, Sultan Chand and Co., New Delhi.
6. http://ocw.mit.edu/courses/economics/
7. http://jgc-econ.intrasun.tcnj.edu/Micro%20Links.htm
8. http://www.oswego.edu/~kane/eco101.htm
9. http://catalog.flatworldknowledge.com/bookhub/13

AEC 612 MACRO ECONOMIC ANALYSIS (2+0)

Objectives

To explain the basic concepts, theories and various macroeconomics indicators to the students and make them to understand the implications of the macroeconomic policy measures.

Theory

Unit-I - Macroeconomics - basic concepts

Nature and scope of macro economics - methodology and Keynesian concepts. National income - concepts and measurement. Classical theory of employment and Say's Law - Modern theory of employment and effective demand.

Unit-II - Consumption, saving and investment

Consumption function - investment and savings - concept of multiplier and accelerator - Keynesian theory of income, output and employment. Rate of interest - Classical, Neo classical and Keynesian version - classical theory Vs Keynesian theory. Unemployment and full employment.

Unit-III - Money and prices

Money and classical theories of money and price - Keynesian theory of money and Friedman restatement theory of money - supply of money - demand for money. Inflation: nature, effects and control.

Unit-IV - Public finance

IS and LM frame work. General equilibrium of product and money markets. Monetary policy - fiscal policy- effectiveness of monetary and fiscal policy - Central banking.

Unit-V - Macroeconomic policy

Business cycles. Trade policies - balance of payments - balance of payments adjustment policy with fixed exchange rates and flexible exchange rates - international macroeconomic policies - economic growth and public policy.

Theory schedule

1. Nature and scope of macro economics
2. Methodology and Keynesian concepts
3. National income - concepts and measurement

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4. Classical theory of employment

5. Say's Law
6. Modern theory of employment and effective demand
7. Consumption function
8. Investment and savings
9. Concept of multiplier and accelerator
10. Keynesian theory of income and output and employment
11. Rate of interest - Classical, Neo classical and Keynesian version
12. Classical theory Vs Keynesian theory
13. Unemployment and full employment
14. Money and classical theories of money and price
15. Keynesian theory of money
16. Friedman restatement theory of money
17. Mid semester examination
18. Supply of money
19. Demand for money
20. Inflation: nature, effects and control
21. IS and LM frame work
22. General equilibrium of product market
23. General equilibrium of money market
24. Monetary policy
25. Fiscal policy
26. Effectiveness of monetary and fiscal policy
27. Central banking
28. Business cycles
29. Trade policies
30. Balance of payments
31. Balance of payments adjustment policy with fixed exchange rates
32. Balance of payments adjustment policy with flexible exchange rates
33. International macroeconomic policies
34. Economic growth and public policy

Reference books

1. Ahuja, H.L., 2007. Macro Economics - Theory and Policy, S. Chand and Co. Ltd., New Delhi.
2. Branson, H. William, 1986. Macroeconomic Theory and Policy, Harper Collins, New Delhi.
3. Dornbusch, 2006. Macroeconomics, McGraw Hill Publication, New Delhi.
4. Eugene A Diulio, 2006. Macroeconomics, 4th Ed. Schaums' Outlines, New Delhi.
5. Shapiro, Edward, 1989. Macroeconomic Analysis, Galgotta Publications, New Delhi.
6. http://ocw.mit.edu/courses/economics/14-02-principles-of-macroeconomics-fall-2009/
7. www.uh.edu/~bsorense/Macro_Lecture_Notes.pdf
1549
8. http://www.cals.ncsu.edu/course/are012/notes.html
9. http://getyourecon.com
10. http://welkerswikinomics.com/blog/
11. http://www.econclassroom.com

12. http://econphd.econwiki.com/notes.htm
13. https://www.coursera.org/course/macroeconomics

AEC 613 AGRICULTURAL MARKETING AND INTERNATIONAL TRADE (2+1)

Objective

This course aims at teaching the students about the various principles and dynamic changes of agricultural marketing and price analysis with their application at both micro and macro levels.

Theory

Unit-I - Agricultural marketing

Agricultural marketing and economic development - characteristics of agricultural products. Producer's surplus - marketed and marketable surplus. Marketing efficiency - marketing costs, margins and price spread - technical and pricing efficiency.

Unit-II - Market structure

Market structure, conduct and performance. Market integration - vertical and horizontal integration - vertical co-ordination. Marketing system and sub-sector analysis. Determination of inputs and output prices under different market situations. Market research and information - sources of agricultural marketing information - role of ICT in agricultural marketing - NAM - e NAM - market linkages - public-private partnership - contract farming

Unit-III - Agricultural price analysis and policy

Price indices and parity concepts - price support programmes - subsidies - MSP - SAP - CACP. Spatial and temporal price relationships - price forecasting - price policies and economic development. Marketing institutions - cooperatives - regulated markets - state trading and government interventions - Agmark.

Unit-IV - Demand - supply relationship and prices

Role of agricultural prices - supply and demand relationships - demand and supply models - incorporation of risk. Future markets - speculation - hedging - commodity exchange. Marketing of derivatives - integration of spot and future markets - role of FMC in agricultural marketing.

Unit-V - International trade

International trade - introduction and scope - basic concepts. Foreign exchange market. Terms of trade - WTO and their role in promotion of trade - export and import policies of India - agricultural export zones - export promotion agencies in India - APEDA - MPEDA. Role of World Bank, IMF and ADB in international trade. Role of EXIM bank and commercial banks in foreign trade - IPR - international organization of standards - HACCP - organic certification.

Practical

Producer's surplus - price spread analysis - estimation of marketing efficiency - technical and allocation efficiency - estimation of index numbers - price index - WPI - time series analysis and forecasting - demand and supply estimation in single 1550

and multimarket situation - value chain analysis for major agricultural commodities - price instability - Markov chain model - market equilibrium analysis - visit to cooperative marketing institution - visit to regulated market - visit to agro processing units - export organizations - EXIM bank - visit to patent office, Chennai - case studies on rice, wheat and other major food grains - case studies on horticultural crops.

Theory schedule

1. Agricultural marketing and economic development
2. Characteristics of agricultural products and production
3. Producer's surplus, marketed and marketable surplus
4. Marketing efficiency, marketing costs, margins and price spread - technical and pricing efficiency
5. Market structure, conduct and performance (SCP paradigm)
6. Market integration, vertical and horizontal integration - conglomaration
7. Vertical co-ordination
8. Marketing system and sub sector analysis
9. Determination of input and output prices under different market situations
10. Market research and information and sources of market information
11. Role of ICT in agricultural marketing - NAM - e - NAM
12. Market linkages - public - private partnership - contract farming
13. Price indices and parity concepts
14. Price support programmes and subsidies - MSP - SAP - CACP
15. Spatial and temporal price relationships
16. Price forecasting - price policies and economic development
17. Mid semester examinations
18. Marketing institutions - co-operative markets - regulated market
19. State trading and government intervention - Agmark
20. Role of agricultural price - supply and demand relationship
21. Demand and supply model incorporation of risk
22. Future market speculation - hedging
23. Commodity exchange - Marketing of derivatives - Integration of spot and future markets
24. Role of FMC in agricultural marketing
25. International trade - introduction and scope - basic concepts
26. Foreign exchange market
27. Terms of trade
28. WTO and the role in promotion of trade
29. Export and import policies of India
30. Agricultural export zones
31. Export promotion agencies in India - APEDA - MPEDA
32. Role of world bank, IMF and ADB in international trade
33. Role of EXIM bank and commercial banks in foreign trade - IPR
34. International organization of standards - HACCP - organic certification

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Practical schedule

1. Estimation procedure for producers surplus of different agricultural commodities
2. Price spread analysis
3. Marketing efficiency - technical and allocation efficiency
4. Estimation of index number - price index - WPI
5. Time series analysis and forecasting
6. Estimation of demand and supply estimation of - single and multi market situations

7. Value chain analysis for major agricultural commodities
8. Price instability analysis for agricultural commodities
9. Markov - chain analysis
10. Market equilibrium analysis
11. Visit to co-operative market institution
12. Visit to regulated market
13. Visit to agro processing unit
14. Export organizations - EXIM bank
15. Visit to patent office - Chennai
16. Case study on rice, wheat and other major food grains
17. Case study on horticultural crops

Reference books

1. Acharya, S.S. and N.L. Agarwal, 2004. Agricultural Prices - Analysis and Policy, Oxford and IBH, New Delhi.
2. Acharya, S.S. and N.L. Agarwal, 2008. Agricultural Marketing in India, Oxford and IBH, New Delhi.
3. Dhal, C. Dale and Hammond W. Jerome, 1997. Market and Price Analysis - The Agricultural Industries, McGraw Hill Book Company, New York.
4. Francis Cherunilam, 2006. International Trade and Export management, Himalaya Publishing House, Mumbai.
5. Gulati, Ashok, 1996. Agricultural Price Policy in India - An Econometric Approach, Concept Publishing Company, New Delhi.
6. https://lss.at.ufl.edu/.
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AEC 614 RESEARCH METHODOLOGY FOR SOCIAL SCIENCES (1+1)

Objectives

To expose the students to research methodology used in social sciences. The focus will be on providing knowledge related to research process, data collection and data analysis.

Theory

Unit-I - Research process

Importance and scope of research in agricultural economics. Types of research - fundamental Vs. applied. Concept of researchable problem - research prioritization - selection of research problem - steps in formulation research problem. Approaches to research - research process. Hypothesis - meaning - 1552
characteristics - types of hypothesis - setting of research objectives and hypotheses - review of literature.

Unit-II - Research design

Research design and techniques - types of research design. Sampling theory and sampling design - sampling error - methods of sampling - probability and non-probability sampling methods - sampling under different situations - criteria to choose.

Unit-III - Data collection

Data collection - assessment of data needs - sources of data collection - Methods of collecting primary and secondary data - case study - criteria for selection of appropriate method of data collection. Mailed questionnaire and interview schedule - structured, unstructured, open ended and closed-ended

questions. Preparation of schedule - selection of variables - scaling techniques and measurement - problems in measurement of variables in agriculture. Interviewing techniques and field problems - methods of conducting survey - reconnaissance survey and pre testing.

Unit-IV - Data analysis

Data processing - coding - editing - tabulation - validation of data. Tools of analysis - statistics in research - descriptive and inferential statistics - Parametric and non-parametric tests - correlation analysis - association of attributes - regression analysis - testing of hypothesis - statistical test based on normal population - small and large sample test. Use of econometric software in data analysis.

Unit-V - Report writing

Interpretation of results - techniques of interpretation - significance of report writing - layout of report writing - illustration of tables - preparing research report / thesis - universal procedures for preparation of bibliography, reference, foot notes - writing of research articles.

Practical

Exercises in problem identification. Project proposals - contents and scope. Formulation of objectives and hypotheses. Assessment of data needs - sources of data - methods of collection of data. Methods of sampling - criteria to choose - discussion on sampling under different situations. Scaling techniques - measurement of scales. Preparation of interview schedule - field testing, finalizing and coding. Methods of conducting survey. Data preparation process - exercise on coding, editing, tabulation and validation of data. Preparing for data entry into computer - statistics in research descriptive and inferential statistics. Use of econometric software in data analysis. Hypothesis testing - Parametric and non-parametric tests. Exercises on format for thesis / report writing. Presentation of the results.

Theory schedule

1. Importance and scope of research in agricultural economics - types of research - fundamental Vs. applied
2. Concept of researchable problem - research prioritization - selection of research problem - steps in formulation research problem

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3. Approaches to research - research process. Hypothesis - meaning - characteristics - types of hypothesis - setting of research objectives and hypotheses - review of literature
4. Research design and techniques - types of research design
5. Sampling theory and sampling design - sampling error - methods of sampling - probability and non-probability sampling methods - sampling under different situations - criteria to choose
6. Data collection - assessment of data needs - sources of data collection - methods of collecting primary and secondary data - case study - criteria for selection of appropriate method of data collection
7. Mailed questionnaire and interview schedule - structured, unstructured, open ended and closed-ended questions
8. Preparation of schedule - selection of variables - scaling techniques and measurement - problems in measurement of variables in agriculture
9. Mid semester examination
10. Interviewing techniques and field problems - methods of conducting

survey - reconnaissance survey and pre testing.
11. Data processing - coding - editing - tabulation - validation of data
12. Tools of analysis - statistics in research - descriptive and inferential statistics
13. Parametric tests - Non-parametric tests - correlation analysis - association of attributes - regression analysis
14. Testing of hypothesis - statistical test based on normal population - small and large sample test
15. Use of econometric software in data analysis
16. Interpretation of results - techniques of interpretation - significance of report writing - layout of report writing - illustration of tables - preparing research report / thesis
17. Universal procedures for preparation of bibliography, reference, foot notes - writing of research articles

Practical schedule

1. Exercises in problem identification
2. Project proposals - contents and scope
3. Formulation of objectives and hypotheses
4. Assessment of data needs - sources of data - methods of collection of data
5. Methods of sampling - criteria to choose
6. Discussion on sampling under different situations
7. Scaling techniques - measurement of scales
8. Preparation of interview schedule - field testing, finalizing and coding
9. Methods of conducting survey
10. Exercise on coding, editing, tabulation and validation of data
11. Statistics in research descriptive and inferential statistics
12. Use of econometric software in data analysis
13. Preparing for data entry into computer
14. Hypothesis testing - parametric tests
15. Non-parametric tests

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16. Exercises on format for thesis / report writing
17. Presentation of the results

Reference books

1. Creswell, J.W., 1999. Research Design - Qualitative and Quantitative Approaches, SAGE Publication, New Delhi.
2. Kothari, C.R., Gaurav Gang, 2014. Research Methodology - Methods and Techniques, New Age International Publication, New Delhi.
3. Raj, G.L., Saga Mondal, 2004. Research Methods in Social Science and Extension Education, Kalyani Publication, New Delhi.
4. Rao, K.V., 1993. Research Methodology in Commerce and Management, Sterling Publication, New Delhi.
5. Singh, A.K., 1993. Tests, Measurements and Research Methods in Behavioural Sciences, Tata McGraw-Hill, New Delhi.
6. http://ase.tufts.edu/gdae/?gclid=CPGY7pfyjL4CFU0pjgodul8AWA
7. https://www.iser.essex.ac.uk/study
8. http://www.sagepub.com/isw4/weblinks.htm
9. http://econpapers.repec.org/article/agsaerrae/

AEC 621 AGRICULTURAL PRODUCTION ECONOMICS (1+1)

Objective

The objective of this course is to provide applied and practical understanding of production economics and farm management techniques with emphasis on its economic analysis.

Theory

Unit-I - Scope of agricultural production economics

Nature, scope and significance of agricultural production economics - agricultural production process - relationship between farm management and production economics. Neoclassical production function - three stages - physical and economic optimum - elasticity of production

Unit-II - Production and cost functions

Production functions - forms and types - production with two input case - production of more than one product. Cost concepts and cost functions - linkages between cost and production functions - duality of cost and production. Economies and diseconomies of scale - returns to scale.

Unit-III - Economic efficiency

Technology in agricultural production - nature, effect and measurement - measuring efficiency in agricultural production - technical, allocative and economic efficiencies. Yield gap analysis - concepts - types and measurement.

Unit-IV - Linear programming

Linear programming and marginal analysis - simplex method, maximization and minimization - duality - simulation and programming techniques in agricultural production.

Unit-V - Risk and uncertainty

Elements of risk and uncertainty in agriculture - measurement of risk and adjustment to risk - incorporation of weather uncertainty in decision making - risk constrained linear programming model - MOTAD model - game theory models.

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Practical

Principle of diminishing marginal returns - estimation of different forms of production functions using farm level data - estimation of elasticity - estimation of isoquant and least cost combinations of factors - product - product relationship - cost function analysis - factor share analysis - decomposition analysis - technical efficiency estimation and frontier production functions - linear programming - maximization and minimization - MOTAD - Goal programming.

Theory schedule

1. Nature, scope, significance of agricultural production economics
2. Agricultural production process - relationship between farm management and production economics
3. Neoclassical production function - three stages - physical and economic optimum
4. Elasticity of production. Production functions - forms and types of production functions
5. Production with two input case - production of more than one product
6. Cost concepts and cost functions - linkages between cost and production functions - duality of cost and production
7. Economies and diseconomies of scale
8. Returns to scale - technology in agricultural production - nature, effect

and measurement
9. Mid semester examination
10. Measuring efficiency in agricultural production – technical, allocative and economic
11. Yield gap analysis – concepts - types and measurement of yield gap
12. Linear programming and marginal analysis. Simplex method – maximization - duality
13. Simulation and programming techniques in agricultural production
14. Elements of risk and uncertainty in agriculture - measurement of risk and adjustment to risk
15. Incorporation of weather uncertainty in decision making
16. Risk constrained linear programming model - MOTAD model
17. Game theory models

Practical schedule

1. Principle of diminishing marginal returns
2. Estimation of different forms of production functions using farm level data
3. Estimation of different forms of production functions using farm level data (cont.)
4. Estimation of elasticity of production
5. Estimation of isoquant and least cost combinations of factors
6. Product - product relationship
7. Cost function analysis
8. Factor share analysis
9. Decomposition analysis

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10. Technical efficiency estimation and frontier production functions
11. Technical efficiency estimation and frontier production functions (cont.)
12. Linear programming - maximization
13. Linear programming - minimization
14. Dual problems
15. Dual problems (cont.)
16. MOTAD
17. Goal programming

Reference books

1. David, L., Debertin, 2012. Agricultural Production Economics, (Second edition), Macmillan Publishing Company, New York.
2. Doll, John P. and Frank Orazem, 1978. Production Economics - Theory and Applications, John Wiley and Sons, New York.
3. Palanisami, K., P. Paramasivan and C.R. Ranganathan, 2002. Agricultural Production Economics - Analytical Methods and Applications, Associate Publishing Company, New Delhi.
4. Peter, B.R., Hazell and Roger D. Nortan, 1986. Mathematical Programming for Economic Analysis in Agriculture, Macmillan Publishing Company, New York.
5. Sankhayan, P.L., 1998. Introduction to the Economics of Agricultural Production, Prentice Hall of India, New Delhi.
6. http://ocw.mit.edu/courses/economics
7. https://www.msu.edu/course/ECO/855
8. http://www.uky.edu/~deberti/prod/agprod5.pdf

9. http://www.csuchico.edu/ag/_assets/documents/syllabi/ABUS/ABUS%20301%20AG%20Production%20Econ%20Analysis.pdf

AEC 622 AGRICULTURAL FINANCE AND PROJECT MANAGEMENT (2+1)

Objective

The objective of the course is to impart knowledge on issues related to lending to priority sector. The course would also bring in the various appraisal techniques in agricultural project management.

Theory

Unit-I - Agricultural finance

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 - principles of co-operation - co-operative movement in India - present trend of co-operative institutions in India - NABARD, commercial banks and RRBs - District credit plans and lending to agriculture/priority sector. Micro financing - role of MFI's, NGOs and SHGs. Non-banking financial institutions in India.

Unit-II - Agricultural credit system

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 - appraisal of credit proposals. Understanding lenders and developing better working relationship and supervisory credit system. Credit inclusions - credit widening and credit deepening. 1557

Unit-III - Financial statements and analysis

Financial decisions - investment, financing, liquidity and solvency. Preparation of financial statements - balance sheet, cash flow statement and profit and loss account. Ratio analysis and assessing the performance of farm/firm - financial literacy and lending to small and marginal farmers.

Unit-IV - Agricultural project management

Project approach in financing agriculture. Financial, economic and environmental appraisal of investment projects. Project cycle - identification, formulation, appraisal, financing, implementation and evaluation of projects. Project appraisal techniques - undiscounted measures - time value of money - use of discounted measures - BCR, NPV and IRR. Sensitivity analysis, Agreements, supervision, monitoring and evaluation phases in appraising agricultural investment projects. Net work techniques - PERT, CPM and Grash programme methods.

Unit-V - Risk management in agriculture

Risks in financing agriculture. Risk management strategies and coping mechanisms. Crop Insurance programmes - review of different crop insurance schemes - yield loss and weather based insurance and their applications. Agriclinics and agribusiness centers.

Practical

Demand and supply of institutional agricultural credit. District credit plan. Preparation of scale of finance for selected crops. Preparation of financial statements using farm/firm level data. Farm credit appraisal techniques and farm financial analysis through financial statements. Financial instruments and methods - E-banking, kisan cards and core banking. Time value of money. Identification and formulation of investment projects. Project appraisal techniques -

undiscounted measures and their limitations. Discounted measures. Sensitivity analysis. Network techniques - PERT and CPM for project management. SWOC analysis - Decision tree analysis - social cost and benefit analysis - Environmental Impact Assessment (EIA).

Theory schedule

1. Role and importance of agricultural finance
2. Financial Institutions and credit flow to rural/priority sector
3. Agricultural lending - direct and indirect financing
4. Financing through co-operatives
5. Principles of co-operation and co-operative movement in India
6. Present trend of co-operative institutions in India
7. Role of NABARD, Commercial Banks and RRBs in agricultural lending
8. District Credit Plan and lending to agriculture/priority sector.
9. Micro-financing and role of MFI's, NGOs, and SHGs - Non-banking financial institutions (NBFIs) in India
10. Lending to farmers - The concept of 3 C's, 7 P's and 3 R's of credit
11. Estimation of technical feasibility, economic viability and repaying capacity of borrowers and appraisal of credit proposals

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12. Understanding lenders and developing better working relationship and supervisory credit system
13. Credit inclusions - credit widening and credit deepening
14. Financial decisions - investment, financing, liquidity and solvency
15. Preparation of financial statements
16. Balance sheet, cash flow statement
17. Mid semester examination
18. Profit and loss account and ratio analysis
19. Assessing the performance of farm/firm
20. Financial literacy and lending to small and marginal farmers
21. Project approach in financing agriculture
22. Financial, economic and environmental appraisal of investment projects
23. Project cycle identification, preparation, appraisal, financing and implementation of projects
24. Project appraisal techniques - undiscounted measures - time value of money
25. Use of discounted measures - BCR, NPV and IRR
26. Agreements, supervision, monitoring and evaluation phases in appraising agricultural investment projects
27. Net work techniques - PERT and CPM
28. Risks in financing agriculture
29. Risk management strategies and coping mechanisms
30. Crop insurance programmes
31. Review of different crop insurance schemes
32. Assessment of yield loss
33. Weather based insurance and their applications
34. Agriclinics and agribusiness centres

Practical schedule

1. Demand and supply of institutional agricultural credit
2. District credit plan

3. Preparation of scale of finance for selected crops
4. Preparation of financial statements using farm/firm level data
5. Farm credit appraisal techniques
6. Farm financial analysis through financial statements
7. Financial instruments and methods - E banking, kisan cards and core banking
8. Time value of money
9. Identification and formulation of investment projects
10. Project appraisal techniques - undiscounted measures and their limitations
11. Discounted measures
12. Sensitivity analysis
13. Network techniques - PERT and CPM for project management
14. SWOC analysis
15. Decision tree analysis
1559
16. Social cost and benefit analysis
17. Environmental Impact Assessment (EIA)

Reference books

1. Dhubashi, P.R., 1986. Policy and Performance - Agricultural and Rural Development in Post Independent India. Sage Publ. New Delhi.
2. Gittinger, J.P., 1982. Economic Analysis of Agricultural Projects. The Johns Hopkins Univ. Press. London.
3. Gupta, S.C., 1987. Development Banking for Rural Development. Deep and Deep Publ. New Delhi.
4. Little IMD and Mirlees JA., 1974. Project Appraisal and Planning for Developing Countries. Oxford and IBH Publ. New Delhi.
5. Muniraj, R., 1987. Farm Finance for Development. Oxford and IBH Publ. New Delhi.
6. Subba Reddy, S. and P. Raghu ram, 2014, Agricultural Finance and Management, Oxford and IBH Publ. Co. Pvt. Ltd., New Delhi.

AEC 623 BASIC ECONOMETRICS (2+1)

Objective

The objective of the course is to impart knowledge on econometric tools to the students of agricultural economics. This would help the students to analyze the economic problems by applying appropriate quantitative techniques.

Theory

Unit-I - Basic concepts

Econometrics - definition - methodology and types of econometrics. Nature and sources of data for econometric analysis. Basic ideas of regression analysis - PRF and SRF - linearity of regression model - significance of stochastic error term. Estimation of two variable regression model - method of Ordinary Least Square.

Unit-II - Classical linear regression model

Classical linear regression model - assumptions underlying the method of least square - Normality assumption of error term - properties of least square estimators. Gauss-Markov theorem. Goodness of fit - coefficient of determination. Method of Maximum Likelihood Estimate (MLE). Interval estimation and hypothesis testing. Extensions of two variable regression models - regression through origin. Nature of

dummy variables - dummy variable regression models - test for structural stability of regression model.

Unit-III - Hypothesis testing

Estimation in multiple regression analysis - OLS estimators - multiple coefficient of determination - R2 and adjusted R2 - inference in multiple regression analysis. Hypothesis testing - individual regression coefficient - overall significance of the model - F-test and t-test

Unit-IV - Problems in estimation

Relaxing the assumptions of CLRM: Multicollinearity - definition, consequences, detection, remedial measures. Heteroscadasticity - definition, detection, consequences. Autocorrelation - definition, consequences, detection - remedial measures Durbin-Watson test. Model specification diagnostic tests - tests of specification errors.

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Unit-V- Econometric models

Dummy variable regression models - intercept and slope dummy - estimation and interpretation. Dummy dependent variable models. Linear probability models - logit and probit models - estimation and interpretation. Simultaneous equation models - structural equations - reduced form equations - identification and approaches to estimation.

Practical

Single equation two variable model - specification and estimation - hypothesis testing - restrictions on parameters - transformations of functional forms and OLS application - estimation of multiple regression model - hypothesis testing - testing and correcting specification errors - testing and managing multicollinearity - testing and managing heteroscedasticity - testing and managing autocorrelation - estimation of regressions with dummy explanatory variables - intercept and slope dummy variable models. Estimation of regression with limited dependent variable - logit and probit models. Identification of equations in simultaneous equation models.

Theory schedule

1. Econometrics - definition, methodology and types of econometrics
2. Nature and sources of data for econometric analysis
3. Basic ideas of regression analysis: PRF and SRF
4. Linearity of regression model - significance of stochastic error term
5. Estimation of two variable regression model - method of Ordinary Least Square.
6. Classical linear regression model: assumptions underlying the method of least square
7. Normality assumption of error term in CNLRM
8. Properties of least square estimators - Gauss-Markov theorem
9. Goodness of fit - coefficient of determination
10. Method of Maximum Likelihood Estimate (MLE)
11. Interval estimation and hypothesis testing
12. Extensions of two variable regression models: regression through origin
13. Nature of dummy variables - dummy variable regression models
14. Test for structural stability of regression model
15. Estimation in multiple regression analysis: OLS estimators
16. Multiple coefficient of determination R2 and adjusted R2

17. Mid semester examination
18. Inference in multiple regression analysis: Hypothesis testing
19. Individual regression coefficient
20. Overall significance of the model - F-test and t-test
21. Relaxing the assumptions CLRM: Multicollinearity - definition, consequences, multicollinearity, detection - remedial measures
22. Heteroscadasticity - definition, consequences, detection
23. Autocorrelation - definition, consequences, detection - remedial measures
24. Durbin-Watson test
25. Model specification diagnostic tests
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26. Tests of specification errors
27. Dummy variable regression models - intercept and slope dummy
28. Estimation and interpretation
29. Dummy dependent variable models
30. Linear probability models - logit and probit models
31. Estimation and interpretation
32. Simultaneous equation models
33. Structural equations - reduced form equations
34. Identification and approaches to estimation

Practical schedule

1. Single equation two variable model - specification and estimation
2. Hypothesis testing
3. Restrictions on parameters
4. Transformations of functional forms - OLS application
5. Estimation of multiple regression model
6. Hypothesis testing
7. Testing and correcting specification errors
8. Testing and managing multicollinearity
9. Testing and managing heteroscedasticity
10. Testing and managing autocorrelation
11. Estimation of regressions with dummy explanatory variables
12. Intercept dummy variable model
13. Slope dummy variable model
14. Estimation of regression with limited dependent variable
15. Logit model
16. Probit model
17. Identification of equations in simultaneous equation models

References books

1. Damodar, N. Gujarati, Dawn C. Porter and Sangeetha Gunasekar, 2016, (Fifth Edition), Basic Econometrics, Mc-Graw Hill Education (India) Private Limited, Chennai.
2. Harry, H. Kelejan, and Walace E. Oates, 1974. Introduction to Econometrics Principles and Applications, Harper and Row Publication, New York.
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8. http://www.varsitynotes.com/economics/econometrics.html
9. http://www.stata.com/features/
10. http://www.oswego.edu/~economic/econsoftware.htm
11. http://ocw.mit.edu/courses/political-science/17-874-quantitative-research-methods-multivariate-spring-2004/

1562

AEC 624 AGRICULTURAL DEVELOPMENT POLICY ANALYSIS (2+0)

Objectives

To make the students understand the background of development economics, existing policies, their performance and guide them in framing meaningful and relevant policy models.

Theory

Unit-I - Economic development and economic growth

Development economics - scope and importance - economic development and economic growth - divergence in concept and approach - indicators and measurement of economic development. GNP as a measure of economic growth - new measures of welfare - NEW and MEW, PQLI, HDI, green GNP - criteria for under development - obstacles to economic development - economic and non economic factors of economic growth.

Unit-II - Theories of economic growth

Economic development - meaning - stages of economic development - determinants of economic growth. Theories of economic growth - Ricardian growth model - The Harrod Domar Model - The Neo classical model of growth - The Kaldor model - The Von Newmann growth model - optimal economic growth. Recent experiences of developing country - economies in transition - role of state in economic development - government measures to promote economic development - introduction to development planning.

Unit-III - Agricultural policies

Role of agriculture in economic / rural development - theories of agricultural development - population and food supply - need for sound agricultural policies - population policies resource policies - credit policies - input and product marketing policies - price policies - monetary and fiscal policies.

Unit-IV - Role of agriculture in economic development

Development issues - poverty - inequality - unemployment and environmental degradation - models of agricultural development - induced innovation model - policy options for sustainable agricultural development.

Unit-V - Agricultural development and free trade

Globalization and the relevance of development policy analysis - the dilemma of free trade - free trade versus protectionism - arguments for protection - arguments against protection - role of protection in developing countries. WTO - Agreement on Agriculture - contradictions of free trade - proponents and opponents policies in vulnerable sectors like agriculture - lessons for developing countries.

Theory schedule

1. Development economics - scope and importance
2. Economic development and economic growth - divergence in concept and approach

3. Indicators and measurement of economic development
4. GNP as a measure of economic growth
5. New measures of welfare - NEW and MEW
6. PQLI, HDI, Green GNP
7. Criteria for under development - obstacles to economic development
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8. Economic and non-economic factors of economic growth
9. Economic development - meaning, stages of economic development, determinants of economic growth
10. Theories of economic growth - Ricardian growth model. The Harrod Domar Model
11. The Neo classical Model of Growth - The Kaldor Model
12. The Von Newmann growth model - Optimal Economic Growth
13. Recent experiences of developing country - economies in transition
14. Role of state in economic development - government measures to promote economic development
15. Introduction to development planning
16. Role of agriculture in economic / rural development
17. Mid semester examination
18. Theories of agricultural development - population and food supply
19. Need for sound agricultural policies - population policies
20. Resource policies - credit policies - input and product marketing policies
21. Price policies - monetary and fiscal policies
22. Development issues - poverty – inequality
23. Unemployment and environmental degradation
24. Models of agricultural development
25. Induced innovation model
26. Policy options for sustainable agricultural development
27. Globalization and the relevance of development policy analysis
28. The dilemma of free trade
29. Free trade versus protectionism - arguments for and against protection
30. Role of protection in developing countries
31. WTO - Agreement on Agriculture
32. Contradictions of free trade
33. Proponents and opponents policies in vulnerable sectors like agriculture
34. Lessons for developing countries

Reference books

1. Ellis Frank, 1992, Agricultural Policies in Developing Countries, Cambridge University Press, New York.
2. Ghatak S and Ingersent K., 1984. Agriculture and Economic Development, Select Book Service Syndicate, New Delhi.
3. Jhingan, M.L., 1998, The Economics of Development and Planning, Vrinda Publication, New Delhi.
4. Naqvi Syed Nawab Haider, 2002, Developemnt Economics - Nature and Significance, Sage Publication, New Delhi.
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6. www.econlib.org

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1564

OPC AEC 621 NATURAL RESOURCE AND ENVIRONMENTAL ECONOMICS (2+1)

Objective

To introduce economic principles related to natural resource and environmental economics, explore the concept of efficiency and the efficient allocation of natural resources, understand the economics of environmental problems, explore the concept of pollution control and pollution prevention decisions and understand the environmental policy issues and alternative instruments of environmental policies.

Theory

Unit-I - Basic concepts

Concepts, classification, problems of natural resource economics. Economy - environment interaction - the material balance principle, entropy law. Resource scarcity - limits to growth - measuring and mitigating natural resource scarcity - Malthusian and Ricardian scarcity - scarcity indices - resource scarcity and technical change.

Unit-II - Optimal use

Theory of optimal extraction of renewable resources - economic models of forestry, fisheries - logistic growth curve - maximum sustainable yield and economic yield - theory of optimal depletion of exhaustible resources - efficiency - time path of prices and extraction. Economic models of oil extraction - Hotelling's rule - Solow Harwick's rule.

Unit-III - Markets and natural resources

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-IV - Economic instruments

Environmental regulation - economic instruments - pollution charges - Pigouvian tax - Carbon trading - tradable permits - indirect instruments - environmental legislations in India.

Unit-V - Sustainability

Concept of sustainable development - economic perspective - indicators of sustainability - relationship between development and environmental stress, poverty and environment - Environment Kuznet's Curve (EKC) - environmental accounting - resource accounting methods. International environmental issues - climate change - likely impacts - adaptation and mitigation efforts - international treaties.

Practical

Land use planning - energy use pattern - solid waste management - biodiversity, biopiracy, biosafety issues. 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 pricing method - travel cost method - contingent valuation method. Discount rate in natural resource management. Environment impact assessment. Visit to Pollution Control Board. Social cost benefit analysis.

Theory schedule

1. Concepts, classification, problems of natural resource economics
2. Economy - environment interaction
1565
3. The material balance principle, entropy law
4. Resources scarcity - limits to growth
5. Measuring and mitigating natural resource scarcity
6. Malthusian and Ricardian scarcity - scarcity indices
7. Resource scarcity and technical change
8. Theory of optimal extraction renewable resources
9. Economic models of forestry
10. Economic models of fisheries
11. Logistic growth curve - maximum sustainable yield and economic yield
12. Theory of optimal extraction of exhaustible resources
13. Efficiency - time path of prices and extraction
14. Economic models of oil extraction
15. Hotelling's rule, Solow - Harwick's Rule
16. Efficiency and markets - market failures
17. Mid semester examination
18. Externalities - types
19. Property rights - transaction costs
20. Coase's theorem and its critique
21. Public goods - common property and open access resource management
22. Collective action - environmental regulation
23. Economic instruments
24. Pollution charges - Pigouvian tax
25. Carbon trading
26. Tradable permits
27. Indirect instruments
28. Environmental legislations in India
29. Concept of sustainable development
30. Economic perspective - indicators of sustainability
31. Relationship between development and environmental stress, poverty and environment, Environment Kuznet's curve
32. Environmental accounting - resource accounting methods
33. International environmental issues - climate change - likely impacts
34. Adaptation and mitigation efforts - international treaties

Practical schedule

1. Land use planning
2. Energy use pattern
3. Solid waste management
4. Biodiversity, biopiracy, biosafety issues - case studies
5. Renewable resource management
6. Optimum harvest of forestry/fishery
7. Discount rate in natural resource management
8. Exercise on pollution abatement - I
9. Exercise on pollution abatement - II
10. Concepts in valuing the environment

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11. Taxonomy of valuation techniques
12. Productivity change method - substitute cost method
13. Hedonic pricing method - travel cost method
14. Contingent valuation method - discount rate in natural resource management
15. Environment impact assessment
16. Visit to Pollution Control Board
17. Social cost, benefit analysis

Reference books

1. Conard, J.M. and W. Collin, 1987. Natural Resource Economics, Notes and Problems, Cambridge University Press, London.
2. Kerr, J.M., Marothia D.K., Katar Singh, Ramasamy C. and Bentley W.R., 1997.
Natural Resource Economics: Theory and Applications in India, Oxford and IBH, New Delhi.
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4. Sengupta, R., 2000. Ecology and Economy, an Indian Perspective, Oxford Univ. Press, New Delhi.
5. Tietenberg, T., 2003. Environmental and Natural Resource Economics, 6th Ed., Addition Wesley.
6. http://www.iisd.org/publications
7. http://www.valuing-nature.net/
8. www.teebweb.org
9. http://ocw.mit.edu/courses/environment-courses/
10. http://www.colorado.edu/Economics/morey/4545/4545lnts.html
11. http://pubs.iied.org/
12. http://www.unep.org/publications/
13. http://www.env-econ.net/
14. http://environment.yale.edu/TEEB

OPC AEC 711 AGRI BUSINESS ANALYSIS (2+1)

Objective

The objective of this course is to teach the students the basic concepts, principles and tools of agri/farm business management.

Theory

Unit-I - Agribusiness – basic concepts

Definition - basic concepts - structure of agribusiness - agribusiness sectors - special features of agribusiness - importance of agribusiness in Indian economy - role of farm business management - farm management decisions - farm management problems.

Unit-II - Principles of management

Management - definitions and importance - management functions - nature, roles, skills, levels and functional areas of management. Forms of business 1567
organization - sole proprietorship - partnership - private and public limited - cooperatives.

Unit-III - Elements of management

Planning - definition - types of plans - steps in planning - advantages of

planning. Organizing - structure, departmentation - line and staff functions - centralization and decentralization - formal and informal organizations. Staffing - human resource planning - process. Directing - concept, principles, techniques, supervision - motivation - communication - leadership. Controlling - concept, steps, types, process.

Unit-IV - Approaches in agribusiness management

Approaches to management - Management By Objectives (MBO) - Quality Circle (QC) - profit center approach - Strength, Weakness, Opportunity and Threat (SWOT) - Management Information System (MIS) - agribusiness management - future prospects.

Unit-V - Tools of farm management

Principle of variable proportion - cost principle - factor substitution, opportunity cost principle. Farm business analysis - valuation of farm assets and depreciation - net worth statement - income statement - cash flow statement. Farm planning and budgeting - completer budget, partial budget, enterprise budget. Farm records and accounts - types of farm record. Management of farm resources - land, labour, farm machinery, farm building etc., - break even analysis.

Practical

Agribusiness opportunities - business project preparation - business project scheduling - inventory management - production management - working capital management - repayment schedule of loans - feasibility control network analysis - project evaluation - visit to agro processing units and agribusiness units - consumer survey - market potential assessment. Farm survey - methods of data collection - estimation of cost of cultivation for annual and perennial crops - estimation of cost of production of milk, egg, broiler, fish - valuation of farm assets - depreciation of farm assets - farm financial statements - balance sheet - income statement - cash flow statement - budgeting - complete budgeting and partial budgeting - break even analysis.

Theory schedule

1. Definition - basic concepts - structure of agribusiness
2. Agribusiness sectors - special features of agribusiness
3. Importance of agribusiness in Indian economy
4. Role of farm business management
5. Farm management decision
6. Farm management problems
7. Management - definitions and importance
8. Management functions - nature, roles, skills, levels
9. Functional areas of management
10. Forms of business organization
11. Sole proprietorship, partnership
12. Private and public limited, cooperatives

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13. Planning - definition - types of plans
14. Steps in planning - advantages of planning
15. Organizing - structure, departmentation - line and staff functions
16. Centralization and decentralization
17. Mid semester examination
18. Formal and informal organizations

19. Staffing - human resource planning process
20. Directing - concept, principles, techniques, supervision
21. Motivation - communication - leadership
22. Controlling - concept, steps, types, process
23. Approaches to management - Management By Objectives (MBO)
24. Quality Circle (QC) - profit center approach
25. Strength, Weakness, Opportunity and Threat (SWOT)
26. Management Information System (MIS) - agribusiness management - future prospects
27. Principle and variable proportion - cost principle
28. Factor substitution, opportunity cost principle
29. Farm business analysis - valuation of farm assets and depreciation
30. Net worth statement - income statement - cash flow statement
31. Farm planning and budgeting - completer budget, partial budget, enterprise budget
32. Farm records and accounts - types of farm records
33. Management of farm resources, land, labour, farm machinery, farm building
34. Break even analysis

Practical schedule

1. Agribusiness opportunities
2. Business project preparation
3. Business project scheduling
4. Inventory management
5. Production management
6. Working capital management
7. Repayment schedule of loans
8. Feasibility control network analysis - project evaluation
9. Visit to agro processing units and agribusiness units
10. Consumer survey - market potential assessment
11. Farm survey - methods of data collection
12. Estimation of cost of cultivation for annual and perennial crops
13. Estimation of cost of production of milk, egg, broiler, fish
14. Valuation of farm assets - depreciation of farm assets - budgeting
15. Farm financial statements - balance sheet - income statement - cash flow statement
16. Complete budgeting and partial budgeting
17. Break even analysis

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Reference books

1. Acharya, S.S. and N.L. Agarwal, 2004. Agricultural Prices - Analysis and Policy, Oxford and IBH, New Delhi.
2. Acharya, S.S., and N.L. Agarwal, 2008. Agricultural Marketing in India, Oxford and IBH, New Delhi.
3. Francis Cherunilam, 2006. International Trade and Export management, Himalaya Publishing House, Mumbai.
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8. http://www.uky.edu/~deberti/prod/agprod5.pdf
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OPC AEC 712 AGRICULTURAL INSURANCE AND RISK MANAGEMENT (2+1)

Objective

The aim of this course is to provide the students a thorough knowledge on the principles of insurance, practices of risk management and various insurance policies and schemes available for agri business.

Unit-I - Agricultural finance

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, Commercial Banks and RRBs. District Credit Plan- and lending to agriculture/priority sector. The concept of 5 C's, 7 P's and 3 R's of credit.

Unit-II - Classification of risks

The concept of risk - kinds and classification of risks - assessment - the concept of insurance - types of general insurance - agriculture, fire, marine, engineering - insurance of property. Insurance professionals and intermediaries.

Unit-III - Principles of insurance

Basic principle of insurance - utmost good faith - insurable interest - material facts - economic principles - sharing - subrogation - contribution - legal principles - the Indian Contract, 1872 - insurable interest - nomination and assignment - financial principles - premium funds - investments.

Unit-IV - Agricultural risks

Agricultural risks - sources of risk - production and technical risk, output and input price risk, financial risk, political risk, legal risk, personal risk. Risk management tools. Low risk investments. Enterprise diversification - excess - debt capacity, liquid financial reserves. Off - farm Income, shared ownership or leasing risk transfer insurance products. Contracts - hedging and options market.

Unit-V - Agricultural insurance

Agricultural insurance - importance of agricultural insurance - scope - genesis - crop insurance development in India - Comprehensive Crop Insurance Scheme 1570
(CCIS) - advantages - livestock insurance - agencies of agricultural insurance - General Insurance Corporation - New India Assurance - Agricultural Insurance Corporation - National Agricultural Insurance Scheme - business loss estimation - appraisal - claiming and repayment. Types of insurance products - stakeholders.

Practical

Estimation of cost of cultivation for major crops. Procedure on scale of finance for major crops. Estimation of technical feasibility, economic viability of farmers - Repaying capacity of borrowers and appraisal of credit proposals. Analysis of trend in farm lending and over dues - assessment of farm credit needs. Collection of farm level data on yield and crop losses. Visit to commercial bank, insurance agency - processes and procedure for agricultural insurance - crop loss assessment -

estimation of indemnity - actuarial method of premium calculation - pure risk rate liability - case study on insurance development - case study on problem and prospect of insurance in India - role of government in farm insurance.

Theory schedule

1. Agricultural finance
2. Role and importance of agricultural finance
3. Financial institutions and credit flow to rural/priority sector
4. Agricultural lending - direct and indirect financing
5. Financing through co-operatives
6. Role of NABARD, Commercial Banks and RRBs
7. District credit plan and lending to agriculture/priority sector
8. The concept of 5 C's, 7 P's and 3 R's of credit
9. The concept of risk - kinds and classification of risks - assessment
10. The concept of insurance - types of general insurance - agriculture, fire, marine, engineering
11. Insurance of property - insurance professionals and intermediaries
12. Basic principle of insurance - utmost good faith - insurable interest - material facts
13. Economic principles - sharing - subrogation - contribution
14. Legal principles - the Indian contract, 1872
15. Insurable interest - nomination and assignment
16. Financial principles - premium funds – investments
17. Mid semester examination
18. Agricultural risks - sources of risk - production and technical risk
19. Output and input price risk
20. Financial risk - political risk - legal risk - personal risk
21. Risk management tools
22. Low risk investments - enterprise diversification
23. Excess - debt capacity - liquid financial reserves off - farm income - shared ownership or leasing
24. Risk transfer insurance products - contracts - hedging and options market
25. Agricultural insurance importance of agricultural insurance - scope
26. Genesis - crop insurance development in India

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27. Comprehensive Crop Insurance Scheme (CCIS) - advantages
28. Livestock insurance - agencies of agricultural insurance
29. General Insurance Corporation. New India Assurance
30. Agricultural insurance corporation
31. National agricultural insurance scheme
32. Business loss estimation - appraisal
33. Claiming and repayment
34. Types of insurance products - stakeholders

Practical schedule

1. Estimation of cost of cultivation for major crops
2. Procedure on scale of finance for major crops
3. Estimation of technical feasibility, economic viability of farmers
4. Repaying capacity of borrowers and appraisal of credit proposals
5. Analysis of trend in farm lending and over dues

6. Assessment of farm credit needs
7. Collection of farm level data on yield and crop losses
8. Visit to commercial bank
9. Visit to insurance agency
10. Processes and procedure for agricultural insurance
11. Crop loss assessment
12. Estimation of indemnity
13. Actuarial method of premium calculation
14. Pure risk rate liability
15. Case study on insurance development
16. Case study on problem and prospect of insurance in India
17. Role of government in farm insurance

Reference books

1. Crop Insurance, 1998. Publication of Insurance Institution of India, Mumbai.
2. David, C. and Debertin, 1986. Agricultural Production Economics, Mac Millan Publishing Company, New York.
3. General Insurance, 2004. Publication of United India Insurance Co, Ltd., Chennai.
4. Watis and Associate, IIRM, 2014. Introduction to Agricultural Insurance and Risk Management, World Bank Corporation, International Finance Corporation, Washington.
5. Sankhayan, P.L., 1988. Introduction to the Economics of Agricultural Production, Prentice Hall of India, New Delhi.
6. http://pages.stern.nyu.edu/~adamodar/
7. http://educ.jmu.edu//~drakepp/
8. www.microfinancegateway.org
9. http://www.ruralfinance.org
10. www.nabard.org
11. www.rbi.org

Annexure V

Present Syllabus

I. The following are the subjects to be conducted during VII semester (This is to be shifted to VIII semester)

IV year VII semester

S.No	Course No.	Course Title	Credit Hours
1.	16 AEX 401	Rural Agricultural Work Experience - RAWE (VSP+ADA+NGO+INDUSTRY)	0+20
2.	16 PRJ 401	Project Work**	0+2
3.	16 AEX 402	All India Tour (21 days)	0+1
		Total	**0+23=23**

** Research course (Project Topic based on current issue)

II. The following are the subjects to be conducted during VIII semester (This is to be shifted to VII semester)

IV year VIII semester

S.No.	Course No.	Course Title	Credit Hours
1.	17 EXP 401	Experiential Learning – Module I	0+10***
2.	17 EXP 402	Experiential Learning – Module II	0+10***
		Total	**0+20= 20**

LIST OF EXPERIENTIAL COURSES

S. No	Course code	Titles of the module	Credits
1.	17 AGM 411	Bio-inoculant production technology	0+10

2.	17 HOR 411	Hybrid Seed Production in Vegetable Crops	0+10
3.	17 SAC 411	On Farm Advisory for Soil Health, Water Quality & Plant Nutrition	0+10
4.	17 AEN 411	Commercial Beekeeping	0+10
5.	17 SER 411	Commercial Cocoon Production	0+10
6.	17 ABT 411	Commercial Plant Tissue Culture	0+10
7.	17 HOR412	Commercial Nursery Technology of Horticultural Crops	0+10
8.	17 HOR 413	Commercial Landscape Gardening	0+10
9.	17 PAT 411	Commercial production of Bio-control agents	0+10
10.	17 PAT 412	Commercial mushroom production	0+10
11.	17 AMP 411	Commercial broiler and layer production	0+10
12.	17 SST 411	Commercial seed production	0+10
13.	17 PBG 411	Hybrid pearl millet seed production	0+10
14.	17 PBG 412	Hybrid rice parental line seed production	0+10
15.	17 ARM 411	Managerial skills for Agribusiness	0+10
16.	17 AGR 411	Development of Integrated Farming system Model	0+10
17.	17 HOR 414	Protected cultivation of Vegetable crops	0+10
18.	17 ENS 411	Composting technology	0+10
19.	17 AGR 412	Organic Agriculture	0+10

Annexure VI

S. No	Present Syllabus		Changes to be carried out	
	Course title	**Credit hours**	**Course title**	**Credit hours**
1.	18 AGR 302 – Practical crop production I (Kharif crops)	(1+1)	18 AGR 302 – Practical crop production I (Kharif crops)	**(0+2)**
2.	18 AGR 304- Practical crop production II (Rabi crops)	(1+1)	18 AGR 304- Practical crop production II (Rabi crops)	**(0+2)**