

FACULTY OF AGRICULTURE

SYLLABUS

For

M.Sc. Ag. (Agronomy)

(Semester: I–IV)

Session: 2020-21

KHALSA COLLEGE AMRITSAR-143001

M.Sc. Ag. (AGRONOMY)

SEMESTER-I

Sr. No	Course Code	Subject	Periods per week		Marks		Internal Assesment*	Grand Total
			Th.	Pract.	Th.	Pract.		
1	AGR-511	Modern Concepts in Crop Production	4	3	75	37	38	150
2	AGR-512	Soil Fertility & Nutrient Management	4	6	75	37	38	150
3	AGR-513	Principles and Practices of Water Management	4	3	75	37	38	150
4	TWC-514	Technical Writing and Communication Skills	2	0	50	-	-	50 (NC)
5	SSC- 410 (Minor)	Soil Chemistry and Bio Chemistry	4	6	75	37	38	150
6	STA-415	Statistical Methods for Research Workers	4	3	75	37	38	150
		Research Work (Synopsis)	-	2	-	-	-	--
	Total		22	23	375	185	190	750

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

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SEMESTER-II

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal Assesment*	Grand Total
			Th.	Pract.	Th.	Pract.		
1	AGR- 521	Principles and Practices of Weed Management	4	3	75	37	38	150
2	AGR- 522	Agronomy of Oil Seeds, Fibre and Sugar Crops	4	6	75	37	38	150
3	AGR- 523	Field Plot Techniques	4	3	75	37	38	150
4	AGR-524/ AGP-524	Advanced Trends in Agronomy/ Advanced Crop Growth and Productivity	4	3	75	37	38	150
5	SSC-420/ (Minor)	Soil Fertility and Fertilizer Use	4	6	75	37	38	150
6	STA-425	Experimental Designs for Research Worker	4	3	75	37	38	150
		Research Work (Synopsis)	-	2	-	-	-	--
	Total		24	26	450	222	228	900

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

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SEMESTER-III

Sr. No	Course Code	Subject	Periods per week		Marks		Internal Assesment*	Grand Total
			Th	Pract	Th	Pract		
1	AGR-531	Agronomy of Major Cereals and Pulses	4	3	75	37	38	150
2	AGR-532	Principles and Practices of Organic Farming	4	6	75	37	38	150
3	SSC-430 / AGM-430/ BOT-430 (Minor)	Fertilizer Technology / / Fundamentals of Agroclimatology/ Physiology of Growth & Development	4	3	75	37	38	150
4.		Credit Seminar	3	--	100	--	--	100
5		Research Work (Thesis)	--	4	--	--	--	S/US
	Total		15	16	325	111	114	550

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

M.Sc. Ag. (AGRONOMY)

SEMESTER-IV

Sr. No.	Course Code	Subject	Periods per week		Marks		Internal Assesment*	Grand Total
			Th	Pract	Th	Pract		
1.	AGR-541	Cropping Systems and Sustainable Agriculture	4	3	50	25	25	100
2.	AGR-542	Dry Land Agriculture and Water Shed Management	4	3	50	25	25	100
3.		Research Work (Thesis)	--	4	--	--	--	S/US
		Total	08	10	100	50	50	200

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

M.Sc. Ag. (AGRONOMY)

SEMESTER-I

AGR-511: Modern Concepts in Crop Production

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory

Section-A: Crop growth analysis in relation to environment, agro-ecological zones of India. Quantitative agro-biological principles and inverse yield nitrogen law; Mitscherlich yield equation its interpretation and applicability; Baule unit.

Section-B: Effect of lodging in cereals; physiology of grain yield in cereals; optimization of plant population and planting geometry in relation to different resources, concept of ideal plant type and crop modeling for desired crop yield.

Section-C: Scientific principles of crop production; crop response production functions; concept of soil plant relations; yield and environmental stress.

Section-D: Integrated farming systems, organic farming, and resource conservation technology including modern concept of tillage; dry farming; determining the nutrient needs for yield potentiality of crop plants, concept of balance nutrition and integrated nutrient management; precision agriculture.

Practical

Time: 3 Hours

Analysis of Growth & Development; leaf area index, Crop Growth rate, Relative growth rate, etc; Estimation of yield, mulching, cropping scheme, crop rotation, comparison of chemical & organic farming; Quality standards for organic farming.

M.Sc. Ag. (AGRONOMY)

SEMESTER-I

AGR-512: Soil Fertility and Nutrient Management

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week : 04+6

Instructions for the Paper Setters:

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

Theory

Section-A: Soil fertility and productivity – factors affecting; features of good soil management; problems of supply and availability of nutrients; relation between nutrient supply and crop growth; organic farming – basic concepts and definitions. Criteria of essentiality of nutrients; Essential plant nutrients – their functions, nutrient deficiency symptoms; transformation and dynamics of major plant nutrients.

Section-B: Preparation and use of farmyard manure, compost, green manures, vermicompost, biofertilizers and other organic concentrates their composition, availability and crop responses; recycling of organic wastes and residue management.

Section-C: Commercial fertilizers; composition, relative fertilizer value and cost; crop response to different nutrients, residual effects and fertilizer use efficiency, fertilizer mixtures and grades; agronomic, chemical and physiological methods of increasing fertilizer use efficiency; nutrient interactions.

Section-D: Time and methods of manures and fertilizers application; foliar application and its concept; relative performance of organic and inorganic manures; economics of fertilizer use; integrated nutrient management; use of vermicomposting and residue wastes in crops.

Practical:

Time: 3 Hours

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.

M.Sc. Ag. (AGRONOMY)

SEMESTER-I

AGR-513: Principles and Practices of Water Management

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory

Section-A: Water and its role in plants; water resources of India, major irrigation projects, extent of area and crops irrigated in India and different states. Soil water movement in soil and plants; transpiration; soil-water-plant relationships; water absorption by plants; plant response to water stress, crop plant adaptation to moisture stress condition.

Section-B: Soil, plant and meteorological factors determining water needs of crops; scheduling, depth and methods of irrigation; micro irrigation system; fertigation; management of water in controlled environments and polyhouses.

Section-C: Water management of the crops and cropping systems; quality of irrigation water and management of saline water for irrigation; water use efficiency.

Section-D: Excess of soil water and plant growth; water management in problem soils; drainage requirement of crops and methods of field drainage, their layout and spacing.

Practical:

Time: 3 Hours

Measurement of soil water potential by using tensiometer, pressure plate and membrane apparatus; soil-moisture characteristics curves; water flow measurements using different devices; determination of irrigation requirements; calculation of irrigation efficiency; determination of infiltration rate; determination of saturated? Unsaturated hydraulic conductivity.

M.Sc. Ag. (AGRONOMY)

SEMESTER-I

TWC-514 Technical Writing and Communication Skills

Time:-3 hours

Max. Marks: 50
Theory Marks: 37
Internal Assessment: 13
Periods per week: 02+0

Instructions for the Paper Setters:

- 1) The question paper will consist of seven skill-oriented questions.
- 2) The first 6 Questions carry 5 marks each. There will be internal choice wherever possible
(6x5=30 Marks).
- 3) There will be one essay type question out of two parts of the course. The student has to attempt any one of the two in about 150 words (1x7=7 Marks)

Course Contents:

1. **Technical Writing**-Various forms of technical writing-theses, technical papers, reviews, electronic communication etc; qualities of technical writing; parts of research communications- title page, content page, authorship, preface, introduction, review of literature, materials and methods, experimental results, documentation; photographs and drawings with suitable captions; pagination; citations; writing of abstracts; précis; synopsis; editing and proof reading.

2. **Communication Skills**-defining communication; types of communication- verbal and non-verbal; assertive communication; using language for effective communication; paraphrasing; vocabulary building- word roots, prefixes.

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *The Written Word* by Vandana R Singh, Oxford University Press

M.Sc. Ag. (AGRONOMY)

SEMESTER-I

SSC-410

Soil Chemistry and Bio Chemistry (Minor)

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+06

Instructions for the Paper Setters:

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

Theory

Section-A: Soil colloids–nature, properties, origin of charges and their significance; Cation and anion exchange phenomena and their importance; Introduction to ionic adsorption and fixation; **Section-B:** Soil reaction and buffering; Distribution, characterization, genesis and amelioration of acid, acid sulphate, saline, saline-sodic, sodic and calcareous soils; Plant reaction and tolerance to soil salinity, sodicity and acidity;

Section-C: Chemical and electro chemical properties of submerged soils; Organic matter and characterization of clay –organic matter interaction ;

Section-D: Biochemical decomposition of organic manures and farm wastes, composting and vermicomposting .Biochemistry of humus formation and biogas production .

Practical:

Determination of the effect of dilution and salinity on soil pH; Active and potential acidity; Cation and anion exchange capacity and exchangeable cations; Soluble salts in soils; Lime and gypsum requirements. Nutrient adsorption and fixation capacities of soils; Estimation of biochemical constituents of organic residues- cellulose, hemi-cellulose, lignin and C: N ratio. Preparation of enriched compost, biofertilizers and vermiculture

M.Sc. Ag. (AGRONOMY)

SEMESTER-I

STA-415: Statistical Methods for Research Workers

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory

Section-A: Probability and fitting of standard frequency distribution, sampling techniques, sampling distributions, mean and standard error.

Section-B: Simple partial, multiple and intra- class correlation and multiple regression.

Section-C: Tests of significance, students'-t, chi-square and large sample tests, confidence intervals.

Section-D: Analysis of variance for one way and two way classification with equal cell frequencies, transformation of data.

Practical:

Time: 3 Hours

Fitting of distributions, samples and sampling distributions, correlation and regression, tests of significance and analysis of variance.

Note: Students shall be trained to use computer to analysis the data, using available softwares. However, during university examination students will use scientific calculators to analyse the data.

M.Sc. Ag. (AGRONOMY)

SEMESTER-II

AGR-521: Principles and Practices of Weed Management

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory:

Section-A: Weed biology and ecology, crop-weed competition including allelopathy; principles and methods of weed control and classification; weed indices.

Section-B: Herbicides introduction and history of their development; classification based on chemical, physiological application and selectivity; mode and mechanism of action of herbicides.

Section-C: Herbicide structure activity relationship; factors affecting the efficiency of herbicides; herbicide formulations, herbicide mixtures; herbicide resistance and management; weed control through bio-herbicides, mycoherbicides and allelochemicals; Degradation of herbicides in soil and plants; herbicide resistance in weeds and crops; herbicide rotation.

Section-D: Weed management in major crops and cropping systems; parasitic weeds; weed shifts in cropping systems; aquatic and perennial weed control. Integrated weed management; cost: benefit analysis of weed management.

Practical:

Time: 3 Hours

Identification of important weeds of different crops; preparation of a weed herbarium; weed survey in crops and cropping systems; crop-weed competition studies; preparation of spray solutions of herbicides of high and low-volume sprayers; use of various types of spray pumps and nozzles and calculation of swath width; economics of weed control; herbicide residue analysis in plant and soil; bioassay of herbicide residue; calculation of herbicidal requirement.

M.Sc. Ag. (AGRONOMY)

SEMESTER-II

AGR-522: Agronomy of Oil Seeds, Fibre and Sugar Crops

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+6

Instructions for the Paper Setters:

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

Theory:

Origin, history, area and production, classification, improved varieties, adaptability, climate, soil water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of Rabi, oilseeds –

Section-A: Rabi Oilseeds-Rapeseed and mustard, linseed.

Section-B: Kharif oilseeds-Groundnut, sesame, castor, sunflower, soybean etc.

Section-C: Fiber Crops-Cotton, jute, sunhemp etc.

Section-D: Sugar crops – Sugar-beet and sugarcane.

Practical:

Time: 3 Hours

Planning and layout of field experiments; cutting of sugarcane setts, its treatment and methods of sowing, tying and propping of sugarcane; determination of cane maturity and calculation on purity percentage, recovery percentage and sucrose content in cane juice phonological studies at different growth stages of crop; intercultural operations in different crops; cotton seed treatment; working out growth indice (LER, CGR, RGR, NAR, LAD) aggressivity, relative crowding coefficient, monetary yield advantage and ATER of prominent intercropping systems; judging of physiological maturity in different crops;; working out harvest index; working out cost of cultivation of different crops; estimation of crop yield on the basis of yield attributes; formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities; determination of oil content in oilseeds and computation of oil yield; estimation of quality of fibre of different fibre crops; study of seed production techniques in various crops; visit of field experiments on cultural, fertilizer, weed control and water management aspects; visit to nearby villages for identification of constraints in crop production.

M.Sc. Ag. (AGRONOMY)

SEMESTER-II

AGR-523:

Field Plot Techniques

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory

Section-A: Planning field experiments - objectives, selection of field and treatment. Conduct of the experiment, precautions during sowing management, harvesting and threshing - Sampling. **Section-B:** Recording biometrical observations. Source of error in the field experiments and methods of reducing it. Optimum plot size and number of replications.

Section-C: Selection of experimental designs. Rotational experiments. Experiments to study the effect of years and locations compilation, presentation and interpretation of the data.

Section-D: Factorial experiments and interaction effects. Different tests of significance. Correlation and response functions. Transformation of data.

Practical:

Time: 3 Hours

Actual layout of field experiments. Critical examination of experiments scientific journals. Compilation and interpretation of the given data. Missing lots and analysis of variance results. Use of computers for analysis

M.Sc. Ag. (AGRONOMY)

SEMESTER-II

AGR-524

Advanced Trends in Agronomy

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory:

Section-A: Agro-physiological basis of variation in yield. Recent advances in soil- plant- water relationship. Globalization of agriculture and WTO.

Section-B: Precision agriculture. Contract farming. Organic farming, marketing and export potential of organic products, certification, labeling and accreditation procedures.

Section-C: Crop residue management in multiple cropping systems. Latest developments in plant management, weed management, cropping systems, grassland management and allelopathy. GIS, GPS and remote sensing for crop management.

Section-D: Global warming. GM crops. Seed production technology. Seed certification, seed multiplication, hybrid seed production etc. Concepts of system agriculture, holistic approach of farming systems, dryland farming, sustainable agriculture and research methodology in Agronomy.

Practical:

Various methods of crop residue management, Latest Techniques in weed management, Computer applications in crop production, Latest techniques in water management, Recent methods of rice-wheat cultivation, Agronomy of new crops.

M.Sc. Ag. (AGRONOMY)

SEMESTER-II

AGP-524

Advanced Crop Growth and Productivity

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+6

Instructions for the Paper Setters:

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

Theory:

Section-A: Physiological limitations to crop yield. Growth analysis- concept, indices, validity and limitations. Growth curves, sigmoid, polynomial and asymptotic.

Section-B: Root systems, root-shoot relationship. Principles involved. Concept and differentiation of inter and mixed cropping, criteria in assessing the yield advantages. Competitive relationship and competition functions, biological and agronomic basis of yield advantage.

Section-C: Physiological principles of dry land crop production, constraints and remedial measures. Heat unit concept of crop maturity, and its types.

Section-D: Concept of plant ideotypes, crop physiological and new ideotypes, characteristics of ideotype for wheat, rice, maize, etc. Concept and types of growth hormones, their role in crop production.

Practical:

Study of root & shoot system in relation to external environment, Yield evaluation in intercropping system, Study of field experiments relevant to dryland farming, visit to dryland and soil conservation research stations and watershed projects. Farm operations in raising fodder crops; Canopy measurement, yield and quality estimation.

M.Sc. Ag. (AGRONOMY)

SEMESTER-II

SSC-420

Soil Fertility and Fertilizer Use (Minor)

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+6

Instructions for the Paper Setters:

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

Theory

Section-A: Plant growth – factors affecting, growth equations; Plant nutrients-functions, deficiency symptoms;, content and distribution in soils;

Section-B: Nutrient toxicities nutrient transformations, retention and availability; Nutrient interactions; Nutrient removal by crops; Methods of soil fertility evaluation; Maintenance of soil fertility;

Section-C: Fertilizers and their fate in soils; Crop responses to fertilizers; Fertilizer use efficiency; Principles of time and mode of fertilizer application; integrated use of fertilizers and manures;

Section-D: Nutrient release and carry -over effects; Current fertilizer production and consumption, future trends and needs in India.

Practical:

Time: 3 Hours

Analysis of soils for different forms of nitrogen, phosphorus, potassium and sulphur; Determination of DTPA extractable micronutrients; Plant analysis for nitrogen, phosphorus, potassium, calcium, magnesium and sulphur; Diagnosis and management of nutrient deficiencies and toxicities.

M.Sc. Ag. (AGRONOMY)

SEMESTER-II

STA-425: Experimental Designs for Research Workers

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment: 38

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory:

Section-A: Need for designing of experiments- characteristics of a good design, basic principles- randomization, replication and local control, uniformity trials- size and shape of plots and blocks, analysis of variance and interpretation of data.

Section-B: Completely randomized, randomized block and latin square design, multiple comparison tests, factorial experiments- interpretation of main effects and interactions,

Section-C: Orthogonality and partitioning of degrees of freedom confounding in 2^3 , 2^4 and 3^3 designs, split and strip plot designs, crossover designs and balanced incomplete block designs, response surface designs, switch over trials and long term experiments;

Section-D: Selection of experimental design, mechanical errors in field experiments and methods of reducing it, presentation of research results.

Practical:

Uniformity trials, completely randomized, randomized block and latin square designs, missing plot and analysis, of covariance, 2^3 , 2^4 and 3^3 simple and confounded experiments, split and strip plot designs, cross over Uniformity trials, completely randomized, randomized block and latin square designs, missing plot and analysis, of covariance, 2^3 , 2^4 and 3^3 simple and confounded experiments, split and strip plot designs, cross over and balanced incomplete block designs.

Note: Students shall be trained to use computer to analysis the data, using available softwares. However, during university examination students are allowed to use scientific calculators to analysis is the data.

Note: Students are allowed to use scientific calculator in University examinations; statistical tables will be provided to students in examinations. No rigorous mathematical proofs are expected from students; stress will be on application only.

M.Sc. Ag. (AGRONOMY)

SEMESTER-III

AGR-531: Agronomy of Major Cereals and Pulses

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment =38

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory:

Origin, history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of:

Section-A: Kharif cereals

Section-B: Rabi cereals

Section-C: Kharif pulses

Section-D: Rabi pulses

Practical:

Time: 3Hours

Phonological studies at different growth stages of crop; estimation of crop yield on the basis of yield attributes; formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities; working out growth indices (CER, CGR, RGR, NAR, LAD); aggressiveness, relative crowding coefficient, monetary yield advantage and ATER of prominent intercropping systems of different crops; estimation of protein content in pulses; planning and layout of field experiments; judging of physiological maturity in different crops; intercultural operations in different crops; determination of cost of cultivation of different crops; working out harvest index of various crops; study of seed production techniques in various crops; visit of field experiments on cultural, fertilizer, weed control and water management aspects and visit to nearby villages for identification of constraints in crop production.

M.Sc. Ag. (AGRONOMY)

SEMESTER-III

AGR-532: Principles and Practices of Organic Farming

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment =38

Periods per week: 04+6

Instructions for the Paper Setters:

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

Theory:

Section-A: Organic farming - concept and definition, its relevance to India and global agriculture and future prospects;

Section-B: land and water management - land use, minimum tillage; shelter zones, hedges, pasture management, agro-forestry. Organic farming and water use efficiency; soil fertility, nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures and biofertilizers.

Section-C: Farming systems, crop rotations, multiple and relay cropping systems, intercropping in relation to maintenance of soil productivity. Control of weeds, diseases and insect pest management, biological agents and pheromones, biopesticides.

Section-D: Socio-economic impacts; marketing and export potential: inspection, certification, labeling and accreditation procedures; organic farming and national economy.

Practical:

Time: 3 Hours

Aerobic and anaerobic methods of making compost; making of vermicompost; identification and nursery raising of important agro-forestry trees and trees for shelter belts; efficient use of biofertilizers, technique of treating legume seeds with Rhizobium cultures, use of Azotobacter, Azospirillum, and PSB cultures in field; visit to an organic farm; quality standards, inspection, certification and labeling and accreditation procedures for farm produce from organic farms.

M.Sc. Ag. (AGRONOMY)

SEMESTER-III

SSC-430

Fertilizer Technology (Minor)

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment =38

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory:

Section-A: Fertilizer industry in India; Raw materials; Manufacture of different types of fertilizers including reactions and flow diagrams;

Section-B: Granulation, segregation, caking, drying and cooling of fertilizers;

Section-C: Complex, mixed, liquid, suspension and slow release fertilizers;

Section-D: Production of fertilizers containing secondary and micronutrients; changing trends in fertilizer technology.

Practical:

Collection of soil and fertilizer samples; Preparation of standard solutions. Colorimetric and flame photometric methods; Analysis of soil for fertilizer recommendations and suitability for orchard plantation; Gypsum and lime requirements of soil; Analysis of fertilizer for quality control; Planning and formulation of project on establishment of soil and fertilizer testing laboratories. Visit to fertilizer factories.

M.Sc. Ag. (AGRONOMY)

SEMESTER-III

BOT-430

Time: 3 Hours

Physiology of Growth and Development

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment =38

Periods per week: 04+3

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3. In all nine questions should be asked, of which first question of 15 marks (Comprising of 10 short answer type questions covering the whole syllabus) will be compulsory.
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Theory:

Concepts of growth, differentiation and pattern formation; growth curves, meristems, growth kinetics, factors affecting growth and general aspects of development, level of differentiation, control of development at genetic level. Hormones and growth regulators - auxins, gibberellins, cytokinins, ethylene, ABA, other inhibitors, retardants, polyamines, aliphatic alcohols, brassins, hormonal regulation of growth and development, plant movements; photoperiodism, phytochrome, flowering hormones, vernalization, abscission, ageing, senescence; physiology of seed and fruit development; seed germination; seed and bud dormancy. Plant physiology and agriculture.

Practical:

Experiments on growth measurements, hormonal bioassays, plant movements; experiments on quality of light on seed germination, breaking of dormancy. Experiments on photoperiodism. Experiments on hormonal regulation of development.

M.Sc. Ag. (AGRONOMY)

SEMESTER-III

AGM-430

Fundamentals of Agroclimatology (Minor)

Time: 3 Hours

Max. Marks: 150

Theory: 75

Practical: 37

Internal assessment =38

Periods per week: 04+3

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

Theory:

Section-A: Survey of the atmosphere; introduction to basic meteorological processes; nature, receipt and disposal of solar radiation;

Section-B: Atmospheric humidity and forms condensation; Evaporation and evapotranspiration ; Winds, air masses and disturbance ;

Section-C: Influence of climate on plants, animals and pests; Meteorological droughts; indices in agroclimatology ;

Section-D: Agroclimatic classifications and their application; field climate modification.

Practical:

Meteorological instruments and their use in the measurement of agroclimatic environment; Measurement of field climate; Computation of agroclimatic indices-GDD, PTU, PET etc; Determining crop production sensitivity to weather.

M.Sc. Ag. (AGRONOMY)

SEMESTER-III

CREDIT SEMINAR

Total Marks: 100
Periods per week: 03

M.Sc. Ag. (AGRONOMY)

SEMESTER-IV

AGR-541:

Cropping Systems and Sustainable Agriculture

Time: 3 Hours

Max. Marks: 100

Theory: 50

Practical: 25

Internal assessment =25

Periods per week: 04+3

Instructions for the Paper Setters:

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

Theory

Section-A: Cropping systems: definition, indices and its importance; physical resources, soil and water management in cropping systems; assessment of land use. Concept of sustainability in cropping systems and farming systems, scope and objectives;

Section-B: Production potential under monoculture cropping, multiple cropping, alley cropping, sequential cropping and intercropping, mechanism of yield advantage in intercropping systems. Above and below ground interactions and allelopathic effects; competition relations; multi-storied cropping and yield stability in intercropping,

Section-C: Role of non-monetary inputs and low cost technologies; research need on sustainable agriculture. Crop diversification for sustainability; role of organic matter in maintenance of soil fertility; crop residue management;

Section-D: fertilizer use efficiency and concept of fertilizer use in intensive cropping system. Plant ideotypes for drylands; plant growth regulators and their role in sustainability

Practical:

Time: 3 Hours

Preparation of Models of different Cropping Systems. Interaction Studies of different component Crops. Assessment of yield Advantages i.e. CEY, LER, RYT, Assessment of Land Use and Economic Evaluations.

M.Sc. Ag. (AGRONOMY)

SEMESTER-IV

AGR-542: Dry Land Agriculture and Water Shed Management

Time: 3 Hours

Max. Marks: 100

Theory: 50

Practical: 25

Internal assessment =25

Periods per week: 04+3

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

Theory:

Section-A: Definition, concept and characteristics of dry land farming; dry land versus rainfed farming; significance and dimensions of dry land farming in Indian agriculture.

Section-B: Soil and climatic parameters with special emphasis on rainfall characteristics; constraints limiting crop production in dry land areas; types of drought, characterization of environment for water availability; crop planning for erratic and aberrant weather conditions. Stress physiology and resistance to drought, adaptation of crop plants to drought, drought management strategies; preparation of appropriate crop plans for dry land areas; mid contingent plan for aberrant weather conditions.

Section-C: Tillage, tith, frequency and depth of cultivation, compaction in soil tillage; concept of conservation tillage; tillage in relation to weed control and moisture conservation; techniques and practices of soil moisture conservation (use of mulches, kinds, effectiveness and economics); **Section-D:** Antitranspirants; soil and crop management techniques, seeding and efficient fertilizer use. Concept of watershed resource management, problems, approach and components.

Practical:

Time: 3 Hours

Seed treatment, seed germination and crop establishment in relation to soil moisture contents; moisture stress effects and recovery behaviour of important crops; estimation of moisture index and aridity index; spray of anti-transpirants and their effect on crops; collection and interpretation of data for water balance equations; water use efficiency; preparation of crop plans for different drought conditions; study of field experiments relevant to dryland farming; visit to dryland research stations and watershed projects.

M.Sc. Ag. (AGRONOMY)

SEMESTER-IV

RESEARCH WORK

S/US

Periods per week: 04