COURSE CONTENTS
B.Sc. (Ag) Second Year Odd Semester

S.No.	Course Title	Credit Hrs	Theory		Practical	Total
			Ex.	Int.		
1.	Vegetable Production	2+1	35	15	25	75
2.	Irrigation water management	2+1	35	15	25	75
3.	Principles of Plant Breeding & Breeding of Field Crops	3+1	35	15	25	75
4.	Soil Fertility and Nutrient Management	2+1	35	15	25	75
5.	Agri. Marketing and International Trade	2+1	35	15	25	75
6.	Field Crops (Kharif)	2+1	35	15	25	75
7.	Crop Disease and their Management	2+1	35	15	25	75
Total		**15+7=22**	**245**	**105**	**175**	**525**

Paper I. Vegetable Production

Importance of vegetable in human nutrition and national economy, factors affecting vegetable productivity viz. light, temperature, moisture, oxygen, Co_2 minerals, nutrients, Soil reaction, disease and insect; types of vegetable farming; types of classification of vegetable viz. botanical, seasonal, classification based on cold hardiness, parts used, duration of crop; weed management, use of bio regulators, seed production, harvesting and marketing.

Cultivation practices viz. time of sowing, nursery management, transplanting, sowing/ planting distance, recommended cultivars, seed rate, manure and fertilizers does, harvesting, storage, physiological disorders, diseases and insects pests and their control measure of various vegetable crops namely potato, tomato, onion, garlic, okra, sweet corn peas, beans, cucurbitaceous croup-pumpkin, bottle gourd, sponge gourd, ridge gourd, pointed gourd, bitter gourd, cucumbers etc.

Practical

Identification of vegetable crops seed, study of morphological characters; practice of nursery raising. Transplanting of seedlings and direct seed sowing in the field; fertilizer application by different methods; raising of vegetable seed crops, seed extraction; harvesting and preparation for market; economics of vegetable production.

Paper II. Irrigation water management

Water resources of India, sources of irrigation water demand, supply and resources development of irrigation, soil moisture and its characteristics , soil water potential, retention and movement of soil water , water intake and infiltration. Moisture sensitive stage, water availability and nutrient up take.

Scheduling of irrigation based on sol moisture status, physiological stage of crop and meteorological parameters, irrigation under limited water supply conditions. Methods of irrigation; surface irrigation, flooding, furrow, border and basin irrigation. Sub-irrigation; drip and sprinkler irrigations.

Water stress and plant growth, effect of water stress on physio-morphological characteristics and productivity of plant, deficit irrigation and strategy for optimizing yield. Water quality standards and its suitability for irrigation, water use efficiency, agronomic techniques to boost water use efficiency, factors affecting water use-efficiency. Irrigation management in soil with low intake rate, saline and alkali soil, soil with shallow ground water table and in poorly drained soil.

Water requirement of crops, factor affecting the water requirement of crops method of determining water requirement, effective rainfall, evapo transpiration and potential evapo transpiration and consumptive use irrigation requirement of major crops.

Practical

Soil moisture measuring instruments, measurement of soil and plant water status with the help of different instruments. Measurement of irrigation water and efficiency of different methods. Use of meteorology data in scheduling irrigation, scheduling of irrigation on the basis of ET demand of crops, measurement of ground water, irrigation water quality determination, exercise on field capacity, PWP, Bulk density, consumptive use, irrigation water requirement, irrigation plan for a farm and fertilizer application with pressurize irrigation system.

Paper III. Principal of Plant Breeding & Breeding Field Crops

Historical development of plant breeding, plant breeding concept nature and role of plant breeding, major achievements and future prospects, genetics in relation to plant breeding, modes of reproduction, self incompatibility and sterility. Plant breeding materials, domestication, centers of origin, center of diversity, acclimatization and genetic variation and heritability.

Breeding methods in self pollinated crops: introduction, selection- pure-line theory, multilane varieties, hybridization techniques and handling of segregation population, hardy- weinberg law, methods of breeding crops pollinated crops, systesyntheticm of mating, heterosis and inbreeding depression, development of inbred lines and hybrids and varieties, breeding methods in asexually propagation crops, clonal selection and hybridization, polyploidy in relation to plant

breeding, mutation breeding-methods, uses, nature of gene mutation, muagenic agents, induced mutation in plant breeding, breeding for important biotic and abiotic stresses, and use of bio-technology in plant breeding, procedure for release of new varieties.

Crop systematic, species relationship, floral biology and inheritance of economically important character, breeding objectives- development of varieties with desired yield, adaptability, stability, disease and pest resistance and quality (Physical, chemical, nutritional and marketing); important varieties along with parentage and characteristics , future thrust area in varietal improvement in crops like whet, rice maize, soybean, field pea, urd bean and rapeseed- mustard, sunflower, groundnut, sorghum, sugarcane, potato, cotton and tobacco.

Practical

Germ plasm of various crops. Floral structure and biology of self –pollinated and cross-pollinated crops. Self incompatibility, emasculation and hybridization techniques in self pollinated crops. Study of variation in segregation population for qualitative and quantitative in self pollinated crops. Study mean, range, variances, standard deviation and genetic advance; heterosis and inbreeding depression. Prediction of performance of double cross hybrids. Comparative study of selection method in self-pollinated crops. Induction of polyploidy through colchicines and other methods. Induction of mutation through chemical mutagens eg. EMS etc.
Germ plasm, breeding trials in field and features of the varieties of the region of crops viz. whet, barley, pea maize, sugarcane, rapeseed, mustard, sunflower , oat, potato, urd bean and cotton.

Paper IV. Soil fertilizer and Nutrient Management

History of plant nutrition and soil fertilizer and productivity, problems of fertility in India; plant growth and development, factor affecting plant growth; essential plant nutrients, their role and deficiency and toxicity symptoms; ion exchange phenomena in soil and its role in plant nutrient availability; movements of nutrients from soil to plant roots, their uptake and translocation.

Chemistry of soil nitrogen- Nitrogen cycle, mineralization and immobilization, properties and use of inorganic an organic nitrogenous fertilizer in crop production ; chemistry of phosphorus in soil, phosphate fixation and availability; chemistry of potassium in soil, potash fixation and availability; properties fixation and use of phosphorus and potassium fertilizers, chemistry of calcium, magnesium and their sources and usage; soil fertilizer evaluation and fertilizer recommendations; bio fertilizer; integrated nutrient management; methods and time of application of fertilizers, efficient use of fertilizers.

Practical

Estimation of total and different inorganic forms of nitrogen in soil. Determination of available nitrogen, phosphorus, potassium sulphate and micronutrients in soil. Estimation of cataion exchange capacity and exchange bases in soil. Interpretation of soil test data/report.
Determination of moisture. Total N, water soluble P and soluble K in fertilizers. Rapid plant tissue tests and use of soil water plant test kit. Field trip for studying visual symptoms of nutritional disorders in plants.

Paper V. Agriculture Marketing & International Trade

Concept of marketing human needs and marketing, the marketing mix, the marketing strategy, product planning, promotion. Physical distribution and pricing; marketing at different levels of development, function of prices and role of price in economic development; marketing planning and organization; elements of marketing mix concept of marketing segment, market segmentation, basis of market segmentation, Type of markets, classification of consumer behavior, consumers of farm products factors affecting demand and consumption of farm products; supply of farm products; product decision and strategies, product life cycle and new product development, characteristic of farm firm, farm products and farm production, spatial and temporal distribution of farm products, supply, marketed and marketable surplus, factors affecting supply marketed surplus and marketable surplus of farm products; women's role in agriculture produce marketing; pricing and promotion strategies market structure, determination of price under alternate market structures price movement overtime, seasonal cyclical and trend, marketing communication, advertising, publicity, personnel selling and sales promotion; marketing function, exchange function's buying and selling physical function storage, transportation and processing; facilitating function – packaging, branding, financing, market information, grading etc. Management of marketing functions, marketing channel's stages of marketing, selection and management of marketing channels for farm products; meaning and components of marketing cost, price spread and market margins, marketing efficiency, concept and measurements of marketing efficiency; Role of government in Agriculture marketing, public sector institution- CACP, FCL, CWE, DMI, Fair price shops, EXIM Banks etc.

The concept and importance of inter-regional and international trade; emerging scenario of international trade in Agriculture commodities; basic theories of international trade; concept of terms of trade and BOP, implications of new GATT agreement (WTO).

Practical

Plotting and study of demand and supply curves and calculation of their elasticity. Relationship between market arrivals and prices of some selected agricultural commodities and their temporal behavior. Acquaintance with pricing methods. Visit to local agricultural markets and cooperative marketing societies to study their organization, functioning and performance. Collection of data

from the agriculture markets for some selected commodities to study the marketing margins and costs. Class discussion on marketing practical and problems related to major produce cereals, pulses, oilseeds, livestock and livestock products. Application of comparative cost advantage principles in international trade.

Paper VI. Field Crops I (kharif)

Origin, geographic distribution, economic importance, soil and climate requirement, varieties, cultural practices yield of kharif crops. Cereals-rice, maize, sorghum, pearl millet and finger millet; pulses-Pigeonpea, mungbean and urdbean; oilseeds-groundnut sesame and soybean crops-cotton, jute and sunhemp; and farage crops sorghum, maize, cowpea, cluster bean and napier.

Practical

Rice nursery preparation and their transplanting. Sowing of soybean, pigeon pea, mung bean, maize, ground nut and cotton. Effect of seed on germination and seedling vigor of soybean/ groundnut. Effect of sowing depth on germination of soybean. Identification of seeds in rice, maize and soybean fields and study of weed control experiments in these crops. Top dressing of nitrogen in maize and rice and study of fertilizer experiments on rice, maize, sorghum millets. Study of yield contributing characters, yield calculation, harvesting and yield estimation of above crops. Study of crop varieties and important agronomic experiment. Study of forage experiments.

Paper VII. Crop Disease and their management

Wheat disease-rusts, loose smut, kernel bunt, powdering mildew, *Alternaria* blight, khaira and tungro; maize disease- stalk rots, downy mildews, leaf spots and helminthosporium leaf spots; sorgam disease-smuts. Grain mold, anthracnose and strigaa; bajra disease-downy mildews and ergot; Sugarcane disease-red rot, smut wilt; groundnut disease- Sclerotinia stem rot, and Alternaria blght; white rust, downy mildew, Sclerotinia rot, and bacterial rot Soybean disease-Rhizoctonia blight, pot blight, seed rot, bacterial pustlle, seeding blight and mosaic; pigeon pea diseases- phytophthora blight, wilt and sterility mosaic; gram disease- wilt, grey mould and ascochyta blight; lentil disease- rust and wilt; cotton disease anthracnose, vascular wilt, and black gram; tobacco diseases- damping off, early and late blight scurf, common scab, bacterial wilt and virus diseases; Tamato diseases- damping off, late and early blight, wilts root knot and virus diseases; Brinjal diseases- Phomopsis blight, fruit rot, Sclerotinia rot bacterial wilt and rot knot, chilies diseases- anthracnose and virus diseases, vegetable crucifer diseases- damping off, Downey mildew, and black rot; vegetable cucurbit diseases- downy mildew, powdery mildew, fusarium wilt and mosaic, Pea diseases; powdery and rust, Bean disease- anthracnose, blights, and virus diseases; scab, collar rot powdery mildew, fire blight, stem black and brown, pink

diseases, Papaya diseases- stem and foot rot, leaf curl, and mosaic, citrus- canker, anthracnose, citrus decline and virus diseases; Peach and pear diseases- leaf curl, brown rot, and guvava- wilt, anthracnose and stem canker.

Practical

Color preservation of disease plant materials and dry preservation concept and method, study of the three wheat rust (black rust, brown rust and yellow rust), specimens of plants with references to symptomatology and casual fungi; Study of the loose smut and kernel bunt diseases of wheat- comparative differences between casual fungi and symptoms, study of bacterial blight of rice with references to symptomatology and casual bacterium- microscope studies. Differential staining and identification of plant pathogenic bacteria. Study of sorghum smuts, ergot of bajra and downey mildew of bajara symptomatology and morphological characteristics of the casual fungi, study of red rot of sugarcane and cercospora leaf spots of groundnut- symptomatology and characteristics of the casual fungi. Histopathological studies of *Albugo candida* casusing white rust of mustard. Mung bean yellow mosaic-symptoms and transmission through white fly vector, *Bemisia tabaci*. Histopathological studies of wilts (*Fusarium oxysporum*) of chickpea and cotton. Study of the late blight and early blight and mosaic diseases of potato and isolation and microscope study of root knot nematode, *Meloidogyne incognita*. Study of mango malformation and powdery mildew of mango, etiology and historical and study of citrus canker, apple scab and guvava application of fungicides; sprayers and dusters and disease measurement concerning prevalence, incidence and severity etc.