NATIONAL EDUCATION POLICY-2020, Dr. B.R. AMBEDKAR UNIVERSITY, AGRA
PAPER CODING AND CREDIT DISTRIBUTION
M.Sc. (SEED TECHNOLOGY)

S.No.	Name of Degree	SEMESTER	TITLE OF PAPER	CREDITS	CODE NUMBER
1	Bachelor (Research) of Science in Seed Technology	VII	Morphology and Development of seed	4	B210701T
			Seed Physiology	4	B210702T
			Plant Breeding for Crop Improvement	4	B210703T
			Principles of Seed Production in Field Crops	4	B210704T
			Practical	4	B210705P
			Research Project		
2		VIII	Seed Biotechnology	4	B210801T
			Seed Testing	4	B210802T
			Seed Production in Fruit, flower, spices and medicinal plants	4	B210803T
			Seed production in vegetables crops	4	B210804T
			Practical	4	B210805P
			Research Project/ Industrial training/ Survey	8	B210806R
		One Minor Paper to be selected from OTHER FACULTY in VII or VIII Semester		4/5/6	
3	Master of Science in Seed Technology	IX	Seed Pathology	4	B210901T
			Seed Entomology	4	B210902T
			Seed processing and storage	4	B210903T
			Hybrid seed production	4	B210904T
			Practical	4	B210905P
			Research Project		
4		X	Seed certification and quality control	4	B2101001T
			Seed production techniques in fiber, forage and green manure crops	4	B2101002T
			Seed Marketing and Farm Management	4	B2101003T
			Emerging trends in seed quality enhancement	4	B2101004T
			Practical	4	B2101005P
			Research Project/ Industrial training/ Survey	8	B2101006R
5	P.G.D.R.	XI	Instrumentation in seed technology	6	B2101101T
			Biostatistics and Computer Application	6	B2101102T
			Research Methodology	4	B2101103T
			Research Project	Qualifying	B2101104R

Students of Science Faculty may choose **MINOR** paper from: Faculty of Commerce/ Arts, Humanities, Agriculture Science and Social Sciences/ Languages/Fine Art and Performing Art/Education/Rural Science.

10/11/22

SYLLABUS

M.Sc. SEED TECHNOLOGY

DR. B. R. AMBEDKAR UNIVERSITY

AGRA (U.P.) 282002

Course Contents

SEMESTER - VII

Paper I

(Code No. B210701T) **(Morphology and Development of Seed)**

Unit I

Flower type, Flower structure in relation to seed development, Types of Seed, Reproductive process in plant, Importance and characteristics of seeds. Seed morphology of important plants and their identification. Type of ovule and placentation. Basic structure of cell and cell division.

Unit II

Micro/Megasporogenesis, Micro/Megagametogenesis, Pollination mechanism and control of pollination. Fertilization, barriers of fertilization, Pollen physiology, Preservation and sterility.

Unit III

Development of embryo, endosperm and seed coat. Different types of embryo, endosperm – development and structure of crop plants.

Unit IV

Seed and seed coat structure. Morphology, Genetics and cytogenetic of seed development and seed dispersal. Structure and development of seed. Polyembryony, Apomixis: Classification, significance and its utilization in hybrid seed production.

Unit V

Parthenocarpy and induced parthenogenesis. Seed maturation, Seed sterility and its causes; Causes of embryo abortion. Types of fruits and their development. Factors affecting seed set.

10/11/22

Paper II

(Code No. B210702T) **(Seed Physiology)**

Unit I

Chemical composition of seed and their significance in seed quality, Seed ripening and maturation process, Synthesis, accumulation and mobilization of food reserves(Carbohydrate, Fats and proteins) during germination., Physiology of seed development and maturation.

Unit II

Germination and factors affecting germination, Biochemistry and physiology of germination, Respiration pathway during germination, Role of different organs of seed in germination,

Unit III

Enzymatic activities during germination, Involvement of hormones and growth regulators in seed germination, Effect of age, size and position of seed on germination, Seed viability, methods to minimize the loss of viability and test of viability in different crops. Seedling establishment, role of endosperm and embryo size in seedling establishment and Seedling abnormalities.

Unit IV

Seed vigour, its concept, factors affecting seed vigour, Phsiological and genetical basis of seed vigour, Vigour tests, Effect of seed vigour on crop performance and yield. Biochemical methods, Electrophoresis, Phenol colour test, Peroxidase test and GA_3 test.

Unit V

Seed dormancy: definition, types and mechanism, Advantages and disadvantages of dormancy; Involvement of hormones and growth regulators in seed dormancy. Seed deterioration: Causes and factors influencing seed deterioration. Physiological, biochemical and cytological changes in seeds during storage and its implication on seed quality; methods to minimize the seed deterioration.

Paper III

(Code No. B210703T) **(Plant breeding for crop improvement)**

Unit I

Definition, history, nature, scope and objectives of Plant breeding. Achievement and future prospect of organisation for crop improvement in India. Plant breeding techniques and hybridization in self and cross pollinated crops, self and crossing techniques of various crops.

Unit II

Genetic basis of crop improvement : (a) Mendelian principles of inheritance (b) Gene interaction (c) Genetic and Environmental variation (d) Inheritance of quantitative traits. Tests of significance: t-test, X^2 tests for goodness of fit.

Unit III

Definition and concept of hybrid vigour, Inbreeding depression, Genetic, Physiological and biochemical basis of heterosis, Haploid breeding and its role in development of inbreeds, studies on one line system hybrid development, Possible ways of heterosis fixation, Exploitation of heterosis at commercial scale in crops, Maize, Pearl millet, Sorghum, Sunflower, Castor, Pigeonpea and Cotton, Calculation of heterosis and its importance in crop improvement, Handling of segregating population, F_1 hybrid.

Unit IV

Male sterility and its type and role in exploitation of hybrid vigour in crop plants, Role of marker genes. Genetic male sterility, Self incompatibility, its genetics and role in hybrid seed production, gametocides and its use in hybrid seed production, problem and prospects of hybrid vigour in self and cross pollinator plants. Use of growth regulator in hybrid seed production, Two or three line system of hybrid seed production, Development of A, B and R line.

Unit V

Methods of Plant breeding: (a) Introduction and Acclimatization, (b) Selection (1) Mass Selection, (2) Pure Line Selection and (3) Clonal Selection, (c) Hybridization and (d) Mutation breeding, Polyploid breeding and Breeding for disease resistance.

Paper IV

(Code No. B210704T) **(Principles of seed production in field crops)**

Unit I

Introduction: concept of seed technology, Quality seed and its importance: role of improved seed in India agriculture, Seed industry in India, Development of seed programme, Basic principles of seed production- genetic principles and agronomic principles, Factors affecting seed production.

Unit II

Seed production techniques of following field crops with special emphasis on land requirement, isolation requirement, cultural practices, male sterility, rouging, field inspection, insect and disease control, harvesting and threshing, pre-processing care, sealing and bagging of following cereals: Rice, Wheat, Maize, Barley, Sorghum and Pearl millet.

Unit III

Seed production techniques of following field crops with special emphasis on land requirement, isolation requirement, cultural practices, male sterility, rouging, field inspection, insect and disease control, harvesting and threshing, pre-processing care, sealing and bagging of following Pulses: Red gram, Black gram, Green gram, Chick pea, Pea, Lentil and Rajmah.

Unit IV

Seed production techniques of following field crops with special emphasis on land requirement, isolation requirement, cultural practices, male sterility, rouging, field inspection, insect and disease control, harvesting and threshing, pre-processing care, sealing and bagging of following Oilseeds: Groundnut, Castor, Mustard, Sunflower, Safflower, Sesame and Soyabean.

Unit V

Seed production organisation at national and international levels, System of release and notification of varieties for general cultivation, Compact area approach in seed production, Classes of seed and maintenance of nucleus and breeder seed. Seed village concept and community seed bank.

Practical

Study of floral biology of monocots and dicots. Seedd coat: its structure, texture in relation to permeability, imbibition of water, heterostyly. Micro and Megasporogenesis. Pollen morphology, pollen germination and pollen sterility. Monocot and dicot embryos. External and internal structure of monocot and dicot seeds. Maturity indices. Study of cell and cell division.

Proximate analysis of chemical composition of seeds, germination metabolism, methods for breaking and inducing dormancy in various crop species, vigour tests, kinetics of imbibition and leakages of solutes from hydrated seeds. Volatile aldehyde tests, accelerated ageing tests, quantitative tetrazolium tests, activity of enzymes, respiratory rates, position, weight and size of seed in relation to germination.

Seed production planning in different crops with special reference to land and isolation requirement, Rouging, Harvesting and Threshing. Nucleus, Breeder, Foundation and certified seed production in crops like wheat, rice, potato, lentils and mustard. Hand emasculation and pollination and hybrid seed production. Nursery requirement of different vegetables and flower crops. Seedling age for transplanting.

Sessional record and Viva-Voce

SEMESTER - VIII

Paper V

(Code No. B210801T) **(Seed Biotechnology)**

Unit I

Introduction and brief history of biotechnology, Scope of biotechnology in conservation of quality seeds and their improvement, Tools and techniques of tissue culture.

Unit II

Procedures in Tissue culture: Preparation of media, Plant hormones and their role in development, Fumigation, wet and dry sterilization, ultraviolet sterilization, ultra filtration and surface sterilization

Unit III

Problems encountered in genetic conservation, production of haploids, embryo culture and embryo rescue technique, Anther and pollen culture, production of dihaploids and their utility

Unit IV

Cryopreservation of seed, plant material and callus principles and techniques, *In vitro* flowering, production and maintenance of disease free clones through tissue culture.

Unit V

Genetic purity analysis of seeds, Application of different techniques, Viz: identification of marker proteins, isozyme analysis, Introduction of RFLP and RAPD techniques and their applicability, Impact of biotechnology on agriculture.

Paper VI

(Code No. B210802T) **(Seed Testing)**

Unit I

Seed testing: Introduction, history and development of seed testing, National and International organizations and seed testing linkages, seed testing laboratory layout and furnishing, seed testing equipments and their maintenance, seed testing laboratory management and functioning.

Unit II

Seed Sampling: definition, objectives, seed-lot and its size; types of samples; sampling devices; procedure of seed sampling; sampling intensity; methods of preparing composite and submitted samples; sub-sampling techniques, dispatch, receipt and registration of submitted sample in the laboratory, sampling in the seed testing laboratory. Physical Purity: definition, objective and procedure, weight of working samples for physical purity analysis; components of purity analysis and their definitions and criteria; pure seed definitions applicable to specific genera and families; multiple seed units; general procedure of purity analysis; calculation and reporting of results, prescribed seed purity standards.

Unit III

Seed moisture content: importance of moisture content; equilibrium moisture content; principles and methods of moisture estimation - types, instruments and devices used; pre-drying and grinding requirements, procedural steps in moisture estimation; calculation and reporting of results. Germination: importance; definitions; requirements for germination, instrument and substrata required; principle and methods of seed germination testing; working sample and choice of method; general procedure for each type of method; duration of test; seedling evaluation; calculation and reporting of results.

Unit IV

Viability and Vigour Testing: definition and importance of viability tests; different viability tests; quick viability test (TZ- test) - advantages, principle, preparation of seeds and solutions, procedure, evaluation and calculation of test results. Vigour testing: concept, historical development, definitions, principles and procedures of different methods used for testing vigour.

Unit V

Genetic purity testing : objective and criteria for genetic purity testing; types of test; laboratory, Growth Chamber and field testing based on seed , seedling and mature plant morphology; principles and procedures of chemical, biochemical and molecular tests. Seed health Testing: field and seed standards ; designated diseases, objectionable weeds - significance of seed borne disease vis-a-vis seed quality - seed health testing and detection methods for seed borne fungi, bacteria, viruses and nematodes.

Paper VII

(Code No. B210803T) **(Seed production in fruits, flower, spices and medicinal plants)**

Unit I

Scope for seed production in fruits, flowers, spices and medicinal crops; factors influencing seed production and quality; propagation methods- seed and clonal propagation; seed and seedling standards; propagation and seed production techniques in major tropical, sub tropical and temperate fruit crops; seed orchards- seed collection, extraction processing and storage techniques.

Unit II

Seed production techniques in commercially important flower crops- nursery management, clonal propagation, planting, seed crop management, post harvest seed handling and storage techniques., viz Rose, Chrysanthemum, gladiolus, Tuberose, Orchids, Dahlia, Marigold, Carnation etc.

Unit III

Seed production techniques in commercially important fruit crops- nursery management, clonal propagation, planting, seed crop management, post harvest seed handling and storage techniques. viz Mango, Guava, Papaya, Jackfruit, Amla, Citrus etc.

Unit IV

Seed production techniques in commercially important seed spices and other spices nursery management, sowing, seed crop management and post harvest seed handling and storage techniques., viz Coriander, Capsicum, Black pepper, Fenugreek, Fennel, Cardamom etc.

Unit V

Methods of quality seed production in commercially important medicinal plants- nursery management, sowing, seed crop management, post harvest handling and storage methods., viz Tulsi, Fenugreek, Ashwagandha, Coriander etc.

Paper VIII

(Code No. B210804T) **(Seed production in vegetable crops)**

Unit I

History and objectives of vegetable breeding, History and scope of vegetable seed industry in India, Categories of seeds, Factors influencing seed production, Agro techniques for seed production of vegetable crops, Hybrid seed production, Pollination: Control mechanism, Natural crop pollination, hybrization techniques in vegetables, Breeding methods in vegetables.

Unit II

Seed production techniques of following vegetable crops with special emphasis on land and climate requirement, isolation requirement from practices, rouging, field inspection, plant protection, harvesting and threshing, pre-processing care, sealing and bagging: 1. Fruit vegetables: Tomato, Brinjal, Okra, Chilli, Cucurbits 2. Cole vegetables: Cauliflower, Cabbage, Knol-Khol

Unit III

Seed production techniques of following vegetable crops with special emphasis on land and climate requirement, isolation requirement from practices, rouging, field inspection, plant protection, harvesting and threshing, pre-processing care, sealing and bagging: 1. Leaf vegetables: Spinach, Lettuce, Amaranthus. 2. Root vegetables: Radish, Turnip, Carrot. 3. Bulb crops: Onion and Garlic.

Unit IV

Seed plot techniques in potato tuber seed production; hybrid seed production technology of vegetable crops, TPS (true potato seed) and its production techniques; hybrids in vegetables; maintenance of parental lines; use of male sterility and self incompatibility in hybrid seed production, environmental factors related to flowering/bolting in vegetable crops.

Unit V

Share of vegetable seeds in seed industry; importance and present status of vegetable industry; intellectual property rights and its implication, impact of PVP on growth of seed industry.

Practical

Familiarity with organisation and components of tissue culture and biotechnology laboratory. Different laboratory procedures Viz; Sterilization of space, instruments, plant material and inoculation procedures etc. Composition of various culture media, their preparation, sterilization, handling etc. Introduction to techniques of pollen culture, anther culture and suitable media preparation.

Sampling and submission of samples to seed testing laboratory, sample registration, determination of the relative efficacy of various mixing and dividing techniques, obtaining working samples, physical purity analysis and reporting results. Testing of the germination substrata and determination of substrate quality and reporting results. Methods of breaking dormancy and tetrazolium test, moisture test, Oven method, Visit to seed testing laboratory, Field inspection at different crop growth stages.

Nursery requirement of different vegetables, flower and other crops. Seedling age for transplanting. Floral structure and seed identification, hand emasculation and pollination for hybrid seed production.

Sessional Record, Study Tour and Viva- voce.

SEMESTER - IX

Paper IX

(Code No. B210901T) **(Seed Pathology)**

Unit I

Introduction: Terminology, Historical development, seed health testing and significance of seed borne disease. Seed borne pathogens: Fungi, Bacteria, Virus and nematodes. Location of seed borne inoculums: Embryo, endosperm, perisperm, seedcoat, pericarp and glume: Seed contamination or infestation.

Unit II

Mechanism of seed infection: Systemic infection through flower, fruit or seed stalk, penetration through stigma, ovary wall and seed coat, natural openings and injuries. Factors affecting seed infection: host genotype, environment, crop management, stages of plant infection, severity of mother plant infection, insect infestation, antagonism and synergism. Longevity of seed borne pathogens and the factors influencing longevity.

Unit III

Seed transmission: Systemic and non-systemic, Factors affecting seed transmission: Crop species, environment, inoculums and its survival, cultural practices, seed abnormalities, seed germination, seed lechates and presence of other microflora.

Unit IV

Detection of seed borne pathogens: major objectives of seed health testing, procedures of seed health testing for seed borne fungi, seed borne bacteria, seed borne virus and seed borne nematodes. Deterioration of grains by storage fungi: field and storage fungi, invasion by storage fungi, losses, condition favouring storage fungi, development, detection of damage and control.

Unit IV

Seed treatment: Procedure and equipments, Seed certification and tolerance limits of seed borne pathogen. Seed act in relation to seed borne disease. Ecological relationship of seed borne microorganisms. National and international co-operation in seed pathology. Quarantine for seed.

Paper X

(Code No. B210902T) **(Seed Entomology)**

Unit I

Principle of seed entomology, Role of insect in seed production, General organisation of insects, Method of insect classification. Stages of insect development: Complete and incomplete metamorphosis

Unit II

Important insect- pest of seed crops and stored seeds, their nature of damage and management.

1. Cereals- Paddy, Maize, Wheat and Sorghum.

2. Pulses- Pigeonpea, Mung, Cowpea, Urd, Chickpea, Pea.

3. Oil seed- Mustard, Castor, Linseed, Groundnut.

4. Vegetable seeds and dry fruits.

Unit III

Types of beneficial insect and their role in seed production, Type of insect pollinators, their uses in crop pollination, Honey bee, their social structure and management. Apiculture (Bee keeping).

Unit IV

Definition and various methods of insect- pest control, Different pesticides and their handling, Fumigants and methods of fumigation, Monitoring insect pest and mites in storage, Nature of damage and losses caused and factors influencing them, Detection of infestation

Unit V

Seed protectants and their impact on seed viability, IPM strategies for important pest, Types of equipments and their principles, Safe handling, maintenance and use of machines, Rodents and their control in field and seed godowns.

Paper XI

(Code No. B210903T) **(Seed Processing and storage)**

Unit I

Place and importance of seed processing in the path way of seed improvement, Concept and objectives of seed processing, physical characteristics used to separate seeds, basic flow pattern in seed processing. Preparing seed for processing: The scalper, the debearder, the scarifer, maize sheller – licensing of machines.

Unit II

Seed drying: importance and advantage of seed drainage, moisture content of recalcitrant and orthodox seeds and methods of seed moisture measurement, theory of seed moisture measurement, theory of seed drying, methods of seed drying (wet –dry seeds), advantage of mechanical drying over sun drying, construction and operation of mechanical drying equipment, dehumidification and drying of heat sensitive seeds. Relative humidity and equilibrium moisture content of seeds. The air screen cleaner cum grader, vibrating action on a seed separating screen, penetration and contention of seeds on a screen, selection of screen for seed separation, adjustment of air screen cleaners for improved efficiency, cleaning of air seed cleaning machines.

Unit III

Indented disc and indented cylinder separators, construction and operation of indented disc separator, construction and operation of indented cylinder separators, adjustments of indented disc and indented cylinder separators. Specific gravity separation: parts of the machines, separations of seeds on the separating deck, adjustments of specific gravity separators, starting and operating acquences, separation problems and their rectification, recleaning the middling product. The stoner, aspirators and pneumatic separators. Surface texture separation: The roll mill, parts of the machine separating action on the adjustments cleaning roll mills. Affinity for liquid separation, the magic separators and its separating action.

Unit IV

Shapes of roundness separations, the spiral separators separating action and operations of spiral separators, the draper belt separator, electrostatic separators, cleaning the spiral separators, colour separator. Quality control

and measurement of machine performance in seed processing plants indices of machine performance, sampling of product of rejected from seed handling machines, seed blending. Seed treatment: Seed treatment equipment, slurry seed treater, mist-o-matic seed treater; parts of the machines, Construction and operation, labelling of treated seed and related precautions,storage of treated seed, machine operators and seed users safety.

Unit V

Site selection for seed processing plant on a seed production farm, layout of a machines in a seed processing plant for efficient product and non movements mechanical injury to seeds in post harvest phase, conservation of energy and production in seed processing, maintenance and repair of seed processing equipment. Seed conveyors and elevators, Packaging marketing seeds, bagger weigher, bag closing, portable and conveyors type bag closers, leveling and maintaining lot identity, lot numbers, seed pellets, handling and stacking, maintenance of seed processing records. Seed storage: Importance and factors affecting it. Seed storage structure: Construction, operation and maintenance, insulation storage- aeration, air conditioning, dehumidification and stacking, moisture and heat proofing of seed storage structures, seed storage management.

Paper XII

(Code No. B210904T) **(Hybrid Seed Production)**

Unit I

Heterosis: definition, expression and estimation of hybrid vigour; utilization of heterosis in agricultural crop plants for crop improvement.

Unit II

Pre requisites for hybrid seed production; mechanism and management of pollination in autogamous and allogamous crops; genetic constitution of varieties, hybrids and basic principles in seed production.

Unit III

Techniques of hybrid seed production- emasculation and crossing: use of self incompatibility, modification of sex; types of male sterility and exploitation in hybrid development and its use in hybrid seed production; development and maintenance of A, B and R lines.

Unit IV

Fertility restoration; use of chemical hybridizing agents, problems of non synchrony in flowering of parental lines and methods to overcome; planning ratios and population density in relation to hybrid seed yield.

Unit V

Salient features of hybrid seed production of various crops viz., rice, sorghum, bajra, maize, sunflower, cotton and other major vegetables.

Practical

Techniques of seed health testing- visual examination of seeds, washing test, incubation method, embryo count method, seed soaked method for the detection of certain seed borne pathogen. Method of seed treatment.

Identification and collection of important storage seed and grain pests, knowledge about fumigation and various types of tools for dusting and spraying insecticides.

Effect of temperature, moisture and length of storage on seed viability. Accelerated ageing test. Visit to processing and storage plant.

Methods of hybrid seed production in different crops; planting of parental lines. Maintenance of A, B and R lines and production of breeder seeds; stable diagnostic characteristics of parental lines and their hybrids, genetic purity tests, determination of cost of hybrid seed production of various crops, visit to seed production plot etc.

Sessional Record and Viva voce.

SEMESTER - X

Paper XIII

(Code No. B2101001T) **(Seed Certification and Quality control)**

Unit I

Seed certification: Concept and history of seed certification, classes of seed and phases of seed certification. Seed certification agency and its organisation and seed certification standards.

Unit II

Management of seed certification programme, Seed certification schemes, future trends in seed certification and land requirements and isolation distance

Unit III

Principles of field inspection, Techniques of field inspection of seed production plot varieties and hybrids of cereals, pulses, oilseeds, forage, fibre crops, potato and vegetables, inspection at harvesting , threshing and processing., sampling for seed quality evaluation, issue of certificates and tags, sealing, testing of genetic purity of seed in grow out test particular of cotton.

Unit IV

New seed policy (1988) Provisional seed certification, Composition and function of Central Seed Committee, Central Sub-Committee on crop standards, Notification at release, Central Seed Certification Board, State Committee, Plant variety protection- Plant breeders rights.

Unit V

Seed quality control: Introduction and its concepts, Physical purity, germination, health and genetic purity. Concepts of varietal variation-heritable and non-heritable characters. Seed quality control system, Seed legislation

Paper XIV

(Code No. B2101002T) **(Seed production techniques in fibre, forage and green manure crops)**

Unit I

Scope and importance of seed production in fibre, forage and green manure crops, factors influencing seed production, seasonal influence; problems and constraints in seed production, seed set, shattering and seed dormancy; vegetative and clonal propagules and apomictic seed.

Unit II

Quality seed production techniques in major fibre crops – Cotton and Jute

Unit III

Quality seed production techniques in major fodder crops – Lucerne, hedge lucerne, leucaena, fodder sorghum, fodder maize and oats

Unit IV

Seed and planting material production techniques of major forage crop – legumes, maize and bajra.

Unit V

Seed production techniques in major green manure crops – sunhemp and daincha.

Paper XV

(Code No. B2101003T) **(Emerging trends in seed quality enhancement)**

Unit I

Concept and significance of seed quality enhancement; physical, chemical and pesticidal seed treatments, history, principles and methods of seed treatment, methodology and factors affecting seed enhancement treatments.

UNIT-II

Seed priming: physiological and biochemical basis, types of priming technology, biochemical and molecular changes associated, pregermination, film coating and pelleting, seed tapes, seed mats, seed colouring, biopriming.

UNIT-III

Synthetic seeds – Aim and scope for synthetic seeds, historical development, somatic embryogenesis, somaclonal variation and their control, embryo encapsulation systems, hardening of artificial seeds, cryopreservation, storage of artificial seeds, desiccation tolerance, use of botanicals in improving seed quality etc.

UNIT IV

Detection and identification of pests including use of recent techniques like ELISA, PCR etc., Symptoms of pest damage, salvaging techniques for infested/infected germplasm, post-entry quarantine operation, seed treatment and other prophylactic treatments and facilities; Domestic quarantine; seed certification; International linkages in plant quarantine; weaknesses and future thrust.

UNIT V

Genetically modified seeds or genetically engineered plants (GEPs), Concepts of biosafety, risk analysis and consequences of spread of GE crops on the environment.

Paper XVI

(Code No. B2101004T) **(Seed Marketing and Farm Management)**

Unit I

Seed Marketing: Its definition and importance, Types of markets: domestic and global, their problems and prospective, Marketing policies, Seed marketing schemes, marketing channels, responsibilities of dealers

Unit II

Demand and supply, price equilibrium, seed transportation, storage – costs and returns, cost of processing and packaging, marketing organisation for seed marketing, seed market in India: structure and working.

Unit III

Seed dispatch procedures and forms, Seed store records and its maintenance, Seed market survey, projection of demand and supply for different kinds of seeds in India, Seed Pricing.

Unit IV

Field of seed farm management, scope, basic principles in farm management, law of diminishing, return opportunity cost, most profitable combination of inputs and output, decision making approach, operation and control, cost and capital investment and cost analysis.

Unit V

Farm Business Analysis: Farm size, factors affecting profit and economic size of farm, Budget and record keeping, farm efficiency measures, farm records and their use.

Practical

General procedures of seed certification, identification of weeds and other crops seeds as per specific crops, field inspection at different stages of crops and observations of records and reporting of results, physical purity tests, germination tests, moisture tests, grow out test, visit to seed testing laboratory and seed certification agency.

Estimation of costs of seed production, marketing costs and margins of seeds of different crops, case studies to compare public and private sectors in different condition, impact analysis, seed pricing, cost benefit ratio, economic feasibility of seed industry etc.

Seed treating equipments- slurry and mist -o- matic seed treater, priming-hydration and dehydration of seeds, study on the effect of priming. Method of hydrogel encapsulation on artificial endosperms, hydrophobic coating.

Sessional record, Educational tour and Viva- voce.