DEVI AHILYA VISHWAVIDYALAYA, INDORE (MP)

M.Sc. Seed Technology

Syllabus 2015 Onward

Examination Scheme Semester-I

Paper No.	Nomenclature of Paper	Max. Marks		Minimum Passing Marks	
		Theory	CCE	Theory	CCE
I	Introduction To Seed Technology	85	15	28	05
II	Floral Biology, Seed Development And Maturation	85	15	28	05
III	Seed Physiology	85	15	28	05
IV	Principles Of Seed Production	85	15	28	05
Practical		100		40	

Examination Scheme Semester-II

Paper No.	Nomenclature of Paper	Max. Marks		Minimum Passing Marks	
		Theory	CCE	Theory	CCE
I	Seed Production Of Cereals, Pulses & Oil Seeds	85	15	28	05
II	Seed Production In Vegetables, Fiber & Fodder Crops	85	15	28	05
III	Seed Processing & Storage	85	15	28	05
IV	Seed Quality Testing	85	15	28	05
Practical		100		100	

Examination Scheme Semester-III

Paper No.	Nomenclature of Paper	Max. Marks		Minimum Passing Marks	
		Theory	CCE	Theory	CCE
I	Seed Legislation And Certification	85	15	28	05
II	Seed Pathology	85	15	28	05
III	Seed Entomology	85	15	28	05
IV	Plant Breeding	85	15	28	05
Practical		100		100	

Examination Scheme Semester-IV

Paper No.	Nomenclature of Paper	Max. Marks		Minimum Passing Marks	
		Theory	CCE	Theory	CCE
I	Seed Marketing & Management	85	15	28	05
II	Statistic And Computer Application In Agriculture	85	15	28	05
III	Project/Thesis	200			
IV	Two Seminars (based on Paper I and II)	100			

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DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2016-2017

M.Sc. Seed Technology

Semester-I (Paper – 1)

INTRODUCTION TO SEED TECHNOLOGY

85+15=100

UNIT I

1- **Seed technology** - Seed technology-introduction, aims of seed technology, role of seed technology in modern agriculture, relation of seed technology with other disciplines.
2- History of seed technology in India, seed development programme, basis and types of seed programme.
3- Characteristics of good seed.
4- National Seed Corporation (NSC) and State farm corporation (SFC).

UNIT II

Seed –

1- definition, types of seeds, difference between seed and grain, class of improved seed.
2- External and Internal morphology of seeds of Rice, Wheat, Maize, Chickpea and Soybean.
3- Factors affecting seed morphology.

UNIT III

1- **Terminator seed**- method, terminator technology, advantages and disadvantages of terminator seed.
2- BT cotton & its modern agriculture.
3- **Synthetic seed**-introduction, components of synthetic seed technology.
4- Somatic embryo, production of synthetic seed, application of synthetic seed.

UNIT IV

1- **Plant tissue culture** –introduction, nutrient media, utilization.
2- **Transgenic seeds**-introduction, GEAC (Genetically Engineered Agricultural Crops).
3- Development and Utilization of transgenic seed. Testing for the presence of GE (Genetically engineered)/GM (Genetically modified) seeds.
4- Transgenic Crops- Tomato, Brinjal and Soybean.

UNIT V

1- **Variety of seeds** -characteristics and maintenance.
2- Patent- requirement, limits and breeding procedure with special reference to India.
3- Plant variety protection, World trade organization, the protection of plant varieties and farmers right act 2001.

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Suggested Readings

1- Jaima Kigel,J and G.Galili,1997. Seed development and germination,Marcel Dekker, New York.
2- Kozlowaski,T.T. 1972.Seed Biology, Volume 1, Academic Press, London.
3- Kha,A. 1977. The Physiology and Biochemistry of seed dormancy and germination, North Holland Publishing Co., Amsterdam.
4- Rai,M. and S. Mauria,1995. Hybrid Research and Devlopment. IARI, New Delhi.

18/1/16 13.1.16 (Dr. S. Mishra)

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2016-2017

M.Sc. Seed Technology

Semester-I (Paper – 2)

FLORAL BIOLOGY, SEED DEVELOPMENT AND MATURATION

85+15=100

UNIT I

1- **Floral biology**-floral types, structure and biology in relation to pollination mechanisms.
2- Microsporogenesis and megasporogenesis.
3- Development of male and female gametophytes and their structures.
4- Effect of environmental factors on floral biology.

UNIT II

1- **Pollination**- types adaptation, advantages & disadvantages, differences between self & cross pollination.
2- Structure, development and types of ovules.
3- Embryosac- Structure and types (mono, bi and tetrasporic embryo sacs).
4- Fertilization –Double fertilization and triple fusion, factors affecting fertilization.

UNIT III

1- **Embryogeny** - development of typical monocot and dicot embryos;
2- Endosperm development and types.
3- Modification of food storage, structures with reference to crop plants.
4- Cotyledons, development and their structure in representative crop plants with reference to food storage.
5- Seed coat structure and development in representative crop plants.

UNIT IV

1- **Apomixis** – identification, classification, significance and its utilization in different crops for hybrid seed production.
2- Polyembryony - types and significance; haplontic and diplontic sterility.
3- Embryo abortion- causes & rescue.

UNIT V

1- **Parthenogenesis and Parthenocarpy** – Definition, natural and induced parthenocarpy
2- Development of seedless fruit crops and their commercial exploitation
3- Advantages and disadvantages of parthenogenesis and parthenocarpy.

Suggested Readings

1- Bewley, J.D. and L. Black. 1982. Physiology and Biochemistry of seeds in relation to germination, Vol. 1 and Vol. 11 , Springer Verlag, Berlin Heiderbe New York.
2- Jaima Kigel, J and G. Galili, 1997. Seed development and germination Marcel Dekker, New York.
3- Kha, A. 1977 The Physiology and Biochemistry of seed dormancy and germination Nirth Holland Publishing Co., Amsterdam, New York

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4- Kozlowski, T.T. 1972 Seed Biology, Vol 1 Academic Press London.
5- Bhojwani SS & Bhatnagar SP. 1999. *The Embryology of Angiosperm*. Vikas Publ.
6- Black M, Bewley D & Halmer P. 2006.*The Encyclopedia of SeedsScience, Technology and Uses. CABI.*
7- Chhabra AK. 2006. Practical Manual of Floral Biology of Crop Plants. Deptt. Of Plant Breeding, CCS HAU, Hisar.

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DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2016-2017

M.Sc. Seed Technology

Semester-I (Paper – 3)

SEED PHYSIOLOGY

85+15=100

UNIT I

1- Steps of seed formation, Physiology of seed development and maturation.
2- Chemical composition of seed.
3- Synthesis and accumulation of seed reserves such as lipid, protein, carbohydrates.
4- Induction of desiccation tolerance, hormonal regulation of fruit, seed development.

UNIT II

1- Seed germination; factors affecting seed germination.
2- Physiological processes during seed germination.
3- Role of embryonic axis; growth hormones and enzyme activities, effect of age, size and position of seed on germination.
4- Seed respiration, breakdown of stored reserves in seeds, mobilization and inter conversion pathways.

UNIT III

1- Seed germination in pea, chick pea, castor, soybean, radish, maize, and wheat.
2- Seed dormancy- types, significance, mechanism, endogenous and exogenous factors regulating dormancy.
3- Role of phytochrome and PGR, genetic control of dormancy.

UNIT IV

1- Seed viability and longevity, pre and post-harvest factors affecting seed viability.
2- Seed ageing, physiology of seed deterioration causes of seed deterioration.
3- Lipid per oxidation and other viability theories.
4- Means to prolong seed viability; mechanism of desiccation sensitivity and recalcitrance with respect to seed longevity.

UNIT V

1- Seed vigour and its concept.
2- Vigour test methods, factors affecting seed vigour.
3- Physiological basis of seed vigor in relation to crop performance and yield.
4- Seed invigoration and its physiological and molecular control.

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Practical

Proximate analysis of chemical composition of seed; methods of testing viability; kinetics of seed imbibitions and solute leakage; seed germination and dormancy breaking methods; seed invigoration and priming treatments; accelerated ageing and controlled deterioration tests; enzymatic activities and respiration during germination and effect of accelerated ageing; vigour testing methods etc.

Suggested Readings

1- Agrawal PK & Dadlani M. (Eds.). 1992. *Techniques in Seed Science and Technology*. South Asian Publ.
2- Baskin CC & Baskin JM. 1998. Seeds: Ecology, Biogeography and Evolution of Dormancy and Germination. Academic Press.
3- Basra AS. 2006. Handbook of SeedScience and Technology. Food Product Press.
4- Bench ALR & Sanchez RA. 2004. *Handbook of Seed Physiology*. Food Product Press.
5- Bewley JD & Black M. 1982. Physiology and Biochemistry of Seeds in Relation to Germination. Vols. I, II. Springer Verlag.
6- Bewley JD & Black M. 1985. Seed: Physiology of Seed Development and Germination. Plenum Press.
7- Copeland LO & Mc Donald MB. 1995. *Principles of Seed Science and Technology*. 3rd Ed. Chapman & Hall.
8- Khan AA. 1977. Physiology and Biochemistry of Seed Dormancy and Germination. North Holland Co.
9- Kigel J & Galili G. (Eds.). *Seed Development and Germination*. Marcel Dekker.
10- Murray DR. 1984. *Seed Physiology.* Vols. I, II. Academic Press.
11- Sadasivam S &Manickam A. 1996. *Biochemical Methods*. 2nd Ed. New Age.

18/01/16 18.1.16 (Dr. S. Mishra)

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2016-2017

M.Sc. Seed Technology

Semester-I (Paper – 4)

PRINCIPLES OF SEED PRODUCTION

85+15=100

UNIT I

1- Introduction: Seed as basic input in agriculture.
2- Seed development in cultivated plants; seed quality concept and importance of genetic as physical purity in seed production.
3- Types of cultivars, their maintenance and factors responsible for deterioration.
4- Seed production in self and cross (Pigeon pea, Maize, Wheat, and Soybean) pollinated crops.

UNIT II

1- Mode of pollination and reproduction in crop plants and their modification in relation to hybrid seed production.
2- Principles of hybrid seed production, isolation distance, synchronization of flowering, rouging etc.
3- Male sterility and incompatibility system in hvbrid seed production.
4- Role of pollinators and their management.

UNIT III

1- Seed multiplication ratios, seed replacement rate, demand and supply.
2- Suitable areas of seed production and storage, agronomy of seed production agro climatic requirements and their influence on quality seed production.
3- Generation system of seed multiplication; Production technology of Nucleus Breeder, Foundation and Certified seeds.
4- Causes for its deterioration of seed quality certification standards for self and cross pollinated and vegetatively propagated crops.

UNIT IV

1- Hybrid Seed - Methods of development of hybrids.
2- One, two (A, B) and three line (A, B and R) system; maintenance of parental lines of hybrids.
3- Planning and management of hybrid seed production technology of major field crops (Maize, Sorghum) and vegetables (Tomato, Brinjal).

UNIT V

1- Planning of seed production for different classes (Nucleus, breeder, foundation &Certified) of seeds for self and cross pollinated crops.
2- Seed quality control system and organization, seed village concept.
3- Seed production agencies, seed industry and custom seed production in India.

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Suggested Readings

1- Anon 1997 Seed Technology in Tropoes ISTA Zurich.
2- Desai. B.B., P.M. Kotecha and DK Salunkha 1997 Seeds hand book biology, production, processing and storage. Marcel Dekker New York.
3- Sinclair T.R. and F.P. Gardner, 1977. Principles of Ecology in plant production, CAB international G.K.
4- Rai, M. and S. Mauria, 1995. Hybrid Research and Development. Indian Society of Seed Technology, IARI, New Delhi.
5- Feistrizer,P and A.F. Kelly,1978. Improved Seed Production,FAO,Rome.
6- Habbiethwaite,P.D.,1980.Seed-Production,butter worths,London-Boston,Sydney Wellington-Durban Toronto.
7- Bagga,S.S. and Bagga,S.K.1998. An introduction in hybrid cultivar development. Narosa Pub.House,New Delhi.
8- Agarwal RL. 1997. *Seed Technology*. 2nd Ed. Oxford & IBH.
9- Chhabra AK. 2006. Practical Manual of Floral Biology of Crop Plants. Dept. of Plant Breeding CCS HAU, Hisar.

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DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015 -2016

M.Sc. Seed Technology

Semester-I

Practical – I (Based on Paper I-II)

TIME= 4 Hrs **MAX MARKS =50**

1-	Major Exercise – 1 (Based on Paper I)	– 8
2-	Major Exercise – 2 (Based on Paper II)	– 8
3-	Minor Exercise – 1 (Based on Paper I)	– 5
4-	Minor Exercise – 2 (Based on Paper II)	– 5
5-	Sporting (1-5)	– 10
6-	Viva	– 04
7-	Seasonal / Seed album	– 10
		- **50**

Practical – II (Based on Paper III-IV)

TIME= 4 Hrs **MAX MARKS =50**

1-	Major Exercise – 1 (Based on Paper I)	– 8
2-	Major Exercise – 2 (Based on Paper II)	– 8
3-	Minor Exercise – 1 (Based on Paper I)	– 5
4-	Minor Exercise – 2 (Based on Paper II)	– 5
5-	Sporting (1-5)	– 10
6-	Viva	– 04
7-	Seasonal / Seed album	– 10
		- **50**

(Dr. S. Mishra)

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

M.Sc. Seed Technology

Semester-II (Paper – 1)

SEED PRODUCTION OF CEREALS, PULSES & OIL SEEDS

85+15=100

UNIT I

1- Basic principles in seed production and importance of quality seed.
2- Floral structure, breeding and pollination mechanism in self-pollinated cereals and millets viz, Wheat, Barley, Paddy and Ragi.

UNIT II

1- Floral structure, breeding and pollination mechanism in cross-pollinated cereals and millets viz Maize, Sorghum, Bajra.

UNITE III

1- Floral structure, breeding and pollination mechanism; methods and techniques of seed production in pulses viz Pigeon pea, Chick pea, Green gram.

UNIT IV

1- Floral structure, breeding and pollination mechanism; methods and techniques of quality seed production in minor oil seeds viz Safflower, Mustard, Linseed, and Sesame.

UNIT V

1- Floral structure, breeding and pollination mechanism; methods and techniques of seed production in major oil seeds viz Groundnut, Castor, Sunflower and Soybean.

Practical

Planning of Seed Production, requirements for different classes of seeds in field crops - unit area and rate; Seed production in cross pollinated crops with special reference to land, isolation, planting ratio of male and female lines, synchronization of parental lines and methods to achieve synchrony; supplementary pollination, pollen storage, hand emasculation and pollination in Cotton, detasseling in Corn, identification of rogues and pollen shedders; Pollen collection, storage, viability and stigma receptivity; gametocideapplication and visits to seed production plots etc.

Suggested Readings

1- Kelly AF. 1988. *Seed Production of Agricultural Crops*.
2- John Wiley. McDonald MB Jr & Copeland LO. 1997. *Seed Production: Principles and Practices*. Chapman & Hall.
3- Sinclair T.R. and F.P. Gardner, 1977. Principles of Ecology in plant production, CAB international G.K.
4- Rai, M. and S. Mauria, 1995. Hybrid Research and Development. Indian Society of Seed Technology, IARI, New Delhi.
5- Feistrizer,P and A.F. Kelly,1978. Improved Seed Production,FAO,Rome.

6- Habbiethwaite,P.D.,1980.Seed Production,butter worths,London-Boston,Sydney Wellington-Durban Toronto.
7- Bagga,S.S. and Bagga,S.K.1998. An introduction in hybrid cultivar development. Narosa Pub.House,New Delhi.
8- Agarwal RL. 1997. *Seed Technology*. 2nd Ed. Oxford & IBH.
9- Chhabra AK. 2006. Practical Manual of Floral Biology of Crop Plants. Dept. of Plant Breeding CCS HAU, Hisar.

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DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

M.Sc. Seed Technology

Semester-II (Paper – 2)

SEED PRODUCTION IN VEGETABLES, FIBER & FODDER CROPS

85+15=100

UNIT I

1- Floral structure, breeding and pollination mechanism; methods and techniques of seed Production in fiber producing plants/crops viz Cotton Jute and Sun hemp.

UNIT II

1- Floral structure, breeding and pollination viz mechanism; methods and techniques of seed production in major vegetable plants/crops viz Onion, Tomato, Radish and Lady's finger.

UNIT III

1- Floral structure, breeding and pollination mechanism; methods and techniques of seed production in spices yielding plants viz Chili, Coriander and fennel.

UNIT IV

1- Floral structure, breeding and pollination mechanism; methods and techniques of seed Production in vegetatively propagated crops like Sugarcane, Potato, Turmeric and Ginger.

UNIT V

1- Floral structure, breeding and pollination mechanism; methods and techniques of seed production in fodder and fiber crop viz Barseem, Lucerne, Maize and Oats

Practical

Planning of Seed Production, requirements for different classes of seeds in field crops - unit area and rate; Seed production in cross pollinated crops with special reference to land, isolation, planting ratio of male and female lines, synchronization of parental lines and methods to achieve synchrony; supplementary pollination, pollen storage, hand emasculation and pollination in Cotton, detasseling in Corn, identification of rogues and pollen shedders; pollen collection, storage, viability and stigma receptivity; gametocide application and visits to seed production plots etc.

Suggested Readings

1- Kelly AF. 1988. *Seed Production of Agricultural Crops.*

2- John Wiley. McDonald MB Jr & Copeland LO. 1997. *Seed Production: Principles and Practices.* Chapman & Hall.

3- Sinclair T.R. and F.P. Gardner, 1977. Principles of Ecology in plant production. CAB international G.K.

4- Rai, M. and S. Mauria, 1995. Hybrid Research and Development. Indian Society of Seed Technology, IARI, New Delhi.

5- Feistrizer,P and A.F. Kelly,1978. Improved Seed Production,FAO,Rome.
6- Habbiethwaite,P.D.,1980.Seed Production,butter worths,London-Boston,Sydney Wellington-Durban Toronto.
7- Bagga,S.S. and Bagga,S.K.1998. An introduction in hybrid cultivar development. Narosa Pub.House,New Delhi.
8- Agarwal RL. 1997. *Seed Technology*. 2nd Ed. Oxford & IBH.
9- Chhabra AK. 2006. Practical Manual of Floral Biology of Crop Plants. Dept. of Plant Breeding CCS HAU, Hisar.
10- Pandey,B.P. 2000. Economic Botany. S.Chand & Company Ltd.Ramnagar, New Delhi -110055

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DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

M.Sc. Seed Technology

Semester-II (Paper – 3)

SEED PROCESSING & STORAGE

85+15=100

UNIT I

1- Introduction: Principles of seed processing; methods of seed-drying including dehumidification and its impact on seed quality.
2- Relative humidity and equilibrium. Required moisture content of seed.
3- Thumb rules of seed storage.
4- Loss of viability in important agricultural and horticulture crops, viability equations and application of nomogram.

UNIT II

1- Seed cleaning equipment and their function , Preparing seed for processing function of scalper, debearder, scarifier, huller, seed cleaner and grader
2- Screen cleaners, specific gravity separator, indented cylinder, velvet spiral – disc separator.
3- Colour sorter, delinting machines; seed binding.

UNIT III

1- Assembly line of processing and storage.
2- Receiving, Elevating and conveying equipment.
3- Plant design and layout.
4- Requirement and economic feasibility of seed processing plant.

UNIT IV

1- Seed treatment-methods
2- Seed treating formulations and equipments.
3- Seed disinfestations, identification of treated seeds.
4- Packaging principles and materials, bagging and labeling with proper tagging (Breeder seeds; golden yellow, foundation seeds, white certified seeds blue) advantages of seed treatment.

UNIT V

1- Seed storage seed drying and storage; drying methods – importance and factors affecting it, changes it changes during storage.
2- Concepts and significance of moisture equilibrium, methods of maintaining safe seed moisture content.
3- Methods to minimize the loss of seed vigour and viability.
4- Factors influencing storage losses. Storage methods and godown sanitation storage storage structure. Storage problems of recalcitrant of recalcitrant seeds and their conservation.

Suggested reading-

1- Desai, B.B,P.M. Kotecha and.K. Salunkha,1997.Seeds handbook,Published by Mercel Dekker INC,New York.
2- Mather, S.B. and K.N. Mortensen, 1977 . Seed health testing in the production of quality seeds ISTA Zurich.
3- Neergaard, P. 1977. Seed pathology. Macmillan Press Ltd. London.
4- Mehrotra,R.S. and Agrawal, Ashok.2003 (2nd Ed.). Plant Pathology. McGraw Hill Education (India) Private Limited. New Delhi.
5- Agrios, G.N.1997.Plant Pathology.Fourth Edition,Academic Press,San Diego,California.
6- Dimcock, N. and S.B. Promrose.1994. Introduction to Modern Virology. Blackwell Science,Oxford.
7- Singh,R.S.1998.Plant Diseases,Oxford and IBH Publication Co.Pvt.Lt.,New Delhi.

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(Dr. S. Mishra)

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

M.Sc. Seed Technology

Semester-II (Paper – 4)

SEED QUALITY TESTING

85+15=100

UNIT I

1- Objective concept and components and their role in seed quality control.
2- Instruments devices and tools used in seed testing, ISTA and its role in seed testing
3- Seed sampling; definition, objectives, seed lot and its size; types of samples; sampling devices.
4- Procedure of Seed sampling; Sampling intensity, methods of preparing composite and submitted samples; sub- sampling techniques, dispatch receipt and registration of submitted samples in the seed testing laboratory.

UNIT II

1- Physical Purity, definition objective and procedure, weight of working samples for physical purity analysis, components of purity analysis and their definitions and criteria.
2- Pure seed definitions applicable to specific genera and families multiple seed units; general procedure of purity analysis.
3- Calculation and reporting of results prescribed seed purity standards.
4- Determination of weed seeds and other seeds by number per kilogram; determination of Other Distinguishable Varieties (ODV) determination of test weight and application of heterogeneity test.

UNIT III

1- Seed moisture content: importance of equilibrium principles and methods of moisture estimation - types, instruments and devices used.
2- Pre-drying and grinding requirements, procedural steps in moisture estimation; calculation and reporting of results.
3- Germination: importance; definitions; requirements for germination, instrument and substrata required; principle and methods of seed germination testing; working sample and choice of method.
4- General procedure for each type of method; duration of test; seedling evaluation; calculation and reporting of results.
5- Dormancy: definition, importance, causal mechanisms, types and methods for breaking dormancy.

UNIT IV

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

UNIT V

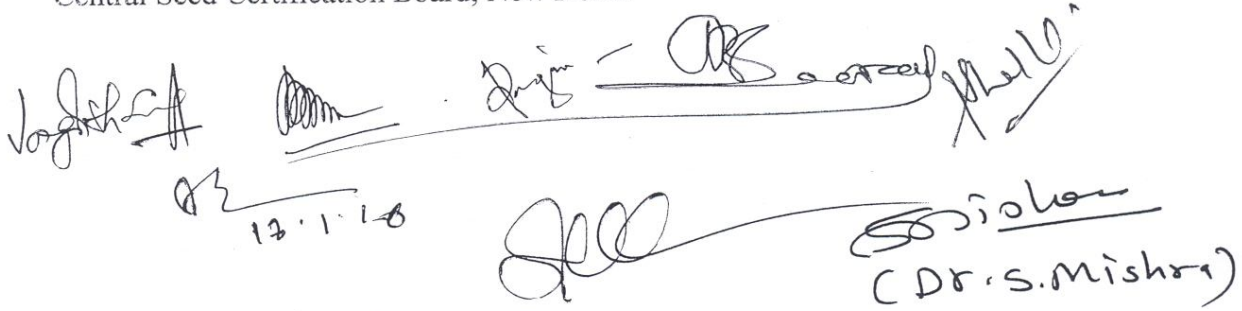
1- Genetic purity testing: objective and criteria for genetic purity testing.
2- Types of test; laboratory, growth chamber and field testing based on seed, seedling and mature plant morphology; principles and procedures of chemical, biochemical and molecular tests. Roughing; definition stages plants to be rougher.
3- Seed health Testing: field and seed standards; designated diseases, objectionable weeds.
4- Significance of seed borne disease as seed quality - seed health testing and detection methods for seed borne fungi, bacteria and viruses. Isolation distance.

Practical

Structure of monocot and dicot seeds of important plant species; identification and ling of instruments used in seed testing laboratory; identification of seeds of weeds and crops; physical purity analysis of samples of different crops; estimation of seed moisture content (oven method); seed dormancy breaking methods requirements for

Suggested Readings

1- Agrawal PK & Dadlani M.1992. *Techniques in Seed Science and Technology*. 2nd Ed. South Asian Publ.
2- Agarwal RL. 1996. *Seed Technology*. Oxford & IBH. Pulising Co., New Delhi.
3- Agrawal PK. (Ed.). 1993. *Handbook of Seed Testing*. Ministry of Agriculture, GOI, New Delhi.
4- Anon 1965.Field Inspection Manual and Minimum Seed Certification Standards, NSC Publications, New Delhi
5- International Seed Testing Association(ISTA)1997.Hand book of seedling evaluations, Scientific Publishers, Jodhpur
6- Martin, C. and D. Barkley, 1961. Seed identification manual, Oxford and IBH Publishing Co., Calcutta.
7- Nema,N.P.1987.Principles of Seed Certification and Testing. Allied Publishers Pvt.Ltd., New Delhi.
8- Tunwar,N.S. and S.V. Singh,1988.Indian Minimum Seed Certification Standards, Central Seed Certification Board, New Delhi.



DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015 -2016

M.Sc. Seed Technology

Semester-II

Practical – I (Based on Paper I-II)

TIME= 4 Hrs **MAX MARKS =50**

1-	Major Exercise – 1 (Based on Paper I)	– 8
2-	Major Exercise – 2 (Based on Paper II)	– 8
3-	Minor Exercise – 1 (Based on Paper I)	– 5
4-	Minor Exercise – 2 (Based on Paper II)	– 5
5-	Spotting (1-5)	– 10
6-	Viva	– 04
7-	Seasonal / Seed album	– 10
		- 50

Practical – II (Based on Paper III-IV)

TIME= 4 Hrs **MAX MARKS =50**

1-	Major Exercise – 1 (Based on Paper I)	– 8
2-	Major Exercise – 2 (Based on Paper II)	– 8
3-	Minor Exercise – 1 (Based on Paper I)	– 5
4-	Minor Exercise – 2 (Based on Paper II)	– 5
5-	Spotting (1-5)	– 10
6-	Viva	– 04
7-	Seasonal / Seed album	– 10
		- 50

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DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

M.Sc. Seed Technology

Semester-III (Paper – 1)

SEED LEGISLATION AND CERTIFICATION

85+15=100

UNIT I

1- Historical development of Seed Industry in India;
2- Seed quality: concept and factors affecting seed quality during different stages of production.
3- Seed processing and handling, seed quality control.
4- Concept and objectives of Central Seed Certification Board (CSCB).

UNIT II

1- Regulatory mechanisms of seed quality control- organizations involved in seed quality control programmes.
2- Seed legislation and seed law enforcement as a mechanism of seed quality control.
3- Seed Act (1966), Seed Rules (1968), Seed (Control) Order 1983; Essential Commodities Act (1955); Plants, Fruits and Seeds Order (1989).
4- National Seed Development Policy (1988) and EXIM Policy regarding seeds, plant materials; New Seed Bill-2004.
5- Introduction, objectives and relevance of plant quarantine, regulations and plant quarantine set up in India.

UNIT III

1- Seed Certification; history, concept and objectives of seed certification.
2- Seed certification agency/organization and staff requirement; legal status and phases of seed certification, formulation, revision and publication of seed certification standards.
3- Indian Minimum Seed Certification Standards (I.M.S.C.S.). General and specific crop standards including GM varieties, field and seed standards; planning and management of seed certification programmes.
4- Eligibility of a variety for certification, area assessment, cropping history of the seed field, multiplication system based on limited generation concept, isolation and land requirements.

UNIT IV

1- Field Inspection, principles, phases and procedures; reporting and evaluation of observations; pre and post-harvest control tests for genetic purity evaluation (grow-out tests), post harvest inspection and evaluation.
2- Seed sampling, testing, labeling, sealing and grant of certificate; types and specifications for tags and labels.
3- Maintenance and issuance of certification records and reports; certification fee and other service charges.
4- Training and legislation for seed growers. OECD seed certification schemes.

UNIT V

1- Introduction to WTO and IPRs; Plant Variety Protection and its significance; UPOV and its role.
2- DUS testing- principles and applications; essential features of PPV & FR Act,2001 and related Acts.

Practical

General procedure of seed certification; identification of weed and other crop seeds as per specific crops; field inspection at different stages of a crop and observations recorded on contaminants and reporting of results; inspection and sampling at harvesting/threshing, processing and after processing for seed law enforcement; testing physical purity, germination and moisture; specifications for tags and labels to be used for certification purpose; grow-out tests for pre and post-harvest quality control; visits to regulatory seed testing laboratory, including plant quarantine lab and seed certification agency.

Suggested Readings

1- Containment facilities and safeguards for exotic plant pathogens and pests. (ed. R.P. Khan & S.B. Mathur) American Phytopathological Society 1999.
2- Plant quarantine and genetic resources management (ed. R.S. Rana, Ram Nath, R.K. Khetarpal, Nandini Gorte and I.S. Bisht) NBPGR, New Delhi, 1993.
3- Neergaard, P. 1979. Seed Pathology Vol. I & II. Macmillan Press London.
4- Sharma, K. D. Usha Dev and Ram Nath (1990). Plant Pathogens not known to occur in India. NBPGR, New Delhi. P. 87.
5- Agarwal RL. 1997. *Seed Technology*. Oxford & IBH.
6- Anonymous 1992. *Legislation on Seeds*. NSC Ltd., Department of Agriculture and Cooperation, Ministry of Agriculture, New Delhi.
7- Nema NP. 1986. *Principles of Seed Certification and Testing*. Allied Publs.
8- Tunwar, N.S. and S.V. Singh, 1988.Indian Minimum Seed Certification Standards, Central Seed Certification Board, New Delhi.

13.1.16

(Dr. S. Mishra)

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

M.Sc. Seed Technology

Semester-III (Paper – 2)

SEED PATHOLOGY

85+15=100

UNIT I

1- History, Terminology and economic importance of seed pathology in seed industry and plant quarantine.
2- Important seed transmitted microbes and pathogens.
3- Storage fungi, their harmful effect on seeds, factors affecting them and Control measures.
4- Detection techniques and identification of common seed borne pathogens.

UNIT II

1- Morphology and anatomy of typical monocotyledonous and dicotyledonous seeds.
2- Mode and mechanism of transmission of seed borne pathogens and microorganisms.
3- Rate of transmission of major plant pathogens, microorganisms in relation to seed certification and tolerance limit.
4- Types of losses caused by seed- borne diseases.

UNIT III

1- Role of microorganisms in seed quality deterioration.
2- Management of seed borne plant pathogens/diseases and procedure for healthy seed production.
3- Different seed health testing methods for detecting microorganisms.
4- Methods of treatment to control seed borne diseases.

UNIT IV

1- Mycotoxins and their types of effect.
2- Mycotoxin producing fungi.
3- Detection of mycotoxins, Factors affecting mycotoxin production.
4- Control measures for mycotoxins.

UNIT V

1- Pest Risk Analysis (PRA) and disease free seed production.
2- Sanitary & Phyto- sanitary (SPS) measures in seed trade.
3- International regulation (ISHI) in respect of seed health standards, Seed certification.

Practical

Different methods of examination of seeds to assess seed-borne microorganisms and to quantify infection percentage, detection of seed-borne fungi, bacteria and viruses. identification of storage fungi, control of seed borne diseases, seed treatment methods.

Suggested Readings

1- Agarwal VK & Sinclair JB. 1997. *Principles of Seed Pathology*. Boca Raton.
2- Karuna V. 2007. *Seed Health Testing*. Kalyani.
3- Neergaard, P. 1977. Seed pathology. Macmillan Press Ltd. London.
4- Mehrotra,R.S. and Agrawal, Ashok.2003 (2nd Ed.). Plant Pathology. McGraw Hill Education (India) Private Limited. New Delhi.
5- Agrios, G.N.1997.Plant Pathology.Fourth Edition,Academic Press,San Diego,California.
6- Dimcock, N. and S.B. Promrose.1994. Introduction to Modern Virology. Blackwell Science,Oxford.
7- Singh,R.S.1998.Plant Diseases,Oxford and IBH Publication Co.Pvt.Lt.,New Delhi.

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

M.Sc. Seed Technology

Semester-III (Paper – 3)

SEED ENTOMOLOGY

85+15=100

UNIT I

1- Role of insects in agriculture.

Principles, utility and relevance: Insect morphology and features of body parts (head, mouthparts, antennae, thorax, wings, legs abdomen, sense organs) and life cycle of following beneficial insects :-(1) honey bee (2) silk moth (3) lac insect (4) ladybird beetle

UNIT II

Harmful insects –

1- Principles, utility and relevance: Insect morphology and features of body parts (head, mouthparts, antennae, thorax, wings, legs abdomen, sense organs)) and life cycle and life cycle of following harmful insects :-(1) Termite (2) rasshopper (3) Rice Weevil (4) Khapra beetle (5) Lemon butterfly

UNIT III

Systematic position, identification, Distribution, host range, bionomics and seasonal abundance, nature and extent of damage and management of insect pests of various crops:-

1- Fruit Crops- mango, guava, banana, and grapes.
2- Vegetable crops- tomato, potato and carrot.

UNIT IV

Systematic position, identification, Distribution, host range, bionomics and seasonal abundance, nature and extent of damage and management of insect pests of various crops:-

1- Plantation crop- coffee and tea.
2- Spices and Condiments- turmeric and ginger.
3- Pests in playhouses/protected cultivation.

UNIT V

Integrated Pest Management and History:-

1- Insecticides- Insecticide Act, registration and quality control of insecticides; safe use of insecticides; diagnosis and treatment of insecticide poisoning.
2- Mode of action and chemical nature of insecticides.
3- Fumigants and method of fumigation.
4- Biological control and its significance.
5- Insecticidal machinery – Sprayers, Dusters, Fumigators.

Suggested Readings

1- R.T. Cottong(1963). Insect pests of stored grain and grain products. Burgess Publ. Co. Minn.USA

2- J.A. Anderson and A.W. Aleock.1954. Storage of cereal grain and their products.American Assoc.cereal chemist St. Pauls Minn.
3- B.P. Khare 1972.Insect pests of stored grain and their control in U.P
4- S.V.Pingale.Handling and storage of food grains
5- R.N. Sinha and Khir. Storage of Food grain
6- H.A.U. Monro.1969. In Manual of Fumigation of insect control, FAO Rome Agric. Studies No.79.
7- N.S. Agrawal and G.K. Grrish 1977.An introduction to action programme to redress on farm storage losses in India.FAO/NORAD Seminar on Farm Storage grain in India. Nov.29-Dec.8,1977.

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(Dr. S. Mishra)

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

ACCORDING TO NEW PATTERN OF DEPT. OF HIGHER EDU. OF MP.

M.Sc. Seed Technology

Semester-III (Paper – 4)

PLANT BREEDING

85+15=100

UNIT I

1. Plant Breeding-Introduction ,Objectves,Activities and important achievements.
2. Modes of pollination in crop plants-
   self-pollination-cross-polination.
   Factors promoting self –pollination.
   Factors promoting cross- pollination.
3. Self incompatibility-Definition-types methods induction & application
4. Male sterility-Definition, types, methods, induction & application.
5. Self Incompatibility.

UNIT II

1. Germplasm & its conservation- Introduction, germplasm collection, centre of origin & diversity.
2. Seed banks and role in crop improvement genetic advance.
3. Plant Introduction-Definition-Types, procedure, merits & demerits.
4. Selection –Definition,Types,Methods,merits and demerits. Pedigree and bulk methods.
5. Pedigree of seed and simple seed descent method and multi line concept.

UNIT III

1. Hybridization-Definition, objectives and types.
2. Techniques of Hybridization-(1) Selection evaluation of parents
   (2) Emasculation (3) Bagging and Tagging (4) pollination (5) Collection and storage of F1 seed (6) Growing of F1 generation.
3. Improvement in self pollinated crops through hybridization application.
4. Procedure merits & demerits and achievements of pedigree methods.
5. Procedure merits & demerits and achievements of bulk methods.

UNIT IV

1. Heterosis Definition types & basis. Genetical and Physiological basis of heterosis production of inbred.
2. Use of heterosis in crops improvements for pigeon pea sorghum pearls millet
3. Hybrid synthetic and composite varieties.
4. Mutation Breeding –Mutagens, procedure, Precautions, application, achievements.

UNIT V

1. Plant breeding for disease resistance-Procedure, Precaution & achievements.
2. Plant Breeding for insect resistance-procedure, precaution & achievements
3. Plant Breeding work done in following crops-

-Wheat -Maize -Rice -Cotton -Potato -Sugarcane

Suggested Readings

1- Feistritser,P and A.F. Kelly.1970.Improved seed production, FAO, Rome, George, A.T.
2- Thompson,J.R.1977.Advances in Research and Technology of Seed, Part.3&4, Centre for Agricultural Publishing Documentation, Washington.
3- Garay, B.R. and Branow, J.R.1988.Pollen selection for heat tolerance in cotton. Crop. Sci. 28:857-859
4- Singh,K.N.1995.Recent approaches to breeding for salt tolerance in crop plants. In; Proc. Genetic Resaerch and Education:Current Trends & the Next Fifty Years. (Eds.B.Sharma et.al.) Vol.I IndianSociety of Genetics and Plant Breeding,New Delhi:490-499.
5- Vijendra Das,L.D.2000.Problems Facing Plant Breeding,CBS Publishers,New Delhi.
6- Roy,D.2000.Plant Breeding-Analysis and Exploitation of Variation.Narosa Publishing House, New Delhi.
7- Gupta,P.K.1985. Genetics. Rastogi Publications,Merut.
8- Singh,B.D.1990. Fundamentals of Genetics. Kalyani Publishers, Ludhiana.
9- SiddiquiB.A. and Khan,S.1999. Breeding in Crop Plants-Mutations & in vitro Mutation Breeding. Kalyani Publishers, New Delhi
10- BrownT.A.1999.Genome.John Wiley & Sons, New York.

13.1.16

(Dr. S. Mishra)

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015 -2016

M.Sc. Seed Technology

Semester-III

Practical – I (Based on Paper I-II)

TIME= 4 Hrs **MAX MARKS =50**

1-	Major Exercise – 1 (Based on Paper I)	– 8
2-	Major Exercise – 2 (Based on Paper II)	– 8
3-	Minor Exercise – 1 (Based on Paper I)	– 5
4-	Minor Exercise – 2 (Based on Paper II)	– 5
5-	Sporting	– 10
6-	Viva	– 04
7-	Seasonal / Seed album	– 10
		- **50**

Practical – II (Based on Paper III-IV)

TIME= 4 Hrs **MAX MARKS =50**

1-	Major Exercise – 1 (Based on Paper I)	– 8
2-	Major Exercise – 2 (Based on Paper II)	– 8
3-	Minor Exercise – 1 (Based on Paper I)	– 5
4-	Minor Exercise – 2 (Based on Paper II)	– 5
5-	Sporting	– 10
6-	Viva	– 04
7-	Seasonal / Seed album	– 10
		- **50**

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(Dr. S. Mishra)

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

ACCORDING TO NEW PATTERN OF DEPT. OF HIGHER EDU. OF MP.

M.Sc. Seed Technology

Semester-IV (Paper – 1)

SEED MARKETING & MANAGEMENT

85+15=100

UNIT I

1- Importance and promotion of quality seed, formal and informal seed supply systems.
2- Basic concepts of marketing with special reference to seed; seed marketing structure.
3- Direct marketing and contract marketing.
4- Marketing corporation .

UNITI II

1- Importance and scope of seed industry in India.
2- Major constraints/problems in seed industry/seed sector role of seed association / federation in seed trade.
3- Problems in Marketing in demand and supply, Institution site.

UNIT III

1- Demand and supply of seed; Role of seed replacement rate (SRR), seed multiplication ratio (SMR).
2- Cost of production and returns; determining seed needs; seed pricing and price policy.
3- Seed processing and /packaging, demand forecasting.
4- Value Chain finance.

UNIT IV

1- Seed marketing intelligence and product mix.
2- Sales promotion, distribution channels.
3- Marketing costs and margins.
4- Role of information technology and telecommunication in marketing of seed.

UNIT V

1- Salient features of national seed policies, role of various sectors/agencies in efficient seed Marketing.
2- Quality control and assurance program me. Responsibilities of seed companies and dealers under Seed Act, EXIM policies for seed trade etc.
3- Market research and market information services.

Practical

Statutory requirements in seed business including R&D, estimation of cost of seed production, marketing costs and margins of seeds of different crops, case studies to compare public & private sectors in different conditions, impact analysis., seed pricing, cost benefit ratio, economic feasibility of seed industry etc.

Suggested Readings

1-Kohls RL & Uhl JN. 1980. Marketing of Agricultural Products. MacMillan.

2-Kundu KK & Suhag KS. 2006. *Teaching Manual on Seed Marketing and Management*. Department of Agricultural Economics CCS HAU Hisar.

3-Venugopal P. 2004. *State of Indian Farmers: A Millennium Study*. Vol. VIII. *Input Management*. Academic Foundation, Department of Agriculture and Cooperation, Ministry of Agriculture, New Delhi.

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DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2015-2016

M.Sc. Seed Technology

Semester-IV (Paper – 2)

STATISTIC AND COMPUTER APPLICATION IN AGRICULTURE

85+15=100

UNIT I

1- Definition Aims Characteristics and Limitations of statistics. Classification and Tabulation of data Definition.
2- Advantages and disadvantages of Arithmetic mean, Median, Mode, Geometric Mean, Harmonic Mean and Weighted Mean as measures of central tendency:
3- Range Quartile Deviation Mean Deviation
4- Variance Standard Deviation and coefficient of variation as measures of dispersion. Definition of probability, Additive and Multiplicative Laws of Problems based on them.

UNIT II

1- Definition, merits and demerits of complete enumeration and sample survey types of data need for sampling, sampling and Non-sampling errors concept of standard error.
2- Concepts of unit and population, sampling unit sampling frame, problem of incomplete frame.
3- random sampling, simple Random sampling (srs) with and with out replacement (srswr, srswor), estimation of population Mean, Variance and their unbiased estimatiors.

UNIT III

1- Basic concepts used in tests of Significance, statistical Hypothesis null Hypothesis two types of error level of significance, degree of freedom, definition and uses of z test in testing significance of difference between two means.
2- F test in testing equality of two variances test as test of independence of attributes in 2x2 contingency table only. Scattered diagram positive and negative correlation, correlation coefficient, rang of correlation coefficient, concept of line of best fit.
3- Basic principles of Experimental Design, Description and Analysis of Completety Randomized Design (CRD) Ramdomized Black Design (RBD) and latin Square Design (ISD).

UNIT IV

1- Introduction of computer. A brief history of computing Data processing and information. 2-Characteristics of the computer, function, capability and limitation, strength and weakness of computer.
2- Generation of computers, First, Second, Third fourth and fifth generation computer with their features only, types of computer.
3- Digital Analog and Hybrid computers Classification of computers on size and capabilities of Micro- Mini-, Mainframe and Super Computer.

UNIT V

1- Anatomy and components of computer, computer organization CPU, ALU, Input and Output devices peripheral devices, storage units hard disk, compact disk, various types fo memories.
2- RAM, ROM, PROM and EPROM. Number systems, Decimal, Binary, Octal, Hexadecimal, Character code ASCH, EBCDIC BCD.
3- Types of software, system software and Application software. Introduction to DOS, (disk Operating System). Fundamentals of DOS commands, Internal commands, external commands, files and directory Editor. Elementary Idea of Basic (Computer Language).

Practical

Different methods of examination of seeds to assess seed-borne microorganisms and to quantify infection percentage, detection of seedborne fungi, bacteria and viruses, dentification of storage fungi, control of seed borne diseases, seed treatment methods.

Suggested Readings

Agarwal VK & Sinclair JB. 1997. *Principles of Seed Pathology*. Boca Raton.
Karuna V. 2007. *Seed Health Testing*. Kalyani.
Books related Computer Application.
Books related Bio-Statistics.

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(Dr. S. Mishra)

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2016-2017
M.Sc. Seed Technology
Semester-IV (Paper –3)
PROJECT/THESIS

200

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2016-2017
M.Sc. Seed Technology
Semester-IV (Paper – 4)
TWO SEMINARS

50+50=100

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