

DEVI AHILYA VISHWAVIDYALAYA, INDORE (MP)

M.Sc. Seed Technology

Syllabus 2017-2018

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 2017-2018

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.

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 Development. IARI, New Delhi.

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DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2017-2018

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 Seeds Science, 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 2017-2018

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.

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

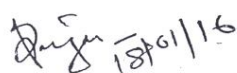
- 1- Agrawal PK & Dadlani M. (Eds.). 1992. *Techniques in Seed Science and Technology*. South Asian Publ.
- 2- Baskin CC & Baskin JM. 1998. *Seeds: Ecology, Biogeography and Evolution of Dormancy and Germination*. Academic Press.
- 3- Basra AS. 2006. *Handbook of Seed Science and Technology*. Food Product 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.

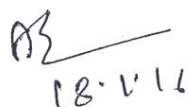
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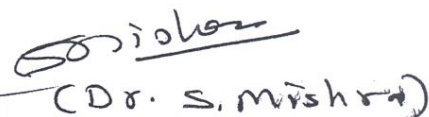




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DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2017-2018

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 hybrid 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.

Suggested Readings

- 1- Anon 1997 Seed Technology in Tropics 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- Habiethwaite, P.D., 1980. Seed-Production, Butterworths, 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 R.L. 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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Dr. S. Mishra

DEVI AHILYA VISHWAVIDYALAYA, INDORE (M.P)

Syllabus 2013-2016

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 |
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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 |
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