

New

**B.Sc. I Semester  
Seed Technology**

**Paper I – Principles of Seed Technology**

**Max. Marks: 85+CCE 15=100**

**Unit –I**

- History, concepts and role and aim of Seed Technology. Seed- Definition and its types. Characteristics of good Seed. Difference between seed and grain
- Seed development programs - Bases for Seed program, Types of Seed program, National Seed program. Role of following agencies in the development of Indian Seed industry - National Seed Corporation, Tarai Development Corporation.

**Unit II**

- Structure of flower. Microsporangium , microsporogenesis and development of male gametophyte.
- Megasporangium , megasporogenesis and development of female gametophyte (Polygonum type). Pollination

**Unit –III**

- Fertilization and Apomixis. Development of Embryo, Endosperm and Fruit.
- Structure of Monocot and Dicot Seeds. Chemical composition of Seeds.

**Unit –IV**

- Seed dormancy- Types, Causes, and Methods of breaking dormancy, advantage and disadvantage. Seed deterioration – Symptoms and causes.
- Seed germination- Pattern , types and requirements for germination. Metabolism of storage product during germination.

**Unit –V**

- Germination stimulators, inhibitors and Hormones. Normal and abnormal seedling.
- Plant tissue culture- General procedure and its importance in agriculture. Synthetic Seeds. Terminator Seeds.

**Suggested Books :**

1. Agrawal, R.L. 1976. Seed Technology, Oxford, IBH Publishing Co., New Delhi.
2. L. O. Copelland. 1988. Principles of Seed Science and Technology. Burgess Publishing Company, Minneapolis, Minnesota, India.

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3. John Robson Thomson. 1979. An introduction to seed technology. Publisher Wiley.
4. Uma Shankar Singh. 2008. Seed Technology and Seed Pathology. Anmol Publications Pvt Ltd.
5. 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.
6. Jaima Kigel, J. and G. Galili, 1997. Seed development and germination, Marcel Dekker, New York.

**Practicals : Based on theory papers.**

Semester –I

Scheme of Practical Examination

S.No.	Experiment	Marks
1	Major	15
2	Minor – I	10
3	Minor – II	5
4	Spotting	10
5	Sessional	10
	<b>Total</b>	<b>50</b>

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**B.Sc. II Semester**  
**Seed Technology**  
**Paper II - Seed production and Economically Important Families and Weeds**

**Max. Marks: 85+CCE 15=100**

Unit I

- General Principles and Methods of Seed Production. Maintenance of Breeder's seed – Methods in self fertilized crops, methods in cross fertilized crops.
- Development, trial and release of variety. Methods of seed production for cereals – Wheat and Maize

Unit II

- Methods of seed production for pulses and oil crops – Gram, Soybean, Groundnut, Mustard and Sunflower.
- Methods of seed production for vegetables and forage crops – Tomato, Potato, Onion, Berseem and Lucerne.

Unit III

- Methods of seed production in fibers and sugar producing crops – Cotton, Juice, Sugarcane, Sugar beet.
- Study of following families with special reference to seed structure, floral structure and economic importance – Brassicaceae and Asteraceae.

Unit IV

- Study of following families with special reference to seed structure, floral structure and economic importance – Malvaceae and Solonaceae.
- Study of following families with special reference to seed structure, floral structure and economic importance – Fabaceae and Poaceae.

Unit V

- Study of following weeds of local crops – *Ageratum conyzoides*, *Chenopodium album*, *Amaranthus virides*, *Cuscuta reflexa*, *Argemone maxicana* and *Cynadon dactylon*.
- Study of following weeds of local crops – *Celosia argantia*, *Eclipta alba*, *Euphorbia hirta*, *Oxalis corniculata*, *Solanum xanthocarpum*, *Parthenium hysterophorus*.

Suggested Books :

1. Kozlowski, T.T. 1972. Seed Biology, Vol. 1, Academic Press, London.
2. Jaima Kigel, J. and G. Galili. 1997. Seed Development and Germination. Marcel Dekker, New York.

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3. Agrawal, R.L. 1976. Seed Technology, Oxford, IBH Publishing Co., New Delhi.
4. Kalivaratharaju, T.V. 1988. Seed Production Technology Manual, Dept. of Agriculture, Government of Tamil Nadu.

**Practicals : Based on theory papers.**

Semester –II

Scheme of Practical Examination

S.No.	Experiment	Marks
1	Major	15
2	Minor – I	10
3	Minor – II	5
4	Spotting	10
5	Sessional	10
	Total	50

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**B.Sc. III Semester**  
**Seed Technology**  
**Paper III - Plant breeding in relation to seed Technology**

**Max. Marks: 85+CCE 15=100**

**Unit I**

- Plant breeding - Introduction, Objectives, Activities and Important achievements. Modes of pollination in self – pollinated crops and cross – pollinated crops.
- Self incompatibility - definition types, mechanism and application. Male sterility definition, types, methods, induction and application.

**Unit II**

- Germplasm and its conservation – Introduction, germplasm collection, center of origin and diversity. Seed banks and types of seed collections.
- Plant Introduction – definition, types, procedure, merits and demerits.
- Selection – definition, types, methods, merits and demerits.

**Unit III**

- Hybridization – definition, types and objectives. Techniques of hybridization - Selection and evaluation of parents, Emasculation, Bagging and tagging, Pollination, Collection and storage of F1 seeds, Growing of F1 generation.
- Improvement in self pollinated crops through hybridization, application, procedure, merits and demerits and achievements of pedigree and bulk.

**Unit IV**

- Heterosis – definition, types, basis and economic uses. Uses of heterosis in crop improvement.
- Hybrid, synthetic and composite varieties. Mutation breeding – mutagens, procedure, precautions, application and achievements.

**Unit V**

- Plant breeding for disease resistance. Plant breeding for insect resistance.
- Plant breeding work done in following crops-Wheat, Maize, Rice, Cotton, Potato, Sugarcane.

**Suggested Books :**

1. Allard, R.W. 1960. Principles of Plant Breeding. John Wiley & Sons, New York.

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2. Hays, H.K., Immer, F.R. and Smith, D.C. 1955. Methods of Plant Breeding. McGraw Hill Book Company, Inc., New York.
3. Fehr, W. R. 1987. Principles of Cultivar Development (2 Volumes). Mac Millan Publishing Co., New York.
4. Poehlman, J. M. 1986, Breeding Field Crops. AVI Publishing Company, Connecticut.
5. Singh, B.D. 2000. Plant Breeding-Principles and Methods. Kalyani Publishers, New Delhi.

**Practicals : Based on theory papers.**

Semester –III

Scheme of Practical Examination

S.No.	Experiment	Marks
1	Major	15
2	Minor – I	10
3	Minor – II	5
4	Spotting	10
5	Sessional	10
	Total	50

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**B.Sc. IV Semester**  
**Seed Technology**  
**Paper IV - Principle of seed testing and certification**

**Max. Marks: 85+CCE 15=100**

**Unit I**

- Principles and procedure of Seed testing.
- Equipment's for Seed testing laboratory. Procedure for samples handling in the laboratory.
- Determination of heterogeneity.
- Determination of genuineness of varieties.

**Unit II**

- Physical and genetic seed purity test.
- Seed germination test, Seed viability test, Seed Vigour test, Seed health test, Seed Moisture test.

**Unit III**

- Seed heterogeneity test, Tolerance value, Importance of seed testing
- Objectives and concept of seed certification. Function of seed certification agency and methods of seed certification. Standard for seed certification.

**Unit IV**

- Objectives and principles of field and seed crop inspection. Method of field crop inspection and seed crop inspection
- Techniques for seed crop inspection for wheat, gram and cotton. Seed inspector qualities, power and duties.

**Unit V**

- Seed legislation in India.
- Seed act.
- Seed Control order.
- Requirement for sale of seed.

**Suggested Books :**

1. Bakendam, R. and R. Schmith. 1997. Handbook of Seedling Evaluation. Scientific Publishers, Jodhpur, India.
2. Mc Donald, M.B. and L.O. Copeland. 1997. Seed Science and Technology Laboratory Manual .Scientific Publisher, Jodhpur.
3. Martin, C. and D. Barkley. 1961. Seed Identification Manual.Oxford, IBH Publishing Co., Calcutta.

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4. International Seed Testing Association. 1979. Hand Book of Seedling Evaluations Scientific Publishers, Jodhpur.
5. Nema, N.P. 1987. Principles of Seed Certification and Testing, Allied Publishers Pvt. Ltd., New Delhi.
6. Anon. 1965. Field Inspection Manual and Minimum Seed Certification Standards, NSC Publication, New Delhi.

**Practicals : Based on theory papers.**

Semester –IV

**Scheme of Practical Examination**

S.No.	Experiment	Marks
1	Major	15
2	Minor – I	10
3	Minor – II	5
4	Spotting	10
5	Sessional	10
	Total	50

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**B.Sc. V Semester  
Seed Technology  
Paper V – Seed protection**

**Max. Marks: 85+CCE 15=100**

**Unit I**

- History, objective and importance of seed technology. Seed borne diseases. Mechanism of infection, Factors affecting seed infection, Important epidemic seed born diseases.
- Seed borne pathogens. Control measures for seed borne pathogens.

**Unit II**

- Seed health test. Dry seed examination. Storage fungi and their harmful effect on seeds.
- Factors affecting storage fungi. Isolation and identification of storage fungi. Control measures for storage fungi.

**Unit III**

- Mycotoxins - Types and effect, Mycotoxins producing fungi. Factors affecting mycotoxin production.
- Mycotoxin – Detection of mycotoxins, Control measures for mycotoxins.

**Unit IV**

- Role of insects in agriculture. Harmful insects of crop plants.
- Beneficial insects of crop plants. Outline of insect control.

**Unit V**

- Insecticides, fumigants and method of fumigation. Insecticidal poisoning and their treatment.
- Insecticidal machinery, Integrated pest management.

**Suggested Books:**

1. Neergaard,P. 1987. Seed Pathology Vol.I and II, Mc Millan Publication.
2. Agarwal, V.K. 1988. Principles of Seed Pathology CRC Publication. G.B.P.U.A. & T., Pantnagar, U.P., India.
3. Maude,R.B. 1995. Seed - borne diseases and their control, Horticultural Research International Wellesbourne, U.K.
4. Kwołoski. Seed Ecology. Vol.II & III.

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**Practicals : Based on theory papers.**

Semester -V

Scheme of Practical Examination

S.No.	Experiment	Marks
1	Major	15
2	Minor - I	10
3	Minor - II	5
4	Spotting	10
5	Sessional	10
	Total	50

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**B.Sc. VI Semester  
Seed Technology  
Paper VI – Seed processing, storage and marketing.**

**Max. Marks: 85+CCE 15=100**

**Unit I**

- Concept, principles and importance of seed processing. Methods of seed conditioning.
- Equipment's used for seed conditioning.. Layout of a seed processing plants.

**Unit II**

- Seed Drying- principles, advantages and methods. Seed dryers.
- Seed cleaning methods, separation and grading. Seed conveyors and elevators. Seed Blending.

**Unit III**

- Definition, advantage and kinds of seed treatments. Methods of Seed treatment - mechanical, physical and chemical.
- Seed treating chemicals. Seed treating equipments

**Unit IV**

- Methods and advantages of seed bagging. Principles and methods of seed storage.
- Pest problems and their treatment during seed storage.

**Unit V**

- Objective and importance of seed marketing
- Major components of seed marketing-
  1. Forecasting of seed demand,
  2. Supply of seed
  3. Seed marketing structure
  4. Seed sales pro motion,
  5. Determination of cost of seed production and seed pricing.

**Suggested Books:**

1. Agrawal, R.L. 1996. Seed Technology. Oxford publication, New Delhi.
2. Barton, L.V. 1985. Seed preservation and longevity, International Books and Periodicals supply service, New Delhi.
3. Justice, O.L. and L.N. Bass, 1978. Principles and practices of seed storage, Castle House Publications Ltd., Great Britain.

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4. Koslowski, T.T. 1972. Seed Biology, Vol. III, Academic Press, New York and London.
5. N.R. Brandenburg, 1961. Why and how are seeds dried? The year book of Agriculture, USDA, Washington, D.C., P. 295.
6. R.K. Mathews, G.B. Welch, J.C. Delouche and G.M. Dougherty, 1969. Drying, processing and storage of corn seed in tropical and subtropical regions, Proc. Am. Agric. Eng. St. Joseph, Mich. Paper No. 69-67. 1969.

**Practicals : Based on theory papers.**

Semester –VI

**Scheme of Practical Examination**

S.No.	Experiment	Marks
1	Major	15
2	Minor – I	10
3	Minor – II	5
4	Spotting	10
5	Sessional	10
	Total	50

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