

RAJA SHANKAR SHAH UNIVERSITY, CHHINDWARA (M.P.)

M.Sc. Seed Technology Syllabus 2025-26 Onward

Examination Scheme Semester-III

Course Code	Paper No.	Nomenclature of Paper	Max. marks		Minimum Passing Marks	
			Theory	CCE	Theory	CCE
MST-301	I	Seed Legislation And Certification	40	10	14	4
MST-302	II	Seed Pathology	40	10	14	4
MST-303	III	Seed Entomology	40	10	14	4
MST-304	IV	Plant Breeding	40	10	14	4
MST-305	V	Practical - I	50		25	
MST-306	VI	Practical - II	50		25	

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RAJA SHANKAR SHAH UNIVERSITY, CHHINDWARA (M.P.)

M.Sc. Seed Technology

Semester-III

Paper-I

MST-301 : SEED LEGISLATION AND CERTIFICATION

MM : 40+10=50

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 programme:es.
- 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, 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.

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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. 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 Pubs.
- 8- Tanwar, N.S. and S.V. Singh, 1988 Indian Minimum Seed Certification standards, Central Seed Certification Board, New Delhi.

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**M.Sc. Seed Technology
Semester-III
Paper-II
MST-302 : SEED PATHOLOGY**

MM : 40+10=50

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.

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- Agrius, 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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M.Sc. Seed Technology

Semester-III

Paper-III

MST-303 : SEED ENTOMOLOGY

MM : 40+10=50

UNIT-I

- 1- Role of insects in agriculture.
- 2- 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 fo body parts (head, mouthparts, antennae, thorax, wings, legs abdomen, sense organse) and life cycle and lfie 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 insect pestsof 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; ddiagnosis 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.

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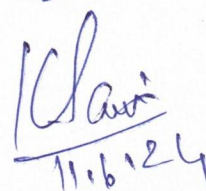
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Suggested Readings

- 1- R.T. Cotton (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 prograMM :e to redress on farm storage losses in India. FAO/NORAD Seminar Farm Storage grain in India. Nov. 29- Dec.8, 1977.



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M.Sc. Seed Technology

Semester-III

Paper-IV

MST-304 : PLANT BREEDING

MM : 40+10=50

UNIT- I

- 1- Plant Breeding-Introduction, Objectives, Activities and important achievements.
- 2- Modes of pollination in crop plants-
Self-pollination-cross-pollination.
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 methods 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 crop-
Wheat –Mize -Rice –Cotton-Potato –Sugarcane

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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- Singh, K.N. 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 Research and Education: Current Trends & the Next fifty Years. (Eds.B.Sharma et.al.) Vol. I Indian Society 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 fo 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, Ludihiana.
- 9- Siddiqui B.A. and Khan, S. 1999 Breeding in Crop Plants-Mutations & in vitro Mutation Breeding Kalyani Publishers, New Delhi
- 10- Brown T.A. 1999 Genome. John Wiley & Sons, New York.






RAJA SHANKAR SHAH UNIVERSITY, CHHINDWARA (M.P.)

M.Sc. Seed Technology

Semester-III

Paper - V

MST-305 : Practical-I (Based on Paper I-II)


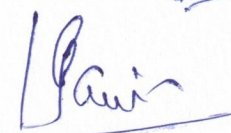


TIME= 4 Hrs

MAX MARKS= 50

1- Major Exercise = 1 (Bassed on Paper I)	-8
2- Major Exercise = 2(Bassed on Paper II)	-8
3- Minor Exercise = 1 (Bassed on Paper I)	-5
4- Minor Exercise =2 (Bassed on PaperII)	-5
5- Sporting (10)	-10
6- Viva	-04
7- Seasonal / Seed album	-10
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Suggested Practical –

- 1- To general procedure of seed certification.
- 2- 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.
- 3- Inspection and sampling at harvesting/threshing, processing and after processing for seed law enforcement.
- 4- To study by testing physical purity germination and moisture; specifications for tags and labels to be used for certification purpose.
- 5- Grow-out tests for pre and post-harvest quality control.
- 6- To study by visits to regulatory seed testing laboratory, including plant quarantine lab and seed certification agency.
- 7- To study by different methods of examination of seeds to assess seed-borne microorganisms and to quantify infection percentage.
- 8- Detection of seed-born fungi, Bacteria and viruses.
- 9- Identification of storage fungi.
- 10- To study by control of seed borne diseases.
- 11- To study by seed treatment methods.



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RAJA SHANKAR SHAH UNIVERSITY, CHHINDWARA (M.P.)

M.Sc. Seed Technology

Semester-III

Paper - VI

MST-306 : Practical – II (Based on Paper III-IV)

TIME= 4 Hrs

MAX MARKS= 50

1- Major Exercise = 1 (Bassed on Paper I)	-8
2- Major Exercise = 2(Bassed on Paper II)	-8
3- Minor Exercise = 1 (Bassed on Paper I)	-5
4- Minor Exercise =2 (Bassed on PaperII)	-5
5- Sporting (10)	-10
6- Viva	-04
7- Seasonal / Seed album	-10
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Suggested Practical –

1. To study the Insect morphology of different insects.
2. Preparation of Insect herbarium
3. To study various types of insecticides.
4. Identification of nature and damage of different insects.
5. To study Life cycle of different insects.
6. Identification of insecticide machineries.
7. To study the control methods of insect pest of stored grains.
8. Identification of nature and extent of damage and management of insect pests of various crops.
9. To study the methods, induction and applications of male sterility.
10. Identification of Techniques of hybridization.
11. To study the Preparation of Seed herbarium.
12. To study the Improvement of self-pollinated crops through hybridization applications.
13. To study the Plant breeding techniques for disease resistance varieties – procedure, precautions and achievements.
14. To study the Plant breeding techniques for insect resistance varieties – procedure, precautions and achievements.

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