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

M.Sc. Seed Technology
Syllabus 2024-25 Onward

Examination Scheme Semester-I

Course Code	Paper No.	Nomenclature of Paper	Max. marks		Minimum Passing Marks	
			Theory	CCE	Theory	CCE
MST-101	I	Introduction To Seed Technology	40	10	14	4
MST-102	II	Floral Biology, Seed Development And Maturation	40	10	14	4
MST-103	III	Seed Physiology	40	10	14	4
MST-104	IV	Principles of Seed Production	40	10	14	4
MST-105	V	Practical – I	50		25	
MST-106	VI	Practical - II	50		25	

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M.Sc. Seed Technology
Semester-I
Paper-I
MST-101: INTRODUCTION TO SEED TECHNOLOGY

UNIT- I **MM : 40+10=50**

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. 1997. Seed Biology, Volume 1, Academic Press, London.
3- Kha,A. 1997. 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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RAJA SHANKAR SHAH UNIVERSITY, CHHINDWARA (M.P.)

M.Sc. Seed Technology
Semester-I
Paper-II
MST-102 : FLORAL BILOGY, SEED DEVELOPMETN AND MATURATION

MM : 40+10=50

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 Marcell Dekker, New York.
3- Kha, A. 1997 The Physiology and Biochemistry of seed dormancy and germination Nirth Holland Publishing Co., Amsterdam, New York.
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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M.Sc. Seed Technology
Semester-I
Paper-III
MST-103 : SEED PHYSIOLOGY

UNIT- I **MM : 40+10=50**

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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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 & 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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M.Sc. Seed Technology
Semester-I
Paper-IV
MST-104 : PRINCIPLES OF SEED PRODUCTION

MM : 40+10=50

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,

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, processin and storage, Marcel Dekker New Yrk.
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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RAJA SHANKAR SHAH UNIVERSITY, CHHINDWARA (M.P.)

M.Sc. Seed Technology
Semester-I
Paper- V
MST-105 : Practical – I (Based on Paper I-II)

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

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

Suggested Practical –

1. Morphological characterization of different seeds of Kharif and Rabi seasons.
2. Determination of germination percentage/ purity percentage of different crops.
3. Hybrid seed production of Cotton/ Maize seed production.
4. Differences between seeds and grains.
5. Differences between weeding and rouging.
6. Study of critical growth stages of different crops.
7. Classes of seed production program.
8. Emasculation technique for good quality hybrid seed production.
9. Calculate percentage germination on the basis of seedling characteristics.
10. Methods and types of seed germination.
11. Seed viability and seed dormancy.

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

M.Sc. Seed Technology
Semester-I

Paper- VI
MST-106 : 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)	-	10
6- Viva	-	04
7- Seasonal / Seed album/Herbarium	-	10
	-	50

Suggested Practical –

1. Seed production techniques in self- and cross-pollinated crops.
2. Floral biology of crops (study of flower characteristics)
3. Methods of testing viability / dormancy.
4. Determination of Vigour testing methods.
5. Methods of seed treatment.
6. Factors affecting Pre and post harvesting of crops.
7. Determination of Physical and chemical purity of seeds.
8. Methods of development of hybrid seeds.
9. Identification of Tag colour for different classes of seeds.
10. Study about Isolation distances of different crops.

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