Shivaji University, Kolhapur
B.Sc. Part-III
SEED TECHNOLOGY (VOCATIONAL COURSE)
PAPER -V
SEED PATHOLOGY AND SEED ENTOMOLOGY
SECTION-I
SEED PATHOLOGY
(Implemented from June, 2010)

Unit I- Seed borne diseases: (10)

1.1History of seed pathology and economic significance of seed borne diseases.

1.2. Seed borne fungi, bacteria, viruses and nematodes. (Any two examples of each group.)

1.3 Inoculum density of seed borne pathogens and its relationship with disease security, yield losses.

1.4. Ecological relationship of seed borne micro organisms.

Unit II- Seed infection (10)

2.1 Storage fungi and their impact on animal and human health. (Suitable examples)

2.2 Mechanisms of transmission of seed pathogen.

2.3 Entry points of seed infection.

2.4 Influence of environmental factors on seed borne diseases.

Unit III- Seed treatment (13)

3.1. Seed treatment, procedures and equipments.

3.2. Objectives of seed health testing, procedures of sampling methods of seed health testing.

Unit IV -Seed Legislation (07)

4.1 Quarantine for seed. (Principle and procedure)

4.2. Seed certification and tolerance limits of seed borne pathogens.

4.3. Seed act in relation to seed borne diseases.

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SECTION-II

SEED ENTOMOLOGY

Unit V- General Organization of insects (10)

External morphology and types of appendages,
Stages of insect development, complete and incomplete metamorphosis;
Insect classification up to orders of class insecta of economic importance.

Unit VI- Insect pests

Study of following insect pests of seed crops; their nature of damage and (10)
Management -

1) Cereals Paddy – grass hopper.
2) Maize Army worm.
3) Sorghum – Stem borer.
4) Kharip pulse (Pigeon Pea) – Tur pod borer.
5) Rabi pulse (Chick Pea) – Gram pod borer.
6) Pea – Pea pod borer.
7) Oil crop – Castor – semilooper.
8) Oil crop- Groundnut – White grub.
9) Vegetables- Cabbage caterpillar.
10) Vegetables - Brinjal fruit borer.
11) Vegetables – Tomato leaf minor
12) Vegetables – Bean aphids.

Unit VII- Insect pest control (10)

Methods of insect pest control; cultural, mechanical, physical, chemical,

Quarantine, pesticides of plant origin, Autocidal and Biological control. (in brief)

Insecticide formulations, and preparation of spray solution ,safe application of

pesticides.Types of equipments and their principles; safe handling,

maintanance and use of machines,

fumigants and methods of fumigation, seed protectants and their

impact on seed viability.

Unit VIII- Beneficial and harmful insects (10)

Beneficial insects and their role in seed production (Honey bee), types of

insects pollinators and their use in crop pollination.

Types of insect pests and mites in storage seeds and dry fruits; nature of

damages and losses caused, factors influencing them, sources, development

and infestation

Shivaji University, Kolhapur
B.Sc. Part-III
SEED TECHNOLOGY (VOCATIONAL COURSE)
PAPER-VI

SEED PROCESSING, STORAGE AND SEED FARM MANAGEMENT MARKETING.

SECTION-I

SEED PROCESSING AND STORAGE.

Unit I- Seed processing (10)

1.1. Concept and objectives of seed processing, basic flow pattern in seed processing,
Concept and importance of seed processing in the pathway of seed improvement,
physical characteristics used to separate seeds.
1.2. Preparing seeds for processing .The scalper,the debearder,the maize Scarifier and sheller, licensing of machines.
1.3. Seed drying : importance and advantages of seed drying ,moisture content, Orthodox / recalcitrant methods of seed moisture measurements, Theory of seed
Drying (wet dry seeds),advantages of mechanical drying equipments dehumidification and drying of heat sensitive seeds.
Relative humidity and equilibrium, moisture content of seeds.

Unit II- Seed processing machines (10)

Principle, construction, working, adjustments, cleaning and uses of seed Processing machines viz.
i) Air screen cleaner cum grader.
ii) Specific gravity separator, aspirators, pneumatic aspirators, the stoner-
iii) Roll mill.
iv) Magnetic separators.
v) Spiral separators, the dropper best separator, electrostatic separators.

Unit III Seed treatment and seed processing plant (10)

3.1 Seed Treatment; Principle, construction, working, adjustments and uses of slurry seed treater mist -o- matic seed treated, storage and labeling of treated seeds, seed users safety.
3.2. Site selection for seed processing plant on a seed production farm, layout of Machines in a seed processing plant for efficient product and man movement, seeds in post harvest phase, conservation of energy and production.
3.3 Seed conveyors and elevators, bucket elevator ,belt conveyor, screen conveyor, oscillation conveyor, pneumatic conveyor.

Unit IV- Seed storage and packing (10)

4.1 Seed storage – structures and their management
4.2 Packing and marketing seeds, bagger weigher, bag closing ,portable and Conveyor type of bag closer, labeling and maintaining lot identify, lot numbers, Seed pellets, handling and stacking, maintenance of seed processing record.

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SECTION-II

SEED FARM MANAGEMENT AND MARKETING.

Unit V-Farm management (10)

5.1. Scope : basic principles in farm management, field of farm management, decision making operation & control .

5.2. Decision making based on production, cost and capital investment, cost analysis, Law of diminishing returns, opportunity cost, most profitable combination of input and output.

Unit VI- Field practices and machinery management (10)

6.1 Concepts of various crop production, field practices as tillage, irrigation, sowing, plant protection, harvesting and threshing ,maintenance of soil fertility ,weeds & their control, crop rotation - mixed cropping ,multiple cropping & dry land farming.

6.2 . Machinary selection & their management, determinatoion of field capacity & field efficiency.

Unit VII- Farm Resource Management and analysis (10)

7.1. Farm planning, construction of infarm buildings, implement shed, strong structures.

7.2. Farm business analysis, farm efficiency measures, farm records & their uses.

7.3. Farm budgeting procedure and uses, farm size, factors affecting profit and economic size of farm.

7.4. Farm surveys, data collection & analysis.

7.5. Acquisition & management of land, labour & capital.

Unit VIII- Seed marketing (10)

8.1. Marketing- basic concepts, supply & demand, price equilibrium seed transportation & storage cost & returns, cost processing & packing ,marketing organization for seed marketing , seed markets in India, structure & working.

8.2. Seed market surveys, seed industry in relation to global market, concept of WTO, GATT, IPR and PBR.

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Shivaji University, Kolhapur
B.SC.III
SEED TECHNOLOGY
PRACTICAL-I

Unit I

1. Demonstration & handling of stereobinocular microscope.

2. Characters of important seed borne pathogens. (Any five)

3. Visual examination of dry seeds for disease symptoms. (Any five)

4. Examination of suspensions obtained from washings of seed.

5. Viability test- space germination test and tetrazolium test.

6. Infection sites studied by planting seed components.

Unit II

7,8. Detection of important seed borne fungi-various detection methods.

9,10. Detection of important seed borne bacteria- various methods.

Unit III

11,12. External morphology of insect, type of mouth-parts antenna & legs.

13,14. Identification of important storage and dry fruit pests and their control.

15. Detection of seed borne insects.

Unit IV

16. Fumigation-principle and practical application.

17,18 Types of insecticide formulations ,their preparation & safe use.

19. Plant protection equipments, their safe handling & use.

20. Collection and submission of stored product pests.

21,22&23. Visits to warehouse & godowns and market.(Visit reports to be submitted)

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Shivaji University, Kolhapur
B.Sc. III
SEED TECHNOLOGY
PRACTICAL-II

Unit I

1. Study of physical characteristics of different crop seeds & their shapes.

2. Determination of physical properties of seeds of different crops.

3. Measurement of seed moisture content by O S W A moisture meter / oven drying method.

Unit II

4. Study of seed –pre-cleaner ,maize sheller & dehusker.

5. Study of air screen cleaner cum grader.

6. Study of magnetic separator.

7. Study of specific gravity separator.

8. Study of seed treatment machines.

9. Study of seed packaging equipment.

10. Study of bucket elevator, screw conveyers and pneumatic elevators.

11. Measuring performance of seed processing machines.

Unit III

12. Study of threshing machine and its use.

13. Determination of field capacity & field efficiency.

14. Soil sampling for fertility & moisture content.

Unit IV

15. Study of farm implements viz. .Weeders, hoes, harrow.

16. Cost analysis.

17. Farm planning & budgeting.

18. Record keeping.

19,20. Visit to a seed processing & storage complex and familiarization with different machines.

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Reference Books :-

1. Neergaard – Seed Pathology vol.I & II.
2. Agarwal.V.E. & Sincelair, J.B.-Principles of seed pathology Vol.I & II.
3. K.A. Jeffs-Seed treatment.
4. C.J. Alexopoulus – Introductory mycology.
5. J.P.Shrivastava – An Introduction to fungi.
6. R.W. Marsh – Systemic Fungicides.
7. Y.L.Nene & M.J. Thapliyal –Fungicides in plant disease control.
8. Mary Noble & M.J. Richardson – An annolated list of see borne diseases.
9. S.C. Vyas –Systematic Fungicides.
10. Metcalf & Flint –Desructive & useful Insects.
11. J.B. Free – Insect pollination of field crops.
12. A.S. Atwal – Agricultural Entomology.
13. D.S. Bindra- Plant Protection and equipments.
14. Billy R. Gregg, Alvin G.Law,S.S. Virde,J.S. Balis-Seed Processing.
15. S.M. Henderson & R. Perry –Agricultural process Engineering.
16. Carl W. Hall – Drying Farm crops.
17. A Chakravarty- Post Harvest Technology & cereals ,pulses & oil seeds.
18. Waren L.Melabe,Julien C. Smith & Peter Harviot – Unit operation in chemical engineering.
19. ICAR – Handbook of Agriculture.
20. Hunt D. – Farm power & machinery management.
21. John E. Kadlec – Farm management, decision operation control.
22. Michael D. Boehlje & Verman R. Eidman –Farm management.
23. S.S. Johl & T.R. Kator – Fundamentals of farm management.
24. A.S. Kahlona Karam Singh – Economics of farm management in India.
25. V.T. Raju & D.V. Rao – Economics of Farm production & management.
26. S.S. Acharya – Agricultural marketing in India.
27. Prem Singh and Arya – Vegetable breeding and seed production; Kalyani Publ. Ludhiana.
28. B. D. Singh, - Plant Breeding 2nd ed. 2006. Kalyani publ Ludhiana.
29. B. D. Singh, - Plant Breeding Principles and Methods. Kalyani Publ Ludhiana.
30. V. L. Chopra, - Plant Breeding Theory and Practices Oxford IBH Pvt.Ltd.
31. V. L. Chopra, - Plant Breeding Field crops Oxford IBH Pvt. Ltd. New Dehli. 2001

B. Sc. – III (Seed Technology) Shivaji University, Kolhapur

Practical Examination.

A) Each candidate must produce a certificate from the Head of the department in his College, stating that he/she has completed the practical course in a satisfactory manner and has properly maintained the laboratory journal. Every candidate must have recorded his/her observations in the laboratory journal and has written a report on each exercise performed. Every journal is to be checked and signed periodically by a member of the teaching staff and certified by the Head of the department at the end of the year. Candidates are to produce their journals at the time of practical examination.

B) Excursion and visits to ware houses godowns ,markets and study farm Machinery. Study of seed processing with different machines, market survey is necessary. One of the excursions shall be to the Research Institute or Agricultural University engaged in seed Technological studies and research .

C) Each practical examination (I&II) shall be of five hours duration & shall test a candidate on two successive days.

D) Report of job training or seminar or market survey. Students should visit to seed processing units, various crop fields(maintain field diary) at breeding stations and local market and submit the report of the same at the practical examination. They should be duely signed by the teacher in charge and certified by the Head of the department.The same will be assessed by the job training teacher.

E) Field diary :-

1) Locality.
2) Crop-Kharip/Rabi,Type-oil seeds /seeds/cereals/pulses,variety sown.
3) Soil.
4) Climate.
5) Irrigation facilities.
6) Seed rate.
7) Duration.
8) Insect pests and their control, success achived.
9) Diseases and their control, success achived.
10) Weeds and their control, success achived.
11) Farm machinery used at various periods.
12) Productivity (harvesting time)
13) Storage & its management.
14) Losses / benefit.

B. Sc. – III (Seed Technology) Shivaji University, Kolhapur
Key To the Practicals

PRACTICAL – I

1. Diseased seeds or their suspension. (5)
2. Viability test / Tetrazolium test. (5)
3. Identification, classification (order) and description of the insect. (5)
4. Apparatus of plant protection / fumigation. (5)
5. Spotting – i) Seed fungi and Seed bacteria (16)
ii) mouth parts / legs/antenna/metamorphosis stage of
an insect.
iii) storage pest.
iv) Bees or Bee box.
6. Submission-storage pest, field diary and viva based on these. (09)
7. Journal. (5)

PRACTICAL-II

1. Physical properties of crop seeds. (5)
2. Moisture content of seed /soil. (5)
3. Apparatus and its use (maize sheller and de-husker Air cleaner (5)
& grader) OR
Apparatus and its use (magnetic separator / specific gravity separator)
4. Machine and its working (bucket elevator /pneumatic elevator) (5)
OR
Machine and its working (Seed treatment /packing equipment)
5. Measurement of performance of a seed processing machine. (5)
6. Making a cost analysis / budgeting on basis of a given data. (5)
7. Making a farm plan / preparation of farm record on basis of given data. (5)
8. Report of training, seminar and market survey. (10)
9. Journal. (5)

B Sc. – III (Seed Technology) Shivaji University, Kolhapur.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. III PRACTICAL EXAMINATION MARCH/APRIL 2010

SEED TECHNOLOGY :- Practical – I

Time :- 11.00 a.m. onwards Marks :- 50

N.B. 1) Draw neat labeled sketches wherever necessary.
2) Show your preparations to the examiners.

Q 1. Find out the average % of diseased seeds/grains of the given sample A / Prepare slides from the given seed suspension A. Identify the causal Organism. (5)

Q 2. Determine the viability % of the given seed / grain sample B by using Tetrazolium test. Write in brief the procedure of the test (5)

Q 3. Give the classification and description of the specimen C. (5)

Q 4. Describe the structure and working of the apparatus D (5)

Q 5. a) Identify and describe E (4)
b) Identify and describe the morphology of F (4)
c) Comment on the specimen G (4)
d) Describe the given specimen H (4)

Q 6. Submission and field diary and viva voce (9)

Q 7. Journal (5)

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SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. III PRACTICAL EXAMINATION MARCH/APRIL 2010

SEED TECHNOLOGY :- Practical – I

Time :- 11.00 a.m. onwards Marks :- 50

N.B. 1) Draw neat labeled sketches wherever necessary.
2) Show your preparations to the examiners.

Q 1. Describe external and internal physical properties of given seed/grain – A (5)

Q 2. Determine the moisture % of the given seed/soil sample B. write in short. The procedure you have followed. (5)

Q 3. Describe the structure and working of apparatus C (5)

Q 4. Comment on the working and use of the apparatus D (5)

Q 5. Comment on the performance of machine E (5)

Q 6. Prepare a budget / cost analysis by using given data F (5)

Q 7. Prepare a layout plan of a farm by using given data G (5)

OR

Q 7. Prepare a farm record by using given data G

Q 8. Report of training/seminar/market survey and viva voce. (10)

Q 9. Journal (5)

B.Sc. III – Seed Technology (Vocational) Old			B.Sc. III – Seed Technology (Vocational) Revised	
Sr.No.	**Paper Number**	**Marks**	**Paper Number**	**Marks**
1	Paper- V (BOTANY)	100	Paper- V (BOTANY)	100
2	Paper -VI (BOTANY)	100	Paper -VI (BOTANY)	100
3	Paper –VI (ST)	100	Paper –VI (ST)	100
4	Paper -VIII (ST)	100	Paper -VIII (ST)	100
5	Practical- I (BOTANY)	50	Practical- I (BOTANY)	50
6	Practical- II (BOTANY)	50	Practical- II (BOTANY)	50
7	Practical -III (ST)	50	Practical -III (ST)	50
8	Practical IV (ST)	50	Practical IV (ST)	50
9	**Total**	**600**	**Total**	**600**