

Syllabus for Seed Production and Processing Technician

Course Name	Seed Production and Processing Technician
Sector	Agriculture
Course Code	AGR/2024/SPPT/418
Level	3
Occupation	Seed Production and Processing Technician
Job Description	<p>The Seed Production and Processing Technician plays a crucial role in the agricultural sector by contributing to the efficient production and processing of high- quality seeds. Responsibilities include executing precision cultivation techniques, monitoring and ensuring compliance with seed quality parameters and actively participating in various stages of seed production, from source verification to storage. The technician is expected to operate and maintain seed processing equipment, conduct tests to assess seed quality and implement corrective measures as needed.</p> <p>With the optional module-Soil collection & Testing, they will be able to collect soil samples using proper techniques, conduct primary soil testing for fertility and nutrient analysis and maintain records of sample collection and test results.</p>
Course Duration	Total Duration Min- 390 Hrs. (T-90, P-180, OJT-60 and ES-60) Max-450 Hrs. (T-110, P-220, OJT-60 and ES-60)
Trainees' Entry Qualification	<p>Class10passed OR Class8passedandpursuingcontinuousschoolinginregularschool with vocational subject OR Class8passedwith2yearsrelevantexperience OR PreviousrelevantQualificationofNSQFLevel2withoneyear experience OR PreviousrelevantQualificationofNSQFLevel2.5with6months experience</p>
Trainers Qualification	<p>M.Sc.(Ag.)inSeedScienceandTechnologywith1year experience in relevant field OR B.Sc.(Hons.)Agriculturewith2yearsexperienceinrelevantfield OR B.Tech.inAgriculturalEngineeringwith2yearsexperiencein relevant field OR DiplomainAgriculturalEngineeringwith3yearsexperiencein relevant field</p>

Different Combination in which course may be offered

Course Name	Course Code	Course Duration	Full Marks
Seed Production and Processing Technician	AGR/2024/SPPT/418	390 Hours	1000
Seed Production and Processing Technician [with Optional: Prepare & test soil samples.]	AGR/2024/SPPT/418 [with Optional AGR/0278/OC8]	450 Hours	1100

Structure of Course:

Module No.	Module name	Outcome	Compulsory/ Elective/ Optional	Theory (Hrs.)	Practical (Hrs.)	OJT (Hrs.)	Total (Hrs.) [Multiple of 30]
1	Seed and Seed Certification	Describe the basic idea developed on seed and seed certification	Compulsory	10	20		30
2	Seed Production	Explain the principle involved in quality seed production	Compulsory	20	40		60
3	Plant Protection and Seed Health	Develop strategies to protect plants from pests and diseases	Compulsory	10	20		30
4	Seed Processing and Storage	Apply seed processing and storage techniques including cleaning, sorting, drying, conditioning and management	Compulsory	20	40		60
5	Seed Testing	Demonstrate to conduct primary seed testing methods including germination testing, purity analysis and moisture content determination	Compulsory	10	20		30
6	Basic Seed Business and Entrepreneurship Development	Formulate marketing strategies to small seed businesses and entrepreneurship development	Compulsory	20	40		60
7	OJT	Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	Compulsory	-	-	60	60
8	Employability Skill	As per guided curriculum	Compulsory	60	-	-	60
Soil collection & Testing		Prepare & test soil samples	Optional	10	20		60
9	Soil Collection						

10	Primary Soil Testing			10	20		
TOTAL			Min	150	180	60	390
			Max	170	220	60	450

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SYLLABUS:

Module1: Seed and Seed Certification

Outcome: Describe the basic idea developed on seed and seed certification

Theory Content:

- Definition and difference between seed and grain, structure of seed
- Floral biology of open and cross-pollinated crops, types of germination
- Classification of seed (Nucleus, Breeder, Foundation, Certified and Truthfully-labeled) and their characteristics
- Seed quality parameters, and importance
- Agronomic and genetic principles in seed production
- Seed Act, Seed certification – rules and regulations
- Concept and steps of seed certification, role of State Seed Certification Agency, procedures in field inspection and sampling, types of tags, etc.
- Definition, idea on seed village, benefits, limitations, scenario in West Bengal condition
- Role and responsibility of National Seed Corporation (NSC), West Bengal State seed Corporation Limited (WBSSCL)

Practical Content:

- Draw sketches of structure of seed, open and cross-pollinated flowers, types of germination
- Draw flowchart of seed certification process
- Identify the label of different classes of seeds
- Interact with District Seed Certification Officer to develop idea on seed production and business in the district
- Visit to the district office of WBSSCL

Module2: Seed Production

Outcome: Explain the principle involved in quality seed production

Theory Content:

- Common cereals (rice, wheat and maize) in West Bengal, important varieties, selection of land, isolation distance, seed treatment, agronomic practices, rouging, harvesting and seed yield
- Common pulses (lentil, chickpea, green gram, black gram, etc.) in West Bengal, important varieties, selection of land, isolation distance, seed treatment and inoculation, agronomic practices, rouging, harvesting and seed yield
- Common oilseeds (rape seed-mustard, sesame, groundnut, etc.) in West Bengal, important varieties, selection of land, isolation distance, seed treatment, agronomic practices, rouging, harvesting and seed yield
- Common fibre crops (jute) in West Bengal, important varieties, selection of land, isolation distance, seed treatment, agronomic practices, rouging, harvesting and seed yield
- Common tuber crops (potato) in West Bengal, true potato seed (TPS), important varieties, selection of land, isolation distance, seed treatment, agronomic practices, rouging, harvesting and seed yield
- Common vegetable crops (brinjal, chilli, bottle gourd, bitter melon, pumpkin, etc.) in West Bengal, important varieties, selection of land, isolation distance, seed treatment, agronomic practices, rouging, harvesting and seed yield
- Concept of hybrid seed, crops and varieties, parental lines, adjusting sowing/transplanting, row ratio, harvesting and threshing

Practical Content:

- Identification of seeds of different varieties of common crops
- Selection of season, area and land, varieties, etc.
- Demonstrate land preparation, isolation distance, sowing techniques, seed treatment, fertilizer application, weed control, water management, rouging, harvesting and threshing of at least one crop from each group of cereals, pulses, oilseeds, fibre crops, tuber crops and vegetable crops
- Demonstrate special agro-techniques for different crops (e.g. dehauling in potato, detopping in jute, etc.)
- Primary calculation on seed rate, fertilizer, pesticide, herbicide, etc.
- Follow inspection in seed production fields, and conduct sampling as per certification standards
- Identify optimum harvesting time of different crops, demonstrate harvesting, threshing, drying and cleaning
- Demonstrate operation and maintenance of different farm machineries (power tiller, seed drill, sprayer, harvester, thresher, etc.)
- Preparation of seed lots
- Maintenance of Field Note Book
- Visit to a Government/University/KVK Seed Farm
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Module 3: Plant Protection and Seed Health

Outcome: Develop strategies to protect plants from pests and diseases

Theory Content:

- Common insect-pests of different crops, symptoms of damage, economic threshold level, control measures
- Common diseases of different crops, symptoms of damage, economic threshold level, control measures
- Integrated pest-disease management
- Common store-grain pests, symptoms of damage, control measures

- Concept on seed health, methods of tests of primary seed health

Practical Content:

- Identify common insect-pests of different crops, symptoms of damage, and demonstrate control methods
- Identify common diseases of different crops, symptoms of damage, and demonstrate control methods
- Demonstrate different methods of seed treatment
- Demonstrate integrated pest-disease management
- Identify common store-grain pests, symptoms of damage, and demonstrate control methods
- Demonstrate use of sprayer, duster, etc.
- Demonstrate methods of primary seed health tests

Module No. 4: Seed Processing and Storage

Outcome: Apply seed processing and storage techniques including cleaning, sorting, drying, conditioning and management

Theory Content:

- Introduction to seed processing, importance of good quality seed in crop production and higher productivity
- Basic principles and steps in seed processing
- Methods of seed processing (drying, cleaning, grading, bagging, etc.) – Manual and Mechanical
- Principles of safety, hygiene and sanitation in seed processing
- Basic servicing and maintenance of various equipment, machines involved in processing
- Idea on seed certification labels and producer cards
- Need of seed storage, types of storage containers, godowns for different crops
- Concept on storage environment, relationship with seed moisture
- Factors in deterioration of seed quality in storage and precautionary management

Practical Content:

- Draw the layout and workflow of Seed Processing Unit
- Demonstrate different methods of seed drying (sundrying, mechanical drying)
- Demonstrate different methods of seed cleaning, and measure quantity of impurities
- Identify seed processing machineries for different crops
- Operate seed processing machines including the activities like loading, adjusting, setting and process monitoring
- Demonstrate on steps of seed processing, grading, bagging, sealing, etc. and use of seed certification labels
- Sanitation of processing plants and regular cleaning of workplace
- Identify different types of storage containers, godowns for different crops
- Demonstrate steps of seed storage, use of shelves based on shape, size and weight of seed, and other related activities during the period of seed storage
- Maintenance of different registers at Seed Processing Unit
- Visit to a Modern Seed Processing Plant

Module No. 5: Seed Testing

Outcome: Demonstrate to conduct primary seed testing methods including germination testing, purity analysis and moisture content determination

Theory Content:

- Introduction and importance of seed quality
- Methods of sample collection, and preparation of working samples before seed test

- Idea on primary seed quality parameters (purity, germination, moisture content, etc.)
- Methods of seed testing

Practical Content:

- Demonstrated drawing representative samples from seed lot including use of seed triers
- Identify different equipment (seed germinator, seed counter, etc.), glasswares, chemicals, etc. used in seed testing
- Preparation of working samples for different crops before seed testing
- Demonstrated different steps of seed testing, and recording values of the tests
- Maintenance of Seed Testing Register for traceability, quality control and compliance purpose

Module No. 6: Basic Seed Business and Entrepreneurship Development

Outcome: Formulate marketing strategies to small seed businesses and entrepreneurship development

Theory Content:

- Idea on seed market chain, factors involved in seed marketing, demand forecast, price competitiveness
- Brief idea about small seed business and related issues
- Project preparation, technical strength and financial viability
- Knowledge on seed license, registration of seed units, Govt. schemes, bank loan, GST, etc.
- Time-line plan for involvement in seed business network, probable risks and measures

Practical Content:

- Examine the demand and price of seeds throughout the season/year
- Maintenance of accounts and calculation of economic of seed production
- Preparation of a small seed business project
- Visit to rural/nationalized bank, agriculture fair, seed shop, etc.
- Maintenance of contacts of people related to seed business and local emergency services

Module 7: OJT

Outcome: Work in real job situation with special emphasis on basic safety and hazards in this domain

Practical Content:

Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain. (The trainee is expected to undertake work in actual workplace under any supervisor / contractor for **60 Hours**.)

Module 8: Employability Skills

(60 Hrs.)

Key Learning Outcomes

Introduction to Employability Skills

Duration: 1.5 Hours

After completion of the programme, participants will be able to:

1. Discuss the Employability Skills required for jobs in various industries
2. List different learning and employability related GO and private portals and their usage

Constitutional values-Citizenship

Duration: 1.5 Hours

3. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
4. Show how to practice different environmentally sustainable practices.

Becoming a Professional in the 21st Century

Duration: 2.5 Hours

5. Discuss importance of relevant 21st century skills.
6. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.
7. Describe the benefits of continuous learning.

Basic English Skills

Duration: 10 Hours

8. Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
9. Read and interpret text written in basic English
10. Write a short note/paragraph/letter/e-mail using basic English

Career Development and Goal Setting

Duration: 2 Hours

11. Create a career development plan with well-defined short- and long-term goals

Communication Skills

Duration: 5 Hours

12. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
13. Explain the importance of active listening for effective communication
14. Discuss the significance of working collaboratively with others in a team

Diversity and Inclusion

Duration: 2.5 Hours

15. Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
16. Discuss the significance of escalating sexual harassment issues as per POSH Act.

Financial and Legal Literacy

Duration: 5 Hours

17. Outline the importance of selecting the right financial institution, product, and service
18. Demonstrate how to carry out offline and online financial transactions, safely and securely
19. List the common components of salary and compute income, expenditure, taxes, investments etc.
20. Discuss the legal rights, laws, and aids

Essential Digital Skills

Duration: 10 Hours

21. Describe the role of digital technology in today's life
22. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
23. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
24. Create sample word documents, excel sheets and presentations using basic features
25. Utilize virtual collaboration tools to work effectively

Entrepreneurship

Duration: 7 Hours

26. Explain the types of entrepreneurship and enterprises
27. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
28. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
29. Create a sample business plan, for the selected business opportunity

Customer Service

Duration: 5 Hours

30. Describe the significance of analyzing different types and needs of customers
31. Explain the significance of identifying customer needs and responding to them in a

professional manner.

32. Discuss the significance of maintaining hygiene and dressing appropriately

Getting Ready for Apprenticeship and Jobs

Duration: 8 Hours

33. Create a professional Curriculum Vitae (CV)
34. Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
35. Discuss the significance of maintaining hygiene and confidence during an interview
36. Perform a mock interview
37. List the steps for searching and registering for apprenticeship opportunities

Optional:

Module No. 9: Soil collection

Theory Content:

- Explain the objectives of soil sampling (predictive, diagnostic, monitoring).
- Identify factors influencing soil sample collection (area size, frequency, time, depth, sub-samples).
- Describe types of soil sampling (cluster, grid, zig-zag, random).
- Describe soil sampling procedures for field crops, vegetables, orchards, plantation crops and problem soils.
- Explain the preparation process of soil sample for analysis (drying, grinding, mixing, partitioning, sieving, etc.)

Practical Content:

- Identify soil sampling tools.
- Use GPS to record sample locations in the field.
- Demonstrate the procedure of soil sampling.
- Demonstrate processing of samples for testing and labeling.

Module No. 10: Primary Soil Testing

Theory Content:

- Explain soil fertility and essential plant nutrients.
- Identify the parameters of soil testing.
- Outline the physical properties of soil (texture and structure).
- Describe the chemical properties of soil (pH, organic carbon, N, P₂O₅, K₂O, salinity etc.).
- Describe the usage of soil health card.
- Explore the functions and equipment of a Soil Testing Laboratory and Soil Testing Kit.
- Identify the components and operational procedures of a mobile soil testing van.

Practical Content:

- Measure soil pH.
- Determine soil organic carbon, salinity and other parameters.
- Estimate N, P₂O₅, and K₂O content in soil.
- Demonstrate the use of a soil testing kit.
- Maintain hygiene, safety and sanitation in the soil testing laboratory.
- Keep records of soil sample collection and testing.
- Create a draft plan for setting up of Soil Testing Laboratory.
- Create a draft plan for Mobile Soil Testing Van including financial assessment

Learning Outcome– Assessment Criteria

Sl. No.	Outcome	Assessment Criteria
1	Describe the basic idea developed on seed and seed certification	After completion of this module students will be able to: <ol style="list-style-type: none"> 1.1 Distinguish between seed and grain 1.2 Explain different classes of seed, and identify labels 1.3 Explain significance of using high-quality seeds in crop production 1.4 Identify the steps in seed certification 1.5 Explain the role and responsibility of SSCA, NSC, WBSSCL, etc.
2	Explain the principle involved in quality seed production	After completion of this module students will be able to: <ol style="list-style-type: none"> 2.1 Identify seeds of different varieties of common crops 2.2 Choose appropriate varieties and land situation for different crops, verify seed labels 2.3 Perform agro-techniques for production of quality seeds of various crops in different seasons 2.4 Perform special activities of seed certification (seed treatment, maintenance of isolation distance, rouging, etc.) 2.5 Identify and use farm machineries (power tiller, seed drill, harvester, thresher, etc.) 2.6 Assist field inspection and related activities under seed certification programme 2.7 Implement innovative cultivation methods using modern technologies
3	Develop strategies to protect plants from pests and diseases	After completion of this module students will be able to: <ol style="list-style-type: none"> 3.1 Identify common insect-pests and follow control measures in seed production fields 3.2 Identify common diseases and follow control measures in seed production fields 3.3 Comprehend of IPM and its application 3.4 Use of different sprays, dusts, etc. 3.5 Identify common store-grain pests and follow control measures 3.6 Perform primary tests of seed health

4	Apply seed processing and storage techniques including cleaning, sorting, drying, conditioning and management	After completion of this module students will be able to: <ul style="list-style-type: none"> 4.1 Describe fundamental concepts and purposes of seed processing 4.2 Explain the steps of seed processing and draw processing work chart 4.3 Identify and operate different seed processing machineries 4.4 Demonstrate different methods of seed drying and cleaning 4.5 Demonstrate grading, bagging and sealing 4.6 Maintain seed processing register 4.7 Describe fundamental principles of safety, hygiene and sanitation related to seed processing 4.8 Demonstrate basic servicing and maintenance tasks for seed processing equipment and machines including maintenance registers 4.9 Describe different seed containers, godowns 4.10 Explain optimum storage environment and its maintenance 4.11 Explain correct storage practices for chemicals used in seed storage ensuring compliance with safety regulations
5	Demonstrate to conduct primary seed testing methods including germination testing, purity analysis and moisture content determination	After completion of this module students will be able to: <ul style="list-style-type: none"> 5.1 Explain seed testing and its importance 5.2 Prepare working sample, and identify different equipment, glasswares, chemicals, etc. used in seed testing 5.3 Perform different methods of seed testing (purity, germination, moisture, etc.) of different crops 5.4 Maintain seed testing register
6	Formulate marketing strategies to small seed businesses and entrepreneurship development	After completion of this module students will be able to: <ul style="list-style-type: none"> 6.1 Explain demand-supply system for seeds of different crops/ varieties 6.2 Share idea on market price of inputs and seeds 6.3 Prepare small seed business project 6.4 Explain self-capability as Seed Producer and Processing Technician and/or plan for small seed business
7	OJT	Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).
8	Employability Skill	As per guided curriculum
9	Prepare & test soil samples.	After completion of this module students will be able to: <ul style="list-style-type: none"> (9.1) Describe the purpose of soil collection. (9.2) Demonstrate different methods of soil collection. (9.3) Make a list of tools required for soil collection. (9.4) Prepare soil sample for analysis. (9.5) Record soil sample locations using GPS. (9.6) Measure soil pH and other essential parameters. (9.7) Use soil testing kits to estimate nutrient content. (9.8) Maintain hygiene and safety standards in the testing lab. (9.9) Prepare a project plan for setting up of Soil Testing Laboratory. (9.10) Prepare a project plan for Mobile Soil Testing Van including financial assessment

List of Tools, Equipment and Materials needed for 30 Trainees (Practical)

Sl.	Name of the Tool & Equipment	Specification	Quantity
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No.			
1.	Land for cultivation	Fertile, high or medium-high land	10 bigha
2.	Seeds of different crops / varieties	Certified and Foundation	As required
3.	Power tiller		1
4.	Spade		6
5.	Khurpi / Trowel		6
6.	Tyne		6
7.	Augur – tube, screw, barrel, dutch		1 each
8.	Measuring tape	50 m	1
9.	Seed drill		1 for each crop
10.	Nirani		6
11.	Sprayer		2
12.	Duster		1
13.	Harvester		As required
14.	Thresher	Pedal and Power	1 + 1
15.	Winnowing / Pedestal fan		1
16.	Processing machine (different sieves)	According to specific crop	1
17.	Sewing machine		2
18.	Weighing machine	Upto 5 kg and 100 kg	1 + 1
19.	Precision balance	Upto 100 g	1
20.	Moisture meter		1
21.	Germinator	210 L	1
22.	Purity work board		1
23.	Riffle type divider		1
24.	Sleeve trier /Nobbe trier		2
25.	Seed counter		1
26.	Seed grader	Small	1
27.	Seed cleaner (Air screen cleaner)		1
28.	Grinding machine	Small	1
29.	Hot air oven		1
30.	Seed dryer (with blower)		1
31.	Storage bin / Metal container		6
32.	Gunny bag		30
33.	HDPE bag		30
34.	Cloth bag		30
35.	Sealing machine		1
36.	Lead seal		As required
37.	Producer cards		As required
38.	Certification tags	(Golden, White, Blue)	As required
39.	Petridish with lid	Large and small	20 + 20
40.	Glass plate	8" x 6"	20
41.	Forcep	Large and small	4 + 4
42.	Watch glass	Large and small	10 + 10

43.	Beaker	500 ml, 250 ml, 100 ml	5 + 5 + 10
44.	Aluminium box	Small	12
45.	Polythene sheet	6'x4' and 2'x2'	30 + 30
46.	Polythene bag/packet (small)		90
47.	Wooden mortar, roller		2 + 2
48.	Sieve	80 mesh and 20 mesh	2 + 2
49.	Beaker	500 ml, 250 ml, 100 ml	2 + 6 + 30
50.	Conical flask	500 ml, 250 ml	10 + 10
51.	Volumetric flask	50 ml	30
52.	Pipettes	10 ml, 5 ml	10 + 10
53.	Burette & stand		6
54.	Glass rod		30
55.	Funnel		30
56.	Filter paper	Whatman Grade 1 & 42	6 + 3 packets
57.	Measuring cylinder	100 ml	6
58.	Standard buffer solution	pH 4, 7, and 9.2	1 each
59.	Wash bottle	500 ml	6
60.	Asbestos sheet	Organic carbon	30
61.	Moisture box (Aluminum)	Small	30
62.	pH meter		1
63.	Electrical Conductivity (EC) meter		1
64.	Kjeldahl flasks with distillation unit		1
65.	Spectrophotometer		1
66.	Flame photometer		1
68.	Soil testing kit		6
69.	Register	Seed production, processing, sale, machine maintenance, and Soil testing	1 each
70.	Cash book and Stock book	Seed processing, and Soil testing	1 each
71.	White board		1
72.	Marker	Different colours	As required
73.	Laptop		1 (optional)
74.	Projector		1 (optional)
75.	Audio-visual aids		1 (optional)
76.	Smart phone		1 each (own)
77.	First-aid Box		1

Marks Distribution

Outcome	Outcome Code	Type	Total Th marks	Total Pr marks	Total OJT marks
Describe the basic idea developed on seed and seed certification	AGR/0278/OC1	Compulsory	20	90	0
Explain the principle involved in quality seed production	AGR/0278/OC2	Compulsory	30	130	0
Develop strategies to protect plants from pests and diseases	AGR/0278/OC3	Compulsory	20	80	0
Apply seed processing and storage techniques including cleaning, sorting, drying, conditioning and management	AGR/0278/OC4	Compulsory	30	130	0
Demonstrate to conduct primary seed testing methods including germination testing, purity analysis and moisture content determination	AGR/0278/OC5	Compulsory	20	90	0
Formulate marketing strategies to small seed businesses and entrepreneurship development	AGR/0278/OC6	Compulsory	30	130	0
Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	AGR/0278/OC7	Compulsory	0	0	150
Employability Skills – 60 Hrs	DGT/VSQ/N0102	Compulsory	50	0	0
Prepare & test soil samples.	AGR/0278/OC8	Optional	20	80	0
Full Marks: Minimum: 1000 (Th 200, Prac 800) <i>without</i> Optional Maximum: 1100 (Th 220, Prac 880) <i>with</i> Optional					