

AGRO PROCESSING

NSQF LEVEL- 6



SECTOR- FOOD INDUSTRY

COMPETENCY BASED CURRICULUM
CRAFT INSTRUCTOR TRAINING SCHEME (CITS)



GOVERNMENT OF INDIA

Ministry of Skill Development & Entrepreneurship

Directorate General of Training

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

EN-81, Sector-V, Salt Lake City, Kolkata – 700091



Directorate General of Training

AGRO PROCESSING

(Non-Engineering Trade)

SECTOR – FOOD INDUSTRY



CRAFT INSTRUCTOR TRAINING SCHEME (CITS)

कौशल भारत - कुशल भारत
NSQF LEVEL - 6

Developed By

Government of India
Ministry of Skill Development and Entrepreneurship

Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091

www.cstaricalutta.gov.in

CONTENTS

SNo.	Topics	Page No.
1.	Course Overview	1
2.	Training System	2
3.	General Information	6
4.	Job Role	8
5.	Learning Outcome	11
6.	Course Content	12
7.	Assessment Criteria	18
8.	Infrastructure	21
	Annexure I –List of Trade Experts	25

1. COURSE OVERVIEW

The Craft Instructor Training Scheme is operational since inception of the Craftsmen Training Scheme. The first Craft Instructors' Training Institute was established in 1948. Subsequently, 6 more institutes namely, Central Training Institute for Instructors (now called as National Skill Training Institute (NSTI)), NSTI at Ludhiana, Kanpur, Howrah, Mumbai, Chennai and Hyderabad were established in 1960's by DGT. Since then the CITS course is successfully running in all the NSTIs across India as well as in DGT affiliated institutes viz. Institutes for Training of Trainers (IToT). This is a competency based course of one year duration. "Agro Processing" CITS trade is applicable for Instructors of "Agro Processing" Trade under CTS.

The main objective of Craft Instructor training programme is to enable Instructors explore different aspects of the techniques in pedagogy and transferring of hands-on skills so as to develop a pool of skilled manpower for industries, also leading to their career growth & benefiting society at large. Thus promoting a holistic learning experience where trainee acquires specialized knowledge, skills & develops attitude towards learning & contributing in vocational training ecosystem.

This course also enables the instructors to develop instructional skills for mentoring the trainees, engaging all trainees in learning process and managing effective utilization of resources. It emphasizes on the importance of collaborative learning & innovative ways of doing things. All trainees will be able to understand and interpret the course content in right perspective, so that they are engaged in & empowered by their learning experiences and above all, ensure quality delivery.

2. TRAINING SYSTEM

2.1 GENERAL

CITS courses are delivered in National Skill Training Institutes (NSTIs) & DGT affiliated institutes viz., Institutes for Training of Trainers (IToT). For detailed guidelines regarding admission on CITS, instructions issued by DGT from time to time are to be observed. Further complete admission details are made available on NIMI web portal <http://www.nimionlineadmission.in>. The course is of one-year duration. It consists of Trade Technology (Professional skills and Professional knowledge), Training Methodology and Engineering Technology/ Soft skills. After successful completion of the training programme, the trainees appear in All India Trade Test for Craft Instructor. The successful trainee is awarded NCIC certificate by DGT.

2.2 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one year:

S No.	Course Element	Notional Training Hours
1.	Trade Technology	
	Professional Skill (Trade Practical)	640
	Professional Knowledge (Trade Theory)	240
2.	Soft Skills	
	Practical	100
	Theory	100
3.	Training Methodology	
	TM Practical	320
	TM Theory	200
	Total	1600

2.3 CAREERPROGRESSION PATHWAYS

- Can join as an Instructor in a Vocation Training Institutes/ technical Institution.
- Can join as a supervisor in Industries.

2.4 ASSESSMENT & CERTIFICATION

The CITS trainee will be assessed for his/her Instructional skills, knowledge and attitude towards learning throughout the course span and also at the end of the training program.

a) The Continuous Assessment (Internal) during the period of training will be done by **Formative Assessment Method** to test competency of instructor with respect to assessment

criteria set against each learning outcomes. The training institute has to maintain an individual trainee portfolio in line with assessment guidelines. The marks of internal assessment will be as per the formative assessment template provided on www.bharatskills.gov.in

b) The **Final Assessment** will be in the form of **Summative Assessment Method**. The All India Trade Test for awarding National Craft Instructor Certificate will be conducted by DGT as per the guidelines of DGT. The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The external examiner during final examination will also check the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS CRITERIA

S No.	Subject		Marks	Internal Assessment	Full Marks	Pass Marks	
						Exam	Internal Assessment
1.	Trade Technology	Trade Theory	100	40	140	40	24
		Trade Practical	200	60	260	120	36
2.	Soft Skills	Practical	50	25	75	30	15
		Theory	50	25	75	20	15
3.	Training Methodology	TM Practical	200	30	230	120	18
		TM Theory	100	20	120	40	12
Total Marks			700	200	900	370	120

The minimum pass percent for Trade Practical, TM Practical, Soft Skill Practical Examinations and Formative assessment is 60% & for all other subjects is 40%. There will be no Grace marks.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. While assessing; the major factors to be considered are approaches to generate solutions to specific problems by involving standard/non-standard practices.

Due consideration should also be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure,

behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising of the following:

- Demonstration of Instructional Skills (Lesson Plan, Demonstration Plan)
- Record book/daily diary
- Assessment Sheet
- Progress chart
- Video Recording
- Attendance and punctuality
- Viva-voce
- Practical work done/Models
- Assignments
- Project work

Evidences and records of internal (Formative) assessments are to be preserved until forthcoming examination for audit and verification by examining body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should be well versed with instructional design, implement learning programme and assess learners which demonstrates attainment of an acceptable standard of crafts instructorship with occasional guidance and engage students by demonstrating good attributes of a trainer.	<ul style="list-style-type: none"> • Demonstration of fairly good skill to establish a rapport with audience, presentation in orderly manner and establish as an expert in the field. • Average engagement of students for learning and achievement of goals while undertaking the training on specific topic. • A fairly good level of competency in expressing each concept in terms the student can relate, draw analogy and summarize the entire lesson. • Occasional support in imparting effective training.
(b) Weightage in the range of 75%-90% to be allotted during assessment	
For performance in this grade, the candidate should be well versed with instructional design, implement learning programme and assess learners which demonstrates	<ul style="list-style-type: none"> • Demonstration of good skill to establish a rapport with audience, presentation in orderly manner and establish as an expert in the field.

<p>attainment of reasonable standard of crafts instructorship with little guidance and engage students by demonstrating good attributes of a trainer.</p>	<ul style="list-style-type: none"> • Above average engagement of students for learning and achievement of goals while undertaking the training on specific topic. • A good level of competency in expressing each concept in terms the student can relate, draw analogy and summarize the entire lesson. • Little support in imparting effective training.
<p>(c) Weightage in the range of more than 90% to be allotted during assessment</p>	
<p>For performance in this grade, the candidate should be well versed with instructional design, implement learning programme and assess learners which demonstrates attainment of a high standard of crafts instructorship with minimal or no support and engage students by demonstrating good attributes of a trainer.</p>	<ul style="list-style-type: none"> • Demonstration of high skill level to establish a rapport with audience, presentation in orderly manner and establish as an expert in the field. • Good engagement of students for learning and achievement of goals while undertaking the training on specific topic. • A high level of competency in expressing each concept in terms the student can relate, draw analogy and summarize the entire lesson. • Minimal or no support in imparting effective training.

3. GENERAL INFORMATION

Name of the Trade	AGRO PROCESSING -CITS
Trade code	DGT/4039
NCO – 2015	2356.0100, 7514.9900, 6111.0100, 6111.0101, 6111.0201, 6111.0301, 6111.0401, 8160.0700, 8160.0800, 8160.1000
NSQF Level	Level-6
Duration of Craft Instructor Training	One Year
Unit Strength (No. Of Student)	25
Entry Qualification	Degree in Food Technology/ Food Engineering/Food processing from recognized Board / University. OR Diploma(Minimum 2 Years)in Food Technology/Food Engineering /Food processing from recognized Board / University. OR NTC / NAC in ‘Agro Processing’ or related trades.
Minimum Age	18 years as on first day of academic session.
Space Norms	Lab Space - 120 Sq. m Quality lab - 40 Sq. m
Power Norms	10 KW
Instructors Qualification for	
1. Agro Processing -CITS Trade	B.Voc/Degree in Food Technology/Food Engineering/Food processing from AICTE/ UGC recognized University with two years experience in relevant field. OR Diploma (Minimum 2 Years) in Food Technology/Food Engineering/Food processing from recognized University /Board or relevant Advanced Diploma (Vocational) from DGT with five years experience in relevant field. OR NTC/NAC passed in the Trade of “Agro Processing” with seven years experience in the relevant field. Essential Qualification: National Craft Instructor Certificate (NCIC) in “Agro Processing” Trade, in any of the variants under DGT.
2. Soft skills	MBA/ BBA / Any Graduate/ Diploma in any discipline from AICTE/ UGC recognized College/ university with Three years’ experience and

	<p>short term ToT Course in Soft Skills from DGT institutes. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above).</p>
3. Training Methodology	<p>B.Voc/ Degree in any discipline from AICTE/ UGC recognized College/ university with two years experience in training/ teaching field. OR Diploma in any discipline from recognized board / University with five years experience in training/teaching field. OR NTC/ NAC passed in any trade with seven years experience in training/ teaching field.</p> <p>Essential Qualification: National Craft Instructor Certificate (NCIC) in any of the variants under DGT / B.Ed /ToT from NITTTR or equivalent.</p>
4. Minimum Age for Instructor	21 Years

Distribution of training on Hourly basis: (Indicative only)

Total Hrs. /week	Trade Practical	Trade Theory	Soft Skills		Training Methodology	
			Practical	Theory	Practical	Theory
40 Hours	16 Hours	6 Hours	2.5Hours	2.5 Hours	8 Hours	5 Hours

4. JOB ROLE

Brief description of job roles:

Manual Training Teacher/Craft Instructor; instructs students in ITIs/Vocational Training Institutes in respective trades as per defined job role. Imparts theoretical instructions for the use of tools & equipment of related trades and related subjects. Demonstrate process and operations related to the trade in the workshop; supervises, assesses and evaluates students in their practical work. Ensures availability & proper functioning of equipment and tools in stores.

Fruit and Vegetable Related Preservers, Other; perform variety of routine tasks in canning and preserving food, fruits and vegetables not elsewhere classified, and may be designated according to nature of work performed such as: Peeler Hand peels skin of fruits and vegetables using hand knife. Grader examines, classifies and separates fruits, vegetables and fish according to size, quality, colour, condition or species. Washer tends machine that washes raw fruits or vegetables preparatory to canning, freezing or packing. Feeder Charger feeds machine with fruits or vegetables by hand for washing, shelling, shredding, cooking and pulping

Cultivator, General; Cultivators, General; Farmer, General; grows crops, vegetables, fruits, etc. depending upon soil, irrigation facilities, market, etc., and sells produce. Determines crops to be grown depending on nature of soil, climate, irrigation and marketing facilities. Selects and purchases good seed, fertiliser, implements and other items of farm equipment including machinery. Clears field of stones, grass, shrubs, trees etc., using hand tools. Prepares plots by raising 'bund'(earthwork) around them for retention of water. Tills land using plough or tractor and breaks loads. Sows seeds and levels earth. Makes channels connecting land to source of water for irrigation. Conducts weeding and hoeing to conserve moisture. Prepares manure by collecting and storing farmyard refuse into ditch and covering it with earth. Sprays insecticides, evolves measures to protect crops from destruction by plant diseases and wild animals and nurses growing crops by picking wild growth. Harvests matured crops using sickle etc. Collects harvested crop into bundles and carries it to the threshing ground when completely dried by sun. Threshes harvested crop by treading bullocks or machine. Separates grain from straw by winnowing. Bags corn, bundles straw and stores corn in godown. Sells produce in market. Hires labourers when necessary and supervises their work. Maintains equipment, building, fences etc. in good order. May operate tractor, winnowing, threshing and other machines. May breed animals. May do share cropping or take land on lease for cultivation.

Paddy Farmer; Paddy Farmer cultivates paddy as per the package of practices recommended for a particular agronomic climate zone, type of soil, rainfall pattern and climatic conditions to achieve the yields as per the genetic potential of a given variety and sell the produce in the market.

Wheat Cultivator; Wheat Cultivator cultivates wheat as per the package of practices recommended for a particular agro climate zone, type of soil, rainfall pattern and climatic condition to achieve the yield as per the genetic potential of given variety and sell the produce as per the competitive market prices without distress sale.

Maize Cultivator; Maize Cultivator undertakes the cultivation of maize crop at the farm level. The individual is also responsible for harvesting the maize crop. The maize cultivator needs to adapt recommended practices for a particular agro climate zone, type of soil, rainfall pattern and climatic conditions to achieve the best possible yield.

Pulses Cultivator; Pulses Cultivator undertakes the cultivation of pulses at the farm level. The individual is also responsible for harvesting the pulses. The pulses cultivator needs to adapt recommended practices for a particular agro climate zone, type of soil, rainfall pattern and climatic conditions to achieve the best possible yield.

Miller, Food Grains; Miller, Food grains processes rice, wheat, pulses, spices and other food grains by operating one or more machines or by supervising their operations by other workers. Adjusts and operates machines for removing husk or bran from grains, polishing rice, grinding and crushing grain and spices into smaller pieces or powder, grinding, shifting and screening grains, flour or spices etc.; observes and supervises milling process for desired results, maintains flow of milled product by regulating flow of ingredients in specified proportion; removes obstructions by tapping clogged spouts with mallet and by adjusting gates; examines product periodically by rubbing sample between fingers or comparing it with colour and texture of standard sample; keeps records of materials received and products milled. May supervise other workers at various stages of processing. May be designated according to type of grains milled or processed such as MILLER, RICE; MILLER, SPICES; MILLER, DAL etc.

Husker, Machine (Food Grains); Husker, Machine (Food grain); Hullerman, Grain operates husking machine to separate grain from its outer covering or shell. Starts machine; pours grain into storage bin attached to machine; regulates feeding of grain into machine by manipulating lever; examines hulled grain periodically for proper husking and adjusts machine as necessary; switches off machine after completion of process or when machine does not function properly; removes minor defects and reports major defects to supervisor for rectification. Cleans and oils machine when not in use. May keep production reports, may direct workers in storage of graded grain.

Flour Mill Operator; Flour Mill Operator operates grinding machine or mill to grind wheat, gram or other grains into flour or animal feed. Sets mill by adjusting roller according to fineness of grinding desired; feeds grain into feeding bin of mill by hand; observes process, keeping grain moving at regular rate by tapping clogged spouts with hammer and by adjusting gates; examines crushed product periodically by feel of fingers and adjusts roller as necessary; removes flour collected in bag or container at delivery end; cleans and oils

machinery. May weigh grain and flour; calculate charges and collect payment of services rendered to customers. May dress mill stones.

Reference NCO 2015:

- a) 2356.0100 – Manual Training Teacher/Craft Instructor
- b) 7514.9900 – Fruits, Vegetables and Related Preservers, Others
- c) 6111.0100 – Cultivator General
- d) 6111.0101 – Paddy Farmer
- e) 6111.0201 – Wheat Cultivator
- f) 6111.0301 – Maize Cultivator
- g) 6111.0401 – Pulses Cultivator
- h) 8160.0700 – Miller, Food Grains
- i) 8160.0800 – Husker, Machine (Food Grains)
- j) 8160.1000 – Flour Mill Operator

5. LEARNING OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 LEARNING OUTCOMES (TRADE TECHNOLOGY)

1. Demonstrate operation, handling and maintenance of agro processing machinery.
2. Plan for safe production processes of foods and identification of wastes in Agro industry along with its proper utilization.
3. Test and evaluate storing and packaging materials.
4. Plan for various production processes of different wheat products and detection of extraneous matter in those along with determination of several physical parameters.
5. Demonstrate milling operations in production of dal (pulse) along with detection of khesari dal and metanil yellow.
6. Plan and execute production of cereal based products and by-products and evaluate their quality parameters.
7. Demonstrate procurement & processing of Spice powders and identification of various quality parameters of the same.
8. Plan and execute extraction, refining and purification of oil and determination of its quality parameters.
9. Demonstrate various processing of paddy for rice and evaluate its quality.

6. COURSE CONTENT

SYLLABUS FOR AGRO PROCESSING –CITS TRADE			
TRADE TECHNOLOGY			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
Practical 48 Hrs Theory 18 Hrs	Demonstrate operation, handling and maintenance of agro processing machinery.	1. Demonstrate operating and handling of agro processing machinery: <ul style="list-style-type: none"> • Hammer mill, Groundnut decorticator hand operated, Mini dal mill, Mini rice mill, Mini oil expeller, Grain cleaner, Mini grain mill, Wheat flour mill, Micro pulveriser and Destoner, Packaging machine (Heat sealing machine), Weighing Balance, Extruder. 2. Fault identification and rectification of faults.	Machinery in Agro processing Different machines used in agro processing industry; working principles and operation and maintenance. Maintenance of equipment.
Practical 48 Hrs Theory 18 Hrs	Plan for safe production processes of foods and identification of wastes in Agro industry along with its proper utilization.	3. Apply HACCP and GMP in agro processing industry. 4. Utilize agro industry wastes: Prepare and verify normality of standard solutions.	Food regulations: Overview of Food Safety and Standards Act, 2006 BIS, ISO-22000, Agmark, HACCP, International Food Standards. International food laws and regulatory agencies: International Organizations – FAO (Food & Agriculture Organization), WHO (World Health Organization), Codex Alimentarius, ISO, WTO. National Organizations – ICMR, ICAR, Council for social welfare, International Food

			Control Systems including CODEX GMP. Importance of personal Hygiene, Cleaning & Sanitary standards of Agro processing industry.
Practical 64 Hrs Theory 24 Hrs	Test and evaluate storing and packaging materials.	<ol style="list-style-type: none"> 5. Explain different storage structure for grains. 6. Demonstrate pack aging evaluations. 7. Test packaging materials. 	Storage and packaging Need and importance of storage and packaging methods, Types of packaging materials e.g. paper, glass, metal, plastic, packaging form. Quality standards for packed processed products. Packaging evaluation WVTR, GTR, Bursting strength, tensile strength, tearing strength, drop test
Practical 80 Hrs Theory 30 Hrs	Plan for various production processes of different wheat products and detection of extraneous matter in those along with determination of several physical parameters.	<ol style="list-style-type: none"> 8. Demonstrate cleaning, grading and other pre-processing activities. 9. Show production of whole wheat and corn flour. 10. Detect extraneous matter in atta/ maida. 11. Demonstrate production of Suji, Maida, Dalia. 12. Plan and perform packaging and labelling of the products. 13. Demonstrate preparation and quality evaluation of popped corn. 14. Estimate gluten content from wet milling of corn. 15. Determine dry and wet gluten content of flour. 16. Determine moisture 	Cereal grains: wheat, corn Primary and secondary processing of wheat and corn. Types of corn. Methods of Cleaning, grading, milling. Standards for the wheat flour. Adulteration in flour.

		<p>content of flour using hot air oven method and IR Moisture meter.</p> <p>17. Determine ash content of flour.</p> <p>18. Determine water absorption power of flour.</p> <p>19. Determine thousand kernel weight of grains.</p> <p>20. Determine impurities present in the grains.</p> <p>21. Determine hector litre weight of grains.</p> <p>22. Determine vitreousness/mealiness of wheat grain.</p> <p>23. Determine pelshenke value of wheat flour.</p> <p>24. Determine maltose figure of wheat flour.</p> <p>25. Estimate free fatty acid of wheat flour.</p> <p>26. Determine wheat grain hardness using texture analyzer.</p>	
<p>Practical 80 Hrs</p> <p>Theory 30 Hrs</p>	<p>Demonstrate milling operations in production of dal (pulse) along with detection of khesari dal and metanil yellow.</p>	<p>27. Monitor pre-treatment in dal milling like cleaning, grading, soaking, and drying.</p> <p>28. Demonstrate milling pulses for production of dal, e.g. pigeon pea, green gram, Bengal gram.</p> <p>29. Detect khesari dal in pulses.</p> <p>30. Show Packaging and uses of wastes from dal mill.</p> <p>31. Demonstrate effect of moisture content on the dehusking efficiency and breakage of pulses</p>	<p>Dal (Pulse) Milling</p> <p>Classification of pulses.</p> <p>Pre milling treatments of pulses, pulse milling and recent developments.</p> <p>Principle of dal milling.</p> <p>Pulses suitable for milling.</p> <p>Different Methods of dal milling</p> <p>Working and principle of dal mill.</p> <p>By-products utilization.</p> <p>Adulteration in pulse.</p>

		<p>during milling.</p> <p>32. Show effect of alkali treatment on the milling characteristic of pulses.</p> <p>33. Demonstrate effect of wet methods of milling on the dehusking efficiency and breakage of pulses during milling.</p> <p>34. Detect metanil yellow in pulses.</p>	
<p>Practical 80 Hrs</p> <p>Theory 30 Hrs</p>	<p>Plan & execute production of cereal based products and by-products and evaluate their quality parameters.</p>	<p>35. Monitor production of cereal based products like macaroni, noodles, spaghetti and vermicelli.</p> <p>36. Estimate moisture content, protein content, ash content and fat content in cereals flour.</p> <p>37. Determine different quality parameters in cereals product.</p>	<p>Cereals industry By-Products :</p> <p>Recovery and utilization of starch, gluten, dextrin, dextrose, bran, bran oil, Germ and germ oil, husk, protein isolates, high fructose corn syrup, corn liquor, yellow and white dextrin and dextrose powder.</p>
<p>Practical 80 Hrs</p> <p>Theory 30 Hrs</p>	<p>Demonstrate procurement & processing of Spice powders and identification of various quality parameters of the same.</p>	<p>38. Plan & perform procurement and Pre-processing of spices, cleaning, grading, destoning, milling, blending and formulating and preparing of spices and spice mixes.</p> <p>39. Demonstrate the working of machinery for spice grinding.</p> <p>40. Show production of spice powders from, coriander, black pepper, red chilly, turmeric etc.</p> <p>41. Detect extraneous matter in ground spices.</p> <p>42. Detect coal tar dyes in spices containing fast natural colour like (Turmeric).</p>	<p>Spices and condiments Grinding</p> <p>Production of major spices in India & their importance in Indian diet.</p> <p>Spices suitable for processing.</p> <p>Unit operations in spices processing: Principles, method and machinery in spice grinding.</p> <p>Quality assurance & methods to detect adulteration.</p> <p>Oleoresin of different spices.</p>

		<p>43. Detect papaya seeds in black pepper.</p> <p>44. Detect powdered bran and sawdust in spices (ground).</p> <p>45. Detect brick powder, sand dirt in chillies.</p> <p>46. Demonstrate process of essential oil extraction and oleoresin of different spices.</p>	
<p>Practical 96 Hrs</p> <p>Theory 36 Hrs</p>	<p>Plan & execute extraction, refining and purification of oil and determination of its quality parameters.</p>	<p>47. Show working of oil expellers.</p> <p>48. Demonstrate effect of pre treatment on the oil recovery from different oil seeds.</p> <p>49. Show oil expelling from different oil seeds e.g. mustard, groundnut, and rapeseed, sunflower.</p> <p>50. Plan & perform filtration and packaging of oil.</p> <p>51. Detect Argemone oil.</p> <p>52. Detect oil soluble coal tar dyes in oil.</p> <p>53. Estimate protein content in the deoiled meal.</p> <p>54. Determine iodine value, RM value, P- value, saponification value of oils.</p> <p>55. Conduct qualitative checking of various adulterants in oils.</p> <p>56. Demonstrate solvent extraction of selected oilseeds.</p> <p>57. Explain physical properties of oil seeds.</p> <p>58. Conduct preparation and sensory evaluation of peanut butter.</p>	<p>Oil Extraction :</p> <p>Nutritional importance and functions of oils from plant sources.</p> <p>Different methods of oil extractions, oil expression from oilseeds like mustard/rapeseed, coconut, sunflower, groundnut, sesame, cotton etc.</p> <p>Different types of oil expellers.</p> <p>Process flow chart of oil extractions.</p> <p>Oil refining and purification :</p> <p>Refining, purification, deodorization, stabilization and hydrogenation.</p> <p>Different quality parameters :</p> <p>Peroxide value, saponification value, Iodine value, acid value, TBA , RM value, P- value, Kries value,</p>
<p>Practical 64 Hrs</p> <p>Theory 24 Hrs</p>	<p>Demonstrate various processing of paddy for rice and evaluate its quality.</p>	<p>59. Conduct processing of paddy for rice.</p> <p>60. Show packaging of rice: weighing, bagging,</p>	<p>Rice Milling</p> <p>Discuss the working and principle of rice mill in detail and their parts.</p>

		sealing machines. 61. Demonstrate grading of rice grain on the basis of shape and size. 62. Determine milling yield of paddy. 63. Demonstrate preparation and quality evaluation of beaten rice. 64. Show different methods of parboiling and their effects on milling of rice.	Suitability of paddy for rice milling. Drying of paddy for rice milling. Process of modern rice milling. Curing and ageing of rice. Working principle and operation. Cleaner, Sheller, separator, polisher, rubber roller and graders etc. Nutritional loss in polished rice. Parboiling of rice: Theory & methods of Parboiling. Advantages and limitations of parboiling of rice.
--	--	---	--

SYLLABUS FOR CORE SKILLS	
1.	Training Methodology(TM)(Common for all CITS trades) (320 Hrs + 200 Hrs.)
2.	Soft Skills(100 Hrs + 100 Hrs.)

Learning outcomes, assessment criteria, syllabus and Tool List of above Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in

7. ASSESSMENT CRITERIA

LEARNING OUTCOME	ASSESSMENT CRITERIA
TRADE TECHNOLOGY (TT)	
1. Demonstrate operation, handling and maintenance of agro processing machinery.	Identify basic machineries used in agro processing industries.
	Operate Hammer mill, Groundnut decorticator hand operated, Mini dal mill etc.
	Handle Mini rice mill, Mini oil expeller, Grain cleaner, Mini grain mill, Wheat flour mill etc.
	Demonstrate usage of Micro pulveriser and Destoner, Packaging machine (Heat sealing machine), Weighing Balance, Extruder etc.
	Explain working principles of the machineries.
	Check and rectify faults in machineries.
	Demonstrate maintenance of all equipment.
2. Plan for safe production processes of foods and identification of wastes in Agro industry along with its proper utilization.	Differentiate application of HACCP and GMP in agro processing industry.
	List out international food standards.
	Explain international food laws.
	Demonstrate the roles of food regulatory agencies.
	List out the wastes coming out from agro industries.
	Illustrate the utilization process for the wastes.
	Demonstrate importance of personal Hygiene, Cleaning & Sanitary standards of Agro processing industry.
3. Test and evaluate storing and packaging materials.	Explain different storage structure for grains.
	List out the packaging materials used in agro industries
	Consider the factors before selection of proper packaging material.
	List the parameters to be checked during packaging of foods.
	Demonstrate the testing method of packaging materials.
	Check quality standards for packed processed products.
4. Plan for various production processes of different wheat products and detection of extraneous matter in those along with determination of several physical parameters.	Conduct cleaning, grading and other pre-processing activities.
	Select and ascertain tools and equipment for production of whole wheat, corn flour, Suji, atta/maida and dalia.
	Demonstrate preparation and quality evaluation of popped corn.
	Check moisture content of flour using hot air oven method and IR Moisture meter.
	Determine ash content of flour.
	Ascertain water absorption power of flour.
	Determine thousand kernel weight of grains.
	Check impurities present in the grains.
	Determine hectolitre weight of grains.
	Ascertain vitreousness/ mealiness of wheat grain.
	Determine pelshenke value of wheat flour.

	Ascertain maltose figure of wheat flour.
	Estimate free fatty acid of wheat flour.
	Determine wheat grain hardness using texture analyzer.
5. Demonstrate milling operations in production of dal (pulse) along with detection of khesari dal and metanil yellow.	List out the pre-treatment in dal milling like cleaning, grading, soaking, and drying.
	Demonstrate milling pulses for production of dal, e.g. pigeon pea, green gram, Bengal gram.
	Detect khesari dal in pulses.
	Show Packaging and uses of wastes from dal mill.
	Demonstrate effect of moisture content on the dehusking efficiency and breakage of pulses during milling.
	Show effect of alkali treatment on the milling characteristic of pulses.
	Detect metanil yellow in pulses.
6. Plan and execute production of cereal based products and by-products and evaluate their quality parameters.	Plan and execute production of cereal based products like macaroni, noodles, spaghetti and vermicelli.
	Estimate moisture content, protein content in cereals flour.
	Ascertain ash content and fat content in cereals flour.
	Determine different quality parameters in cereals product.
7. Demonstrate procurement & processing of Spice powders and identification of various quality parameters of the same.	Plan & execute procurement and Pre- processing of spices, cleaning, grading, de-stoning, milling, blending and formulating and preparing of spices and spice mixes.
	Demonstrate the working of machinery for spice grinding.
	Show production of spice powders from, coriander, black pepper, red chilly, turmeric etc.
	Check extraneous matter in ground spices.
	Detect coal tar dies in spices containing fast natural colour like (Turmeric).
	Find papaya seeds in black pepper.
	Detect brick powder, sand dirt in chillies.
	Plan & execute the process of essential oil extraction and oleoresin of different spices.
8. Plan and execute extraction, refining and purification of oil and determination of its quality parameters.	Explain the working of oil expellers.
	Demonstrate effect of pre-treatment on the oil recovery from different oil seeds.
	Show oil expelling from different oil seeds e.g. mustard, groundnut and rapeseed, sunflower.
	Plan & perform filtration and packaging of oil.
	Detect oil soluble coal tar dies in oil.
	Estimate protein content in the deoiled meal.
	Determine iodine value, RM value, P- value, saponification value of oils.
	Conduct qualitative checking of various adulterants in oils
	Demonstrate solvent extraction of selected oilseeds.
	Conduct preparation and sensory evaluation of peanut

	butter.
9. Demonstrate various processing of paddy for rice and evaluate its quality.	Execute processing of paddy for rice.
	Show packaging of rice: Weighing, bagging, Sealing machines.
	Demonstrate grading of rice grain on the basis of shape and size.
	Determine milling yield of paddy.
	Show preparation and quality evaluation of beaten rice.
	Illustrate different methods of parboiling and their effects on milling of rice.

8. INFRASTRUCTURE

LIST OF TOOLS AND EQUIPMENT FOR AGRO PROCESSING (CITS)			
For Batch Of 25 Candidates			
S No.	Name of the Tools& Equipment	Specification	Quantity
A. Equipment, Machine & Tools			
1.	Hammer mill	Power operated, 1 HP ,10 Kg/hr. Body and hopper of stainless	1 no.
2.	Groundnut decorticator hand operated	Hand operated 10 Kg/hr.	1 no.
3.	Mini dal mill	Power operated, 1 HP 10 Kg/hr. Body and hopper of stainless	1 no.
4.	Mini rice mill	Power operated, 1 HP 10 Kg/hr. Body and hopper of stainless	1 no.
5.	Mini oil expeller	Power operated, 10 HP 15 lit/hr. Body and hopper of stainless	1 no.
6.	Grain cleaner	Power operated, 1/2 HP;100 Kg/hr. Body and hopper of stainless	1 no.
7.	Mini grain mill	Power operated, 01 HP 10 Kg/hr .Body and hopper of stainless	1 no.
8.	Flour Mill	Capacity 8-9 kg , per hr. Body and hopper of stainless steel	1 no.
9.	Micro pulveriser	Power operated, 1 HP 25 Kg/hr	1 no.
10.	Storage bins of different capacity	Aluminium, 10-50 Kg Capacity with proper outlet and inlet	As required
11.	Platform scale balance	100 Kg Capacity	1 no.
12.	Hot Air Oven	<ul style="list-style-type: none"> • Should be double walled unit: - outer chamber should made up of M.S. Sheet duly painted & inner must be made up of S.S. Sheet. • Temperature should be controlled by Microprocessor Based PID Digital Temperature Indicator-cum-Controller from ambient to 390°C with an accuracy of ±3°C. • Air ventilators should also be provided on the sides & Air Circulation fan be a standard feature. • Supply- 220/230 Volts A. C. • Inner Size (W*D*H):605*605*605 mm 	1 no.
13.	Moisture box	Aluminium, 100 g capacity cylindrical	1 no.

14.	De-stoner : For cleaning light materials, air classifier type		1 no.
15.	Packaging material : PP, PE, laminated, Stand pouches		As required
16.	Extruder : Lab scale		1 no.
17.	Weighing Balance	(0.10 gm to 2 kg), (100 gm to 5 kg)	1 no each
18.	IR Moisture meter		1 no.
19.	Sealing machine (For pouch and bags)		1 each
20.	Pop corn making machine		1 no.
21.	Muffle Furnace:	<ul style="list-style-type: none"> • Body Material- Should be light weight with ceramic fiber wool insulation. The outer casing should be made of double walled thick PCRC sheet, reattached with thick perforated sheet on the bottom portion, painted with attractive stove enamel. • Heating elements should be made of KANTHAL "A-1" wire and backed by high temperature ceramic wool insulation. • The temperature control- must be fitted in front of furnace with two pilot lamps. • Power supply- 220/230 volts AC fitted with microprocessor based digital temperature indicator cum controller. • Max. Temperature 1000 °C and working temperature 900 °C. Size-(150 x 150x300)mm (WxHxD) 	1 no.
22.	De-husker for dehusking of paddy		1 no.
23.	Ball Mill:	<ul style="list-style-type: none"> • Electrically operated having capacity from few grams to 2 Kg. Fitted with F. H. P. motor up to 2 Kg jar and with % H. P. heavy duty motor for 5 Kg jar. • Maximum speed of 80 RPM. • Jar is to be made of aluminium/S.S. • Steel balls of different sizes. • Single phase 220/230 volts A.C. supply. Capacity-2 kg. 	1 no.
24.	Digital Weighing Balance	Capacity: 220 gm Readability: 0.1 mg or 0.0001 gm Weighing Pan: 80 mm or large, with wind draft shield. Auto Calibration should be provided	1 no.

		with respect to temperature.	
25.	Texture analyzer (Instrument for determination of texture, effect of viscosity, rheology, measurement of hardness, softness and stickiness, brittleness, cutting force, shearing, consistencies and penetration force and also to function as Extensograph):	Texture analyzing system of minimum 50 Kg load frame capacity, should be computer controlled through compatible window based software for finding rheological properties of food products. (Load cells of 50 Kg, Cylinder Probes 2 Nos., Conical Probes 1 No., Spherical Probes 1 No., Crisp fracture support rig 1 No., Blade set 1 No., Back extrusion rig 1 No., Forward extrusion rig 1 No., TTC spreadability)	01 no.
B. Consumable			
26.	Beaker 50, 100, 250 ml, 500 ml		15 nos.
27.	Conical flask 50, 100, 250 ml, 500 ml		15 nos.
28.	Measuring cylinder 100ml,250ml, 200 ml, 500ml,		15 nos.
29.	Measuring flask of assorted sizes		15 nos.
30.	Burrete of assorted sizes with Burrete stands		15 nos.
31.	Pipettes of assorted sizes		15 nos.
32.	Thermometer (10°C to 110°C) Digital		16Pcs.
33.	Rubber Gloves		12 pair for each trainee
34.	Aprons		01 for each trainee
35.	Glass Funnels of assorted sizes		15nos.
36.	Funnels 500ml. & 100ml. Separating		15nos.
37.	Test Tube With Test tube stand		nos.
38.	Glass rod		10 nos.
39.	Gas lighter		06 no.
40.	Ph meter Rod		02 nos.
41.	Petri dish with cover		16 nos.
42.	Label for labelling machine		As required
43.	Raw materials for practical's		As required
C. FURNITURE			
44.	Instructor Chair & Table with Glass		01 no.
45.	Magnetic White Board		01 no.
46.	Display Board		01 no.
47.	Table for computer/printer/scanner with		01 Set.

	chair		
48.	Dual Desk		13no.
Workshop/Lab			
49.	Working table with 6-3x21/2 Aluminium tops		05 nos.
50.	Stools		25nos.
51.	Laboratory Table with rack (8'*2'-6"-6") and sinks		04 nos.
52.	Racks for keeping books (glass panel)etc.		01 sets
53.	Trainee Locker with space for 25		01 no.
54.	Storage Rack for Chemicals		01 no.
55.	Cup Board (large)		04 nos.
56.	First Aid Box		01 no.
57.	Fire Extinguisher		As required
58.	Almirah		02 nos.
59.	Wooden Show Case For keeping & Display sample		02 nos.
60.	White Board		01 no.

Note:-

- Remaining Raw material, Testing chemicals and consumables not included in the list may be purchased as per requirement.
- All machines shall be covered under AMC.
- Facility should be provided for removal of waste water used for cleaning of machines.
- Pest control should be done in lab time to time.

ANNEXURE - I

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts and all others who contributed in revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of Expert Members contributed/ participated for finalizing the course curriculum of Agro Processing(CITS) trade			
S No.	Name & Designation Sh./Mr./Ms.	Organization	Remarks
1.	Dr D.C Sexana, Professor & HOD	Food Engineering and Tech. Dept, S.L.I.E.T, Longowal, Punjab	Chairman
2.	Dr S.L Shrivastava, Professor	Indian Institute of Technology, Kharagpur	Member
3.	Dr. Vikas Nanda, Associate Professor	Food Engineering and Tech. Dept, S.L.I.E.T, Longowal, Punjab	Member
4.	Dr Ashok Kumar, Professor	Department of Process and Food Engineering, Punjab Agriculture University, Ludhiana, Punjab	Member
5.	Dr. D.S Sogi, Professor	Department of Food Science and Technology, Guru Nanak Dev University, Amritsar, Punjab	Member
6.	Dr. Neeraj Kumar, Assistant Professor	National institute of food technology Entrepreneurship & Management, Kundli, Sonipat, Haryana	Member
7.	Rakesh Kumar, Principal	Govt. I.T.I, Hajipur, Bihar	Member
8.	M.A. Tejani	Gits Foods Products Pvt.Ltd, Pune	Member
9.	ErPardumanSingh	Principal, Govt. I.T.I, Nabha, Punjab	Member
10.	Dr P.S Negi, Scientist	Central Food Technological, Research Institute, Mysore	Member
11.	Rizwana Ansari, TO	Govt. I.T.I, Chindwara, Madhya Pradesh	Member
12.	Priti Dwivedi, TO	Govt. I.T.I, Chindwara, Madhya Pradesh	Member
13.	Khurseed Jamal Siddique, TO	Govt. I.T.I, Chindwara, Madhya Pradesh	Member
14.	Sandhya Singh, TO	Govt. I.T.I, Chindwara, Madhya Pradesh	Member
15.	Ranjeeta Sharma, Principal	Maharashi Dayanand Institute of Tech. Jabalpur, M.P	Member
16.	J.P Meena, Director	DGET HQ, New Delhi.	Mentor
17.	K.L.Kulli, JDT	CSTARI, Kolkata	Co-ordinator
18.	G.Mohan, ADT	NIMI, Chennai.	Member

19.	Raminder Kumar, VI	R.V.T.I, Panipat	Team Leader
20.	SriyaSumanPatro	Lecturer, Government Polytechnic, Behrampur, Ganjam, Odisha	Member
21.	Gagandeep Gupta, Quality Assurance Manager	International Fresh Farm Product India, Ltd, Channo, Sangrur, Punjab	Member
22.	Paramdeep Singh Ghuman	Moonak Distiller and Bottler pvt ltd, Moonak, Sangrur, Punjab	Member
23.	Vijay Singh, GM	International Mega Food Park, Fazilka, Punjab	Member
24.	Ranveer Singh, Sr. Manufacturer Executive	, I.T.C, Greater Noida, U.P	Member
25.	Rohit Verma, GM	Jupiter multi-fruit processor Plot no 1, phase III, Industrial area Talliwal, District Una, H.P	Member

