



GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

VESSEL NAVIGATOR

(Duration: Two Years)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR – TRANSPORTATION LOGISTIC AND WAREHOUSE



VESSEL NAVIGATOR

(Engineering Trade)

(Revised in September 2024)

Version: 3.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4

Developed By

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.cstaricalcutta.gov.in

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1. COURSE INFORMATION

During the two-year duration of Vessel Navigator trade, a candidate is trained on Professional Skill, Professional Knowledge and Employability Skill related to job role. In addition to this, a candidate is entrusted to undertake Training and assessment record (TAR) book that need to be followed for onboard training and to be completed by the candidate. Also, extracurricular activities are carried out to build up confidence. The broad components covered under Professional Skill subject are as below: -

FIRST YEAR– In this year, the trainee learns to calculate course, distance and position arrived using plane parallel sailing and Mercator sailing method, determine position of celestial body. Trainee also learns about basic chart work. Also, about safety and environment, use of fire extinguishers, artificial respiratory resuscitation to begin with. The candidate will be able to achieve skill on using different navigational equipment – sextant, azimuth mirror, pelorus, chronometer etc. & maintaining bearing of a vessel.

Students are taught about various fishing methods and selection of suitable fishing gears as per fish resources and basic design concept of fishing gear. Design and construction of fishing gear (joining, stapling and mounting). They also learn about types of ropes (vegetable, synthetic and wire ropes), breaking strength, safe working load etc. Candidates will also learn about basic marine engineering. Develop skill to carry out repair and maintenance of fishing vessel.

SECOND YEAR– In this year, candidate will be able to calculate azimuth, intercept direction of position line and draw the position line in the chart. Study includes training to overcome the critical situation during on board navigation and to observe standard guidelines during voyage in different emergency situation. Watch keeping is also taught in this year along with various aspect of stability for preparing voyage. Meteorology and oceanography are also introduced in syllabus.

Fishing technology covers surveying of various subsistent fishing gears. The trainees will able to execute by proper selection of different types of ropes, blocks and tackles, able to design and perform fabrication of trawl with TED and BRD, perform navigation by collecting data on fishing from different sources. In addition, components like sea food quality assurance system in India and HACCP are taught. Marine electronics has been introduced for trainees.

Professional Knowledge subject is simultaneously taught in the same fashion to apply cognitive knowledge while executing task. In addition to above components the core skills components viz., Workshop calculation & science and Engineering drawing are also covered. These core skills are essential skills which are necessary to perform the job in any given situation.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of labour market. The vocational training programs are running under aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) with variants and Apprenticeship Training Scheme (ATS) are two pioneer schemes of DGT for strengthening vocational training.

The Vessel Navigator trade under CTS is one of the less explored trades in India but has huge potential considering the present shipping industry. The course is of two years' duration. It mainly consists of Domain area and Core area. The Domain area (Trade Theory & Practical) imparts professional skills and knowledge, while Core area (Employability Skills) imparts requisite core skill, knowledge and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by DGT which is recognized worldwide.

Trainee broadly needs to demonstrate that they are able to:

- Read & interpret technical parameters/documentation, plan and organize work processes, identify necessary materials and tools;
- Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job, and navigation work.
- Document the technical parameters in tabulation sheet related to the task undertaken.

2.2 PROGRESSION PATHWAYS:

- Can join industry as Vessel Navigator and will progress further as Senior Navigator, Mate, Skipper Grade 1, Skipper grade 2 and can rise up to the level of Fleet Manager.
- Can become Entrepreneur in the fishery and related fields.
- Can join fishing industry in different capacities like fishing gear manufacturing, fish processing sector etc.
- Can join Apprenticeship programs in different types of industries leading to a National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming an instructor in ITIs as applicable.
- Can join BFSc (NS) course in CIFNET, Kochi under lateral entry scheme and do research in the field also.

2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two-years: -

S No.	Course Element	Notional Training Hours	
		1 st Year	2 nd Year
1	Professional Skill (Trade Practical)	840	840
2	Professional Knowledge (Trade Theory)	240	300
3	Employability Skills	120	60
	Total	1200	1200

Every year 150 hours of mandatory OJT (On the Job Training) at nearby industry, wherever not available then group project is mandatory.

On the Job Training (OJT)/ Group Project	150	150
Optional Courses (10th/ 12th class certificate along with ITI certification or add on short term courses)	240	240

Trainees of one-year or two-year trade can also opt for optional courses of up to 240 hours in each year for 10th/ 12th class certificate along with ITI certification or add on short term courses.

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through formative assessment and at the end of the training program through summative assessment as notified by the DGT from time to time.

a) The Continuous Assessment (Internal) during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute has to maintain an individual trainee portfolio as detailed in assessment guideline. 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. The All India Trade Test for awarding NTC will be conducted by Controller of examinations, DGT as per the guidelines. The

pattern and marking structure is being notified by DGT from time to time. **The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The 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 REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one-year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percent for Trade Practical and Formative assessment is 60% & for all other subjects is 33%.

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. Due consideration should 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 some of the following:

- Job carried out in labs/workshop/onboard
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work
- Computer based multiple choice question examination
- Practical Examination

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 for formative assessment:

Performance Level	Evidence
(a) Marks in the range of 60%-75% to be allotted during assessment	
<p>For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices</p>	<ul style="list-style-type: none"> ● Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. ● 60-70% accuracy achieved while undertaking different work with those demanded by the component/job. ● A fairly good level of neatness and consistency in the finish. ● Occasional support in completing the project/job.
(b) Marks in the range of 75%-90% to be allotted during assessment	
<p>For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices</p>	<ul style="list-style-type: none"> ● Good skill levels in the use of hand tools, machine tools and workshop equipment. ● 70-80% accuracy achieved while undertaking different work with those demanded by the component/job. ● A good level of neatness and consistency in the finish. ● Little support in completing the project/job.
(c) Marks in the range of more than 90% to be allotted during assessment	
<p>For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.</p>	<ul style="list-style-type: none"> ● High skill levels in the use of hand tools, machine tools and workshop equipment. ● Above 80% accuracy achieved while undertaking different work with those demanded by the component/job. ● A high level of neatness and consistency in the finish. ● Minimal or no support in completing the project.

Brief description of Job roles:

Vessel Navigator; trainees are well trained in various aspects such as navigation of fishing vessel in the sea, seaman ship, chart work practical, marine meteorology & Oceanography, safety of life at sea, use, care and maintenance of various lifesaving, firefighting appliances used onboard a fishing vessel. The various precautions to be taken while fishing for the safety of the crew are also included. Vessel navigators are capable to carry out following works onboard the fishing vessel such as preparation for the voyage, casting off from the jetty, ensuring the tide conditions, observing weather forecast, chart preparation for passage planning, maneuvering the vessel, efficient watch keeping (i.e. look out), carry out anchor work, anchoring the vessel, anchor watch duty and heaving the anchor, carry out preparation for fishing operation such as trawling and other than trawling and also to maintain the quality of fish catch onboard, perform on hygienic fish handling and preservation.

Vessel navigators are also taught about international collision regulation for preventing collision at sea while navigating. They are provided hands on training onboard along with training on state-of-the-art Navigation simulator.

In the event of emergency or distress situations they are well versed to operate various lifesaving equipment, firefighting appliances and communication equipment. The vessel Navigator can perform operation of various fishing methods namely trawling, purse seining, long lining, gill netting, squid jigging, trolling, pole and line etc. and also pros and cons of operating different fishing gears. Maintain responsible fishing to sustain the fishery resources and ecosystem. In addition, understands design and fabrication of various fishing gears and also the use of various devices to carry out the responsible fishing.

Awareness about different types of material available in the fishing industry and selection of suitable materials for fabrication of different type of fishing gear are taught to the trainees. Trainees will come to know different type of fishing gear accessories and select suitable accessories to carry out the different type of fishing methods. Vessel navigator is conversant with the deck layout of different fishing craft and required deck equipment.

The awareness of marine environment and marine fishery resources is essential to carry out the fishing operations, in this contest this course is designed to teach about the marine environment and marine fishery resources.

Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Be sensitive to environment, self-learning and productivity.

Reference NCO-2015:

- a) 8350.0100 - Serang, Deck/Bosun
- b) 8350.0600 - Boatman
- c) 8350.0300 - Seaconny/OS (Ordinary Seaman)
- d) 8350.0700 - Rudderman
- e) 8350.0400 - Lascar/OS (Ordinary Seaman)
- f) 8350.0800 - Oarsman
- g) 8350.0500 - Driver, Launch/Tug Master
- h) 8350.9900 - Ships' Deck Ratings, Barge Crews and Boatmen, Other

Reference NOS:

- | | |
|--------------|--------------|
| a) LSC/N9401 | l) LSC/N9412 |
| b) LSC/N9402 | m) LSC/N9413 |
| c) LSC/N9403 | n) LSC/N9414 |
| d) LSC/N9404 | o) LSC/N9415 |
| e) LSC/N9405 | p) LSC/N9416 |
| f) LSC/N9406 | q) LSC/N9417 |
| g) LSC/N9407 | r) LSC/N9418 |
| h) LSC/N9408 | s) LSC/N9419 |
| i) LSC/N9409 | t) LSC/N9420 |
| j) LSC/N9410 | u) LSC/N9421 |
| k) LSC/N9411 | v) CSC/N9402 |

4. GENERAL INFORMATION

Name of the Trade	VESSEL NAVIGATOR
NCO – 2015	8350.0100, 8350.0300, 8350.0400, 8350.0500, 8350.0600, 8350.0700, 8350.0800, 8350.9900
NOS Covered	LSC/N9401, LSC/N9402, LSC/N9403, LSC/N9404, LSC/N9405, LSC/N9406, LSC/N9407, LSC/N9408, LSC/N9409, LSC/N9410, LSC/N9411, LSC/N9412, LSC/N9413, LSC/N9414 LSC/N9415, LSC/N9416, LSC/N9417, LSC/N9418, LSC/N9419, LSC/N9420, LSC/N9421, CSC/N9402
NSQF Level	Level – 4
Duration of Craftsmen Training	Two Years (2400 hours + 300 hours OJT/Group Project)
Entry Qualification	Passed 10 th class examination with Science and Mathematics or with vocational subject in same sector or its equivalent.
Minimum Age	14 years as on as on first day of academic session.
Eligibility for PwD	LD, LC, DW, AA LV, DEAF
Unit Strength (No. of Students)	20 (There is no separate provision of supernumerary seats)
Space Norms	88 Sq.m.
Power Norms	3.51 KW
Instructors Qualification for	
1. Vessel Navigator Trade	<p><u>INSTRUCTOR (SEAMANSHIP & NAVIGATION)</u> (i) Bachelor's degree from recognized university or institute. (ii) Certificate of Competency as Skipper Fishing Vessel issued by the Mercantile Marine Department; and (iii) One year sailing experience on board a fishing vessel.</p> <p style="text-align: center;">OR</p> <p>(i) Bachelor's Degree in Fishery Science (Nautical Science) from a recognized university or institute; and (ii) Two year's experience in imparting training in the field of Seamanship & Navigation.</p> <p><u>INSTRUCTOR (FISHING TECHNOLOGY)</u> (i) Master's Degree in Zoology or Fishery Science or Industrial Fisheries from a recognized university; or Post Graduate Diploma in Fishery Science from Central Institute of Fishery Education, Mumbai. (ii) One year experience in Sea Fishing and Gear Fabrication;</p> <p style="text-align: center;">OR</p> <p>(i) Bachelor of Fishery Science (Nautical Science) from a recognized university. (ii) Three year's experience in Sea Fishing and Gear Fabrication.</p>

INSTRUCTOR (MARINE ENGINEERING)

Essential

1. Degree in or Marine Engineering or Mechanical Engineering or Automobile Engineering from a recognized university or Institute.
2. One year experience in operation and maintenance of Marine Diesel Engines or engineering drawing & machine drawing or supervising welding/machining/fabrication, overhauling or fitting work of various machineries in a recognized Mechanical or Marine Workshop or Institution.

Desirable

Two years experience in operation and maintenance of shipboard marine mechanical equipment and systems, ship repairs or building or teaching Marine Engineering subjects such as diesel engines, hydraulics, workshop technology, etc.

INSTRUCTOR (ELECTRONICS)

Essential

(i) B.E./B.Tech. Degree in Electronics and Telecommunication Engineering,
OR

Associate Membership of Institution of Engineers (India) in Electronics and Telecommunication;

OR

Associate Membership of Institution of Electronics and Telecommunication Engineers

(ii) Two years experience in maintenance and repairs of Marine Electronic equipments.

Desirable

One year experience of teaching Radio Telephone Operation in a recognized Institution.

INSTRUCTOR (OCEANOGRAPHY AND MARINE METEOROLOGY)

Essential

B.Sc. in Oceanography or Meteorology from a recognized University or Institute;

Desirable

One year research or teaching experience in Oceanography or Meteorology in a Government Department or Undertaking or organization or Institution, including experience in practical data collection on board vessel.

INSTRUCTOR (NAVAL ARCHITECTURE)

(i) Bachelor's Degree in Naval Architecture from a recognized University or Institute.

	(ii) One years experience in shipping industry in the field of Ship building or ship repair.
2. Workshop Calculation & Science	<p>B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>03 years Diploma in Engineering from AICTE recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/ NAC in any one of the engineering trades with three years' experience.</p> <p>Essential Qualification: Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade</p> <p style="text-align: center;">OR</p> <p>Regular / RPL variants NCIC in RoDA or any of its variants under DGT</p>
3. Engineering Drawing	<p>B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>03 years Diploma in Engineering from AICTE recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/ NAC in any one of the engineering/ Draughtsman group of trades with three years' experience.</p> <p>Essential Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade</p> <p style="text-align: center;">OR</p> <p>Regular/RPL variants NCIC in RoDA or any of its variants under DGT</p>
4. Employability Skill	<p>MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above)</p> <p style="text-align: center;">OR</p> <p>Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills.</p>
5. Minimum Age for Instructor	21 Years
6. List of Tools and Equipment	As per Annexure – I

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

FIRST YEAR

1. Calculate course and distance between two positions using Terrestrial Navigation methods onboard a fishing vessel. (NOS: LSC/N9402)
2. Choose various parameters to determine position for Celestial Navigation onboard. (NOS: LSC/9403)
3. Use basic charts and publications required for navigation onboard a fishing vessel. (NOS: LSC/N9404)
4. Perform basic chart work to find various parameters required for navigation onboard a fishing vessel. (NOS: LSC/N9405)
5. Familiarize with the various safety requirements onboard a fishing vessel. (NOS: LSC/N9406)
6. Recognize different direction indicating equipment onboard a fishing vessel. (NOS: LSC/N9407)
7. Illustrate about sextant and taking altitude onboard a fishing vessel. (NOS: LSC/N9407)
8. Distinguish among different fishing gear materials used onboard a fishing vessel. (NOS: LSC/N9408)
9. Identify different fishing techniques used in different regions. (NOS: LSC/N9408)
10. Analyse different fishing gear designs and their suitability. (NOS: LSC/N9408)
11. Explain about different fishing gear accessories and their usage. (NOS: LSC/N9408)
12. Examine basic marine engineering concepts and working of various machineries. (NOS: LSC/N9409)
13. Plan to carry out operation and maintenance onboard a fishing vessel. (NOS: LSC/N9410)
14. Analyse basic mathematical and science concepts to perform operations in the field of study. (NOS: CSC/N9402)
15. Illustrate application of Engineering Drawing (Ship construction) on fishing vessel. (NOS: LSC/N9401)

SECOND YEAR

16. Recognize concepts of elementary Navigation onboard a fishing vessel. (NOS: LSC/9418, LSC/N9411)

Vessel Navigator

17. Perform elementary chart work required for navigation onboard a fishing vessel. (NOS: LSC/N9405)
18. Use of tide tables onboard a fishing vessel. (NOS: LSC/N9404)
19. Identify various emergencies and their handling procedures onboard a fishing vessel. (NOS: LSC/N9412)
20. Explain different rules of the road and collision regulations applicable to deep sea fishing vessels. (NOS: LSC/N9413)
21. Design & select criteria for different types of propellers, tackles, anchors etc. (NOS: LSC/9414)
22. Perform various functions while carrying out watch keeping duties onboard a fishing vessel. (NOS: LSCN/9415)
23. Identify various factors affecting ship stability on a fishing vessel. (NOS: LSC/N9416)
24. Calculate effect of varying sea and loading conditions on ship stability on a fishing vessel. (NOS: LSC/9416)
25. Explain various parameters and terminologies used in Basic Meteorology from fishing vessel perspective. (NOS: LSC/N9417)
26. Analyse sea visibility for understanding Elementary Meteorology from fishing vessel perspective. (NOS: LSC/N9418)
27. Illustrate Basic Oceanography from fishing vessel perspective. (NOS: LSC/N9419)
28. Examine Elementary Oceanography from fishing vessel perspective. (NOS: LSC/N9419)
29. Collect data on different types of fishing gear fabrication, operation & fish handling onboard. (NOS: LSC/9420)
30. Locate various electronic navigational equipment and illustrate their uses onboard. (NOS: LSC/N9421)
31. Distinguish among various electronic communication equipment and explain method of their operation onboard. (NOS: LSC/N9421)
32. Analyse basic mathematical and science concepts to perform operations in the field of study. (NOS: CSC/N9402)
33. Illustrate application of Engineering Drawing (Ship construction) on fishing vessel. (NOS: LSC/N9401)

6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
FIRST YEAR	
<p>1. Calculate course and distance between two positions using Terrestrial Navigation methods onboard a fishing vessel. (NOS: LSC/N9402)</p>	Ascertain the given latitude and understand whether it is North or South and given Longitude and understand whether it is East or West.
	Do the calculations as per the formula
	Find the course and distance as per the difference of Lat and Long.
	Understand the present dead reckoning position and the present fixed position.
	Do the calculation as per the formula and find out the direction and speed of current.
	Explain the principles of Mercator sailing method
	Obtain the meridional parts from the nautical table for the corresponding latitude
	Obtain the difference of Lat and long and name them according to the direction of travel
	Apply the Mercator sailing formula to find course and distance to reach destination
	Find out the DR position, estimated position, Course made good & speed made good by day's work
<p>2. Choose various parameters to determine position for Celestial Navigation onboard. (NOS: LSC/9403)</p>	Obtain current year nautical almanac
	Make sure the sextant is free from error or find out the error if any.
	Observe the altitude of celestial body by the sextant and find GHA, LHA and longitude of the ship by calculation.
	Find the relation between the GHA, LHA & Longitude and GMT, LMT & LIT
	Keep Chronometer ready without any error to obtain GMT
<p>3. Use basic charts and publications required for navigation onboard a fishing vessel. (NOS: LSC/9404)</p>	Identify Nautical charts
	Explain the symbols and abbreviations used in nautical charts
	Ascertain the navigational marks and buoys at sea
	Explain the specification of Light houses.
	Obtain the knowledge about the Nautical publications and its use onboard fishing vessels
	Explain chart Correction procedure

	Correct other nautical publications
	Keep the nautical charts
4. Perform basic chart work to find various parameters required for navigation onboard a fishing vessel. (NOS: LSC/9405)	Ascertain the ability to plot the position of the fishing vessel on the chart
	Measure the distance and marking on the chart
	Find the compass error and making the compass course to true course and vice versa
	Apply the gyro error to the gyro course
	Find the position of the fishing vessel by simple running fix and running fix with current method
5. Familiarize with the various safety requirements onboard a fishing vessel. (NOS: LSC/9406)	Maintain LSA equipment as per LSA plan onboard fishing vessel
	Execute automatic and manual operation of ILR
	Maintain and service all the LSA equipment
	Maintain FFA equipment as per FFA plan onboard fishing vessel
	Operate and recharge the FFA equipment
	Service all the FFA Equipment
6. Recognize different direction indicating equipment onboard a fishing vessel. (NOS: LSC/9407)	Install the marine magnetic compass onboard fishing vessel
	Explain the Nautical terminology
	Familiarize with helm order given during navigation
	Operate the Gyro compass
7. Illustrate about sextant and taking altitude onboard a fishing vessel. (NOS: LSC/9407)	Use the azimuth mirror, pelorus
	Explain starting procedure of chronometer and wind the chronometer
	Check the error and enter the chronometer error in the log book
	Explain the parts of the marine sextant
	Familiarize with the optical law and principle of sextant
	Check the errors of sextant
	Take the altitude with sextant
8. Distinguish among different fishing gear materials used onboard a fishing	Assess the fishing gear materials quality and quantity
	Explain suitability of materials for webbing and fabrication, strength and durability of fishing gear materials
	Design and fabricate a gill net of suitable material

vessel. (NOS: LSC/9408)	Design and fabricate a trawl of suitable material
	Design and fabricate a purse seine of suitable material
	Design and fabricate a long line of suitable material
	Ascertain updated knowledge biodegradable and advanced synthetic fishing gear materials
9. Identify different fishing techniques used in different regions. (NOS: LSC/9408)	Classify the fishing methods-based principles of capture and design
	Familiarize with the categories of fishing gears based on fishing methods and resources
	Familiarize with the categories and subcategories of fishing gears
	Classify the fishing methods for the analysis of global fishery
10. Analyze different fishing gear designs and their suitability. (NOS: LSC/9408)	Design and construct Trawl, Purse seine, Gill net and Longline
	Fabricate and repair fishing nets
	Identify factors effecting fishing gear design
	Carryout Joining of netting, shaping, Seaming, stapling of two sections, Lacing, Mounting, Reeving.
11. Explain about different fishing gear accessories and their usage. (NOS: LSC/9408)	Identify suitable accessories for rigging to various fishing gears
	Select suitable accessories for trawl
	Select suitable accessories for purse seine
	Select suitable accessories for long line
	Select suitable accessories for gillnet
12. Examine basic marine engineering concepts and working of various machineries. (NOS: LSC/9409)	Classify the engines, nomenclature/components and basic working principle of engine. Engine basic systems like – Fuel, Lube, Cooling, Starting, Intake/Exhaust etc.
	Explain free rotation of the engine& checking for any loose parts, engine operating procedure.
	Describe the starting methods, watch keeping & stopping requirements for various machineries including engine.
13. Plan to carry out operation and maintenance onboard a fishing vessel. (NOS: LSC/9410)	Identify the types, uses, operating procedures, maintenance and troubleshooting of various deck machineries.
	Maintain the fishing vessels. Types of maintenance. Maintenance schedules.
	Explain various works carried out in Dry docks.
	Perform power transmission methods, type of propellers & rudders

14. Analyze basic mathematical and science concepts to perform operations in the field of study. (NOS: CSC/N9402)	Concepts of Factors, Fractions & decimals.
	Concepts of Ratio, Proportion & Percentage.
	Unit systems, concepts of Mass, weight, density & Specific gravity
	Concepts of speed, velocity, force, motion, pressure,
	Concepts of work, heat & temperature, heat treatment and material science.
	Explain basic electricity, conductors & insulators.
15. Illustrate application of Engineering Drawing (Ship construction) on fishing vessel. (NOS: LSC/N9401)	Definite & draw the principal dimensions in ship building like LOA, LOP, Beam, Breadth, Depth, Draft, Port, Starboard etc.
	Draw the water line, Freeboard, peak tanks, Camber, sheer etc.
	Draw the rise to floor, bilge radius, tumble home, hogging sagging, stem, stern etc.
	Perform bilge keel, Framing & types, planking, Sheathing, engine installation, stern tube arrangements etc.
	Draw the tanks, hatches, steering gear, wheelhouse, accommodation underwater fittings etc.
SECOND YEAR	
16. Recognize concepts of elementary Navigation onboard a fishing vessel. (NOS: LSC/9418, LSC/N9411)	Find the Latitude by meridian altitude- sun, star, planet and moon
	Find out the observed longitude and there by the position line- sun, star, planet and moon
	Find the deviation for the compass by Azimuth and amplitude method - sun, star, planet and moon
	Find the Latitude by Intercept - sun, star, planet and moon
	Find the Latitude and Deviation by Polaris
17. Perform elementary chart work required for navigation onboard a fishing vessel. (NOS: LSC/N9405)	Find the set and drift of the current by allowing & counteracting current
	Find the actual current experienced by using estimated current
	Fix the position by sextant angle problems (HSA & VSA) Vertical sextant angle and Horizontal sextant angle
	Fix position by Dipping and raising range & bearing of lights
18. Use of tide tables onboard a fishing vessel. (NOS: LSC/N9404)	Calculate the height of tide and time of tide for the Indian port with help of Indian Tide Table
19. Identify various emergencies and their handling	Familiarize with handling the emergency situation like MOB, Accidents on board, Collision, Fire on board, Hull leak (Beaching or landing), Engine break down, Aground Environment protection.

procedures onboard a fishing vessel. (NOS: LSC/N9412)	Know Abandoning ship procedure.
	Operate the fishing task with safety precautions and prepare for bad weather.
	Prepare muster list and conduct drills on board fishing vessel.
	Perform Emergency signals on board
20. Explain different rules of the road and collision regulations applicable to deep sea fishing vessels. (NOS: LSC/N9413)	Explain international regulation for preventing collision at sea (COLREGS) - Rule of the road
	Apply the international regulation for preventing collision at sea (COLREGS) - Rule of the road.
	Perform light & sound signals used on board
	Explain the Morse-codes, Distress signals, IALA buoyage system. International code of signals (FLAG CODE) and Penalties for misuse of Distress signals
21. Design & select criteria for different types of propellers, tackles, anchors etc. (NOS: LSC/9414)	Execute effects of propellers/rudder on steering of a fishing vessel and manoeuvring capabilities of fishing vessels including turning circles.
	Perform turning a fishing vessel short round
	Use blocks and tackles and their rigging.
	Perform rigging a stage, rigging bosun's chair and rigging pilot ladder
	Use and mark lead lines (deep sea & hand lead lines)
	Execute anchor and anchoring procedure (how to drop and heave up the anchor)
22. Perform various functions while carrying out watch keeping duties onboard a fishing vessel. (NOS: LSC/9415)	Fix On-board before sailing and getting underway.
	Prepare the fishing vessel for Dry docking
	Prepare the fishing vessel for the Certificate of inspection.
	Prepare FV Hull surface for painting and painting schedule.
	Perform duties of watch keeping officer at sea, at anchor and at port.
23. Identify various factors affecting ship stability on a fishing vessel. (NOS: LSC/9416)	Perform Density, Relative density, Archimedes principle, Principle of floatation
	Find Various displacement, Light load, Present load, Dead weight, Tonnes per Centimeter (TPC) Immersion
	Ascertain the effect of density on draft and displacement, Fresh Water Allowance, Dock Water Allowance, Load lines
	Perform load lines of Fishing vessel

24. Calculate effect of varying sea and loading conditions on ship stability on a fishing vessel. (NOS: LSC/9416)	Find the COG & COB, final KG after loading discharging and shifting.
	Relate effect of GM on equilibrium
	Find the on List, heel and effect of COG while loading, discharging and shifting cargo onboard.
	Calculate based on stability and hydrostatic data
	Execute the stability curves
25. Explain various parameters and terminologies used in Basic Meteorology from fishing vessel perspective. (NOS: LSC/9417)	Record the values of different parameters atmosphere to understand/predict the weather and climate.
	Observe the variation of atmospheric pressure in the Barometer and record the reading of Barometer during cyclonic condition.
	Calculate Humidity and its parameters and temperature for rain shadow areas of the mountain range
26. Analyse Sea visibility for understanding Elementary Meteorology from fishing vessel perspective. (NOS: LSC/9418)	Calculate visibility during Fog, smog; Haze and spray
	Draw different clouds formed based on height and its abbreviation
27. Illustrate Basic Oceanography from fishing vessel perspective. (NOS: LSC/9419)	Calculate pressure gradient. Calculation of Coriolis Force
	Observe the wind and their direction on board vessel and Calculation of apparent wind.
	Observe the direction trade wind and monsoon wind on board vessel
28. Examine Elementary Oceanography from fishing vessel perspective. (NOS: LSC/9419)	Record the barometric pressure during cyclonic weather condition and judge the warning signal based on the intensity of cyclone.
	Record the values of meteorological parameters with the help of Meteorological instruments
	Observe the different types of waves to record the wave length and wave height.
	Calculate amplitude and velocity.
29. Collect data on different types of fishing gear	Fabricate mid water trawl as per plan on resources, shrimp trawl, trawl with TED, trawl with BRDs.
	Survey and study of cast net and Chinese net, pole & line and trolling,

fabrication, operation & fish handling onboard. (NOS: LSC/9420)	Changadam and raft, bag net and dol net, shore seine and trammel net.
	Locate fishing ground with the help of fish finding equipment, remote sensing data, exploratory survey and data collected by fisheries research organizations, commercial fishermen, own fishing experience
	Identify and use by-catch reduction devices
	Apply Code of Conduct for Responsible Fisheries (CCRF)
	Explain the uniform ban period
	Explain hygienic handling of catch onboard fishing vessel
	Handle long line catch to maintain Sashimi grade quality
	Apply preservation technique using ice, refrigeration and salt curing, sun drying and smoking
	Apply canning process for fish preservation
	Identify demersal and pelagic fishery resources and selection of suitable fishing gears for exploitation
	Identify deep sea and oceanic resources and select suitable fishing gear for exploitation
	Identify the gear to exploit fishery resources from the different water depth.
Identify the suitable fishing gear to exploit shoaling pelagic fishes, deep sea resources, deep sea resources, demersal resources, predatory fishes.	
30. Locate various electronic navigational equipment and illustrate their uses onboard. (NOS: LSC/9421)	Know Basic Electronic Navigational Aids
	Operate and maintain all electronic bridge/wheelhouse equipment.
	Describe radar, principle of radar, basic Radar plotting.
31. Distinguish among various electronic communication equipment and explain method of their operation onboard. (NOS: LSC/9421)	Describe basic electronic communication equipment.
	Operate and maintain bridge/wheelhouse communication equipment.
	Use radiotelephony on board a fishing vessel for transmission and reception of navigation warning, urgency and distress messages in emergency.
	Communicate the procedure during emergency and distress.
32. Analyze basic	Concepts of Trigonometry - angles, Pythagoras theorem, Trigonometric

<p>mathematical and science concepts to perform operations in the field of study. (NOS: CSC/N9402)</p>	ratios, Trigonometric tables & Spherical Trigonometry
	Concepts of Levers & Simple machines, Effort & load, efficiency of machine, relationship between efficiency, velocity ratio & mechanical advantage.
	Concepts of Friction, Advantages and disadvantages, Laws of friction, co-efficient of friction, angle of friction, Lubrication.
	Concepts of Elasticity, Elastic, plastic materials, stress, strain and their units & young's modulus, Ultimate stress & working stress.
	Concepts of Estimation and Costing - Simple estimation of the requirement of material.
<p>33. Illustrate application of Engineering Drawing (Ship construction) on fishing vessel. (NOS: LSC/N9401)</p>	Knowledge about Backbone assembly, Mold lofting, Building stock, Mold preparation, Rabbet, Hull planking & types.
	Knowledge about Quarter knees, Bulkheads, Riders and pointer, and carlings, Caulking & Seaming, Floor timbers etc.
	Concepts of Keel plate, Shell plating, Double bottom tanks, Corrugated type & Collision bulkheads, Hawse & Spurling pipe, cathodic protection
	Free hand sketches or drawings of keel, shell expansion plan, bulkheads backbone assembly, mold lofting, General Arrangement plan etc.

7. TRADE SYLLABUS

SYLLABUS FOR VESSEL NAVIGATOR TRADE			
FIRST YEAR			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
Practical Navigation			
Professional Skill (Practical) 105 Hrs; Professional Knowledge (Theory) 45 Hrs	LO-1: Calculate course and distance between two positions using Terrestrial Navigation methods onboard a fishing vessel	<ol style="list-style-type: none"> 1. Calculate the difference of latitude (D'lat), difference of longitude (D'long) and mean latitude M'lat. 2. Plan the plane and parallel sailing to find course and distance between two positions. 3. Determine the arrived position if course and distance is given. 4. Compute set and drifts of current, DR position and Estimated position. 5. Find course, distance and position arrived by mercator sailing method. 6. Identify the difference of meridional parts and the relationship between them. 7. Calculate Day's work problems. 	<ul style="list-style-type: none"> • Definitions on Terrestrial reference terminologies • Parallel sailing concepts • Method to find Arrived position • Understand set & drift, DR position • Mercator sailing principle and formula. • Days works
Professional Skill (Practical) 42 Hrs; Professional Knowledge	LO-2: Choose various parameters to determine position for Celestial	<ol style="list-style-type: none"> 8. Work out celestial reference problems like GHA, LHA, longitude, GMT, LMT, LIT exercises 9. Find problems related to Correction of 	<ul style="list-style-type: none"> • Analysis of celestial reference terminologies • Sextant altitude corrections

(Theory)18Hrs	Navigation onboard	altitude, position lines (LOP) Theory	
Chart Work			
Professional Skill (Practical) 42 Hrs; Professional Knowledge (Theory)18Hrs	LO-3: Use basic charts and publications required for navigation onboard a fishing vessel	<p>10. Use the information given on a chart like Buoys, lights, Radio Beacons, Navigational Aids, depths and nature of bottom, soundings and recognition of the coast.</p> <p>11. Explain radar responsive target, depth and height contours.</p> <p>12. Demonstrate the ability to make intelligent use of sailing directions, Admiralty catalogue of charts and list of lights.</p> <p>13. Understand the use of Notices to Mariners</p> <p>14. Familiarize with the process of chart correction.</p>	<ul style="list-style-type: none"> • Basic navigational chart work, Description & Types of charts. Chart work symbols and abbreviations. • Nautical Publications – NTM, Sailing direction, MS Notice, Chart catalogue, ALRS, ALLFS, List of Lights etc.
Professional Skill (Practical) 105 Hrs; Professional Knowledge (Theory) 45 Hrs	LO-4: Perform basic chart work to find various parameters required for navigation onboard a fishing vessel	<p>15. Plot the positions (given latitude and longitude), method of fixing ship position by bearing and depth, bearing and distance, cross bearings.</p> <p>16. Measure the distance, course & time (2 positions are given) and to find arrived position (given 1 position, course and distance)</p>	<ul style="list-style-type: none"> • Plotting & fixing position, Measurement of distance, nautical miles. • Compass error (Variation, Deviation etc.). • Gyro errors • To counteract current and leeway problems. Beam bearing. • Allowing current and leeway problems.

		<p>17. Convert the magnetic course to true course and vice versa, compass error (deviation and variation)</p> <p>18. Understand the relation between gyro course, gyro error and true course, the effect of current on speed.</p> <p>19. Given course made good, the speed of the ship and direction and rate of currents to find the true courses to steer, CMG, SMG.</p> <p>20. Simple running fix and running fix with current problems.</p> <p>21. Find the actual current experienced.</p> <p>22. Fix the position by bearings of one or more objects with the run between, allowing for a current and to find the distance at which the ship will pass a given point.</p>	<ul style="list-style-type: none"> • Simple & running fix. Method of fixing – Effect of wind and leeway.
Basic Safety			
<p>Professional Skill (Practical) 63 Hrs;</p> <p>Professional Knowledge (Theory) 27 Hrs</p>	<p>LO-5: Familiarize with the various safety requirements onboard a fishing vessel</p>	<p>23. Operate, Inspect & service the LSA like life jacket, life buoy, life-raft, life-boats, EPIRB, SART, pyrotechnics, line throwing appliance, artificial respiratory resuscitation etc.</p>	<ul style="list-style-type: none"> • Requirement & various type of life saving appliances (LSA) including handling characteristics, construction and stowage. • Fire Fighting Principle & fire prevention.

		<p>24. Explain survival procedure in life-boats and life rafts.</p> <p>25. Operate, Inspect & service the FFA like fire extinguishers, fireman outfits, fire hydrants, nozzles, smoke helmet, emergency fire pump and self-contained breathing apparatus etc.</p>	<p>Requirement & type of fire-fighting appliances (FFA)</p>
Basic Seamanship			
<p>Professional Skill (Practical) 42 Hrs;</p> <p>Professional Knowledge (Theory) 18 Hrs</p>	<p>LO-6: Recognize different direction indicating equipment onboard a fishing vessel.</p>	<p>26. Demonstrate nautical terminology and their marking/locations onboard conning a ship, Helms order.</p> <p>27. Care & maintenance of magnetic compass.</p> <p>28. Demonstrate the procedure for starting and stopping gyro compass.</p> <p>29. Care & maintenance of marine gyro compasses.</p>	<ul style="list-style-type: none"> • Familiarization on nautical terminologies. • Exploration on different types of magnetic compass and its errors • Concept of Gyro Compass principles and errors. • Rudder angle indicator
<p>Professional Skill (Practical) 42 Hrs;</p> <p>Professional Knowledge (Theory) 18 Hrs</p>	<p>LO-7: Illustrate about sextant and taking altitude onboard a fishing vessel</p>	<p>30. Use the bearing instruments.</p> <p>31. Explain the relation between relative bearing and true bearing.</p> <p>32. Use the Chronometer – starting, stopping & checking the error while at sea.</p>	<ul style="list-style-type: none"> • Knowledge of Pelorus & azimuth mirror. • Chronometer, The ambiguity of chronometer time, chronometer error. • Marine Sextant, parts of sextant, Principles of sextant, Errors of sextant.

		<p>33. Care and maintenance of chronometer.</p> <p>34. Use sextant to take altitude of celestial bodies, horizontal and vertical angles of terrestrial objects.</p>	
Fishing technology			
<p>Professional Skill (Practical) 42 Hrs;</p> <p>Professional Knowledge (Theory) 18 Hrs.</p>	<p>LO-8: Distinguish among different fishing gear materials used onboard a fishing vessel</p>	<p>35. Identify different types of fishing gear materials.</p> <p>36. Collect data on different materials used in fishing gears. Natural and synthetic fibers</p> <p>37. Practice Yarn numbering system- Indirect system: British system, Metric system, Runnage System, Direct System: Denier, Tex Conversion of yarn numbering system</p> <p>38. Construct details of twines and ropes - Stages in twisting operation, Twist of netting material 'S' and 'Z' twist, Degree of twist.</p> <p>39. Identify the fishing gear materials - By flame test, solubility test.</p> <p>40. Select Materials for the fabrication of Trawl net, Purse seine, Gill Net, Long line.</p> <p>41. Identify the Natural &</p>	<ul style="list-style-type: none"> • Introduction & classification of Fishing Gear Materials –Natural and synthetic fibers. • Numbering system • Specification of Twines and ropes • Advanced fishing gear materials. • Fishing Gear Materials. Physical, Chemical and Biological properties of fishing gear materials. • Types & Selection of ropes for gear fabrication • Hitches and bends

		<p>Synthetic wire ropes.</p> <p>42. Identify rope breaking strength and safe working load (SWL) problems.</p>	
<p>Professional Skill (Practical) 21 Hrs;</p> <p>Professional Knowledge (Theory) 09 Hrs.</p>	<p>LO-9: Identify different fishing techniques used in different regions</p>	<p>43. Identify different type of fishing gears - Modal/prototype like Active fishing gear, Passive fishing gear and miscellaneous fishing gear.</p> <p>44. Collect the data on different methods used in fishing industry.</p>	<ul style="list-style-type: none"> • Prof. Andres Von Brandt Classification of fishing gears • FAO Classification of fishing gears.
<p>Professional Skill (Practical) 126 Hrs;</p> <p>Professional Knowledge (Theory) 54 Hrs.</p>	<p>LO-10: Analyze different fishing gear designs and their suitability</p>	<p>45. Identify different Knots – trawl knot, double trawl knot and reef knot.</p> <p>46. Practice on Mesh, Shape of mesh, Knot, Netting Direction of Netting- 'T' direction, 'N' direction Type of netting- Knotted netting, Knot less netting</p> <p>47. Fabricate the webbing.</p> <p>48. Apply the shaping of Netting by Hand Braiding – Baiting, Creasing, Fly mesh (Single and Double).</p> <p>49. Execute the shaping of Netting by Tailoring (Cutting) - Bar cut, Knot cut ('N' cut and 'T' cut),</p>	<ul style="list-style-type: none"> • Introduction to Fishing Gear Design • Definition and Terms • Shaping of netting by hand braiding • Shaping of netting by tailoring • Design Process, Factors affecting fishing gear design • Joining of netting - Horizontal joining. • Seaming • Lacing • Types of mounting used in fabrication of different fishing gears. • Mounting –Hanging ratio, Hanging co-efficient, Hang-in or take-up • Stapling (Loose

		<p>Combination cut.</p> <p>50. Design & construct the commercial fishing gears like Trawl, Purse seine, Gill net and long line (Monofilament and Multifilament).</p> <p>51. Collect the data on different fishing gear designs from net makers.</p> <p>52. Join the meshes of</p> <ul style="list-style-type: none"> - Same number and size in both sections. - Same number but of different meshes size in both sections. - Different numbers but of the same size in both sections. - Different number and size in both sections. <p>53. Practice on Seaming</p> <p>54. Practice on Lacing</p> <p>55. Execute fixed mounting- Indirect mounting (making an additional row and attached to the mounting rope)</p> <p>56. Perform direct mounting (fixed directly to the mounting rope)</p> <p>57. Perform stapling - Meshes with in the loop method, End mesh in</p>	<p>mounting)</p> <ul style="list-style-type: none"> • Reeving
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		<p>two loop method, Lock loop method</p> <p>58. Execute reeving - Fastening with mesh method, Fastening without mesh method.</p>	
<p>Professional Skill (Practical) 21 Hrs;</p> <p>Professional Knowledge (Theory) 09 Hrs.</p>	<p>LO-11: Explain about different fishing gear accessories and their usage</p>	<p>59. Familiarize & use the fishing gear accessories like Thimble, Shackle, Swivel, Otter Boards, Floats, Sinkers, G-link assembly, Kelly's eye, Stopper link, Purse Ring, Kite, Bobbins, Ground rope assembly, Hooks and Jigs, Depressor, Danleno etc.</p>	<ul style="list-style-type: none"> • Identification of fishing gear accessories as per the design and type of the gear (Rigging) •
Marine Engineering			
<p>Professional Skill (Practical) 21 Hrs;</p> <p>Professional Knowledge (Theory) 09 Hrs</p>	<p>LO-12: Examine basic marine engineering concepts and working of various machineries</p>	<p>60. Identify the system component.</p> <p>61. Examine the engine basic systems like – Fuel, Lube, Cooling, Starting, Intake/Exhaust etc.</p> <p>62. Check the free rotation of the engine, checking for any loose parts, wiping and keeping the engine clean.</p> <p>63. Perform OBM & life boat engines.</p> <p>64. Demonstrate starting, watch keeping (including parameter checking) & stopping for various machineries including engine.</p>	<ul style="list-style-type: none"> • Classification of engines. Nomenclature/Components & working principle of engine. • Engine operating procedure. <p>Brief description of the starting methods, watch keeping & stopping requirements.</p>

<p>Professional Skill (Practical) 42 Hrs;</p> <p>Professional Knowledge (Theory) 18 Hrs</p>	<p>LO-13: Plan to carry out operation and maintenance onboard a fishing vessel.</p>	<p>65. Operate procedures, maintenance, troubleshooting of various deck machineries.</p> <p>66. Prepare the maintenance charts, Types of maintenance, Maintenance schedules.</p> <p>67. Perform various works carried out during & after dry docking.</p> <p>68. Demonstrate various systems of power transmission.</p> <p>69. Identify the type of propellers & rudders.</p>	<ul style="list-style-type: none"> • Types and uses of deck machineries • Maintenance of fishing vessels. • Concept of Dry docking. • Methods of power transmission from engine to propeller.
<p>Workshop calculation and science</p>			
<p>Professional Knowledge (Theory) 30 Hrs.</p>	<p>LO-14: Analyze basic mathematical and science concepts to perform operations in the field of study.</p>	<p>Factors - HCF, LCM and problems.</p> <p>Fractions & Decimal fractions - Addition, subtraction, multiplication & division and Solving problems by using calculator.</p> <p>Square, Square root, Ratio & Proportions and Percentage – Concepts and Simple related problems using calculator, Direct and indirect proportions, Changing percentage to decimal and fraction.</p> <hr/> <p>Unit, Fractions - Classification of unit system, Fundamental and Derived Units F.P.S, C.G.S, M.K.S and SI units, Measurement units and conversion.</p> <p>Mass, Weight, Volume, Density & Specific gravity – Concepts and Related problems.</p> <p>Speed, Velocity, Work, Power and Energy – Concepts. HP, IHP, BHP and efficiency.</p> <p>Heat & Temperature and Pressure – Concepts. Effects of heat, difference between heat and temperature, boiling point & melting point of different metals and non-metals, Units of pressure, atmospheric pressure, absolute pressure,</p>	

		<p>gauge pressure and gauges used for measuring pressure.</p> <p>Basic Electricity - Introduction and uses of electricity, conductors & insulators, electric current - AC, DC their comparison, voltage, resistance and their units.</p>
Engineering drawing		
<p>Professional Knowledge (Theory) 30Hrs</p>	<p>LO-15: Illustrate application of Engineering Drawing (Ship construction) on fishing vessel.</p>	<p>General definition and drawing of principal dimensions in ship building.</p> <p>Knowledge about following in wooden/steel boat construction: Bilge keel, Framing & types, Longitudinal& transverse, Breast hooks, Deck beams, Deck planking, Sheathing, Engine bed, Engine installation, Stern tube arrangements, Steering gear arrangement, Peak tanks – Fore & Aft, Fuel & Water tanks, Chain locker, Hatch and Hatch coaming, Wheelhouse, Crew’s accommodation, Underwater fittings.</p> <p>Free hand sketches or drawings for all above mentioned topics like hatch coaming, framing system, stern tube arrangement, mid-ship section of fishing vessel, cross section of rudder etc.</p>

SYLLABUS FOR VESSEL NAVIGATOR TRADE			
SECOND YEAR			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
Practical Navigation			
Professional Skill (Practical) 126 Hrs; Professional Knowledge (Theory) 54 Hrs	LO-16: Recognize concepts of elementary Navigation onboard a fishing vessel	70. Calculate latitude by meridian altitude- sun, star, planet and moon. 71. Estimate azimuth & amplitude method- sun, star (Observation of Polaris), planet and moon. 72. Calculate longitude by chronometer - sun, star, planet and moon 73. Intercept- sun, star, planet and moon to find direction of position line and position through which to draw it.	<ul style="list-style-type: none"> • Latitude by meridian altitude • Definition of Azimuth and amplitude method • To find out the observed longitude and there by the position line- theory • To find out the zenith distance and there by position line – theory
Chart Work			
Professional Skill (Practical) 63 Hrs; Professional Knowledge (Theory) 27 Hrs	LO-17: Perform elementary chart work required for navigation onboard a fishing vessel	74. Troubleshoot the problems of finding set and drift of current experienced. 75. Perform compass course steered and distance run or 2 position and fix, to determine the set and rate of the current experienced between two positions. 76. Set position fixing by	<ul style="list-style-type: none"> • Set and drift concepts • Position fixing by sextant angle (HSA & VSA) • Dipping & raising range and bearing of lights • Position fixing concepts

		<p>sextant angle problems - Vertical sextant angle and Horizontal sextant angle</p> <p>77. Calculate dipping & raising range and bearing of lights.</p> <p>78. Fix the position on a chart by simultaneous cross bearings and range, positional information from radio aids to navigation or by any combination applying the necessary correction.</p> <p>79. Use position lines and circles obtained by any method.</p>	
<p>Professional Skill (Practical) 42 Hrs;</p> <p>Professional Knowledge (Theory) 18 Hrs</p>	<p>Lo-18: Use of tide tables onboard a fishing vessel</p>	<p>80. Calculate tidal - find the height of tide & time of tide of Indian ports.</p> <p>81. Understand the dangers of placing implicit reliance upon floating navigational aids.</p>	<ul style="list-style-type: none"> • Indian Tide table
Basic Safety			
<p>Professional Skill (Practical) 42 Hrs;</p> <p>Professional Knowledge (Theory) 18 Hrs</p>	<p>LO-19: Identify various emergencies and their handling procedures onboard a fishing</p>	<p>82. Perform MOB, Accidents onboard, Collision, Fire onboard, Hull leak (Beaching or landing), Engine break down, Aground actions,</p>	<ul style="list-style-type: none"> • Emergencies and handling procedures onboard. • Merchant ship search and resume manual. (MERSAR) • Ship drills and

	vessel	<p>Abandoning procedure.</p> <p>83. Execute actions of navigating officer (OOW) during critical situation - Emergency signal, abandon ship signal,</p> <p>84. Implement safety precautions during fishing operation and prepare for bad weather.</p> <p>85. Use all bridge/ wheelhouse safety equipment including emergency steering gear.</p>	<p>muster list.</p> <ul style="list-style-type: none"> • Environment protection.
Basic Seamanship			
<p>Professional Skill (Practical) 63 Hrs;</p> <p>Professional Knowledge (Theory) 27 Hrs</p>	<p>LO-20: Explain different rules of the road and collision regulations applicable to deep sea fishing vessels.</p>	<p>86. Perform navigation simulator for international regulation for preventing collision at sea – Rule of the road.</p> <p>87. Operate and maintenance the light and sound signalling apparatus.</p> <p>88. Understand navigation lab for distress signals, IALA buoyage system.</p> <p>89. Apply navigation simulator for international code of signals</p>	<ul style="list-style-type: none"> • COLREGS - full knowledge and application. • Knowledge of light & sound signals & Morse codes. • Distress signals, IALA buoyage system. • FLAG CODE & Penalties for misuse.

<p>Professional Skill (Practical) 21 Hrs; Professional Knowledge (Theory) 09 Hrs</p>	<p>LO-21: Design & select criteria for different types of propeller, tackles, anchors etc.</p>	<p>90. Identify navigation simulator. 91. Know the effects of propellers/rudder on steering of a fishing vessel. 92. Identify the effects of wind and currents on handling of fishing vessels, turning a fishing vessel short round, Emergency manoeuvres. 93. Execute slinging a stage, rigging bosun's chair, pilot ladder & lead lines (deep sea & hand lead lines) 94. Perform and stowage the anchors. Anchoring procedure (how to drop and heave up the anchor) & anchor stations. Care and maintenance of Windlass and anchor cables.</p>	<ul style="list-style-type: none"> • Knowledge of manoeuvring capabilities of fishing vessels including turning circles, stopping distances etc. • Blocks and tackles and their rigging. • Different types of anchors (Stock and stockless). Anchor cables.
Watch keeping			
<p>Professional Skill (Practical) 42 Hrs; Professional Knowledge (Theory) 18 Hrs</p>	<p>LO-22: Perform various functions while carrying out watch keeping duties onboard a fishing vessel</p>	<p>95. Perform duties of watch keeping officer at sea, at anchor and at port. 96. Prepare before sailing and getting underway. 97. Prepare FV Hull surface for painting</p>	<ul style="list-style-type: none"> • Concept of watch keeping. • Dry docking procedure & preparation. • Fishing vessel certification. • Importance of Navigation

		<p>and painting schedule.</p> <p>98. Prepare the Registration of fishing vessel and Certificate of inspection.</p> <p>99. Maintain the navigational records.</p>	
Ship Stability			
<p>Professional Skill (Practical) 42 Hrs;</p> <p>Professional Knowledge (Theory) 18 Hrs</p>	<p>LO-23: Identify various factors affecting ship stability on a fishing vessel</p>	<p>100. Troubleshoot problems on Density, Relative density, Archimedes principle, Principle of floatation, Problems on displacement, Light load, Present load, Dead weight</p> <p>101. Use the displacement & TPC immersion scales to determine weights of cargo or ballast from draught or freeboard.</p> <p>102. Troubleshoot problems on effect of density on draft and displacement, Fresh Water Allowance, Dock Water Allowance etc., Problems on Block coefficient, buoyancy and reserve buoyancy.</p>	<ul style="list-style-type: none"> • Ship stability & Basic terminology • Weights and loading terms onboard • Tonnes Per Centimeter (TPC) Immersion • Effect of density on draft and displacement, FWA, DWA, Load lines. • Block co-efficient, Buoyancy & RB.
<p>Professional Skill (Practical) 42 Hrs;</p>	<p>LO-24: Calculate effect of varying sea and loading</p>	<p>103. Troubleshoot COG & COB problems</p> <p>104. Find the final KG</p>	<ul style="list-style-type: none"> • Meaning of the terms COG, COB, Transverse static

<p>Professional Knowledge (Theory) 18 Hrs</p>	<p>conditions on ship stability on a fishing vessel</p>	<p>after loading discharging and shifting</p> <p>105. Analyse the effect of adding and removing weights on ship's COG, COB, metacentric height & Righting lever.</p> <p>106. Relate effect of Metacentric height on equilibrium free surface corrections.</p> <p>107. Troubleshoot problems on List, heel and effect of COG while loading, discharging and shifting cargo onboard.</p> <p>108. Calculate based on use of stability and hydrostatic data as supplied to fishing vessel.</p>	<p>stability, GM, GZ, Righting moment.</p> <ul style="list-style-type: none"> • Stable, Unstable and Neutral equilibrium • Free surface effect • Difference between trim, list and heel. • Stability and hydrostatic data. Intact stability criteria.
<p>Marine Meteorology</p>			
<p>Professional Skill (Practical) 21 Hrs; Professional Knowledge (Theory) 09 Hrs</p>	<p>LO-25: Explain various parameters and terminologies used in Basic Meteorology from fishing vessel perspective</p>	<p>109. Observe visual different parameters of atmosphere and judging of weather and climate. weather and climate diurnal variation of atmospheric temperature over land and sea, lapse rate, Isothermal layer.</p>	<ul style="list-style-type: none"> • General idea of atmosphere, composition and vertical structure. • Atmospheric pressure, semidiurnal and seasonal variations, barometric tendency isallobars. • Water vapour in the atmosphere,

		<p>110. Observe barometric tendency & storm prediction. storm predictions by observations of atmospheric pressure. Use of barometric observations and weather signs at a single station to predict the onset of a depression or storm.</p> <p>111. Calculate the absolute and relative humidity. Saturation and dew point. Fohn wind effect. Adiabatic lapse rate of temperature. Rain shadow areas of the mountain range.</p>	<p>humidity, absolute and relative humidity.</p>
<p>Professional Skill (Practical) 10 Hrs; Professional Knowledge (Theory) 05 Hrs</p>	<p>LO-26: Analyze sea visibility for understanding Elementary Meteorology from fishing vessel perspective</p>	<p>112. Observe the visual of different types of precipitation at land and sea, Judging the visibility at sea during voyage and physical</p> <p>113. Observe the clouds at land and sea, the differences between drizzle, rain and hail. Condensation near the ground, formation of dew frost, rime.</p> <p>114. Analyse the visibility, types of fog-radiation</p>	<ul style="list-style-type: none"> • Hydrological cycle, evaporation, condensation, precipitation, drizzle, rain snowflakes, snow pellets, hail. • Visibility - mist and fog, • Clouds and their abbreviations

		<p>fog, advection fog, orographic fog, smog; Haze, spray and their effect on visibility</p> <p>115. Identify the different types Clouds - formation & classification due to height and appearance of the ten basic types commonly seen.</p>	
Oceanography			
<p>Professional Skill (Practical) 21 Hrs;</p> <p>Professional Knowledge (Theory) 09 Hrs</p>	<p>LO-27: Illustrate Basic Oceanography from fishing vessel perspective</p>	<p>116. Record the atmospheric pressure from barometer and observe the variation of reading during extreme weather condition. Cautions for applying Buys Ballots law, Parameters and significance of Coriolis force. The Beaufort wind scale & weather notation.</p> <p>117. Identify the simple problems on true and apparent wind. Estimate direction and force of wind at sea. Periodic & local winds-Land & sea breezes</p> <p>118. Visit of Cyclone warning Centre to</p>	<ul style="list-style-type: none"> • Pressure & wind systems, isobars and pressure gradient, meaning of veering backing, gust & squall, Buys Ballots law. • Wind and their meaning & difference, katabatic & anabatic winds, • General circulation of atmosphere, doldrums, ITCZ, thermal equator, Trade winds, motions of earth, seasons, perihelion and aphelion. • Indian weather patterns • Study of pressure & wind distribution in Indian waters

		<p>now the procedure for prediction of monsoon, cyclone and cyclone warning signs.</p> <p>119. Draw Indian weather patterns, SW and NE monsoons, Nor westers and Elephantas</p>	<ul style="list-style-type: none"> • Tropical revolving storms, tornado & water spout, pressure & wind distribution in the Indian ocean sector, jet streams
<p>Professional Skill (Practical) 10 Hrs;</p> <p>Professional Knowledge (Theory) 05 Hrs</p>	<p>LO-28: Examine Elementary Oceanography from fishing vessel perspective</p>	<p>120. Identify the cyclones and anti-cyclones, cyclone prone regions, cyclogenesis area ideal conditions for the formation of TRS, structure of TRS, warning signs.</p> <p>121. Operate and observe the different meteorological instruments.</p> <p>122. Observe physically the different types of waves, Equatorial current system during NE and SW monsoon periods, Temperature, salinity, density, General distribution of temperature and salinity in ocean, thermocline and halocline regions</p> <p>123. Identify ocean waves, wave parameters, classification of</p>	<ul style="list-style-type: none"> • Study of cyclones in Indian waters • A detailed knowledge of the Meteorological instruments normally used on fishing vessels like Marine thermometer, Barometer, Barograph. Whirling Psychrometer, Anemometer and wind vane. • Sea's surface current system in Indian Ocean Sector. • Physical properties of ocean. • Study of waves

		<p>waves, sea and swell waves, Internal waves, ocean tides, tidal ranges, spring and neap tides, ebb and flood tides</p>	
Fishing Technology			
<p>Professional Skill (Practical) 147 Hrs;</p> <p>Professional Knowledge (Theory) 63 Hrs</p>	<p>LO-29: Collect data on different types of fishing gear fabrication, operation & fish handling onboard.</p>	<p>124. Observe visually deck layout of fishing vessels like trawlers, gill netter, long liner, purse seiner and combination vessels.</p> <p>125. Inspect the deck equipment onboard various fishing vessels such as trawl winch, net drum, power block, triplex winch, line hauler, hand reels, gill net hauler, gurdie etc.</p> <p>126. Execute mending of - Simple tear, Vertical tear, Horizontal tear & Oblique tear, Filling a tear with a suitable piece of netting.</p> <p>127. Splice ropes and steel wire ropes – back splice, long splice, short splice & eye splice.</p> <p>128. Fabricate the models of commercial fishing gears such as Trawl net, Purse seine,</p>	<ul style="list-style-type: none"> • Deck layout of different fishing vessels. • Working principle of deck equipment used onboard fishing vessels. • Repair and construction of various fishing gears. • Construction and Specification of wire rope, Combination rope. • Fabrication of Commercial Fishing gears. • Basic design and operation of subsistent fishing gears • Introduction to Marine environment. • Various Marine Fishery Resources of India and migration of fishes. • Responsible Fishing

		<p>Gillnet etc.</p> <p>129. Demonstrate the models of traditional and various subsistent fishing gears such as pole and line, troll line, changadom, raft, bag net, dol net, shore seine, Chinese net, cast net, trammel net, tangle net, trap, fyke net etc.</p> <p>130. Locate fishing ground by fish finding equipment, remote sensing data and by exploratory survey.</p> <p>131. Identify commercially important marine fish/shellfish of India like pelagic/demersal/ deep sea fishes.</p> <p>132. Familiarize with various types of By-catch Reduction Devices like Square mesh window, Radial Escapement Device, Fish Eye, Turtle Excluder Device (TED)</p> <p>133. Demonstrate Hygienic handling of fish on-board.</p> <p>134. Identify the spoilage of fish & causes of</p>	<p>and BRD.</p> <ul style="list-style-type: none"> • Code of Conduct for Responsible Fisheries (CCRF) • Hygienic handling of fish on-board. • Organoleptic Assessment of Fish Quality. Fish Preservation & avoid spoilage on board fishing vessel. Fish Preservation Technique • Value addition in fish products. • HACCP • Sea food quality assurance system in India • Value added products by-products - Fish cutlets, Fish balls, fish burger, fish nuggets, fish finger etc.
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		<p>spoilage.</p> <p>135. Apply various fish preservation technique like – Chilling, Freezing, salting and curing, sun drying, canning and smoking.</p> <p>136. Set appropriate technique for preservation and maintain quality of fish.</p>	
Marine Electronics			
<p>Professional Skill (Practical) 42 Hrs;</p> <p>Professional Knowledge (Theory) 18 Hrs</p>	<p>Locate various electronic navigational equipment and illustrate their uses onboard.</p>	<p>137. Operate and Maintain all equipment like</p> <ul style="list-style-type: none"> (i) Echo sounder (ii) Special aids for fishing like Sonar. (iii) GPS (iv) Radar principle, use as an anti-collision device & navigational aid and limitations. Radar block diagram. Radar Plotting (v) ARPA – Navigation during restricted visibility, approaching the coast, anchoring, dense traffic area etc. (vi) ECDIS (vii) AIS (viii) NAVTEX (ix) BNWAS (x) Speed log & types (xi) Net Sounder 	<ul style="list-style-type: none"> • Importance & requirement of Electronic Navigational Aids

		(xii) Auto Pilot	
Professional Skill (Practical) 21 Hrs; Professional Knowledge (Theory) 09 Hrs	Distinguish among various electronic communication equipment and explain method of their operation onboard.	138. Operate and maintain the wheelhouse communication equipment. 139. Use of Radiotelephony for transmission and reception of navigation warning, urgency and distress messages in emergency. 140. Operate terrestrial radio - VHF DSC and MF/HF DSC. Satellite radio – Transponder, INMARSAT B, Sat C, Fleet 77, LRIT, DAT, Intercom	<ul style="list-style-type: none"> • Importance & requirement of electronic communication Aids. • Communication procedure during emergency and distress.
Workshop Calculation & Science			
Professional Knowledge (Theory) 30 Hrs.	Analyze basic mathematical and science concepts to perform operations in the field of study.	<p>Trigonometry - Measurement of angles, Applications of Pythagoras theorem and related problems, Trigonometric ratios, Trigonometric tables, Spherical Trigonometry</p> <p>Levers and Simple machines - Effort and load, efficiency of machine, relationship between efficiency, velocity ratio and mechanical advantage.</p> <p>Friction - Application and effects of friction, Advantages and disadvantages, Laws of friction, co-efficient of friction, angle of friction, Lubrication. Simple related problems.</p> <p>Elasticity - Elastic, plastic materials, stress, strain and their units and young's modulus, Ultimate stress and working stress.</p> <p>Estimation and Costing - Simple estimation of the requirement of material etc., as applicable to the trade,</p>	

		related Problems.
Engineering Drawing		
Professional Knowledge (Theory)30Hrs	Illustrate application of Engineering Drawing (Ship construction) on fishing vessel.	<p>Knowledge about following in wooden/steel boat construction: Backbone assembly, Mold lofting, building stock, Mold preparation, Rabbet, Hull planking & types – Carvel, Diagonal & Clinker & Quarter knees, Bulkheads, Riders and pointer, and carlings, Caulking & Seaming, Floor timbers.</p> <p>Keel plate, Shell plating, Double bottom tanks, Corrugated type & Collision bulkheads, Hawse & Spurling pipe, cathodic protection</p> <p>Free hand sketches or drawings for all above mentioned topics like keel, shell expansion plan, bulkheads backbone assembly, mold lofting, General Arrangement plan etc.</p>
<p>TAR book: Training and assessment record (TAR) book that need to be followed for onboard training and to be completed by the candidate.</p>		
<p>On Job Training: Consist of visit to fishing vessels, dock yards, fish processing institutes, sea food industry, Net making factory, fishing harbor and landing centers.</p>		

SYLLABUS FOR CORE SKILLS

1. Employability Skills (Common for all CTS trades) (120 Hrs. + 60 Hrs.)

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

List of Tools & Equipment			
VESSEL NAVIGATOR (For batch of 20 Candidates)			
Sl. No.	Name of the Tool & Equipment	Specification	Quantity
A. TRAINEES TOOL KIT			
1.	Motor Vessel	length not less than 25 m and not less than 500 BHP	1 No
2.	Sextant		3 nos.
3.	Parallel scales		21 Nos.
4.	Pelorus		1 No
5.	Azimuth mirrors		1 No.
6.	Magnetic compass		1 No
7.	Binocular		1 No
8.	Telescope		As required
9.	Self-igniting light		2 Nos.
10.	Magnetic board for ROR		1 No
11.	Patent log		1 No
12.	Small Admiralty stock anchor		1 No
13.	Mast head light, side lights		1 each
14.	Diving set		As required
15.	Jet nozzle & coupling		1 No
16.	Hydrostatic release gear unit		1 No
17.	Inflatable life Raft for demonstration purpose (06-person capacity)		1 No
18.	Block models		1 Set
19.	Anemometer		As required
20.	Rule of the Road - display board		1 No
21.	DCP – extinguisher		1 No
22.	AFFF	9 lts.	1 No
23.	CO ₂ - Water type extinguisher		1 No
24.	AFFF	50 lts.	1 No
25.	Lifebuoy		2 Nos.
26.	Life jackets		5 Nos.
27.	Navigational charts of East & West coast of India		21 Nos.
28.	Chart tables		21 Nos.
29.	Instructional charts	5059, 5060, 5061 and 5062	21 Nos. each

Vessel Navigator

30.	Various display boards for position fixing and signals.		As required
31.	EPIRB		1 No
32.	SART		1 No
33.	Self-contained breathing apparatus		1 No
34.	LTA (Line Throwing Apparatus)		2 sets
35.	International shore connection		1 No
36.	Chronometer		1 No
37.	GPS		2 Nos.
38.	Adjustable net making stand provided with cup hooks.		2 Sets
39.	Different type of live models in glass showcase representing stern trawling operation, side trawling operation, out - rigger trawling operation, multi-rig trawl operation, Bull or pair trawl operation (all bottom trawling operations) Gill net operation, purse seine net operation, long line operation and Mid water trawling operation.		2 sets each
40.	A live model of purse-seine net with facilities to pursing the net as in original operation.		2 sets
41.	A live model trawl net fixed with TED (Turtle Excluder Device)		2 sets
42.	Live model nets of different type of trawl nets like two seam trawl, four seam trawl, multi seam trawl and rope trawl. Different sizes of live model of gill nets and purse-seine nets.		2 sets
43.	Different type of live model of Otter boards like flat rectangular wooden otter board, oval otter board, " V " shape otter board (steel) etc.		2 set
44.	One unit of Tuna long line gear with all accessories like float, float line, main line, branch line, snap clip, swivel, sekiyama, snood wire and		2 sets

Vessel Navigator

	tuna hook.		
45.	Different type of fishing hooks like mustad tuna hooks, shark hooks, kalava hooks etc.		2 sets
46.	Samples of different type of twines and ropes like PP rope, PE rope, HDPE ropes, PE twines, HDPE twines, Nylon twines with different specifications.		2 sets
Display boards showing			
47.	Modern classification of fishing gear and indigenous fishing gear.		2 sets
48.	Classification of fishing gear materials		2 sets
49.	Display showing "Tailoring" like point cut, bar cut, mesh cut or "T" cut etc.		2 sets
50.	Display showing "baiting" "creasing" and Fly mesh etc.		2 sets
51.	Display showing different type of mountings, splicing like eye splice, long splice, short splice etc.		2 sets
52.	Twine twister machine.		1 set
53.	Twine wounding spool.		2 sets
54.	Live models of fish trap, lobster trap, Fyke Nets.		2 sets
55.	Spotters like artificial jigs, "G" link assembly, shackle, Swivels, different type of sinkers, different type of floats like aluminium, glass, rubber, sponge corks, PVC floats etc.		2 sets
56.	Different type of net making needles and mesh gauges.		2 sets

Note: -

1. Internet facility is desired to be provided in the class room.

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts, trainers of ITIs, NSTIs, faculties from universities 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 Trade Committee Members for finalizing the course curriculum of Vessel Navigator Course held on 01.08.2024 at Kochi			
Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Remarks
1.	M Habibullah, Director	CIFNET, Kochi	Chairman
2.	T Ragulan, JD	CSTARI, Kolkata	Member
3.	B Sharanappa, AD	CSTARI, Kolkata	Member
4.	B Biswas, Training Officer	CSTARI, Kolkata	Member
5.	Dr P K Saji, Professor	CUSAT, Kochi	Member
6.	Dr Jomon Joseph, CI(FT)	Retd. from CIFNET	Member
7.	A Ravichandran, DD	CIFNET Unit, Chennai	Member
8.	Hrusikesh Bisoyi, DD	CIFNET Unit, Vishakhapatnam	Member
9.	Aashish Kaushik, MME	CIFNET, Kochi	Member
10.	Dr K B Bijumon, CI(FT)	CIFNET, Kochi	Member
11.	K S Vinod, SI (ME)	CIFNET, Kochi	Member
12.	Arun A S, Skipper I/c	CIFNET, Kochi	Member
13.	Shaji S, I(S&N)	CIFNET, Kochi	Member
14.	Mohan Kumar M S, I(D)	CIFNET, Kochi	Member

ABBREVIATIONS

CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Craft Instructor Training Scheme
DGT	Directorate General of Training
MSDE	Ministry of Skill Development and Entrepreneurship
NTC	National Trade Certificate
NAC	National Apprenticeship Certificate
NCIC	National Craft Instructor Certificate
LD	Locomotor Disability
CP	Cerebral Palsy
MD	Multiple Disabilities
LV	Low Vision
HH	Hard of Hearing
ID	Intellectual Disabilities
LC	Leprosy Cured
SLD	Specific Learning Disabilities
DW	Dwarfism
MI	Mental Illness
AA	Acid Attack
PwD	Person with disabilities

