Industrial Training Institute
Vessel Navigator

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

COMPETENCY BASED CURRICULUM

VESSEL NAVIGATOR

(Duration: Two Years)
Revised in July 2022

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4

SECTOR – CAPITAL GOODS AND MANUFACTURING

Directorate General of Training

VESSEL NAVIGATOR

(Engineering Trade)

(Revised in Jul 2022)

Version: 2.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4

Developed By

Ministry of Skill Development and Entrepreneurship

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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 project work and extracurricular activities to build up confidence. The broad components covered under Professional Skill subject are as below: -

FIRST YEAR– In this year, the trainee learns about safety and environment, use of fire extinguishers, artificial respiratory resuscitation to begin with. Able to calculate course, distance and position arrived using plane parallel sailing and Mercator sailing method. It includes Illustration of altitude corrections, various fishing methods and selection of suitable fishing gears as per fish resources and basic design concept of fishing gear.

The candidate will be able to achieve skill on using different navigational equipment – sextant, azimuth mirror, pelorus, chronometer, etc. maintaining bearing of a vessel, determine position of celestial body. 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.

SECOND YEAR– In this year, develop skill to carry out repair and maintenance of fishing vessel and make ready for inspection certificate. It includes training to overcome the critical situation during on board navigation; to analyze various aspect of stability for preparing voyage; surveying of various subsistent fishing gears. (viz. pole and line, troll line, changadom, raft, bag net, dol net, shore seine, Chinese net, cast net, trammel net, tangle net, etc.)

The candidate will be able to calculate azimuth, intercept direction of position line and draw the position line in the chart, to anchor vessel and to release cable in appropriate place; to observe standard guidelines during voyage in different emergency situation (viz. abandoning, distress signals, storm signals). It includes conservation and management of marine fishery resources; hygienic handling of fish on board; various fish preservation technique to avoid spoilage.

Professional Knowledge subject is simultaneously taught in the same fashion to apply cognitive knowledge while executing task. In addition components like Physical properties of engineering materials, ship stability – density, relative density, Archimedes principle, principle of floatation, various displacement, light load, present load , dead weight, effect of density on draft and displacement fresh water allowance, dock water allowance, tonnes per centimetre immersion, load lines and related problems, centre of gravity, centre of buoyancy, to find the final K.G after loading discharging and shifting, transverse static stability, stable , unstable, natural equilibrium and free surface effect and correction, various types of ropes (vegetable,

synthetic and wire ropes), breaking strength, safe working load, design and construction of fishing gear (joining, stapling and mounting), sea food quality assurance system in India, HACCP.

The projects need to be completed by the candidates in a group. In addition to above components the core skills components viz., Workshop calculation & science, Engineering drawing, employability skills 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 programmes 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, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- 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.
- Can join Advanced Diploma (Vocational) courses under DGT as applicable.

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	
		1st Year	2nd 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.

4	On the Job Training (OJT)/ Group Project	150	150

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 programme 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
- 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	
For performance in this grade, the	• Demonstration of good skill in the use of

candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	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	
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	• 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	
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.	• 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.

3. JOB ROLE

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, safety of life at sea, use, care and maintenance of various life saving, firefighting appliances used onboard a fishing vessel. The various precautions to be taken while fishing for the safety of the crew is 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.

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, longlining, 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 of different types of material available in the fishing industry and select suitable materials for fabrication of different type of fishing gear. Knows 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. Sensitive to environment, self-learning and productivity.

Reference NCO-2015:

(i) 8350.0100 - Serang, Deck/Bosun
(ii) 8350.0600 - Boatman
(iii) 8350.0300 - Seaconny/OS (Ordinary Seaman)
(iv) 8350.0700 - Rudderman
(v) 8350.0400 - Lascar/OS (Ordinary Seaman)
(vi) 8350.0800 - Oarsman
(vii) 8350.0500 - Driver, Launch/Tug Master
(viii) 8350.9900 - Ships' Deck Ratings, Barge Crews and Boatmen, Other

Reference NOS: LSC/N9401 to LSC/N9426, CSC/N9401, CSC/N9402

4. GENERAL INFORMATION

Name of the Trade	**VESSEL NAVIGATOR**
Trade Code	DGT/1090
NCO – 2015	8350.0100, 8350.0300, 8350.0400, 8350.0500, 8350.0600, 8350.0700, 8350.0800, 8350.9900
NOS Covered	NOS: LSC/N9401 to NOS: LSC/N9426, NOS: CSC/N9401, NOS: CSC/N9402
NSQF Level	Level – 4
Duration of Craftsmen Training	Two Years (2400 hours + 300 hours OJT/Group Project)
Entry Qualification	Passed 10th 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 Student)	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	**A. INSTRUCTOR (FISHING TECHNOLOGY)** (i) B.Voc / Degree in Zoology or Fishery Science or fishery science (nautical science) or Industrial Fisheries from AICTE/UGC recognised university with One year experience on board a fishing vessel OR Diploma in Fishery Science from AICTE recognized University board with Two years experience in field of fisheries on board a fishing vessel or in fisheries development activities. AND (ii) One year experience in Sea Fishing and Gear Fabrication OR **B. INSTRUCTOR (SEAMANSHIP & NAVIGATION)** (i) B.Voc /Bachelor's degree from AICTE/UGC recognized university or institute. (ii) Certificate of competency as skipper fishing vessel issued by the mercantile marine department AND One year experience in field of fisheries on board a fishing vessel or in fisheries development activities.

	<u>For BFSc also Skipper certificate to be made mandatory</u> OR **C.** NTC/NAC passed in the Trade of "Vessel Navigator" with three years experience in the relevant field. **<u>Essential Qualification</u>:** Relevant Regular / RPL variants of National Craft Instructor Certificate (NCIC) under DGT. ***NOTE:- Out of two Instructors required for the unit of 2 (1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications. However both of them must possess NCIC in any of its variants.***
2. Workshop Calculation & Science	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 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. **OR** NTC/ NAC in any one of the engineering trades with three years' experience. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade **OR** Regular / RPL variants NCIC in RoDA or any of its variants under DGT
3. Engineering Drawing	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 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. **OR** NTC/ NAC in Vessel Navigator group (Gr-III) trade categorized under Engg. Drawing'/ D'man Mechanical / D'man Civil' with three years' experience. **<u>Essential Qualification:</u>** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade

	OR Regular / RPL variants of NCIC in RoDA / D'man (Mech /civil) or any of its variants under DGT.
4. Employability Skill	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) **OR** Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills.
5. Minimum Age for Instructor	21 Years
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 plane parallel sailing to find course and distance between two positions following safety precautions. NOS: LSC/N9401
2. Calculate, set and drift current from DR position to fix. NOS: LSC/N9402
3. Calculate course, distance and position arrived using Mercator sailing method NOS: LSC/N9403.
4. Illustrate altitude corrections. NOS: LSC/N9404
5. Plan and Fabricate specific fishing gears by selecting suitable material. NOS: LSC/N9405
6. Distinguish various fishing methods and select suitable fishing gears according to the fish resources. NOS: LSC/N9406
7. Recognize basic design concept of fishing gear and select suitable fishing gear, technique to carryout fishing. NOS: LSC/N9407
8. Use different navigational equipment and examine the compass error *(Different important navigational equipment – sextant, azimuth mirror, pelorus, chronometer.)* NOS: LSC/N9408
9. Choose various parameters to determine position of celestial body. (various parameters:- GHA, LHA, Longitude) NOS: LSC/N9409
10. Examine the breaking strength, safe work load of ropes, blocks and tackles in marine use and apply the same during execution in various situations. NOS: LSC/N9410
11. Plan & perform fabrication of fishing gears especially trawls by various techniques. *(Various techniques:- TED and BRD)* NOS: LSC/N9411
12. Design and construction of fishing gears. NOS: LSC/N9412
13. Identify fishing gear accessories. NOS: LSC/N9413
14. Collect data on fishing from different source and analyse the same to perform navigation. *(Different sources – Fishing vessels, dock yards, net making factory)* NOS: LSC/N9414
15. Read and apply engineering drawing for different application in the field of work. NOS: CSC/N9401
16. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. NOS: CSC/N9402

SECOND YEAR

17. Perform dry docking and maintain fishing vessel including painting schedule. NOS: LSC/N9415
18. Plan and make vessel ready for certificate inspection. NOS: LSC/N9416
19. Recognize and act on different critical situation during on board navigation. *(Different critical situation - accidents, collision, man overload, leak, bad weather preparation, aground.)* NOS: LSC/N9417
20. Analyze the various aspect of ship stability to prepare for voyage. *(Various aspect – displacement, effect of density on draft and displacement, dead weight, load)* NOS: LSC/N9418
21. Recognize various subsistent fishing gears to operate the same for commercial fishing. *(Various subsistent fishing gears:-Pole and line, troll line, changadom, raft, bag bet, dol net, shore seine, Chinese net, cast net, trammel net, tangle net)* NOS: LSC/N9419
22. Locate the marine fishery resources of India and apply specific fishing techniques for the exploitation of marine fishery resources. NOS: LSC/N9420
23. Calculate by chronometer and Intercept method to find direction of position line and position. NOS: LSC/N9421
24. Distinguish types of anchor, anchoring procedure and demonstrate anchoring of vessel. NOS: LSC/N9422
25. Distinguish different emergency situation and observe standard guidelines during voyage. *(Different emergency situation – Abandoning, distress signals, storm signals)* NOS: LSC/N23
26. Analyse different advance ship stability features and arrange loading, discharging, shifting cargo onboard for stability. *(Different advance ship stability features – Centre of Gravity, Centre of buoyancy, transverse stability, list, heel.)* NOS: LSC/N9424
27. Explain conservation and management of marine fishery resources, hygienic handling of fish on board and its implementation in day to day work. NOS: LSC/N9425
28. Illustrate fish preservation technique, avoid spoilage and set up appropriate technique for preservation and maintain quality of fish. *(Appropriate fishing technique – chilling, freezing, salting, curing, sun drying, canning and smoking.)* NOS: LSC/N9426
29. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. CSC/N9402

6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
FIRST YEAR	
1. Calculate plane parallel sailing to find course and distance between two positions following safety precautions. NOS: LSC/N9401	Ascertain the given latitude and understand whether it is North or South.
	Ascertain the given Longitude and understand whether it is East or West.
	Do the calculation as per the formula.
	Find the course and distance as per the difference of Lat and Long.
2. Calculate, set and drift current from DR position to fix. NOS: LSC/N9402	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.
	Result obtained by calculation is the set of current and the distance is the drift of current.
3. Calculate course, distance and position arrived using Mercator sailing method. NOS: LSC/N9403	Understand the principles of Mercator sailing method
	Obtain the meridional parts table from the nautical table
	Obtain the difference of Lat and long and name them according to the direction
	Apply the Mercator sailing formula to find course and distance to reach destination
4. Illustrate altitude corrections. NOS: LSC/N9404	Determine the error of sextant
	Take the altitude of celestial body
	Obtain the correct GMT for the above observations
	Obtain nautical almanac of that year and extract corrections and apply to the altitude of celestial body
5. Plan and Fabricate specific fishing gears by selecting suitable material. NOS: LSC/N9405	Design and fabricate a gill net of suitable material
	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
6. Distinguish various fishing methods and select suitable fishing gears according to the fish	Identify demersal fishery resources and selection of suitable fishing gears for exploitation
	Identify pelagic fishery resources and selection of suitable fishing gears for exploitation

resources. NOS: LSC/N9406	Identify deep sea and oceanic resources and select suitable fishing gear for exploitation
7. Recognize basic design concept of fishing gear and select suitable fishing gear, technique to carryout fishing. NOS: LSC/N9407	Identify the gear to exploit fishery resources from the different water depth.
	Identify the suitable fishing gear to exploit shoaling pelagic fishes
	Identify the suitable fishing gear to exploit deep sea resources
	Identify the suitable fishing gear to exploit demersal resources
	Identify the suitable fishing gear to exploit predatory fishes.
8. Use different navigational equipment and examine the compass error *(Different important navigational equipment – sextant, azimuth mirror, pelorus, chronometer.)* NOS: LSC/N9408	Arrange Marine magnetic compass
	Also azimuthal mirror, pelorus
	Arrange the above equipment in such a manner in order to take compass bearing
	Take compass bearing of different objects and find the difference between the true bearing
	Find the difference and apply variation of that places in order to find the deviation and compass error
9. Choose various parameters to determine position of celestial body. (various parameters:- GHA, LHA, Longitude) NOS: LSC/N9409	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.
	Chronometer also kept ready without any error to obtain GMT
10. Examine the breaking strength, safe work load of ropes, blocks and tackles in marine use and apply the same during execution in various situations. NOS: LSC/N9410	Collect various types of ropes
	The ropes are used for marine purpose and determine the size of rope
	As per the theory and formula find out the breaking strength and safe working load of different rope.
	Select different types of blocks and tackle for various purpose and rig the same for different purpose
11. Plan & perform fabrication of fishing gears especially trawls by various techniques *(TED and BRD)* NOS: LSC/N9411	Design and Fabrication of bottom trawl
	Fabrication of midwater trawl as per plan on resources
	Fabrication of shrimp trawl
	Fabrication of trawl with TED
	Fabrication of trawl with BRDs

12. Design and construction of fishing gears NOS: LSC/N9412	Design and construct Trawl, Purse seine, Gill net and Longline
	Identify factors effecting fishing gear design
	Carryout Joining of netting, Seaming, Stapling of two sections, Lacing, Mounting, Reeving.
13. Identify fishing gear accessories. NOS: LSC/N9413	Identify suitable accessories for rigging to various fishing gears
	Select suitable accessories for trawl
	Select suitable accessories for purse seine
	Select suitable accessories for longline
	Select suitable accessories for gillnet
14. Collect data on fishing from different source and analyse the same to perform navigation. *(Different sources – Fishing vessels, dock yards, net making factory)* NOS: LSC/N9414	Collect the data about the traditional fishing
	Collect the data about different fishing vessel operated in fishing arbour
	Collect the data about local dockyards/boat building yards
	Collect the data about different types of webbings fabricated and used for fishing (From net making factory)
	Collect the data about the implementation fishing rules and regulation (MFRAs)
15. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. NOS: LSC/N9401	Solve different mathematical problems
	Explain concept of basic science related to the field of study
16. Read and apply engineering drawing for different application in the field of work. NOS: CSC/N9402	Read & interpret the information on drawings and apply in executing practical work.
	Read &analyze the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
Second Year	
17. Perform dry docking and maintain fishing vessel including painting schedule. NOS: LSC/N9415	Dry docking a vessel is very large process of work to carry out maintenance and repair of vessel and machinery
	Repair work order in consultation with Chief engineer and to be submitted to the dock authority
	Obtain the day and time for dry docking the vessel in consultation with the dock authority

	Obtain necessary tools and paints for the preliminary work
	Before the work starts surveyor may be inspect the vessel and his suggestions may be obtained
18. Plan and make vessel ready for certificate inspection. NOS: LSC/N9416	Service all necessary lifesaving appliances
	Service all firefighting appliances and replace if necessary
	Make sure that all communication and navigational equipment are working properly.
	Ensure that all navigational lights and signals are working properly.
	Carry out all other important works noted by the surveyor
19. Recognize and act on different critical situation during on board navigation. *(Different critical situation - accidents, collision, man overload, leak, bad weather preparation, aground.)* NOS: LSC/N9417	Mock drill of various situations is to be created and demonstration in this regard may be conducted.
	The above drill may be carried out on board vessel during sailing as well as when the vessel at harbour.
	Comply the safety procedure and rules while performing the above operations.
	Dispose all the used and unwanted items as per the ship standing order.
	Refill or recharge firefighting equipment and the date/month/year of recharge may be indicated
20. Analyze the various aspect of ship stability to prepare for voyage. *(Various aspect – displacement, effect of density on draft and displacement, dead weight, load)* NOS: LSC/N9418	Study and analyse hydrostatic particulars of the ship supplied by the shipyard.
	Understand the maneuvering capability of the ship.
	As per the hydrostatic particulars study the present displacements
	Ascertain the load displacement, dead weight available, dead weight aboard etc.
21. Recognize various subsistent fishing gears to operate the same for commercial fishing. *(Various subsistent fishing gears:-Pole and line, troll line, changadom, raft, bag bet, dol net, shore seine, Chinese net, cast net, trammel net, tangle net etc)* NOS: LSC/N9419	Survey and study of cast net and Chinese net
	Survey and study of pole & line and trolling
	Survey and study of *Changadam* and raft
	Survey and study of bag net and dol net
	Survey and study of shore seine and trammel net

22. Locate the marine fishery resources of India and apply specific fishing techniques for the exploitation of marine fishery resources. NOS: LSC/N9420	Locate fishing ground with the help of fish finding equipment
	Locate fishing ground with the help of remote sensing data
	Locate fishing ground with the help of exploratory survey and data collected by fisheries research organizations
	Locate fishing ground with the help of commercial fishermen
	Locate fishing ground with own fishing experience
23. Calculate by chronometer and Intercept method to find direction of position line and position. NOS: LSC/N9421	Understand starting procedure of chronometer
	Wind the chronometer
	Enter the chronometer error in the log book
	Calculate the GMT time while taking altitude of Sun, Moon, Star
	Calculate azimuth, intercept and direction of position line and draw the position line in the chart
24. Distinguish types of anchor, anchoring procedure and demonstrate anchoring of vessel. NOS: LSC/N9422	Identify the anchor to be dropped and its working condition
	Check the hydraulic winch to be used for anchoring
	Check to be made for the break and bow stopper
	Choose appropriate place for anchoring the vessel and calculate the cable to be released
	During the above work all safety measures to be taken
25. Distinguish different emergency situation and observe standard guidelines during voyage. *(Different emergency situation – Abandoning, distress signals, storm signals)* NOS: LSC/N9423	Carry out voyage preparation and inform the crew about sailing program
	Inform the crew about the muster list to be followed during emergency as well as distress situation.
	Follow the traffic rules while navigating the channel and open sea
	Comply with the international regulation for preventing collision at sea.
	Observe other bulletin and radio communication.
26. Analyze different advance ship stability features and arrange loading, discharging, shifting cargo onboard for stability. *(Different advance ship stability features – Centre*	Study and analyse hydrostatic particulars of the ship supplied by the shipyard.
	Understand the maneuvering capability of the ship.
	As per the hydrostatic particulars study the present displacements
	Ascertain the load displacement, dead weight available, dead weight aboard etc.

of Gravity, Centre of buoyancy, transverse stability, list, heel.) NOS: LSC/N9424	After loading the cargo always observe that there is no list appeared in the vessel if any lists arrange the cargo in such a manner to remove list.
27. Explain conservation and management of marine fishery resources, hygienic handling of fish on board and its implementationin day to day work. NOS: LSC/N9425	Identification and use of by-catch reduction devices
	Code of Conduct for Responsible Fisheries (CCRF)
	Knowledge about the uniform ban period
	Hygienic handling of catch onboard fishing vessel
	Handling of longline catch to maintain *Sashimi* grade quality
28. Illustrate fish preservation technique, avoid spoilage and set up appropriate technique for preservation and maintain quality of fish. *(Appropriate fishing technique – chilling, freezing, salting, curing, sun drying, canning and smoking.)* NOS: LSC/N9426	Preservation technique using ice
	Preservation technique using refrigeration
	Knowledge and application of preservation technique such as salt curing, sun drying and smoking
	Application of canning process for fish preservation
29. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. NOS: CSC/N9402	Solve different mathematical problems
	Explain concept of basic science related to the field of study

7. TRADE SYLLABUS

SYLLABUS FOR VESSEL NAVIGATOR TRADE			
DURATION - FIRST YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 84 Hrs; Professional Knowledge 15 Hrs	Calculate plane parallel sailing to find course and distance between two positions following safety precautions. NOS: LSC/N9401	1. Importance of trade training, List of tools & Machinery used in the trade. (02 hrs.) 2. Health & Safety: Introduction to safety equipment and their uses. Introduction of first aid, operation of Electrical mains. (02 hrs.) 3. Occupational Safety & Health (01 hrs.) 4. Importance of housekeeping & good shop floor practices. (01 hrs.) 5. Health, Safety and Environment guidelines, legislations & regulations as applicable. (01 hrs.) 6. Disposal procedure of waste materials like cotton waste, metal chips / burrs etc. Basic safety introduction, Personal protective Equipment (PPE):- Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. (02 hrs.)	Importance of safety and general precautions Observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. Soft Skills: its importance and Job area after completion of training. Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Introduction to 5S concept & its application. Response to emergencies e.g.; power failure, fire, and system failure. (03 hrs)

		7. Preventive measures for electrical accidents & steps to be taken in such accidents. (02 hrs.) 8. Use of Fire extinguishers. (01 hrs.)	
		9. Find difference of latitude, longitude, departure mean latitude. (15 hrs.) 10. Find difference meridional parts. (07 hrs.)	The shape of the earth. Poles, equator, meridians, Parallel of latitude. Position by latitude and longitude. Bearing, distance, unit of measurements, nautical miles. (04 hrs)
		11. Calculate plane parallel sailing to find course and distance between two positions. (30 hrs.) 12. Calculate arrived position if course and distance is given. (20 hrs.)	Familiarization of fishing Vessels. Important Nautical Terminology (08 hrs)
Professional Skill 21 Hrs; Professional Knowledge 05 Hrs	Calculate, set and drift current from DR position to fix. NOS: LSC/N9402	13. Calculate set and drift of current from DR position to fix. (21 hrs.)	Life Saving Appliances (05 hrs)
Professional Skill 63 Hrs; Professional Knowledge 15 Hrs	Calculate course, distance and position arrived using Mercator sailing method. NOS: LSC/N9403	14. Find course and distance by Mercator sailing method. (30 hrs.)	Fire Fighting Principle, fire prevention and fire fighting appliances. (10 hrs)
		15. Find position arrived by Mercator sailing method. (33 hrs.)	Marine Magnetic Compass, Compass points. (05 hrs)
Professional Skill 21 Hrs; Professional Knowledge 05 Hrs	Illustrate altitude corrections. NOS: LSC/N9404	16. Altitude corrections. (21 hrs.)	Sextant. Hand lead line and deep-sea lead line. (05 hrs)
Professional Skill 42 Hrs; Professional	Plan and Fabricate specific fishing gears by selecting suitable material. NOS:	17. Visually identify different types of fishing gear materials. (42 hrs.)	**Introduction to Fishing Technology** **Fishing Gear Materials** Introduction to fishing gear

Knowledge 10 Hrs	LSC/N9405		materials Classification of fishing gear materials- Natural and synthetic fibres, Yarn numbering system- Indirect system: British system, Metric system, Runnage System Direct System: Denier, Tex Conversion of yarn numbering system Construction details of twines and ropes -Stages in twisting operation, Twist of netting material 'S' and 'Z' twist, Degree of twist, Specification of twines and ropes. (10 hrs)
Professional Skill 21 Hrs; Professional Knowledge 05 Hrs	Distinguish various fishing methods and select suitable fishing gears according to the fish resources. NOS: LSC/N9406	18. Identify different type of fishing gears- modal/prototype. (21 hrs.)	**Fishing Techniques** Prof. Andres Von Brandt Classification of fishing gears FAO Classification of fishing gears. Active fishing gear, Passive fishing gear and miscellaneous fishing gear. (05 hrs)
Professional Skill 126 Hrs; Professional Knowledge 25 Hrs	Recognize basic design concept of fishing gear and select suitable fishing gear, technique to carryout fishing NOS: LSC/N9407	19. Identify different Knots – trawl knot, double trawl knot and reef knot. Fabrication of webbing. (60 hrs.)	**Introduction to Fishing Gear Design** Definition and Terms –Mesh, Shape of mesh, Knot, Netting Direction of Netting-'T' direction, 'N' direction Type of netting- Knotted netting, Knot less netting (15 hrs)
		20. Shaping of Netting by Hand Barding. (12 hrs.) 21. Baiting/Creasing. (14 hrs.) 22. Single fly mesh, Double fly mesh. (15 hrs.)	Shaping of netting Shaping of netting by hand braiding – Baiting, Creasing, Fly mesh (Single and Double) (07 hrs)
		23. Shaping of Netting by Tailoring (Cutting). (6 hrs.) 24. Bar cut (4 hrs.) 25. Knot cut ('N' cut and 'T' cut). (8 hrs.) 26. Combination cut (Knot cut	Shaping of netting by tailoring (Cutting)- Bar cut, Knot cut ('N' cut and 'T' cut), Combination cut. (03 hrs)

		and Bar cut). (7 hrs.)	
Professional Skill 84 Hrs; Professional Knowledge 15 Hrs	Use different navigational equipment and examine the compass error *(Different important navigational equipment – sextant, azimuth mirror, pelorus, chronometer.)* NOS: LSC/N9408	27. Celestial references. (10 hrs.) 28. The celestial sphere, celestial poles, equinoctial. (30 hrs.)	SEXTANT: Parts of sextant, principle of sextant, adjustable error s and their correction , Non adjustable error , Use of sextant (08 hrs)
		29. Declination circles, celestial meridians, declination of celestial body. (18 hrs.) 30. Greenwich hour angle, local hour angle, sidereal hour angle. (26 hrs.)	Bearing instruments: Azimuth mirror, Pelorus, Chronometer. (07 hrs)
Professional Skill 126 Hrs; Professional Knowledge 25 Hrs	Choose various parameters to determine position of celestial body. (various parameters:- GHA, LHA, Longitude) NOS: LSC/N9409	31. Position of celestial body, the suns orbit. (20 hrs.) 32. Connection between GHA, LHA, longitude. (20 hrs.)	Chronometer: error, purpose Duties of officer while at sea and anchor. (10 hrs)
		33. Given LHA and longitude to find GHA. (10 hrs.) 34. Given GHA and LHA to find longitude. (10 hrs.) 35. Given GHA and longitude to find LHA. (10 hrs.) 36. Connection between GMT, LMT and LIT. (10 hrs.)	ROPE WORKS: Knot, Bents, Hitches, splicing, Eye splice, Long splice, Short splice, Back splice. (10 hrs)
		37. Given GMT and longitude to find LMT. (10 hrs.) 38. Given LMT and longitude to find GMT. (12 hrs.) 39. Given GMT and LMT to find longitude. (13 hrs.) 40. Correction of altitude-theory. (11 hrs.)	Various types of Ropes: Vegetable, Synthetic and Wire ropes, Care and maintenance, Breaking strength, Safe working load (05 hrs)
Professional Skill 42 Hrs; Professional Knowledge 10 Hrs	Examine the breaking strength, safe work load of ropes, blocks and tackles in marine use and apply the same during execution in various situations. NOS: LSC/N9410	41. Day's work problems. (20 hrs.) 42. Rope works, rigging of blocks and tackles. (22 hrs.)	Problems: Finding the Breaking strength and Safe working load, Blocks and tackles, parts of Blocks, various type tackles rigged to Advantage and Disadvantage, Simple problems to find the size of rope and weight of load to be lifted (10 hrs)

Professional Skill 42 Hrs; Professional Knowledge 10 Hrs	Plan & perform fabrication of fishing gears especially trawls by various techniques.*(Various techniques:- TED and BRD)* NOS: LSC/N9411	43. Identification of fishing gear materials – By flame test, solubility test. (42 hrs.)	**Fishing Gear Design and Materials and Accessories** Properties of fishing gear materials Physical, Chemical and Biological properties Selection of Materials for the fabrication of Trawl net, Purse seine, Gill Net, Longline (10 hrs)
Professional Skill 126 Hrs; Professional Knowledge 20 Hrs	Design and construction of fishing gears. NOS: LSC/N9412	44. Design of fishing gears. (20 hrs.)	**Design and Construction of Fishing Gear**- Design Process, Factors effecting fishing gear design, Design and construction of Trawl, Purse seine, Gill net and Longline (Monofilament and Multifilament) (03 hrs)
		45. Joining of netting: Horizontal joining- Joining meshes of same number and size in both sections, Joining meshes of same number but of different meshes size in both sections, Joining meshes of different numbers but of the same size in both sections, Joining of meshes of different number and size in both sections. (15 hrs.) 46. Seaming (05 hrs.) 47. Stapling- Stapling of two sections with meshes of same size and number, Stapling of two sections with meshes of different size and number. (12 hrs.) 48. Lacing (05 hrs.)	Joining- Horizontal joining- Joining meshes of same number and size in both sections, Joining meshes of same number but of different meshes size in both sections, Joining meshes of different numbers but of the same size in both sections, Joining of meshes of different number and size in both sections Seaming Stapling- Stapling of two sections with meshes of same size and number, Stapling of two sections with meshes of different size and number Lacing (07 hrs)
		49. **Mounting:** Fixed mounting- Indirect mounting (making an additional row and attached to the mounting	Mounting –Hanging ratio, Hanging co-efficient, Hang-in or take-up Fixed mounting- Indirect mounting (making an

		rope) Direct mounting (fixed directly to the mounting rope). (24 hrs.) 50. Stapling (Loose mounting) Meshes with in the loop method, End mesh in two loop method, Lock loop method. (30 hrs.) 51. Reeving- Fastening with mesh method, fastening without mesh method. (15 hrs.)	additional row and attached to the mounting rope) Direct mounting (fixed directly to the mounting rope) Stapling (Loose mounting) Meshes with in the loop method, End mesh in two loop method, Lock loop method Reeving- Fastening with mesh method, Fastening without mesh method Types of mounting used in fabrication of different fishing gears (Trawl net, gill net and purse seine). (10 hrs)
Professional Skill 21 Hrs; Professional Knowledge 05 Hrs	Identify fishing gear accessories. NOS: LSC/N9413	52. Familiarization of and identification of fishing gear accessories and use them as per requirement during navigation. (21 hrs.)	**Fishing gear Accessories:** 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. (05 hrs)
Professional Skill 21Hrs; Professional Knowledge 05Hrs	Collect data on fishing from different source and analyse the same to perform navigation. *(Different sources – Fishing vessels, dock yards, net making factory)* NOS: LSC/N9414	**In-plant training:** Practical Navigation training onboard training vessel Visit-Various Fishing vessels, Dock yards Visit –Net making factory **Project report.** Data collection- Different traditional fishing gears operated/used - Fishing harbour/landing centre	
ENGINEERING DRAWING: (40 Hrs.)			
Professional Knowledge ED- 40 Hrs.	Read and apply engineering drawing for different application in the field of work. NOS: CSC/N9401	**Topic** Introduction to Engineering Drawing and Drawing Instruments • Conventions • Sizes and layout of drawing sheets • Title Block, its position and content • Drawing Instrument Lines- Types and applications in drawing Free hand drawing of –	

		• Geometrical figures and blocks with dimension • Transferring measurement from the given object to the free hand sketches. • Free hand drawing of hand tools and measuring tools. Drawing of Geometrical figures: • Angle, Triangle, Circle, Rectangle, Square, Parallelogram. • Lettering & Numbering – Single Stroke. Dimensioning • Types of arrowhead • Leader line with text • Position of dimensioning (Unidirectional, Aligned) Symbolic representation – • Different symbols used in the Vessel Navigator trade. Reading of Navigational Chart drawing
WORKSHOP CALCULATION & SCIENCE: (30 Hrs)		
Professional Knowledge WCS- 30 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study NOS: CSC/N9402	**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 Factors, HCF, LCM and problems Fractions - Addition, substraction, multiplication & division Decimal fractions - Addition, subtraction, multiplication & division Solving problems by using calculator **Square root, Ratio and Proportions, Percentage** Square and square root Simple problems using calculator Applications of Pythagoras theorem and related problems Ratio and proportion Ratio and proportion - Direct and indirect proportions Percentage Percentage - Changing percentage to decimal and fraction **Mass, Weight, Volume and Density** Mass, volume, density, weight and specific gravity Related problems for mass, volume, density, weight and specific gravity **Speed and Velocity, Work, Power and Energy** Work, power, energy, HP, IHP, BHP and efficiency **Heat & Temperature and Pressure** Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point & melting point of different metals and non-metals Concept of pressure - Units of pressure, atmospheric pressure, absolute pressure, gauge pressure and gauges used for

		measuring pressure **Basic Electricity** Introduction and uses of electricity, electric current AC, DC their comparison, voltage, resistance and their units **Levers and Simple machines** Simple machines - Effort and load, mechanical advantage, velocity ratio, efficiency of machine, relationship between efficiency, velocity ratio and mechanical advantage **Trigonometry** Measurement of angles Trigonometrical ratios Trigonometrical tables

SYLLABUS FOR VESSEL NAVIGATOR TRADE			
Second Year			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
Professional Skill 21 Hrs; Professional Knowledge 07 Hrs	Perform dry docking and maintain fishing vessel including painting schedule NOS: LSC/N9415	53. Position fixing methods, Painting, Chipping etc. (21 hrs.)	Dry docking procedure, Surface preparation, Painting schedules (07 hrs)
Professional Skill 42Hrs; Professional Knowledge 18Hrs	Plan and make vessel ready for certificate inspection. NOS: LSC/N9416	54. Install and align engine. (20 hrs.) 55. Service all life saving appliances. (10 hrs.) 56. Inspect all fire fighting appliances. (02 hrs.) 57. Service all navigational lights and emergency signal. (10 hrs.)	The use and care of life saving appliances including handling characteristic, construction and stowage of life-rafts. Emergency signal, abandon ship signal, bending setting and taking in life boat sails, management of boats under oars, sails, power and in heavy weather, recovering boats at sea. Beaching or landing. Survival procedure in lifeboats and life rafts. Certification of inspection , Registration of fishing vessels (18hrs)
Professional Skill 42Hrs; Professional Knowledge 18Hrs	Recognize and act on different critical situation during on board navigation. *(Different critical situation - accidents, collision, man overload, leak, bad weather preparation, aground.)* NOS: LSC/N9417	58. Communication procedure during emergency and distress. (30 hrs.) 59. Chronometer time. (12 hrs.)	Accident, Collision, Man over board, leak. Bad weather preparation, Aground (18hrs)
Professional Skill 189 Hrs;	Analyze the various aspect of ship stability to prepare for voyage. *(Various aspect –*	60. The ambiguity of chronometer time, chronometer error. (24 hrs.)	Precaution while fishing, Voyage preparation SHIP STABILITY: Density,

Professional Knowledge 60 Hrs	*displacement, effect of density on draft and displacement, dead weight, load)* NOS: LSC/N9418	61. Latitude by meridian altitude-SUN. (15 hrs.)	Relative density, Archimedes principle, Principle of floatation (10 hrs)
		62. Latitude by meridian altitude STAR. (15 hrs.) 63. Azimuth-SUN, to find deviation of the compass. (25 hrs.)	Various displacement, Light load, Present load, Dead weight (10 hrs)
		64. Amplitude-SUN, to find deviation of the compass. (20 hrs.)	Effect of density on draft and displacement Fresh Water Allowance., Dock Water Allowance, Tonnes Per Centimetre Immersion (09 hrs)
		65. Ex-meridian SUN. (20 hrs.)	Load lines and related problems (09 hrs)
		66. Wire Rope Splice - Eye Splice. (30 hrs.) 67. Rope Splice - Eye splice, Short Splice, Long splice, Back Splice. (40 hrs.)	Construction and Specification of wire rope, Combination rope (22 hrs)
Professional Skill 84 Hrs; Professional Knowledge 30 Hrs	Recognize various subsistent fishing gears to operate the same for commercial fishing. *(Various subsistent fishing gears: -Pole and line, troll line, changadom, raft, bag bet, dol net, shore seine, Chinese net, cast net, trammel net, tangle net etc)* NOS: LSC/N9419	68. **Mending-** Mending of simple tear**,** Mending of vertical tear**,** Mending of horizontal tear**,** Mending of oblique tear, Filling a tear with a suitable piece of netting. (54 hrs.) 69. Demonstration of models of traditional fishing gears. (30 hrs.)	Design and Construction of Fishing Gear, Factors effecting fishing gear design, Designing and construction of Trawl, Purse seine, Gill net and Longline (Monofilament and Multifilament **Commercial Fishing**: Trawling, Purse Seining, Gillnetting, Longlining, Trolling and Squid Jigging. Design and operation of 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 (30 hrs)
Professional	Locate the marine fishery	70. Locate fishing ground by	Various pelagic/demersal/

Skill 42 Hrs; Professional Knowledge 18 Hrs	resources of India and apply specific fishing techniques for the exploitation of marine fishery resources. NOS: LSC/N9420	fish finding equipment, remote sensing data and by exploratory survey. (22 hrs.) 71. Identification of commercially important marine fish/shellfish of India. (20 hrs.)	deep sea Marine Fishery Resources of India. (18 hrs)
Professional Skill 42 Hrs; Professional Knowledge 18 Hrs	Calculate by chronometer and Intercept method to find direction of position line and position. NOS: LSC/N9421	72. Calculation of long by chronometer practical navigation problem to find direction of position line and position through which to draw it (SUN). (42 hrs.)	Anchor works: Stock and stockless anchors, Anchor cable, Anchoring procedure (18 hrs)
Professional Skill 42 Hrs; Professional Knowledge 18 Hrs	Distinguish types of anchor, anchoring procedure and demonstrate anchoring of vessel NOS: LSC/N9422	73. Calculation of intercept method to find direction of position line and position through which to draw it (SUN). (42 hrs.)	Abandoning procedure, Distress signals, Storm signals, IALA Buoyage system (18 hrs)
Professional Skill 84 Hrs; Professional Knowledge 30 Hrs	Distinguish different emergency situation and observe standard guidelines during voyage. *(Different emergency situation – Abandoning, distress signals, storm signals)* NOS: LSC/N9423	74. Observation of Polaris. (20 hrs.) 75. Abandoning procedures, distress signals, understands storm signals and its meaning. (24 hrs.)	Collision regulations (Rule of the road) (15 hrs)
		76. IALA buoyage system and International Regulation for Preventing Collision at Sea. (40 hrs.)	Centre of gravity, Centre of buoyancy, To find the final K.G after loading discharging and shifting (15 hrs)
Professional Skill 84 Hrs; Professional Knowledge 30 Hrs	Analyze different advance ship stability features and arrange loading, discharging, shifting cargo onboard for stability. *(Different advance ship stability features – Centre of Gravity, Centre of buoyancy, transverse*	77. Learning advance ship stability such as center of gravity, center of buoyancy and transverse stability. (44 hrs.)	Transverse static stability, Stable, Unstable, Natural equilibrium and free surface effect, and correction (15 hrs)
		78. List, heel and effect of centre of gravity while loading, discharging and shifting cargo onboard. (40 hrs.)	Difference between list and heel, simple problems related to list (15 hrs)

	stability, list, heel.) NOS: LSC/N9424		
Professional Skill 63 Hrs; Professional Knowledge 15 Hrs	Explain conservation and management of marine fishery resources; hygienic handling of fish on board and its implementation in day to day work. NOS: LSC/N9425	79. Familiarization of various types of By-catch Reduction Devices. (40 hrs.) 80. Model net fabrication- Trawl net, gill net. (23 hrs.)	Responsible Fishing, By-catch Reduction Devices (BRD) Square mesh window, Radial Escapement Device, Fish Eye, Turtle Excluder Device (TED) Code of Conduct for Responsible Fisheries (CCRF) Hygienic handling of fish on-board, Spoilage of fish. (15 hrs)
Professional Skill 105 Hrs; Professional Knowledge 20 Hrs	Illustrate fish preservation technique, avoid spoilage and set up appropriate technique for preservation and maintain quality of fish. *(Appropriate fishing technique – chilling, freezing, salting, curing, sun drying, canning and smoking.)* NOS: LSC/N9426	81. Organoleptic Assessment of fish quality. (65 hrs.)	Organoleptic Assessment of Fish Quality Fish Preservation on board Chilling and Freezing Fish Preservation Technique – Chilling, Freezing, salting and curing, sun drying, canning and smoking (15 hrs)
		82. Value added products - Fish cutlets, Fish balls. (40 hrs.)	Value added products and by-products Sea food quality assurance system in India, HACCP (05 hrs)
WORKSHOP CALCULATION & SCIENCE: (18 Hrs)			
Professional Knowledge WCS- 18 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study NOS: CSC/N9402	**Friction** Friction - Advantages and disadvantages, Laws of friction, co-efficient of friction, angle of friction, simple problems related to friction Friction - Lubrication Friction - Co- efficient of friction, application and effects of friction in workshop practice **Centre of Gravity** Centre of gravity - Centre of gravity and its practical application **Elasticity** Elasticity - Elastic, plastic materials, stress, strain and their units and young's modulus	

		Elasticity - Ultimate stress and working stress **Estimation and Costing** Estimation and costing - Simple estimation of the requirement of material etc., as applicable to the trade Estimation and costing - Problems on estimation and costing
In-plant training: Visit to shipyards, Dry docking yards Fish processing factory, Fishing harbours/Fish landing centre visit **Project report.** Value added product preparation-Fish and shell fish		

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 / dgt.gov.in

ANNEXURE-I

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 for VNC & MFC
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		1 No (6 persons capacity)
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 Its.	1 No
23.	CO_2 - Water type extinguisher		1 No
24.	AFFF	50 Its.	1 No
25.	Lifebuoy		2 Nos.
26.	Life jackets		5 Nos.
27.	Life rafts for demonstration purpose		1 No (Item No.16)
28.	Navigational charts of East & West coast of India		21 Nos.
29.	Chart tables		21 Nos.

30.	Instructional charts	5059, 5060, 5061 and 5062	21 Nos. each
31.	Various display boards for position fixing and signals.		As required
32.	EPIRB		1 No
33.	SART		1 No
34.	Self contained breathing apparatus		1 No
35.	International shore connection		1 No
36.	Chronometer		1 No
37.	GPS		2 Nos. for the Institute
38.	Adjustable net making stand provided with cup hooks.		2 Sets
39.	Different type of live models in glass showcase. Live models 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 operational technique such as 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 tuna hook.		2 sets

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.			

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


कौशलं बलम्