



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- 5**



**SECTOR - PRODUCTION & MANUFACTURING**

# **VESSEL NAVIGATOR**

**(Engineering Trade)**

**(Revised in 2018)**



**CRAFTSMEN TRAINING SCHEME (CTS)**

**NSQF LEVEL- 5**

**Skill India**  
कौशल भारत - कुशल भारत

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

**CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE**

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## 1. COURSE INFORMATION

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During the two-year duration of Vessel Navigator trade, a candidate is trained on Professional Skill, Professional Knowledge, Engineering Drawing, Workshop Calculation & Science and Employability Skill. In addition to this, a candidate is entrusted to undertake project work and extracurricular activities to build up confidence. The broad components covered related to the trade are categorized in four semesters each of six months duration. The semester wise course coverage is categorized as below:

**1<sup>st</sup> Semester** – In this semester, 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.

**2<sup>nd</sup> Semester** – In this semester, 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.

**3<sup>rd</sup> Semester** – In this semester, 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.)

**4<sup>th</sup> Semester** – In this semester, 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.



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### 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 National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes under NCVT for propagating 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 (04 semester) duration. It mainly consists of Domain area and Core area. In the Domain area (Trade Theory & Practical) impart professional skills and knowledge, while Core area (Workshop Calculation & science, Engineering Drawing and Employability Skills) impart requisite core skill, knowledge and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by NCVT 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 CAREER PROGRESSION PATHWAYS:

- Can join Apprenticeship programs in different types of industries leading to a National Apprenticeship certificate (NAC).



## 2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two-year (04 semesters): -

S No.	Course Element	Notional Training Hours
1	Professional Skill (Trade Practical)	2158
2	Professional Knowledge (Trade Theory)	504
3	Workshop Calculation & Science	168
4	Engineering Drawing	252
5	Employability Skills	110
6	Library & Extracurricular Activities	168
7	Project Work	320
8	Revision & Examination	480
	<b>Total</b>	<b>4160</b>

## 2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of the course and at the end of the training program as notified by the Government of India (GoI) from time to time. The employability skills will be tested in the first two semesters itself.

a) The **Internal Assessment** 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 template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NTC will be conducted by NCVT at the end of each semester as per the guideline of Government of India. The pattern and marking structure is being notified by Govt. of India 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

The minimum pass percentage for practical is 60% & minimum pass percentage of theory subjects is 40%. For the purposes of determining the overall result, 25% weightage is applied to the result of each semester examination.

## 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.

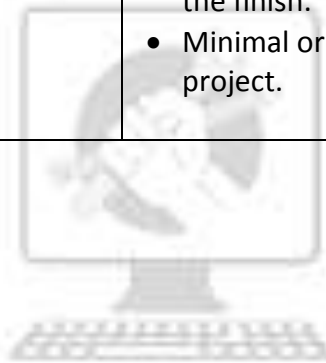
Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

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

Performance Level	Evidence
<b>(a) Weightage in the range of 60%-75% to be allotted during assessment</b>	
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	<ul style="list-style-type: none"> <li>• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment.</li> <li>• Below 70% tolerance dimension achieved while undertaking different work with those demanded by the component/job.</li> <li>• A fairly good level of neatness and consistency in the finish.</li> <li>• Occasional support in completing the project/job.</li> </ul>
<b>(b) Weightage in the range of 75%-90% to be allotted during assessment</b>	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and	<ul style="list-style-type: none"> <li>• Good skill levels in the use of hand tools, machine tools and workshop equipment.</li> <li>• 70-80% tolerance dimension achieved while undertaking different work with those</li> </ul>

<p>regard for safety procedures and practices</p>	<p>demanded by the component/job.</p> <ul style="list-style-type: none"> <li>• A good level of neatness and consistency in the finish.</li> <li>• Little support in completing the project/job.</li> </ul>
<p>(c) Weightage in the range of more than 90% to be allotted during assessment</p>	
<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"> <li>• High skill levels in the use of hand tools, machine tools and workshop equipment.</li> <li>• Above 80% tolerance dimension achieved while undertaking different work with those demanded by the component/job.</li> <li>• A high level of neatness and consistency in the finish.</li> <li>• Minimal or no support in completing the project.</li> </ul>



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#### **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, fire fighting 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 life saving equipments, fire fighting appliances and communication equipments. 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 equipments.

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:**

- a) 8350.0100
- b) 8350.0300
- c) 8350.0400
- d) 8350.0500
- e) 8350.0600
- f) 8350.0700
- g) 8350.0800
- h) 8350.9900

## 4. GENERAL INFORMATION

<b>Name of the Trade</b>	Vessel Navigator
<b>NCO - 2015</b>	8350.0100, 8350.0300, 8350.0400, 8350.0500, 8350.0600, 8350.0700, 8350.0800, 8350.9900
<b>NSQF Level</b>	Level – 5
<b>Duration of Craftsmen Training</b>	Two years (Four semesters each of six months duration).
<b>Entry Qualification</b>	Passed 10 <sup>th</sup> Class with Science and Mathematics under 10+2 system of education or its equivalent
<b>Unit Strength (No. Of Student)</b>	16 (Max. supernumeraries seats: 5)
<b>Space Norms</b>	88 Sq. m
<b>Power Norms</b>	3.51 KW
<b>Instructors Qualification for</b>	
<b>1. Vessel Navigator Trade</b>	<p><b>A. INSTRUCTOR (FISHING TECHNOLOGY)</b>            (i) Master’s Degree in Zoology or Fishery Science or Industrial Fisheries from a recognised university            OR            Post Graduate Diploma in Fishery Science from Recognized University/ board            AND            (ii) One year experience in Sea Fishing and Gear Fabrication            OR  <b>B. INSTRUCTOR ( SEAMANSHIP &amp; NAVIGATION)</b>            (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 experience on board a fishing vessel            OR            (i) bachelors degree in fishery science (nautical science) from a recognized university or institute            AND            (ii) two years 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  <b>C. Candidate with NTC in Vessel Navigator with three years experience in the relevant field.</b>            Preference will be given to a candidate with CIC (Craft Instructor Certificate) in Vessel Navigator trade.</p>
<b>2. Workshop Calculation</b>	Degree in Engineering with one year experience.

<b>&amp; Science</b>	<p style="text-align: center;">OR</p> <p>Diploma in Engineering with two years experience.  <b>Desirable:</b>          Craft Instructor Certificate in RoD&amp; A course under NCVT.</p>					
<b>3. Engineering Drawing</b>	<p>Degree in Engineering with one year experience.  <p style="text-align: center;">OR</p>         Diploma in Engineering with two years experience.  <p style="text-align: center;">OR</p>         NTC / NAC in the Draughtsman (Mechanical) with three years experience.  <b>Desirable:</b>          Craft Instructor Certificate in RoD&amp; A course under NCVT.</p>					
<b>4. Employability Skill</b>	<p>MBA OR BBA with two years experience OR Graduate in Sociology/ Social Welfare/ Economics with Two years experience OR Graduate/ Diploma with Two years experience and trained in Employability Skills from DGT institutes.  <p style="text-align: center;">AND</p>         Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above.  <p style="text-align: center;">OR</p> <b>Existing Social Studies Instructors duly trained in Employability Skills from DGT institutes.</b></p>					
<b>List of Tools and Equipment</b>	As per Annexure – I					
<b>Distribution of training on Hourly basis: (Indicative only)</b>						
Total hours /week	Trade practical	Trade theory	Work shop Cal. &Sc.	Engg. Drawing	Employability skills	Extra-curricular activity
40 Hours	25 Hours	6 Hours	2 Hours	3 Hours	2 Hours	2 Hours

## 5. NSQF LEVEL COMPLIANCE

NSQF level for **Vessel Navigator** trade under CTS: **Level 5**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

- a. Process
- b. Professional Knowledge
- c. Professional Skill
- d. Core Skill
- e. Responsibility

The broad Learning outcome of **Vessel Navigator** trade under CTS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and learning and some responsibility for other's work and learning.

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

### 6.1 GENERIC LEARNING OUTCOME

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

### 6.2 SPECIFIC LEARNING OUTCOME

#### Semester – I

9. Calculate plane parallel sailing to find course and distance between two positions.
10. Calculate set and drift current from DR position to fix.



11. Calculate course, distance and position arrived using Mercator sailing method.
12. Illustrate altitude corrections.
13. Distinguish various fishing methods and select suitable fishing gears according to the fish resources.
14. Plan and Fabricate specific fishing gears by selecting suitable material.
15. Recognize basic design concept of fishing gear and select suitable fishing gear, technique to carryout fishing.

#### **Semester – II**

16. Use different navigational equipment and examine the compass error (*Different important navigational equipment – sextant, azimuth mirror, pelorus, chronometer.*)
17. Choose various parameters to determine position of celestial body. (various parameters:- GHA, LHA, Longitude)
18. Examine the breaking strength, safe work load of ropes, blocks and tackles in marine use and apply the same during execution in various situations.
19. Plan & perform fabrication of fishing gears especially trawls by various techniques. (*Various techniques:- TED and BRD*)
20. Design and construction of fishing gears.
21. Identify fishing gear accessories.
22. Collect data on fishing from different source and analyse the same to perform navigation. (*Different sources – Fishing vessels, dock yards, net making factory*)

#### **Semester – III**

23. Perform dry docking and maintain fishing vessel including painting schedule.
24. Plan and make vessel ready for certificate inspection.
25. Recognize and act on different critical situation during on board navigation. (*Different critical situation - accidents, collision, man overload, leak, bad weather preparation, aground.*)
26. Analyze the various aspect of ship stability to prepare for voyage. (*Various aspect – displacement, effect of density on draft and displacement, dead weight, load*)

27. 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)*
28. Locate the marine fishery resources of India and apply fishing techniques for the exploitation of marine fishery resources.

#### **Semester – IV**

29. Calculate by chronometer and Intercept method to find direction of position line and position.
30. Distinguish types of anchor, anchoring procedure and demonstrate anchoring of vessel.
31. Distinguish different emergency situation and observe standard guidelines during voyage. *(Different emergency situation – Abandoning, distress signals, storm signals)*
32. 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 stability, list, heel.)*
33. Explain conservation, management of marine fishery, handling of fish on board and comply such in day to day work.
34. 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.)*

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## 7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING/ ASSESSABLE OUTCOME	
LEARNING/ ASSESSABLE OUTCOME	ASSESSMENT CRITERIA
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1. 1. Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1. 2. Recognize and report all unsafe situations according to site policy.
	1. 3. Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1. 4. Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1. 5. Identify and observe site policies and procedures in regard to illness or accident.
	1. 6. Identify safety alarms accurately.
	1. 7. Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1. 8. Identify and observe site evacuation procedures according to site policy.
	1. 9. Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1. 10. Identify basic first aid and use them under different circumstances.
	1. 11. Identify different fire extinguisher and use the same as per requirement.
	1. 12. Identify environmental pollution & contribute to avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different	2.1 Explain concept of basic science related to the field such as

mathematical calculation & science in the field of study including basic electrical and	Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.
apply in day to day work.[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]	2.1 Measure dimensions as per drawing
	2.2 Use scale/ tapes to measure for fitting to specification.
	2.3 Comply given tolerance.
	2.4 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.5 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.6 Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. [Different engineering drawing- Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]	3. 1. Read & interpret the information on drawings and apply in executing practical work.
	3. 2. Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3. 3. Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments such as micrometers, verniercalipers, dial gauge, bevel protector and height gauge (as per tool list).
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts

6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available resources optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7.1. Explain personnel finance and entrepreneurship.
	7.2. Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7.3. Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8.1. Use documents, drawings and recognize hazards in the work site.
	8.2. Plan workplace/ assembly location with due consideration to operational stipulation
	8.3. Communicate effectively with others and plan project tasks
	8.4. Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.

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<b>SPECIFIC LEARNING OUTCOME</b>	
<b>LEARNING/ASSESSABLE OUTCOME</b>	<b>ASSESSMENT CRITERIA</b>
<b><u>SEMESTER-I</u></b>	
9. Calculate plane parallel sailing to find course and distance between two positions.	9.1 Ascertain the given latitude and understand whether it is North or South.
	9.2 Ascertain the given Longitude and understand whether it is East or West.
	9.3 Do the calculation as per the formula.
	9.4 Find the course and distance as per the difference of Lat and Long.
10. Calculate set and drift current from DR position to fix.	10.1 Understand the present dead reckoning position and the present fixed position.
	10.2 Do the calculation as per the formula and find out the direction and speed of current.
	10.3 Result obtained by calculation is the set of current and the distance is the drift of current.
11. Calculate course, distance and position arrived using Mercator sailing method.	11.1 Understand the principles of Mercator sailing method
	11.2 Obtain the meridional parts table from the nautical table
	11.3 Obtain the difference of Lat and long and name them according to the direction
	11.4 Apply the Mercator sailing formula to find course and distance to reach destination
12. Illustrate altitude corrections.	12.1 Determine the error of sextant
	12.2 Take the altitude of celestial body
	12.3 Obtain the correct GMT for the above observations
	12.4 Obtain nautical almanac of that year and extract corrections and apply to the altitude of celestial body
13. Plan and Fabricate specific fishing gears by selecting suitable material.	13.1 Design and fabricate a gill net of suitable material
	13.2 Design and fabricate a trawl of suitable material
	13.3 Design and fabricate a purse seine of suitable material
	13.4 Design and fabricate a long line of suitable material
14. Distinguish various fishing methods and select suitable fishing gears according to the fish resources.	14.1 Identify demersal fishery resources and selection of suitable fishing gears for exploitation
	14.2 Identify pelagic fishery resources and selection of suitable fishing gears for exploitation
	14.3 Identify deep sea and oceanic resources and select suitable

	fishing gear for exploitation
15. Recognize basic design concept of fishing gear and select suitable fishing gear, technique to carryout fishing.	<p>15.1 Identify the gear to exploit fishery resources from the different water depth.</p> <p>15.2 Identify the suitable fishing gear to exploit shoaling pelagic fishes</p> <p>15.3 Identify the suitable fishing gear to exploit deep sea resources</p> <p>15.4 Identify the suitable fishing gear to exploit demersal resources</p> <p>15.5 Identify the suitable fishing gear to exploit predatory fishes.</p>
<b><u>SEMESTER-II</u></b>	
16. Use different navigational equipment and examine the compass error ( <i>Different important navigational equipment – sextant, azimuth mirror, pelorus, chronometer.</i> )	<p>16.1 Arrange Marine magnetic compass</p> <p>16.2 Also azimuthal mirror, pelorus</p> <p>16.3 Arrange the above equipments in such a manner in order to take compass bearing</p> <p>16.4 Take compass bearing of different objects and find the difference between the true bearing</p> <p>16.5 Find the difference and apply variation of that places in order to find the deviation and compass error</p>
17. Choose various parameters to determine position of celestial body. (various parameters:- GHA, LHA, Longitude)	<p>17.1 Obtain current year nautical almanac</p> <p>17.2 Make sure the sextant is free from error or find out the error if any.</p> <p>17.3 Observe the altitude of celestial body by the sextant and find GHA, LHA and longitude of the ship by calculation.</p> <p>17.4 Chronometer also kept ready without any error to obtain GMT</p>
18. Examine the breaking strength, safe work load of ropes, blocks and tackles in marine use and apply the same during execution in various situations.	<p>18.1 Collect various types of ropes</p> <p>18.2 The ropes are used for marine purpose and determine the size of rope</p> <p>18.3 As per the theory and formula find out the breaking strength and safe working load of different rope.</p> <p>18.4 Select different types of blocks and tackle for various purpose and rig the same for different purpose</p>
19. Plan & perform fabrication of fishing gears especially trawls by various techniques ( <i>TED and BRD</i> )	<p>19.1 Design and Fabrication of bottom trawl</p> <p>19.2 Fabrication of midwater trawl as per plan on resources</p> <p>19.3 Fabrication of shrimp trawl</p> <p>19.4 Fabrication of trawl with TED</p> <p>19.5 Fabrication of trawl with BRDs</p>

20. Design and construction of fishing gears	20.1 Design and construct Trawl, Purse seine, Gill net and Longline
	20.2 Identify factors effecting fishing gear design
	20.3 Carryout Joining of netting, Seaming, Stapling of two sections, Lacing, Mounting, Reeving.
21. Identify fishing gear accessories.	21.1 Identification of suitable accessories for rigging to various fishing gears
	21.2 Select suitable accessories for trawl
	21.3 Select suitable accessories for purse seine
	21.4 Select suitable accessories for longline
	21.5 Select suitable accessories for gillnet
22. Collect data on fishing from different source and analyse the same to perform navigation. <i>(Different sources – Fishing vessels, dock yards, net making factory)</i>	22.1 Collect the data about the traditional fishing
	22.2 Collect the data about different fishing vessel operated in fishing harbour
	22.3 Collect the data about local dockyards/boat building yards
	22.4 Collect the data about different types of webbings fabricated and used for fishing (From net making factory)
	22.5 Collect the data about the implementation fishing rules and regulation (MFRA)
<b><u>SEMESTER-III</u></b>	
23. Perform dry docking and maintain fishing vessel including painting schedule.	23.1 Dry docking a vessel is very large process of work to carry out maintenance and repair of vessel and machinery
	23.2 Repair work order in consultation with Chief engineer and to be submitted to the dock authority
	23.3 Obtain the day and time for dry docking the vessel in consultation with the dock authority
	23.4 Obtain necessary tools and paints for the preliminary work
	23.5 Before the work starts surveyor may be inspect the vessel and his suggestions may be obtained
24. Plan and make vessel ready for certificate inspection.	24.1 Service all necessary life saving appliances
	24.2 Service all fire fighting appliances and replace if necessary
	24.3 Make sure that all communication and navigational equipments are working properly.
	24.4 Ensure that all navigational lights and signals are working properly.
	24.5 Carry out all other important works noted by the surveyor
25. Recognize and act on different critical situation	25.1 Mock drill of various situations are to be created and demonstration in this regard may be conducted.



during on board navigation. ( <i>Different critical situation - accidents, collision, man overload, leak, bad weather preparation, aground.</i> )	25.2	The above drill may be carried out on board vessel during sailing as well as when the vessel at harbour.
	25.3	Comply the safety procedure and rules while performing the above operations.
	25.4	Dispose all the used and unwanted items as per the ship standing order.
	25.5	Refill or recharge fire fighting equipments and the date/month/year of recharge may be indicated
26. Analyze the various aspect of ship stability to prepare for voyage. ( <i>Various aspect – displacement, effect of density on draft and displacement, dead weight, load</i> )	26.1	Study and analyse hydrostatic particulars of the ship supplied by the shipyard.
	26.2	Understand the manoeuvring capability of the ship.
	26.3	As per the hydrostatic particulars study the present displacements
	26.4	Ascertain the load displacement, dead weight available , dead weight aboard etc.
27. Recognize various subsistent fishing gears to operate the same for commercial fishing. ( <i>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</i> )	27.1	Survey and study of cast net and Chinese net
	27.2	Survey and study of pole & line and trolling
	27.3	Survey and study of <i>Changadam</i> and raft
	27.4	Survey and study of bag net and dol net
	27.5	Survey and study of shore seine and trammel net
28. Locate the marine fishery resources and apply specific fishing techniques for their exploitation	28.1	Locate fishing ground with the help of fish finding equipments
	28.2	Locate fishing ground with the help of remote sensing data
	28.3	Locate fishing ground with the help of exploratory survey and data collected by fisheries research organizations
	28.4	Locate fishing ground with the help of commercial fishermen
	28.5	Locate fishing ground with own fishing experience
<b>SEMESTER-IV</b>		
29. Calculate by chronometer and Intercept method to find direction of position line and position.	29.1	Understand starting procedure of chronometer
	29.2	Wind the chronometer
	29.3	Enter the chronometer error in the log book
	29.4	Calculate the GMT time while taking altitude of Sun, Moon, Star

	29.5 Calculate azimuth, intercept and direction of position line and draw the position line in the chart
30. Distinguish types of anchor, anchoring procedure and demonstrate anchoring of vessel.	30.1 Identify the anchor to be dropped and its working condition
	30.2 Check the hydraulic winch to be used for anchoring
	30.3 Check to be made for the break and bow stopper
	30.4 Choose appropriate place for anchoring the vessel and calculate the cable to be released
	30.5 During the above work all safety measures to be taken
31. Distinguish different emergency situation and observe standard guidelines during voyage. ( <i>Different emergency situation – Abandoning, distress signals, storm signals</i> )	31.1 Carry out voyage preparation and inform the crew about sailing program
	31.2 Inform the crew about the muster list to be followed during emergency as well as distress situation.
	31.3 Follow the traffic rules while navigating the channel and open sea
	31.4 Always comply with the international regulation for preventing collision at sea.
	31.5 Always observe other bulletin and radio communication.
32. Analyze different advance ship stability features and arrange loading, discharging, shifting cargo onboard for stability. ( <i>Different advance ship stability features – Centre of Gravity, Centre of buoyancy, transverse stability, list, heel.</i> )	32.1 Study and analyse hydrostatic particulars of the ship supplied by the shipyard.
	32.2 Understand the manoeuvring capability of the ship.
	32.3 As per the hydrostatic particulars study the present displacements
	32.4 Ascertain the load displacement, dead weight available , dead weight aboard etc.
	32.5 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.
33. Explain conservation and management of marine fishery resources; hygienic handling of fish on board and its implementation in day to day work.	33.1 Identification and use of by-catch reduction devices
	33.2 Code of Conduct for Responsible Fisheries (CCRF)
	33.3 Knowledge about the uniform ban period
	33.4 Hygienic handling of catch onboard fishing vessel
	33.5 Handling of longline catch to maintain <i>Sashimi</i> grade quality
34. Illustrate various fish preservation technique to avoid spoilage; appropriate preservation technique to	34.1 Preservation technique using ice
	34.2 Preservation technique using refrigeration
	34.3 Knowledge and application of preservation technique such as salt curing, sun drying and smoking

maintain quality of fish and fishery products.  
*(Appropriate preservation technique – chilling, freezing, salting, curing, sun drying, canning and smoking.)*

34.4 Application of canning process for fish preservation



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SYLLABUS – VESSEL NAVIGATOR			
FIRST SEMESTER – 06 Months			
Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1.	Recognize & comply safe working practices, environment regulation and housekeeping.	<ol style="list-style-type: none"> <li>1. Importance of trade training, List of tools &amp; Machinery used in the trade.</li> <li>2. Health &amp; Safety: Introduction to safety equipments and their uses. Introduction of first aid, operation of Electrical mains.</li> <li>3. Occupational Safety &amp; Health</li> <li>4. Importance of housekeeping &amp; good shop floor practices.</li> <li>5. Health, Safety and Environment guidelines, legislations &amp; regulations as applicable.</li> <li>6. Disposal procedure of waste materials like cotton waste, metal chips / burrs etc. Basic safety introduction, Personal protective Equipments(PPE):- Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution &amp; personal safety message.</li> <li>7. Preventive measures for electrical accidents &amp; steps to be taken in such accidents.</li> <li>8. Use of Fire extinguishers.</li> </ol>	<p>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.</p> <p>Soft Skills: its importance and Job area after completion of training.</p> <p>Introduction of First aid.</p> <p>Operation of electrical mains.</p> <p>Introduction of PPEs.</p> <p>Introduction to 5S concept &amp; its application.</p> <p>Response to emergencies e.g.; power failure, fire, and system failure.</p>
2 – 3	Calculate plane parallel sailing to find course and distance between two positions.	<ol style="list-style-type: none"> <li>9. Find difference of latitude, longitude, departure mean latitude.</li> <li>10. Find difference meridional parts.</li> </ol>	<p>The shape of the earth. Poles, equator, meridians, Parallel of latitude.</p> <p>Position by latitude and longitude. Bearing, distance, unit of measurements, nautical miles.</p>
4 – 5		11. Calculate plane parallel sailing to	Familiarization of fishing

		find course and distance between two positions. 12. Calculate arrived position if course and distance is given.	Vessels. Important Nautical Terminology,
6 – 7	Calculate set and drift current from DR position to fix.	13. Calculate set and drift of current from DR position to fix.	Life Saving Appliances
8 – 9	Calculate course, distance and position arrived using Mercator sailing method.	14. Find course and distance by Mercator sailing method.	Fire Fighting Principle, fire prevention and fire fighting appliances.
10 –11		15. Find position arrived by Mercator sailing method.	Marine Magnetic Compass, Compass points.
12 –13	Illustrate altitude corrections.	16. Altitude corrections.	Sextant. Hand lead line and deep sea lead line.
14 –15	Plan and Fabricate specific fishing gears by selecting suitable material.	17. Visually identify different types of fishing gear materials.	<b>Introduction to Fishing Technology</b> <b>Fishing Gear Materials</b> Introduction to fishing gear 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.
16	Distinguish various fishing methods and select suitable fishing gears according to the fish resources.	18. Identify different type of fishing gears-modal/prototype.	<b>Fishing Techniques</b> Prof. Andres Von Brandt Classification of fishing gears FAO Classification of fishing gears. Active fishing gear, Passive fishing gear and miscellaneous fishing gear.
17-19	Recognize basic design concept of fishing gear	19. Identify different Knots – trawl knot, double trawl knot and reef	<b>Introduction to Fishing Gear Design</b>

	and select suitable fishing gear, technique to carryout fishing	knot. Fabrication of webbing.	Definition and Terms –Mesh, Shape of mesh, Knot, Netting Direction of Netting-‘T’ direction, ‘N’ direction Type of netting- Knotted netting, Knot less netting
20-21		20. Shaping of Netting by Hand Barding. 21. Baiting/Creasing. 22. Single fly mesh, Double fly mesh.	Shaping of netting Shaping of netting by hand braiding – Baiting, Creasing, Fly mesh (Single and Double)
22		23. Shaping of Netting by Tailoring (Cutting). 24. Bar cut 25. Knot cut (‘N’ cut and ‘T’ cut). 26. Combination cut (Knot cut and Bar cut).	Shaping of netting by tailoring (Cutting)- Bar cut, Knot cut (‘N’ cut and ‘T’ cut), Combination cut.
23	Onboard practical.		
24-25	<b>Revision</b>		
26	<b>Examination</b>		

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SYLLABUS – VESSEL NAVIGATOR			
SECOND SEMESTER – 06 Months			
Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
27-28	Use different navigational equipment and examine the compass error <i>(Different important navigational equipment – sextant, azimuth mirror, pelorus, chronometer.)</i>	27. Celestial references. 28. The celestial sphere, celestial poles, equinoctial.	SEXTANT: Parts of sextant, principle of sextant, adjustable error s and their correction , Non adjustable error , Use of sextant
29-30		29. Declination circles, celestial meridians, declination of celestial body. 30. Greenwich hour angle, local hour angle, sidereal hour angle.	Bearing instruments: Azimuth mirror, Pelorus, Chronometer.
31-32	Choose various parameters to determine position of celestial body. (various parameters:- GHA, LHA, Longitude)	31. Position of celestial body, the suns orbit. 32. Connection between GHA, LHA, longitude.	Chronometer: error , purpose Duties of officer while at sea and anchor.
33-34		33. Given LHA and longitude to find GHA. 34. Given GHA and LHA to find longitude. 35. Given GHA and longitude to find LHA. 36. Connection between GMT, LMT and LIT.	ROPE WORKS: Knot, Bents, Hitches , splicing, Eye splice , Long splice , Short splice, Back splice.
35-36		37. Given GMT and longitude to find LMT. 38. Given LMT and longitude to find GMT. 39. Given GMT and LMT to find longitude. 40. Correction of altitude-theory.	Various types of Ropes: Vegetable, Synthetic and Wire ropes, Care and maintenance , Breaking strength , Safe working load
37-38	Examine the breaking strength, safe work load of ropes, blocks and tackles in marine use and apply the same during execution in various situations.	41. Day’s work problems. 42. Rope works, rigging of blocks and tackles.	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

39-40	Plan & perform fabrication of fishing gears especially trawls by various techniques.	43. Identification of fishing gear materials – By flame test, solubility test.	<b>Fishing Gear Design and Materials and Accessories</b> Properties of fishing gear materials Physical, Chemical and Biological properties Selection of Materials for the fabrication of Trawl net, Purse seine, Gill Net, Longline
41	Design and construction of fishing gears.	44. Design of fishing gears.	<b>Design and Construction of Fishing Gear-</b> Design Process, Factors effecting fishing gear design, Design and construction of Trawl, Purse seine, Gill net and Longline (Monofilament and Multifilament)
42-43		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. 46. Seaming 47. Stapling- Stapling of two sections with meshes of same size and number, Stapling of two sections with meshes of different size and number. 48. Lacing	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
44-46		49. Mounting: Fixed mounting- Indirect mounting (making an additional row and attached to the mounting rope) Direct mounting (fixed directly to the mounting rope). 50. Stapling (Loose mounting)	Mounting –Hanging ratio, Hanging co-efficient, Hang-in or take-up Fixed mounting- Indirect mounting (making an additional row and attached to the mounting rope) Direct mounting (fixed directly



		<p>Meshes with in the loop method, End mesh in two loop method, Lock loop method.</p> <p>51. Reeving- Fastening with mesh method, Fastening without mesh method.</p>	<p>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).</p>
47	Identify fishing gear accessories.	<p>52. Familiarization of and identification of fishing gear accessories and use them as per requirement during navigation.</p>	<p><b>Fishing gear Accessories:</b> 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>
48-49	<p>Collect data on fishing from different source and analyse the same to perform navigation. <i>(Different sources – Fishing vessels, dock yards, net making factory)</i></p>	<p><b>In-plant training:</b> Practical Navigation training onboard training vessel Visit-Various Fishing vessels, Dock yards Visit –Net making factory <b>Project report.</b> Data collection- Different traditional fishing gears operated/used - Fishing harbour/landing centre</p>	
50-51	<b>Revision</b>		
52	<b>Examination</b>		

SYLLABUS – VESSEL NAVIGATOR			
THIRD SEMESTER – 06 Months			
Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
53-54	Perform dry docking and maintain fishing vessel including painting schedule	53. Position fixing methods, Painting, Chipping etc.	Dry docking procedure, Surface preparation , Painting schedules
55-56	Plan and make vessel ready for certificate inspection.	54. Install and align engine. 55. Service all life saving appliances. 56. Inspect all fire fighting appliances. 57. Service all navigational lights and emergency signal.	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,
57-58	Recognize and act on different critical situation during on board navigation. ( <i>Different critical situation - accidents, collision, man overload, leak, bad weather preparation, aground.</i> )	58. Communication procedure during emergency and distress. 59. Chronometer time.	Accident, Collision, Man over board, leak. Bad weather preparation, Aground
59-60	Analyze the various aspect of ship stability to prepare for voyage. ( <i>Various aspect – displacement, effect of density on draft and displacement, dead</i>	60. The ambiguity of chronometer time, chronometer error. 61. Latitude by meridian altitude-SUN.	Precaution while fishing, Voyage preparation SHIP STABILITY: Density, Relative density , Archimedes principle, Principle of floatation
61-62		62. Latitude by meridian altitude	Various displacement, Light

	<i>weight, load)</i>	STAR. 63. Azimuth-SUN, to find deviation of the compass.	load, Present load , Dead weight,
63		64. Amplitude-SUN, to find deviation of the compass.	Effect of density on draft and displacement Fresh Water Allowance., Dock Water Allowance, Tonnes Per Centimetre Immersion
64		65. Ex-meridian SUN.	Load lines and related problems
65-67		66. Wire Rope Splice - Eye Splice. 67. Rope Splice - Eye splice, Short Splice, Long splice, Back Splice.	Construction and Specification of wire rope, Combination rope
68-71	Recognize various subsistent fishing gears to operate the same for commercial fishing. <i>(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)</i>	68. <b>Mending-</b> 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.  69. Demonstration of models of traditional fishing gears.	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 <b>Commercial Fishing:</b> 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
72-73	Locate the marine fishery resources and apply specific fishing techniques for their exploitation	70. Locate fishing ground by fish finding equipments, remote sensing data and by exploratory survey. 71. Identification of commercially important marine fish/shellfish of India.	Various pelagic/demersal/ deep sea Marine Fishery Resources of India.
74-75	<b>In-plant training :</b> Practical Navigation training onboard training vessel Fishing harbour/landing centre visit –Identification of different fishing vessels (Trawler, Purse seiner, Long liner, ring seiner and Gill netter) <b>Project report-</b> Collection of different commercial important species (Finfish, Crustaceans and molluscs)		

76-77	<b>Revision</b>
78	<b>Examination</b>



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SYLLABUS – VESSEL NAVIGATOR			
FOURTH SEMESTER – 06 Months			
Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
79-80	Calculate by chronometer and Intercept method to find direction of position line and position.	72. Calculation of long by chronometer practical navigation problem to find direction of position line and position through which to draw it (SUN).	Anchor works: Stock and stockless anchors, Anchor cable, Anchoring procedure
81-82	Distinguish types of anchor, anchoring procedure and demonstrate anchoring of vessel	73. Calculation of intercept method to find direction of position line and position through which to draw it (SUN).	Abandoning procedure, Distress signals, Storm signals, IALA Buoyage system
83-84	Distinguish different emergency situation and observe standard guidelines during voyage. ( <i>Different emergency situation – Abandoning, distress signals, storm signals</i> )	74. Observation of Polaris. 75. Abandoning procedures, distress signals, understands storm signals and its meaning.	Collision regulations (Rule of the road),
85-86		76. IALA buoyage system and International Regulation for Preventing Collision at Sea.	Centre of gravity , Centre of buoyancy , To find the final K.G after loading discharging and shifting
87-88	Analyze different advance ship stability features and arrange loading, discharging, shifting cargo onboard for stability.	77. Learning advance ship stability such as center of gravity, center of buoyancy and transverse stability.	Transverse static stability , Stable , Unstable , Natural equilibrium and free surface effect , and correction ,
89-90	( <i>Different advance ship stability features – Centre of Gravity, Centre of buoyancy, transverse stability, list, heel.</i> )	78. List, heel and effect of centre of gravity while loading, discharging and shifting cargo onboard.	Difference between list and heel, simple problems related to list
91-93	Explain conservation and management of marine fishery resources; hygienic handling of fish on board and its implementation in day to day work.	79. Familiarization of various types of By-catch Reduction Devices. 80. Model net fabrication-Trawl net, gill net.	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.
94-96	Illustrate various fish preservation technique to avoid spoilage; appropriate preservation technique to maintain quality of fish and fishery products. <i>(Appropriate preservation technique – chilling, freezing, salting, curing, sun drying, canning and smoking.)</i>	81. Organoleptic Assessment of fish quality.	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
97-98		82. Value added products - Fish cutlets, Fish balls.	Value added products and by-products  Sea food quality assurance system in India, HACCP
99-101	<b>In-plant training :</b> Visit to shipyards, Dry docking yards Fish processing factory, Fishing harbours/Fish landing centre visit <b>Project report.</b> Value added product preparation-Fish and shell fish		
102-103	<b>Revision</b>		
104	<b>Examination</b>		

**Note: -**

1. *Some of the sample project works (indicative only) are given against each semester.*
2. *Instructor may design their own project and also inputs from local industry may be taken for designing such new project.*
3. *The project should broadly covered maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, Work to be assigned in a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and application of Learning. They need to submit Project report.*
4. *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of navigation, fishing technique, etc., may be shown to the trainees to give a feel of actual work scenario and their future assignment.*

### 9.1 WORKSHOP CALCULATION SCIENCE AND ENGINEERING DRAWING

First Semester Duration: Six Month		
S No.	Workshop Calculation and Science	Engineering Drawing
1.	<b>Unit:</b> Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Engineering Drawing: Introduction and its importance <ul style="list-style-type: none"> <li>- Relationship to other technical drawing types</li> <li>- Conventions</li> <li>- Viewing of engineering drawing sheets.</li> <li>- Method of Folding of printed Drawing Sheet as per BIS SP:46-2003</li> </ul>
2.	<b>Fractions</b> : Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.	Drawing Instruments : their Standard and uses <ul style="list-style-type: none"> <li>- Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.</li> </ul>
3.	<b>Square Root</b> : Square and Square Root, method of finding out square roots, Simple problem using calculator.	Lines : <ul style="list-style-type: none"> <li>- Definition, types and applications in Drawing as per BIS SP:46-2003</li> <li>- Classification of lines (Hidden, centre, construction, Extension, Dimension, Section)</li> <li>- Drawing lines of given length (Straight, curved)</li> <li>- Drawing of parallel lines, perpendicular line</li> <li>- Methods of Division of line segment</li> </ul>
4.	<b>Ratio &amp; Proportion</b> : Simple calculation on related problems.	Drawing of Geometrical Figures: Definition, nomenclature and practice of <ul style="list-style-type: none"> <li>- Angle: Measurement and its types, method of bisecting.</li> <li>- Triangle -different types</li> <li>- Rectangle, Square, Rhombus, Parallelogram.</li> <li>- Circle and its elements.</li> </ul>
5.	<b>Percentage:</b> Introduction, Simple calculation. Changing percentage to	Lettering and Numbering as per BIS SP46-2003: <ul style="list-style-type: none"> <li>- Single Stroke, Double Stroke, inclined, Upper</li> </ul>

	decimal and fraction and vice-versa.	case and Lower case.
6.	<b>Material Science</b> : properties -Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.	Dimensioning: <ul style="list-style-type: none"> <li>- Definition, types and methods of dimensioning (functional, non-functional and auxiliary)</li> <li>- Types of arrowhead</li> <li>- Leader Line with text</li> </ul>
7.	<b>Mass, Weight and Density</b> : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.	Free hand drawing of <ul style="list-style-type: none"> <li>- Lines, polygons, ellipse, etc.</li> <li>- geometrical figures and blocks with dimension</li> <li>- Transferring measurement from the given object to the free hand sketches.</li> </ul>
8.	<b>Speed and Velocity</b> : Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems.	Sizes and Layout of Drawing Sheets <ul style="list-style-type: none"> <li>- Basic principle of Sheet Size</li> <li>- Designation of sizes</li> <li>- Selection of sizes</li> <li>- Title Block, its position and content</li> <li>- Borders and Frames (Orientation marks and graduations)</li> <li>- Grid Reference</li> <li>- Item Reference on Drawing Sheet (Item List)</li> </ul>
9.	<b>Work, Power and Energy</b> : work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	Method of presentation of Engineering Drawing <ul style="list-style-type: none"> <li>- Pictorial View</li> <li>- Orthogonal View</li> <li>- Isometric view</li> </ul>
10.	-----	Symbolic Representation (as per BIS SP:46-2003) of : <ul style="list-style-type: none"> <li>- Fastener (Rivets, Bolts and Nuts)</li> <li>- Bars and profile sections</li> <li>- Weld, brazed and soldered joints.</li> </ul>



		<ul style="list-style-type: none"><li>- Electrical and electronics element</li><li>- Piping joints and fittings</li></ul>
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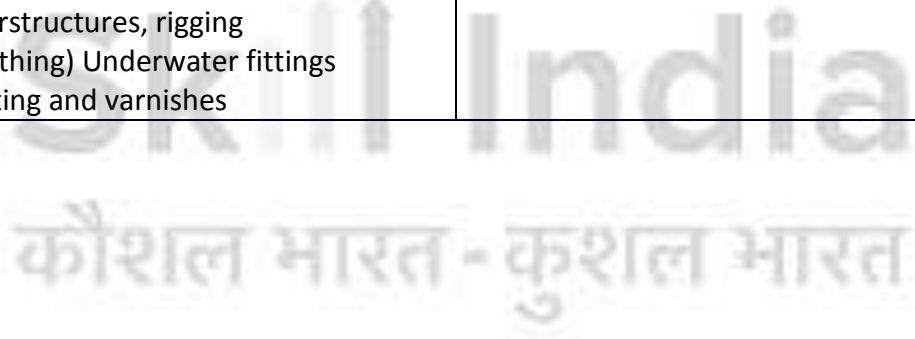
Second Semester		
Duration: Six Month		
S No.	Workshop Calculation and Science	Engineering Drawing
1.	<b>Algebra</b> : Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	Construction of Scales and diagonal scale
2.	<b>Mensuration</b> : Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids – cube, cuboids, cylinder and Sphere. Surface area of solids – cube, cuboids, cylinder and Sphere.	Practice of Lettering and Title Block
3.	<b>Trigonometry</b> : Trigonometrical ratios, measurement of angles.  Trigonometric tables	Dimensioning practice: <ul style="list-style-type: none"> <li>- Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003)</li> <li>- Symbols preceding the value of dimension and dimensional tolerance.</li> <li>- Text of dimension of repeated features, equidistance elements, circumferential objects.</li> </ul>
4.	<b>Heat &amp; Temperature</b> : Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.	Construction of Geometrical Drawing Figures: <ul style="list-style-type: none"> <li>- Different Polygons and their values of included angles. Inscribed and Circumscribed polygons.</li> <li>- Conic Sections (Ellipse &amp; Parabola)</li> </ul>
5.	<b>Basic Electricity</b> : Introduction, use of electricity, how electricity is produced, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections – series, parallel, electric power, Horse power, energy, unit of	Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.

	electrical energy.	
6.	<p><b>Levers and Simple Machines:</b> levers and its types.</p> <p>Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency, velocity ratio and Mechanical Advantage.</p>	Free Hand sketch of hand tools and measuring tools used in respective trades.
7.	---	<p>Projections:</p> <ul style="list-style-type: none"> <li>- Concept of axes plane and quadrant.</li> <li>- Orthographic projections</li> <li>- Method of first angle and third angle projections (definition and difference)</li> <li>- Symbol of 1<sup>st</sup> angle and 3<sup>rd</sup> angle projection as per IS specification.</li> </ul>
8.	--	Drawing of Orthographic projection from isometric/3D view of blocks
9.	--	Orthographic Drawing of simple fastener (Rivet, Bolts, Nuts & Screw)
10.	--	Drawing details of two simple mating blocks and assembled view.

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Third Semester Duration: Six Month		
S No.	Workshop Calculation and Science	Engineering Drawing
1	<b>INTRODUCTION TO METEOROLOGY</b> <b>The Atmosphere</b> composition and vertical structure, weather and climate, Atmospheric temperature variations, Isotherms, Lapse rate, DALR, SALR, Atmospheric pressure, Barometric tendency	<b>BASIC NAVIGATIONAL CHART WORK PRACTICE</b> Introduction of a navigational chart. Various type of navigational chart. Parallel Ruler and instruments used. Measurement of distance, sea miles, International nautical mile, geographical mile.
2	<b>Water vapour in the atmosphere</b> humidity, relative humidity; Saturation and dew point, Fohn wind effect, Visibility, mist and fog, types of fog-radiation fog, sea fog, orographic fog	Great circle, parallels of latitude and Longitudes. Important features of Mercator chart. Simple plotting of position and measurement of distance. Variation, Deviation, Conversion of compass course to true course.
3	<b>Hydrological cycle</b> Evaporation, condensation, precipitation; types of precipitation, Clouds and cloud formation, classification of clouds	Conversion of true course to compass course. Calculation involving deviation, variation, and compass error. A few terms associated with chart work, symbols and Abbreviations.
4	<b>Pressure and wind systems</b> Isobars and pressure gradient, Buys ballot's law, coriolis force, Beaufort scale, land and sea breezes.	True bearing, compass bearing, abeam bearing. Current, wind and its effects. Allowing current and leeway.
5	General circulation of atmosphere, ITCZ, Thermal equator, trade winds, local winds.	To counteract current and wind. Find actual current experienced.
6	<b>NAVAL ARCHITECTURE</b> Importance of lofting in boat building Construction Backbone assembly Building stock, making the moulds Rabbet building of wood Hull planking - different types Framing and longitudinal Deck beams and carlings Knees, Riders and pointer, Deck planking Floor <b>timbers and Engine bearers Stern tube arrangements.</b>  Bottom and side framing  Double bottom – internal structure –	Method of fixing the ship position by bearing and depth, bearing and distance by vertical sextant angle, horizontal angle or Radar Given: course steered engines speed direction and rate of current wind and leeway to find course and speed made good. Give: Initial position / final position to find set and rate of drift Transfer position line and simple running fix.

<p>side framing – tank side bracket –          beam knees – web frames          Shell and decks          Shell plating – bulwarks – deck plating          – beams – deck girders and pillars          discontinuities – hatches – hatch          corners          Bottom and side framing          Double bottom – internal structure –          side framing – tank side bracket –          beam knees – web frames          Shell and decks          Shell plating – bulwarks – deck plating          – beams – deck girders and pillars          discontinuities – hatches – hatch          corners          Bulk heads          Water tight bulk head – water tight          doors – non-water tight – bulkhead          Free hand sketches          Fish hold          Insulated fish hold. Free hand sketches          Caulking and stopping          Wheel house and other          superstructures, rigging          Sheathing) Underwater fittings          Painting and varnishes</p>	
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Fourth Semester		
Duration: Six Month		
S No.	Workshop Calculation and Science	Engineering Drawing
1	<b>MARINE METEOROLOGY</b> <b>Monsoon over Indian Ocean Sector</b> Pressure and wind distribution over Indian ocean sector – Monsoon winds, NE & SW monsoon over Indian sub continent and adjacent seas, Norwesters and Elephantas,	<b>ADVANCED NAVIGATIONAL CHART WORK PRACTICE</b> Transfer of position line and running fix with current. Running fix with current and leeway.
2	<b>Tropical Revolving Storms (TRS),</b> Cyclones and Anticyclones, Structure of cyclones, origin, tracks and life span of TRS, parts of TRS- eye, eye wall , outer storm area; weather conditions, Ideal conditions for formation of TRS, warning signs	Transfer to position line while makes more than one course to given running fix. To find course to steer to counteract the current and leeway.
3	<b>Meteorological Instruments</b> Measurement of Sea surface temperature, Atmospheric pressure, Relative humidity, wind speed and direction	To find course to steer and speed to steer in order to maintain the required ETA in prevailing current. Three bearing method to find course made good.
4	<b>Weather reporting system</b> Role of VOF, Classification of VOF, Weather bulletins, Weather warnings to fishermen	To find CMG direction by three bearing of same object from different position.[only set is given rate is not known]
5	<b>General aspects of ocean waves</b> wave formation, wave parameters and classification, shallow water wave transformation, sea and swell waves	To find CMG direction by three bearing of same object from different position[both set and rate is given]
6	Tides and tide generating forces, tidal currents, flood and ebb tides, spring and neap tides.	Dipping and rising bearing of lights[dipping range or rising range]
7	<b>MARINE ELECTRONICS &amp; EQUIPMENTS</b>  Power development, power, BHP, FHP, SHP, EHP, IHP, power rating. Engine handling. Operation, Preparation for starting Watch keeping the running,	To find true set and drift [actual set and rate of current experienced]

	<p>precaution for stopping. Maintains, scheduled maintains, preventive maintains, break down maintain. Power transmission, gear box, intermediate shaft, stern tube, Propeller. Dry docking procedure, preparation before docking and undocking Preparation of defect list, safety procedure for entering and working in confined spaces/welding/cleaning etc.</p>	
8	<p><b>MARINE ELECTRONICS &amp; EQUIPMENTS</b></p> <p>General Classification of Electronic Equipments used on board ship - working principle, operation and maintenance.</p> <p><b>Navigational Equipments:</b> General principle, Working and operation of : Global Positioning System, RADAR, NAVTEX, Automatic Identification System</p> <p><b>Communication Equipments:</b> Wave propagation, antennas, Transmitters and Receivers, Frequency range, operation of MF, HF, VHF and Satellite Communication Equipments (INMARSAT).</p>	<p>Tide problems</p>
9.	<p><b>Fish finding Equipments:</b> Elementary Acoustics, Measuring distance using sound, General Principle, Working and operation of ECHO SOUNDER &amp; FISH FINDER, NET SOUNDER &amp; SONAR</p>	<p>To arrive with a given point right ahead at extreme range.</p>
10.	<p><b>Emergency Equipments:</b> Different types of EPIRB &amp; SART, Working and operation, Emergency Communication procedures. Global</p>	<p>Nautical publications.</p>

	Maritime Distress and Safety System (GMDSS).	
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## 9.2 EMPLOYABILITY SKILLS

CORE SKILL – EMPLOYABILITY SKILL	
First Semester	
<b>1. English Literacy</b>	<b>Duration : 20 hrs</b> <b>Marks : 09</b>
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking/ Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on known people, picture reading, gain confidence through role-playing and discussions on current happening, job description, asking about someone's job, habitual actions. Cardinal (fundamental) numbers, ordinal numbers. Taking messages, passing on messages and filling in message forms, Greeting and introductions, office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
<b>2. IT Literacy</b>	<b>Duration : 20 hrs</b> <b>Marks : 09</b>
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of the computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc. Use of Common applications.
Word Processing and Worksheet	Basic operating of Word Processing, Creating, Opening and Closing Documents, Use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & Creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple

	worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of Computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, WebSite, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
<b>3. Communication Skills</b>	
	<b>Duration : 15 hrs</b> <b>Marks : 07</b>
Introduction to Communication Skills	Communication and its importance Principles of effective communication Types of communication - verbal, non-verbal, written, email, talking on phone. Non-verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening, guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active listening skills.
Motivational Training	Characteristics essential to achieving success. The power of positive attitude. Self awareness Importance of commitment Ethics and values Ways to motivate oneself Personal goal setting and employability planning.
Facing Interviews	Manners, etiquettes, dress code for an interview Do's & don'ts for an interview

Behavioral Skills	Problem solving Confidence building Attitude
<b>Second Semester</b>	
<b>4. Entrepreneurship Skills</b>	<b>Duration : 15 hrs Marks : 06</b>
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises: Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance & record, Role & function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing Analysis	Qualities of a good entrepreneur, SWOT and risk analysis. Concept & Application of PLC, Sales & Distribution management. Difference between small scale & large scale business, Market survey, Method of marketing, Publicity and advertisement, Marketing mix.
Institution's Support	Preparation of project. Role of various schemes and institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarize with the policies / programmes, procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop act, Estimation & costing, Investment procedure - Loan procurement - Banking processes.
<b>5. Productivity</b>	<b>Duration : 10 hrs Marks : 05</b>
Benefits	Personal/ Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working aids, Automation, Environment, Motivation - How it improves or slows down productivity.
Comparison with Developed Countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in select industries, e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and insurance.
<b>6. Occupational Safety, Health and Environment Education</b>	<b>Duration : 15 hrs Marks : 06</b>

Safety & Health	Introduction to occupational safety and health Importance of safety and health at workplace.
Occupational Hazards	Basic hazards, chemical hazards, vibroacoustic hazards, mechanical hazards, electrical hazards, thermal hazards. occupational health, occupational hygiene, occupational diseases/ disorders & its prevention.
Accident & Safety	Basic principles for protective equipment. Accident prevention techniques - control of accidents and safety measures.
First Aid	Care of injured & sick at the workplaces, First-aid & transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of India.
Ecosystem	Introduction to environment. Relationship between society and environment, ecosystem and factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of energy, re-use and recycle.
Global Warming	Global warming, climate change and ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and harvesting of water.
Environment	Right attitude towards environment, Maintenance of in-house environment.
<b>7. Labour Welfare Legislation</b>	
	<b>Duration : 05 hrs</b> <b>Marks : 03</b>
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's Compensation Act.
<b>8. Quality Tools</b>	
	<b>Duration : 10 hrs</b> <b>Marks : 05</b>
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality circle, Roles and function of quality circles in organization, Operation

	of quality circle. Approaches to starting quality circles, Steps for continuation quality circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of housekeeping, Practice of good housekeeping.
Quality Tools	Basic quality tools with a few examples.



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LIST OF TOOLS & EQUIPMENTS			
VESSEL NAVIGATOR (For batch of 16 candidates)			
A. TRAINEES TOOL KIT			
S No.	Name of the Tool & Equipments	Specification	Quantity
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		17 Nos.
4.	Pelorus		1 No
5.	Azimuth mirrors		1 No.
6.	Magnetic compass		1 No
7.	Binocular		1 No
8.	Telescope		Not 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		Not 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		Not required
20.	Rule of the Road - display board		1 No
21.	DCP - extinguisher		1 No
22.	AFFF	9 lts "	1 No
23.	CO <sub>2</sub> - Water type extinguisher		1 No
24.	AFFF	50 lts.	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		20 Nos
29.	Chart tables		17 Nos
30.	Instructional charts	5059, 5060, 5061 and 5062 (17	20 Nos

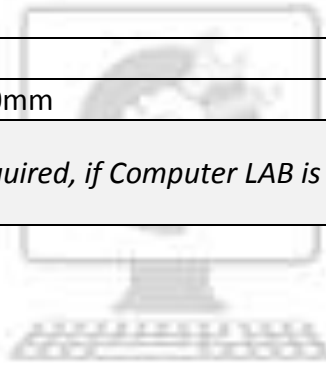
		Nos. Each)	
31.	Various display boards for position fixing and signals.		Not required
32.	EPIRB		1 No
33.	SART		1 No
34.	Self contained breathing apparatus		1 No
35.	International shore connection		1 No
36.	Chronometer		1 No
37.	GPS		2 Nos for the Institute
38.	Adjustable net making stand provided with 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
<b>Display boards showing</b>			
47.	a. Modern classification of fishing gear and indigenous fishing gear.		2 sets
48.	b. Classification of fishing gear materials		2 sets
49.	c. Display showing " Tailoring " like point cut, bar cut, mesh cut or "T" cut etc.		2 sets
50.	d. Display showing "baiting ""creasing " and Fly mesh etc.		2 sets
51.	e. 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
<b>Note: - All the tools and equipment are to be procured as per BIS specification.</b>			



TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
S No.	Name of the Equipment	Quantity
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software.	10 nos.
2.	UPS - 500VA	10 nos.
3.	Scanner cum Printer	01 no.
4.	Computer Tables	10 nos.
5.	Computer Chairs	20 nos.
6.	LCD Projector	01 no.
7.	White Board 1200mm x 900mm	01 no.

**Note:** Above Tools & Equipments not required, if Computer LAB is available in the institute.



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### FORMAT FOR INTERNAL ASSESSMENT

<b>Name &amp; Address of the Assessor:</b>			<b>Year of Enrollment:</b>												
<b>Name &amp; Address of ITI (Govt./Pvt.):</b>			<b>Date of Assessment:</b>												
<b>Name &amp; Address of the Industry:</b>			<b>Assessment location: Industry/ ITI</b>												
<b>Trade Name:</b>		<b>Semester:</b>		<b>Duration of the Trade/course:</b>											
<b>Learning Outcome:</b>															
S No.	Maximum Marks (Total 100 Marks)		15	5	10	5	10	10	5	10	15	15	Total Internal Assessment Marks	Result (Y/N)	
	Candidate Name	Father's/Mother's Name	Safety Consciousness	Workplace Hygiene	Attendance/ Punctuality	Ability to Follow Manuals/ Written Instructions	Application of Knowledge	Skills to Handle Tools & Equipment	Economical Use of Materials	Speed in Doing Work	Quality in Workmanship	VIVA			
1															
2															