

LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

CLASS 11 & 12

**SECTOR:
AGRICULTURE & ALLIED**

JOB ROLE FISHING BOAT MECHANIC

(QUALIFICATION PACK: REF. ID.AGR/Q5103)



State Council of Educational Research & Training (SCERT) Kerala
(Department of General Education, Government of Kerala)
Vidhya Bhavan, Poojappura, Thiruvananthapuram



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www.scert.kerala.gov.in

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FOREWORD

A collaborative initiative for developing learning outcome based vocational curriculum and courseware aimed at integrating both vocational and general qualifications has been implemented by the State Council of Educational Research and Training (SCERT) Kerala and the PSSCIVE Bhopal. This is intended to open up pathways of career progression for students and the SCERT Kerala is developing curricula under the project as an integral part of Vocationalisation of Education under Samagra Shiksha, approved by the Government of Kerala. Decisive improvement in the teaching-learning process and working competencies through learning outcomes that have been judiciously embedded in the vocational subject is expected to be the major impact that will be brought about by the learning outcome based vocational curriculum.

It is a matter of great pleasure to introduce this learning outcome based vocational curriculum as part of the vocational training package for the job role of Fishing Boat Mechanic (AGR/Q 5103). The curriculum has been developed for the higher secondary students of vocational education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National Skill Qualification Framework (NSQF).

The key aim of the curriculum will be to provide children with employability and vocational skills that would in turn aid occupational mobility and lifelong learning. A major transformation in the teaching process is also aimed at, which will be brought about through interactive sessions in classrooms, practical activities in laboratories and workshops, projects, field visits, and professional experiences.

The curriculum has been meticulously developed and judiciously reviewed by a group of experts and their much-valued contributions are immensely acknowledged. The imminent utility of the curriculum will without doubt, be adjudged by the qualitative improvement that it brings about in teaching-learning. The feedback and suggestions on the content by the teachers and other stakeholders will be of immense value to us in bringing about further enhancement and augmentation to this document.

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We are extremely thankful to Dr. RVG Menon, Chairperson, High Power Committee for the implementation of NSQF in Kerala, Dr. Sukesh Kumar, Former Principal, Government Engineering College Palakkad and Sri. G S Unnikrishnan Nair, Former Director State Agricultural Management and Extension Training Institute (SAMETI), Thiruvananthapuram for their mentorship in the process of developing this document. The contributions made by Dr. Vinay Swarup Mehrotra, Professor and Head, Curriculum Development and Evaluation Centre (CDEC), PSSCIVE Bhopal in development of the curriculum are duly acknowledged.

We are thankful to the course coordinator Sri. Renjith Subhash, Research Officer SCERT Kerala and experts for their untiring efforts and contributions in the development of this learning outcome based curriculum document. We are grateful to the experts for their earnest efforts and contributions in the development of this learning outcome based vocational curriculum. Their names are acknowledged in the list of contributors.

We are grateful to the Vocational Higher Secondary wing of the Directorate of General Education (DGE) Kerala for extending the support to develop this curriculum document on time by providing the service of its teaching staff.

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1. COURSE OVERVIEW

COURSE TITLE: FISHING BOAT MECHANIC

GENERAL OBJECTIVES

Fishing industry plays an important role in the growth of both the Indian and the global Economy. Mechanized fishing is the major component of this sector. Automation and modernization in the industry has increased the demand of highly skilled manpower. The main objective of Fishing Boat Mechanic (FBM) course is to create skilled personnel to carry out the operation and maintenance of machinery onboard fishing vessels.

On successful completion of this course, the learners are expected to develop skills to;

- assist operation of engine room equipment in a fishing boat
- understand the operation of deck machineries
- assist fish handling onboard
- understand watch keeping in machinery space and wheelhouse.
- demonstrate the importance of green skills in meeting the challenges of sustainable development and environment protection
- demonstrate the importance of life saving appliances and procedures.

COURSE OUTCOMES

On completion of the course, students should be able to;

- apply effective oral and written communication skills to interact with people and customers;
- identify the principal components of a computer system;
- demonstrate the basic skills of using computer;
- demonstrate self-management skills;
- demonstrate the ability to provide a self-analysis in context of entrepreneurial skills and abilities;
- demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection;
- familiarize with general workshop tools
- able to identify various machineries and equipment on board
- develop skill for operation and testing of machineries in engine room
- identify firefighting equipment and familiarize firefighting practices.
- able to recognize marine metrology and forecasting terms
- develop skill for operation and testing of deck machineries
- recognize causes of fouling of propeller and fishing gear
- develop skill for watch keeping while running the engine

- familiarize radio regulations and communication procedure.
- able to explain safe and emergency procedures of machineries on board
- develop skill to identify fishing accessories and its uses
- familiarize safety measures of fishing and handling
- familiarize rules of the road at sea
- familiarize use of personal life saving equipment.

COURSE REQUIREMENTS:

The learner should have the basic knowledge of science.

COURSE DURATION: 600 hrs

| | |
|--------------|----------------|
| Class 11 | 300 hrs |
| Class 12 | 300 hrs |
| Total | 600 hrs |

2. SCHEME OF UNITS

The unit-wise distribution of hours and scores for Class 11 is as follows:

| CLASS 11 | | | |
|-----------------|---|--|--|
| | Units | No. of Hours for Theory and Practical = 300 | Max. Scores for Theory and Practical =100 |
| Part A | Employability Skills | | |
| 1. | Communication Skills – III | 25 | 10 |
| 2. | Self-management Skills – III | 25 | |
| 3. | Information and Communication Technology Skills – III | 20 | |
| 4. | Entrepreneurial Skills – III | 25 | |
| 5. | Green Skills – III | 15 | |
| | Total | 110 | 10 |
| Part B | Vocational Skills | | |
| 6. | Introduction to FBM | 29 | 40 |
| 7. | Machinery on board-operations and testing | 66 | |
| 8. | Fire fightingequipments | 17 | |
| 9. | Life saving appliances | 18 | |
| 10. | Fishing gear | 15 | |
| 11. | Operation and testing of deck machineries. | 20 | |
| | Total | 165 | 40 |
| Part C | Practical Work | | |
| | Practical Examination | 06 | 15 |
| | Written Test | 01 | 10 |

FISHING BOAT MECHANIC

| | | | |
|--------|----------------------------------|------------|------------|
| | Viva Voce | 03 | 10 |
| | Total | 10 | 35 |
| Part D | Project Work/Field Visit/ OJT | | |
| | Practical File/Student Portfolio | 10 | 10 |
| | Viva Voce | 05 | 05 |
| | Total | 15 | 15 |
| | Grand Total | 300 | 100 |

The unit-wise distribution of hours and scores for Class 12 is as follows:

| CLASS 12 | | | |
|----------|--|---|---|
| | Units | No. of Hours for Theory and Practical =300 | Max. Scores for Theory and Practical = 100 |
| Part A | Employability Skills | | |
| 1. | Communication Skills – IV | 25 | 10 |
| 2. | Self-management Skills – IV | 25 | |
| 3. | Information and Communication Technology Skills – IV | 20 | |
| 4. | Entrepreneurial Skills – IV | 25 | |
| 5. | Green Skills – IV | 15 | |
| | Total | 110 | 10 |
| Part B | Vocational Skills | | |
| 6. | Manning of fishing vessel | 35 | 40 |
| 7. | Safe manning precautions | 49 | |
| 8. | Radio regulations and communication | 28 | |
| 9. | Marine meteorology and forecasting. | 16 | |
| 10. | Emergency and safe procedures for machinery operation | 12 | |
| 11. | Navigation rules | 11 | |
| 12. | Safety measures in fish handling on board | 09 | |
| 13. | Health and Safety at workplace | 05 | |
| | Total | 165 | 40 |
| Part C | Practical Work | | |
| | Practical Examination | 06 | 15 |
| | Written Test | 01 | 10 |
| | Viva Voce | 03 | 10 |
| | Total | 10 | 35 |
| Part D | Project Work/Field Visit/OJT | | |
| | Practical File/Student Portfolio | 10 | 10 |
| | Viva Voce | 05 | 05 |
| | Total | 15 | 15 |
| | Grand Total | 300 | 100 |

3. LEARNING OUTCOME BASED ACTIVITIES

Classroom, Laboratory/workshop and field are the key spots where teaching and learning take place. Classroom and laboratory-based teaching and learning facilitate knowledge creation whereas field visits open venues for free interaction with experts and also helps acquaint learners with various tools, materials, equipment procedures and operations in the workplace. While considering these intensified ways of knowledge acquisition, emphasis should also be laid on the occupational safety, health and hygiene of the participants.

Classroom activities

Classroom activities are mainly interactive lecture sessions, followed by discussions and doubt clarifications. Classes are handled by trained vocational teachers and this is considered as an integral part of the course. The most attractive feature of the class is that the classes are in tune with the outcome-based curriculum. Teaching learning processes are well planned and implemented. Teaching learning materials such as audio-visual materials, colour slides, charts, diagrams, models, exhibits, handouts, on-line teaching materials etc., have been incorporated in accordance with the topic and this may help the teachers to impart the content in an effective manner.

Practical work in Laboratory / Workshop

Practical work is usually performed to enhance the skills of the learners which are indeed essential for them to become specialized technicians. Practical sessions may include hands on training, simulation training, role-play, case-based studies and exercises. Equipment and other appliances are available for use in abundance. Trained personnel teach and exercise specialized techniques. Practical classes involving laboratory/workshop are well planned with tools, equipment, materials and also other skill acquisition activities. Vocational teachers should submit the plan of laboratory/workshop work in advance to the head of the institution and get it sanctioned prior to use.

Field visits/ Educational Tour

Field visit is one of the ways and means of learning outside the classroom. It promotes knowledge acquisition by giving opportunity to learners to interact with renowned experts and to make observations of the activities performed by them. An observation check list may help the students to ensure the collection of required information and its analysis for further use. This may be developed with the help of vocational teachers who are in charge of outdoor learning activities. All the field visits are well planned by taking into consideration of the learning requirements, distance to travel, time, health and hygiene. The Principal and teachers should plan to implement at least three field visits within a year by making all necessary arrangements.

Virtual Field Visits, Expert Interactions and Practical Activities

With the rapid potentials offered by information technology in digital classrooms, the extent of virtual field visits, online expert interactions and online demonstrations cum practical activities can be worked out. It may be helpful amid the current Covid 19 pandemic scenario. A State level cluster of teachers and experts in the concerned subject can be pooled together for the purpose. The guidelines for such activities can be issued by the concerned SCERTs.

Suggested topics for expert interaction

1. Basics of boat construction
2. Safety of life at sea
3. Seamanship and navigation skills
4. Preparation before sailing of a fishing boat, Engine and Deck machinery
5. Onboard fish handling
6. Fishing and fishing accessories
7. Basic fire fighting
8. Navigation equipment
9. Engine performance monitoring
10. Advanced engine control system

4. ASSESSMENT AND CERTIFICATION

The National Skill Qualification Framework (NSQF) is based on outcomes rather than inputs referred by the National Occupation Standards (NOSs). Learning outcomes, as per the NSQF level descriptors, include the Process, Professional Knowledge, Professional Skills, Core Skills and Responsibility. Knowledge in the job of a learner shall be the basis of assessment. It would also be considered if the learning program undertaken by the learner has delivered the required output. Certification is based on required standards so that the learner and the employer could come to know about the competency attained in the vocational subject/ course. In order to make the assessment reliable, valid, flexible, convenient, cost effective, fair and transparent standardised assessment tools are to be used. Technology assisted assessment process is in vogue now.

Knowledge Assessment (Theory)

Knowledge Assessment usually includes two components – Internal Assessment and External Assessment. External assessment includes theory examination conducted by the concerned examination Boards. Tools for assessment contain components for testing the application of knowledge. Knowledge testing can be performed by making use of either objective or short answer type paper-based test. Source of the questions should be the content of the curriculum.

Written Test

A group, comprising of academicians, experts from existing vocational subject experts / teachers, subject experts from University/ College or from the industry prepare theory question paper for the vocational subjects. A panel of experts for question paper setting and conducting examination should be formed by the respective central / state boards. Written tests allow the learners to demonstrate that they have acquired the necessary knowledge and skill in the given topics.

The blue print for the question paper may be as follows:

Duration: 3 hrs

Maximum scores: 50

| No. of Questions | | | | | |
|------------------|--|--------------------------------|----------------------------|---------------------------|-----------------------------|
| | Typology of Question | Very Short Answer (1 Score) | Short Answer (2 Scores) | Long Answer (3 Scores) | Scores |
| 1. | Remembering – (Knowledge based simple recall questions, to know specific facts, terms, concepts, principles, or theories; identify, define or recite, information) | 3 | 3 | 3 | 18 |
| 2. | Understanding – (Comprehension – to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information) | 2 | 4 | 3 | 19 |
| 3. | Application – (Use abstract information in concrete situation, to apply knowledge to new situations: Use given content to interpret a situation, provide an example, or solve a problem) | 0 | 2 | 1 | 07 |
| 4. | High Order Thinking Skills – (Analysis and Synthesis – Classify, compare, contrast, or differentiate between different pieces of information; Organize and/ or integrate unique pieces of information from a variety of sources) | 0 | 2 | 0 | 04 |
| 5. | Evaluation – (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values) | 0 | 1 | 0 | 02 |
| | Total | 5x1=5 | 12x2=24 | 7x3=21 | 50 (24questions) |

Skill Assessment (Practical)

Skill assessment should be done by considering the practical demonstration of skills by the candidate. It is assessed by making use of a competency checklist prepared by experts. The competency checklist should be developed as per the National Occupation Standards (NOSs). This should be in tune with the qualification pack for the Job Role to ensure necessary consistency in the quality of assessment across different sectors and institutions. As per the performance criteria defined in the National Occupation Standards, the students have to demonstrate their competencies in front of the examiners. Assessment will indicate whether they are competent or incompetent. The assessors assessing the skills of the students should possess enough industrial experience and should have undergone a rigorous training in assessment principles and practices. The Sector Skill Councils (SSCs) should ensure that the assessors are given the required training on the assessment of competencies.

The demonstration of knowledge and skill in performing a task of the learners, is the purpose of the practical examination. This include practical examination where hands on experience will be displayed and a viva voce. A team of two evaluators, one a subject teacher and the other an expert from the relevant industry certified by the relevant Board or SSCs concerned can conduct practical examination as well as viva voce.

Project Work

Project is an efficient strategy to assess the practical skills acquired along a certain timeline. Project is chosen and given to candidates only on the basis of their capabilities, because it needs specific skills. It is performed step by step and the first and foremost step is classroom discussion and selection of the topic for the project. After fixing the topic and objectives, the methodology of the project work should be decided during the classroom discussions. Monitoring and evaluation should be done at each stage. Proper feedback shall be provided to the learners for improvement and innovation. Field visits can be organized as part of the project work. The data collected may be used for presentations and report writing. Accuracy of the data is to be ensured. The entire project work is maintained as a practical work file or as student's portfolio.

Student Portfolio

It is a document that supports the candidate claim of competencies acquired as a part of the teaching learning process. The student portfolio is a compilation of project reports, articles, photos of products prepared by the student.

Viva Voce

Viva voce provides chance to each candidate to demonstrate communication skills and content knowledge. It is a way of obtaining feedback on the student's experience, learning, project work and field visit. Audio visual recording of the whole procedure can be done for future reference and documentation. A Board, including external examiners, is constituted as per the norms which in turn should be suitably adapted to the specific requirement of the vocational subjects.

The central/state examination board for secondary education and the respective Sector Skill Councils can certify the competencies of the learner upon the successful completion of the course.

5. UNIT CONTENTS

CLASS 11

Part A: Employability Skills

| Sl.No. | Units | Duration (hrs) |
|--------|---|----------------|
| 1 | Communication Skills- III | 25 |
| 2 | Self-management Skills – III | 25 |
| 3 | Information and Communication Technology Skills - III | 20 |
| 4 | Entrepreneurial Skills – III | 25 |
| 5 | Green Skills – III | 15 |
| | Total | 110 |

Unit 1: Communication Skill– III

| Expected Learning Outcomes | Theory (10 hrs) | Practical (15 hrs) | Duration (25 hrs) |
|--|---|---|-------------------|
| 1. Demonstrate knowledge of various methods of communication | <ul style="list-style-type: none">• Methods of communication• Verbal• Non-verbal• Visual | <ul style="list-style-type: none">• Writing pros and cons of written, verbal and non-verbal communication• Listing do's and don'ts for avoiding common body language mistakes | 05 |
| 2. Identify specific communication styles | <ul style="list-style-type: none">• Communication styles- assertive, aggressive, passive-aggressive, submissive, etc. | <ul style="list-style-type: none">• Observing and sharing communication styles of friends, teachers and family members and adapting the best practices• Roleplays on communication styles. | 10 |
| 3. Demonstrate basic writing skills | <ul style="list-style-type: none">• Writing skills to the following:• Sentence• Phrase• Kinds of Sentences• Parts of Sentence | <ul style="list-style-type: none">• Demonstration and practice of writing sentences and paragraphs on topics related to the subject | 10 |

| | | | |
|--------------|--|--|-----------|
| | <ul style="list-style-type: none"> • Parts of Speech • Articles • Construction of a Paragraph | | |
| Total | | | 25 |

Unit 2: Self-Management – III

| Expected Learning Outcomes | Theory (10 hrs) | Practical (15 hrs) | Duration (25 hrs) |
|--|---|---|--------------------------|
| 1. Demonstrate impressive appearance and grooming | <ul style="list-style-type: none"> • Describe the importance of dressing appropriately, looking decent and positive body language • Describe the term grooming • Prepare a personal grooming checklist • Describe the techniques of self- exploration | <ul style="list-style-type: none"> • Demonstration of impressive appearance and groomed personality • Demonstration of the ability to self- explore | 10 |
| 2. Demonstrate team work skills | <ul style="list-style-type: none"> • Describe the important factors that influence in team building • Describe factors influencing team work | <ul style="list-style-type: none"> • Group discussion on qualities of a good team • Group discussion on strategies that are adopted for team building and team work | 10 |
| 3. Apply time management strategies and techniques | <ul style="list-style-type: none"> • Meaning and importance of time management – setting and prioritizing goals, creating a schedule, making lists of tasks, balancing work and leisure, using different optimization tools to break large tasks into smaller tasks. | <ul style="list-style-type: none"> • Game on time management • Checklist preparation • To-do-list preparation | 05 |
| Total | | | 25 |

Unit 3: Information and Communication Technology - III

| Expected Learning Outcomes | Theory (08 hrs) | Practical (12 hrs) | Duration (20 hrs) |
|--|--|--|--------------------------|
| 1. Create a document on word processor | <ul style="list-style-type: none"> • Introduction to word processing. • Software packages for word processing. • Opening and exiting the word processor. • Creating a document | <ul style="list-style-type: none"> • Demonstration and practice of the following: • Listing the features of word processing • Listing the software packages for word processing | 10 |

| | | | |
|--|--|---|-----------|
| | | <ul style="list-style-type: none"> • Opening and exit the word processor • Creating a document | |
| 2. Edit, save and print a document in word processor | <ul style="list-style-type: none"> • Editing text • Wrapping and aligning the text • Font size, type and face • Header and Footer • Auto correct • Numbering and bullet • Creating table • Find and replace • Page numbering • Printing document • Saving a document in various formats | <ul style="list-style-type: none"> • Demonstration and practising the following: • Editing the text • Word wrapping and alignment • Changing font type, size and face • Inserting header and footer • Removing header and footer • Using autocorrect option • Insert page numbers and bullet • Save and print a document | 10 |
| Total | | | 20 |

Unit 4: Entrepreneurial Skills – III

| Expected Learning Outcomes | Theory (10 hrs) | Practical (15 hrs) | Duration (25 hrs) |
|--|--|--|-------------------|
| 1. Describe the significance of entrepreneurial values and attitude | <ul style="list-style-type: none"> • Values in general and entrepreneurial values • Entrepreneurial value orientation with respect to innovativeness, independence, outstanding performance and respect for work | <ul style="list-style-type: none"> • Listing of entrepreneurial values by the students. • Group work on identification of entrepreneurial values and their roles after listing or reading 2-3 stories of successful entrepreneur • Exhibiting entrepreneurial values in Ice breaking, rapport building, group work and home assignments | 10 |
| 2. Demonstrate the knowledge of attitudinal changes required to become an entrepreneur | <ul style="list-style-type: none"> • Attitudes in general and entrepreneurial attitudes • Using imagination/ intuition • Tendency to take | <ul style="list-style-type: none"> • Preparing a list of factors that influence attitude in general and entrepreneurial attitude | 15 |

| | | | |
|--------------|--|--|-----------|
| | <p>moderate risk</p> <ul style="list-style-type: none"> • Enjoying freedom of expression and action • Looking for economic opportunities • Believing that we can change the environment • Analyzing situation and planning action • Involving in activity | <ul style="list-style-type: none"> • Demonstrating and identifying own entrepreneurial attitudes during the following micro lab activities like thematic appreciation test • Preparing a short write-up on “who am I” • Take up a product and suggest how its features can be improved • Group activity for suggesting brand names, names of enterprises, etc. | |
| Total | | | 25 |

| Unit 5: Green Skills – III | | | |
|--|---|--|-------------------|
| Expected Learning Outcomes | Theory (07 hrs) | Practical (08 hrs) | Duration (15 hrs) |
| 1. Describe importance of main sector of green economy | <ul style="list-style-type: none"> • Main sectors of green economy- E-waste management, green transportation, renewal energy, green construction, water management • Policy initiatives for greening economy in India | <ul style="list-style-type: none"> • Preparing a poster on any one of the sectors of green economy • Writing a two-page essay on important initiatives taken in India for promoting green economy | 08 |
| 2. Describe the major green Sectors/Areas and the role of various stakeholder in green economy | <ul style="list-style-type: none"> • Stakeholders in green economy • Role of government and private agencies in greening cities, buildings, tourism, industry, transport, renewable energy, waste management, agriculture, water, forests and fisheries | <ul style="list-style-type: none"> • Preparing posters on green Sectors/Areas: cities, buildings, tourism, industry, transport, renewable energy, waste management, agriculture, water, forests and fisheries | 07 |
| Total | | | 15 |

PART B: VOCATIONAL SKILLS

| Sl.No. | Units | Duration (hrs) |
|--------------|--|-------------------|
| 1 | Introduction to FBM | 29 |
| 2 | Machinery on board-operations and testing | 66 |
| 3 | Fire fighting equipment | 17 |
| 4 | Life saving appliances | 18 |
| 5 | Fishing gear | 15 |
| 6 | Operation and testing of deck machineries. | 20 |
| Total | | 165 |

Unit 1: Introduction to FBM

| Expected Learning Outcomes | Theory (13 hrs) | Practical (16 hrs) | Duration (29hrs) |
|---|--|---|---------------------|
| 1. Explain prospects and opportunities of a fishing boat mechanic | <ul style="list-style-type: none"> • Job role of a fishing boat mechanic • Influence of fishing industry in Indian economy. • Types of fishing boat • Mechanised fishing | <ul style="list-style-type: none"> • Prepare chart showing comparison of conventional and mechanised fishing. • Prepare chart showing fish species in Indian coast. • Prepare chart showing influence of fishing industry in Indian economy. | 14 |
| 2. Demonstrate mechanical work shop tools. | <ul style="list-style-type: none"> • Measuring tools • Holding tools • Striking tools • Cutting tools • General purpose tools | <ul style="list-style-type: none"> • Make a 'V' model from metallic bar as per the given dimensions. | 15 |
| Total | | | 29 |

Unit 2: Operations and testing of onboard Machinery

| Expected Learning Outcomes | Theory (26hrs) | Practical (40 hrs) | Duration (66 hrs) |
|--|--|--|----------------------|
| 1. Explain role of main engine, auxiliary engine, air compressors and pumps. | <ul style="list-style-type: none"> • Introduction to main engine. • Auxiliary engine. • pumps and air compressors | <ul style="list-style-type: none"> • Visit to lab/vessel for identifying machinery on board | 8 |
| 2. Describe working of a diesel engine. | <ul style="list-style-type: none"> • Four stroke diesel engine working to working of four stroke diesel engine • Important parts of a four stroke diesel engine • Checklist to ensure | <ul style="list-style-type: none"> • Working demonstration of a four stroke diesel engine. • Dismantling and assembling of four stroke diesel engine | 10 |

FISHING BOAT MECHANIC

| | | | |
|---|---|---|-----------|
| | proper functioning of a diesel engine | | |
| 3. Identify different types of pumps used in fishing boat | <ul style="list-style-type: none"> Familiarization and identifying of various pumps | <ul style="list-style-type: none"> Demonstration of different types of pumps | 6 |
| 4. Describe working of centrifugal pump, Reciprocating pump, Gear pump and Hand pump. | <ul style="list-style-type: none"> Construction and working principle of various pumps(Centrifugal, Reciprocating, Gear pump and Hand pump) Checklist to ensure proper functioning of pumps | <ul style="list-style-type: none"> Dismantling and assembling of centrifugal Pump. Dismantling and assembling of reciprocating pump. Dismantling and assembling of gear pump | 15 |
| 5. Describe the function of steering mechanism in a fishing boat. | <ul style="list-style-type: none"> Steering system-working principle and operation Function of joystick Checklist to ensure proper functioning of steering mechanism | <ul style="list-style-type: none"> Demonstration of steering system using working model | 5 |
| 6. Describe the communication equipment (Telegraph and Voice pipe) | <ul style="list-style-type: none"> Application of telegraph system in fishing vessel . Use of Voice pipes in fishing vessels. Checklist to ensure proper functioning of communication system | <ul style="list-style-type: none"> Wheel house visit in a fishing boat. | 5 |
| 7. Explain how to check and maintain the battery | <ul style="list-style-type: none"> Battery care and maintenance Checklist to ensure proper functioning of battery | <ul style="list-style-type: none"> Check battery unit and its connections. Find out the specific gravity of electrolyte. Conduct load test. | 6 |
| 8. Describe the use of gauge glass and explain sounding. | <ul style="list-style-type: none"> Function of daily service tank Tank sounding procedure Function of gauge glass | <ul style="list-style-type: none"> Sounding practicing | 4 |
| 9. Explain engine room fuel line, fresh water line and sea water line | <ul style="list-style-type: none"> Fuel system Fresh water line Sea water line Routine inspection against leakage in pipes | <ul style="list-style-type: none"> Sketch the line diagram of fuel system, freshwater cooling system and sea water cooling system. | 7 |
| Total | | | 66 |

Unit3: Fire Fighting equipment

| Expected Learning Outcomes | Theory (8 hrs) | Practical (9 hrs) | Duration (17 hrs) |
|--|---|---|--------------------------|
| 1. Explain different types of fire fighting equipment. | <ul style="list-style-type: none"> • Fire triangle • Classification of fire. • Principle of fire fighting. • Fire plan • Fire fighting equipment. • Fire alarm system | <ul style="list-style-type: none"> • Familiarize with fire extinguisher. | 7 |
| 2. Demonstrate the routine check for fire extinguisher | <ul style="list-style-type: none"> • Routine check for fire extinguisher | <ul style="list-style-type: none"> • Prepare Checklist for routine inspection | 5 |
| 3. Demonstrate the routine check for fire hoses. | <ul style="list-style-type: none"> • Hoses and hydrants | <ul style="list-style-type: none"> • Prepare Checklist for routine inspection of fire hydrants | 5 |
| Total | | | 17 |

Unit 4: Life saving appliances

| Expected Learning Outcomes | Theory (7 hrs) | Practical (11hrs) | Duration (18 hrs) |
|--|--|---|--------------------------|
| 1. Explain different types of life saving appliances | <ul style="list-style-type: none"> • Life jacket • Life Buoy • Life boat • Life raft | <ul style="list-style-type: none"> • Prepare chart showing images of different life saving appliances | 7 |
| 2. Demonstrate use of personal life saving appliances. (life jacket and Life buoy) | <ul style="list-style-type: none"> • Application and maintenance of life jacket(access /strap) and life buoy | <ul style="list-style-type: none"> • Demonstration of life jacket donning procedure | 6 |
| 3. Explain standards of training and watch keeping | <ul style="list-style-type: none"> • Introduction to SOLAS • Desirable requirements of safety and life saving appliances • ISM code | <ul style="list-style-type: none"> • Prepare chart showing desirable quantity of life saving and safety appliances | 5 |
| Total | | | 18 |

Unit 5: Fishing gear

| Expected Learning Outcomes | Theory (5 hrs) | Practical (10 hrs) | Duration (15 hrs) |
|--|---|--|--------------------------|
| 1. Describe Fishing Gear | <ul style="list-style-type: none"> • Various types of fishing gear • Mending of net | <ul style="list-style-type: none"> • Field visit for familiarization of basic types of net and rope | 8 |
| 2. Demonstrate different knots in rope work and mending of net | <ul style="list-style-type: none"> • Different types of knots and ropes | <ul style="list-style-type: none"> • Demonstration of basic knots and rope work | 7 |
| Total | | | 15 |

| Unit 6: Operation and testing of deck machinery | | | |
|--|--|---|--------------------------|
| Expected Learning Outcomes | Theory (6 hrs) | Practical (14 hrs) | Duration (20 hrs) |
| 1. Describe working of winches, Net drum, line hauler, Gurdy, and Power blocks | <ul style="list-style-type: none"> Usage and working of winches, Net drum, line hauler, Gurdy, and Power blocks Checklist for proper functioning of all deck machinery | <ul style="list-style-type: none"> Field visit for on board demonstration of winches, net drum, line hauler, gurdy, and power blocks Dismantling and assembly of winch. | 14 |
| 2. Explain the limitations of fishing gear and its effect on the engine. | <ul style="list-style-type: none"> Advantages and disadvantages of fishing gear | <ul style="list-style-type: none"> Demonstration of fishing gear and its effect on the engine | 6 |
| Total | | | 20 |

CLASS 12

Part A: Employability Skills

| Sl.No. | Units | Duration (hrs) |
|---------------|--|-----------------------|
| 1 | Communication Skills- IV | 25 |
| 2 | Self-management Skills - IV | 25 |
| 3 | Information and Communication Technology Skills - IV | 20 |
| 4 | Entrepreneurial Skills - IV | 25 |
| 5 | Green Skills - IV | 15 |
| Total | | 110 |

Unit 1: Communication Skills - IV

| Expected Learning Outcomes | Theory (10 hrs) | Practical (15 hrs) | Duration (25 hrs) |
|--|--|---|--------------------------|
| 1. Describe the steps to active listening skills | <ul style="list-style-type: none"> Importance of active listening at workplace Steps to active listening | <ul style="list-style-type: none"> Demonstration of the key aspects of becoming active listener Preparing posters of steps for active listening | 10 |
| 2. Demonstrate basic writing skills | <ul style="list-style-type: none"> Writing skills to the following: <ul style="list-style-type: none"> Sentence Phrase Kinds of Sentences Parts of Sentence Parts of Speech Articles | <ul style="list-style-type: none"> Demonstration and practice of writing sentences and paragraphs on topics related to the subject | 15 |

| | | | |
|--------------|---|--|-----------|
| | <ul style="list-style-type: none"> • Construction of a Paragraph | | |
| Total | | | 25 |

Unit 2: Self-Management Skills – IV

| Expected Learning Outcomes | Theory (10 hrs) | Practical (15 hrs) | Duration (25 hrs) |
|---|---|--|-------------------|
| 1. Describe the various factors influencing self-motivation | <ul style="list-style-type: none"> • Finding and listing motives (needs and desires); • Finding sources of motivation and inspiration (music, books, activities);expansive thoughts; living fully in the present moment; dreaming big | <ul style="list-style-type: none"> • Group discussion on identifying needs and desire • Discussion on sources of motivation and inspiration • Field visit for understanding the operation | 10 |
| 2. Describe the basic personality traits, types and disorders | <ul style="list-style-type: none"> • Describe the meaning of personality • Describe how personality influence others • Describe basic personality traits • Describe common personality disorders- paranoid, antisocial, schizoid, borderline, narcissistic, avoidant, dependent and obsessive | <ul style="list-style-type: none"> • Demonstrate the knowledge of different personality types | 15 |
| Total | | | 25 |

Unit 3: Information and Communication Technology Skills - IV

| Expected Learning Outcomes | Theory (06 hrs) | Practical (14 hrs) | Duration (20 hrs) |
|---|---|---|-------------------|
| 1. Perform tabulation using spreadsheet application | <ul style="list-style-type: none"> • Introduction to spreadsheet application • Spreadsheet applications • Creating a new worksheet • Opening workbook and entering text | <ul style="list-style-type: none"> • Demonstration and practice on the following: • Introduction to the spreadsheet application • Listing the spreadsheet applications | 10 |

| | | | |
|--|---|---|-----------|
| | <ul style="list-style-type: none"> Resizing fonts and styles Copying and moving Filter and sorting Formulas and functions Password protection. Printing a spreadsheet. Saving a spreadsheet in various formats. | <ul style="list-style-type: none"> Creating a new worksheet Opening the workbook and enter text Resizing fonts and styles Copying and move the cell data Sorting and Filter the data Applying elementary formulas and functions Protecting the spreadsheet with password Printing a spreadsheet Saving the spreadsheet in various formats. | |
| 2. Prepare presentation using presentation application | <ul style="list-style-type: none"> Introduction to presentation Software packages for presentation Creating a new presentation Adding a slide Deleting a slide Entering and editing text Formatting text Inserting clipart and images Slide layout Saving a presentation Printing a presentation document. | <ul style="list-style-type: none"> Demonstration and practice on the following: Listing the software packages for presentation Explaining the features of presentation Creating a new presentation Adding a slide to presentation. Deleting a slide Entering and edit text Formatting text Inserting clipart and images Sliding layout Saving a presentation Printing a presentation document | 10 |
| Total | | | 20 |

Unit 4: Entrepreneurial Skills - IV

| Expected Learning Outcomes | Theory (10 hrs) | Practical (15 hrs) | Duration (25 hrs) |
|---|--|---|--------------------------|
| 1. Identify the general and entrepreneurial behavioural competencies | <ul style="list-style-type: none"> • Barriers to becoming entrepreneur • Behavioural and entrepreneurial competencies – adaptability/decisiveness, Initiative/perseverance, interpersonal skills, organizational skills, stress management, valuing service and diversity | <ul style="list-style-type: none"> • Administering self-rating questionnaire and score responses on each of the competencies • Collect small story/ anecdote of prominent successful entrepreneurs • Identify entrepreneurial competencies reflected in each story and connect it to the definition of behavioural competencies • Preparation of competencies profile of students | 10 |
| 2. Demonstrate the knowledge of self-assessment of behavioural competencies | <ul style="list-style-type: none"> • Entrepreneurial competencies in particular: self-confidence, initiative, seeing and acting on opportunities, concern for quality, goal setting and risk taking, problem solving and creativity, systematic planning and efficiency, information seeking, persistence, influencing and negotiating, team building | <ul style="list-style-type: none"> • Games and exercises on changing entrepreneurial behaviour and development of competencies for enhancing self-confidence, problem solving, goal setting, information seeking, team building and creativity | 15 |
| Total | | | 25 |

Unit 5: Green Skills - IV

| Expected Learning Outcome | Theory (05 hrs) | Practical (10 hrs) | Duration (15 hrs) |
|--|--|--|--------------------------|
| 1. Identify the role and importance of green jobs in different sectors | <ul style="list-style-type: none"> • Role of green jobs in toxin-free homes, • Green organic gardening, public transport and energy conservation, • Green jobs in water | <ul style="list-style-type: none"> • Listing of green jobs and preparation of posters on green job profiles • Prepare posters on | 15 |

| | | | |
|--------------|--|-------------|-----------|
| | conservation <ul style="list-style-type: none"> • Green jobs in solar and wind power, waste reduction, reuse and recycling of wastes, • Green jobs in green tourism • Green jobs in building and construction • Green jobs in appropriate technology • Role of green jobs in Improving energy and raw materials use • Role of green jobs in limiting greenhouse gas emissions • Role of green jobs minimizing waste and pollution • Role of green jobs in protecting and restoring ecosystems • Role of green jobs in support adaptation to the effects of climate change | green jobs. | |
| Total | | | 15 |

Part B–Vocational Skills

| Sl.No. | Units | Duration (hrs) |
|--------------|---|-------------------|
| 1 | Manning of fishing vessel | 35 |
| 2 | Safe manning precautions | 49 |
| 3 | Radio regulations and communication | 28 |
| 4 | Marine meteorology and forecasting. | 16 |
| 5 | Emergency and safe procedures for machinery operation | 12 |
| 6 | Navigation rules | 11 |
| 7 | Safety measures in fish handling onboard | 09 |
| 8 | Health and safety at workplace | 05 |
| Total | | 165 |

Unit 1: Manning of fishing vessel

| Expected Learning Outcomes | Theory (10 hrs) | Practical (25 hrs) | Duration (35 hrs) |
|---|--|-----------------------|----------------------|
| 1. Explain manning of engine. | <ul style="list-style-type: none"> • Manning of engine. | | 3 |
| 2 Explain Fouling in fishing accessories. | <ul style="list-style-type: none"> • Fouling of propeller and fishing gear. | | 3 |

| | | | |
|---|--|---|-----------|
| 3 Explain causes and remedies of fouling of the propeller and fishing gear. | <ul style="list-style-type: none"> • .Precaution to avoid fouling. • Repairing of fouled propeller and damaged gear. | <ul style="list-style-type: none"> • Demonstrate repairing of fouled propeller | 29 |
| Total | | | 35 |

Unit 2: Safe manning precautions

| Expected Learning Outcomes | Theory (15 hrs) | Practical (34 hrs) | Duration (49 hrs) |
|---|---|--|-------------------|
| 1. Explain the possibility for over loading engine while hauling the catch. | <ul style="list-style-type: none"> • Safe manning precautions. | <ul style="list-style-type: none"> • Field visit for understanding the operation | 17 |
| 2. Explain how to avoid the over turning of boat during fishing operation and in rough weather. | <ul style="list-style-type: none"> • Over loading in fishing gear- Possible causes (Wind, Cyclone, Current, Catch load, loss of stability) • Overturning of fishing boat- Causes and remedy. • Rolling and pitching | <ul style="list-style-type: none"> • Field visit- - Engine watch keeping and fishing gear operation | 28 |
| 3. Explain the procedure for watch keeping the engine during extreme conditions | <ul style="list-style-type: none"> • Checklist of watch keeping officer. | | 4 |
| Total | | | 49 |

Unit 3: Radio regulations and communication

| Expected Learning Outcomes | Theory (8 hrs) | Practical (20 hrs) | Duration (28 hrs) |
|--|--|---|-------------------|
| 1. Explain the procedure of VHF radio operation. | <ul style="list-style-type: none"> • Radio regulation. • Communication devices. • Working and application of VHF. | <ul style="list-style-type: none"> • Field visit in a fishing vessels bridge room. | 18 |
| 2. Describe function of navigation equipments | <ul style="list-style-type: none"> • Navigation equipments (GPS, AIS, RADAR, Echo sounder, Fish finder, SONAR, Compass) | <ul style="list-style-type: none"> • Prepare chart showing images and uses of different navigation equipment | 10 |
| Total | | | 28 |

| Unit4: Marine meteorology and forecasting | | | |
|---|--|---|--------------------------|
| Expected Learning Outcomes | Theory (5 hrs) | Practical (11 hrs) | Duration (16 hrs) |
| 1. Explain weather forecasting methods at sea. | <ul style="list-style-type: none"> Weather forecasting methods at sea. | <ul style="list-style-type: none"> Field visit in a fishing vessel | 10 |
| 2. Explain the steps to be taken upon receiving a signal (distress) regarding the weather condition from different sources. | <ul style="list-style-type: none"> Approved weather forecasting agencies. Local weather condition and interpretation | <ul style="list-style-type: none"> Prepare chart/ presentation showing different forecasting methods | 6 |
| Total | | | 16 |

| Unit 5: Emergency and safe procedures for machinery operation | | | |
|--|---|---|--------------------------|
| Expected Learning Outcomes | Theory (6 hrs) | Practical (6 hrs) | Duration (12 hrs) |
| 1. Explain possible emergency situations during machinery operation. | <ul style="list-style-type: none"> Possible emergency situations during machinery operation. | <ul style="list-style-type: none"> Prepare a presentation showing emergency procedures in machinery operations | 7 |
| 2. Explain the safe and emergency procedures to be followed for different machinery. | <ul style="list-style-type: none"> Emergency and safe procedures for machinery operation | | 5 |
| Total | | | 12 |

| Unit 6: Navigation rules | | | |
|--|--|--|--------------------------|
| Expected Learning Outcomes | Theory (6 hrs) | Practical (5 hrs) | Duration (11 hrs) |
| 1. Explain international regulations for preventing collisions and the Costal Regulation Zone pertaining to inshore areas. | <ul style="list-style-type: none"> Navigation rules. Nautical chart. | <ul style="list-style-type: none"> Prepare chart of navigation lights. | 5 |
| 2. Explain the terms- rules of the road, collreg. | <ul style="list-style-type: none"> Signals used in fishing and other operations | <ul style="list-style-type: none"> Prepare chart of signals during fishing and anchoring. | 6 |
| Total | | | 11 |

| Unit 7: Safety measures in fish handling onboard | | | |
|--|--|--|--------------------------|
| Expected Learning Outcomes | Theory (5 hrs) | Practical (4 hrs) | Duration (09 hrs) |
| 1. Explain pollution laws. | <ul style="list-style-type: none"> • Explain MARPOL. | | 1 |
| 2. Explain gear conservation laws related to fishing net disposal. | <ul style="list-style-type: none"> • Fishing net disposal. | | 1 |
| 3. Explain conservation laws related to banned species. | <ul style="list-style-type: none"> • Conservation of banned species. | <ul style="list-style-type: none"> • Make a chart of banned species at sea. | 2 |
| 4. Identify poisonous creatures and its disposal | <ul style="list-style-type: none"> • Poisonous creatures and its safe disposal procedure. | <ul style="list-style-type: none"> • Make a chart of poisonous creatures at sea | 2 |
| 5. Explain on board fish preservation methods (icing and chilling) | <ul style="list-style-type: none"> • Icing and Chilling | | 1 |
| 6. Explain quality fish handling | <ul style="list-style-type: none"> • Quality Fish handling methods. | | 2 |
| Total | | | 09 |

| Unit 8: Health and Safety at workplace | | | |
|---|---|---|-------------------------|
| Expected Learning Outcomes | Theory (2 hrs) | Practical (4 hrs) | Duration (9 hrs) |
| 1. Describe the health & safety and list the equipment and materials for safety & security. | <ul style="list-style-type: none"> • Meaning of health and safety • Safety requirements. • Meaning of Risk • List of safety equipment kept in the workshop • Trace out approved action to deal with risk | <ul style="list-style-type: none"> • List out various safety equipment • Identify and select equipment for safety and health concern in a given situation. | 2 |
| 2. Dealing with accidents or emergencies and its reporting. | <ul style="list-style-type: none"> • Meaning of accidents • Dealing with accidents- Company Procedure of evacuation. • Meaning and method of Reporting. • System of Reporting | <ul style="list-style-type: none"> • Prepare a chart on company procedure to deal with accidents/ emergency situations • Prepare a poster on managing emergency. • Visit any workshop/service center to know the procedure to deal with emergency. | 3 |

| | | | |
|--------------|--|--|----------|
| | | • Role play on reporting emergencies/ accidents to the right person. | |
| Total | | | 5 |

6. ORGANISATION OF FIELD VISITS/ ON-THE-JOB TRAINING

In a year, at least 3 field visits/educational tours should be organized for the students to expose them to the activities in the workplace. Teachers and students should visit fishing vessels and marine workshops to observe and practice various aspects of fishing boat handling, maintenance, working of different fishing accessories. During the visit, students should be able to identify the following.

1. Engine room, Deck and Bridge room/wheel house of a vessel.
2. Main engine, Auxiliary engine and auxiliary equipment.
3. Different types of pumps in engine room and deck.
4. Winches, Gurdies, Line hauler, Power blocks.
5. Different life saving equipment like life buoy, life raft, life boat.
6. Different navigating equipment like Compass, Echo sounder, Fish finder, VHF radio, AIS

On-the-job training of at least 80 hours is to be organized by the institution to provide hands-on training to the students.

OJT Centers

1. Central Institute of Fisheries Nautical and Engineering Training. (CIFNET)
2. Fisheries Survey of India
3. Marine engineering work shops
4. Central Marine Fisheries Research Institute (CMFRI)
5. Central Institute for Fisheries Technologies (CIFT)
6. Kerala State Inland Navigation Corporation (KSNIC)
7. National Institute of Fisheries Post Harvesting Technology and Training (NIFPHAT)

7. LIST OF EQUIPMENT AND MATERIALS

The list given below is suggestive and an exhaustive list should be prepared by the vocational teacher. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

| Sl no | Item |
|-------|---|
| 1 | 4 stroke Diesel engine Multicylinder (Old, working) |
| 2 | Out Board Engine 2 Stroke |
| 3 | Out Board Engine 4 Stroke, Electric start |
| 4 | Air Compressor with electric motor |
| 5 | Battery load tester |
| 6 | Hydrometer |
| 7 | Piston Ring Expander |
| 8 | Piston Ring compressor |
| 9 | Puller |
| 10 | Bench Vice |
| 11 | Pipe Vice |
| 12 | Scriber |
| 13 | Torque wrench |
| 14 | Pipe Wrench |
| 15 | Try Square |
| 16 | Steel Rule |
| 17 | Vernier Caliper |
| 18 | Outside Screw Gauge |
| 19 | Inside caliper |
| 20 | Outside caliper |
| 21 | Feeler Gauge |
| 22 | Prick Punch |
| 23 | Centre Punch |
| 24 | Snips |
| 25 | Flat Chisel |
| 26 | Cross Cut Chisel |
| 27 | Half Round Chisel |
| 28 | Diamond Point Chisel |
| 29 | Side Chisel |
| 30 | File - Flat (Rough) |
| 31 | File - Flat (Smooth) |
| 32 | File - Half Round |
| 33 | File - Round |
| 34 | File - Triangular |
| 35 | File - Square |
| 36 | File - Triangular |
| 37 | Hack saw frame - Solid |
| 38 | Hack saw frame - Adjustable |
| 39 | Hammer - Ball Peen |
| 40 | Hammer - Claw |
| 41 | Hammer - Straight peen |
| 42 | Hammer - Cross Peen |
| 43 | Hammer - soft (wooden) |
| 44 | Screw Driver - Phillips head |
| 45 | Screw Driver - Flat |
| 46 | Plier - Cutting |
| 47 | Plier - Combination |
| 48 | Plier - Circlip (Inside) |

FISHING BOAT MECHANIC

| | |
|----|---|
| 49 | Plier - Circlip (Outside) |
| 50 | Plier - Nose |
| 51 | Spanner-Double End Open |
| 52 | Spanner-Ring |
| 53 | Spanner-Box (Ratchet Type) /Socket wrench set |
| 54 | Spanner-Tubular |
| 55 | Spanner-Adjustable |
| 56 | Allen Key set |
| 57 | Heat Exchanger - Boat (old) |
| 58 | Pump - Reciprocating with motor |
| 59 | Pump - Centrifugal with motor |
| 60 | Pump - Hand |
| 61 | Bourdon Tube pressure Gauge |
| 62 | Fire Extinguisher |
| 63 | Life Bouy |
| 64 | Life Jacket |
| 65 | Flow meter |
| 66 | Gauge glass |
| 67 | Temperature gauge |
| 68 | Grease gun |
| 69 | Volt meter |
| 70 | Ammeter |
| 71 | Lead acid battery |
| 72 | Hygrometer |

8. LIST OF CONTRIBUTORS

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