

**VOCATIONAL HIGHER SECONDARY  
SECOND YEAR**

**FISHING CRAFT AND GEAR  
TECHNOLOGY**

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**TEACHERS' SOURCEBOOK**



**GOVERNMENT OF KERALA  
Department of Education**

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**State Council of Educational Research & Training**  
Vidyabhavan, Poojappura, Thriuvananthapuram-12, Kerala



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# Preface

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Dear Teachers,

In the context of the changing scenario in the field of education, the role of the teacher is not simply teaching the syllabi. The emerging needs of education calls for a facilitator's role from the teachers. The learning process has to be student centred and activity- based. Learning activities must enable the student to develop process domain and multiple intelligence skills to their maximum extent.

This sourcebook has been written primarily for the benefit of teachers who teach **Fishing Craft and Gear Technology** at Vocational Higher Secondary level. The subject matter has been dealt with in such a way as to enable the teacher to provide suitable learning activities for effective learning. The success of the approach depends upon the vision and commitment of the teacher. It is also expected that the teacher has to seek help from other sources like reference books from libraries, websites etc.

Hope that this sourcebook will help the teacher to develop the skills and experience required for effective classroom transaction.

With regards,

Thiruvananthapuram

July. 2006

E. Valsala Kumar

Director SCERT, Kerala

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# **GENERAL APPROACH**

## **SIGNIFICANCE OF VOCATIONAL EDUCATION**

The ultimate aim of education is human refinement. Education should enable the learner to formulate a positive outlook towards life and to accept a stand, which suits the well being of the society and the individual as well.

The attitude and potential 'to work' has determined the destiny, progress and cultural development of the human race. The objective of education is to form a society with individuals having a positive work culture. The educational process expected in and outside our formal schools should concentrate upon inculcating concepts, abilities, attitudes and values in tune with this work culture. Hence vocational education cannot be isolated from the main stream of education. In another sense, every educational process should be vocational. However our inability to utilize the resources wisely and scarcity of job opportunities are a severe issues of the present society. For overcoming this deep crisis, emergent techniques has to be sorted out and appropriate research have to be seriously carried out. It is in this sense that the content and methodology of Vocational Higher Secondary Education have to be approached. The need for meaningful linkages between the world of work and world of education is well recognized. The essence of the recommendations made by various commissions and committees is that vocationalisation should be the main feature of the future system of education at the higher secondary stage; it can be extended to school level also. Vocational education intends to create various skills in different occupations comprising several areas of activities.

The Vocational Higher Secondary Course was envisaged as a part of the National Policy on Education with the noble idea of securing a job along with education. The relevance of vocational education is very great in this age of

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unemployment. This education system, which ensures a job along with higher education, stands aloof from other systems of education.

This education imparts the life skills required by the youth to enter the world of work and assume the responsibilities of adulthood. As per the expert meeting report (2001) of UNESCO, the life skills are grouped under 4 categories.

They are

1. Skills for personal fulfillment
2. Skills for living in society
3. Skills for dealing with changing economies
4. Skills for dealing with changing work patterns.

Vocational Education ensures fulfillment of manpower requirement or national development and for social security of the citizens through self-employment. It also helps to reduce the migration of rural youth to urban areas and thus helps in rural development.

The learners of Vocational Education get an opportunity to avail one year apprenticeship training in industries to improve their practical skill. During the course of study, on the job training (OJT) for 10 days in a year is arranged to improve the skill and efficiency of the learner. This education system motivates the attitude towards self-employment through Production Cum Service Training Centers. (PSTC)

#### **OBJECTIVES OF VOCATIONAL EDUCATION**

The National policy on education has accorded very high priority to the program of vocationalisation of education, considering the following objectives.

- ❑ To fulfill national goals of development and eradication of unemployment and poverty.
- ❑ To impart education relevant to increased production and productivity, economic development and individual prosperity.

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- ❑ To make available skilled work force at all levels to alleviate the rural unemployment and for the development of nation.
  - ❑ To develop environmental awareness to ensure sustainable development.
  - ❑ To develop vocational aptitude, work culture, values and attitudes of the learners so as to enrich the productivity of the nation.
  - ❑ To develop entrepreneurial competencies and skills of learners for self-reliance and to undertake gainful self-employment.
  - ❑ To facilitate the expansion of higher education and explore future opportunities through innovative guidance and programmes.
  - ❑ To develop vocational competencies, creative thinking in the related areas and facilitate training.
  - ❑ To create awareness on mental, physical and social health.
  - ❑ To acquire awareness about different job areas and to provide backgrounds for obtaining higher level training in subjects concerned.

## **LEARNING**

Learning is construction of knowledge through a continuous mental process. It is advancement through adding and correcting by comparing the new issue with the previously learned concepts. Learning is an intellectual process rather than mere memorization of facts. Learning is a conglomeration of a variety of activities like problem solving, finding out co-relations, prediction, arriving at conclusions, rational as well as critical thinking, finding applications, grouping for other possibilities. When opportunities are provided for intellectual processes learning will become effective and intellectual ability will get strengthened.

### **Theoretical foundations of learning**

Education is the best device that can be adopted for creation of a new society. It should be democratic in content and process and should acknowledge the rights of the learner. It should also provide opportunity for better citizenship training. The concept of equality at all areas should get recognition in theory and

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practice. There should be a planned programme of action to develop nationality, humanness and love against the encroachment of sectarianism of caste and religion. The learner should become cognizant of the implications of privatization, liberalization, globalization etc.

They should develop the potential to use the acquired learning as a liberative weapon.. They should be able to view education and life through the perspective of social well being. A basic awareness of all the subjects needed for life is essential for all students.

The impact of perspectives formed in us during the colonial period still reflects in our educational philosophy. The solution to the present day perplexities of the society, which exposes education on the basis of competitions and marketisation, is only a comprehensive view of life.

It is high time that education is reorganized on the basis of the philosophy of human education. The human approach to education has to reflect in its content, learning process and outlook. The perspective of 'learning to be' and 'learning to live together' as expressed by the UNESCO and the concepts of existential, interpersonal and intrapersonal intelligence.

The basis of new approaches to curriculum and teaching- learning process are the developments that took place in the eastern and western of the worlds.

When we plant the learner at the center of the learning process, the teaching process has to be changed accordingly. It is the result of the rapid growth and development of Science and Technology and Pedagogy. If we want to undergo the changing process, we have to imbibe the modern hypothesis regarding learner. They have;

- ❑ Great curiosity
- ❑ Good imagination
- ❑ Numerous other qualities and interests
- ❑ Individuality

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- ❑ Interest in thinking and working in a free and fearless atmosphere.
  - ❑ Interest in enquiring and questioning.
  - ❑ Ability to draw conclusions after logical thinking.
  - ❑ Ability to express and establish freely the conclusions arrived at.
  - ❑ Interest for recognition in the society.
  - ❑ Determination to face the interference of society and make components which is a part of social life.

When we consider the learning system, the domain to be stressed in education according to the modern development becomes relevant. The knowledge domain consists of

- ❑ Facts
- ❑ Ideas
- ❑ Laws
- ❑ The temporary conclusions and principles used presently by scientists.

Learning is a process. The continuous procedures we undergo to reach a particular goal can be called process. The skills that are parts of the process to analyze the collected ideas and proofs and come to a conclusion is called process skills. Some important **process skills** are,

- ❑ To observe
- ❑ To collect data and record
- ❑ To classify
- ❑ To measure and prepare charts
- ❑ To experiment
- ❑ To predict
- ❑ To recognize and control the variables
- ❑ To raise questions

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- ❑ To generalize
  - ❑ To form a hypothesis and check.
  - ❑ To conclude
  - ❑ To communicate
  - ❑ To predict and infer
  - ❑ To use tools.

Observation is the process of acquiring knowledge through the senses. It is purely objective oriented. Learning experiences, which provide the opportunities to use all the senses.

The process of grouping is known as classifying. Starting from simple groupings of data, it can extend to the level of classification into minute sub-groups.

In addition to this, consider the skills related to creative domain also, they are skills:

- ❑ To visualize
- ❑ To connect facts and ideas in new ways.
- ❑ To find out new and uncommon uses of objects
- ❑ To fantasize
- ❑ To dream
- ❑ To develop creative isolated thoughts

Creativity is an essential component of process and activities. The element of creativity is involved in finding out problems, formation of hypothesis, finding 'solutions' to problems etc. Through activity oriented learning experiences, opportunities to express creativity can be created.

Again, the following factors included in the **Attitudinal domain** deserve special mention.

- ❑ Self-confidence
- ❑ Love for scientific knowledge

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- ❑ Attitude to know and value history
  - ❑ Respect human emotions
  - ❑ Decide with reasonable present problems
  - ❑ Take logical decisions regarding personal values

'Hypothesis' is a temporary conclusion drawn using insight. Based on knowledge and experiences relating to the problems the causes and solutions can be guessed.

As regards the **application domain** the important factors are the ability to:

- ❑ observe in daily life examples of ideas acquired.
- ❑ take the help of scientific process to solve the problems of daily life.
- ❑ choose a scientific life style
- ❑ connect the ideas acquired with other subjects.
- ❑ integrate the subjects with other subjects.

Some basic stands have to be taken on the new scientific knowledge about intelligence learning and teaching. When such basic concepts are accepted changes are required in the following factors.

- ❑ The vision, approach, structure and content of the curriculum.
- ❑ The vision, approach, structure and content of the textbooks.
- ❑ Role of the teacher and the learner.
- ❑ Learner atmosphere, learning materials and learning techniques.

Some scientific perspectives accepted by modern world in educational psychology are given below.

### **Constructivism**

This approach points out the concept that the learner constructs knowledge. New knowledge is constructed when ideas are examined and practiced in new

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situations relating them with the previously acquired knowledge and experience. That is assimilated into the cognitive structure of one's knowledge. This method, which gives priority to critical thinking and problem solving, provides opportunity for self-motivated learning.

### **Social Constructivism**

Social constructivism is a sub section of constructivism. Knowledge is formed, spread and imbibed and it becomes relevant in a social environment. Interactive learning, group learning, co-operative participatory learning, all these are concepts put forward by social constructivism.

The main propounders of constructivism are Piaget, Vygotsky and Bruner.

Discovery learning and interactive learning have prime importance. Learning takes place as a part of the attempt for problem solving. The activities of a learner who confronts cognitive disequilibria in a learning situation when he tries to overcome it leads to the renewal of cognitive structure. It is through this process construction of new knowledge and the assimilation of them takes place. Observation and enquiry are unavoidable factors. The learner advances towards new areas of acquisition of knowledge where he tries to compare his new findings with the existing concepts.

Learning is a live mental process rather than the ability for memorization of facts. Cognitive process has to be given emphasis. The process of problem analysis, elucidation, critical thinking, rational thinking, finding out co-relation, prediction, hypothesis formation, application, probing for other possibilities, extracting the crux and other processes are of critical importance in learning.

Constructivism gives greater predominance to co-operative learning. Social and cultural factors influence learning. Sharing of knowledge and experience among learners, collective enquiry, assessment and improvement, group activity and collaborative learning by sharing responsibilities with the objective of public activity, provide opportunity for effective learning.

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In learning internal motivation is more important than external motivation. The learner should have interest and initiative in learning. Learning situation should be capable of forming a sense of ownership in the learner regarding the learning process.

Learning is not a linear process. It progresses in a spiraled way advancing deeper and wider.

## **NEW CONCEPTS OF LEARNING**

### **1. Discovery Learning**

The teacher has to create a motivating atmosphere for the learner to discover concepts and facts, instead of listening always. Creating occasion to progress towards discovery is preferred. Instead of telling everything before and compelling to initiate the models, situations are to be created to help the children act models as themselves.

### **2. Learning by discussion**

Discussion leads to learning is Burner's theory. Here discussion is sharing on the plane of ideas. New ideas are arrived at by seeking explanations, by mutual giving and taking of ideas and by problem solving.

### **3. Problem solving and learning**

Only when the learner feels that some thing is a problem to be solved that he takes the responsibility of learning it. It is an inborn tendency to act to solve a problem that causes cognitive disequilibrium in a particular area. It is also needed to have confidence that one is capable of doing it. The problems are to be presented in consideration of the ability and level of attainment of the learner.

### **4. Collaborative learning**

This is the learning in which the responsibilities are distributed among the members of the group keeping common learning objectives. The common

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responsibility of the group will be successful only if each member discharges his duties. All the members will reach a stage of sharing the result of learning, equally through the activity with mutual understanding. The teachers who arrange collaborative learning will have to make clear the responsibilities to be discharged. This is possible through the discussion with the learners. Collaborative learning will help to avoid the situations of one person working for the whole group.

## **5. Co-operative learning**

This is the learning in which the learners help one another. Those who have more knowledge, experience and competency, will help others. By this exchange of resources the learners develop a plane of social system in learning also. As there are no high ups and low ones according to status among the learners they can ask the fellow students doubts and without any hesitation. Care should be taken not to lead this seeking of help to mechanical copying. It should be on the basis of actual needs. So even while encouraging this exchange of ideas, among the members of the group cautious acceptance is to be observed as a convention. There should be an understanding that satisfactory responses should come from each member and that the achievement of the group will be assessed on the basis of the achievement of all the members.

## **6 Zone of Proximal Development**

Vygotsky observes that there is a stage of achievement where a learner can reach by himself and another higher zone where he can reach with the help of his teachers and peers and elders. Even though some can fulfill the learning activity by them there is the possibility of a higher excellence. If appropriate help is forth covering every learner can better himself.

## **7 Scaffolding**

It is natural that the learner may not be able to complete his work, if he does not get support at the proper time. The learner may require the help of the teacher in several learning activities. Here helping means to make the learner complete the activity taking responsibility by himself. The teacher has to keep in mind the

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objective of enabling the learner to take the responsibility and to make it successful.

## **8. Learning - an active mental process**

Learning being a cognitive process, the teacher needs to know cognitive processes to facilitate the creation of learning opportunities. Learning can be made effective by providing learning experiences involving mental processes like

- Retrieves/recollects/retells information
- Readily makes connections to new information based on past experiences and formulates initial ideas /concepts.
- Detects similarities and differences
- Classifies/categories/organizes information approximately.
- Translates/transfer knowledge or understanding and applies them in a new situation.
- Establishes cause-effect relationships
- Makes connections/relates prior knowledge to new information/applies reasoning and draw inferences
- Communicates knowledge/understanding through different media.
- Imagines/fantasises/designs/predicts based on received information
- Judges /appraises/evaluates the merits or demerits of an idea/develops own solutions to a problem.

## **9. Intrinsic Motivation**

Intrinsic motivation is given more importance than extrinsic motivation. The teacher has to arouse the internal motivation of the learner. A person internally motivated alone can immerse in learning and own its responsibility.

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## 10. Multiple Intelligence

The theory of multiple intelligence put forward by Howard Gardener has created a turning point in the field of education. The National curriculum documents has recommended that the curriculum is to be designed taking into consideration this theory. Main factors of the intellect:

- 1. Verbal/linguistic intelligence-** Ability to read and write, making linguistic creation, ability to lecture competence to effective communication, all these come under the this. This can be developed by engaging in language games and by teaching others.
- 2. Logical/mathematical intelligence** - Thinking rationally with causes and effect relation and finding out patterns and relations come under this area. Finding out relations, explaining things, sequential and arithmetical calculations etc. are capable of developing this area of intelligence.
- 3. Visual/spatial intelligence** - In those who are able to visualize models and bringing what is in the imagination into visual form and in philosophers, designers and sculptors this area of intelligence is developed. The activities like modeling using clay and pulp, making of art equipments, culture and giving illustrations to stories can help the development of this ability.
- 4. Bodily Kinaesthetic Intelligence** - The activities using body language come under this. This area of intelligence is more developed in dancers and actors who are able to express ideas through body movements and in experts in sports, gymnastics etc.
- 5. Musical Intelligence** - This is an area of intelligence, which is highly develop0ed in those who are able to recognize the different elements of music in musicians and in those who can here and enjoy songs. Playing musical instruments imitating the songs of musicians, listening silently to the rhymes and activities like this are capable of developing this area of intelligence.

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- 6. Interpersonal Intelligence** - Those in whom this area is developed show qualities of leadership and behave with others in a manner. They are capable of understanding the thought of others and carrying on activities like discussion successfully.
  - 7. Intra-personal Intelligence** - This is the ability to understand oneself. These people can recognize their own abilities and disabilities. Writing diaries truthfully and in an analyzing way and assessing the ideas and activities of others will help developing these areas of intelligence
  - 8. Naturalistic Intelligence**- A great interest in the flora and fauna of the nature, love towards fellow beings interest in spiritual and natural factors will be capable of developing this area.
  - 9. Existential Intelligence** - The ability to see and distinguish our own existence as a part of the universe, ability to distinguish the meaning and meaninglessness of life, the ability to realize the ultimate nature of mental and physical existences, all these are the peculiarities of this faculty of intelligence.

## **EMOTIONAL QUOTIENT**

The concept of emotional intelligence put forward by Daniel Golman was used in framing the new curriculum. The fact that one's Emotional Quotient (E.Q) is the greatest factor affecting success in life is now widely accepted. The teacher who aims to focus on improving the emotional intelligence of students needs to concentrate on the following.

### **i) Ability to take decisions**

Rather than imposing decision on students while planning and executing activities, the students may be allowed to take part in the decision making process. Taking decisions through open discussion in the class, inviting students suggestions on common problems etc. are habits to be cultivated.

### **ii) Ability to reach consensus**

- When different opinions, ideas and positions arise, the students may be given the responsibility to reach a consensus.

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- Imagining what would be the course of action in some situations, allowing to intervene in a healthy way in problems between individuals.

### **iii) Problemsolving**

- Developing the idea that there is reason and solution to any problem.
- Training in finding reasons for problems.
- Suggesting solutions through individual or group efforts.
- Discussing social problems.
- Analyzing the shortcomings in methods to solve problems.

Whether plastic can be banned within school premises can be given as a problem. Group discussion will provide reasons and solutions. Problems, which can influence classroom learning and for which the learner can actively contribute

Solutions need to be posed

- Self criticism, evaluation
- Ability to face problem-situation in life
- Thinking what one would do if placed in the situation of others, how one would respond to certain experiences of others - All these foster the growth of emotional intelligence.

### **iv) Life skills**

Life skills need to be given a prominent place in education. W.H.O. has listed: skills required for-success in life.

- Self awareness
- Empathy
- Inter personal relations

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- Communication
  - Critical thinking
  - Creative thinking
  - Decision making
  - Problem solving
  - Coping with emotion
  - Coping with stress
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The new curriculum addresses these areas.

Knowing the characteristics of the learner, role of the teacher and how to use the teacher's handbook help the teacher to plan and effectively implement learning activities.

## **ROLE OF A TEACHER**

In the earlier approach the teacher was mainly depending on the lecture method for teaching. But in the new method of education the student centered approach is given more importance than the teacher centered approach. Under this changed scenario the teacher has to perform the following roles in the classroom.

The teacher should be

- A facilitator of learning
- A guide to the overall development of the student
- A good observer and motivator
- Able to consider the activities, needs, special features and age group of students at higher secondary level.
- Able to understand the limitations of learner and their learning problems.
- An instructional material developers

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- A good communicator
  - An innovator
  - Able to raise leadership qualities and self confidence of the learner
  - An authoritarian in the concerned subject
  - Able to arrest and sustain the attention of the learner
  - Able to bring out and encourage the inborn talents.
  - A resource person to ensure the optimum utilization of resources.
  - A systematic record keeper
  - A controller to issue guidance to the students
  - A person with high level of practical competency
  - Able to correlate area of study with familiar environmental situations
  - A self evaluator and good listener
  - Able to create awareness in social problems
  - A person with democratic and humanitarian approach
  - A professional as well as a philosopher
  - A good evaluator
  - A good organizer and a friend.
  - A co-learner as well as co-researcher
  - Able to give assistance and advice in placement needs and self employment by giving moral and technical support
  - Able to keep moral values
  - A person equipped with skill for using new techniques of learning
  - Optimistic and impartial

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## **CHILD FRIENDLY CLASS ROOM ATMOSPHERE**

Learning can be effective and enjoyable only when the class atmosphere is according to the new conception of learning and the characteristics of higher secondary learner.

- Class and seating are arranged in an attractive way
- Democratic nature is upheld
- Always active
- Students interact with teachers without fear
- Opportunity for a variety of activities
- Students allowed to involve interesting group activities
- Learning speed, learning style and differencing levels of attitudes are considered. Help is extended whenever needed.
- Sufficient instructional materials are available
- There is freedom of expression, students share their ideas and experiences
- Students are given acceptance and encouragement
- Healthy atmosphere
- Needs of each student is given consideration. Happy and energetic atmosphere
- Teachers work considering the rights of students
- Problems handled in a patient way
- Teachers look at all events from the student's view point

There will be students of various ability levels in any class because learning style, learning speed, varying exposure to language experiences, physical and psychological problems and varying socio-cultural background.

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The learning experiences provided must help to bring the low activities to an expected level and extended the breadth and depth of the skills of the high activities.

By repeating experiences, introducing variations in a learning experience to suit different levels and if needed, formulating additional experiences the problem of varying ability levels can be tackled.

## **LEARNER**

The learner in second year has undergone a learner centered and process oriented learning experience up to first year. The learner at this age is in awakening stage and he is enthusiastic about environment. He needs recognition and encouragement from environment and also recognize as a grown up man. He is adequately competent to select vocational subjects according to his aptitude and interact and to acquire higher education and profession as he wishes. The aspiration about future life is framed in this particular age for seeming national and international job opportunities. Some of the peculiarities of learner at this stage are;

- Physical, intellectual and emotional planer are intensive changes during the age and their reflections can be observed
- Ability to enquire discover and establish cause effect relationship between phenomena
- headiness to undertake challenges
- Capacity to shoulder leadership roles
- Attempt to interpret oneself
- Susceptibility to different pressures
- Doubts, anxieties and eagerness about sex
- Imaging for social recognition
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## **NEEDS OF LEARNER**

- To make acquaintance with a job or self employment through vocational education
- To acquire more knowledge in the concerned area through higher education
- To recognize and encourage the peculiar personality of the later adolescent period
- To enable him to defined against the unfavorable circumstances without any help

## **ROLE OF LEARNER**

- Active participant in the learning process
- Act as a researcher
- Sharer of information
- Sharer of responsibilities
- Collect information
- Takes leadership
- Involves in group work
- Act as a co-participant
- Observes his environment
- Experiments and realize
- Make interpretations and draw inferences
- Mould himself in to an active contributor for the welfare of the society

## **EVALUATION**

In vocational higher secondary education, a new approach to education and evaluation should be made. Evaluation must be a systematic and continuous

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process. As the curriculum is based on vocational stream, capacity building is a most important part and it should be evaluated accordingly. The technical skills, interest in the particular field, communication skill, analysis organizing and presentation skills etc have to be evaluated. The personal and social qualities also have to be evaluated. Therefore, evaluation should be transparent, continuous and comprehensive.

## **SUPPORTING SYSTEM**

In learner centered vocational education, a learning methodology has to be organized and a proper learning atmosphere is to be provided. Many organizations can support the learning activity. They are: -

### **1 School Resource Group (SRG)**

Comprising all teachers (vocational and non vocational) instructors, and lab assistants with academic head as the group leader.

### **2 School support Group (SSG)**

Comprising PTA president, members of local bodies, members of social clubs, subject experts etc who can contribute guidance /technology /infrastructure / financial assistance etc.

### **3 Parent Teacher Association (PTA)**

Can provide adequate funds for field trips, production cum training centers (PCTC), exhibition, On Job training (OJT) etc.

### **4. Local bodies**

Grama Panchayat, district panchayat and block panchayat can provide infrastructure ie, class rooms, laboratory, library, seminar hall, audiovisual equipment etc.

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## **5 Subjectclub**

All vocational teachers handling same vocational subjects should form a subject club at regional level or district level. This will help to share the knowledge and practical facilities, production and marketing of materials, service etc.

- Based on the excellency, district wise nodal schools may be selected to provide facilities like central library, museums, video conferencing etc.

## **6 Institution Industry Interaction Project (IIIP)**

This should be implemented in every institution to update knowledge this also helps for OJT, PSTC and field visit.

## **MONITORING SYSTEM**

Education is a kind of journey from darkness to light satisfying the needs and the wants of the individual and the society. The modernization of education through activity-oriented system enhances freethinking and working in a fearless atmosphere. It is a qualitative process not a quantitative one this necessitates a proper monitoring system. The system of monitoring should have the following features.

1. It must be transparent
2. It must enrich the ideas of the facilitator through innovative process
3. It must be time bound and rational
4. It must motive the facilitator to adopt new strategies
5. It must be recorded and ensure effective feedback for the effective monitoring of the system, three levels of the mechanism should be setup.
  - School level monitoring group
  - Regional level monitoring group
  - State level monitoring group

Moreover a social auditing system is advisable to attain the objective effectively.

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## **FEATURES OF LEARNING PROCESS IN THE NEW SYSTEM OF EDUCATION**

In the new system of education the learning process should be modified in such a way as to enable the learner to construct the knowledge of his own through observation, co-operation, problem solving, social interaction etc. The learning process should consider the nature ability, social setup, inborn talents and subject selected by the learner. Therefore the learning process should be,

- A continuous mental process
- Simple learner must feel that he is able to undertake the task
- Enable the learner to attain the curriculum objective
- Interesting
- Suitable to the age and attitude of the learner
- Future possibilities
- Enable group activity
- Challenging
- Time bound
- Constructive and curiosity developing
- Possibilities for evaluation
- Capacity to generate independent thinking
- Ability to enquire discovers and establishes cause effect relationship between phenomena.

### **LEARNING AIDS**

To make the teaching and learning process simple and effective, certain learning aids and necessary use of such aids are transacting a complex idea makes the classroom live and students get more and more involved. The advances in science and technology may be effectively utilized for this purpose. Some of the learning aids listed below.

- 
- Multimedia
  - Over Head Projector
  - Computer
  - Internet
  - Liquid Crystal display Projector
  - TV, VCD, DVD and tape recorders
  - Working models
  - Charts
  - Slides
  - Video Conferencing facility
  - Library
  - Text book
  - Source book

## **SOCIETY**

The new educational policy uplifts the social commitment of the learner. Therefore the society can also give some valuable contributions in this changing situation. The new system also ensures that the learner can perform certain useful services for the betterment of society. The social obligations can be illustrated as follows.

- To enrich social values, aptitude and ability in learner
- To develop entrepreneurial aptitude and ability which helps social welfare and self employment
- New system of education adopts OJT, PSTC etc is a part of vocational curriculum, which helps to make close contact with the society.
- The resources available from our society can be positively utilized to convene seminars, interview etc.

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- Social organizations can help learners to make their education socially committed.
  - The social clubs like NSS, Tourism club, CDO club, energy club etc functioning in schools can make direct link with the society.
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## **FISHERIES APPROACH**

Man has constantly been trying to explore the universe for providing himself with food, clothing and housing. These days the problems of food have become very drastic and it is being felt that supplementing agriculture could develop the main weapon in war on hunger. Fisheries is one of the important allied activities of agriculture sector. It is regarded as a powerful income and employment generator as it stimulates the growth of a number of subsidiary industries. This is also a foreign exchange earner besides providing balance protein food to all classes of people.

India possesses ideal conditions for improvement of fisheries. In spite of various advantages of fish as a valuable source of food, its availability is rather restricted in India on account of limited fishing industry. Till recently fishing and allied activities were restricted with certain sector of population. Boats, nets and tackles are what were devised centuries ago and are made by hands while other countries have marched much ahead with modern techniques. Organization of fishing industry on modern line will go a long way in solving the food problem in the country and improving the lot of the fishermen who constitute a significant part of India's population.

One of the important objective of fisheries development has been improvement of economic condition of fishermen who are the prime producers. One of the best ways to uplift the fisher folk is to eradicate illiteracy and to give awareness about new techniques developed in fishing and allied industries.

Today fisheries have been incorporated in our education system as a subject at various levels. Our approach is to teach fisheries as a vocational subject to

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transfer the scientific and technical know how to learners, which will empower them to transfer the knowledge to fisheries sector and modernize it.

## **FCGT APPROACH**

A diverse range of fishing crafts, gears and methods have been evolved to capture a wide range of species constituting the fisheries in different parts of the world. They range from simple fishing methods made from basic materials at minimal cost to modern methods requiring high investment, skilled labours and sophisticated vessels to operate them. Significant developments have taken place in the fishing craft and gear, their materials, design and fabrication/construction and degree of sophistication in the operation and handling, in the last decades. Advances in the vessel technology, precision in electronic navigation system, high definition fish finders and sonars, gear monitoring systems and computerized control systems have increased the precision and efficiency of fishing.

In this course of fishing craft and gear technology, it is attempted to give an overview of the important types of fishing boats- their design, construction, maintenance, important gears- their design, fabrication, major fishing accessories, navigational devices, engines, life saving appliances etc with focus on their recent advances and use. It is hoped that this will be an useful source of information for the students of fisheries science and education, may inspire them to share their knowledge for the overall development of fisheries and fisher folk.

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# LEARNING STRATEGIES

In the modern era of globalization the introduction of new technologies ensure only the survival of the fittest. So it becomes a necessity to equip the leanness to face the growing challenges in the competitive world. Hence the traditional approach to learning is no more relevant in the present context. The teacher should use instructional techniques that motivate the students to construct his own knowledge. Now the learners are not passive listeners, but they are the active participants in the construction of knowledge. Here the teacher – student interaction should be given much importance.

In the new instructional strategy while selecting the methods of teaching, the social and psychological aspects of the learner is to be taken into consideration. The given activities for learning are only suggested ones. It can be altered according to the discretion of the teacher.

To obtain the objectives, the new system of education is introduced in the Vocational Higher Secondary Education for attaining the objectives of the courses in this system, we can adopt the following strategies.

## **I. Assignment**

Assignment is some specific work assigned to the students as a part of their academic enrichment. There are learning activities undertaken as a continuation of class room activities to realize the curriculum objectives to a broader extent . They should be completed in time bound manner. They help to lead learner to higher level of learning from the present status. Challenging assignment can motivate the students to involve in group dynamics and achieve fruitful results. The teachers may at as a guide.

Assignment may be given on individuals or group basis. Assignment includes preparation of notes, preparation of charts, models, collection of materials from institutions etc. Assignments develop skills of reference, observation, enquire reporting etc. It ensures the effective utilization of leisure time of the students.

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## II. Seminar

Seminar is a learning strategy involving an in-depth analysis of specific topic, preparation of a paper and presentation . The paper is presented by either one student or a group of students. After the presentation, there will be a discussion/ interaction in which all the students can participate . The students get an opportunity to clear their doubts and make clarification. Seminar helps to develop communication skill and overcome stage fright.

### ***Stages***

1. *Selection of Topic:* The topic of seminar should be relevant to the subject of study
2. *Assignment of topic to individuals students or team:* The topic may be assigned to one student or to a group of students.
3. *Collection of relevant information:* Information required for seminar can be collected from various sources namely books, magazines, internet, institutions, place and persons.
4. *Preparation of draft paper:* Based on the information collected the student may prepare a draft paper and submit it to the teachers for comments. Revise the draft paper based on the comments of the teachers. The refined draft is submitted for approval.
5. *Program scheduling:* The date, time and venue of the seminar is fixed. A seminar leader may be selected from the students
6. *Seminar paper presentation:* The student/ students shall present the paper in the seminar. The teacher may function as the moderator during the initial stages.
7. *Discussion/ Interaction:* A number of respondents from the students make comments on the topic. This will be followed by a general discussion. All the group members should actively participate in discussion.
8. *Summing up deliberation:* The moderator sums up the deliberation
9. *Evaluation / Feed back:* Both teachers and students evaluate the programme.
10. *Preparation of final report:* A final seminar report is prepared covering all the additional points discussed and consolidated.

## III. Panel Discussion

It is a learning strategy in which a panel of experts are allowed to discuss a specific subject under the control and direction of a moderator. Subjects can be divided according to the number of panel members. Number of panel members

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are fixed according to subdivision of points in the subject. Relevant materials and handout may be given in advance to the learners. The monitor or moderator introduces the subject of discussion and invites a panel member to start the discussion. Each panel member is invited for discussion afterwards. After briefing by the panel members the questions are raised from the audience and the panel members give suitable answer to them. A report should be submitted by each learner to the moderator.

#### **IV. Project**

Project is a self-learning strategy which can exert great influence on the overall development of the learner. Project as learning strategy is to be selected where a problem arises in any part of the curriculum. The students may be divided into groups and assigned different aspects of the problem. Each group works independently. Specific aspects of the problem such as data collection, classification, analysis, report preparation and presentation is to be undertaken by each of the members. Even though the work is divided among the members, it must be ensured that the execution of each and every activity is done with the active participation of all. After analyzing data collected from different sources, the learner arrives at a conclusion that can help to solve the problem. Thereby learner learns the topic through his own activity. The other advantage of this learning activities is that it helps the learner to scientifically handle any problematic situation. It helps in the development of scientific thinking and thereby builds up the students aptitude for the subject.

##### **Stages of the project**

###### ***1. Selection of a topic***

The project selected should be related to the curriculum and it should not be a project for projects sake. The topic or problem should arise from the curriculum.

###### ***2. Planning of the Project***

- (a) Hypothesizing: Hypothesizing means making assumptions based on the available primary information.
- (b) Methods and Technique : The methods and Technique should be based on the aim and Hypothesizing of the Project. The nature of the project,

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suitability of the tools, and the methods of learning should be related to each other.

### **3. Collection and Tabulation of Data**

The data may be primary, secondary or tertiary. Either census or sampling method can be used based on the objective of the project. Suitable questionnaires are to be prepared for the collection of primary data.

The collected data is to be classified and tabulated so as to make it easily understandable.

### **4. Analysis of data and formulation of conclusion**

By analyzing the data, the reliability of the hypothesis can be examined. Preparation of graphs and diagrams and maps will positively help the analysis. The similarities, relations and differences gathered from the analyzed information would tell whether the hypothesis should be accepted or rejected.

### **5. Preparation of Report**

The cover page should have the title of the project, the period of study, name (s) of investigator/group, and the address of the school. The report should be structured in the following order.

1. Title
2. Preface
3. Hypothesis and aim
4. Methodology
5. Sources of data
6. Analysis and conclusion
7. Suggestions (if any)
8. References
9. Appendices (Questionnaire, Observation schedule, check list Etc.)

### **6. Presentation of the Project**

When the project is presented, the learner is being evaluated and accepted. It is through this presentation that ideas are shared with others in the class and society.

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The project methods promotes scientific self learning and makes him capable of solving the problem arising in real life situations.

## **V. Debate**

Debate is a hot and interesting learning activities. A debate can be organized only on a topic on which there is difference of opinion. Therefore a topic suitable for debate has to be chosen.

Debate can be on relevant topic that is different and interesting to the students and relevant to society. Students with different opinions have to be identified for discussion. Those who have similar opinion should join together to form a side . Those who hold the opposite view with form the other side. It would be ideal to write down the topic of the debate and displayed in advance. There should also a person to control debate.

Students should be given opportunity to absorb the ideas obtained from discussion and debate, develop the idea through reading and study, and to express them through writing or other means

### ***Stage of Debate***

1. Topic Selection
2. Selection of panels keeping in balance with intelligence, gender etc.
3. Selection of moderator
4. Collection of information guided by the teacher
5. Conducting the debate under the control of moderator by avoiding any sort of personal conflicts
6. Conclusion by the moderator expressing his final version or verdict.

## **VI. Case Study**

A case may be a person, institution or a community case study is an in-depth analysis of an actual event or situation. It presents real pictures of situation with facts, objective information or data. Learners analyses the case to interpret, predict and resolve issues associated with it. The case study provides the learner an opportunity to analyse and apply concepts, data and theory taught from the class. Learners can work individually or in groups.

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By studying realistic cases in the classroom, students develop new insights into the solution of specific on – the – job problem and also acquire knowledge of the latest concepts and principles used in problem solving.

Case may be presented by the teachers or may be provided in print form.

A simple case study may have the following steps

1. Collection of data
2. Conversion of data into information
3. Analysis of the case in groups
4. Presentation of the finding by each group leader.
5. Evaluation

In addition to the above mentioned learning strategy there are many other learning strategies which can be used in appropriate situations to enrich learning process such as problem solving, Role play, brain storming, debate etc.

### **VII. Brain Storming**

This is the best method for solving creative problems. It facilitates generation of ideas quickly. Rules for conducting Brain storming.

1. No response is wrong. So welcome every response.
2. Welcome as many responses as possible
3. No criticism is allowed
4. Allow to work on others idea

*Steps in Brain storming*

1. Presentation of the problem
2. Provide relevant information
3. Record the ideas put forth by the participants
4. Combine similar ideas
5. Evaluate each idea and solution
6. Selection of the best solution

If brainstorming is used as an instruction strategy, the last step is not essential

### **VIII. Discussion**

Discussion is essential for the student to share new finding, idea and conclusion at each stage of learning with fellow students and teachers. In general discussion the teachers should guide the discussion through questioning and summarizing.

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The major steps involved are

1. Introduction initiated by the teacher
2. Development of discussion by giving lead points and follow up interactions
3. Transaction stage in which the key points are reviewed by the teacher and
4. Summarizing stage in which teacher provides additional support materials to ensure the achievement of the objectives

#### **IX. Group Discussion**

Group discussion is an ideal method to develop cooperation, democratic attitude, friendliness and compromising attitude which are the ultimate aims of education. During group discussion the teacher may observe each group and it needed help them to channel the discussion towards the common objectives. All students may be given opportunity to take part and express their ideas within a time limit. The conclusion reached may be entered by each student. A group representative must present this during consolidation in which the teacher may correct or add informations to ensure that all the relevant ideas have been covered

#### **X. Collection**

Collection is a continuous learning activity, which ensures complete participation of students. The collected item may be materials, pictures, charts, ideas, data etc. Collection provides direct experience to learn. An exhibition of collected materials will help to strengthen the concept.

#### **XI. Practical works**

Experimentation contains the process skill in an integrated way. In the new approach of curriculum the student forms idea and comes to conclusion though process. The term 'Practical' when associated with a science subject usually means an experiment. The objective of doing an experiment is to explore new ideas though investigation only. Its main purpose is to verify some principles associated with theory. The subjects end here. But this is not the case with 'Vocational Practical'

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The ultimate goal of a Vocational Education is to generate skill through continuous practice along with investigation and invention. Continuous practice transforms the unskilled to the skilled. This is the significance and importance of practical in the Vocational stream. Hence it is very crucial that Vocational teachers as well as instructor should understand the importance of vocational practical and act accordingly.

## **XII. Quiz**

Quiz programmes can be used as an interesting class room tool for transaction of curriculum objectives as well as to evaluate the effectiveness of transaction and achievement of students.

For conducting a quiz programme a topic should be selected based on the above objective

The students are asked to prepare questions based on the topic individually. The next day / next hour the students are grouped into 3-4 groups randomly. A question is raised by a particular team and the other teams to answer them if they can answer the question they get points for that if all other teams fail to answer the question raised by the 1<sup>st</sup> team the 1<sup>st</sup> team answer the question and explain the background if necessary. All the teams get equal number of chances to ask the question. Time limit is also prescribed for the conduction of the programme. The team who scores maximum points wins

All the participants can make notes on the questions asked, answers and their explanations which help them in learning

## **XIII. Models**

Models are used in learning process. It enhance the leaning experience. This is based on the 'seeing is believing". It helps the learner a chance to see feel the model presented. Still models and working models help the students to understand the structure, working principles, actual operation etc.

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***Several steps are involved***

1. Locating the problem
2. The teacher should plan the type of model according to co's
3. Grouping the students
4. Briefing the tasks
  - Aim
  - Need
  - Material required
  - Source & Materials
  - Cost of materials
  - Division of Labour
  - Guidance
  - Fixing of a time limit
5. Presentation by each group about
  - How the models were prepared
  - Details of - Expenses
  - Working and principles
  - Finally documentation of the process
6. Evaluation
  - By the other groups
  - Later a consolidation by teachers are to be done.

**XIV. Games**

Class rooms can be made attractive by introducing different types of games. Games should be interesting as well as informative. Some of suitable games are

1. Odd man out
2. Cross word puzzles
3. Match the following
4. Aswamedham
5. Link game – Answer using clues.

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## **XV. Survey**

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This strategy involves collection of data from the group under study (book, person, materials etc.) It develops the social interaction and communication ability of the learner. It also provides a scope for discovery learning.

### ***Step involved in survey***

- 1 Objective of survey
- 2 Selection of area for survey/sampling frame
- 3 Selection of survey method

Direct method

With help of questionnaire/schedule

- 1 Tabulation and analysis
- 2 Consolidation and Presentation

## **XVI. Exhibition**

It is a learning strategy by which the learner can get a chance to show the skill developed. It provides the intrinsic motivation and exposure.

Exhibition item can be conducted either individually or as a group task. It can be conducted at school / Regional/State/National level. Necessary publicity and other arrangements can be provided. Presentation, documentation, participation and innovative skills of the learner can be evaluated.

## **XVII. Interview**

Interview is one of the important learning strategies taking the help of a resource person. Interview is an inner view. It provides opinion and information about a topic.

An interview is conducted by the following steps

1. How to introduce a problem?
2. Invite a resource person
3. Decide the questions by learners
4. Decide the time, place etc.
5. How to discuss?
6. How many students to participate?
7. Implementation of the interview
8. Conclusion (Facilitator)

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**Items required**

- 1 Interview Schedule
- 2 List of questions prepared by learners Selection of students, selected names sequence of question

**XVIII. Field Visit**

Field visit is an inevitable vocational tool to be implemented in vocational Higher Secondary Education. This helps the students to familiarise with the modern technologies and new situation in a different atmosphere. It provides learning through viewing. It is based on the principle that seeing is better than having. It enables the learning to retain the learned information longer and to make the subject more interesting. It motivates and give more confidence in his/her particular vocation.

The facilitator should identify suitable center/ institution/site. Get prior permission from the authorities before conducting the field visit. Give instructions to the learners for collection data/information/materials/specimens. Teacher may assign different duties to learners by working them different groups.

Each learner should take utmost care and interest during the visit. He/She should observe and interact at the center/ institution where the field visit is conducted

After the visit, learner should acquire the ability to apply the ideas/concepts in his future carrier. Each learner should submit a detailed report about the field visit.

**XIX. Demonstration**

Though demonstration we can present an item/product and emphasis its features very effectively.

Eg:- To understand the functioning of a computer

1. Material/Item/Process
2. Demonstration
3. Venue
4. Additional requirements depending upon the nature of the item

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## Demonstration Process

1. Introduction about the item/Material
2. Principles – Working
3. Operation
4. Components
5. Merits of the item

## **XX. Chart display**

It is also one of the important teaching aids. It can be used in every activities of a learning process.

Chart display is a written or pictorial representation of idea or concept. It is abbreviate, brief and clear. It is prepared by study

### ***Benefits***

1. A learner gets clear idea about the concept
2. The leaner can retain the ideas in his mind for longer periods
3. A complicated idea can be simplified though a chart

Cheap method of teaching aid.

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# CURRICULUM OBJECTIVES

## Curriculum objectives

- To identify and list the external parts and their position of a typical fishing boat through demonstration , discussion & presentation of notes on discussion & observation
- Develop an idea about the function and use of various parts of a typical fishing boat through group discussion & secondary references .Preparation & presentation of notes on discussion & references and observation.
- Make an awareness about stability and factors affecting stability through demonstration, discussion and listing out the points.
- Develop capability to differentiate various bottoms of boats and analyze the merits and demerits of different boat bottoms using models, charts/ slides/multimedia, and prepare a diagram
- To get acquainted with the devices which aid in navigation such as Compass, GPS, Navigational charts and Radar; and to understand their uses, position and general working principle through multimedia presentation, group discussion and field visit.
- To develop skill in reading blue print of construction drawings and table of offset through discussion and observation
- To develop skill in the constructional procedure of fishing boats (wooden, plywood and FRP) through field visit, OJT and practice
- To analyze various factors affecting life of a boat and get an insight on the care and protective measures through discussion, field visit and case study
- To get awareness on the significance of annual maintenance and its procedures through discussion field study and interview

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- To identify different parts of fishing gear such as gill net, trawl net, purse seine and long line through observation of demonstration and discussion
  - To attain skill in fabrication and mounting of fishing gears like gill net, trawl net, purse seine, and tuna long line through practice/ OJT
  - To get an awareness of the care and maintenances of fishing gear through general discussion and field study.
  - To appraise the significance of the annual maintenances and its procedures through general discussion, field study and interview
  - To get accustomed to the different types of marine engines ,their operation and maintenance through discussion, structured interview and OJT
  - To identify and list the important fishing accessories and under stand their uses and position through field visit.
  - To collect information and familiarize with different types of fish detection devices such as Echo sounder, Sonar, SatNav, LORAN, Net sonde through general discussion and field visit
  - To appraise the significance of Artificial Reefs and Fish Aggregating Devices through discussion and slide/video clippings
  - .To get awareness on the impact of AR's and FAD's in fishery through debate
  - To become familiar with the major rules and regulation of fisheries sector in Kerala like KMFRA Act, code of conduct of responsible fisheries ie, Article. 8, Merchant shipping Act through interview and discussion
  - To make aware of the policies and procedures for registration, insurance, compensation for craft, gears and fisherman through survey and discussion
  - To accustom with various financial assistance and subsidies for purchase of craft and gear from the Kerala state fisheries dept, Matsyafed and MPEDA through survey.

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# Syllabus

Theory - 140 hrs

## Unit. I

### **BOATS—GENERALDESCRIPTION**

Description of different parts and principal dimensions of a fishing boat. Their uses and position.

## Unit. II

### **BOATSSTABILITYANDDIFFERENTBOATBOTTOMS**

Stability of boats and factors affecting stability; Types of boat bottoms- their merits and demerits.

## Unit . III

### **BOATORIENTINGDEVICES**

Types of boat orienting devices and their uses.

## Unit. IV

### **BOATCONSTRUCTION**

Reading blue print of boat design drawing: Section, Profile, and Plan views, Table of offset; Constructional procedure of different type of boats (plywood, wood and FRP).

## Unit. V

### **BOATMAINTENANCE**

Factors affecting life of a boat; care and maintenance of boat

## Unit. VI

### **FISHINGGEAR**

Design and fabrication of different gears like Trawl net, Gill net, Purse seine net, and Longline;their parts identification and mounting.

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## **Unit. VII**

### **GEARMAINTENANCE**

Factors affecting life of a gear; care and maintenance of gear.

## **Unit. VIII**

### **MARINEENGINESANDFISHINGACCESSORIES**

Different types of marine engines, difference between petrol and diesel engines, maintenance of marine engines; Different fishing accessories and their functions.

## **Unit. IX**

### **FISHDETECTIONDEVICES**

Types of detection devices such as Echo sounder, Sonar, SATNAV, LORAN and netsonde; their position and general working principle.

## **Unit. X**

### **ARTIFICIALREEFSANDFISHAGGREGGATINGDEVICES**

Types, function, significance and impact of artificial reefs and FAD's.

## **Unit. XI**

### **RULES,REGULATIONSANDPOLICIESINFISHERIESSECTOR**

Rules and regulation of use and operation of craft and gear; Catastrophes and safety measures in fishing. Policies and procedures for insuring craft and gear and fishing employees. Compensation claims for fishing employees. Financial assistance /subsidies for purchase of craft and gear for the welfare of the fishermen.

### **PRACTICALS – 420Hours**

- Drawing of labelled diagram of a fishing boat's parts
- Field visit to the harbour, to identify different boat bottoms
- Chart preparation of types of boat bottoms
- Field visit to a fishing boat for identifying boat orienting devices

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- Visit to boat building yards(plywood, wood, FRP)
  - Visit /OJT/Practical training on construction of boat
  - Field visit to identify factors affecting life of a boat
  - Case study of different factors affecting the life of a boat and care and maintenance of boat
  - Practical training on net fabrication and mounting
  - Field visits to identify the factors affecting life of gears
  - Field visit to understand the care and maintenance schedule of fishing gears
  - Field visits to identify different types of marine engines and fishing accessories
  - Field visit to understand maintenance and care of marine engines
  - Field visit to identify different fish detection devices
  - Field visit to collect information on different rules and regulation and policies

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## PLANNING

The transaction of fisheries curriculum in Vocational Higher Secondary classes has to be made through different but relevant activities. The teacher should plan those activities, which are suitable for the development of different concepts, skills and elements of multiple intelligences in the learner. Such activities can be made within or outside the classroom. For the effective, timely and systematic transaction of the curriculum the activities has to be planned well in advance. This will help the teacher to guide the learners to prepare for the activities and to evaluate the process at different stages.

It is necessary that the teacher should prepare an annual plan, unit plan and daily plan for the effective transaction of the curriculum.

### **Year Plan**

An year plan has to be prepared in order to foresee picture of the whole activities to be conducted in the class in an academic year. The year plan is to be prepared by the teacher after examining the curriculum objectives, textbook, source book and other training materials. While preparing year plan the teacher will consider the facilities available in the school, the possibilities of field visits, interviews, seminars, projects, collections, discussions, lab work etc. which form part of the activities of the lessons. Activities are to be arranged by utilizing the local resources available. For systematic and effective transaction of the curriculum the year plan is an important instrument. With the help of year plan the teacher can transact the curriculum systematically within the stipulated time. The year plan included in this source book is flexible in nature and revised and rearranged to create favorable opportunities for providing positive learning experiences on the basis of locality aspects with the support of school support group (SSG) and school resource group (SRG).

While framing the year plan the following points should be kept in mind;

- Field visits of various units can be clubbed together, if there is any practical difficulty in conducting these field visits separately or unit wise.
- The OJT should be conducted before January.
- Types of products and period of operation can be modified on the basis of raw materials availability, season, demand etc.

## YEAR PLAN

Unit	Month	Topic	Activities	Time/ Hours	
				Theory (140 hrs)	Practical (420 hrs)
Unit I Boats – General Discussion	June	<ul style="list-style-type: none"> <li>• Identification of different parts – keel, hog keel, stem, stern, transom frame, mast, boom, deck, hull, wheel house, rudder post, propeller, bulk heads, engine bed, waterlines, free board, length overall</li> <li>• Functional use of each parts</li> </ul>	Demonstration Discussion Listing out the parts Drawing a labelled diagram Presentation of notes General Discussion Group Discussion Presentation Field Visit	1 2 1 - 2 1 - - - -	- - - 1 - - - - - 9
Unit II Boats stability and different boat bottoms	June	<ul style="list-style-type: none"> <li>• Boats stability, center of gravity, buoyancy, metacentre</li> <li>• Different types of boat bottom – Round, V type and flat type</li> <li>• Their merits and demerits</li> </ul>	Discussion Demonstration Group Discussion Chart preparation Field Visit	2 2 4 - -	- - - 2 8
Unit III Boat Orienting Devices	June	<ul style="list-style-type: none"> <li>• Types of orienting devices – Radar, GPS, Navigational charts</li> <li>• Their uses and position</li> </ul>	Discussion Multimedia Demonstration Field visit	3 2 - -	- - 8 -

Unit	Month	Topic	Activities	Time/ Hours	
				Theory (140 hrs)	Practical (420 hrs)
Unit IV Boat construction drawings and constructional procedures	June	<ul style="list-style-type: none"> <li>• Reading boat construction plan- Profile view, half breadth view, sheer view, table of offset</li> </ul>	Demonstration	1	-
			Discussion	3	-
			Demonstration	4	-
			Visit to a boat building yard with different types of boats	6	40
Unit IV Boat construction drawings and constructional procedures	July	<ul style="list-style-type: none"> <li>• Boat construction yard – Constructional procedures; Familiarization of different constructional procedures</li> </ul>	OJT/ Practical training	-	80
Unit V Boat maintenance	August	<ul style="list-style-type: none"> <li>• Factors affecting life of a boat</li> <li>• Care and Maintenance of boat</li> <li>• Significance of annual maintenance</li> </ul>	Discussion	6	-
			Field visit	-	15
			Case study	-	25
			Interview	-	10
			Discussion	4	-
<b>First Term Evaluation</b>					
Unit VI Fishing Gear	September	<ul style="list-style-type: none"> <li>• Different parts of fishing gears</li> <li>• Gill net</li> <li>• Trawl net</li> <li>• Long line</li> <li>• Purseseine</li> <li>• Net fabrication and mounting</li> </ul>	Demonstration	6	-
			Discussion	7	-
			Practical	-	50
Unit VII Gear Maintenance	October	<ul style="list-style-type: none"> <li>• Factors affecting the life of a gear</li> <li>• Care and Maintenance of fishing gear</li> <li>• Significance of annual maintenance procedures</li> </ul>	Discussion	5	-
			Field study	-	16
			Project	-	30
			General Discussion	4	-
			Field study	-	12
			Interview	-	5

Unit	Month	Topic	Activities	Time/ Hours	
				Theory (140 hrs)	Practical (420 hrs)
Unit VIII Marine engines and fishing accessories	November	<ul style="list-style-type: none"> <li>• Different types of Marine engines</li> <li>• Difference between petrol and diesel engines</li> <li>• Maintenance of Marine engines Fishing accessories- their position and uses</li> </ul>	Discussion	5	-
			Field visit	-	16
			Structural Interview	5	-
			Field visit	-	30
			Field visit	-	15
			Discussion	6	-
Unit IX Fish Detection Device	December	<ul style="list-style-type: none"> <li>• Echo sounder Sonar, LORAN, SATNAV, Net sonde</li> </ul>	Discussion	6	-
			Multimedia presentation	2	-
			Field visit	-	18
			Assignment	9	-
<b>Second Term Evaluation</b>					
Unit X Artificial reefs and fish aggregating device	January	<ul style="list-style-type: none"> <li>• Significance and impact of artificial reefs and Fish aggregating devices</li> </ul>	Discussion	6	-
			Slide/ Video presentation	2	-
			Discussion	7	-
			Debate	4	-
Unit XI Rules, Regulation and policies in fishing sector	February	<ul style="list-style-type: none"> <li>• Major rules and regulations, financial assistance, subsidies</li> </ul>	Interview	7	-
			Field study	-	10
			Survey	-	20
<b>March</b>		<b>Final Term Evaluation</b>			

## Unit Plan

In order to convey the curriculum objectives to the students, the teacher should make adequate and prior preparation. This will help in making classroom transaction effective. In the planning process, unit plan occupies an important place.

In the unit plan the steady growth of the annual plan is reflected. This is the plan of a unit to enable us to complete the activities by interrelating the year plan in a time bound manner with suitable modifications on the basis of local demands and environment. Curriculum objectives, teaching strategies, learning aids, expected outcome, evaluation possibilities etc, are to be decided in advance for unit planning. Each unit plan is attached in the concerned units. Teachers can prepare unit plans for each unit by utilizing this as a base. A sample unit plan is given. Find out more and more learning processes and introduces it in the classroom by applying different strategies of teaching and learning.

### UNIT PLAN

#### Gear Maintenance

CURRICULUM	CONTENT/ OBJECTIVE	ACTIVITIES/ AREAS	MATERIALS EXPERIENCES	PRODUCT	EVLUATION
<ul style="list-style-type: none"> <li>To get an awareness on the care and maintenance of fishing gear through general discussion and field study.</li> <li>To appraise the significance of the annual maintenance and its procedure through general discussion field study and interview.</li> </ul>	<ul style="list-style-type: none"> <li>Causative factors like rotting</li> <li>Weathering</li> <li>Abrasion</li> <li>Mechanical destruction</li> <li>Fouling</li> <li>Rusting</li> <li>Daily</li> <li>Weekly</li> <li>Annual</li> <li>Maintenance procedures and interview.</li> </ul>	<ul style="list-style-type: none"> <li>General discussion on the causative agents</li> <li>Field study</li> <li>Project</li> <li>General discussion</li> <li>Field Study</li> <li>Interview</li> </ul>	<ul style="list-style-type: none"> <li>Reference books or materials</li> <li>Reference materials</li> </ul>	<ul style="list-style-type: none"> <li>Project report</li> <li>Field study report</li> <li>Interview report.</li> </ul>	<ul style="list-style-type: none"> <li>Participation in discussion</li> <li>Authenticity of the report</li> <li>Presentation of report.</li> <li>Participation in discussion and field study</li> <li>Presentation of report</li> <li>Authenticity of report.</li> </ul>

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## DailyPlan

Daily plan is the programme for achieving the curriculum objectives targeted for a day. This gives a detailed plan for each hour. CO's can be included and may be divided on the basis of similarities, ideas and activities. This section can be divided into two parts as process\ learning activities and response. If an activity require more than one day to complete a single daily plan is enough for all these days. Teachers have to plan elaborately and systematically before organizing a class. The success of a class depends on the daily plan. The following points should be kept in mind while framing the daily plan.

- Learning activities should be formulated in such a way for developing the various skills of the learner.
- It should be in accordance with the availability of time, needs of the learner, learning atmosphere etc. (if needed the teacher should club one or more periods)
- Active participation of all the learners should be ensured.
- Learning activities should be challenging, interesting and thought provoking.
- Response part of the daily plan can be completed only after the class.
- Future planning should be based on this feedback.
- The teacher can make use of this part for continuous evaluation.
- In response column the teacher should note about the process/ activities, the learners and the teacher himself.

## DailyPlan

A sample unit plan is given. Find out more and more learning processes and introduces if in the classroom by applying different strategies of teaching learning.

## DAILY PLAN

Name of the teacher	:	XXX
Name of the unit	:	Artificial reefs and fish aggregating devices
Name of the class:	:	II VHSE
Time	:	2 hrs
CO	:	To get an awareness on the impact of FAD's in fishery through debate
Learning materials	:	News paper cuttings, Reference books, slide/ video clippings, pictures ,pamphlets' internet sources.

ACTIVITIES	RESPONSES
<p><b>DEBATE</b></p> <ul style="list-style-type: none"> <li>• Exhibition of newspaper cuttings on artificial reefs to present the topic</li> <li>• Observation and reading of the article by all students</li> <li>• Based on the reading a general discussion.</li> <li>• Teacher can supplement the discussion through asking some questions; regarding the exploitation of fishery resource; how the depleting resources can be protected;</li> <li>• What is your opinion about fish aggregating devices;</li> <li>• What are the causes of wrecks in Sea etc?</li> <li>• According to their view point the class is grouped into two, A group and B group</li> <li>• Both groups are provided with learning materials, Reference books slide/ video clippings, pictures pamphlets,etc.</li> <li>• Each group discuss their arguments, they are going to present</li> <li>• Presentation of the arguments by two groups</li> <li>• General discussion on the presentation</li> <li>• Consolidation by teacher.</li> <li>• Recording or preparation of consolidated note.</li> </ul>	<p>Single copy of newspaper was insufficient; time lagging.</p> <p>Additional or Photostat copies are to be provided.</p> <p>The discussion of B group was noisy and emotional.</p> <p>Initially some girls in group A was reluctantTo participate in discussion when encouraged they also actively participated.</p> <p>Group A has presented their arguments more systematically.</p> <p>Time limit has to be strictly followed.</p>

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# EVALUATION

Evaluation is a systematic process of collecting, analyzing, synthesizing and interpreting evidences of students' progress and achievements both in cognitive and non-cognitive areas of learning. Evaluation has to play significant role in making the learning process more effective. It provides diverse experiences to the learners, keeping in view the skill to be attained continuously by them.

As the curriculum is based on a particular vocation the selected stream is the most important part and it should be evaluated accordingly. Technical skills, interest and devotion in the field, communication skills, organizational and presentation skills are to be evaluated. Evaluation of the personal and social qualities also should be done. So the evaluation should be continuous and comprehensive.

## **Terminal or Term End Evaluation (TE)**

It is the written form of evaluation aimed at evaluating the facts, concepts and ideas gained by the learner. The test should not be aimed to evaluate the memory alone. Questions are framed in such a way that the learners are able to apply different mental process while answering. The Terminal Evaluation questions give more emphasis on application, analysis and synthesis level.

The maximum scores for TE is 80 and the minimum is 24 (30%). The questions should be formulated taking into consideration the time required to read, think, understand and write answers. These aspects should be considered while fixing the scores also. To avoid blind guessing, multiple choice and application level questions may be mixed. The total number of questions may vary from time to time. All the questions should be based on the curricular objectives. Open ended questions may be included. Choice questions, if included also should be based on the same curricular objectives.

## **Continuous and comprehensive evaluation (CCE)**

Our traditional evaluation methods measure only the memory and recollection capacity of the learner. To eliminate/ overcome the limitation the evaluation should be done on multi dimensional ways by measuring multiple intellectual capacities of the learner. So it is better to evaluate the learner in a continuous and comprehensive manner. CCE helps the learner to understand and develop his own progress and to develop adequate strategies for further improvement.

### ***Merits***

1. Assess the all round development of the learner on a continuous basis through a variety of activities.

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2. Effective feed back is possible
  3. Remedial diagnostic teaching is possible
  4. Process as well as products are assessed.

A series of learning activities are grouped into five major thrust areas as follows

***Investigative activities***

Activities which create a spirit of enquiry, investigation and a mind for research in the learner belong to this group.

For example.

1. Study project
2. Case study
3. Field study

***Interactive activities***

Activities which improve the communication skill, activities of sharing ideas, etc.

For example

1. Seminar
2. Panel discussion
3. Debate
4. Group discussion

***Assigned task***

Activities assigned to the learners to enrich/ strengthen the concept and ideas.

For example

1. Assignment
2. Collections

***Performance task (Tests)***

Activities related to the achievements of the learner.

For example

1. Class test (oral/ written/ performance test)
2. Quiz
3. Open book examination
4. Interview
5. Group testing

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### ***Practical based activities***

For example

1. Preparation of working model
2. Album
3. Improvisation

From the above five group of activities, the teacher has the freedom to choose any three areas for evaluation purpose.

#### **1. Investigative activity**

Sl.No.	Stages	Criteria	Score	Total Scores
1.	Planning	Planning Relevance of the study Identification of problem Ability to select appropriate tools, ability to select suitable bearing method.	4/3/2/1	
2.	Data collection	Ability to collect sufficient and relevant data. Ability to classify and arrange data for analysis. Reliability and authenticity of the data collected.	4/3/2/1	
3.	Analysis and inference	Ability to analyses the data Systematic arrangements. Ability to draw inferences based on analysis. Ability to give suggestions based on inference.	4/3/2/1	
4.	Report Presentation	Ability to present in logical and sequential order, authenticity of report, time bound comparison.	4/3/2/1	
5.	Viva-Voice	Knowledge of content and process. Ability to analyses data. Ability to justify inference. Ability to explain. Strategies and methods adopted.	4/3/2/1	

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**Case Study**

Sl.No	Criteria	Score	Total Scores
1.	Identifying the problem	43/2/1	
2.	Approach to the problem	43/2/1	
3.	Time bound Action	43/2/1	
4.	Analysis of the problem	43/2/1	
5.	Problem solving / Reporting	43/2/1	

**Field study**

Sl.No	Criteria	Score	Total Scores
1.	Attitude and readiness towards the task	43/2/1	
2.	Capacity for Observation	43/2/1	
3.	Data collection	43/2/1	
4.	Application of ideas	43/2/1	
5.	Documentation / Recording	43/2/1	

**Assignment**

Sl.No	Criteria	Score	Total Scores
1.	Awareness of the content	43/2/1	
2.	Comprehensiveness of the content	43/2/1	
3.	Systematic and sequential arrangement	43/2/1	
4.	Observation/suggestion/views/judgment/evaluation	43/2/1	
5.	Timely Submission		

**Seminar**

Sl.No	Criteria	Score	Total Score
1.	Planning and Organization	43/2/1	
2.	Collection and data / content	43/2/1	
3.	Observation / appraisal and clarity	43/2/1	
4.	Content knowledge	43/2/1	
5.	Presentation	43/2/1	

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**Debate**

Sl.No	Criteria	Score	Total Score
1.	Readiness to participate	43/2/1	
2.	Depth of subject knowledge	43/2/1	
3.	Communication skill	43/2/1	
4.	Ability to justify the stand	43/2/1	
5.	Presentation	43/2/1	

**Group Discussion**

Sl.No	Criteria	Score	Total Score
1.	Readiness to participate	43/2/1	
2.	Depth of subject knowledge	43/2/1	
3.	Communication skill	43/2/1	
4.	Ability to justify in a democratic way	43/2/1	
5.	Leadership quality	43/2/1	

**Interview**

Sl.No	Criteria	Score	Total Score
1.	Planning	43/2/1	
2.	Preparation of Questions	43/2/1	
3.	Communication skill	43/2/1	
4.	Participation	43/2/1	
5.	Report preparation	43/2/1	

**Practical Evaluation (PE)**

The goal of vocational Education is to generate skills through continuous practices along with investigation and innovations. Continuous and comprehensive practice transforms the unskilled learner to a skilled one. This is the importance and significance of vocational practicals.

PE is done to evaluate the practical skills achieved by the learner in the concerned vocational subject Total Scores for PE is 150 and minimum is 60 score ie 40%. Practical Examination is conducted for a batch of 8 learners having 6 hours duration.

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Practical evaluation should be done taking into account the whole practicals included in the curriculum since learning of practical skills is a continuous process through out the period of study.

### **Vocational Competency Evaluation (VCE)**

Vocational Competency Evaluation is to evaluate the vocational skill and aptitude developed by the students during the learning process. This is a system to judiciously evaluate the required value addition and consequent capacity building in the concerned vocational curriculum. The vocational education is aimed at developing interest, skills and devotion in specific vocational fields. As other evaluation components like CE, PE and TE cannot assess the vocational competencies and professional skills, acquired by the students an internship evaluation (IE) components has been introduced to meet this requirement.

Internship evaluation should be done based on the following components like regularity and punctuality, value addition and capacity building.

#### ***1. Regularity and punctuality***

Regularity and punctuality has vital role in vocational education learning continuous process, the regular presence of the learner is must for attaining maximum efficiency.

#### ***2. Value Addition***

Value addition is the qualitative measure of the learner's interest, devotion perseverance and efficiency. Value addition can be evaluated through conducting field visits/ vocational survey. The experiences gained through field visit / vocational survey increases the level of intrinsic motivation and positive attitude towards the vocational field and thereby increase his value as a semiprofessional.

#### ***3. Capacity Building***

It gives a quantitative measure of the student's skill in graded area exposure. Capacity building can be evaluated through conducting the following activities.

1. OJT / Simulated experiment
2. Performance – camp/exhibition/clinic
3. Performance – PCT/Service cum Training center.

These components help the learner to practise the acquired skills in the real situation and thereby increasing self-confidence and promoting self reliance.

***Vocational Competency Evaluation Indicators***

No	Items	Scores
1.	Regularity and punctuality	10
2.	Field visit / survey (anyone) vocational project	20
3.	OJT/Simulated experiment performance – Camp/exhibition /clinic Performance – PSCTC (anyone)/Practical skills	20
Total		50

1. Regularity and punctuality can be assessed by using attendance of the learner and time bound completion of tasks. It is evaluated by using 5 point grading system.

***Rating scale***

Sl.No.	Item	1	2	3	4	5
1.	Regularity	Never regular	After regular	Equally regular	Most of the time regular	Always
2.	Punctuality	Never regular	Often punctual	Usually punctual	Most of the time punctual	Always punctual

Item	Evaluation indicators	Scores	Score
Value addition	<b><i>Field visit</i></b>		
	1. Attitude and readiness towards the task	4/3/2/1	
	2. Capacity for observation	4/3/2/1	
	3. Data collection	4/3/2/1	
	4. Application of ideas	4/3/2/1	
	5. Documentation/recording	4/3/2/1	
	<b><i>Or</i></b>		
	<b><i>Survey</i></b>		
	1. Planning	4/3/2/1	
	2. Data collection	4/3/2/1	
3. Consolidation of data and analysis	4/3/2/1		
4. Drawing inference	4/3/2/1		
5. Reporting	4/3/2/1		

Capacity Building	<b><i>OJT/Simulated experiment</i></b>	
	1. Involvement/participation	4/3/2/1
	2. Skills in doing work/ communication skills	4/3/2/1
	3. Time bound action	4/3/2/1
	4. Capacity for observation, analysis and innovation	4/3/2/1
	5. Documentation, recording and display	4/3/2/1
	<b><i>Or</i></b>	
	<b><i>Performance in camp/exhibition/clinic</i></b>	
	1. Ability for planning and organizing	4/3/2/1
	2. Mastery of subject	4/3/2/1
	3. Ability for communication	4/3/2/1
	4. Innovation	4/3/2/1
	5. Involvement/social commitment	4/3/2/1
	<b><i>Or</i></b>	
	<b><i>Performance in production/service cum training center (PSCTC)</i></b>	
1. Mastery of vocational skills	4/3/2/1	
2. Managerial capacity	4/3/2/1	
3. Promoting self confidence	4/3/2/1	
4. Innovation approach	4/3/2/1	
5. Promoting self reliance	4/3/2/1	

### CRITERIA FOR PROMOTION

A minimum of 80% attendance is required to register for the public examination. Those who are having at least 65% can apply for condonation from higher authorities. Those who have shortage of attendance below 65% should repeat the second year.

The students should obtain minimum 30% score in all subjects separately in TE. In first year if the student failed to obtain 30% minimum score in any subject he will be promoted and will be given chance for improvement.

The students should obtain a minimum of 40% score in the vocational practical Evaluation (PE) that is 60 out 150 score. If a student fails to attain the minimum required score for TE and secure minimum score for pass in TE, he need not reappear for practical examination and vice versa.

# FISHINGBOATS— GENERAL DESCRIPTION

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## Introduction

Fishing is the oldest profession of mankind ever since man began his search for food. The method and equipment used by earlier fisherman appear crude and unsophisticated. In fact so far as modern commercial fishing is concerned, the opposite is the fact in most of the world's important fisheries. Technology, sophistication, complexity and investment in vessels and equipments together with techniques of fish finding and bringing fish to board are showing rapid development. Increasing investment in vessel and development are continuously improving the efficiency of operation and conditions under which the fishermen work.

Fishing technology can be defined as a discipline that deals with study, development and improvement of the techniques used for fish production by capture. This involves transfer of appropriate technology as well as upgrading of local gear, method and skills.

Fishing technology has an important role to play in the rational development and management of national fisheries. They include;

1. Increasing fish production per fishing unit per fisherman.
2. Improving fishermen's living conditions.
3. Providing technical assistance and advice to fisheries administration.
4. Providing advisory service to the fishery industry.

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5. Giving training to fisher men & dissemination of improved fishing techniques.
  6. Improvement of fishing vessels.
  7. Conduct experimental fishing.
  8. Help for commercial fishing operations.

The success of fisheries in a country depends on the boats that can ply in its waters and the nets that can capture its fishes. India has a coast line of over 8041kms with vast resource of fishes and with a promising development arena .Fortunately our land Kerala is also blessed with immense fishery resources and the fisheries sector is growing day by day. Therefore a course on fishing craft and gear technology has a promising career opportunity .Craft & gear technology course for II VHSE mainly deals with the scientific study, use of mechanical arts & application of this to practical tasks in industry of crafts, gears and their accessories. This section deals with the technology of fishing crafts, which include the construction ,care & maintenance. To study the constructional procedure a prior knowledge of the different parts of a boat is essential. Therefore this unit aim to acquire a through knowledge of various parts of a craft.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>To identify and list the external parts and their position of a typical fishing boat through demonstration ,discussion &amp; presentation of notes on discussion &amp;observation</li> </ul>	Different parts of a boat Keel,Hogkeel,Stem ,Stern Transom frame,Mast,Boom, Deck,Hull,Wheel house, Rudder post, Propeller,Bulk heads, Engine bed, Water lines, Free board, Length over all.	Demonstration of model boat/chart Observation Discussion Listing out the parts Draw labeled diagram Presentation of notes prepared	Models, Charts	Notes prepared based on observation, in discussion, in diagram	Participation in observation, in discussion Preparation of notes& diagram Presentation of notes
<ul style="list-style-type: none"> <li>Develop an idea about the function and use of various parts of a typical fishing boat through group discussion &amp; secondary references. Preparation &amp; presentation of notes on discussion &amp;references.</li> </ul>	Function and use of the above observed parts	Priliminary discussion Collection of additional information through references Group discussion Presentation of each group Consolidation by teacher	Reference books, journals, Internet source	Report of each group's discussion A final consolidated report	Participation in discussion Participation in collection of information Presentation of report

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**\*Discussion with demonstration on ‘different parts of a boat’.**

Arrange a demonstration of parts of a boat through models or charts. Let the learners observe the parts. Ask them to identify parts and list them. In order to expand the idea lead them to discussion. Let each learner prepare notes on discussion and observation. Randomly selected learners may be asked to present the prepared notes. After presentation ask the learners to draw a diagram and label it.

Discussion points should include the following parts and the learners must be able to identify these parts and their position in the boat, upon completion of this unit.

Keel, Hog keel, Stem, Stern, Portside, Starboard side, Transom frame, Mast, Boom, Deck, Hull, Wheel house, Rudder post, Propeller, Bulk head, Engine bed, Water lines, Free board, Length over all, Hatch, Stern post, Horn timber, Breadth, Draft, Camber.

**\* Group discussion on the function and use of various parts.**

A group discussion can be arranged to transact this topic. Class may be divided into smaller batches and discussion is arranged on “ the use of the different parts” they have listed in the previous classes. After a preliminary discussion ask them to collect more information from references and another discussion can be arranged, to discuss the collected informations. Ask all members of the group to make a report of their discussion and let a representative of each group present their conclusions. The teacher may correct or add to the conclusions and ensure that all the relevant informations have been covered. Learners may be instructed to enter the consolidated ideas in to their note books. A field visit to a near by fishing harbor can be conducted to make their idea more thorough.

UNT

# 2

## BOATS STABILITY AND DIFFERENT BOAT BOTTOMS

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### Introduction

It is a known fact that a big ship or a boat loaded with large quantities of cargo will float on water but a very small piece of steel or iron will sink. This is due to the theory of stability based on the principle of displacement. The stability of a boat is a crucial factor in the construction of a boat. Therefore a student studying craft and gear technology should have a thorough knowledge on the stability and factors affecting it. This unit deals with the various factors affecting stability and explains the buoyancy of a boat.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>Make awareness about stability and factors affecting stability through demonstration, discussion and listing out the points.</li> </ul>	Boats stability/Centre of Gravity Buoyancy, Metacentre	General discussion based on reference notes	Reference materials.	Preparation of notes based on discussion	Participation in discussion
<ul style="list-style-type: none"> <li>Develop capability to differentiate various bottoms of boats and analyze the merits and demerits of different boat bottoms using models, charts/slides/multimedia, and prepare a diagram.</li> </ul>	Flat bottom, U bottom & V bottom, their merits & demerits	Group discussion on types, merits & demerits and uses of each bottoms based on reference materials and pictures and charts provided.	Reference books or printed materials.	Notes preparation based on discussion	Participation

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### **\*General discussion on stability and displacement**

Learners already have knowledge on floating concept .Recall it by asking some questions like;

- Why a piece of steel sinks but a huge ship made of steel floats?
- What will happen to a ship/boat in a stormy weather?
- Why the boat/ship have a typical shape?

To introduce the concept of displacement teacher could narrate the story of Archimidis.Thus a general discussion shall be initiated .List out the points for discussion

- Why boats float?
- What is stability?
- Factors which affect stability
- What is buoyancy?
- Role of gravity and buoyancy
- Displacement

Later the discussion could be supplemented with reference notes. After discussion teacher may consolidate the discussion by adding or correcting the discussion notes. Factors like metacenter, center of buoyancy and center of gravity shall be cited using charts.

### **\*Discussion with demonstration and preparation of charts of various Bottoms of boats**

Pictures/charts/models can be presented to the learners to make them understand the different types of boat bottoms . Arrange a group discussion to list out the merits & demerits of these different boat bottoms. For this class may be divided in to 3 groups and each group can discuss the merits and demerits of each boat bottom (flat shape, U shape and V shape).Let each group discuss and present their consolidation and other group's shall supplement their ideas .A final consolidation can be done by teacher and all the learners are asked to record it. Later a chart showing three types of boat bottoms shall be prepared in the class room.

UNIT

# 3

## BOAT ORIENTING DEVICES

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### Introduction

Boat Orienting/Navigation is the process of directing the movement of a craft from one place to another. It is the science of finding ships position and the art of conducting her safely from place to place. Navigation deals with chart work, marine compass, GPS and Radar and it is largely concerned with position, direction, distance, speed and time.

In the present day most of the boats are provided with various types of orienting devices. Therefore students should have a good knowledge of different types of devices and their use in navigation. This unit familiarize with major navigational devices common in fishing boats.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>To get acquainted with the devices which aid in navigation such as Compass, GPS, Navigational charts and Radar; and to understand their uses, position and general working principle through multimedia presentation, group discussion and field visit.</li> </ul>	<p>Types of orienting devices; Compass, GPS, Navigational charts, Radar; Uses</p>	<p>Discussion Demonstration Field visit Presentation of report</p>	<p>Reference materials Multimedia CD'S Slides Pre recorded video clips.</p>	<p>Notes prepared based on discussion, demonstration &amp; field trip.</p>	<p>Participation in discussion. Participation in observation, field trip Presentation of notes.</p>

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**\* Discussion on different types of boat orienting devices.**

Teacher can initiate the discussion by asking the students to name any devices which help in navigation. E.g. Compass.

OR

Teacher can ask any student who have fishing experience, how they usually fix their position and direction in sea. Thereby the discussion about boat orienting devices can be started. Let them do a general discussion. Later based on the multimedia presentation and reference materials a group discussion on various navigational devices and their uses can be conducted. Thereafter notes shall be prepared and presented.

**Field Visit**

A field trip is preferable as a strategy to study these devices. A field visit on a fishing boat may be conducted to provide a real life experience of these devices. Teacher may enable the students to visit a fishing boat equipped with the devices for getting a first hand experience regarding them. To prepare the students for field trip a pre recorded video clips or slides may be shown to the students in the class. The teacher should give an idea on the objectives to be fulfilled by the students during and after the trip. For e.g.: the use of the devices, their position in the boat and their working. The report should be recorded and later presented in the class room by each student.

Upon the completion of this unit the student should be able to:

- Identify and differentiate various navigational devices – Radar, Compass, Chart and GPS.
- State the uses of each device.
- Have awareness in the significance of these devices in navigation.

Boat Construction is a complex task requiring plenty of knowledge and skill. First of all it is necessary to be able to produce drawings and calculations relevant to the design procedure in an efficient way and in a reasonable span of time without error. Independent designers must be able to produce these by him. It is assumed that before starting an independent design study a preliminary knowledge on reading line's plan, table of offset is necessary.

The scope of any design is to build the vessel and put it into operation. It must be based on realistic and sound economic assumption; otherwise it will be a failure. A failure of the design may also be of purely technical character and this kind of failure is always combined with particular operational drawbacks: for e.g.: If the insulation of fish hold is not properly designed the quality of catch landed will be lower than anticipated; if the propeller is wrongly selected the fuel consumption will be increased or speed and pull insufficient. Therefore a successful design must be economically and technically sound.

In the past fishing boats have been constructed by trials and errors or by experience. However, during the last few decades, fishing boats have been designed keeping in mind their performance. Due to the high demand of fishing vessels there are immense scope for boat construction which provide a guaranteed employment opportunity to the experts in boat construction. Several boat building (both government and private) yards are there throughout our coastal belt. As boat building is a highly capital intensive industry, and fishermen being basically conservative a thorough knowledge and skill in boat construction is necessary. This unit provide the students a good opportunity in acquiring skill and to collect information in different constructional procedures.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>To develop skill in reading blue print of construction drawings and table of offset through discussion and observation</li> </ul>	Profile view Half breadth view Sheer view Table of offset	Group discussion Observation	Reference materials Charts		Participation in discussion and observation
<ul style="list-style-type: none"> <li>To develop skill in the constructional procedure of fishing boats (wooden, plywood and FRP) through field visit, OJT and practice.</li> </ul>	Boat building materials Methods of construction Wooden, plywood and FRP boats Comparison of the constructional methods	Field visit OJT/ Practical training at work shed		Field visit and OJT report	Participation in training, in observation.

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## **Group Discussion on observation**

The discussion can be initiated by the teacher by showing a construction plan/drawing of a house. Later the need and significance of construction of house using a plan and demerits of construction without plan shall be discussed. Encourage the learners to analyze the need of plan in boat construction. After reaching to a conclusion in the importance of plans, the class is provided with reference materials or charts. Further for reading the plan teacher may help learners by simplifying the lines plan drawing. All three views; profile, sheer and half breadth view and table of offset has to be read.

Later teacher shall arrange field visits in such a way that the constructional procedures are observed stage by stage. Learners shall be divided into small convenient groups and asked to observe different functions in the yard. Later in the class room the information collected may be shared and discussed and recorded.

## **OJT/Practical training at work shed for acquiring skill**

OJT/Practical training is preferable as a strategy to develop skill in constructional procedure. Teacher may enable the learners to attain a regular and systematic practice in construction either through On-Job-Training or through practical training at work shed. Suitable training centers adjacent to the school shall be selected for OJT. Teacher should check whether the training is imparted adequately to all learners. Learners are to be instructed on the manner of recording and the safe handling of equipment and materials during training. The report and the experiences shall be discussed and consolidated in the class after the training, by the learner's.

## **Field visit to collect information on boat construction**

This is a completely practical oriented unit and therefore the learners have to acquire skill in construction through constant observation. For this teacher could arrange frequent field visits to nearby boat building yards to observe and collect information on boat construction.

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Upon completion of this unit the learners should be able to:

- Appreciate the use of materials in the construction.
- Commend the methods of construction of boat.
- List different stages of construction
- Compare and analyze different constructional methods. (wooden, plywood and FRP)
- Review the selection of boat building materials.
- Explain the method of fixing different structural members.
- Understand the methods of sheathing, caulking & painting.

UNIT

5

## BOATMAINTENANCE

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Wooden as well as metallic structures in marine environment undergo rapid deterioration due to fouling and wood boring organisms, corrosion, wear and tear etc. It is very much essential that the fishing boats and machineries on the boats are well cared and systematically maintained. Fishing boats should be held ashore at least once in a year. During monsoon season fishing is irregular and very much limited, so it is the best time for carrying out maintenance work. Since the fishing boats require high investment its maintenance is crucial for its long life. This unit aims the student to have an insight on the significance of maintenance and the factors to be considered for protective measures. This unit also helps them to give awareness to the steps involved in the maintenance procedures.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>To analyze various factors affecting life of a boat and get an insight on the care and protective measures through discussion, field visit and case study</li> </ul>	Factors affecting <ul style="list-style-type: none"> <li>Fouler's</li> <li>Borer's</li> <li>Corrosion</li> </ul> Mechanical damage	Discussion Field visit Case study Observation		Notes prepared based on discussion field visit and case study.	Participation in discussion. Participation in case study.
<ul style="list-style-type: none"> <li>To get awareness on the significance of annual maintenance and its procedures through discussion filed study and interview</li> </ul>	Annual weekly Daily maintenance.	Discussion Field study Interview		Report of field study and interview	Participation in discussion, field study and interview.

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## Discussion on factors affecting life of a boat

This unit can be introduced to the students by encouraging them to list out the maintenance procedure of a vehicle or their house. Ask some questions like what is the reason for doing maintenance work? What will happen if we won't do maintenance? Factors affecting the life of vehicle etc. And gradually direct the discussion to the factors affecting the life of boats. Thus discussion may be started. Teacher shall supplement the discussion through corrections and additions and supply of reading materials.

The discussion points are;

- Types of causatives agents affecting life of a boat. [fouling, boring, corrosion, mechanical damage]
- Factors influencing the causative agents.

[Fouling & boring – temperature, salinity, pollution, waves, light, colors, natures and texture of substratum.

Corrosion – Atmosphere, moisture and chemical.

Mechanical damage – collision, careless handling, lack of maintenance.]

After discussion, to enrich the idea on “factors affecting life of boat” teacher can arrange frequent field visits to a boat maintenance yard.

### Case study

Case study is one the most suitable method of instruction of this unit. It helps the student, to identify a problem through observation and enquiry, to solve the problem by collecting information and to apply it. By doing case study they are given the opportunity to develop various abilities, feel the problem measure the intensity, classify, collect informations, application of knowledge, evaluation of the merits and demerits, and finally coming to a conclusion.

For this learners are grouped into 2 or 3 groups in the class room and are encouraged to list out the objectives of the case study. Each group shall be given each case to study.

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For e.g.:

- Fouling of wooden boats
- Corrosion of a steel boat
- Mechanical damage in wooden boats

Adequate reference must be made available. Ensure the participation of all learners in collection of data (teacher should provide necessary guidance and suggestion at appropriate time) students are asked to collect data and submit the report within the prescribed time limit. Arrangements for field visits should be provided by the teacher. After submission of the report let each group present the topic in the class and after each presentation a general discussion has to be arranged. After the final consolidation learners are assigned to submit a report of the case study.

**General discussion based on field study and interview on the significance of annual maintenance.**

A suitable activity to deliver this topic is to arrange a general discussion after a field study and interview. Learners shall be divided into groups and a preliminary discussion is held to list out/ prepare a detailed questionnaire for conducting interview. It should be noted that the questionnaire should fulfill all the objectives of this topic. A time limit has to be kept for the submission of data report.

Arrange adequate facilities to visit a fishing village and conduct interview. After submission of report each group shall present their findings and consolidate the presentation. A general discussion may be arranged. Finally a consolidated report shall be prepared by each learner.

Upon completion of this unit the student should be able to:

- List the principal fouling and boring organisms in sea water.

[Borers – Teredo, Martesia

Fouler – Bacteria, Fungi, Diatoms, rotifers and macroscopic one

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like coelenterates, flat worms, tube worms, barnacles, and molluscs.

Rot – Fungi]

- Explain the effect of fouling on the boat hulls

[Rot - Wood becomes soft and spongy

Decay

Borers - Bore in to the under part of hull and eventually destroy the wood.

Fouler - Affect propulsion and efficiency of under water acoustic devices, speed of boat is reduced due to the settlement and thereby the fuel consumption gets increased.]

- Explain the preventive measures adapted to curb fouling

[Rot – Usage of heart wood, seasoned and treated wood,

Allowing proper ventilation of the wood surface,

Eliminating entry of water into the boat.

Borers - Use the antifouling paints or use of under water sheathing made of copper, fiber reinforced plastic, or aluminium.

If it is moored in fresh water for few weeks or taken out of water for about 3 weeks they will perish. Wooden plugs can be used for small damages and if there is severe damage it is advisable to replace a member.

Foulers – Mooring in fresh water for a considerable time, adherent shells can be removed by scrapping during dry docking; Metallic sheathing using copper, application of antifouling paints.]

- Recognize the deterioration of wood, and the Preventive measures.

Classify the nature of damages to wood

[Mechanical – Collision, cracking of wood, wear and tear, fire;

Biological – decay by fungi, damage by insects, and foulers, borers.]

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- Identify the types of fungi

[Wood destroying fungi – rot;

Wood staining fungi – stain stored wood and cause discoloration;

Moulds - They discolor wood superficially.]

- Describes important fungal defects.

[Blue stain - sap wood is stained by bluish colour by fungi;

Brown rot - Certain fungi remove cellulose compounds from wood and it becomes brown colour – brown rot;

Dry rot - Certain Fungi feed on wood and converts it into powder form]

- Explain the prevention of deterioration by traditional method.

[Use of sardine/ shark liver oil, callophyllum sps.(poon seed oil), cashew nut shell liquid, various vegetables oil and animal fats, natural resin, dammar batu mixed with groundnut oil, lime plastering, coal tar]

- Explain the prevention by modern method.

[Sheathing – Copper, Aluminium, FRP;

Waterborne preservative – ASCU, Copper-Chrome-Arsenic (CCU)

Oil borne preservative – Creosote

Solvent type preservatives – penta chlorophenols, naphthanates of zinc and copper.]

- Explain seasoning and its advantages.

[Natural Seasoning – Air seasoning

Artificial seasoning – Boiling in water, chemical seasoning, kiln seasoning.]

- Explain methods or types of application of preservatives.

[Surface applications, soaking treatment, hot & cold process, boucherie process, pressure process, diffusion process]

- 
- Understand the procedure of daily, weekly and annual maintenance.
  - Describe the annual maintenance procedures to be carried out below the water line, above the water line and for the deck maintenance.

### **Additional points**

For the proper upkeep of wooden fishing boats, a regular maintenance schedule is necessary. Dry docking is done at least once a year preferably during the monsoon. The following schedule has been recommended by the CIFT.

- a. The boat is made as light as possible by removing stores, mast, derricks etc.
- b. The boats are kept at a certain height above the ground so as to permit free air movement on all sides. It should be protected from white ant, sun and rain.
- c. Bottom foulers are removed by scrapers.
- d. Hull sheathing is examined carefully particularly at the stem, keel and rudder. The hull has to be checked for leakage recaulked and filled with putty wherever necessary.

The underwater part of the hull has to be checked for marine borers. The borer's holes are either filled with wooden plugs or with sealing compounds. In case of extensive damage the effected members need replacement.

The entire wooden hull below water line should receive 2 or more coats of coal tar or its derivatives like creosote. A thick layer of insulation tar felt underlay is fixed over the coal tar coatings prior to the fastenings of metal sheathing. Painting is needed over the sheathing to prevent corrosion and settlement of foulers. Though copper sheathing doesn't need any coat of paint, aluminium sheathing need two coats of anti corrosive and antifouling paints and FRP sheathing need two coats of antifouling paint. The antifouling paints are to be applied a few hours before launching the boat when the paint is still wet.

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- a. The deck is checked for leaks, frequent application of linseed oil keep the deck planks free from splitting and weathering.
  - b. The frames, shelves, beams, bulk heads etc are regularly checked for rot. Affected parts have to be replaced. Application of fungicides like penta chlorophenol, good ventilation and hygienic conditions prevent fungal infection.
  - c. The old paint on the outside of hull above water line has to be scraped and hull is cleaned and allowed to dry. Two coats of good quality marine grade paints are given. There is no need to paint inside of the hull. All ferrous structures should be chipped, brushed and cleaned to remove rust and mill scale. One coat of anticorrosive paint is given.
  - d. Check all the external fastenings for slackness and corrosion. Badly corroded ones should be replaced. Rudder and stern gear fittings are to be checked for possible failures.
  - e. All major and minor repairs of engine and machinery to be attended by competent hands.
  - f. Check the propeller for dents, wear and tear. Minor dents are cleaned up with a file and finally treated with emery paper. Propeller has to be replaced if it is severely damaged.
  - g. Zinc blocks are to be fitted at appropriate places for cathodic protection.

UNIT

6

## FISHING GEAR

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A diverse range of fishing gears and methods have been evolved to capture a wide range of species constituting the fishers in different parts of the world. They can range from simple fishing gears such as gill nets, hook and line or traps made from basic materials at minimal cost to large trawlers and purse seiners requiring high investment, skilled labour and sophisticated vessels to operate them. Significant development have taken place in the fishing gear materials, design and fabrication and degree of sophistication in the operation and handling of fishing gears in the last three decades.

In this unit it is attempted to present an over all view of the most widely used fishing gears such as gill net, long line, trawl net and purse seine net, their fabrication and operation.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>To identify different parts of fishing gears such as gill net, trawl net, purse seine and long line through observation of demonstration and discussion</li> </ul>	Gill net Trawl net Purse seine Long line	Observation Demonstration Discussion	Models charts	Notes prepared on discussion	Participation in observation and discussion
<ul style="list-style-type: none"> <li>To attain skill in fabrication and mounting of fishing gears like gill net, trawl net, purse seine, and tuna long line through practice/ OJT.</li> </ul>	Braiding Fabrication Mounting Rigging	Practical work/ OJT		Skill developed in fabrication and mounting	Participation in practical work. Perfection in fabrication and mounting.

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## **Demonstration and discussion on different parts of fishing gears**

Display separate charts showing labeled diagram of fishing gears such as gill nets, trawl nets, purse seine net and long line and allow the learners to observe it.

Show the models of each fishing gears and ask the learners to identify and list out different parts.

Conduct a discussion regarding the role of each part during fishing operation.

Teachers may consolidate;

- Gill net – float line, lead line, gavel line (side ropes), floats, sinkers, buoy, buoys lines and the netting.
- Trawl net – cod end, extension piece, belly, baitings(top belly), square, lower wings, top wings, chaffing gear, head rope, foot rope, float, sinkers.
- Purse seine – bunt, main body, selvedges, float line, lead line, side ropes, bridles and low line, floats, sinkers, purse line with purse rings.
- Long line – main line, branch line, branch line proper(compound wire), sekiyama (secondary leader), snood wire (leader wire), hook, floats and float lines, flag poles, light buoys, radio buoy, radar reflectors.

## **Practical work on net fabrication and on mounting.**

Conduct series of practical work on net braiding, mounting and rigging of each of the fishing net. As this topic needs a thorough practical skill, this may be included for OJT.

UNIT

**7**

## **GEAR MAINTENANCE**

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A wide variety of materials ranging from natural fibers to wood, metals to synthetic fibers are used in the construction of different fishing gears. All these gears whether made of natural or synthetic materials need proper treatment, preservation and storage for longer life expectancy and better catching efficiency. There are several causes affecting the efficiency and durability of the materials. People who handle fishing gears should have a thorough knowledge on the preservation, care, maintenance and preventive measures to protect the life of gear.

This unit deals with the factors affecting the life of gear their preventive measures, and also the care and maintenance procedure.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>To get an awareness on the care and maintenances of fishing gear through general discussion and field study.</li> </ul>	Rotting Weathering Abrasion Mechanical destruction Fouling Rusting	Project General -discussion Field study		Project Report, field study report	Participation in project and field study. Authenticity in project report
<ul style="list-style-type: none"> <li>To appraise the significance of the annual maintenances and its procedures through general discussion, field study and interview</li> </ul>	Daily Weekly Annual Maintenances	General- discussion Field study Interview		Report of field study	Participation in discussion, field study and interview. Authenticity In Field study reports.

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## **Project on care and maintenance of fishing gear**

Divide the learners into 6 groups. One discussion point can be distributed to one group. Ask the group to discuss and collect information through field visit and reference and list out the points.

### **Discussion points:**

- Rotting
- Weathering
- Abrasion
- Mechanical destruction (by animal, collision etc.)
- Fouling
- Rusting

A member of each group can present their report in the class room. Ask the class to supplement each presentation. Encourage students to note down the points in presentations and a final consolidation of these points can be done by the teacher/monitor. Based on this a project report can be prepared by each student.

- General discussion and field study on the significance of annual maintenance.

Conduct a general discussion on the significance of annual maintenance.

List out the points. Teacher may consolidate the concepts of

- Daily maintenance
- Weekly maintenance
- Yearly maintenance

Arrange a field study to a fishing village. Collect information about the maintenance procedures followed by them by interviewing fisher men. Prepare a field report and discuss it in the class.

UNIT



**MARINE ENGINES AND  
FISHING ACCESSORIES**

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In this modern age, importance is attached to efficiency, productivity etc in all the fields of production. Hence following the foot steps of other industries, fishing industry too has adopted mechanization of boats and mechanical operation of gears for increasing the productivity and quality of service.. Mechanization not only saves time but also reduces manual labour, increase earnings, which in turn uplifts the socio economic conditions of the fisher folk.

In this respect the awareness about operation and maintenance of marine engines and fishing accessories play an important role. This unit deals with the types, operation and maintenance of marine engines and fishing accessories common in fishing sector.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>To get accustomed to the different types of marine engines ,their operation and maintenance through discussion, structured interview and OJT</li> </ul>	Diesel Petrol out board engine Inboard trouble shooting	Discussion Structured interview OJT		Notes Report on interview and OJT	Report of OJT and interview
<ul style="list-style-type: none"> <li>To identify and list the important fishing accessories and under stand their uses.</li> </ul>	Fishing accessories Their position and uses	Field visit Discussion		Report on field visit	Report

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## Discussion on different types of marine engines

A general discussion can be initiated through asking some introductory questions like,

What are the crafts used for reaching the fishing ground?

What type of engines you have noticed?

Have you noticed the difference in position of engines?

Teacher may consolidate that,

Marine engines are classified on the following basis

- a. Fuel – petrol, diesel oil, gasoline
- b. Ignition – spark, combustion
- c. Mechanics - four stroke, two stroke
- d. Cylinder cooling – air, sea water, fresh water, coolant
- e. Fitting of engine – inboard, out board

## Structural Interview on the difference between diesel and petrol engines

Learners are asked to list out the questions on their doubts about petrol and diesel engines. Collect the questions and teacher can prepare questions to achieve the following objectives.

<b>Petrol</b>	<b>Diesel</b>
<ul style="list-style-type: none"><li>• Low initial cost</li><li>• Lighter in construction</li><li>• Occupies less space</li><li>• Use petrol as fuel</li><li>• Highly inflammable</li><li>• More expensive fuel; high consumption &amp; higher operating costs</li><li>• Accelerate quickly</li><li>• Ignition is by spark – plug</li><li>• Carburetor is present to vaporize fuel</li><li>• A mixture of air and petrol vapour is drawn into the cylinder during suction stroke.</li></ul>	<ul style="list-style-type: none"><li>• High</li><li>• Heavier</li><li>• More space</li><li>• Diesel oil</li><li>• Minimum risk</li><li>• Less operating expenses</li> <li>• Slowly</li><li>• By compression</li><li>• Absent</li> <li>• Only air enters the cylinder during suction stroke. Fuel is injected in the form of spray at the end of compression stroke</li></ul>

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Arrange an interview with an expert, in the class room/ in the field. The prepared questionnaire is given to the expert prior to the interview and to students during the interview. And thus a structured interview shall be conducted .Encourage the students to list out the points.

### **Field visit to collect information on maintenance of marine engines**

A field visit can be conducted at maintenance and repair yard for achieving a good knowledge and understanding on the following areas

- Starting systems (types)-hand, Electric, Air
- Cooling systems (types)-liquid, Air
- Lubrication
- Service schedule-cleaning and Washing
- Trouble shooting-Fuel system leak, wrong fuel injection, timing, worn out piston and rings, engine over heating
- Causes and remedies

### **Additional Points**

#### **Service Schedule**

Servicing is carried out depending upon the number of hours the engines has worked. The engine should be checked daily for engines oil level and water cooling and weekly greasing of gearbox propeller shaft etc

#### **Every 100/150 hours**

1. Change lubricating oil/oil filter
2. Cleaning of air cleaners]
3. Checking of batteries and topping up with distilled water.

#### **Every 250/300hours**

1. Clean fuel filter
2. Check valve clearances, oil in clutch
3. Adjust belts, clutch
4. Clean cooling fans

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### Every 500/600 hours

1. Check and adjust valve clearance, driving belts, clutch and gearbox, injector nozzles, heater plugs.
2. If boat is out of water, draw propeller shaft out and check shaft for wear at bearing points
3. Check under water fitting e.g.: water Inlet, keel-cooling pipes etc.
4. Check propeller, rudder for damages.

### Major service: 2000/2500 hours

1. Removing the cylinder head
2. Cleaning the carbon deposit from the combustion chamber
3. Cleaning the crankcase and oil pump.
4. Checking crankshaft, piston ring
5. Cleaning gear box, adjusting clutch etc

### Troubleshooting

1. Fuel system leaks	Inspect for leak and make repair
2. Wrong injection timing	Make adjustment to timing
3. Engine over heating	Avoid over heating
4. Dirty air cleaner	Replace

### Engines Over heating

1.Lack of coolant and oil	Add to level
2.Retard timing	Check up and adjust
3. Chocked silencer	Clean
4. Chocked radiation and water jacket	Flush out and clean

### Fuel consumption too high

#### Engine will not start

Causes	Remedies
• Slow cranking speed	Eliminates the defect in starting system.
2.No fuel to the cylinder	Put the fuel in the tank prime.
3. Wrong fuel injection timing	Make adjustment to tuning
4.Poor compression	Tighten loose nuts injection head, replace broken piston

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## Field visit on fishing accessories

A field visit shall be arranged to fishing Harbour to identify, observe, its position and list out uses of the following fishing accessories:

- **Mast** – To carry sails, radar, satellite, aerial, navigational light and derrick booms
- **Derrick** –Used as crane for hoisting heavy weight especially code end
- **Block and pulleys** – Used to lead in the ropes to convenient positions.
- **Power take off and winch drive**-To take the power from the main engine for winch drive
- **Gallows** – Used for taking up heavy weights like otter board as well as for passing towing warps; One single Gallows used in small vessels while a pair of gallows in bigger vessel.
- **Davits**- used in pure seine, gill nets – For passing tow lines. Gentries – Replace gallows, mast, derrick and stay. Assists in positioning of warp leads, hitching of otter board and lifting of heavy catch.
- **Towing block**-For holding together of both warps in a side trawler
- **Stern ramp**- Platforms for hauling the catch directly to the deck through stern side
- **Out rigger** –Poles extending out from vessel for operation from it for double rig trawlers and trolling lines.
- **Net chute** –It is a slope at bulwark in gill-netters for easy shooting the gear.
- **Fish pump** – to transfer the catch from the purse seine net in to the deck.
- **Ring needle** – Open ended bar on which purse rings are stowed
- **Brailer** - Dip nets used to transfer the catch from purse seine to the fish hold.

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- **Windlass** – Used for towing and hauling the anchor chain.
  - **Net hauler**- Used to haul gill net, purse seine nets and trawl net.
  - **Net drums** - used in gill netting, trawling and seining are fitted at the stern .In Net drums the entire net is wound on the drum and it not only reduce labour in setting and hauling the gear during operation but also prevent sagging or fouling of the gear during operation.
  - **Triplex** – Used in purse seiner instead of power block for hauling
  - **Power block** – It s a heavy pulley block used for shooting and hauling of purse seine net .It is hung on the end of heavy long boom and is operated hydraulically or electrically
  - **Gurdy** – it is machine used for hauling troll line. It is operated hydraulically or electrically. It is having a base gear box which helps in controlling the speed.
  - **Line Hauler**- It is used for hauling long lines and is operated either hydraulically or electrically. Line hauler consists of a lower part containing the driving shaft, a middle part having speed governor and and an upper part consisting of 3 pulleys's which wind the line automatically.
  - **Bollard** – Used for mooring of vessel to jetty. It is fixed on both sides at the rear side of the vessel
  - **Winches** – It is an equipment for hoisting or hauling of fishing gear in vessels. Mainly there are 2 types of winches, Trawl winches - used for hauling and shooting of trawl net- It has 2 or 3 winch drums and are operated mechanically; Purse seine winches – a heavy duty winch operated hydraulically for hauling and shooting of purse seine .It has a winch drum with large diameter.
  - **Otter board** – These are shearing devices, which keep the mouth of trawl horizontally open during towing. When fitted with brackets and other

Low density material	High density material	Special floats
Wood	Glass	Trawl plane float
Cork	Aluminum	Hydro dynamic float
Thermocol	Steel	Up thruster float
Sponge plastic	HD plastic	Siamese float
Synthetic rubber	GRP	Inflatable float

accessories, its design is such that it will shear outward when pulled through the water. There are different types of otter boards such as rectangular flat, rectangular cambered, oval flat slotted, oval cambered slotted, V type, suber krub etc.

- **Floats** – Essential component of fishing gear. They help in keeping the gear at the required depth, obtaining proper shape during operation and in maintaining vertical opening in gears like trawls. They should be able to withstand pressure, should be highly buoyant, should not absorb water, must be light in weight, durable and should have means of attachment.
- **Sinker** – Sinker are essential component of fishing gear used to keep the net in the desired position as in gill nets or to keep the trawl open vertically or to stretch the net down wards as in purse seine .It should have high specific gravity, should be durable and easily available.
- The materials used for sinker are clay, cement, granite stone, iron, lead and occasionally copper alloy, brass, pig iron and porcelain are also used.
- **Buoys** – Used as floating mark for the following purposes:- navigation (marking channels and approaches) Marking fishing ground, locating the gear and for keeping the gear at the required depth. Empty water tight tins, wooden barrels, bigger floats made of glass aluminum and plastic are common. Besides special type buoys are used in gill net and long line fishing they are light buoy, radio buoy and Dahn buoy.

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- **Anchor** – A large and heavy instrument designed to hold the ship in any desired locality and to prevent her from drifting at the mercy of wind, tide and current. Stones, wood tied with stones, iron, cement concrete or steel are used as material for anchor Dan forth, admiralty CQR, Patent and Grapnel are types of anchors currently in use.
  - **Thimble** – Grooved ring set in the eye of a rope or cable to prevent chafing of the material and deforming of the eye. Made of galvanized forged iron or steel, brass or gunmetal. They are either round or oval.
  - **Shackle**- Connecting device used for fastening parts together, normally made of galvanized forged iron. They are mainly three types anchor shackle, D-shackle and eye bolt shackle.
  - **Swivel** – Used to prevent twisting and kinking of the lines. They are made of bronze, galvanized iron and steel
  - **Hooks** – used in line fishing, made of steel and wrought iron. Consist of eye, shank, bend, barb and point. Different types of hooks ;Single, double, triple, multiple, barb less.
  - **Artificial baits or jigs** – For attracting fishes either by shape, color or by their reflection. Materials used are tin, lead, brass, whale bone, feathers, plastic fishes etc

UNIT

9

## FISH DETECTION DEVICES

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Introduction of acoustic fish detection devices is one of the most significant development in modern fishing .It has greatly reduced the element of the chance and the dependence on fisherman's intuition in fishing and has enhanced the effective time by reducing the time spent for searching. Therefore this unit deals with major fish detection devices such as Echo sounder, Sonar, SatNav, LORAN and Net sonde through discussion and field study.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>To collect information and familiarize with different types of fish detection devices such as Echo sounder, Sonar, SatNav, LORAN, Net sonde through general discussion and field visit</li> </ul>	Echo sounder, Sonar, Sat nav, LORAN, Net sonde 4-position and uses	Discussion Multimedia presentation Field visit Assignment	Reference materials CD's Pre-recorded video clippings Slides Chart	Notes prepared based on discussion and observation and experience assignment notes	Participation in observation and Discussion

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## **Discussion on the different types of detection devices**

For introducing this unit to the class, teacher can encourage a student with fishing experience to narrate their fish detection techniques. After the narration a general discussion can be conducted. The discussion can be supplemented by providing reading materials/showing slides or video clippings to expand their idea about types of detection devices and their uses. Learner can note down the points of discussion.

## **Field visit to collect information on the detection devices**

In order to get a first hand experience in operation and in observation of devices a field visit shall be arranged to a modern fishing vessel equipped with the above said devices or to institutions like CIFNET, CIFT,IFP.

This unit is also suitable for assignment. The learner can be directed to collect information about detection devices /techniques (both modern and natural) in the locality .The collected information shall be discussed and consolidated in the class.

All these procedure shall be done to include the following objectives.

Position, General working principle and uses of

- Echo sounder
- Sonar
- LORAN
- SatNav
- Net sonde

# ARTIFICIAL REEFS AND FISH AGGREGATING DEVICES

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The total annual potential of marine fishery resources in India is 3.9 million tones. The present catch of 2.57 million tones is only 66% of the resources available. Only 30% of the marine fishery resources beyond a depth of 50 meters are being utilized. The artificial reefs (AR) Technology and fish aggregating devices ((FAD) Can help to realize the full potential of marine resources as well as to improve the per capita fish catch and income of fisher folk. AR/FAD installations have been reported to increase the catch by 150%.

FAD/ AR is a simple man made structure sunk in the sea bed to attract fish species from around it and deeper waters for easy capture. It can be fabricated from easily available cheap material, and it mimics the effect of natural reef, under whose shelter fishes are known to aggregate, under sunlight it creates shadows and fishes are attracted by the moving shadows. It also provides substratum for the growth of diverse marine flora and fauna, which further attract the fish.

The main advantages of FAD's are

- Increase in daily income of fisher folk by 50-150%
- Minimize searching time for fisher folk
- Reduce fuel consumption of mechanized boats
- Provide excellent environment and substratum for marine flora and fauna to grow and thrive, producing further link in the food chain.
- Reduces the drudgery in fishing as fisher folk know the catchment area
- Helps to demarcate territorial water for traditional fisher folk and to enforce marine fishing regulation act

Thereby this unit aims in giving an opportunity to the student to understand the significance and impact of FAD's or AR's in fishery.

## Unit at a Glance

Curriculum objective	Content Area	Activities/ Experiences	Materials	Product	Evaluation
<ul style="list-style-type: none"> <li>To appraise the significance of AR's and FAD's through discussion and slide/video clippings</li> </ul>	Need, Advantages and disadvantages, materials used for construction	General discussion Slide show	Slides/video clipping/ pictures	Consolidated notes	Participation
<ul style="list-style-type: none"> <li>To get awareness on the impact of AR's and FAD's in fishery through debate</li> </ul>	Positive and negative impacts	Discussion Debate	Reference material	Consolidated notes	Participation and Presentation

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## **Discussion on Artificial reef and FAD's**

The student already have a knowledge on the role of natural reefs in the life of fishes or recall their memory how they give shelter to aquarium fishes.

Initiate the discussion on FAD's and AR's by giving information on artificial methods employed to protect / give shelter to wild fishes.

The major discussion points are

- The types of FAD's -(pelagic and bottom)
- The types of material required (HDPE, Bamboos, old tyre, empty drum, iron rod, Swivel, cement, coconut leaves, old netting etc.
- Construction

After discussion teacher can enrich their understanding showing slides/pictures or video clippings and finally a consolidate note can be prepared by the learners.

## **Debate on the impact of FAD's in fishery**

The impact of FAD's in fishery is a controversial topic. It can be selected for a debate. For this there must be a preliminary discussion. Then the students are divided into two groups according to their view point and let them discuss the argument they are going to present; sufficient reading material can be provided. Either the teacher or a student functions as moderator. Both view points must help in cultivating certain positive attitudes in students. The teacher must not take a stand favoring one group. Each group presents their arguments. Moderator presents analysis of the ideas and consolidates the points. He may present the consolidation in tune with the objectives to be attained. The consolidated information is recorded.

# **RULES, REGULATIONS AND POLICIES IN FISHERIES SECTOR**

Marine fisheries within the territorial waters are the subject of maritime states whereas fisheries beyond this limit within the EEZ fall in the jurisdiction of central government. The central Government besides playing an advisory role also provides funding support to the states/ union territories for implementation of central sector and centrally sponsored schemes. The policy initiatives are required not only for making marine fisheries sustainable and responsible, but also ensure global competition so that Indian procedures stand to gain in international markets.

The marine fishing policy announced by the government of India in the past focused only on the developmental needs of the deep sea sector, leaving aside similar issues pertaining to the coastal sector to the respective marine states/ UT'S. Therefore in the present policy the govt seeks to bring the traditional and coastal fishermen also in to focus, together with stakeholders in the deep sea sector so as to achieve harmonized development of marine fishery both in the territorial and extra territorial waters of our country.'

In order to ensure the social security and economic well being of fishermen the Government has set up several rules and regulation for use and operation of crafts and gear, catastrophes and safety measures in fishing, policies and procedures for insuring craft, gear and fisher's, compensation claims for fishing employees etc through acts like KMFRA, code of conduct, merchant shipping act and Maritime Zones of India act. In addition to these the government of Kerala has several schemes for financial assistance/ subsidies for purchase of craft and gear and for the welfare of fishermen through fisheries department. Knowledge about the different schemes and rules provided in the fisheries sector is essential for students studying fishing technology, so that it shall be applied in their society for the general upliftment and welfare of fisher men community.



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### **Interview to collect information on the financial assistance through fisheries department/ boards.**

An interview can be conducted for collecting information on different schemes and financial assistance provided by fisheries department, fund board, Matsyafed, Panchayat / Municipality. For this students shall be divided into smaller groups and shall be provided with a questionnaire prepared in the previous class. The questionnaire should fulfill the objectives. A thorough planning should be done in the class room about the data to be collected, places to visit, procedure of the interview, analysis of data collected, and preparation of report. Finally each group can present their report in the class. The teacher may intervene and provide adequate instructions at each stage.

### **Survey on the socio economic conditions of the fisher men**

To have a first hand experience in the conditions and effectiveness of the different rules, assistances and policies for the fishermen by the government; socio economic survey is suitable. For an activity like survey a thorough and detailed planning is essential. The primary stage of planning is to decide where, when and how to conduct the survey. For this teacher has to select a suitable, local ward/ colony / area where maximum population of fishermen dwells. For conducting the survey a detailed questionnaire has to be prepared, after a discussion on the objectives to be fulfilled.

The main objectives shall include;

- The present social and economic condition of fisher men
- Their standard of living (shelter, food, education, amenities, occupation, health etc.)
- Awareness in the different schemes/ assistances/grants/provisions granted through government and other agencies.
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After preparing questionnaire the class shall be grouped into 3 or 4 groups. The collected data can be tabulated and analyzed to examine the present socio economic condition of fisher folk. Further for clarification and comparison a discussion shall be held between the groups and their data shall be compared and classified and a final report can be prepared.

### **Additional Points**

#### **KMRA act – Salient features**

- Kerala Marine Fishing Regulation Act 1980 was given assent, to by the president as 17<sup>th</sup> Jan 1981. It came into force with effect from 24-11-1980.
- The Kerala Marine Fishing Regulation Act 1980 envisages; ( view look at, visualize)
  - o The need to protect the interests of traditional fishermen.
  - o The need to conserve fish and the need to regulate fishing and scientific lines.
  - o The need to maintain law and order in the sea
  - o The Act empowers
  - o For regulation, restriction or prohibition of fishing within specified areas using specified craft and gear.
  - o For registration and licensing of fishing vessels.
  - o For prohibition of fishing by non-licensed vessels.
  - o For cancellation, suspension and amendment of licenses already granted.
  - o Penalty for breach of provisions.
  - o The sea along the entire coast line of Kerala state is divided into two distinct zones.

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## **First zone**

The area from the shore up to 30m line in the sea along the coast line of the state from Kollamcode in the south to Paravoor, Pozhikkara, a length of 78 KM.

## **Second zone**

The area up to 20m line in the sea along the coast line from Paravoor south to Manjeswaram in the north for a length of 52 Kms.

Mechanized fishing except fishing by motorized country crafts is prohibited in the said fishing zones. Only fishing with motorized country crafts and traditional crafts is allowed in these zones.

The government notification prohibiting the purse-seine, ring seine, pelagic and mid-water trawl in the territorial sea (within 22 Kms) was signed by high court on 09-04-1986.

- Vessels above 25 GRT are prohibited in the territorial waters.
- Mechanized boats wishing to move from the area of one port to another are required to obtain permission from an authorized officer.
- All bottom trawl nets which have less than 35 mm mesh size are prohibited for fishing in territorial waters along the entire coast line.
- The use of bottom trawl has been prohibited between sunrise and sunset in the specified area.
- Trawling is banned throughout the territorial waters during the monsoon period.

Fisher men having scheme of various descriptions would be unified and implemented as a master plan through a national agency.

Financing institutions would be asked to give greater focus to this sector so as to eliminate exploitation of fisher men by middlemen.

Programmes to improve safety at sea and also to have an early weather warning system in place would be chalked out. The sea safety issue also would be incorporated in to MFRA's for prompt enforcement.

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## **Maritimes zones of India Act**

The maritime zones of India (Regulations) on (Fishing by foreign vessels) Act, 1981 and Rules 1982 provide that no foreign fishing vessel shall undertake fishing operations within the territorial waters of India. According to the provisions of the rules, Charter vessels shall fish beyond 44.5 Km from the shore on the western coast and 22.2 Km on the eastern coast as a general rule, subject to certain restrictions.

### **Merchant shipping act.**

The merchant shipping act (44) of 1958 has been formulated to ensure efficient maintenance of Indian Mercantile Marine in a manner best suited to save the national interest. As per the act a “Fishing vessel” means a ship fitted with mechanized means of propulsion which is exclusively engaged in sea fishing for profit.

According to the Merchant shipping act vessels of all types are classified into 15 classes. Fishing vessels come under classes XIII and XIV. Mechanized fishing vessels are covered under Class XIII while sailing fishing vessels come under also XIV. The following is the brief description of LSA & signals equipments used in fishing vessels registered under merchant shipping act of 1958.

### **Life saving appliances (LSA)**

Life-saving equipments are the appliances used to save the lives in case the vessel is in danger. The vessels may be in distress due to various misfortunes like fire, cyclone, leaks, collision, running around, hitting against iceberg etc. To meet such contingency and to save the lives of all men on board, life-saving appliances are provided on the vessels.

### **Life boat:-**

Life-boat is a boat usually carried on large vessels of size 35m and above. It is a rigid boat used in ship to escape for about 12-20 persons when the ship is under danger. It shall have sufficient freeboard and stability. First aid boxes are present in the life boat

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## **Life buoy**

This is for assisting men while in distress at sea. It is thrown for retrieving the person quickly and helping him board the rescue vessel. It shall be made of cork or a crude material. It has a power to float in water for 24 hours with 145 Kg suspended in it. It shall be painted with a highly visible colour. Its inside diameter shall be 45cm and outside diameter is 75cm. A lifebuoy can support 4 persons. The ship's name/ official no; & port registration shall be painted on it.

## **Life Jacket.**

It is one of the important life-saving appliances worn round the shoulder of each person in distress. This will help the person to keep afloat in water. It shall be of highly visible colour. It is made of cork. It shall allow the wearer to jump from a height of 6 mts & on entering water it must turn the wearer into safe floating position within 5 seconds lifting the mouth of an exhausted or unconscious person. It has a lining of polythene inside to prevent the water entering and loosing its buoyancy. It shall be fitted with a ring of sufficient strength to facilitate rescue & shall be fitted with a whistle.

## **Parachute distress rocket signals.**

These rockets are fired from the vessel or life-boat in distress to attract the attention of nearby vessels. On firing, these rockets release bright red stars with parachutes at pre destined height.

## **Red star distress signals**

Red star distress signals serve the same purpose as parachute distress rocket signals but they are of a lesser magnitude and without parachute.

## **Other rules for fishing vessels**

### **Rule 18 ©**

A vessel engaged in fishing when under way as far as possible keep out of the way of:

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- (i) Vessel not under command
  - (ii) A vessel restricted in her ability to maneuver.

## **Light**

### **Mast head light**

White light placed over the fore and aft central line of the vessel showing an unbroken light of the horizon of 225o.

### **Side light**

Green light near the starboard side and red light on the port side.

### **Stern light**

A white light placed as nearly as practicable at the stern showing an unbroken light over an arc of the horizon of 135o.

All round light— Unbroken light 360o

White, green red and yellow fixed on mast.

Towing light— Yellow light

Flash light-Light flashing at regular intervals at a frequency of 120 flashes or more per minute.

Power Driven vessels underway shall exhibit.

- (i) Mast head light forward
- (ii) Second mast head light abaft of and higher than the forward one.
- (iii) Side lights.
- (iv) Stern lights.

A power driven vessel less than 7m in length where speed does not exceed 7 Knots may in lieu of the above lights, exhibit all round white light.

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**Rule 37**

When the vessel is in distress.

The following are used or exhibited either together or separately.

- (a) A gun or other explosive signal fired at intervals of about a minute.
- (b) Continuous sounding with any fog-signaling apparatus.
- (c) Rockets throwing red stars fired one at a time at short intervals.
- (d) A signal made by radio telegraphy-SOS
- (e) Spoke word May day in radio telephony
- (f) The international code signal of distress indicated by N.C.
- (g) A signal consisting of a square flag having above or below it a ball or anything resembling a ball.
- (h) Rocket-Parachute flares showing red light.
- (i) Smoke signal giving orange colored smoke
- (j) Slowly and repeatedly raising and lowering arms outstretched each side.

**Rules and regulations of use and operation of craft and gear.****Rule 3d (Fishing vessel)**

A vessel engaged in fishing means any vessel fishing with nets, lines, trawls or other fishing apparatus-but does not include fishing with troll lines or other fishing apparatus which do not restrict maneuverability.

**Rule 9 ©.**

A vessel engaged in fishing shall not impede the passage of any other vessel navigating within a narrow channel.

**Rule 10 (i)**

A fishing vessel shall not impede the passage of any vessel following traffic lane under traffic separation scheme.

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**Rule 18(a)**

A power-driven vessel under way shall keep out of a vessel engaged in fishing.

**Rule 18 (b)**

A sailing vessel shall keep out of a vessel engaged in fishing

**Code of conduct for responsible fisheries**

After the adoption of EEZ in 1982 the coastal states got rights and responsibilities for the management and use of fishery resources within their EEZ. Such extended jurisdiction leads to serious challenges towards the efficient management and sustainable development of fisheries due to lack of experience and financial and physical resources. The committee on fisheries (COFI) at its 19<sup>th</sup> session in March 1991 and the international conference on responsible fishing held in 1992 requested FAO to prepare an international code of conduct to address these concerns. Thus the code of conduct was adopted on 31<sup>st</sup> Oct 1995 to ensure sustainable fishery. The article 8-deals with code of conduct of fishing operations and the major provisions are; state should ensure that only allowed fishing operation are carried out in waters under their jurisdiction. State should maintain an updated record, on all fishing operations, ensure that health and safety standards are adopted for everyone employed in fishing operations, enhance through education and training programmes in accordance with international standard guidelines to improve skill of fisheries. State has power to withdraw permit, refuse or suspend the officers of a fishing vessel who are charged with an offence relating to operation of vessel.

**Flag State duties**

Flag state should maintain record of fishing vessels entitled to fly their flag and authorized to be used for fishing and should indicate in such records details of the vessels, their ownership and authorization to fish.

**Fishing operations**

States should ensure that fishing is conducted with due regard to the safety of human life and the International maritime organization, International Regulations

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for preventing collisions at sea, organization of marine traffic, protection of marine environment and the prevention of damage to or loss of fishing gear.

State should prohibit dynamiting, poisoning and other comparable destructive fishing practice.

### **Fishing gear selectivity**

State should require that fishing with fishing gear, methods and practices to the extent practicable are sufficiently selective so as to minimize waste, discards, catch of non-target species, both fish and non-fish species.

### **Energy optimization**

States should promote the development of appropriate standards and guidelines which would lead to the more efficient use of energy in leaving and post harvest activities within the fisheries sector

### **Protection of the aquatic environment.**

States should introduce and enforce laws and regulations based on the International convention for the prevention of pollution from ships.

### **Protection of the atmosphere**

States should adopt relevant standards and guidelines which would include provisions for the reduction of dangerous substances in exhaust gas emissions.

### **Harbours and landing places in fishing vessels**

States should take into account the design and construction of harbours and landing places-servicing facilities, fresh water supplies, waste disposal systems, abandonment of structures and other materials.

## **Artificial reefs and fish aggregation devices**

States, should develop policies for increasing stock populations and enhancing fishing opportunities through the use of artificial structures placed with due regard to the safety of navigation, on or above the sea bed or at the surface. State should ensure that, when selecting the materials to be used in the creation of

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artificial reefs as well as when selecting the geographical location of such artificial reefs, the provisions of relevant international countries concerning the environment and safety of navigation are observed. The approval for construction and deployment of such reefs and devices should take into account the interests of fisheries including artisanal and subsistence fisheries.

### **Fishermen welfare**

Fishing is the soul livelihood for about 10 lakh fisher men households along the coast line and this policy attaches top priority to ensuring their social security and economic well being.

- 1) A detailed enumeration of the fisher men of the entire country for making available all requisite data in the demographics of the sector would be considered. Each house hold should be given a card for easy identification and for settlement of claims.
- 2) Cooperative movement of fisher men would be strengthened and extended to areas where it is non-existent. Apex bodies of cooperatives of each state would be up- linked to the national body.
- 3) Uniformity in welfare schemes that are being implemented in different regions would be ensured. Schemes operated parallel by states and center would be rationalized.

Greater participation of cooperatives, NGOS and local self Government would be sought in implementation of welfare schemes for fisher men, there by reducing the dual role of central and state Government in the process.

Artisanal fisheries deploying OBMS and small mechanized boats up to 12m would be treated as par with agriculture while small scale fisheries involving mechanized boats less than 20m OAL would be treated at par with small scale industries. Fishing vessels above 20m and fishing activity involving motor ships on factory vessels could be treated as industrial activity.

Full time/Occasional fisher men whose household does not own a boat would be treated at par with landless labourer and would qualify for special care and protection.

Contribution towards reassurance coverage and saving cum-relief scheme would be restricted to the fisher men who do not own a boat.

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## PE DETAILING

### Demonstration/Workdone/experiment

#### Net mounting

Technique-Mounting	-	30 Score
Perfection & integrity	-	10Score
Total	-	40Score

### CALCULATION/DIAGRAM

Procedure	-	20 Score
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### DIAGNOSIS/SITUATIONANALYSIS

Problem identification	-	10Score
Analysis/Remedy	-	15 Score
Perfection in presentation	-	05 Score

### IDENTIFICATIONOFSPOTTERS

Ten spotters -@3	-	30 Score
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### VIVA VOCE

	-	20 Score
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### RECORD

	-	10 Score
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## SAMPLE TERM END QUESTIONS

### Practical Evaluation

Total marks: 150

Max. Time: 6 hrs

1. Qn No 1 to 10 identify and comment (3marks each)  
(10 x 3 marks)  
(30 marks)
2. Calculate the hanging coefficient of a gillnet and mount the given panel of net (60 marks)
3. Diagnosis and analyze the defect found in the given net panel and do necessary remedial measure 30 marks)
4. Viva voce on field visit. OJT, Project etc. (20 marks)
5. Record (10 marks)

### Theory Evaluation

1. The Portion above waterline: Freeboard:: The portion below waterline:
2. Draw a profile view of a typical fishing boat and ask to mark parts;LOA,LBP,FP,Draught,Waterline.
3. Give a picture of a typical fishing boat and ask to mark parts.
4. You have noted that a piece of iron sink in water while a vessel loaded full does'nt. Comment on it.
5. During an onboard visit you have noticed the vessel was very unstable even in calm water. Can you comment on the reason of such rolling nature of boat

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6. Suggest a type of boat bottom you will recommend to use in shallow and calm water. Give reason.
  7. Identify the type boat bottoms using the following hints;  
It is more seaworthy than others.  
It is less expensive to build  
Common in steel vessels  
Faster than others.
  8. During a stormy weather at night if your boat loses its path .How can you fix your path?
  9. Find the odd out. GPS, Echo sounder, compass, Chart; Give reason for the odd man
  10. Rearrange correctly. Installation of engine Planking Laying of keel-  
Painting- Wheel house construction- Backbone assembly Rigging
  11. Give a fig of backbone assembly -Identify and label parts.
  12. While construction of backbone assembly if you didn't get a single piece of log for hog keel what joint will you select and why
  13. Lenghtening joint: Scarf joint: Widening joint:
  14. Give a fig of profile view and ask to read it
  15. Suppose a steel boat owner approaches you for advice on the possible methods to extent the life of boat. What advice will you give?
  16. Coelenterates: foulers: Terredo:
  17. A boat after a long voyage has bought to your Dock for maintenance. Prepare a maintenance schedule.
  18. The life of a boat anchored is less than those anchored in off shore. Give reason.

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19. Find the odd one. ASCU, Creosote, Coal tar, Dammar battu,
20. Give a fig of purse seine net ;Identify and mark the parts
21. Identify the type of net using the following hints;
- It is an active gear;
- It has a device for opening its mouth;
- The fish caught are collected at its rear end;
- It is operated by mechanized boats.
22. Rearrange the sequence correctly; Hook-Snap clip- Sekiyama-main line-snood wire-branch line-swivel
23. A purse seine net operator complains that the wing portion is not sinking fast while shooting the net. State reason for this and suggest a remedy.
- 24.

Cause	Causative Agent	Remedy
-----	Fungi	Proper Seasoning
Mechanical destruction	-----	Mending
Reduce propulsion	-----	-----
-----	Careless handling	-----
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25. Suggest a type of engine you will recommend for a traditional fishing boat. Substantiate your suggestion

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26. Match the following

<ul style="list-style-type: none"><li>• Only suitable for light boats</li><li>• Mechanism for connecting and disconnecting driving member from driven member.</li><li>• A calibrated stick for measuring engine oil level.</li><li>• Device for removing impurities from fuel.</li><li>• Abnormal sound by auto ignition.</li></ul>	<ul style="list-style-type: none"><li>○ Dip stick</li><li>○ Fuel filter</li><li>○ Knocking</li><li>○ Mooring</li><li>○ Clutch</li><li>○ Submarine</li><li>○ Outboard</li></ul>
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27. Can you suggest the type of machineries to be used to catch a huge shoal of fishes?

28. Among the following an unmatched group is

- a. Derrick, winch, davit, towing block, gallows
- b. Fishpump, power block, net hauler, ring needle, outrigger
- c. Glass floats, dahnbuoy, steelfloats, cork, thermocole
- d. Shank, barb, Swivel, bend, point, eye.

Give reason for unmatching.

29. Arrange the following devices into minimum groups possible

Write the reason you adopted for grouping.

Echo sounder, GPS, Artificial reefs, Sonar FAD's, Radar, LORAN, Compass, Lights, Radiotelephone.

30. Suppose you have to attend a debate on the impact of FAD's in fishery. Briefly note down your point of view, you are going to present in the debate.

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