# DIPLOMA IN MARINE ENGINEERING

# M – SCHEME

## SYLLABUS

## 2015 - 2016



**Course Code: 1027**

# Syllabus Revision Committee
# Diploma in Marine Engineering(M-Scheme)

**Chairperson**

**Tmt. S. Madumathi, I.A.S.,**
Director of Technical Education
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Chennai – 600 025.

## Convener:

**Prof. Dr. A. Alaudeen,**
Principal,
Mohamed Sathak Polytechnic College,
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## Members:

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| **Thiru I. Kamal Abdul Nazer**,<br>Vice Principal,<br>Mohamed Sathak Polytechnic College,<br>Kilakarai – 623 806. | **Thiru K. Ramaraj**,<br>Head of the Department of Marine Engineering,<br>Mohamed Sathak Engineering College,<br>Kilakarai – 623 806. |
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**DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY**
**(SEMESTER SYSTEM)**
**(Implemented from 2015- 2016)**
**M – SCHEME**

## R E G U L A T I O N S*

* *Applicable to the Diploma Courses other than Diploma in Hotel Management & Catering Technology and the Diploma Courses offered through MGR Film Institute, Chennai.*

### 1. Description of the Course:

### a. Full Time (3 years)

The Course for the full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters* and the First Year is common to all Engineering Branches.

### b. Sandwich (3½ years)

The Course for the Diploma in Engineering (sandwich) shall extend over a period of three and half academic years, consisting of 7 semesters* and the First Year is common to all Engineering Branches. The subjects of three years full time diploma course being regrouped for academic convenience.



During 4th and/or during 7th semester the students undergo industrial training for six months/ one year. Industrial training examination will be conducted after completion of every 6 months of industrial training

### c. Part Time (4 years)

The course for the diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters*, the subjects of 3 year full time diploma courses being regrouped for academic convenience.

* Each Semester will have 15 weeks duration of study with 35 hrs. /Week for Regular Diploma Programme and 18hrs/ week (21 hrs. / Week I year) for Part-Time Diploma Programmes.

The Curriculum for all the 6 Semesters of Diploma courses (Engineering & Special Diploma Courses viz. Textile Technology, Leather Technology, Printing Technology, Chemical Technology etc.) have been revised and revised curriculum is applicable for the candidates admitted from 2015 – 2016 academic year onwards.

## 2. Condition for Admission:

Condition for admission to the diploma courses shall be required to have passed in The S.S.L.C Examination of the Board of Secondary Education, TamilNadu.

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in TamilNadu.

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examination recognized as equivalent to the above by the Board of Secondary Education, TamilNadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time.

## 3. Admission to Second year (Lateral Entry):

A pass in HSC ( Academic ) or ( Vocational ) courses mentioned in the Higher Secondary Schools in TamilNadu affiliated to the TamilNadu Higher Secondary Board with eligibility for university Courses of study or equivalent examination, & Should have studied the following subjects.



| Sl. No | Courses | H.Sc Academic | H.Sc Vocational | |
|---|---|---|---|---|
| | | Subjects Studied | Subjects Studied | |
| | | | Related subjects | Vocational subjects |
| 1. | All the Regular and Sandwich Diploma Courses | Maths, Physics & Chemistry | Maths / Physics / Chemistry | Related Vocational Subjects Theory & Practical |
| 2. | Diploma course in Modern Office Practice | English & Accountancy<br><br>English & Elements of Economics<br><br>English & Elements of Commerce | English & Accountancy,<br><br>English & Elements of Economics,<br><br>English & Management Principles & Techniques,<br><br>English & Typewriting | Accountancy & Auditing, Banking, Business Management, Co-operative Management, International Trade, Marketing & Salesmanship, Insurance & Material Management, Office Secretaryship. |

- For the diploma Courses related with Engineering/Technology, the related / equivalent subjects prescribed along with Practical may also be taken for arriving the eligibility.

- Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.

- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Modern Office Practice Diploma courses the candidates studied the related subjects will be given first preference.

- *Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.*

**4. Age Limit: No Age limit.**

**5. Medium of Instruction: English**

**6. Eligibility for the Award of Diploma:**

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed course of study for a period of not less than 3 academic years in any institution affiliated to the State Board of Technical Education and Training, TamilNadu, when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination.



The minimum and maximum period for completion of Diploma Courses are as given below:

| Diploma Course | Minimum Period | Maximum Period |
|---|---|---|
| Full Time | 3 Years | 6 Years |
| Full Time(Lateral Entry) | 2 Years | 5 Years |
| Sandwich | 3½ Years | 6½ Years |
| Part Time | 4 Years | 7 Years |

**7. Subjects of Study and Curriculum outline:**

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical. The curriculum outline is given in Annexure **- I**

**8. Examinations:**

Board Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester.

The Internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment and 75 marks are allotted for Board Examination.

**9. Continuous Internal Assessment:**

**A . For Theory Subjects:**

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

**i. Subject Attendance** **5 Marks**

(Award of marks for subject attendance to each subject theory/practical will as per the range given below)

| | |
|---|---|
| 80% - 83% | 1 Mark |
| 84% - 87% | 2 Marks |
| 88% - 91% | 3 Marks |
| 92% - 95% | 4 Marks |
| 96% - 100% | 5 Marks |



**ii) Test #** **10 Marks**

2 Tests each of 2 hours duration for a total of 50 marks are to be conducted. Out of which the best one will be taken and the marks to be reduced to: 05 marks

The Test – III is to be the Model test covering all the five units and the marks so obtained will be reduced to : 05 marks

Total **10 marks**

| TEST | UNITS | WHEN TO CONDUCT | MARKS | DURATION |
|---|---|---|---|---|
| **Test I** | Unit – I & II | End of 6th week | 50 | 2 Hrs |
| **Test II** | Unit – III & IV | End of 12th week | 50 | 2 Hrs |
| **Test III** | **Model Examination** - **Compulsory** Covering all the 5 Units. (Board Examination-question paper-pattern). | End of 15th week | 75 | 3 Hrs |

**# - From the Academic year 2015-2016 onwards.**

Question Paper Pattern for the Periodical Test :( Test - I & Test- II)

With no choice:

| | | |
|---|---|---|
| PART A type questions: | 4 Questions X 2 mark | … … 8 marks |
| PART B type questions: | 4 Questions X 3 marks | … … 12 marks |
| PART C type questions: | 3 Questions X 10 marks | … … 30 marks |
| | | ---------- |
| | **Total** | 50 marks |
| | | ---------- |

**iii) Assignment** **10 Marks**

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 10 marks

All Test Papers and assignment notebooks after getting the signature with date from the students must be kept in the safe custody in the Department for verification and audit. It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.



**B. For Practical Subjects:**

The internal assessment mark for a total of 25 marks which are to be distributed as follows:-

| | | | |
|---|---|---|---|
| a) | Attendance (Award of marks as same as Theory subjects) | : | **5 Marks** |
| b) | Procedure/ observation and tabulation/ Other Practical related Work | : | **10 Marks** |
| c) | Record writing | : | **10 Marks** |
| | | | ----- |
| | TOTAL | : | **25 Marks** |
| | | | ----- |

- *All the Experiments/exercises indicated in the syllabus should be completed and the same to be given for final board examinations.*
- The Record for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 for each exercise as per the above allocation.
- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)

- The students have to submit the duly signed bonafide record note book/file during the Practical Board Examinations.
- *All the marks awarded for assignment, Test and attendance should be entered in the Personal Log Book of the staff, who is handling the subject. This is applicable to both Theory and Practical subjects.*

**10. Life and Employability Skill Practical:**

The Life and Employability Skill Practical with more emphasis is being introduced in IV Semester for Circuit Branches and in V Semester for other branches of Engineering.
Much Stress is given to increase the employability of the students:

Internal assessment Mark **….. 25 Marks**

**11. Project Work:**

The students of all the Diploma Programmes **(except Diploma in Modern Office Practice)** have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamilnadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester.**

**a) Internal assessment mark for Project Work & Viva Voce:**



| | | |
|---|---|---|
| Project Review I | … | **10 marks** |
| Project Review II | … | **10 marks** |
| Attendance | … | **05 marks** (award of marks same as theory subjects pattern) |
| Total | … | **25 marks** |

Proper record to be maintained for the two Project Reviews, and It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

**b) Allocation of Mark for Project Work & Viva Voce in Board Examination:**

| | | |
|---|---|---|
| Viva Voce | … | **30 marks** |
| Marks for Report Preparation, Demo | … | **35 marks** |
| Total | | **65 marks** |

**c) Written Test Mark (from 2 topics for 30 minutes duration):** $

| | | |
|---|---|---|
| i) Environment Management | 2 questions X 2 ½ marks | **= 5 marks** |
| iI) Disaster Management | 2 questions X 2 ½ marks | **= 5 marks** |
| | | **10marks** |

$ - Selection of Questions should be from Question Bank, by the External Examiner. No choice need be given to the candidates.

| | | |
|---|---|---|
| Project Work & Viva Voce in Board Examination | -- | **65 Marks** |
| Written Test Mark (from 2 topics for 30 minutes duration) | -- | **10 Marks** |
| TOTAL | -- | **75 Marks** |

**A neatly prepared PROJECT REPORT as per the format has to be submitted by individual during the Project Work & Viva Voce Board examination.**

## 12. Scheme of Examinations:

The Scheme of examinations for subjects is given in **Annexure - II.**

## 13. Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the State Board of Technical Education & Training, Tamil Nadu and pass all the subjects prescribed in the curriculum.
2. A candidate shall be declared to have passed the examination in a subject if he/she secures not less than *40% in theory subjects* and *50% in practical subject* out of the total prescribed maximum marks including both the internal assessment and the Board Examination marks put together, subject to the condition that he/she secures at least a minimum of *30 marks out of 75 marks in the Board's Theory examinations and a minimum of 35 marks out of 75 marks in the Board Practical Examinations.*



## 14. Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2018 onwards (Joined in first year in 2015-2016) will be done as specified below.

**First Class with Superlative Distinction:**

A candidate will be declared to have passed in **First Class with Superlative Distinction** if he/she secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study 3/ 3½/ 4 years (Full Time/Sandwich/Part Time) without any break in study.

**First Class with Distinction:**

A candidate will be declared to have passed in **First Class with Distinction** if he/she secures not less than 75% of the aggregate of marks in all the semesters put together and passes all the semesters except the I and II semesters in the first appearance itself and passes all the subjects within the stipulated period of study 3/ 3½/ 4 years (Full Time/Sandwich/Part Time) without any break in study.

**First Class:**

A candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all semesters put together and passes all the subjects within the stipulated period of study 3/ 3½ / 4 years (Full Time/Sandwich/Part Time) without any break in study.

**Second Class:**

All other successful candidates will be declared to have passed in **Second Class.**

The above mentioned classifications are also applicable for the Sandwich / Part-Time students who pass out Final Examination from October 2018 /April 2019 onwards (both joined in First Year in 2015-2016)

**15. Duration of a period in the Class Time Table:**



The duration of each period of instruction is 1 hour and the total period of instruction hours excluding interval and Lunch break in a day should be uniformly maintained as 7 hours corresponding to 7 periods of instruction (Theory & Practical).

**16. Seminar:**

For seminar the total seminar 15 hours(15 weeks x 1hour) should be distributed equally to total theory subject per semester(i.e 15 hours divided by 3/4 subject). A topic from subject or current scenario is given to students. During the seminar hour students have to present the paper and submit seminar material to the respective staff member, who is handling the subject. It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

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## Diploma in Marine Engineering M-Scheme

### List of Equivalent Subjects of L-Scheme

### III Semester – W.E.F. OCT '16

| | L-SCHEME | | M-SCHEME | |
|---|---|---|---|---|
| Sl.No. | Subject code | Name of the Subject | Subject code | Name of Subject |
| 1. | 22731 | Strength of Materials and Fluid Mechanics | 32731 | Marine Strength of Materials and Fluid Mechanics |
| 2. | 22732 | Workshop Technology I | 32732 | Marine Workshop Technology - I |
| 3. | 22733 | Ship Construction Technology | 32733 | Ship Construction Technology |
| 4. | 22734 | Strength of Materials and Fluid Mechanics Practical | 32734 | Marine Strength of Materials and Fluid Mechanics Practical |
| 5. | 22735 | Workshop Technology - I Practical | 32735 | Marine Workshop Technology - I Practical |
| 6. | 22736 | Ship Construction Practical | 32736 | Ship Construction Technology Practical |
| 7. | 20001 | Computer Applications Practical | 30001 | Computer Applications Practical |

## IV Semester – W.E.F. APR '17

| | L-SCHEME | | M-SCHEME | |
|---|---|---|---|---|
| Sl.No. | Subject code | Name of the Subject | Subject code | Name of Subject |
| 1. | 22741 | Workshop Technology II | 32741 | Marine Workshop Technology – II |
| 2. | 22742 | Personal Safety and Social Responsibilities | 32742 | Personal Safety and Social Responsibilities |
| 3. | 22043 | Electrical Drives & Control | 32043 | Electrical Drives & Control |
| 4. | 22744 | Marine Engineering Drawing | 32743 | Marine Engineering Drawing |
| 5. | 22745 | Workshop Technology II Practical | 32745 | Marine Workshop Technology - II Practical |
| 6. | 22746 | Computer Aided Marine Engineering Drawing Practical | 32746 | Computer Aided Marine Engineering Drawing Practical |
| 7. | 22047 | Electrical Drives & Control Practical | 32047 | Electrical Drives & Control Practical |

**V Semester W.E.F. OCT '17**

| | L-SCHEME | | M-SCHEME | |
|---|---|---|---|---|
| Sl.No. | Subject code | Name of the Subject | Subject code | Name of Subject |
| 1. | 22751 | Thermodynamics | 32751 | Marine Thermodynamics |
| 2. | 22752 | Marine Diesel Engine and Power Plant | 32752 | Marine Diesel Engine and Power Plant |
| 3. | 22771 | Personal Survival Techniques **Elective Theory - I** | 32781 | Personal Survival Techniques **Elective Theory - II** |
| 4. | 22772 | Seamanship and Life saving appliances **Elective Theory - I** | 32772 | Seamanship and Life Saving Appliances **Elective Theory - I** |
| 5. | 22754 | Naval Architecture | 32753 | Naval Architecture |
| 6. | 22755 | Marine Diesel Engine and Power Plant Practical | 32755 | Marine Diesel Engine and Power Plant Practical |
| 7. | 22773 | Personal Survival Techniques Practical **Elective Practical - I** | 32785 | Personal Survival Techniques Practical **Elective Practical - II** |
| 8. | 22774 | Seamanship and Life saving appliances Practical **Elective Practical - I** | 32776 | Seamanship and Life Saving Appliances Practical **Elective Practical - I** |
| 9. | 20002 | Communication and Life Skills Practical | 30002 | Life and Employability Skill Practical |

## VI SemesterV – W.E.F. APR '18

| | L-SCHEME | | M-SCHEME | |
|---|---|---|---|---|
| Sl.No. | Subject code | Name of the Subject | Subject code | Name of Subject |
| 1. | 22761 | Elementary First Aid and Fire Fighting | 32761 | Elementary First Aid and Fire Fighting |
| 2. | 22762 | Marine Auxiliary Machinery | 32762 | Marine Auxiliary Machinery |
| 3. | 22781 | Navigation and Oceanography **Elective Theory - II** | 32771 | Navigation and Oceanography **Elective Theory - I** |
| 4. | 22782 | Rule of The Road **Elective Theory - II** | 32782 | Rule of The Road **Elective Theory - II** |
| 5. | 22764 | Elementary First Aid and Fire Fighting Practical | 32764 | Elementary First Aid and Fire Fighting Practical |
| 6. | 22765 | Marine Auxiliary Machinery Practical | 32765 | Marine Auxiliary Machinery Practical |
| 7. | 22783 | Navigation and Meteorology Practical **Elective Practical – II** | 32775 | Navigation and Meteorology Practical **Elective Practical – I** |
| 8. | 22784 | Rule of the Road Practical **Elective Practical – II** | 32786 | Rule of the Road Practical **Elective Practical – II** |
| 9. | 22767 | Project Work | 32767 | Project Work |

## Annexure - I

## CURRICULUM OUTLINE

**THIRD SEMESTER**

| Subject Code | SUBJECT | HOURS PER WEEK | | | |
|---|---|---|---|---|---|
| | | Theory Hours | Tutorial / Drawing | Practical hours | Total Hours |
| THEORY SUBJECTS | | | | | |
| 32731 | Marine Strength of Materials and Fluid Mechanics | 6 | - | - | 6 |
| 32732 | Marine Workshop Technology - I | 6 | - | - | 6 |
| 32733 | Ship Construction Technology | 5 | - | - | 5 |
| PRACTICAL SUBJECTS | | | | | |
| 32734 | Marine Strength of Materials and Fluid Mechanics Practical | - | - | 4 | 4 |
| 32735 | Marine Workshop Technology - I Practical | - | - | 4 | 4 |
| 32736 | Ship Construction Practical | - | - | 5 | 5 |
| 30001 | Computer Applications Practical** | - | - | 4 | 4 |
| | Seminar | 1 | - | - | 1 |
| | Total | 18 | - | 17 | 35 |

** Common to all Diploma Courses

## CURRICULUM OUTLINE

**FOURTH SEMESTER**

| Subject Code | SUBJECT | HOURS PER WEEK | | | |
|---|---|---|---|---|---|
| | | Theory Hours | Tutorial / Drawing | Practical hours | Total Hours |
| THEORY SUBJECTS | | | | | |
| 32741 | Marine Workshop Technology – II | 5 | - | - | 5 |
| 32742 | Personal Safety and Social Responsibilities | 5 | - | - | 5 |
| 32743 | Marine Engineering Drawing | - | 6 | - | 6 |
| 32044 | Electrical Drives & Control* | 6 | - | - | 6 |
| PRACTICAL SUBJECTS | | | | | |
| 32745 | Marine Workshop Technology - II Practical | - | - | 4 | 4 |
| 32746 | Computer Aided Marine Engineering Drawing Practical | - | - | 4 | 4 |
| 32047 | Electrical Drives & Control Practical* | - | - | 4 | 4 |
| | Seminar | 1 | - | - | 1 |
| | Total | 17 | 6 | 12 | 35 |



* Common with Mechanical Engineering

## CURRICULUM OUTLINE

**FIFTH SEMESTER**

| Subject Code | SUBJECT | HOURS PER WEEK | | | |
|---|---|---|---|---|---|
| | | Theory Hours | Tutorial / Drawing | Practical hours | Total Hours |
| THEORY SUBJECTS | | | | | |
| 32751 | Marine Thermodynamics | 6 | -- | -- | 6 |
| 32752 | Marine Diesel Engine and Power Plant | 5 | -- | -- | 5 |
| 32753 | Naval Architecture | 6 | -- | -- | 6 |
| **Elective – I Theory** | | 5 | -- | -- | 5 |
| 32771 | Navigation and Oceanography | | | | |
| 32772 | Seamanship and Life Saving | | | | |
| 32773 | Robotics | | | | |
| 32774 | Fishing Technology – I | | | | |
| PRACTICAL SUBJECTS | | | | | |
| 32755 | Marine Diesel Engine and Power Plant Practical | -- | -- | 4 | 4 |
| | **Elective – I Practical** | | | | |
| 32775 | Navigation and Meteorology Practical | - | - | 4 | 4 |
| 32776 | Seamanship and Life Saving Practical | | | | |
| 32777 | Robotics Practical | | | | |
| 32778 | Fishing Technology – I Practical | | | | |
| 30002 | Life and Employability Skill Practical** | -- | -- | 4 | 4 |
| Seminar | | 1 | - | - | 1 |
| TOTAL | | 23 | -- | 12 | 35 |

** Common to all Diploma Courses

## CURRICULUM OUTLINE

**SIXTH SEMESTER**

| Subject Code | SUBJECT | HOURS PER WEEK | | | |
|---|---|---|---|---|---|
| | | Theory Hours | Tutorial / Drawing | Practical hours | Total Hours |
| THEORY SUBJECTS | | | | | |
| 32761 | Elementary First Aid and Fire Fighting | 6 | -- | -- | 6 |
| 32762 | Marine Auxiliary Machinery | 6 | -- | -- | 6 |
| **Elective – II Theory** | | 5 | -- | -- | 5 |
| 32781 | Personal Survival Techniques | | | | |
| 32782 | Rule of The Road | | | | |
| 32783 | Marine Welding Technology | | | | |
| 32784 | Fishing Technology – II | | | | |
| PRACTICAL SUBJECTS | | | | | |
| 32764 | Elementary First Aid and Fire Fighting Practical | -- | -- | 5 | 5 |
| 32765 | Marine Auxiliary Machinery Practical | -- | -- | 4 | 4 |
| **Elective – II Practical** | | -- | -- | 4 | 4 |
| 32785 | Personal Survival Techniques Practical | | | | |
| 32786 | Rule of the Road Practical | | | | |
| 32787 | Marine Welding Technology Practical | | | | |
| 32788 | Fishing Technology – II Practical | | | | |
| 32767 | Project Work | -- | -- | 4 | 4 |
| Seminar | | 1 | - | - | 1 |
| TOTAL | | 18 | -- | 17 | 35 |

## Annexure - II
## SCHEME OF THE EXAMINATION
## DIPLOMA IN MARINE ENGINEERING (FULL TIME) (1027)

**THIRD SEMESTER**

| Subject Code | SUBJECT | Examination Marks | | | Minimum for pass | Duration of Exam Hours |
|---|---|---|---|---|---|---|
| | | Internal assess-ment Marks | Board Exam. Marks | Total Mark | | |
| **THEORY SUBJECTS** | | | | | | |
| 32731 | Marine Strength of Materials and Fluid Mechanics | 25 | 75 | 100 | 40 | 3 |
| 32732 | Marine Workshop Technology - I | 25 | 75 | 100 | 40 | 3 |
| 32733 | Ship Construction Technology | 25 | 75 | 100 | 40 | 3 |
| **PRACTICAL SUBJECTS** | | | | | | |
| 32734 | Marine Strength of Materials and Fluid Mechanics Practical | 25 | 75 | 100 | 50 | 3 |
| 32735 | Marine Workshop Technology - I Practical | 25 | 75 | 100 | 50 | 3 |
| 32736 | Ship Construction Technology Practical | 25 | 75 | 100 | 50 | 3 |
| 30001 | Computer Applications Practical** | 25 | 75 | 100 | 50 | 3 |
| Total | | 175 | 525 | 700 | | |

** Common to all Diploma Courses

## SCHEME OF THE EXAMINATION
## DIPLOMA IN MARINE ENGINEERING (FULL TIME) (1027)

**FOURTH SEMESTER**

| Subject Code | SUBJECT | Examination Marks | | | Minimum for pass | Duration of Exam Hours |
|---|---|---|---|---|---|---|
| | | Internal assess-ment Marks | Board Exam Marks | Total Mark | | |
| **THEORY SUBJECTS** | | | | | | |
| 32741 | Marine Workshop Technology – II | 25 | 75 | 100 | 40 | 3 |
| 32742 | Personal Safety and Social Responsibilities | 25 | 75 | 100 | 40 | 3 |
| 32743 | Marine Engineering Drawing | 25 | 75 | 100 | 40 | 3 |
| 32044 | Electrical Drives & Control* | 25 | 75 | 100 | 40 | 3 |
| **PRACTICAL SUBJECTS** | | | | | | |
| 32745 | Marine Workshop Technology - II Practical | 25 | 75 | 100 | 50 | 3 |
| 32746 | Computer Aided Marine Engineering Drawing Practical | 25 | 75 | 100 | 50 | 3 |
| 32047 | Electrical Drives & Control Practical* | 25 | 75 | 100 | 50 | 3 |
| TOTAL | | 175 | 525 | 700 | | |

* Common with Mechanical Engineering

## SCHEME OF THE EXAMINATION
## DIPLOMA IN MARINE ENGINEERING (FULL TIME) (1027)

**FIFTH SEMESTER**

| Subject Code | SUBJECT | Examination Marks | | | Minimum for pass | Duration of Exam Hours |
|---|---|---|---|---|---|---|
| | | Internal assess-ment Marks | Board Exam. Marks | Total Mark | | |
| **THEORY SUBJECTS** | | | | | | |
| 32751 | Marine Thermodynamics | 25 | 75 | 100 | 40 | 3 |
| 32752 | Marine Diesel Engine and Power Plant | 25 | 75 | 100 | 40 | 3 |
| 32753 | Naval Architecture | 25 | 75 | 100 | 40 | 3 |
| **Elective – I Theory** | | 25 | 75 | 100 | 40 | 3 |
| 32771 | Navigation and Oceanography | | | | | |
| 32772 | Seamanship and Life Saving Appliances | | | | | |
| 32773 | Robotics | | | | | |
| 32774 | Fishing Technology – I | | | | | |
| **PRACTICAL SUBJECTS** | | | | | | |
| 32755 | Marine Diesel Engine and Power Plant Practical | 25 | 75 | 100 | 50 | 3 |
| 30002 | Life and Employability Skill Practical** | 25 | 75 | 100 | 50 | 3 |
| **Elective – I Practical** | | 25 | 75 | 100 | 50 | 3 |
| 32775 | Navigation and Meteorology Practical | | | | | |
| 32776 | Seamanship and Life Saving Appliances Practical | | | | | |
| 32777 | Robotics Practical | | | | | |
| 32778 | Fishing Technology – I Practical | | | | | |
| TOTAL | | 175 | 525 | 700 | | |

** Common to all Diploma Courses

## SCHEME OF THE EXAMINATION
## DIPLOMA IN MARINE ENGINEERING (FULL TIME) (1027)

**SIXTH SEMESTER**

| Subject Code | SUBJECT | Examination Marks | | | Minimum for pass | Duration of Exam Hours |
|---|---|---|---|---|---|---|
| | | Internal assess-ment Marks | Board Exam Marks | Total Mark | | |
| **THEORY SUBJECTS** | | | | | | |
| 32761 | Elementary First Aid and Fire Fighting | 25 | 75 | 100 | 40 | 3 |
| 32762 | Marine Auxiliary Machinery | 25 | 75 | 100 | 40 | 3 |
| **Elective – II Theory** | | 25 | 75 | 100 | 40 | 3 |
| 32781 | Personal Survival Techniques | | | | | |
| 32782 | Rule of The Road | | | | | |
| 32783 | Marine Welding Technology | | | | | |
| 32784 | Fishing Technology – II | | | | | |
| **PRACTICAL SUBJECTS** | | | | | | |
| 32764 | Elementary First Aid and Fire Fighting Practical | 25 | 75 | 100 | 50 | 3 |
| 32765 | Marine Auxiliary Machinery Practical | 25 | 75 | 100 | 50 | 3 |
| **Elective – II Practical** | | 25 | 75 | 100 | 50 | 3 |
| 32785 | Personal Survival Techniques Practical | | | | | |
| 32786 | Rule of the Road Practical | | | | | |
| 32787 | Marine Welding Technology Practical | | | | | |
| 32788 | Fishing Technology – II Practical | | | | | |
| 32767 | Project Work | 25 | 75 | 100 | 50 | 3 |
| TOTAL | | 175 | 525 | 700 | | |

**Board Examination - Question paper pattern**

**Common for all theory subjects except Marine Drawing**

***PART A*** ***- (1 to 8) 5 Questions are to be answered out of 8 questions for 2 marks each.*****(Question No. 8 will be the compulsory question and *can be asked from any one of the units)(From each unit maximum of two 2 marks questions alone can be asked)***

***PART B*** ***- (9 to 16)5 Questions are to be answered out of 8 questions for 3 marks each.*** **(Question No. 16 will be the compulsory question and *can be asked from any one of the units) (From each unit maximum of two 3 marks questions alone can be asked)***

***PART C*** ***- (17 to 21) Five Questions will be in the Either OR Pattern. Students have to answer these five questions. Each question carries 10 marks. (Based on the discretion of the question setter, he/she can ask two five mark questions (with sub division A & sub division B) instead of one ten marks question if required)***



**Any tables required should be mentioned in the question paper. Steam table, Design Data Book, Mollier chart, Psychometric Chart etc..**

## III SEMESTER

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## II YEAR

## M SCHEME



## III SEMESTER

2015 -2016 onwards

## MARINE STRENGTH OF MATERIALS AND FLUID MECHANICS

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32731
Semester : III Semester
Subject Title : MARINE STRENGTH OF MATERIALS AND FLUID MECHANICS

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours / Week | Hours / Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Strength of Materials and Fluid Mechanics | 6 Hrs | 90 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl. No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | 1. MECHANICAL PROPERTIES OF MATERIALS, STRESSES AND STRAINS<br>2. POISSON'S RATIO AND ELASTIC CONSTANTS<br>3. GEOMETRICAL PROPERTIES OF SECTIONS | 17 |
| 2. | 1. SHEARFORCE AND BENDING MOMENT DIAGRAMS<br>2. THEORY OF SIMPLE BENDING | 17 |
| 3. | 1. PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENT<br>2. HYDROSTATIC FORCES ON SURFACES | 17 |
| 4. | 1. FLUID KINEMATICS AND FLUID DYNAMICS<br>2. FLOW THROUGH PIPES | 17 |
| 5. | 1. RECIPROCATING PUMPS<br>2. CENTRIFUGAL PUMPS | 17 |
| 6. | TEST & REVISION | 05 |
| **Total** | | **90** |

**Rationale:**

Ships are subject to different types of loads. These loads cause stresses in ships and result in the formation of shear force and bending moment. Loads and stresses are experienced unevenly at different parts of the ships. Movement of ships on waves can also cause stresses and strain depending on the position of the crest and trough of the wave. This study is done by considering the ship as a simply supported beam. Pumps and pressure gauges also play a major role in ships.

**Objectives:**

- At the end of this course the student should be able to understand the various forces and stresses acting on a body.
- Further, the student should understand the principle of centroid of sections.
- To understand the stresses developed in beams under various loads. The student should be able to comprehend the effect of shear force & bending moment on beams.
- The student should be able to understand the properties of fluid in motion and hydrostatic forces on surfaces, the fluid kinematics and fluid dynamics of motion. The applications of the conservation of laws to flow through pipes are studied.
- The student should also be able to comprehend functions of pumps. All these should be achieved both conceptually and through solved examples.

## 32731: MARINE STRENGTH OF MATERIALS AND FLUID MECHANICS

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **1.1. MECHANICAL PROPERTIES OF MATERIALS, STRESSES AND STRAINS:**<br>Introduction—Definitions of mechanical properties of metals — tensile stress, compressive stress. Classification of force systems – tensile, compressive, shear, bending and torsional force systems – Behaviour of mild steel bar in axial tension up to rupture – stress strain diagram. Hook's Law, Young's Modulus, working stress, factor of safety.<br>**1.2. POISSON'S RATIO AND OTHER ELASTIC CONSTANTS**:<br>Lateral strain – Poisson's ratio – volumetric strain, bulk modulus, elastic constants and their relationship. Problems connecting linear, lateral and volumetric deformations. Problems on volumetric strain, Poisson's ratio and E,C,K relation<br>**1.3. GEOMETRICAL PROPERTIES OF SECTIONS:**<br>Introduction – centroid, center of gravity, position of centroids on plane geometrical areas such as square, rectangle, triangle. Determination of centriod of angles, channels, I and T sections. Moment of Inertia (definition only) - parallel axis theorem and perpendicular axis theorem. | 17 Hrs |
| II | **2.1. SHEAR FORCE AND BENDING MOMENT DIAGRAMS**:<br>Classification of beams – shear force and bending moment – sign convention – types of loads – Shear force and bending moment diagram for simply supported beam and cantilever beam subjected to concentrated load and uniformly distributed load only – Problems.<br>**2.2. THEORY OF SIMPLE BENDING:**<br>Introduction – theory of simple bending – assumptions – neutral axis – bending stress distribution – moment of resistance – bending equation (study only). Section modulus – strength and stiffness of beam. Problems involving bending equation for cantilever and simply supported beam. | 17 Hrs |
| III | **3.1. PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENT:**<br>Definition - Fluid Properties - Density - Specific weight - Specific volume – Relative density - Viscosity - Vapour pressure – compressibility - surface tension – capillarity - cohesion – adhesion – Pressure - Pascal's law - Pressure head - Atmospheric pressure - Absolute pressure – Gauge pressure and vacuum pressure. Pressure Measurement - Manometers - Piezometer - simple manometer - Differential manometer - Mechanical gauges - Bourdon tube pressure gauge - Problems on simple and differential manometers.<br>**3.2. HYDROSTATIC FORCES ON SURFACES:**<br>Total pressure - Centre of pressure - Total pressure and position of centre of pressure on horizontal immersed plane surface, vertical immersed plane surface and inclined immersed plane surface. Problems on hydro static forces on plane surfaces of square, rectangular and circular shapes only. | 17 Hrs |

| | | |
|---|---|---|
| IV | **4.1. FLUID KINEMATICS and FLUID DYNAMICS**<br>Types of flow - Laminar flow - Turbulent flow - Steady flow - Unsteady flow – Uniform flow - Non-uniform flow - flow pattern - path line - stream line - mean velocity of flow - Continuity equation (definition only) - Fluid dynamics – Different types of Heads and Energies of a liquid in motion – Bernoulli's theorem (definition only) - Applications and limitations – Horizontal Venturimeters, Orifice meter and Pitot tubes. Problems on Horizontal Venturimeters and Orifice meter.<br>**4.2. FLOW THROUGH PIPES:**<br>Laws of fluid friction for laminar and turbulent flow - Froude's experiment – Wetted perimeter - Hydraulic radius - head lost due to friction - Darcy Weisbach equation and Chezy's formula (derivation not needed) – problems. Minor losses (description only). | 17 Hrs |
| V | **5.1 RECIPROCATING PUMPS**<br>Reciprocating pumps - Classifications - single acting - Double acting reciprocation pumps - discharge of a reciprocating pump - theoretical power required - coefficient of discharge - slip - percentage slip - negative slip - acceleration head - air vessels. Problems on discharge, slip, percentage slip, power required to drive the pump.<br>**5.2 CENTRIFUGAL PUMPS:**<br>Constructional details – Principle of working – classifications – types of casing – volute – vortex – diffuser casings. Types of impellers – closed, open and semi open impellers – multi stage pumps reasons – working and advantages. | 17 Hrs |



**Text Books:**

1. Strength of Materials, R.S.Kurmi. S.Chand & Company Ltd ,2008
2. Hydraulics, Fluid Mechanics and Hydraulic machines, R.S.Kurmi, S.Chand & Company Ltd 2003.

**Reference Books:**

1. Strength of Materials, S. Ramamrutham, Dhanpat Rai Company-2009
2. Hydraulics, Fluid Mechanics and Fluid machines, S. Ramamrutham ,Dhanpat Rai Company-2009

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING



II YEAR

M SCHEME

III SEMESTER

2015 -2016 onwards

# MARINE WORKSHOP TECHNOLOGY - I

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32732
Semester : III Semester
Subject Title : MARINE WORKSHOP TECHNOLOGY – I

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Workshop Technology-I | 6 Hrs | 90 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | FOUNDRY | 17 |
| 2. | WELDING | 17 |
| 3. | HEAT TREATMENTS | 17 |
| 4. | CENTRE LATHE | 17 |
| 5. | SEMI AUTOMATIC AND AUTOMATIC LATHES | 17 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 90 |

**RATIONALE:**

Different materials go into the making of a ship. Cast iron is one of the major materials uses in manufacturing ships. Many parts of ships are cast in foundry. Parts of ships are joined by welding. Different types of welding methods are used in ships. Lathes are used in ships for different purposes.

**OBJECTIVES:**

At the end of the study of III Semester the student will be able to

- Know the various types of moulds and preparation of casting.
- Have knowledge on Welding & heat treatments.
- Know various operations that can be performed in lathe and allied machines
- To equip with the practical knowledge required in the core industries.

## 32732: MARINE WORKSHOP TECHNOLOGY – I

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **FOUNDRY**<br>**PATTERNS** – definition – pattern materials – factors for selecting pattern materials – single piece solid, split patterns – pattern allowances – core prints.<br>**MOULDING** – definition – moulding boxes, moulding sand – ingredients – silica – clay – moisture and miscellaneous materials – properties of moulding sand – sand additives – moulding sand preparation –mixing – tempering and conditioning – types of moulding – green sand – dry sand - core – $CO_2$ process core making – types of core – core boxes.<br>**CASTING** – definition – sand casting using green sand and dry sand – gravity die casting – pressure die-casting – hot and cold- chamber processes –– cupola furnace – melting of non ferrous metals – crucible furnace melting of steel and arc furnaces – cleaning of casting – tumbling, trimming, sand and shot blasting –defects in casting – causes and remedies – safety practices in foundry. | 17 Hrs |
| II | **WELDING :**<br>Welding – arc welding definition –– carbon arc, metal arc, Metal Inert gas (MIG), Tungsten inert gas (TIG), Atomic hydrogen, Plasma arc, Spot welding, resistance welding, Submerged arc and Electro slag welding, Gas welding definition – oxy-acetylene welding – Three types of flame. Inspection and testing of welded joints – destructive and non destructive types of tests – magnetic particle test – radiographic and ultrasonic test - defects in welding – causes and remedies – safety practices in welding. | 17 Hrs |
| III | **HEAT TREATMENTS**<br>Heat treatment processes – purpose – procedures – applications of various heat treatment processes – full annealing – process annealing stress relief annealing - spherodising annealing – isothermal annealing – normalizing – hardening – tempering – quenching medium – different types and their relative merits – case hardening – pack carburizing – cyaniding – nitriding – induction hardening and flame hardening. | 17 Hrs |
| IV | **CENTRE LATHE**<br>Theory of lathes – specifications – principal parts – head stock – back geared type – all geared type – tumbler gear mechanism – quick change gear box – apron mechanism – carriage cross slide – automatic, longitudinal and cross feed mechanism – tail stock and its functions – work holding device –face plate – three jaw chuck – four jaw chuck – catch plate and carrier – types of centres – machining operations done on lathe straight turning – step turning – taper turning – knurling – Thread cutting – Facing – Boring – chamfering – cutting speed – feed – depth of cut. | 17 Hrs |

| | | |
|---|---|---|
| V | **SEMI AUTOMATIC AND AUTOMATIC LATHES**<br>**Semi automatic lathes:**<br>Types of semi automatic lathes – capstan and turret lathes – difference between turret and capstan – tools and work holding devices – self opening die head – collapsible taps.<br>**Automatic Lathes:**<br>Automatic lathe – classification of single spindle automatic lathe – principle of automatic lathes – automatic screw cutting machines – multi spindle automatic lathes – use of cams in automats. | 17 Hrs |

**Text Book:**


1) Elements of workshop Technology By S.K Hajra Choudhury , A.K Hajra Choudhury & Nirjhar Roy Volume I & II, Media promoters & Publishers (P) Ltd – 2004
2) A Text book of workshop Technology, R. S. Khurmi & J. K. Gupta, S.Chand & Co., Ram Nagar, New Delhi – 2006
3) A Text book of Foundry Technology, O.P.Khanna, Dhanpat Rai Publications (P) Ltd-2000
4) A Text book of Production Technology, O.P.Khanna, M.Lal, Dhanpat Rai Publications (P) Ltd – 2002


**Reference Book :**


1) Shop Theory, James Anderson, Earl E.Tatro Six$^{th}$ Edition, Tata Macraw- Hill Publishing Co Ltd - 2001.
2) Technology of Machine Tools, Fourth Edition, Steeve F.KRAR, J. William Oswald, Tata Macraw- Hill Publishing Co Ltd-Singapore-1991.
3) Automation production systems and computer –Integrated manufacturing, Mikell.P.Groover, Prentice- Hall of India private Ltd, 2003.




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# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## II YEAR

## M SCHEME



## III SEMESTER

2015 -2016 onwards

# SHIP CONSTRUCTION TECHNOLOGY

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32733
Semester : III Semester
Subject Title : SHIP CONSTRUCTION TECHNOLOGY

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Ship Construction Technology | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | SHIP TYPES, TERMS , STRESSES IN SHIP | 14 |
| 2. | BOTTOM AND SIDE FRAMING, SHELL AND DECKS | 14 |
| 3. | FORE PART, AFT PART | 14 |
| 4. | SHIP DYNAMICS | 14 |
| 5. | BULK HEADS, DEEP TANKS, SHIP MAINTENANCE | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

In the field of shipping and marine engineering, ship construction has an important place because latest technology is being employed in the field of construction and repair of ships. The knowledge of shipping terms, hull construction, hull dynamics and launching is required for the marine engineer.

**OBJECTIVES:**

At the end of the study of III Semester the student will be able to

- Understand the ship terms, movement of ships and the various materials used in ship building.
- Acquire knowledge about different types of ships.
- Acquire broader ideas about shell & deck plating and stresses acting on the hull.
- Understand about hull dynamics and paintings.
- To study bulkheads, water tight doors, deep tanks and hatches.

## 32733: SHIP CONSTRUCTION TECHNOLOGY

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Ship types:** Passenger ships - cargo liners - cargo tramps - oil tankers - bulk carriers - container ships - roll-on/roll-off vessels - liquefied gas carrier - chemical carrier.<br>**Terms in general use**: Forward – Aft - port side - starboard side – draught – freeboard – Length overall – length between perpendiculars – camber - tumble home – bilge radius – sheer – tonnage – displacement – light weight and dead weight.<br>**Stresses in ship structures:**<br>Longitudinal bending in still water and waves – Transverse bending - stresses when docking – panting and pounding. | 14 Hrs |
| II | **Bottom and side framing:**<br>Double bottom – internal structure – duct keel – double bottom in machinery space. Side framing – tank side brackets – beam knees – web frames.<br>**Shell and decks:** Shell plating – bulwarks – deck plating – beams – deck girders and pillars – discontinuities – Hatches – steel hatch covers – water tight hatches. | 14 Hrs |
| III | **Fore part:** Stem plating – arrangement to resist panting and pounding – bulbous bow – anchor and cable arrangement.<br>**Aft part:** Cruiser stern – transom stern – stern frame and rudder – fabrication of stern frame – cast steel stern frame – unbalanced rudder – balanced rudder – open water stern – spade rudder – rudder and stern frame for twin screw ship – bossing – shaft tunnel – kort nozzle – fixed nozzle rudder – tail flaps and rotary cylinders. | 14 Hrs |
| IV | **Ship dynamics:** Propellers – wake distribution blade loading – controllable pitch propeller – contra rotating propellers – vertical axis propellers – bow thrusters – controllable pitch bow thrusters – hydraulic thrust units – rolling and stabilisation – reduction of rolling – bilge keels – fin stabilisers – tank stabilisers – passive tanks – controlled passive tanks – active controlled tanks. | 14 Hrs |
| V | **Bulk heads and deep tanks:** Water tight bulkheads – water tight doors – deep tanks for water ballast and oil – non water tight bulkheads – corrugated bulkheads.<br>**Ship maintenance:** Insulation of ships – corrosion prevention – surface preparation – painting – cathodic protection – impressed current system – fouling - | 14 Hrs |



**Text Book :** Reeds ship construction – E.A. Stroke

**Reference Book :** Ship construction- Edrich Fernands
Publishers: Pro-Navigator books
Reference Book: Notes on ship construction - Capt. Dara E. Driver
By Rumar Publications

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## II YEAR



## M SCHEME

## III SEMESTER

2015 -2016 onwards

## MARINE STRENGTH OF MATERIALS AND FLUID MECHANICS PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

## STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

### DIPLOMA IN MARINE ENGINEERING
### M-SCHEME
### (to be implemented for the student admitted from the year 2015-2016 onwards)

| | | |
|---|---|---|
| Course Name | : | Diploma in Marine Engineering |
| Subject Code | : | 32734 |
| Semester | : | III Semester |
| Subject Title | : | MARINE STRENGTH OF MATERIALS AND FLUID MECHANICS PRACTICAL |

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Strength of Materials and Fluid Mechanics Practical | 4 Hrs | 60 Hrs | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

The strength of the metal need to be obtained for designing the structure. The load received should no be more than the limit. The material used for ship building should have the required hardness. Torsional strength is important in shafts connected to main engine. The keel of the ship experiences different stresses due to non uniform loading and movement of ship on waves.

**GUIDELINES:**

- All the seventeen experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Equipments and taking readings in the practical classes, every five students should be provided with a separate experimental setup for doing experiments in the laboratory.

## ALLOCATION OF INTERNAL MARKS

| | |
|---|---|
| Procedure/Tabulation/observation | : 10 Marks |
| Record writing | : 05 Marks |
| Result | : 05 Marks |
| Attendance | : 05 Marks |
| **Total Marks** | **: 25 Marks** |

## SCHEME OF EXAMINATION

| | |
|---|---|
| Strength of Materials Practical (any one exercise) | : 35 marks (1½ Hrs) |
| Fluid Mechanics Practical (any one exercise) | : 35 marks (1½ Hrs) |
| Viva - voce | : 05 marks |
| **Total** | **: 75 marks** |

## LIST OF EXPERIMENTS

**I MARINE STRENGTH OF MATERIALS PRACTICAL: (3 Hrs/Week)**

**1. Test on Ductile Materials:**

Finding Young's Modulus of Elasticity, yield points, percentage elongation and percentage reduction in area, stress strain diagram plotting, tests on mild steel.

(Equipment : UTM )

**2. Hardness Test:**

Determination of Brinell hardness number for various materials like mild steel, brass, copper and aluminium.

(Equipment : Brinell Hardness Testing Machine)

**3. Torsion test:**

Torsion test on mild steel – relation between torque and angle of twist – determination of modulus of rigidity and Young's modulus.

(Equipment : Torsion testing machine)

**4. Bending and deflection tests:**

Determination of Young's Modulus for steel by deflection test.

(Equipment : Deflection testing arrangement )

**5. Impact test:**

Finding the resistance of materials to impact loads by Izod test or Charpy test.

(Equipment: Impact testing machine)

**6. Tests on helical springs:**

Determination of modulus of rigidity, strain energy, shear stress by load deflection method.

(Equipment: Tension testing arrangements)

**7. Shear test:**

Shear test on M.S. bar

(Equipment: Shear testing machine)

**II MARINE FLUID MECHANICS PRACTICAL: (3 Hrs/Week)**

**1. Verifying the Bernoulli's Theorem**

(Equipment: The Bernoulli's Apparatus)

**2. Determination of Coefficient of discharge of a Venturimeter / Orifice meter.**

(Equipment: A Centrifugal pump having the discharge line with Venturimeter / Orifice meter arrangement)

**3. Determination of the Friction Factor in a Pipe**

(Equipment: An arrangement to find friction factor)

**4. Performance test on a reciprocating pump and draw the characteristic curves.**

(Equipment: A reciprocating pump with an arrangement for collecting data to find out the efficiency and plot the characteristic curves)

**5. Performance test on a centrifugal pump and draw the characteristic curves.**

(Equipment: A centrifugal pump with an arrangement for collecting data to find out the efficiency and plot the characteristic curves)

**6. Performance test on an impulse turbine**



(Equipment: An impulse turbine with an arrangement for collecting data to find out the efficiency)

**7. Making a suitable Pneumatic (or) Hydraulic circuit connection with DCVS, flow control valve and check valve to show the reciprocating motion of a double acting cylinder with metering-in control circuit.**

(Equipment: Either Pneumatic trainer kit with air compressor (or) Hydraulic trainer kit with hydraulic power pack)

**8. Making a suitable Pneumatic (or) Hydraulic circuit connection with DCVS, flow control valve and check valve to show the reciprocating motion of a double acting cylinder with metering-out control circuit.**

(Equipment: Either Pneumatic trainer kit with air compressor (or) Hydraulic trainer kit with hydraulic power pack)

**INSTRUCTIONS TO CARRY OUT THE PARCTICAL CLASSWORK AS WELL AS THE BOARD EXAMINATION PRACTICALS.**

1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. At the end of the semester the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal mark for practical.
4. All the marks entries for exercise should be entered in the personal log book of the staff, who is handling the subject.

## LIST OF EQUIPMENTS AND THE QUANTITY REQUIRED FOR A BATCH OF 30 STUDENTS

1. Universal Testing Machine ( UTM) - 01
2. BrinellHardness Testing Machine - 01
3. Torsion testing machine - 01
4. Deflection testing arrangement - 01
5. Tension testing arrangements - 01
6. Impact testing machine - 01
7. Shear testing machine - 01
8. The Bernoulli's Apparatus - 01
9. Venturimeter / Orifice meter arrangement - 01
10. An arrangement to find friction factor - 01
11. Reciprocating pump - 01
12. Centrifugal pump - 01
13. Impulse turbine - 01
14. An open tank fitted with a orifice / an external mouthpiece and a collecting tank with Piezometer - 01
15. Either Pneumatic trainer kit with air compressor (or) Hydraulic trainer kit with hydraulic power pack - 01



## SAFETY PRECAUTIONS TO BE FOLLOWED

1. Always wear shoes.
2. Always use good conditions tools during the work.
3. Appropriate safety device should be used.
4. Switch off the machines when not in use.

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## II YEAR

## M SCHEME



## III SEMESTER

## 2015 -2016 onwards

## MARINE WORKSHOP TECHNOLOGY - I PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

## STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

### DIPLOMA IN MARINE ENGINEERING
### M-SCHEME
### (to be implemented for the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Marine Engineering

Subject Code : 32735

Semester : III Semester

Subject Title : MARINE WORKSHOP TECHNOLOGY - I PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Workshop Technology-I Practical | 4 Hrs | 60 Hrs | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

Lathe work is mainly used in ships when non standard nuts, bolts and threads need to be prepared. Cast iron is one of the major materials uses in manufacturing ships. Many parts of ships are cast in foundry. Cracks and breakages are formed in ships due to scale formation and corrosion. These damages are corrected by welding. In some cases pipes also need to be joined by welding.

**GUIDE LINES:**

- Introduction of tools and equipments
- Introduction about lathe and its parts
- Types of patterns
- Types of sand
- Preparation of sand moulds
- Core sands, preparation of cores
- Introduction about welding equipments and accessories
- Types of welded joint
- Edge Preparation.

## ALLOCATION OF INTERNAL MARKS

| | |
|---|---|
| Procedure/Fabrication | : 10 Marks |
| Finishing | : 05 Marks |
| Record writing | : 05 Marks |
| Attendance | : 05 Marks |
| Total Marks | : 25 Marks |

## SCHEME OF EXAMINATION

| | | |
|---|---|---|
| Lathe | : | 45 marks (2 hours) |
| Foundry / Welding (by lot) | : | 25 marks (1 hour) |
| Viva-voce | : | 05 marks |
| Total | : | 75 marks |

## MARINE WORKSHOP TECHNOLOGY – 1 PRACTICAL

**LIST OF EXERCISES:**

**I Lathe:**

a) Plain turning

b) Step turning

c) Taper turning

d) Thread cutting

e) Drilling

f) Knurling

**II Foundry:**

Preparation of sand mould:

1. Solid pattern
    a. Stepped Pulley
    b. Bush bearing
    c. Gear Wheel
    d. T-pipe
2. Split pattern
    a.Tumbles
3. Loose Piece Pattern
    a.Dovetail
4. Cylindrical core making



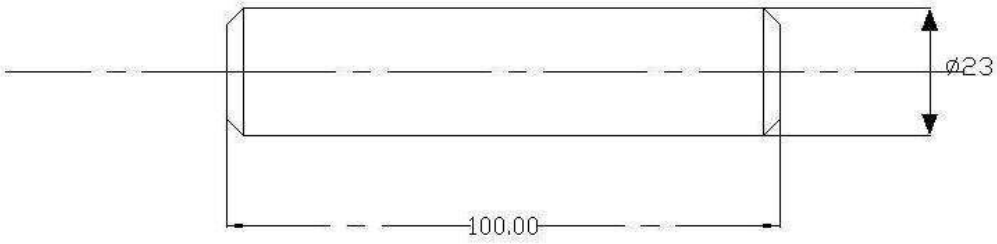
**III Welding**

**LIST OF EXERCISES:**

1. Arc welding
    a) Lap joint ( Material: 25mm x 6mm Ms Flat )
    b) Butt joint ( Material: 25mm x 6mm Ms Flat )
    c) T-joint ( Material: 25mm x 6mm Ms Flat )
    d) Corner joint ( Material: 25mm x 6mm Ms Flat )
2. Gas Welding
    a) Lap joint ( Material: 25mm x 6mm Ms Flat )
    b) Butt Joint ( Material: 25mm x 6mm Ms Flat )
3. Spot welding-Tray work.

EX.NO:1

PLAIN TURNING

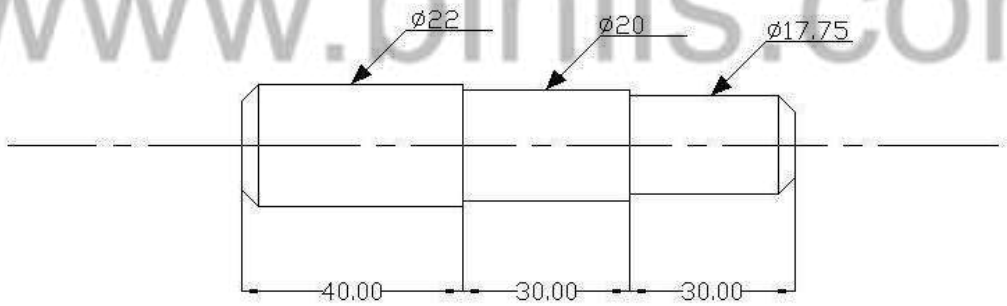



MATERIAL M.S OF SIZE DIA 25*105MM

EX.NO:2

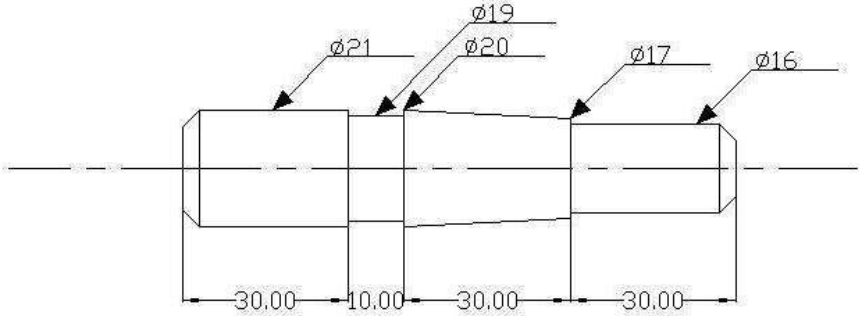
STEP TURNING





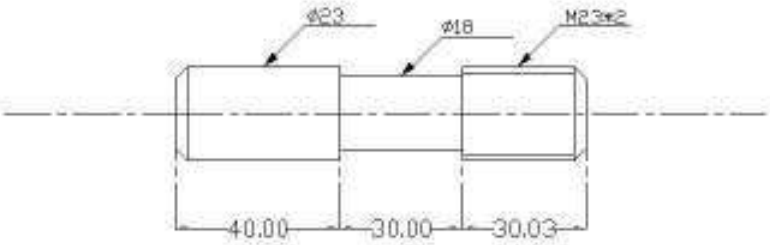

EX.NO:3

TAPER TURNING



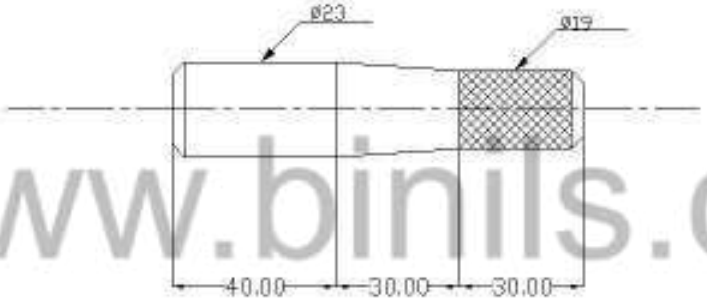
EX.NO:4

THREAD CUTTING




EX.NO:5

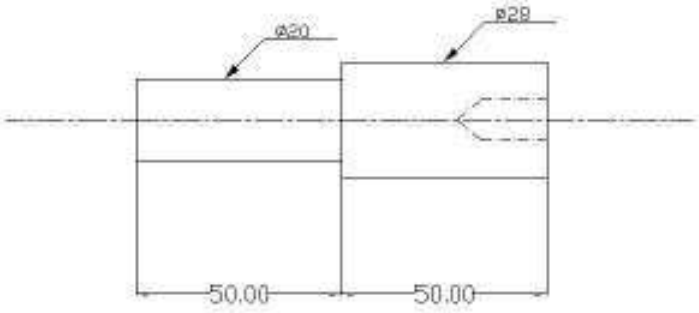
KNURLING






EX.NO:6

BUSHING



## MODEL QUESTIONS FOR THE BOARD PRACTICAL EXAMINATIONS

**Lathe**

1. Use the lathe and machine the given specimen as per the drawing shown in the figures.

**Foundry**

1. To make a green and mould for the given pattern

**Welding**

1. To make a welded lab joint on M.S. flat, in flat position.
2. To make welded butt joint on M.S. flat, in flat position
3. To make welded corner joint on M.S. flat, in flat position

## SPECIFIC INSTRUCTIONS TO CARRY OUT THE PRACTICAL CLASS WORK AS WELL AS THE BOARD EXAMINATION PRACTICALS.

1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. At the end of the semester the average marks of all the exercise should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal mark for practical.
4. All the marks entries for exercise should be entered in the personal log book of the staff, who is handling the subject.

## LIST OF EQUIPMENTS AND THE QUANTITY REQUIRED FOR A BATCH OF 30 STUDENTS.

| | | |
|---|---|---|
| Centre lathe | | - 06 |
| Foundry | | |
| 1. | Pattern (each) | - 07 |
| 2. | Moulding box (16" x 16" x 4") | - 15 |
| 3. | Runner | - 15 |
| 4. | Riser | - 15 |
| 5. | Shawel | - 05 |
| 6 | Gate cutter | - 15 |
| 7. | Spirit level | - 02 |
| 8. | plastic bucket | - 05 |
| 9. | moulding sand | - 500kg |
| 10. | Rammer | - 15 |
| 11 | vent rod | - 15 |
| 12 | Draws spike | - 15 |
| 13 | mallet small size | - 05 |
| 14 | Bellows | - 03 |
| Welding | | |
| 1 | 300 Amps welding transformer with accessories | - 02 |
| 2 | oxy – acetylene gas welding set with accessories | - 01 |
| 3 | Spot welding m/c with accessories | - 01 |

## SAFETY PRECAUTIONS TO BE FOLLOWED

1. Always wear apron, head screen and shoes.
2. Always use good conditions tools during the work
3. Appropriate safety device should be used while welding.
4. Switch off the machines when not in use.
5. Do not leave the chuck key on the chuck.

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 -2016 onwards



## SHIP CONSTRUCTION TECHNOLOGY PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

## STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

### DIPLOMA IN MARINE ENGINEERING
### M-SCHEME
### (to be implemented for the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Marine Engineering

Subject Code : 32736

Semester : III Semester

Subject Title : SHIP CONSTRUCTION TECHNOLOGY PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Ship Construction Technology Practical | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

Ship construction is a major industry with great opportunities and challenges. Ships are constructed and repaired at shipyards. Parts of ships are constructed and assembled at the shipyards. Different types of materials are being used for the construction of different parts of ships. Parts are joined mainly by welding.

**Guidelines:**

1. Introduction about Ship construction
2. To study Elements of ships
3. Types of tools and equipments
4. Preparation of different sections of ships.(Welding)

## ALLOCATION OF INTERNAL MARKS

| | | | |
|---|---|---|---|
| Procedure/Fabrication | : | 10 | Marks |
| Finishing | : | 05 | Marks |
| Record writing | : | 05 | Marks |
| Attendance | : | 05 | Marks |
| Total Marks | : | **25** | **Marks** |

## SCHEME OF EXAMINATION

| | | | |
|---|---|---|---|
| Fabrication of ship parts | : | 50 | Marks |
| Procedure writing and drawing | : | 15 | Marks |
| Viva voce | : | 10 | Marks |
| Total marks | : | **75** | **Marks** |

## SHIP CONSTRUCTION TECHNOLOGY PRACTICAL

Fabrication should be done as individual parts in mild steel sheet by arc welding.

**LIST OF EXERCISES:**

**PART – A**

1. Fabrication of keel part
2. Fabrication of fore part.
3. Fabrication of after part.
4. Fabrication of bulkheads.
5. Fabrication of transverse framing.
6. Fabrication of hatches.
7. Fabrication of mast.
8. Fabrication of the hull.
9. Fabrication of super structure.
10. Fabrication of navigation bridge.

**PART – B**

Ship visit at harbour to study the parts of ship and submit a report

## MODEL QUESTIONS FOR THE BOARD PRACTICAL EXAMINATIONS

1. Prepare a keel as per given specimen
2. Fabricate fore part as per given specimen
3. Fabricate after part as per given specimen
4. Prepare a Hull part as per given specimen
5. Fabricate a bulk head as per given specimen
6. Fabricate rigging of mast as per given specimen
7. Fabricate rigging of derrick as per given specimen
8. Fabricate a water tight compartment as per given specimen
9. Fabricate a Hatch ways as per given specimen
10. Fabricate a Super structure as per given specimen
11. Fabricate a navigating bridge as per given specimen
12. Fabricate Transverse Framing.

## SPECIFIC INSTRUCTIONS TO CARRY OUT THE PRACTICAL CLASS WORK AS WELL AS THE BOARD EXAMINATION PRACTICALS.

1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. At the end of the semester the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal mark for practical.
4. All the mark entries for exercise should be entered in the personal log book of the staff, who is handling the subject.

## LIST OF EQUIPMENTS AND THE QUANTITY REQUIRED FOR A BATCH OF 30 STUDENTS



1. 300 Amps welding transformer with accessories - 02
2. Sheet bending machine - 01
3. Sheet cutting machine - 01

## SAFETY PRECAUTIONS TO BE FOLLOWED

1. Always wear apron/boiler suit, head screen and shoes.
2. Always use good conditions tools during the work.
3. Appropriate safety device should be used while welding.
4. Switch off the machines when not in use.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

II YEAR

M SCHEME



IV SEMESTER

2015 -2016 onwards

# COMPUTER APPLICATION PRACTICAL
# [COMMON TO ALL ENGINEERING BRANCHES]

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU.**

**M- SCHEME**

(Implemented from the academic year 2016-2017 onwards)

Course Name : For All Branches

Subject Code : 30001

Semester : III

Subject title : COMPUTER APPLICATIONS PRACTICAL

**TEACHING & SCHEME OF EXAMINATION:**

No. of weeks per Semester: 15 Weeks

| Course | Instruction | | Examination | | | |
|---|---|---|---|---|---|---|
| | | | Max. | | | Duration |
| | Hours/ week | Hours/ Semester | Internal Assessment | Board Examination | Total | |
| COMPUTER APPLICATIONS PRACTICAL | 4Hrs | 60 Hrs | 25 | 75 | 100 | 3Hrs |



**RATIONALE:**

The application of Computer knowledge is essential the students of all disciplines of Engineering in addition to their respective branch of study. The Computer Application Practical course facilitates the necessary knowledge and skills regarding creating, working and maintaining the documents and presentation of documents with audio visual effects ina computer and produces necessary skills in E- Learning and Chatting tools..

**OBJECTIVES:**

On completion of the following exercises, the students will be able to

- Use the GUI operating systems
- Familiarize and customize the desktop
- Use the different facilities available in the word processor
- Prepare Power Point presentation with different formats
- Expose E-learning tools and chatting tools
- Analyze the datasheet
- Create and manipulate the database
- Create different types of charts
- Prepare PowerPoint presentation

- Understand Internet concepts and usage of e-mail

**GUIDELINES:**

- All the experiments given in the list of experiments should be completed and all the experiments should include for the end semester practical examination.
- The computer systems should be 1:1ratioforpracticalclasses

## SYLLABUS
## LAB EXERCISES
## SECTION – A

**GRAPHICAL OPEARTING SYSTEM**

Introduction to GUI OS; Features and various versions of GUI OS & its use; Working with GUI OS; My Computer & Recycle bin ; Desktop, Icons and Explorer; Screen description & working styles of GUI OS; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts &Autostart; Accessories and Windows Settings using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hard ware & Software program on your computer - Copying in CD/DVD settings – Recording Audio files.



**Exercises**

1. a. Installing screen saver and change the monitor resolution by 1280X960
   b. Setting wall papers
   c. Creating, moving, deleting and renaming a folder
   d. Copy, paste and cut a folder/file
   e. Displaying the properties for a file or folder
2. a. Restoring files and folders from Recycle bin
   b. Creating short cuts for folder/file
   c. Finding a file or folder by name
   d. Selecting and moving two or more files/folders using mouse
   e. Sorting folders/files.

**WORD PROCESSING**

Introduction to Word Processing – Examples- Creation of new documents, opening document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header footer deleting, moving, replace, editing text in document. Saving a document, spell checker.

Printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height width of row or column. Editing, deleting Rows, columns in table. Borders, shading,

Templates, wizards, drawing objects, mail merge.

**Exercises**

3. Create the following table and perform the operations given below

<table>
<tr><th>DAYS</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>MON</td><td colspan="2">←TEST→</td><td colspan="3">A: JPP<br>B:RDBMS</td><td>CA</td><td>RDBMS</td><td>TUT</td></tr>
<tr><td>TUE</td><td>CA</td><td>OOP</td><td>CN</td><td>RDBMS</td><td colspan="3">A: RDBMS<br>B: JPP</td></tr>
<tr><td>WED</td><td>CN</td><td>RDBMS</td><td>OOP</td><td>RDBMS</td><td colspan="2">COMMUNICATION</td><td>CN</td><td>CA</td></tr>
<tr><td>THU</td><td>OOP</td><td colspan="3">A: JPP<br>B: RDBMS</td><td>CA</td><td>RDBMS</td><td>CN</td><td>OOP</td></tr>
<tr><td>FRI</td><td colspan="2">COMMUNICATION</td><td colspan="2">A: RDBMS<br>B: JPP</td><td>OOP</td><td>CN</td><td>RDBMS</td><td>CA</td></tr>
<tr><td>SAT</td><td>OOPS</td><td>RDBMS</td><td>CN</td><td>CA</td><td colspan="4">---------</td></tr>
</table>

4. Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations. Also, create a database and generate labels for the applying organizations.



5. Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background colour and add 'confidential' as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

## SPREADSHEET

Introduction to Analysis Package – Examples - Concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

**Exercises**

6. Create a result sheet containing Candidate's Register No., Name, Marks for six subjects. Calculate the total and result. The result must be calculated as below and failed candidates should be turned to red.

Result is Distinction if Total >= 70 %

First Class if Total > = 60 % and < 70 %

Second Class if Total >= 50 % and < 60 %

Pass if Total >= 35 % and < 50 %

Fail otherwise

Create a separate table based on class by using auto filter feature.

7. Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue color and lowest donation with red colour. The table should have a heading.

8. Create line and bar chart to highlight the sales of the company for three different periods for the following data.

**SALES BAR CHART**

| Period | Product1 | Product2 | Product3 | Total |
|---|---|---|---|---|
| JAN | 35 | 40 | 50 | 125 |
| FEB | 46 | 56 | 40 | 142 |
| MAR | 70 | 50 | 40 | 160 |



## SECTION – B

## DATABASE

Introduction – Menus – Tool bar – Create – Edit – Save – Data types – Insert – Delete – Update – View – Sorting and filtering – Queries – Report – Page setup – Print.

**Exercises**

9. Create Database to maintain at least 10 addresses of your class mates with the following constraints

- Roll no. should be the primary key.
- Name should be not null

10. create a students table with the following fields: Sr.No, Reg. No, Name, Marks in 5 subjects. Calculate total and percentage of 10 students. Perform the following queries.

- To find the details of distinction student
- To find the details of first class students
- To find the details of second class students

11. Design a report for the above exercise to print the consolidated result sheet and mark card for the student.

## PRESENTATION

Introduction - Opening new presentation, Parts of PowerPoint window – Opening -Saving and closing presentations - Features of PowerPoint, Background design, Word art, Clip art, Drawings,3D settings - Animations, Sound, Views, types of views - Inserting and deleting slides, arranging slides, slides show, rehearsal, setup show, custom show - Creating custom presentations, action setting, auto content wizard, working with auto content wizard

**Exercises**

12. Make a marketing presentation of any consumer product with at least 10 slides.
    Use different customized animation effects on pictures and clip art on any four of the ten slides.
13. Create a Presentation about our institution or any subject with different slide transition with sound effect.

## INTERNET

Introduction – Getting acquainted with Internet Connection - Browsers – Website URL - Open a website – Net Browsing - Email: Creating E-mail id – Sending , receiving and deleting E-mail - Email with Attachments – CC and BCC - Chatting – Creating Group mail - Google docs – Search Engines – Searching topics .



**Most Popular Social Networking Sites :** History – Features – Services – Usage of Face book , Twitter and LinkdIn.

Transferring data through wifi / bluetooth among different devices.

**Introduction to cybercrime** – Software Piracy – Viruses – Antivirus Software

**Exercises**

14. Create an e-mail id and perform the following
    - Write an e-mail inviting your friends to your Birthday Party.
    - Make your own signature and add it to the e-mail message.
    - Add a word attachment of the venue route
    - Send the e-mail to at least 5 of your friends.

15. Create a presentation on Google docs. Ask your friend to review it and comment onit. Use "Discussion" option for your discussions on the presentation.

**Hardware and Software Requirements**

**Hardware Requirements:**

- Computers – 36Nos
    - Intel Core i3 Processor
    - 500 GB Hard Disk, 2 MB RAM
    - 14” Monitor
- Projector – 1 Nos
- Laser Printer – 1 No
- Internet Connection – Minimum of 512 KB

**Software Requirement**

- Any GUI Operating System
- Open Source Software / MS- Office

1. SemesterEndExamination–75 Marks

| Content | Max.Marks |
|---|---|
| Writing Procedure – One Question from Section A | 15 |
| Demonstration | 15 |
| Results with Printout | 5 |
| Writing Procedure – One Question from Section B | 15 |
| Demonstration | 15 |
| Results with Printout | 5 |
| Viva voce | 5 |
| Total | **75MARK** |

# IV SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 -2016 onwards



# MARINE WORKSHOP TECHNOLOGY - II

CURRICULUM DEVELOPMENT CENTRE

## STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

### DIPLOMA IN MARINE ENGINEERING
### M-SCHEME
### (to be implemented for the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Marine Engineering

Subject Code : 32741

Semester : IV Semester

Subject Title : MARINE WORKSHOP TECHNOLOGY – II

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Workshop Technology-II | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



**TOPICS AND ALLOCATION OF HOURS:**

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | RECIPROCATING MACHINES | 14 |
| 2. | DRILLING MACHINES | 14 |
| 3. | MILLING MACHINES | 14 |
| 4. | ABRASIVE PROCESS | 14 |
| 5. | COMPUTER NUMERICAL CONTROL (CNC) MACHINES | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

To provide the concepts and working principles of special machineries and recent trends in manufacturing.

**OBJECTIVE**

- To understand the concept and working of standard machine tools such as shaping, planner and allied machines, milling, drilling and allied machines.
- To understand the basic concepts of (CNC) Computer Numerical Control of Machine tools

## 32741: MARINE WORKSHOP TECHNOLOGY - II

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **RECIPROCATING MACHINES**<br>**PLANER :** Types of planers –description of double housing planer-specifications-principles of operation- drives- quick return mechanism-feed mechanism- work holding devices<br>**SHAPER** : Types of shapers- specifications- standard-plain- universal - principles of operation –drives- quick return mechanism-crank and slotted link-feed mechanism- work holding devices.<br>**SLOTTER** :Types of slotter - specifications-method of operations- Whitworth quick return mechanism- feed mechanism – work holding devices | 14 Hrs |
| II | **DRILLING MACHINES**<br>Drills- twist drills – nomenclature – types of drilling machines – bench type – floor type – radial type – gang drill – multi spindle type – principle of operation in drilling — speeds and feeds of various materials – drilling holes – method of holding drill bit – drill chucks – socket and sleeve – drilling operation – reaming – counter boring – counter sinking – spot facing – tapping – deep hole drilling | 14 Hrs |
| III | **MILLING MACHINES**.<br>Types- column and knee type – plain milling machine – universal milling machine – vertical milling machine – specifications of milling machines-principles of operation-work and tool holding devices – arbour – stub arbour – spring collet – adapter – milling cutters – cylindrical milling cutter – slitting cutter-side milling cutter – angle milling cutter – T-slot milling cutter – woodruff milling cutter – fly cutter – nomenclature of cylindrical milling cutter – milling process – conventional milling – climb milling – milling operations – straddle milling – gang milling | 14 Hrs |
| IV | **ABRASIVE PROCESS**<br>Types and classification – specifications – rough grinding – pedestal grinders- portable grinders – belt grinders – precision grinding-cylindrical grinder- centerless grinders – surface grinder – tool and cutter grinder – planetary grinders-principles of operations – grinding wheels – abrasives-natural and artificial diamond wheels – types of bonds – grit, grade and structure of wheels – wheel shapes and sizes – standard marking systems of grinding wheels – selection of grinding wheel – mounting of grinding wheels – Dressing and Truing of wheels – Balancing of grinding wheels. | 14 Hrs |
| V | **COMPUTER NUMERICAL CONTROL (CNC) MACHINES**<br>Numerical control – definition – components of NC systems – development of NC – DNC – CNC and adaptive control systems – working principle of a CNC system – distinguishing features of CNC machines - advantage of CNC machines – difference between NC and CNC – types of turning centre: horizontal, vertical – types of machining centres: horizontal spindle, vertical spindle, universal machines – machine axis conventions – design considerations of NC machine tools. CNC EDM machine – Coordinate | 14 Hrs |

| | | |
|---|---|---|
| | measuring machines: construction, working principles and specifications – maintenance of CNC machines. | |

**Text Books:**


1) Elements of workshop Technology By S.K Hajra Choudhury , A.K Hajra Choudhury & Nirjhar Roy Volume I & II, Media promoters & Publishers (P) Ltd-2004
2) A Text book of workshop Technology, R. S. Khurmi & J. K. Gupta, S.Chand & Co., Ram Nagar, New Delhi – 2006
3) A Text book of Foundry Technology, O.P.Khanna, Dhanpat Rai Publications(P) Ltd-2000
4) A Text book of Production Technology, O.P.Khanna, M.Lal, Dhanpat Rai Publications(P) Ltd-2002


**Reference Books**


1) Shop Theory ,James Anderson, Earl E.Tatro Six$^{th}$ Edition , Tata Macraw- Hill Publishing Co Ltd- 2001.
2) Technology of Machine Tools, Fourth Edition, Steeve F.KRAR, J. William Oswald, Tata Macraw- Hill Publishing Co Ltd-Singapore-1991.
3) Automation production systems and computer –Integrated manufacturing, Mikell.P.Groover, Prentice- Hall of india private Ltd, 2003.

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## II YEAR

## M SCHEME



## IV SEMESTER

2015 -2016 onwards

# PERSONAL SAFETY AND SOCIAL RESPONSIBILITIES

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32742
Semester : IV Semester
Subject Title : PERSONAL SAFETY AND SOCIAL RESPONSIBILITIES

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Personal Safety and Social Responsibilities | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | TYPES OF EMERGENCIES, DRILLS, PERSONAL SAFETY EQUIPMENTS | 14 |
| 2. | ENCLOSED SPACE ENTRY | 14 |
| 3. | MAINTENANCE OF SAFETY DEVICES, PRECAUTION OF FIRE EXPLOSIONS AND WORK PERMIT | 14 |
| 4. | MARPOL 73-78 | 14 |
| 5. | INTERNATIONAL SAFETY MANAGEMENT, PORT STATE CONTROL INSPECTIONS | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

Every marine engineer should know about personal safety and social responsibilities. He should get more knowledge about personal safety equipments and emergency drill. Knowledge about pollution free environment and safety of life at sea is necessary.

**OBJECTIVES:**

At the end of the study of VI Semester the student will be able to

- Understand the important of emergency drill
- Acquire broad ideas about personal safety equipments.
- Understand the enclosed space entry & work..
- Acquire knowledge about maintenance of safety devices.
- Gain knowledge about marine pollution.
- Understand ISM and PSC inspections.

## 32742: PERSONAL SAFETY AND SOCIAL RESPONSIBILITIES

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **TYPES OF EMERGENCIES, DRILLS, PERSONAL SAFETY EQUIPMENTS**<br>Emergency – types of emergency - main engine, steering gear failure, collision, flooding, man overboard. Action to be taken in the event of emergency, emergency signals, action to be taken hearing emergency signal, muster list, muster station – fire station, boat station - drills – value of training and drills important of training and drills , fire drill, Survival craft drills Protective Clothing and Equipment – General – Head protection – Safety helmets –nets and safety caps – Hearing protection – Face and eye protection - Respiratory protective equipment – Respirators –Breathing apparatus – Resuscitators – Hand and foot protection – gloves –Footwear – Protection from falls – Body protection. | **15 Hrs** |
| II | **ENCLOSED SPACE ENTRY**<br>Procedure & precautions, precautions on entry dangerous space, duties and responsibilities of officer, Entering Enclosed or Confined Spaces – General – Precautions on Entering Dangerous Spaces – Duties and Responsibilities of a competent Person and of Responsible Officer – Identifying potential Hazards oxygen Deficiency –Flammability – Other Hazards – Preparing and Securing the Space for Entry –Toxicity of oil Cargoes – Toxicity of Other Substances – Testing the Atmosphere of the Space – Testing for oxygen Deficiency – Testing for Flammable Gases or Vapours – Testing for Toxic Gases – Procedures and Arrangements Before Entry – Procedures and Arrangements During Entry – Drills and Rescue. | **15 Hrs** |
| III | **MAINTENANCE OF SAFETY DEVICES, PRECAUTION OF FIRE EXPLOSIONS AND WORK PERMIT**<br>Testing and maintaining of - life boat engine, fixed $CO_2$ flooding rooms-bulk $CO_2$ rooms – portable extinguisher, – Maintenance of Equipment – Training, Instruction and Information – Statutory Regulations for breathing apparatus – accident causes and prevention – engine room –scavenging fire metal fire in boiler – battery room, main switch board - use of permit to work system - procedure and arrangement before entry, during entry, hot work permit check lists. | **15 Hrs** |
| IV | **MARPOL 73-78**<br>Annex-I-Use of oil record book 1 - Entry of oil record book - oil record book part 2 – Ship board oil pollution prevention emergency plan (SOPPEP) – SOPPEP locker - Bunkering procedure.<br>Annex-II-Definition – categories - disposal of noxious substances.<br>Annex-III- Definition - IMDG Code – packing – marking – labelling – documentation – stowage - transportation<br>Annex-IV- Definition - disposal of sewage<br>Annex-V- Definition - disposal of garbage<br>Annex-VI- Control of emission – CFC, Nitrous oxide, sulphur oxide, incinerator smoke - international air pollution certificate. | **15 Hrs** |

| | | |
|---|---|---|
| **V** | **INTERNATIONAL SAFETY MANAGEMENT (ISM), PORT STATE CONTROL INSPECTIONS**<br>ISM-objectives – safety and environmental protection policy- company responsibilities and authority – Designated person – master responsibility and authority – resource person - development of plan for ship board operation- emergency preparedness- report and analysis of non conformities –maintenance of the ship and equipment- documentation – company verification and review and evaluation –certificate verification and control - master co operation of inspection –document verification of port state control officer - inspection – clear ground – more detailed inspection – suspensions of inspection. | **15 Hrs** |

**Text Book** : Ship board operation H.I.LAVERY
Last Edition 1990 ,
Publisher British library cataloguing in publication data

SOLAS IMO publications
Last Edition 2001
MARPOLE 73 / 78 IMO
Last Edition 1997

**Reference Book** : Ship safety and environmental protection, Vikram Gokhale, N. Nanda
Edition 2003 N.G. Engineering publications



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DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

II YEAR



M SCHEME

IV SEMESTER

2015 -2016 onwards

# MARINE ENGINEERING DRAWING

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32743
Semester : IV Semester
Subject Title : MARINE ENGINEERING DRAWING

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Engineering Drawing | 6 Hrs | 90 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | SECTIONAL VIEWS | 7 |
| 2. | LIMIT, FIT AND TOLERANCES | 7 |
| 3. | SURFACE TEXTURE | 7 |
| 4. | KEYS, SCREW THREADS AND THREADED FASTENERS | 7 |
| 5. | DETAILED ASSEMBLY DRAWING AND MARINE COMPONENT DRAWINGS | 57 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 90 |

**RATIONALE:**

Manufacturing of various machine parts and production of various equipments in small scale to big scale industries start from the basic drawing of components. The assembly of components is also carried out from the drawing. So drawing is an important subject to be studied by supervisor cadre students to carry and complete the production and assembly process successfully.

The first three are theory units in which the students can comprehend the various types of sections used in drawing practice. Types of fits used, limits and tolerances of dimensions and surface finish methods which are to be used in industrial drawing will also be taught in these three units.

The fourth unit is also a theory unit in which the students can understand the types of fasteners and study of temporary fasteners like keys, screw threads and threaded fasteners which are commonly used in assembly process.

The final unit gives the practice of manual drawing of the commonly used components in industries to give a thorough knowledge of drawings.

The overall objective is to impart knowledge to the students so as to carry out the production and the assembly process without wastage of Man/Machine and Materials to have economical overall process.

**OBJECTIVES:**



- Appreciate the need for sectional view and types of sections.
- Draw sectional views using different types of sections.
- Explain the use of threaded fasteners and the types of threads.
- Compare hole basis system with shaft basis system.
- Select different types of fits and tolerance for various types of mating parts.
- Appreciate the importance of fits and tolerance.

## 32743: MARINE ENGINEERING DRAWING

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **SECTIONAL VIEWS**<br>Review of sectioning – Conventions showing the section – symbolic representation of cutting plane- types of section – full section, half section, offset section, revolved section, broken section, removed section – section lining. | 7 Hrs |
| II | **LIMIT, FIT AND TOLERANCES**<br>Tolerances – Allowances – Unilateral and Bilateral tolerances. Limits – Methods of tolerances – Indication of tolerances on linear dimension of drawings – Geometrical tolerances – application – Fits – Classifications of fits – Selection of fits – examples | 7 Hrs |
| III | **SURFACE TEXTURE**<br>Surface texture – importance – controlled and uncontrolled surfaces – Roughness – Waviness – lay – Machining symbols | 7 Hrs |
| IV | **KEYS, SCREW THREADS AND THREADED FASTENERS**<br>Types of fasteners – temporary fasteners – keys – classification of keys – Heavy duty keys – light duty keys. Screw thread – Nomenclature – different types of thread profiles – threads in sections – threaded fasteners – bolts – nuts – through bolt – tap bolt, stud bolt – set screw – cap screws – machine screws – foundation bolts | 7 Hrs |
| V | **DETAILED ASSEMBLY DRAWING**<br>1. Spigot & cotter joint<br>2. Protected type flanged coupling<br>3. Universal coupling<br>4. Screw jack<br><br>**MARINE COMPONENT DRAWINGS**<br>1. Bilge suction strainer<br>2. Feed check valve<br>3. Rams bottom safety valve<br>4. Stop valve<br>5. Marine engine connecting rod<br>6. Blow off cock | 57 Hrs |



**Reference Books:**


1. Machine Drawing by P.S. Gill, Katsan Publishing House, Ludiana
2. A Text book of Engineering Drawing by R.B. Gupta, Satya Prakasan – Technical India Publications, New Delhi
3. Mechanical Draughtsman ship by G.L. Tamta, Dhanpat Rai & Sons, Delhi
4. Geometrical and Machine Drawing by N.D. Bhatt, Cheroter book stalls, Anand, West Railway
5. Engineering Drawing by D.N. Ghose, Dhanpat Rai & Sons, Delhi

**BOARD EXAMINATIONS**
**Question Pattern**

**Time: 3 Hrs** **Max Marks : 75**

**Note: All the questions will be answered in drawing sheet only**

**PART A: (7 x 5 = 35)**

**Theory questions**: (1 TO 8)

Two questions from each unit (I to IV) will be asked.

Answer any seven questions from the given eight questions.

**PART B: 40 Marks (Either A or B.)**

**Answer any one question by selecting either A or B.**

9. A. Assemble and Draw any two views and bill of materials.

(OR)

Assemble and Draw any two views and bill of material

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## II YEAR

## M SCHEME



## IV SEMESTER

2015 -2016 onwards

**ELECTRICAL DRIVES AND CONTROL**

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering

**Subject Code** : 32044

**Semester** : IV

**Subject Title** : ELECTRICAL DRIVES AND CONTROL

## TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 15 Weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours/ Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Electrical Drives and Control | 6 | 90 | 25 | 75 | 100 | 3 Hrs |



## Topics and Allocation of Hours:

| Unit | Topics | Hours |
|---|---|---|
| I | DC CIRCUITS AND DC MACHINES | 17 |
| II | AC CIRCUITS AND AC MACHINES | 17 |
| III | STEPPER AND SERVO MOTORS & DRIVES | 17 |
| IV | POWER SUPPLIES AND LOGIC GATES | 16 |
| V | CONTROL ELEMENTS AND PLC | 16 |
| | TEST AND REVISION | 7 |
| | **Total** | **90** |

## RATIONALE:

The automation is being the order of the day to improve the production with high quality consciousness. Such automation involves electrically operated switches, sensors controlled through electrically driven motors and actuators. The subject aims in introducing the basic electrical DC and AC circuits and motors and also focuses on the various special control devices like stepper, servo drives and its controlling elements.

**OBJECTIVES:**

- Explore fundamental electric circuit laws.
- Explain the working principle of DC and AC Electrical machines.
- Identify the effective uses of drives of Electrical machines.
- Analyze the various power supply circuits.
- Select the field controlled elements.
- Explain the construction and working of Transformer.
- Compare the different types of Logic gates.
- Appreciate the safety practices followed in Electrical system.
- Compare the use of servo motors and stepper motors in electrical driving system
- Identify PLC Input outputs.
- Identify the use of Control elements.

## ELECTRICAL DRIVES & CONTROL

## DETAILED SYLLABUS

**Contents: Theory**

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **DC CIRCUITS AND DC MACHINES**<br>Definition- Electric current, voltage and resistance -Ohm's law and Kirchoff's law. Resistance in series and parallel and series, parallel – simple problems electromagnetism(definitions only ) – magnetic flux, flux density magnetic field intensity, MMF, permeability, reluctance, Faraday's law of electromagnetic induction, electrical and mechanical units<br>DC generators – construction, principle of operation, types and application.<br>DC motors: - construction, principle of operation, types and application.<br>Necessity of starters: Three point, four point starters. | 17 |
| II | **AC CIRCUITS AND AC MACHINES**<br>Fundamentals of AC voltage, and current – peak, average, RMS value of sine wave, frequency, time period, amplitude, power and power factor (definition only)- star and delta connection relationship between phase, line voltage and current in star and delta connections.<br>Transformer: Principle of operation and construction – EMF equation (no definition)- losses in Transformer – efficiency – application.<br>Alternator construction – principle of operation – types and applications.<br>AC machine: AC motors- Principle of operation of single phase capacitor start and universal motor induction motor- applications- Three phase induction motors – Squirrel cage and slip ring Induction motors (construction and working principle only) - application – speed control of 3Φ Induction motor -Necessity of starters – DOL and | 17 |

| | | |
|---|---|---|
| | star/delta starter. | |
| **III** | **STEPPER AND SERVO MOTORS & DRIVES:**<br>PMDC, Stepper motor- construction and working principle and applications - Servo motor – types: brushless servo motor, permanent magnet servo motor construction and applications.<br>Industrial drives- types, group drive, individual drive, multi motor drive, block diagram of Variable frequency drive , stepper motor drive: single stepping and half stepping. Servo drives.<br>Electrical safety: - importance of earthing - electric shock: first aid, precautions - causes of accident and their preventive measures. Energy conservation | **17** |
| **IV** | **POWER SUPPLIES AND LOGIC GATES**<br>Diode – terminals: anode and cathode, forward biasing and reverse biasing – use of diode in rectifiers – half wave and full wave – necessity of filters- Regulated power supplies: IC voltage regulators – SMPS, UPS and Inverters – General description and their applications.<br>Display devices – LED, 7 segment LED, LCD<br>Logic gates: Positive and negative logic, definition, symbol truth table, Boolean expression for OR, AND, NOT, NOR, NAND, EXOR AND EXNOR gates – Universal logic Gates: NAND, and NOR. | **16** |
| **V** | **CONTROL ELEMENTS AND PLC**<br>Fuses – selection of fuse – necessity of fuse- fuse switch units.<br>Sensors: Photo electric sensor, Inductive proximity sensors, Temperature sensors.<br>Switches: Push button switch, selector switch, limit switch, pressure switch,<br>temperature switch, float switch and reed switch.<br>Relays – NO, NC – usage- bimetallic thermal overload relays.<br>Contactors- usage – necessity of contactor- Solenoid type contactor<br>Circuit breakers – Miniature case Circuit breaker (MCCB) and | **16** |

| | | |
|---|---|---|
| | Miniature Circuit<br>breaker (MCB), Oil Circuit breakers (OCB), Earth leakage circuit breaker (ELCB)<br>Features of PLC-PLC Block diagram- PLC scan - Fixed and modular PLC Ladder logic-NO, NC contacts-Coils-AND, OR. | |

**Text Books:**


1) A course in electrical engineering - B.L.Theraja - Multi Colour Edition, S Chand & Co, Reprint 2006
2) Control of Machines - S.K Bhattacharya, Brijinder Singh – New Age Publishers, Second Edition- Reprint 2010
3) Electronic Circuits & System- Analog and Digital – Y.N.Bapat - Tata Mc Graw Hill.


**Reference Books:**


1) Electrical Technology – Hughes - 8th Edition, Pearson Education.
2) Electronic Device and Circuits- An introduction – Allen Mottershed - Prentice Hall of India.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

II YEAR



M SCHEME

IV SEMESTER

2015 -2016 onwards

# MARINE WORKSHOP TECHNOLOGY – II PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32745
Semester : IV Semester
Subject Title : MARINE WORKSHOP TECHNOLOGY – II PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Workshop Technology – II Practical | 4 Hrs | 60 Hrs | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

To have knowledge on common basic machining operations

**GUIDELINES :**

- Identify the parts of a drilling machine, milling machine & grinding machine and their functions.
- Use tools and instruments for drilling, milling and grinding
- Identify the work holding devices
- Hold the work in proper work holding devices.
- Set the tools for various operations.
- Operate the drilling machine, milling machine and grinding.
- Machine a component using drilling machine, milling machine and grinding machine..
- Follow safety practices while machining.

## ALLOCATION OF INTERNAL MARKS

| | | | |
|---|---|---|---|
| Procedure/Dimension/ Turning the shape | : | 10 | Marks |
| Finishing | : | 05 | Marks |
| Record writing | : | 05 | Marks |
| Attendance | : | 05 | Marks |
| Total Marks | : | 25 | Marks |

## SCHEME OF EXAMINATION

| | | |
|---|---|---|
| Drilling | : | 35 marks (1½ hours) |
| Milling / Grinding (by lot) | : | 35 marks (1½ hours) |
| Viva-voce | : | 05 marks |
| Total Marks | : | 75 marks |

## MARINE WORKSHOP TECHNOLOGY PRACTICAL – II

## (Drilling, Milling & Grinding)

**Exercises:**

**1 Drilling:** a) Through hole drilling

b) Through hole drilling with counter sunk

c) Part drilling

d) Through hole drilling (on pitch circle)

**2 Milling:**

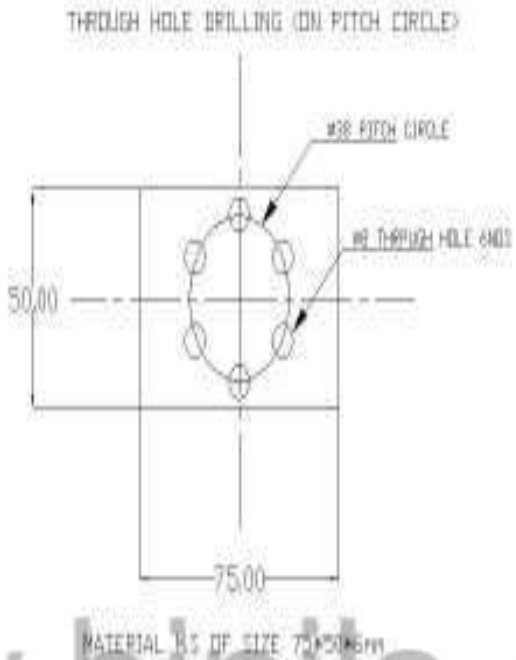
a) Milling a cube

b) Milling a slot

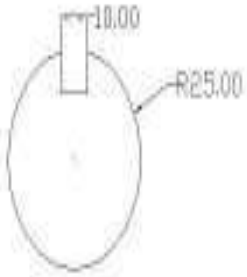
c) Milling a gear

**3 Grinding:**

Surface grinding



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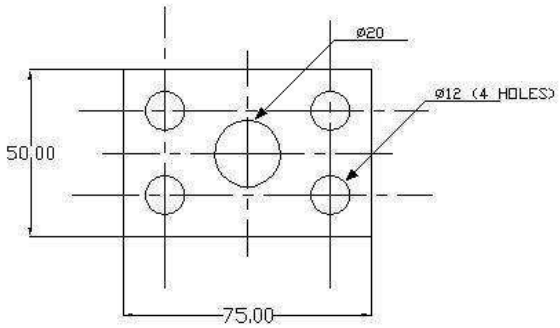
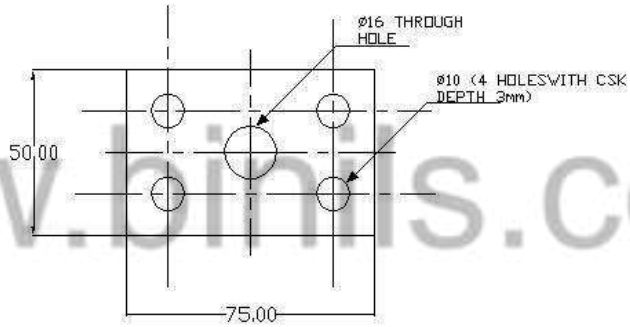
THROUGH HOLE DRILLING




MATERIAL M.S OF SIZE 75*50*6MM

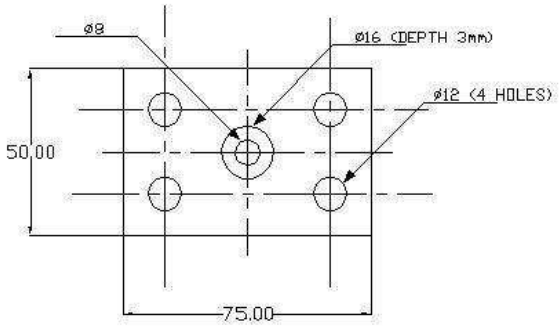
THROUGH HOLE DRILLING WITH COUNDER SUNK



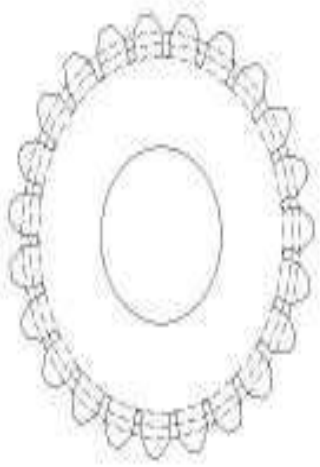



MATERIAL M.S OF SIZE 75*50*6MM

PART DRILLING

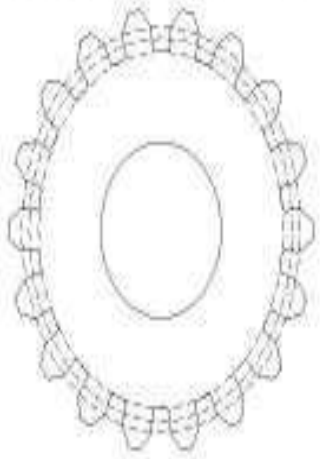



MATERIAL M.S OF SIZE 75*50*6MM



OUTERDIAMETER Ø =50mm
MODULE (m) =2mm
TEETH (T) =23nos





OUTERDIAMETER Ø =50mm
MODULE (m) =2mm
TEETH (T) =18nos

## MODEL QUESTIONS FOR THE BOARD PRACTICAL EXAMINATIONS

1. Use the milling machines and machine given specimen as shown in the sketches.
2. Use the drilling machine and do the drilling operations the given specimen as per the drawing shown in figures.
3. Use the grinding machine and machine the surface as per the drawing shown in the figure.

## SPECIFIC INSTRUCTIONS TO CARRY OUT THE PRACTICAL CLASS WORK AS WELL AS THE BOARD EXAMINATIONS PRACTICALS.

1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. All the end of the semester the average marks of all the exercise should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the sessional mark for practical.
4. All the marks entries for exercise should be entered in the personal log book of the staff, who is handling the subject.



## LIST OF EQUIPMENTS AND THE QUANTITY REQUIRED FOR A BATCH OF 30 STUDENTS

| | | |
|---|---|---|
| 1. | Surface grinding machine | - 01 |
| 2. | Milling M/C | - 02 |
| 3. | Drilling M/C | - 02 |

## SAFETY PRECAUTIONS TO BE FOLLOWED

1. Always worn apron, shoe and safety glasses.
2. Always check speed, feed and stroke length before running the machine.
3. Do not clean and clamp when machine running.
4. Do not hold the job in hand in drilling operation.
5. Switch off the machines when not in use.

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## II YEAR

## M SCHEME



## IV SEMESTER

2015 -2016 onwards

## COMPUTER AIDED MARINE ENGINEERING DRAWING PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

## STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

### DIPLOMA IN MARINE ENGINEERING
### M-SCHEME
### (to be implemented for the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Marine Engineering

Subject Code : 32746

Semester : IV Semester

Subject Title : COMPUTER AIDED MARINE ENGINEERING DRAWING PRACTICAL

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Computer Aided Marine Engineering Drawing Practical | 4 Hrs | 60 Hrs | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

The contemporary progressing world is fast with the latest production systems. The advanced manufacturing of products is developed instantly using CAD Software. Even a small scale industry is now using CAD software as it has become the heart of the Design department. So CAD has now become inevitable in industries.

Accuracy and Precision are the two important things that decide the quality of a product to survive its competitors in the market. Using CAD software design, the uniform accuracy, multiples of copies and storing in a small space for long time are assured.

The CAD software considerably improves the creativity and flexibility of a designer. The syllabus here enables a candidate to draw an industrial drawing within the optimum reach of a diploma cadre.

**OBJECTIVES:**

- Appreciate the need of sectional view and types of sections.
- Draw sectional views using different types of sections.
- Explain the use of threaded fasteners and the types of threads.
- Compare hole basis system with shaft basis system.
- Select different types of fits and tolerance for various types of mating parts.
- Practice on CAD commands in making 2D Drawings.
- Draw assembled drawings of different types of joints and couplings using CAD.
- Draw assembled drawings of various types of machine elements using CAD.

## 32746: COMPUTER AIDED MARINE ENGINEERING DRAWING PRACTICAL

## DETAILED SYLLABUS

**Contents: Theory**

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **INTRODUCTION TO CAD SOFTWARE**<br>Introduction – History of CAD – Applications – Advantages over manual drafting – Hardware requirements – Software requirements – Windows desktop – CAD screen interface – menus – Tool bars – How to start CAD – How to execute command – types of co-ordinate systems – Absolute – Relative – Polar. | 5 Hrs |
| II | **DRAWING AIDS AND EDITING COMMANDS**<br>Creating objects (2D) – Using draw commands – Line, Arc, Circle, Ellipse, Donut, Polygon, Point, Pline, Sketch, Trace – Creating 2D Solid. Creating text – Dtext, Mtext, Text styles – Mline, spline – Drawing with precision – Osnap options – drafting settings –limits – Units – drawing aids – Fill, Snap, Grid, Ortho lines – Function keys - Editing and modify commands – Object selection methods – Erasing object – Oops - Cancelling and undoing a command – Copy – Move – Array – Offset – Scale – Rotate – Mirror – Break – Trim – Extend – Explode. Divide – Measure – stretch – Lengthen – Changing properties – Color – line types –LT scale – Matching properties – Editing with grips – Pedit – Ddedit – Mledit. | 5 Hrs |
| III | **BASIC DIMENSIONING, HATCHING, BLOCKS AND VIEWS**<br>Basic dimensioning – Editing dimensions – Dimension styles – Dimension system variables. Machine drawing with CAD. Creation of blocks – Wblock – inserting a block – Block attributes – Hatching –Pattern types – Boundary hatch – working with layers - Controlling the drawing display – Blipmode – View group commands – Zoom, redraw, regen, regenauto, pan, viewres – Real time zoom. Inquiry groups – calculating area – Distance – Time – Status of drawing – Using calculator. | 5 Hrs |
| IV | **ISOMETRIC DRAWING, PRINTING AND PLOTTING**<br>Isometric drawing – Isometric projection – drawing isocircles – Dimensioning isometric objects. File commands – File Import and export – plotting drawing – external references – 3D fundamentals – 2D to 3D Conversion<br>3D Drawing: 3D Primitives-Extrude – Revolve-Slice-Section, Surface 3D Mesh-3D - Surface-3D Operation-Solid Editing. | 5 Hrs |

| | | | |
|---|---|---|---|
| **V** | **CAD DRAWING PRACTICE**<br>Detailed drawings of following machine parts are given to students to assemble and draw the sectional or plain elevations / plans / and side views with dimensioning and bill of materials using CAD Software | | 40 Hrs |
| | 1. Sleeve & cotter joint<br>2. Spigot & cotter joint<br>3. Knuckle joint<br>4. Protected type flanged coupling<br>5. Universal coupling<br>6. Connecting rod<br>7. Feed check valve<br>8. Bilge suction strainer | **3D Drawing**<br>1. Geneva wheel<br>2. Machined block<br>3. Square head bolt and nut<br>4. Piston and piston rings<br>5. Screw jack<br><br>**Note:** Take the orthographic view and sectional view from the above assembled 3D drawing. | |

**Reference Books:**


1) Inside AutoCAD - D. Raker and H. Rice - BPB Publications, NewDelhi
2) Engineering Drawing and Graphics + AutoCAD – K.Venugopal, - New Age International Publications
3) CAD/CAM/CIM - P. Radhakrishnan, S. Subramaniyan and V.Raju - New Age International Publications.
4) AutoCAD 2002 with Applications - Sham Tickoo - Tata Mcgraw Hill.
5) Computer Graphics, Prentice – Donald Hearn, M. Pauline Baker - Hall of India Pvt. Limited, NewDelhi.

**Board of Examination**

Part A

| | | |
|---|---|---|
| One Mark questions (ten numbers) | - | 1 x 10 = 10 Marks |

Part B

| | | |
|---|---|---|
| Write an Auto CAD command for the given drawing | - | 20 Marks |

Part C

| | | |
|---|---|---|
| Sectional Elevation | - | 20 Marks |
| Plan (or) Side view | - | 15 Marks |
| Bill of materials | - | 05 Marks |
| Viva – voce | - | 05 Marks |
| Total | - | 45 Marks |

**III SEMESTER**
**32746 - COMPUTER AIDED MARINE ENGINEERING DRAWING PRACTICAL**
**MODEL QUESTION PAPER – 1**

PART A

Answer all question: 1x10=10marks

1. ---------- and ---------- two types of memory
2. ------ is the prompt used to get the last erased object
3. -------- and ---- are the available screen in Auto CAD
4. To resolute the drawing ---------- command is used.
5. @ 2.0 prompt is used in ---------- method.
6. @ 2<0 prompt is used in ---------- method.
7. --------- command removes the object from a drawing.
8. To great a drawing file ------ command is used.
9. Polygon is a ---------- object.
10. ---------- and --------- are the options to draw the polygon.

PART B - 20 Marks

Write a Auto CAD command for the given drawing in annexure-I

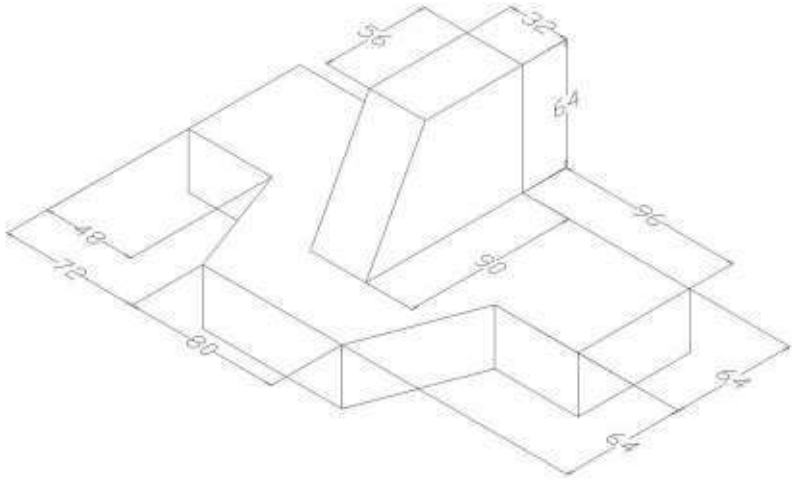
PART C - 45 Marks



The following assembled view for the given drawing in annexure -II

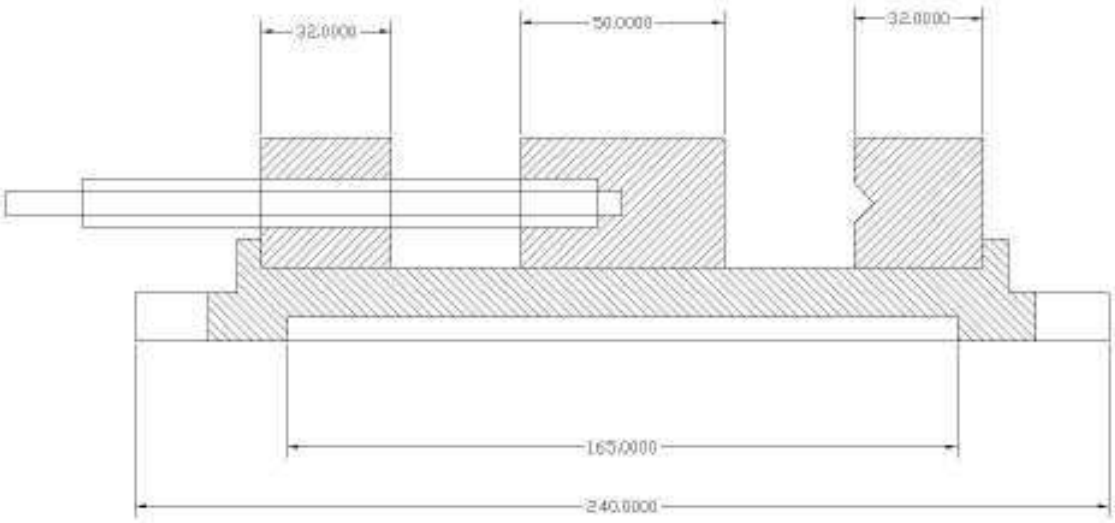
| | |
|---|---|
| Sectional Elevation | - 20 |
| Plan (or) Side view | - 15 |
| Bill of materials | - 5 |
| Viva – voce | - 5 |

**ANNEXURE - I**






**ANNEXURE - II**



**III SEMESTER**

**32746 - COMPUTER AIDED MARINE ENGINEERING DRAWING PRACTICAL**
**MODEL QUESTION PAPER – 2**

PART A 1x10=10 marks

Answer all question:

1. --------- Command is used to type text in the drawing.
2. ---------- Command is used to edit your text.
3. Noun/Verb object selection can be used with trim command (T/F)
4. ---------- methods are in text's justify prompt.
5. %%O is used to get the --------- special character.
6. %%P is used to get the ---------- special character.
7. %% C is used to print the --------special character.
8. %% % is used to print the --------special character.
9. %% D is used to get the --------special.
10. %% U is used to get the --------special character.

PART B 20 marks

Write an Auto CAD command for the given drawing in annexure - I



PART C 45 Marks

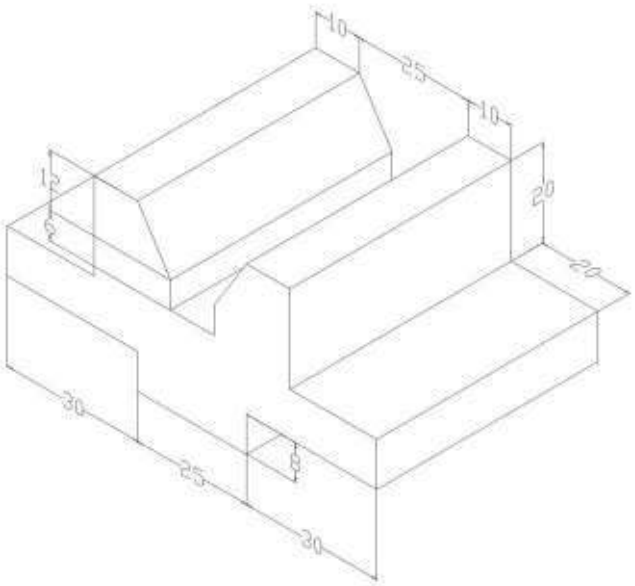
Draw the following assembled view for the given drawing in annexure -II

| | |
|---|---|
| Sectional Elevation | - 20 |
| Plan (or) Side view | - 15 |
| Bill of materials | - 5 |
| Viva – voce | - 5 |

**LIST OF EQUIPMENT**

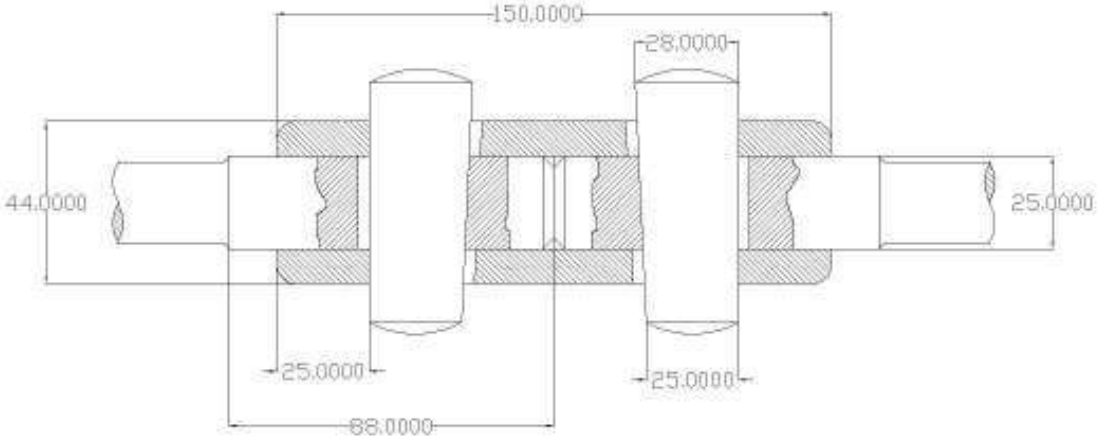
1. Personal computer (With latest processor to suit Auto CAD) – 30 No's
2. MS Windows OS – 30 No's
3. AutoCAD software (release 2000 or above) – 30 Users

**ANNEXURE - I**






**ANNEXURE - II**



# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## III YEAR

## M SCHEME



## V SEMESTER

2015 -2016 onwards

# MARINE DIESEL ENGINE AND POWER PLANT PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering

**Subject Code** : 32047

**Semester** : IV

**Subject Title** : ELECTRICAL DRIVES AND CONTROL PRACTICAL

## TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 15 Weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours/ Week | Hours/ Semester | Marks | | | Duration |
| Electrical Drives and Control Practical | 4 | 60 | Internal Assessment | Board Examination | Total | 3 Hrs |
| | | | 25 | 75 | 100 | |



## OBJECTIVES:

- Identify starters for different motors.
- Study and prepare earthing
- Test the characteristics of DC and AC machines.
- Identify and select controlling elements.
- Explore the performance of ELCB, MCB.
- Design regulated power supplies.
- Identify display devices - LED, 7 segment LED, LCD.
- Identify the drive circuit for special motors.
- Test the speed control circuit of the special motors

**LIST OF EXPERIMENTS:**

**Part A:**

1. Verification of Ohm's Law
2. Testing of DC starters – 3 point and 4 point starter
3. Load test on DC shunt motor
4. Testing of AC starters - DOL , star - Delta starter
5. Load test on single phase induction motor
6. Load test on three phase squirrel cage motor
7. Testing of relays, contactors, push buttons and limit switch
8. Connection and Testing of MCB, ELCB

**Part B**

9. Construction and testing of Half wave and Full wave rectifier.
10. Construction and testing of IC voltage regulator using IC 7805.
11. Verification of truth tables for logic gates.
12. Verification of universal gates.
13. Identification and testing of display devices- LED, 7 segment LED, Laser diode.
14. Testing of Stepper motor drive.
15. Testing of Servo motor drive.



**BOARD EXAMINATION**

**Note: All the exercises are to be completed. One exercise from Part A and another one from Part B should be given for the Examination.**

| | | | |
|---|---|---|---|
| **Part A:** | | | **35** |
| | Circuit diagram | 05 | |
| | Connections & Readings | 15 | |
| | Calculations & Graph | 15 | |
| **Part B:** | | | **35** |
| | Circuit diagram | 05 | |
| | Connections & Readings | 15 | |
| | Execution | 15 | |
| | **Viva Voce** | | **5** |
| **Total** | | | **75** |

## LIST OF EQUIPMENTS

**Electrical Lab**

1. DC ammeter 0-5A - 1no
2. DC ammeter 0-25A - 1no
3. DC voltmeter 0-30V - 1no
4. DC voltmeter 0-300V - 1no
5. Rheostat 10.8 ,8.5A - 1no
6. AC ammeter 0-5A - 1no
7. AC ammeter 0-10A - 2nos.
8. AC voltmeter 0-50V - 3nos
9. AC wattmeter 5A-10A - 3nos
   (0-750W,0-600V)
10. Loading rheostat 5A,230V - 1no
11. Tachometer 0-1000rpm - 1no
    (Analog type)
12. Variac 20A,250V - 2nos
    (Auto transformer )
13. 3 point starter 20A,220V - 1no
14. DOL starter 16A,415V - 1no
15. Star /Delta starter 20a,600V - 1no
16. Over load relay 1 to 2.5A - 1no
17. Air break contactors 20A,220V - 4nos
18. Push button 2A ,220V - 2nos
19. Limit switch 20A,220V - 1no
20. MCB 20A single pole - 1no
21. MCB 20A double pole - 1no
22. ELCB 2pole 20A,100mA - 1no
23. ELCB 4POLE 20A,100mA - 1no

**Electronics Lab**

1. Transformer 230 / 9-0-9V, 1A - 4 nos.
2. Resistor 1 KΩ / ½ W - 3 nos.
3. Capacitor 1000 μF/25V - 4 nos.
4. IC 7805 - 1 no.
5. Logic Gates IC
   7400, 7408, 7432, 7404, 7402, 7486- 1 each
6. Stepper Motor Drive kit - 1no.
7. Servo Motor Drive Kit - 1no
8. Digital Multimeter - 1no.
9. LED, 7Segment LED, Laser Diode - 1 each

# V SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

V SEMESTER

2015 -2016 onwards

# MARINE THERMODYNAMICS

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32751
Semester : V Semester
Subject Title : MARINE THERMODYNAMICS

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Thermodynamics | 6 Hrs | 90 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | BASIC THEORY OF THERMODYNAMICS | 17 |
| 2. | STEAM | 17 |
| 3. | BOILERS | 17 |
| 4. | TURBINE AND CONDENSER | 17 |
| 5. | REFRIGERATION AND AIR CONDITIONING | 17 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 90 |

**RATIONALE:**

The marine engineer working in the engine room of the ship need to have a basic knowledge of thermodynamics. He should know about the theoretical cycles, steam and its properties. The engineer should know about the basic principle of working of engines. The engineer in watch keeping duty should have knowledge about thermodynamics to maintain the machineries in the engine room.

**OBJECTIVES:**

At the end of the study of V Semester the student will be able to

- Understand about the engine cycles and working of various engines.
- Study of steam and its properties.
- Know about the working of boiler, mountings and accessories
- Study about turbine, condenser, cooling towers.
- Acquire broader ideas about basic principles of refrigeration and air conditioning.

## 32751: MARINE THERMODYNAMICS

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Basic theory**<br>Laws of thermodynamics – Zeroth law – First law - Theoretical cycles - Carnot cycle – Otto cycle – diesel cycle- comparison of cycles – compression ratio – cut off ratio – Brake horse power – measurement of BHP in Prony, Rope brake – engine testing – flash point – fire point – pour point – cloud point – specific gravity – viscosity. | 17 Hrs |
| II | **Steam**<br>Introduction – formation of steam – wet steam – dry steam – super heated steam – advantage of super heated steam –dryness fraction –wetness fraction enthalpy of wet, dry, superheated steam – specific volume of water – specific volume of steam – density of steam – external work of evaporation - internal energy of steam – latent heat – entropy of wet, dry, superheated steam – steam tables – T- S and H – S charts | 17 Hrs |
| III | **Boilers**<br>Boilers-Introduction-classification Boilers-High pressure Boiler-La mont and BHEL Boilers-Boiler Mountings-Safety valve-water level indicator-fusible plug-pressure gauge-steam stop valve – Blow off cock – man holes-Boiler Accessories-Air pre-heater – Super heater – Feed pump-Steam trap-steam separator(dryer)-Feed water treatment for Boiler and types-Starting of boiler in cold condition-safety precautions-Provisions in Indian boiler act regarding safety. | 17 Hrs |
| IV | **Turbine and condenser**<br>Introduction - steam power cycles – Rankine's cycle – impulse turbine – reaction turbine – comparison of impulse and reaction turbine - pressure compounding – velocity compounding – pressure velocity compounding – Condenser – introduction – elements of condensing plant – classification of condenser – surface condenser(down flow, central flow, evaporative condenser) – merits and demerits of surface condenser – condenser vacuum – condenser efficiency – Dalton's Law. | 17 Hrs |
| V | **Refrigeration and Air conditioning**<br>refrigerator - Introduction –- classification – performance of refrigerator – common refrigerant – ammonia sulphur dioxide – carbon di oxide – refrigerants of Freon -Air conditioning **–** introduction – psychometric properties – dry air – moist air – dry bulb temperature – wet bulb temperature – dew point temperature - dew point depression – humidity – relative humidity – psychometric chart – sensible heating process – sensible cooling process – comfort air conditioning – industrial air conditioning – window air conditioning – central air conditioning system – loads encountered in air conditioning system | 17 Hrs |



**Text Book** : Thermal Engg, P.L.Ballaney
Thermal Engg, R.S. Khurumi

**Reference Book** : Thermal Engg, Raj Putt

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

V SEMESTER

2015 -2016 onwards

## MARINE DIESEL ENGINE AND POWER PLANT

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32752
Semester : V Semester
Subject Title : MARINE DIESEL ENGINE AND POWER PLANT

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Diesel Engine and Power Plant | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | MARINE DIESEL ENGINE – PARTS AND WORKING | 14 |
| 2. | MARINE DIESEL ENGINE STARTING AND RUNNING | 14 |
| 3. | COOLING SYSTEM, SAFETY PROVISION AND AUTOMATION IN MARINE DIESEL ENGINE | 14 |
| 4. | RECIPROCATING STEAM ENGINE AND STEAM TURBINES | 14 |
| 5. | POWER PLANT: GAS TURBINE AND OTHER POWER PLANTS | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

The proper working and maintenance of the main engine is very important for the ship. Hence enough knowledge has to be acquired for proper running and maintenance of the main engine.

Knowledge about parts of the engine, working principles, functioning of cooling system, safety provisions and automation is necessary. Study of reciprocating steam engine, steam turbines and power generation by non conventional sources of the energy is also required.

**OBJECTIVES:**

At the end of the study of V Semester the student will be able to

- Understand the parts and working of I.C. engines.
- Acquire knowledge about starting and reversing system of marine diesel engines.
- Study about Cooling system, safety provision and Automation in marine diesel engines.
- Acquire broader ideas about reciprocating steam engine and steam turbines.
- Understand about power generation using conventional and non-conventional resources.

## 32752: MARINE DIESEL ENGINE AND POWER PLANT

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **MARINE DIESEL ENGINE – PARTS AND WORKING**<br>Engine components - cylinder- cylinder liner - Cylinder head-piston- piston rod – connecting rod – crank shaft – cross head – piston rings – rocker arm arrangement – cam shaft – fly wheel – bed plates – Working Principles – 2 Stroke & 4 Stroke engines – working and comparison – spark ignition and compression ignition – working and comparison – types of scavenging systems – loop flow, cross flow and uniflow – turbo chargers and super charger – need of turbo charger for marine diesel engines. | 14 Hrs |
| II | **MARINE DIESEL ENGINE (MDE) STARTING AND RUNNING**<br>Working of 4 cylinder and 6 cylinder in-line marine diesel engine – warm up procedure for main engine – air Starting system for main engine – reversing systems of main engine – Factors affecting performance of marine engine – Jerk and common rail systems – importance of atomization – need for injector – design aspects of combustion chamber – compression pressure ratio – peak pressures – properties of fuel used in marine diesel engines.. | 14 Hrs |
| III | **COOLING SYSTEM, SAFETY PROVISION AND AUTOMATION IN MDE**<br>Need for cooling – cylinder head and Jacket water cooling – lubrication oil cooling – piston cooling - need for safety provision – basic governor function and over speed governor – crank case explosion – oil mist detector to prevent explosion – viscosity controller – Automation – need for automation – alarm system – scanning system. | 14 Hrs |
| IV | **RECIPROCATING STEAM ENGINE AND STEAM TURBINES**<br>Marine Reciprocating Steam Engine classification, parts and working – steam turbines classification, parts and working - Warming up procedure for main propulsion turbine - methods of improving turbine efficiency - Comparison of reciprocating engine and turbine - Types of blades and methods of fixing - general layout and description of modern geared steam turbine - materials used for various components in turbine – double reduction gearing for marine use – self closing emergency stop valve | 14 Hrs |
| V | **POWER PLANT: GAS TURBINE AND OTHER POWER PLANTS**<br>Gas turbine working - Auxiliary Gas Turbine Engine -Combined gas turbine and steam turbine - Principles of operation of Atomic Reactors – construction and working of Atomic power Installations – Concept of Atomic Power installations on Sea going Vessels – construction and working of thermal power plant, solar power plant, wind power plant, hydral power plant and tidal power plant. | 14 Hrs |



**Text Book** : Marine Diesel engine - D.K. Sanyal,
Power Plant Engineering – Vijaya ragavan

**Reference Book** : Marine Diesel engine - Mc George Mc

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards



# NAVAL ARCHITECTURE

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32753
Semester : V Semester
Subject Title : NAVAL ARCHITECTURE

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Naval Architecture | 6 Hrs | 90 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | BASIC GEOMETRIC CONCEPTS, AREA AND VOLUME | 17 |
| 2. | HYDROSTATICS AND CENTRE OF GRAVITY | 17 |
| 3. | TRANSVERSE STABILITY | 17 |
| 4. | LONGITUDINAL STABILITY | 17 |
| 5. | PROPELLER AND RUDDER | 17 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 90 |

**RATIONALE:**

Diploma holders in marine engineering should have enough knowledge about different parts of ship. They should know about the basic principles of naval architecture. They should know how the ship floats. Basic knowledge about the area and volume is required. They should know about propellers and rudders.

**OBJECTIVES:**

At the end of the study of V Semester the student will be able to

- Understand how the ship floats in water.
- Know about the basic principles of naval architecture.
- Study about position of centre of gravity of the ship.
- Acquire broader ideas about area, volume and moment.
- Understand about stability of ships.
- Study about propellers and rudder.

## 32753: NAVAL ARCHITECTURE

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Basic geometric concepts, Area and Volume**<br>Middle line plane, transverse plane, waterplane, waterplane area - waterline, amidships, midship section - midship section area, beam, moulded depth.<br>Calculation of Area under a curve - Simpson's first rule - Application of Simpson's rule to calculation of Volume - Use of intermediate ordinates - Simpson's second rule - Trapezoidal rule - Tchebycheff's rule. | 17 Hrs |
| II | **Hydrostatics and Centre of gravity**<br>Density - Relative density - Archimedes' principle – Buoyancy - Floating bodies - Displacement – Volume of Displacement– TPC – Effect of density on draught of a ship – Fresh water allowance - Coefficient of forms - Wetted surface area. Centre of gravity - Shift in centre of gravity due to addition of mass - Shift in centre of gravity due to movement of mass - Effect of suspended mass. | 17 Hrs |
| III | **Transverse Stability**<br>Stability of ships - Statical stability at small angles of heel - Stable, Unstable and Neutral equilibrium - Transverse metacentre - Calculation of KM for rectangular and triangular cross section - Metacentric diagram - Inclining experiment - Free surface effect - Effect of tank divisions on free surface - Stability at large angles of heel – Curve of statical stability - Dynamical stability - Stability of wall sided ship. | 17 Hrs |
| IV | **Longitudinal Stability**<br>Trim - Centre of flotation - Mean draught – longitudinal metacentre – longitudinal metacentric height – Effect of adding small masses - moment to change trim by one centimetre - Change in draught due to addition of masses - Change in mean draught due to change in density – Bilging - Reserve buoyancy - Permeability | 17 Hrs |
| V | **Propeller and Rudder**<br>Propellers – Diameter – Pitch - Pitch ratio - Theoretical speed - Apparent slip - Real slip – Wake - Projected area - Developed area - Blade area ratio - Disc area ratio – Thrust - Measurement of pitch – Cavitation - Built and Solid propellers.<br>Rudders - Force on rudder - Torque on stock - Angle of heel due to force on rudder - Angle of heel when turning. | 17 Hrs |



**Text Book:**

1. Naval Architecture for Marine Engineers By E.A.Stokoe
2. Naval Architecture and ship construction By Vikram Gokhle and N.Nanda

**Reference Books:**


1. Basic Ship Theory, Vol - I and Vol – II By Rawson and Tupper
2. Naval Architecture By Taylor
3. Naval Architecture by Bian Baxter

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards



# NAVIGATION AND OCEANOGRAPHY

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32771
Semester : V Semester
Subject Title : NAVIGATION AND OCEANOGRAPHY

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Navigation and Oceanography | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | COURSES AND DISTANCE | 14 |
| 2. | SAILING AND FLAGS | 14 |
| 3. | NAVIGATIONAL EQUIPMENTS AND CHARTS | 14 |
| 4. | BASIC OCEANOGRAPHY | 14 |
| 5. | CURRENTS AND METEOROLOGICAL INSTRUMENTS | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

Any person who is sailing in a ship need to have a basic knowledge about navigation and oceanography. A seaman should know about the latitudes and longitudes. Different types of sailing should be studied. Navigational flags are used convey important information from one ship to other or from a ship to land. Seamen should know about the working of different navigational equipments. Knowledge about various temperature zones, isobars and cyclone is required. They should know about the metrological instruments and ocean currents.

**OBJECTIVES:**

At the end of VI semester the student will be able to:

- Understand about the courses and distance.
- Know about the latitudes and longitudes.
- Study about different types of sailing.
- Acquire broader idea about navigational flags.
- Understand about various types of navigational equipments.
- Study about oceanography and metrological equipments.

## 32771: NAVIGATION AND OCEANOGRAPHY

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Courses and Distance**<br>Courses – Direction, Degree of points, True north, Magnetic North, The Variation, Deviation, Error, Leeway, poles, Meridian, Longitude, Parallels, Latitudes, D'lat, D'long, Great circle, Small circle. Distance – Departure, Rhumb line, Vertex of Great circle, Position lines, Angular distance between two places, Linear measurement of longitude, Linear measurement of latitude. | 14 Hrs |
| II | **Sailing and Flags**<br>Sailing – Parallel Sailing, Plane sailing, Middle latitude sailing, Mercator sailing, Rotation of the Earth, Convergency.<br>Flags – Types of flags, When and where hoisted, Flags hoisted when entering or leaving a port, When shifting a ship, When berthed, Saluting another ship, Mourning, Meaning of some important international code flags. | 14 Hrs |
| III | **Navigational Equipments and Charts**<br>Navigational Equipments – Navigational Lights, Navigational Flags, Sextant, Magnetic Compass, Gyro Compass, Echo-sounder, Barometer, Walkie-Talkie, Radar, Nav-tex, Global positioning system, Line throwing apparatus.<br>Charts – Kinds of Charts, Mercator chart, Meridnal parts, Gnomonic Charts, Plan, Natural scale, | 14 Hrs |
| IV | **Basic Oceanography**<br>Basic Oceanography – Temperature zones of the world, clouds, Classification of clouds, Formation of clouds, Isobars, Pressure gradient, Wind, Katabatic and Anabatic wind. Prediction of wind direction, Coriolis force, Prediction of wind speed, Basic Isobaric Patterns, Cyclone, Anticyclone, Thunder storms. Disaster Management. Salinity, Ice at sea, Sea ice, Ice-bergs, glacier, ice shelf, International ice patrol, area of coverage, Contributors | 14 Hrs |
| V | **Currents and Meteorological Instruments**<br>Currents – Tides, Sea surface currents, Monsoons, North East monsoon and South West monsoon. Ocean Currents, Drift, Upwelling and gradient currents. Warm and cold currents, Effects of ocean currents on climate. Meteorological Instruments – Rain gauge, Anemometer, Barometer, Wet bulb and dry bulb thermometer, Hygrometer, Hydrometer. | 14 Hrs |



**Text Book :**

1. Munro's Navigation By Capt G.E. Earl and Capt F.L. Main
2. Marine Meteorology By Capt. H.Subramanian

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# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

V SEMESTER

2015 -2016 onwards

# SEAMANSHIP AND LIFE SAVING APPLIANCES

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32772
Semester : V Semester
Subject Title : SEAMANSHIP AND LIFE SAVING APPLIANCES

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Seamanship and life saving appliances | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | ROPES, TYPES AND CONSTRUCTION | 14 |
| 2. | BLOCKS, TACKLES AND CARGO WORK | 14 |
| 3. | SHIP MAINTENANCE AND DUTIES | 14 |
| 4. | LIFE SAVING APPLIANCES | 14 |
| 5. | ABANDON SHIP AND EMERGENCY EQUIPMENTS | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

Diploma holders in marine engineering should have enough knowledge about different types of ropes and their uses. Ropes are used to tie knots and to lift heavy materials. Different types of ropes have different properties and they are made up of different materials. Blocks and tackles are use to handle heavy materials. Ship maintenance is very important because the ship is sailing in rough weather and in salt water. Different life saving appliances is used in ship.

**OBJECTIVES:**

At the end of the study of V Semester the student will be able to

- Understand about different types of ropes and their properties.
- Know about the blocks, tackles and cargo work.
- Study about tank and bilge soundings in the ship.
- Acquire broader ideas about life saving appliances.
- Understand about abandon ship and boat sailing.

## 32772: SEAMANSHIP AND LIFE SAVING APPLIANCES

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Ropes, types and construction**<br>Ropes – Vegetable fibre ropes, construction, coiling, faking, cheesing down, whipping, opening a new coil. Characteristics, care and maintenance Steel wire ropes – Construction, special types, coiling, cutting, opening a new coil, care and maintenance. Synthetic fibre ropes – material used, construction, special charecteristics and care of synthetic ropes. | 14 Hrs |
| II | **Blocks, tackles and cargo work**<br>Blocks – Parts of block, types of blocks, overhauling blocks, marking. Tackles, parts of tackles, types of tackles, power gained, Cargo works – Accident prevention when working cargo, Draft marks, Load lines, Hatch covers, preparing ship for sailing, Ventilation of cargo during the voyage. Tank and Bilge soundings. | 14 Hrs |
| III | **Duties and Ship maintenance**<br>Ship's departments – Time, Watches and Bells. Bridge duties – Lights and signals for power driven ships under way, Ships at anchor, Ships not under command, ship ran aground<br>Ship Maintenance – Chipping, scrapping, painting, paint brushes, paints, types of paints, painting defects, Maintenance of wooden decks, Caulking. | 14 Hrs |
| IV | **Life saving appliances**<br>Life saving appliances - Life buoys, Life jackets, Life boat, Marking on a life boat, Parts of life boat, Davits, Types of davits, Life boat equipment and their uses – open type lifeboat - partially enclosed lifeboat – fully enclosed lifeboat - Inflatable life raft and its equipments, Rigid life raft. Pyrotechniques – Hand flares, Rocket parachutes, Buoyant smoke signals. | 14 Hrs |
| V | **Abandon ship and Emergency equipments**<br>Abandon ship – Emergency signal, Abandon ship signal, Life boat launching - Survival at sea, Search and Rescue.<br>Breathing apparatus – Self contained breathing apparatus – bellow type breathing apparatus – emergency escape breathing apparatus – Thermal protective aid – Immersion suit | 14 Hrs |



**Text Book** : Seamanship Primer By Capt J. Dinger

**Reference Books** :

1. Survival in Life boat and life raft By Capt. S.K. Puri
2. Survival at sea
   The life boat and life raft C.H. Wright Edition 1993
   Brownson & Furguson Ltd.,
   Ship board operation H.I. Lavery 1993 British library cataloguing in publications

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

V SEMESTER

2015 -2016 onwards

# ROBOTICS

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32773
Semester : V Semester
Subject Title : ROBOTICS

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Robotics | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | FUNDAMENTALS OF ROBOT TECHNOLOGY | 14 |
| 2. | ROBOT CONTROLLER, DRIVE SYSTEMS AND END EFFECTERS | 14 |
| 3. | SENSORS AND MACHINE VISION | 14 |
| 4. | ROBOT KINEMATICS AND ROBOT PROGRAMMING | 14 |
| 5. | ROBOT APPLICATIONS IN MANUFACTURING | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

Rapid industrialization and globalization needs industries to be more competitive and deliver cost effective quality products. This needs industries to implement flexible manufacturing systems where Robotic technology plays major role. Hence study of robotic technology is very essential.

**OBJECTIVES:**

- Understand fundamentals of robotics
- Acquire knowledge structure and elements of robot
- Gain knowledge on controller and various drives used in robotics
- Develop knowledge on role of sensors and vision system
- Acquire skill to program and control robot
- Understand to adopt robot to various industrial applications.

## ROBOTICS

## DETAILED SYLLABUS

**Contents: Theory**

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **FUNDAMENTALS OF ROBOT TECHNOLOGY**<br>Introduction – Definitions-Robot Anatomy – Basic configuration of Robotics – Robot Components – Manipulator, End effecter, Driving system, Controller and Sensors.<br>Mechanical arm – Degrees of freedom – Links and joints – Types of joints – Joint notation scheme – Pitch, Yaw, Roll – Classification of robots – Work envelope, Work Volume – Structural Characteristics of Robotics – Effect of structure on Control, Work envelop and Work volume. | 14 Hrs |
| II | **ROBOT CONTROLLER, DRIVE SYSTEMS AND END EFFECTERS**<br>Robot controller – Four types of controls – Open loop and closed loop controls – Speed of response and stability – Precision of movements: Spatial resolutions, accuracy and repeatability.<br>Pneumatic drives – Hydraulic drives – Mechanical drives – Electrical drives – Stepper motors, DC Servo motors and AC Servo motors – Salient features – Applications and Comparisons of Drives.<br>End effecters – Grippers – Mechanical Grippers, Magnetic Grippers, Vacuum Grippers, Two fingered and Three fingered Grippers, Internal and External Grippers – End Of Arm Tooling (EOAT)- Selection and Design considerations. | 14 Hrs |
| III | **SENSORS AND MACHINE VISION**<br>Requirements of Sensors – Principles and applications of the following types of sensors – Position sensors: Piezo-electric sensors, LVDT, Resolvers, Optical encoders and Pneumatic position sensors – Range sensors – Proximity sensors: Inductive, Capacitive, Ultrasonic and Optical proximity sensors – Touch sensors: Binary sensors, Analog sensors – Wrist sensors – Slip sensors.<br>Machine vision system – Camera – Frame grabber – Sensing and digitizing image data – Signal conversion – Image storage – Lighting techniques – Image processing and analysis – Data reduction: Edge detection, Feature extraction and object recognition – Applications – Inspection, Identification, Visual serving and navigation. | 14 Hrs |
| IV | **ROBOT KINEMATICS AND ROBOT PROGRAMMING**<br>Forward kinematics, Inverse kinematics and differences – Forward kinematics and Reverse kinematics of manipulators with Two, Three and Four degrees of freedom – Deviations.<br>Robot programming – Teach pendent programming – Lead through programming – Robot programming languages – VAL Programming – Motion commands, Sensor commands, End effecter commands and Simple programs. | 14 Hrs |

| | | |
|---|---|---|
| V | **ROBOT APPLICATIONS IN MANUFACTURING**<br>Robot applications – Material handling – Press loading and unloading – Die casting – Machine tool loading and unloading – Spot welding – Arc welding – Spray painting – Assembling – Finishing – Automatic Guided Vehicle – Adopting robots to workstations – Requisite robot characteristics and Non requisite robot characteristics – Stages in selecting robots for industrial applications – Safety considerations for robot operations – Robotics in the future – Economical analysis of robots – Social implications. | 14 Hrs |

**Text Books:**


1) "Industrial Robotics – Technology, Programming and Applications", M.P.Groover, MC Graw Hill, 2001


**Reference Books:**


1) "Robotics Control, Sensing, Vision and Intelligence",Fu.K.S.Gonzalz.R.C., and Lee C.S.G, ,McGraw-Hill Book Co., 1987
2) "Robotics for Engineers",Yoram Koren, McGraw-Hill Book Co., 1992
3) "Robotics and Image Processing", Janakiraman.P.A, Tata McGraw-Hill,1995

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## III YEAR

## M SCHEME



## V SEMESTER

2015 -2016 onwards

# FISHING TECHNOLOGY – I

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32774
Semester : V Semester
Subject Title : FISHING TECHNOLOGY – I

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Fishing Technology – I | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | INDIGENOUS FISHING CRAFTS | 14 |
| 2. | MODERN FISHING VESSELS AND INDIGENOUS FISHING GEARS | 14 |
| 3. | MODERN FISHING GEARS | 14 |
| 4. | FISHING GEAR ACCESSORIES AND GEAR MATERIALS | 14 |
| 5. | FISH PRESERVATION | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

The crafts and vessels used for fishing should be equipped with the latest safety devises. The safety of crew members and the cargo is very important. Latest technology is being used in developing fishing gears and machineries. Preservation of fish on board the vessels should be taken care.

**OBJECTIVES:**

The student is expected to learn about indigenous fishing crafts, modern fishing vessels and indigenous fishing gears, modern fishing gears, fishing gear accessories and gear materials and fish preservation

## 32774: FISHING TECHNOLOGY – I

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Indigenous Fishing Crafts**<br>General classification of fishing crafts – Important indigenous fishing crafts – Dugout canoe – Masula boat – Kakinada Nava – Shoe Dhony – Rampani boat – Sathpati boat – Machwa – Wahan – Maliya boat – Out rigger boat – Rathnagiri – Description – Area of operation and Gears operated – Principal dimensions of fishing boats – Length overall (OAL) – Beam – Free board – Draft – Load water line – Depth – Gross tonnage – Registered tonnage – Net tonnage – Terms<br>related to various sides and parts of a fishing boat – Start board side – Port side – Forward side – Aft side – Mid ship – Bow stern – Stem – Gun wale – Bull wark – Ramp – Derrick – Mast – Preservation of fishing crafts. | 14 Hrs |
| II | **Modern Fishing Vessels**<br>Deck layout – Stern trawlers – Out rigger trawlers – Deck layout – Purse seiner –Long liner – Deck layout and deck equipments – Care and maintenance of fishing vessels – Boat construction materials – Wood – Steel – Ferro cement – Fiber glass – Aluminium – Description and properties of each material.<br>**Indigenous Fishing Gears**<br>Classification of fishing gears – Important fishing gears of west coast and east coast of India – Cast net – Gill net – Chinese Dip net – Boat seines – Shore seines – Hook and line – Set net – Dol net – Description of structure and basic principles of operation. | 14 Hrs |
| III | **Modern Fishing Gears**<br>Trawl net – Parts of trawl net – Wing – Square – Belly – Throat - COD end – Head rope – Foot rope – Floats – Sinkers – Tickler chain – Sweep line – Classification of trawl net – Beam trawl – Otter trawl – Bull trawl – Stern trawl – Side trawl – Pelagic – Mid-water – Demersal – 2 Seam trawl and 4 Seam trawl – 6 Seam trawl – Out rigger trawl – Description and basic principles of operation of each trawl.<br>Purse seine net – Parts of Purse Seine – Body – wing – Bunt – Selv edge – Head rope – Foot rope – Floats – Sinkers – Purse Rings – Classification – Description – Basic principles of operation.<br>Long line – For tuna – Parts of long line – Main line – Branch line proper Sekiyama – Snood wire – Hooks – Description – Basic principles of operation. Troll line – Description – Basic principles of operation. Squid jigging – Description – Basic principles of operation.<br>Pole and Line – Description and basic principle of operation. | 14 Hrs |
| IV | **Fishing Gear Accessories and Gear Materials**<br>Floats – Sinkers – Otter board – Bobbins – Tickler chains – Warp – Thimble – Shackles and swivels – Purse rings – Cord end rings – Purpose and uses – Winch – Line hauler – Power block – Light buoy – Hooks – Single Hook – Double Hook – Barbed hook – Barbless hook<br>Fishing Gear materials – Classification of fishing gear material – Natural fiber – Cotton – Manila – Sisal – Synthetic fibers – Polyester – Poly-amide – | 14 Hrs |

| | | |
|---|---|---|
| | Poly-ethylene – Poly-propylene – Poly-vinyl chloride – Selection of fishing gear materials – Properties of materials for trawl, Purse seines, Gill nets etc. Preservation of fishing gears. | |
| **V** | **Fish Preservation**<br>Introduction – Principles of preservation – Cleaning – Lowering the temperature – Raising the temperature – Dehydration – Use of salt – Use of fish preservatives – Exposure to low radiation of gamma rays – Electrocuting by "ion wind" Method of preservation – Chilling – Freezing – Deep freezing – freeze drying – Canning – Sun drying – Dry salting – Brining – Smoking – Special problems in fish preservation – Denaturation due to freezing of fish – problems arising out of industrial processes in fish preservation industries | 14 Hrs |

**Reference Books**


1. Modern Fishing Gear of the World by Hilmer Kristaonsson
2. Fishing Craft of the World by FAO Publications
3. Marine Products of Commerce by Donald K. Tressler, Ph. D and James McW. Lemon
4. CIFNET Manual
5. Fish Catching methods of the World – Sailsbury


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# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## III YEAR

## M SCHEME



## V SEMESTER

2015 -2016 onwards

# MARINE DIESEL ENGINE AND POWER PLANT PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32755
Semester : V Semester
Subject Title : MARINE DIESEL ENGINE AND POWER PLANT PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Diesel Engine and Power Plant Practical | 4 Hrs | 60 Hrs | 25 | 75 | 100 | 3 Hrs |

**RATIONALE:**

To perform various types test like tension, compression impact tests in Laboratory.

To perform experiments on various types of pumps and turbines to understand their characteristics.

To understand the various mechanical properties by conducting tensile test.

To understand the hardness value of different materials.

To understand the concepts flow through different cross sections.

To understand and draw characteristics of various pumps and turbines.

**GUIDELINES:**

- All the sixteen experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Equipments and taking readings in the practical classes, every five students should be provided with a separate experimental setup for doing experiments in the laboratory.

## ALLOCATION OF MARKS

| | |
|---|---|
| Demonstration | : 35 Marks |
| Procedure | : 25 Marks |
| Result | : 10 Marks |
| Viva voce | : 05 Marks |
| **Total Marks** | **: 75 Marks** |

## LIST OF EXPERIMENTS

**Part A**

1. Flash Point and fire point – Open cup apparatus
2. Flash point and fire point – closed cup apparatus
3. Viscosity of Lubrication oils – Redwood Viscometer apparatus
4. Viscosity of Lubrication oils – Saybolt Viscometer apparatus
5. Valve timing diagram of diesel engine – four stroke engine
6. Port timing diagram of diesel engine – two stroke engine

**Part B**

7. Performance test on Multi cylinder Diesel Engine
8. Test on air compressor - Volumetric efficiency
9. Diesel Engine Injection Time Setting
10. Dismantling and assembling of fuel injection pump (Study experiment)
11. Servicing and Testing of Diesel injector (Study experiment)
12. Dismantling and assembling of fuel feed pump (Study experiment)



**Part C**

13. Visit to Power plant and submit a report

**List of equipments for a batch of 30 students**

1. Open cup apparatus -1 No.
2. Closed cup apparatus -1 No.
3. Redwood Viscometer apparatus -1 No.
4. Saybolt Viscometer apparatus -1 No.
5. Cut section of four stroke engine -1 No.
6. Cut section of two stroke engine -1 No.
7. Multi cylinder Diesel Engine with fuel test kit -1 No.
8. Air compressor with volumetric efficiency kit -1 No.
9. Fuel pump injection time setting machine with fuel pump -1 No.
10. Fuel injection pump and pump vice -1 No.
11. Diesel injector -1 No.
12. Fuel feed pump -1 No.

**INSTRUCTIONS TO CARRY OUT THE PARCTICAL CLASS WORK AS WELL AS THE BOARD EXAMINATIONS PRACTICALS.**



1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. All the end of the semester the average marks of all the exercise should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the sessional mark for practical.
4. All the marks entries for exercise should be entered in the personal log book of the staff, who is handling the subject.

## SAFETY PRECAUTIONS TO BE FOLLOWED

1. Always wear shoes.
2. Always use good conditions tools during the work
3. Appropriate safety device should be used
4. Switch off the machines when not in use.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

V SEMESTER

2015 -2016 onwards

# NAVIGATION AND METEOROLOGY PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32775
Semester : V Semester
Subject Title : NAVIGATION AND METEOROLOGY PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| Navigation and meteorology practical | 4 Hrs | 60 Hrs | Internal Assessment | Board Examination | Total | |
| | | | 25 | 75 | 100 | 3 Hrs |



**RATIONAL:**

Diploma holders in marine engineering are expected to work on board ship. So they should have knowledge about the basic navigational equipments and metrological equipments. Persons working in shipyards also need to have basic knowledge about these equipments.

**GUIDELINES:**

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

**ALLOCATION OF MARKS**

| | |
|---|---|
| Demonstration | 10 marks |
| Figure with parts | 15 marks |
| Procedure | 35 marks |
| Result | 05 marks |
| Viva-voce | 10 marks |
| Total | 75 Marks |

## LIST OF EXPERIMENTS

**Navigation:**

1. Study about the construction and working of navigational lights.
2. Study and demonstration of different types of navigational flags.
3. Study about the construction and working of sextant.
4. Study about the construction and working of magnetic compass.
5. Study about the construction and working of gyro compass.
6. Study about the construction and working of echo-sounder.
7. Study about the construction and working of walkie- talkie.
8. Study about the construction and working of radar.
9. Study about the construction and working of nav-tex.
10. Study about the construction and working of global positioning system.
11. Study about the construction and working of line throwing apparatus.

**Meteorological equipments:**

12. Study about the construction and working of rain gauge.
13. Study about the construction and working of anemometer.
14. Study about the construction and working of thermometer (wet bulb and dry bulb)
15. Study about the construction and working of barometer.
16. Study about the construction and working of hygrometer.
17. Study about the construction and working of hydrometer.

**INSTRUCTIONS TO CARRY OUT THE PARCTICAL CLASS WORK AS WELL AS THE BOARD EXAMINATIONS PRACTICALS.**

1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. All the end of the semester the average marks of all the exercise should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the sessional mark for practical.
4. All the marks entries for exercise should be entered in the personal log book of the staff, who is handling the subject.

## LIST OF EQUIPMENTS

1. Navigational lights.
2. Navigational flags.
3. Sextant.
4. Magnetic compass.
5. Gyro compass.
6. Echo-sounder.
7. Barometer.
8. Walkie- talkie.
9. Radar.
10. Nav-tex.
11. Global positioning system.
12. Line throwing apparatus.
13. Rain gauge.
14. Anemometer.
15. Thermometer (wet bulb and dry bulb)
16. Barometer.
17. Hygrometer.
18. Hydrometer.



## SAFETY PRECAUTIONS TO BE FOLLOWED BY STUDENTS

- Do not touch, connect or disconnect any plug or cable without teacher's permission
- Don't attempt to touch any live wires
- Equipments should be switched off properly after completion of work

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## III YEAR



## M SCHEME

## V SEMESTER

2015 -2016 onwards

## SEAMANSHIP AND LIFE SAVING APPLIANCES PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32776
Semester : V Semester
Subject Title : SEAMANSHIP AND LIFE SAVING APPLIANCES PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| Seamanship and life saving practical | 4 Hrs | 60 Hrs | Internal Assessment | Board Examination | Total | |
| | | | 25 | 75 | 100 | 3 Hrs |

**RATIONALE:**

Diploma holders in marine engineering should have enough knowledge about different types of ropes and their uses. Ropes are used to tie knots and to lift heavy materials. Different types of ropes have different properties and they are made up of different materials. Blocks and tackles are use to handle heavy materials. Ship maintenance is very important because the ship is sailing in rough weather and in salt water. Different life saving appliances is used in ship.

**GUIDELINES:**

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

## ALLOCATION OF MARKS

| | |
|---|---|
| Demonstration | 30 marks |
| Diagram with parts | 15 marks |
| Procedure | 20 marks |
| Viva-voce | 10 marks |
| Total | 75 Marks |

## LIST OF EXPERIMENTS

**Seamanship:**

1. Study about the construction of different types of ropes and its uses (Bends and Hitches).
2. Preparation of different types of knots and its uses.
3. Study of different types of blocks and purchases and its applications.
4. Study about the construction and working of EPIRB.

**Life saving appliances:**

5. Study about the construction and working of life boat.
6. Study about the construction and working of life raft (inflatable).
7. Study about the construction and working of life raft (rigid).
8. Study about the construction and working of life buoy.
9. Study about the construction and working of life jacket.

## LIST OF EQUIPMENTS

1. Different types of ropes (Bends and Hitches).
2. Different types of knots
3. Settings of sail
4. Different types of blocks
5. Emergency position indicating radio beacon (EPIRB).
6. Life boat.
7. Life raft (inflatable).
8. Life raft (rigid).
9. Life buoy.
10. Life jacket.

## SAFETY PRECAUTIONS TO BE FOLLOWED BY STUDENTS



1. The ropes should not be stowed carefully away from moisture, heat and direct sunlight
2. Sharp edges should be kept away from the ropes.
3. Opened life rafts should not be kept with filled air. They should be stowed after releasing air.
4. The engine in the life boat should be kept disengaged from the propeller shaft.
5. Safety shoes and helmets should be used in the laboratory.
6. Shoe should not be worn while entering the life raft.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

V SEMESTER

2015 -2016 onwards

# ROBOTICS PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32777
Semester : V Semester
Subject Title : ROBOTICS PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Robotics Practical | 4 Hrs | 60 Hrs | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

Rapid industrialization and globalization needs industries to be more competitive and deliver cost effective quality products. This needs industries to implement flexible manufacturing systems where Robotic technology plays major role. Hence study of robotic technology is very essential.

**OBJECTIVES:**

- Identify the parts of a Robot.
- Operate a Robot using teach pendent.
- Record the positions in a Robot.
- Write a program for pick & place of Robot.
- Write the program for welding application of Robot.
- Write the off-line and on-line program for spray painting application.
- Measure the Robot repeatability

## LIST OF EXPERIMENTS:

1. Robot – System Connection and Component recognition.
2. Teaching the Robot using teach pendent using off-line programming.
3. Position recording using off-line programming.
4. Calculating work space / Work volume using off-line programming.
5. Homing operation using on-line and off-line programming.
6. Pick and place of object using on-line and off-line programming.
7. Pick and stack of the object using on-line and off-line programming.
8. Robot performing continuous Arc welding using off-line programming.
9. Continuous and intermittent motion using Wait command using off-line Programming.
10. Spray painting using off-line programming.
11. Pick and stack the object using Subroutine program using on- line and off-line programming.
12. Program using X, Y, Z Coordinates using off-line programming.
13. Teaching position via XYZ Coordinates using off-line programming.
14. Measurement of Robot motion using on-line and off-line programming.
15. Measurement of robot repeatability using on-line and off-line programming.



## Allocation of marks

| S.No. | Detail | Marks Allotted |
|---|---|---|
| 1. | Exercise 1: Procedure | 5 |
| | Program | 15 |
| | Execution | 15 |
| 2. | Exercise 2: Procedure | 5 |
| | Program | 15 |
| | Execution | 15 |
| 3. | Viva Voce | 5 |
| | Total | 75 |

## LIST OF EQUIPMENTS

| | | |
|---|---|---|
| Computer with Accessories | : | 15 Nos. |
| Simulation Softwares | : | ARISTO Software<br>SCORE BASE Software |
| Hardware | : | 6 Axis Robot, Teach Pendant control and PC Based control through Software |

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

V SEMESTER

2015 -2016 onwards

# FISHING TECHNOLOGY – I PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32778
Semester : V Semester
Subject Title : FISHING TECHNOLOGY – I PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Fishing Technology – I Practical | 4 Hrs | 60 Hrs | 25 | 75 | 100 | 3 Hrs |

**RATIONALE:**

The crafts and vessels used for fishing should be equipped with the latest safety devises. The safety of crew members and the cargo is very important. Latest technology is being used in developing fishing gears and machineries. Preservation of fish on board the vessels should be taken care.

**GUIDELINES:**

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

## ALLOCATION OF MARKS

| | |
|---|---|
| Demonstration | 30 marks |
| Diagram with parts | 15 marks |
| Procedure | 20 marks |
| Viva-voce | 10 marks |
| Total | 75 Marks |

## LIST OF EXPERIMENTS

1. Glossary of terms related to the various parts and positions of fishing boat
2. Drawing practice of deck layout of Stern trawl, out rigger trawler, persue seiner, long liner, troll liner
3. Fabrication of net – 10x10 meshes, 20x20 meshes – Shaping of net – baiting – Creasing – Tailoring
4. Definition of Mesh and types of meshes – Rhombic mesh – Square mesh – Hexagonal mesh
5. Rope work – Splicing – eye splicing – Short, long and back splicing and specification of construction of wire rope
6. Identification of Gear materials, cotton, polyethylene, polypropelene, polyester.
Floats – High density floats – Low density floats – Glass floats – Thermocole floats
7. Drawing practice and design of fishing gears – Trawl net – pursue seine net – Long line – Pole and line – Troll line – Gill nets – Thuri valai – Cast net
8. Field visit to net making plant
9. Visit to fishing harbour to study the deck layout of mechanised fishing vessels – Trawler – Long liner – Gill netter – Pursue seiner and infrastructural facilities for operation and maintenance of fishing vessels
10. Field visit to boat building yard
11. Swimming Practice



**Reference Books:**

1. Modern Fishing Gear of the World
by
Hilmer Kristaonsson
2. Fishing Boats of the World
FAO Publications
3. Marine Fisheries Technology
by
Shahul Hameed

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## III YEAR

## M SCHEME



## V SEMESTER

2015 -2016 onwards

## LIFE AND EMPLOYABILITY SKILL PRACTICAL
## [COMMON TO ALL ENGINEERING BRANCHES]

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN ENGINEERING – SYLLABUS – M Scheme**

(Being implemented from the Academic Year 2016-2017 onwards)

Course Name : **All Branches of Diploma in Engineering and Technology and Special Programmes**

Subject Code : **30002**

Semester : **V**

Subject Title : **LIFE AND EMPLOYABILITY SKILLS PRACTICAL**

**Teaching and Scheme of Examination:** **No. of Weeks per Semester: 15 Weeks**

| Subject | Instruction | | Examination | | | |
|---|---|---|---|---|---|---|
| | | | Marks | | | |
| | Hours/ Week | Hours/ Semester | Internal assessment | Board Examination | Total | Duration |
| Life and Employability Skills | 4 Hours | 60 Hours | 25 | 75 | 100 | 3 Hours |

**Topics and Allocation of Hours:**

| Sl. No. | Section | No. of Hours |
|---|---|---|
| 1 | **Part – A**<br>Communication | **30** |
| 2 | **Part – B**<br>Entrepreneurship, Project Preparation, Productivity, Occupational Safety, Health, Hazard, Quality Tools& Labour Welfare | **20** |
| 3 | **Part – C**<br>Environment, Global Warming, Pollution | **10** |
| **TOTAL** | | **60** |

**RATIONALE**



Against the backdrop of the needs of the Industries, as wells as based on fulfilling the expectations of the Industries, the Diploma Level students have to be trained directly and indirectly in toning up their competency levels. Proficiency in Communication only, equips them with confidence and capacity to cope with the employment. Hence, there is a necessity to focus on these in the curriculum. At the end of the Course, the student is better equipped to express himself in oral and written communication effectively.

**SPECIFIC INSTRUCTIONAL OBJECTIVES**

**1. Emphasize and Enhance Speaking Skills**

**2. Increase Ability to Express Views & Opinions**

**3. Develop and Enhance Employability Skills**

**4. Induce Entrepreneurship and Plan for the Future**

**5. Expose & Induce Life Skills for Effective Managerial Ability**

**LIFE AND EMPLOYABILITY SKILLS PRACTICAL**

**SYLLABUS**

| Unit | Topics | Activity | Hours |
|---|---|---|---|
| I | **Communication, Listening, Training, Facing Interviews, Behavioural Skills** | -- instant sentence making<br>– say expressions/phrases-- self- introduction/another higher official in company<br>– describe/explain product<br>– frame questions based on patterns<br>– make sentences based on patterns | **30** |
| II | **Entrepreneurship, Project Preparation, Marketing Analysis, Support & Procurement** | -- prepare an outline of a project to obtain loan from bank in becoming an entrepreneur<br>– prepare a resume | **10** |
| III | **Productivity – comparison with developed countries, Quality Tools, Circles, Consciousness, Management, House Keeping** | -- search in the website<br>-- prepare a presentation<br>– discuss & interact | **05** |
| IV | **Occupational Safety, Health Hazard, Accident & Safety, First-Aid,Labour Welfare Legislation, Welfare Acts** | -- search in the website<br>-- prepare a presentation<br>– discuss & interact | **05** |

| | | | |
|---|---|---|---|
| **V** | **Environment, Global Warming, Pollution** | -- taking down notes / hints – answering questions<br><br>-- fill in blanks the exact words heard | **10** |

**LEARNING STRUCTURE** **100 Marks**

**-- Focus more on Speaking & Listening Skills**
**-- Attention less on Reading & Writing Skills**
**-- Apply the skills in fulfilling the Objectives on Focused Topics**

**a) Listening** **25 Marks**

1. Deductive Reasoning Skills (taking down notes/hints) **10**
2. Cognitive Skills (answering questions) **10**
3. Retention Skills (filling in blanks with exact words heard) **05**

**b) Speaking Extempore/ Prepared** **30 Marks**

1. Personality/Psychological Skills (instant sentence making) **05**
2. Pleasing & Amiable Skills (say in phrases/expressions) **05**
3. Assertive Skills (introducing oneself/others) **05**
4. Expressive Skills (describe/explain things) **05**
5. Fluency/Compatibility Skills (dialogue) **05**
6. Leadership/Team Spirit Skills (group discussion) **05**



**c) Writing & Reading** **20 Marks**

1. Creative & Reasoning Skills (frame questions on patterns) **05**
2. Creative & Composing Skills (make sentences on patterns) **05**
3. Attitude & Aim Skills (prepare resume) **05**
4. Entrepreneurship Skills (prepare outline of a project) **05**

**d) Continuous Assessment (Internal Marks)** **25 Marks**

(search,read, write down, speak, listen, interact & discuss)

1. Cognitive Skills (Google search on focused topics)
2. Presentation Skills& Interactive Skills (after listening, discuss)

**Note down and present in the Record Note on any 5 topics** **10 Marks**
**Other activities recorded in the Record note** **10 Marks**
**Attendance** **05 Marks**

**INTERNAL MARKS** **25 MARKS**

**EXTERNAL MARKS AT END EXAMINATION** **75 MARKS**

**MODEL QUESTION**

**Time: 3 Hours** **Maximum Marks: 75**

**A. LISTENING** **25 Marks**

1. Listen to the content and take down notes/hints 10
2. Listen to the content and answer the following questions. 10
3. Listen to the content and fill in the blanks the exact words heard. 05

**B. SPEAKING** **30 Marks**

1. Say in a sentence instantly on hearing the word(5 words, one after another). 05
2. Say any five expressions commonly used in communication. 05
3. Imagine, a consultant has come to your department.
   Introduce him to your subordinates. 05
4. Explain/describe the product you are about to launch in the market. 05
5. Speak with your immediate boss about the progress you have made. 05
6. Discuss within the group on the topic of focus in the syllabus. 05



**C. WRITING & READING** **20 Marks**

1. Frame new questions from the pattern given by changing sets of words with your own. 05

| | | | | |
|---|---|---|---|---|
| a. | When | do | you | return? |
| b. | How | is | his performance? | |
| c. | Where | has | the manager | gone? |
| d. | What | is | the progress | today? |
| e. | Why | are | the machines | not functioning? |

2. Make sentences from the pattern given by changing sets of words with your own. 05

| | | | | | |
|---|---|---|---|---|---|
| a. | The workers | are | on strike | | |
| b. | The labourers | are paid | well | in this factory | |
| c. | There | is | a rest room | for the workers | |
| d. | These | are | the new products | launched | by our company |
| e. | Almost everyone | come | to the company | on motorbikes | |

3. Prepare a resume for the post of Department Manager. 05

4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings) 05



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**I. Guidelines for setting the question paper:**

**A. LISTENING :**

ONLY TOPICS related to
POLLUTION /
ENVIRONMENT /
GLOBAL WARMING are to be taken.
These topics are common for all the three types of evaluation.

**B. SPEAKING :**

1. WORDS of common usage
2. Fragments – expression of politeness, courtesy, cordiality
3. Introduce yourself as an engineer with designation or
   Introduce the official visiting your company/department

4. Describe/Explain the product/machine/department
5. Dialogue must be with someone in the place of work.
6. Group of six/eight
   Discuss the focused topic prescribed in syllabus

**C. WRITING & READING:**



1. Provide five different structures.
   Students are to substitute at least one with some other word/words
2. Provide five different structures.
   Students are to substitute at least one with some other word/words
3. Provide some post related to industries.
4. Outline of the project (skeleton/structure)
   Only the various headings and subheadings
   Content is not needed

**II. Guidelines for recording the material on the Focused Topics in the Record note.**

Write in the record note, **on any five topics**, from the list of topics given below. **10 Marks**
**(**5 topics x 10 marks = 50 marks. Thus, the **Average of 5 topics is 10 Marks)**

1. Productivity in Industries – Comparison with developed countries
2. Quality Tools, Quality Circles and Quality Consciousness
3. Effective Management
4. House Keeping in Industries
5. Occupational Safety and Hazard
6. Occupational Accident and First Aid

7. Labour Welfare Legislations
8. Labour Welfare Acts and Rights
9. Entrepreneurship
10. Marketing Analysis, Support and Procurement

**LABORATORY REQUIREMENT:**

1. An echo-free room
2. Necessary furniture and comfortable chairs
3. A minimum of two Computers with internet access
4.A minimum of two different English dailies
5. A minimum of Three Mikes with and without cords
6. Colour Television (minimum size – 29")
7. DVD/VCD Player with Home Theatre speakers
8. Smart board
9. Projector

**Suggested Reading:**


1. Production and Operations Management by S.N. Chary, TMH
2. Essentials of Management by Koontz &Weihrich, TMH
3. Modern Production / Operations Management by E.S. Buffa and R.K. Sarin, John Wiley & Sons
4. Production Systems: Planning, Analysis and Control by J.L.Riggs, 3rd ed., Wiley.
5. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, Macmillan
6. Operations Research - An Introduction by H.A.Taha, Prentice Hall of India
7. Operations Research by J.K.Sharma, Macmillan
8. Business Correspondence & Report Writing by R.C. Sharma and K.Mohan, TMH
9. How to prepare for Group Discussion & Interview (With Audio Cassette) by Prasad, TMH
10. Spoken English – A self-learning guide to conversation practice (with Cassette)
11. Introduction to Environmental Engineering by Mackenzie, L. Davis and A. David, Cornwell, McgrawHill, 3rd Ed.
12. Environmental Engineering by Peary, Rowe and Tchobanoglous, McgrawHill
13. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
14. Quality Control and Applications by Housen&Ghose
15. Industrial Engineering Management by O.P. Khanna

# VI SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards



# ELEMENTARY FIRST AID AND FIRE FIGHTING

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32761
Semester : VI Semester
Subject Title : ELEMENTARY FIRST AID AND FIRE FIGHTING

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Elementary First Aid and Fire Fighting | 6 Hrs | 90 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | STRUCTURE AND FUNCTIONS OF HUMAN BODY | 17 |
| 2. | FRACTURES, WOUNDS AND BURNS | 17 |
| 3. | SHOCK, HEART ATTACK, STROKE, CHOCKING AND POISONING | 17 |
| 4. | THEORY OF FIRE | 17 |
| 5. | FIRE FIGHTING EQUIPMENTS | 17 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 90 |

**RATIONALE:**

A regular physician may not be available in every ship. There is every likely hood of getting injuries when people work in ship. Hence a basic knowledge of first aid is necessary for every person who works on board ship. Fire is a major hazard in ship. When the ship is sailing in mid sea help cannot be expected from outside sources. Hence a mariner should have knowledge about the types of fire, occurrence of fire and the methods of fire fighting.

**OBJECTIVES:**

At the end of the study of VI Semester the student will be able to

- Understand the structure and functions of human body.
- Acquire knowledge about Wounds, Burns, Shocks, Poisoning and Chocking.
- Study about different heart problems and their first aid.
- Have enough knowledge and information about vomiting and diarrhoea.
- Acquire broader ideas about fire.
- Understand the use of Fire fighting equipments.

## 32761: ELEMENTARY FIRST AID AND FIRE FIGHTING

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Structure and functions of human body**<br>Circulatory system – Heart and Blood Vessels – Respiratory System – Nasal cavity – wind pipe – digestive system and abdomen – mouth – small and large intestine – urinary system – kidney – urinary bladder – central nervous system – cerebrum – cerebellum – spinal cord – autonomous nervous system – skin and regulation of body temperature – skeletal system – muscular system | 17 Hrs |
| II | **Fractures, Wounds and Burns**<br>Fractures – Signs & Symptoms – Management – using bandages – Wounds – Management – External and internal bleeding – Signs & symptoms of bleeding – infection – Management – Dressings – Burns and Scalds – Degree of Burns – The estimation of percentage of burns –Management of serious burns and scalds – management of chemical burns – Burns of eye – Alkali burns – Infection – Foreign bodies in the eye – Treatment – Management – Diarrhoea, vomiting and dehydration – Signs and symptoms – first aid. | 17 Hrs |
| III | **Shock, Heart attack, Stroke, Chocking and Poisoning**<br>Shock – Causes – Signs and Symptoms – Unconsciousness – Degree of unconsciousness –Causes for unconsciousness – First aid for unconsciousness – Heart Attack – Contributing factors – Symptoms – Signs – First Aid – cardio pulmonary resuscitation – Strokes –Contributing factors – Signs and symptoms – First Aid. Choking – Signs and Symptoms -First Aid - Heimlich's manoeuvre - Poisoning – Types of Poisons – drug poisoning – Alcohol Poisoning – Acute Alcohol poisoning – Complications – Management – first aid. | 17 Hrs |
| IV | **Theory of Fire**<br>Fire triangle – Heat – combustible materials – requirement of Oxygen - - properties of flammable materials - fire hazards and spread of fire - - fire prevention principle – precautions to prevent fire – Types of fire – Class-A fire, Class-B fire, Class-C fire, Class-D fire, Class-E fire – Principle of fire fighting – cooling, smothering and starvation – methods to extinguish different types of fire - appropriate extinguishing agents. Fire Detectors - types of detectors – Smoke detectors – Heat detectors – Flame detectors - automatic fire alarm. | 17 Hrs |
| V | **Fire fighting equipments**<br>Portable Fire Extinguishers – Water type extinguishers – Chemical foam type – mechanical foam type – Soda Acid Type Extinguishers – Dry chemical Power Type Fire Extinguishers – Carbon dioxide type Fire Extinguishers– Halon type Fire Extinguishers - Fire man outfit – Fire Hydrant – Pumps – Hoses and nozzles – Fixed Installations – Fire mains – Water sprinkler system – Carbon di oxide flooding system – Bulk $CO_2$ system. | 17 Hrs |

| | | |
|---|---|---|
| **Text Book** | **:** | Anatomy - Chaursia – 2005<br>Gross Anatomy – Shaw - 2002 |
| **Reference Book** | **:** | Seamanship prime by Capt. J. Dinger Bhandarkar publications, Mumbai. |

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards



# MARINE AUXILIARY MACHINERY

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32762
Semester : VI Semester
Subject Title : MARINE AUXILIARY MACHINERY

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Auxiliary Machinery | 6 Hrs | 90 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | FRESH WATER SYSTEM, OILY BILGE SEPARATORS, DECK MACHINERY | 17 |
| 2. | BLOWERS AND COMPRESSORS, STEERING SYSTEM AND VALVES | 17 |
| 3. | SHIP BOARD EQUIPMENTS, PUMPS AND PURIFIERS | 17 |
| 4. | MARINE REFRIGERATION, VENTILATION, HEAT EXCHANGERS | 17 |
| 5. | PIPING SYSTEM AND VIBRATION | 17 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 90 |

**RATIONALE:**

The students have learned about marine diesel engines in the fifth semester marine engineering. It should be noted that the main engine need the support of auxiliary machineries. The engineers are responsible for the repair and maintenance of all auxiliary machineries onboard the ship. Hence a basic knowledge about the working of auxiliary machineries is required.

**OBJECTIVES:**

At the end of the study of VI Semester the student will be able to

- Understand about the fresh water system, oil water separator deck machinery.
- Know about the working of steering machineries.
- Study about incinerator, sewage plant, pumps and purifiers.
- Acquire broader ideas about refrigeration and air conditioning plants in ships.
- Understand about piping system and vibration.

## 32762: MARINE AUXILIARY MACHINERY

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Fresh Water System, oily bilge separators, Deck Machinery**<br>Evaporators: Construction and operation of boiling type and flash type evaporators - fresh water generator and Domestic water treatment plant. Pollution prevention oily bilge separators their construction and operation – oil content monitoring system-Bilge level maintenance-bilge pump (gear with reciprocating) - type of deck machinery used in ships - winch – windlass - derricks - cranes, their requirements operation and maintenance. | 17 Hrs |
| II | **Blowers and Compressors, Steering System and Valves**<br>Construction and operation of Blowers and compressors used on board ships - uses of compressed air - steering gears - Construction and operation of 2-RAM steering system ,4-RAM steering system , rotary vane steering system - Emergency steering arrangement - under water fittings - propellers, rudder, bow thrusters - maintenance of hull. Valves – screw valve – gate valve – globe valve – quick closing valve | 17 Hrs |
| III | **Ship board equipments, Pumps and Purifiers**<br>Auxiliary engines (power generators) – Incinerators- chemical sewage treatment plant – biological sewage treatment plant - Engine room crane- Different types of ship stabilizer - Different types of bearings used for marine machineries. Pumps used in ships-centrifugal pump –reciprocating pump - gear pumps – screw pump- axial flow pump - purifiers | 17 Hrs |
| IV | **Marine Refrigeration, Ventilation, Heat exchangers**<br>Vapour compression system - vapour absorption system- Refrigerants used in marine practice and their justification- properties of refrigerant- Control of temperature in various rooms in Cargo or domestic plants, Ventilation necessity – International requirements for ventilation- control in Humidity in Air Conditioning plants, operation and maintenance of Air Conditioning plants - control and safety equipment – heat exchangers (shell & tube and plate type) | 17 Hrs |
| V | **Piping system and Vibration**<br>Piping Systems – fire main systems – fixed Carbon dioxide system - fresh water systems – sea water systems - fuel oil systems - lubricating oil systems – main steam systems – Bilge systems – overflow arrangement and vents. Vibration - source of vibration - various modes of vibration - forced, damped, transverse, longitudinal and torsional vibration. Noise – noise suppression techniques – noise level measurement. | 17 Hrs |



**Text Book** : Marine Auxiliary Machinery by Mc. George

**Reference Book** : Marine Auxiliary Machinery by Smith

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

VI SEMESTER

2015 -2016 onwards

# PERSONAL SURVIVAL TECHNIQUES

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32781
Semester : VI Semester
Subject Title : PERSONAL SURVIVAL TECHNIQUES

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Personal Survival Techniques | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | SAFETY, SURVIVAL AND EMERGENCY SITUATIONS | 14 |
| 2. | EVACUATION | 14 |
| 3. | SURVIVAL CRAFTS, RESCUE BOATS AND LIFE SAVING APPLIANCES | 14 |
| 4. | HELICOPTER ASSISTANCE AND EMERGENCY RADIO EQUIPMENT | 14 |
| 5. | COMMUNICATION ONBOARD | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

Any person working on board a ship should be ready to face any emergency situation that may occur during sailing. Seamen should have knowledge about handling life saving appliances. In an emergency situation the ship may need to be abandoned. I such a situation passengers and crew members need to escape in survival crafts to save their lives. The officers in charge need to give survival instructions to the passengers and other crew members.

**OBJECTIVES:**

At the end of the study of V Semester the student will be able to

- Understand about the stowage of life saving appliances.
- Know about the need for organization and training.
- Study about the survival techniques.
- Acquire broader ideas about survival instructions.
- Understand about search and rescue problems.
- Study about ration to be provided for the persons.

## 32781: PERSONAL SURVIVAL TECHNIQUES

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Safety, survival and emergency situations**<br>Safety guide lines – principles of survival at sea – types of emergencies – precautions – fire provisions – foundering – crew expertise – muster list and emergency signals – crew and emergency instructions – extra equipment for survival – abandoning ship – complications | 14 Hrs |
| II | **Evacuation**<br>Abandoning ship as a last resort – Emergency signal – Abandon ship signal – personal preparation for abandoning ship – need to prevent panic – crew duties to passengers – crew duties launching survival craft – master's orders to abandon ship – means of survival – Survival at sea – Search and Rescue – Landing boat in a surf | 14 Hrs |
| III | **Survival crafts, rescue boats and life saving appliances**<br>Lifeboats – types of lifeboats – liferafts – types of liferafts - rescue boats – marine evacuation system – line throwing appliances –general alarm and public address system – lifebuoys – lifejackets – immersion suits – thermal protective aid – anti explosive suits – dangers to survivors – best use of survival craft facilities | 14 Hrs |
| IV | **Helicopter assistance and emergency radio equipment**<br>Communication with helicopter – evacuation from ship and survival craft – helicopter pickup – rescue net – litter – general precautions for personnel during winching operations – emergency position indicating radio beacons (EPIRB) – types of EPIRB – search and rescue radar transponder (SART) – walkie-talkie. | 14 Hrs |
| V | **Communication onboard**<br>Fundamentals of communication – types of communication – communication onboard ships – written communication – advantages of written method – disadvantages of written method – use of verbal communication – hand signals – effective transmission and listening skills – methods to improve communications – basic principles for giving instructions. | 14 Hrs |



**Text Book:**

1. Survival at sea. The life boat and life raft, C.H. Wright, Edition 1993, Brownson & Furguson Ltd.,
2. Ship board operation H.I. Lavery 1993 British library cataloguing in publications

**Reference Books :**

1. Seamanship Primer By Capt J. Dinger
2. Survival in Life boat and life raft By Capt. S.K. Puri

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

VI SEMESTER

2015 -2016 onwards

# RULE OF THE ROAD

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32782
Semester : VI Semester
Subject Title : RULE OF THE ROAD

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Rule of the Road | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | ACTIONS AND RESPONSIBILITIES AT DIFFERENT SITUATIONS | 14 |
| 2. | TRAFFIC REGULATIONS AND MANEUVERING | 14 |
| 3. | SIGNALS AND BELLS | 14 |
| 4. | IMO GUIDELINES | 14 |
| 5. | LIGHTHOUSE AUTHORITIES AND MARKS | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONAL**:

For safe navigation of the ship certain rules have been implemented. Every marine engineer should know about the international rules and regulations that are being followed in the shipping industry. Enough knowledge about the maintenance of equipments is also required.

**OBJECTIVES:**

At the end of the study of VI Semester the student will be able to

- Understand about the risk of collision and action to avoid collision
- Know about the manoeuvring of ships.
- Study about different types of signals.
- Acquire broader ideas about the guidelines of IMO and other authorities.
- Understand about lighthouse authorities and marks.

## 32782: RULE OF THE ROAD

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | ACTIONS AND RESPONSIBILITIES AT DIFFERENT SITUATIONS<br>Application – Responsibility – General Definitions – Look-out – Safe speed – Risk of collision – Action to avoid collision – Narrow channels – Traffic separation schemes – sailing vessels – Overtaking – Head-On Situation – Crossing Situation – Action by give-way vessel – Action by stand-on vessel – responsibilities between vessels – conduct of vessels in restricted visibility – Light and shapes – Definitions – Visibility of Lights – Power-driven vessels underway – Towing and Pushing – Sailing vessels underway and vessels under oars – Fishing vessels. | 14 Hrs |
| II | TRAFFIC REGULATIONS AND MANEUVERING<br>Vessels not under command or restricted in their ability to man-oeuvre Vessels constrained by their draught – pilot vessels Anchored vessels and vessels aground – Seaplanes – Sound and light signals – Definitions – Equipment for sound signals – Manoeuvring and warning signals - sound signals in restricted visibility – Signals to attract attention – Distress signals – Exemptions – Positioning and Technical details of lights and shapes – Definition – Vertical Positioning and spacing of lights – Horizontal positioning and spacing of Lights – Details of location of direction indicating lights for vessels, Dredgers and vessels Engaged in underwater operations – Screens for sidelights – shapes Colour specification of lights – intensity of Lights – Horizontal sectors – Vertical sectors – Intensity of Non-electric Lights – Manoeuvring light – High-speed craft – Approval. | 14 Hrs |
| III | SIGNALS AND BELLS<br>Additional signals for fishing vessels – fishing in close proximity – signals for trawlers – Signals for purse seiners – Technical details of sound signal alliances – whistles – Frequencies and range of audibility – Limits of fundamental frequencies – Sound signal intensity and range of audibility – Positioning of whistles – Fitting of more than one whistle – combined whistle systems – Bell or gong – intensity of signal – Construction – Approval – Distress signals. | 14 Hrs |
| IV | IMO GUIDELINES<br>I.M.O.'s Guidance for the uniform application of certain rules of the 1972 collision regulations – clarification of the definition "vessel constrained by her draught", - Clarification of the application of the word "underway", - Clarification of the implication of the words "not to impede" as appearing – Clarification of the relation between – Clarification of the transference within a lane – Clarification on the use of inshore traffic zones by small vessels – clarification of the relation between – Basic Principles to be observed in keeping a navigational watch – Fitness for duty - Navigation – Look-out – Navigation with pilot embarked – Protection of the marine environment. | 14 Hrs |
| V | LIGHTHOUSE AUTHORITIES AND MARKS<br>International Association of lighthouse authorities maritime buoyage system – General principles of the system – Lateral Marks – Cardinal Marks – isolated danger mark – safe water marks – Special Marks – New dangers – Maritime buoyge system rules – Scope – Type of marks – Method of | 14 Hrs |

| | | |
|---|---|---|
| | characterizing marks – Definition of “Conventional direction of buoyage - Buoyage Regions - Description of lateral marks used in region. | |

**Text Book** : Seamanship Primer by Capt J. Dinger

**Reference Books** :

1. Survival in Life boat and life raft By Capt. S.K. Puri
2. Survival at sea
   The life boat and life raft C.H. Wright Edition 1993
   Brownson & Furguson Ltd.,
   Ship board operation H.I. Lavery 1993 British library cataloguing in publications

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DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards



# MARINE WELDING TECHNOLOGY

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32783
Semester : VI Semester
Subject Title : MARINE WELDING TECHNOLOGY

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Marine Welding Technology | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | WELDING PROCESSES AND EQUIPMENT | 14 |
| 2. | SPECIAL WELDING PROCESSES | 14 |
| 3. | METALLURGY OF WELDING | 14 |
| 4. | WELDABILITY OF FERROUS AND NON – FERROUS METALS | 14 |
| 5. | WELDING ECONOMY AND APPLICATIONS | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

Diploma holders in marine engineering should have enough knowledge about different welding processes and different types of welding equipments. Special welding processes are used in ships where conventional methods cannot be used. A knowledge about welding of different metals is necessary. The welder should judge the applicability of the weld.

**OBJECTIVES:**

At the end of the study of V Semester the student will be able to

- Understand about different types of welding processes and equipments.
- Know about the special welding process.
- Study about metallurgy of welding.
- Acquire broader ideas about weldability of ferrous and non ferrous metals.
- Understand about welding economy and applications.

## 32783: MARINE WELDING TECHNOLOGY

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **Welding Processes and Equipment**<br>Arc and resistance welding –Types of electrodes - Selection of electrodes - Arc welding power sources – DC Power Sources – DC generators – rectifiers – AC power sources – Generators and transformers – Phenomenon of arching arc voltage – characteristics – arc temperature and heat distribution–Gas welding –oxy-acetylene welding – gas welding techniques – gas welding equipment –gas cutting –Brazing –Soldering - Welding safety – safety recommendations for installation and operation of arc welding and cutting equipment – gas welding and cutting equipment. | 14 Hrs |
| II | **Special Welding Processes**<br>Submerged arc welding –TIG welding –MIG welding – resistance welding – spot welding – $CO_2$ welding – Electro slag welding –plasma arc welding – Under water welding – Principle of operation –equipment – merits and demerits – applications – Ultrasonic welding – explosive welding - atomic hydrogen welding – electron beam welding - laser beam welding – definition, concept principle of operation and applications. | 14 Hrs |
| III | **Metallurgy of Welding**<br>Welding arc – Heat flow and temperature distribution in and around weld metal – temperatures zones – temperatures gradient cooling rates – metallurgical effects of welding–weld metal solidification – absorption of gases by welds and their effects- gas metal reactions – porosity in welds – Isothermal contours for localised heating – thermal effects of welding on parent metal – structure of fusion weld deposits in mild steel – heat affected zones – grain size control – corrosion of welds, weld decay, dilution – metallurgy of soldering and brazing. | 14 Hrs |
| IV | **Weldability of Ferrous and Non – Ferrous Metals**<br>Concept of weldability – Welding Processes used for welding wrought iron – welding of grey cast iron , malleable cast iron, nodular cast and alloy cast iron – Welding of low carbon steels, high carbon steels – welding of steel castings – welding of alloy steels, stainless steels - Welding of aluminium and its alloys, copper and its alloys, magnesium and its alloys – welding of inconel , cadmium – welding of dissimilar metals – welding of plastics. | 14 Hrs |
| V | **Welding Economy and Applications**<br>Principles of sound welding design of ship construction 'V' and 'U' preparation - advantages of 'U' preparation when compared to 'V' preparation economics of welding design – cost of welding design – Welding Economy – Cost of welding by different processes and selection of welding processes – Principles governing design of good welding jigs and fixtures –design of pressure vessels for welding – design of static loaded structures, plate girders, beam brackets for welding. Defects in welds – causes and remedies – welding distortion – control of welding distortion. | 14 Hrs |

**Text Book :**

Workshop technology I and II by Hajra Choudary

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards



# FISHING TECHNOLOGY – II

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32784
Semester : VI Semester
Subject Title : FISHING TECHNOLOGY – II

## TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Fishing Technology – II | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



## TOPICS AND ALLOCATION OF HOURS:

| Sl.No. | Topic | Time(Hrs) |
|---|---|---|
| 1. | GENERAL SURVEY OF MARINE FISHERY RESOURCES | 14 |
| 2. | MARINE FISHERIES OF INDIAN COAST | 14 |
| 3. | FISH POPULATION DYNAMICS | 14 |
| 4. | ASSESSMENT OF FRESH WATER FISHERIES | 14 |
| 5. | POLLUTION IN INLAND WATERS | 14 |
| 6. | TEST & REVISION | 05 |
| TOTAL | | 75 |

**RATIONALE:**

Diploma holders in marine engineering should have enough knowledge about general survey of marine fishery resources. Apart from different types of fishes, prawns, crabs, Lobsters, Sea cucumber, Turtles and Sea horses are seen near the Indian coast. The inland waters are being polluted by insecticides, herbicides, pesticides, industrial effluents, dye factories, leather processing, textile mills and paper mills.

**OBJECTIVES:**

At the end of the study of V Semester the student will be able to

- Understand about General Survey of Marine Fishery Resources
- Know about Marine Fisheries of Indian Coast
- Study about Fish Population dynamics
- Acquire broader ideas about assessment of fresh water fisheries
- Understand about pollution in inland waters

## 32784: FISHING TECHNOLOGY – II

DETAILED SYLLABUS

Contents: Theory

| Unit | Name of the Topic | Hours |
|---|---|---|
| I | **General Survey of Marine Fishery Resources**<br>Enumeration and classification of fishing villages and fish landing centres – Mechanized motorised and non-mechanized crafts and types of nets employed – Sampling methods of catch and effort – Multi stratum – Random sampling method – Determination of sample size – Raising the qualitative data for the day and for the month – Estimation of annual catch and effort – Quantitative estimation of marine fish catch. | 14 Hrs |
| II | **Marine Fisheries of Indian Coast**<br>Important marine fishery group – Pelagic fishery resources – Demersal fishery resources – Crustacean fishery resources – Molluscan fishery resources-species composition and fishery of scomberoids seer fish -Tuna-Mackeral - Oil sardine – Anchovies – Carangids - Bombay duck - Barracuda - Flying fish - Full beaks - Flat fishes - Silver bar – Hilsa - Chirocenrus dorab-Perches - Groupers - Sea bass-Sharks - Rays and Skates – Sciaenids -Thread fin - Thread fin breams - Goat fishes-Flat fishes-Pomfrets-Cat fishes-Cephalopods-Squids - Cuttle fishes - Octopus-Chanks-Pearl oyster - Edible oyster-Mussel-Clam - Penaeid prawns-Non penaeid prawns - Crabs - Mud crabs- Swimming crabs- Lobsters-Rock Lobster-Sand Lobster-others-Sea cucumber-Sea weeds-Endangered species-Pelagic sharks-Marine mammals-Turtles-Sea horse. | 14 Hrs |
| III | **Fish Population dynamics**<br>Fish population dynamics and Fishing management – Single species-fishery- Multispecies fishery-Growth-Estimation of growth-mortality rate – Total mortality rate-(Z)-Natural mortality rate-(M) Fishing mortality rate-(F)-Exploitation ratio-(E)-Exploitation rate-(U)-Standing stock-Annual average-stock-Maximum sustainable yield(MsY)-Over exploitation-Under exploitation-Fishery regulation—Fishing holidays-No fishing area-Marine potential area (MPA)- Marine parks-biosphere reserve-Endangered species-Banned species in schedules-Ecosystem based management. | 14 Hrs |
| IV | **Assessment of fresh water fisheries**<br>Survey and sampling methods for different inland water bodies-Sampling method for marine fishery, reservoir fishery, lake fishery-Estuarine fishery-Survey of different types of water bodies suitable for culture-Back waters-Estuaries-River streams-Lakes-Ponds-Reservoirs- Swamps and Paddy fields-Collection of data-Primary and secondary data-Processing-Classification-Class intervals and frequencies-Graphical presentation of data and interpretation-<br>Bar diagram-Subdivided bar diagram-Pie diagram-Frequency polygon and curve mean-Mode- Median Indian major crops – Exotic crops-Cat fishes-Fresh water shark – Cold water fisheries – Salmon/trout/fresh water prawn – Air breathers – Estuarine fishery – Mud crabs – Mullet fishery – Chanos. | 14 Hrs |

| | | |
|---|---|---|
| **V** | **Pollution in Inland waters**<br>Different sources of pollution-Agriculture form pollutants-Insecticides-Herbicides- Pesticides-Industrial effluents-Dye factories-Leather processing-Textile mills-Paper mills- Thermal pollution from thermal power stations-Heavy metal pollution from effluents-Permissible limits of pollutants-Bio degradable and non-degradable pollutants-Tolerance to pollution- Detection of pollution-Effects of pollution-Pollution monitoring-Bio accumulation-Regulation of pollution-Central Pollution Control Board-State Pollution Control Boards-Their duties-Responsibilities-Reservoir pollution-Lake pollution-River pollution-Estuarine pollution. | 14 Hrs |

**Reference Books :**

UNIT-1: CMFRI Special Publications

Symposium papers

Summer School/Work shop papers

UNIT-2: Fish and Fisheries of India

By

U. G. Jingharan

Marine Fisheries by Paul

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## III YEAR

## M SCHEME



## VI SEMESTER

2015 -2016 onwards

# ELEMENTARY FIRST AID AND FIRE FIGHTING PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32764
Semester : VI Semester
Subject Title : ELEMENTARY FIRST AID AND FIRE FIGHTING PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Elementary First Aid and Fire Fighting Practical | 5 Hrs | 75 Hrs | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

A regular physician may not be available in every ship. There is every likely hood of getting injuries when people work in ship. Hence a basic knowledge of first aid is necessary for every person who works on board ship. Fire is a major hazard in ship. When the ship is sailing in mid sea help cannot be expected from outside sources. Hence a mariner should have knowledge about the types of fire, occurrence of fire and the methods of fire fighting.

**GUIDELINES:**

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the fire fighting laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

## ALLOCATION OF MARKS

| | |
|---|---|
| Part – A | |
| Elementary first aid | 20 marks |
| Part – B | |
| Diagram with parts and working | 20 marks |
| Demonstration | 25 marks |
| Viva-voce | 10 marks |
| Total | 75 Marks |

## LIST OF EXPERIMENTS

**PART – A (Study experiments)**

**Elementary First Aid**

1. First aid and method of the treatment for seasickness.
2. First aid and method of the treatment for fractures.
3. First aid and method of the treatment for burns and scalds.
4. First aid and method of the treatment for dehydration.
5. First aid and method of the treatment for unconsciousness.
6. First aid and method of the treatment for heart attack.
7. First aid and method of the treatment for strokes.
8. First aid and method of the treatment for poisoning.
9. First aid and method of the treatment for cardio pulmonary resuscitations.

**PART – B**

**Fire Fighting**



10. Demonstration and study about the construction and working of water sprinkler fixed fire fighting installations.
11. Demonstration and study about the construction and working of water type portable extinguishers.
12. Demonstration and study about the construction and working of mechanical foam type portable extinguishers.
13. Demonstration and study about the construction and working of chemical foam type portable extinguishers.
14. Demonstration and study about the construction and working of dry chemical powder type portable fire extinguishers.
15. Demonstration and study about the construction and working of carbon dioxide type portable fire extinguishers.
16. Demonstration and study about the construction and working of fire detectors.
17. Demonstration and study about the use of fire man outfit.
18. Demonstration and study about the construction and working of emergency fire pumps.
19. Demonstration and study about the construction and working of hoses and nozzles.

## LIST OF EQUIPMENTS

1. Fixed fire fighting installations.
2. Water type extinguishers.
3. Mechanical foam type extinguishers.
4. Chemical foam type extinguishers.
5. Dry chemical powder type fire extinguishers.
6. Carbon dioxide type fire extinguishers.
7. Fire detectors.
8. Fire man outfit.
9. Fire hydrant.
10. Emergency fire pumps.
11. Fire hoses
12. Fire nozzles.

## SAFETY PRECAUTIONS TO BE FOLLOWED

- The students should wear safety shoe and helmet.
- The students should come to the lab in boiler suit.
- Fresh water should be used to clean the extinguishers and nozzles.
- Verify that the safety lock is provided for all the portable fire extinguishers.
- The fire extinguishers should not be used after expiry date.
- The medicines used in the first aid should be used before the expiry date.

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## III YEAR



## M SCHEME

## VI SEMESTER

2015 -2016 onwards

# MARINE AUXILIARY MACHINERY PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32765
Semester : VI Semester
Subject Title : MARINE AUXILIARY MACHINERY PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| Marine Auxiliary Machinery Practical | 4 Hrs | 60 Hrs | Internal Assessment | Board Examination | Total | |
| | | | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

The students have learned about marine diesel engines in the fifth semester marine engineering. It should be noted that the main engine need the support of auxiliary machineries. The engineers are responsible for the repair and maintenance of all auxiliary machineries onboard the ship. Hence a basic knowledge about the working of auxiliary machineries is required.

**GUIDELINES:**

- All the Ten experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Equipments and taking readings in the practical classes, every five students should be provided with a separate experimental setup for doing experiments in the laboratory.

## ALLOCATION OF MARKS

| | | |
|---|---|---|
| Demonstration | - | 25 |
| Procedure | - | 25 |
| Diagram with parts | - | 10 |
| Result | - | 10 |
| Viva | - | 05 |
| **Total** | **-** | **75** |

## LIST OF EXPERIMENTS

1. Dismantling and assembling of winch.
2. Dismantling and assembling of oil-water separator.
3. Dismantling and assembling of centrifugal pump.
4. Dismantling and assembling of reciprocating pump.
5. Dismantling and assembling of gear with reciprocating pump.
6. Dismantling and assembling of purifier.
7. Study about corrosion. Practice of chipping and painting of corroded parts.
8. Dismantling and assembling of compressor.

## LIST OF EQUIPMENTS

1. Winch -1 No.
2. Oil-water separator -1 No.
3. Centrifugal pump -1 No.
4. Reciprocating pump -1 No.
5. Gear with reciprocating pump -1 No.
6. Purifier -1 No.
7. Chipping hammer, wire brush, paint and painting brush - 6 sets.
8. Air compressor -1 No.

## INSTRUCTIONS TO CARRY OUT THE PARCTICAL CLASS WORK AS WELL AS THE BOARD EXAMINATIONS PRACTICALS.



1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. All the end of the semester the average marks of all the exercise should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the sessional mark for practical.
4. All the marks entries for exercise should be entered in the personal log book of the staff, who is handling the subject.

## SAFETY PRECAUTIONS TO BE FOLLOWED

1 Always wear shoes.
2 Always use good conditions tools during the work
3 Appropriate safety device should be used
4 Switch off the machines when not in use.

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards



## PERSONAL SURVIVAL TECHNIQUES PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32785
Semester : VI Semester
Subject Title : PERSONAL SURVIVAL TECHNIQUES PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| | | | Internal Assessment | Board Examination | Total | |
| Personal Survival Techniques Practical | 4 Hrs | 60 Hrs | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

Any person working on board a ship should be ready to face any emergency situation that may occur during sailing. Seamen should have knowledge about handling life saving appliances. In an emergency situation the ship may need to be abandoned. I such a situation passengers and crew members need to escape in survival crafts to save their lives. The officers in charge need to give survival instructions to the passengers and other crew members.

**GUIDELINES:**

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.



**ALLOCATION OF MARKS**

| | |
|---|---|
| Demonstration | : 35 Marks |
| Procedure | : 25 Marks |
| Result | : 10 Marks |
| Viva | : 05 Marks |
| **Total Marks** | **: 75 Marks** |

## LIST OF EXPERIMENTS

### PART - A

1. Donning of life jacket and lifebuoy
2. Donning of immersion suit and thermal protective aid
3. Life raft drill
4. Emergency fire drill
5. Rescue drill

### PART – B

Practices in swimming pool

1. Swimming practice
2. Huddle position
3. Helpline position
4. Jumping into water
5. Launching of life raft
6. Boarding of life raft

The student need to submit a report after practicing Part-B exercises in the swimming pool

## INSTRUCTIONS TO CARRY OUT THE PARCTICAL CLASS WORK AS WELL AS THE BOARD EXAMINATIONS PRACTICALS.

1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. All the end of the semester the average marks of all the exercise should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the sessional mark for practical.
4. All the marks entries for exercise should be entered in the personal log book of the staff, who is handling the subject.

## LIST OF EQUIPMENTS AND THE QUANTITY REQUIRED FOR A BATCH OF 30 STUDENTS

1. Life boat
2. Life Craft
3. Buoyant apparatus
4. Davit
5. EPIRB
6. Heliograph
7. Survival capsules



## SAFETY PRECAUTIONS TO BE FOLLOWED

1. Always wear shoes.
2. Always use good conditions tools during the work
3. Do not touch, connect or disconnect any plug or cable without teacher permission.
4. Do not attempt to touch any line wires.
5. Equipments should be switched off properly after work complete.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

VI SEMESTER

2015 -2016 onwards

# RULE OF THE ROAD PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32786
Semester : VI Semester
Subject Title : RULE OF THE ROAD PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| Rule of the Road Practical | 4 Hrs | 60 Hrs | Internal Assessment | Board Examination | Total | |
| | | | 25 | 75 | 100 | 3 Hrs |



**RATIONAL:**

Every marine engineer should know about the international rules and regulations that are being followed in the shipping industry. Enough knowledge about the maintenance of equipments is required. For safe navigation of the ship certain rules have been implemented.

**GUIDELINES:**

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

**ALLOCATION OF MARKS**

| | |
|---|---|
| Demonstration | 10 marks |
| Figure with parts | 15 marks |
| Procedure | 35 marks |
| Result | 05 marks |
| Viva-voce | 10 marks |
| Total | 75 Marks |

## LIST OF EXPERIMENTS

1. Demonstration and study of lights and shapes.
2. Demonstration and study of sound and light signals
3. Demonstration and study about risk of collision
4. Demonstration and study about action to avoid collision
5. Demonstration and study of towing and pushing
6. Demonstration and study about positioning of lights and shapes
7. Demonstration and study of different types of buoyage
8. Demonstration and study of international code of signals
9. Demonstration and study of semaphore signal

**QUESTION PAPER**
**RULE OF THE ROAD PRACTICAL**

1. Explain and demonstrate lights and shapes.
2. Explain and demonstrate sound and light signals
3. Explain and demonstrate the risk of collision
4. Explain and demonstrate action to avoid collision
5. Explain and demonstrate towing and pushing
6. Explain and demonstrate the positioning of lights and shapes
7. Explain and demonstrate different types of buoyage
8. Explain and demonstrate international code of signals
9. Explain and demonstrate semaphore signal

**INSTRUCTIONS TO CARRY OUT THE PARCTICAL CLASS WORK AS WELL AS THE BOARD EXAMINATIONS PRACTICALS.**



1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. All the end of the semester the average marks of all the exercise should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the sessional mark for practical.
4. All the marks entries for exercise should be entered in the personal log book of the staff, who is handling the subject.

## LIST OF EQUIPMENTS

1. Navigational lights and shapes.
2. Navigational sound and light signals
3. Different types of buoyage
4. Semaphore signals

## SAFETY PRECAUTIONS TO BE FOLLOWED BY STUDENTS

- Do not touch, connect or disconnect any plug or cable without teacher's permission
- Don't attempt to touch any live wires
- Equipments should be switched off properly after completion of work

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## III YEAR



## M SCHEME

## VI SEMESTER

2015 -2016 onwards

# MARINE WELDING TECHNOLOGY PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

## STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

### DIPLOMA IN MARINE ENGINEERING
### M-SCHEME
### (to be implemented for the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Marine Engineering

Subject Code : 32787

Semester : VI Semester

Subject Title : MARINE WELDING TECHNOLOGY PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| Marine Welding Technology Practical | 4 Hrs | 60 Hrs | Internal Assessment | Board Examination | Total | |
| | | | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

Diploma holders in marine engineering should have enough knowledge about different welding processes and different types of welding equipments. Special welding processes are used in ships where conventional methods cannot be used. A knowledge about welding of different metals is necessary. The welder should judge the applicability of the weld.

**GUIDELINES:**

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

**ALLOCATION OF MARKS**

| | |
|---|---|
| Demonstration | 10 marks |
| Figure with parts | 15 marks |
| Procedure | 35 marks |
| Result | 05 marks |
| Viva-voce | 10 marks |
| Total | 75 Marks |

## SPECIFIC INSTRUCTIONS TO CARRY OUT THE PRACTICAL CLASS WORK AS WELL AS THE BOARD EXAMINATIONS PRACTICALS.

1. All the experiment given in the list of experiments should be completed and given for the end semester practical examination.
2. The record of every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise.
3. All the end of the semester the average marks of all the exercise should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the sessional mark for practical.
4. All the marks entries for exercise should be entered in the personal log book of the staff, who is handling the subject.

## LIST OF EXPERIMENTS

**PART – A**

1. Shielded metal arc welding
2. Gas metal arc welding
3. Flux cored arc welding
4. Gas tungsten arc welding
5. Gas welding

The following joints should be practiced for all the above welding methods:

1. T – joint
2. Butt joint
3. Lap joint
4. Corner joint
5. Open corner joint
6. Pipe joint



**PART – B**

1. Gas cutting
2. Spot welding

## LIST OF EQUIPMENTS

1. Arc welding machine – 2 Nos.
2. Argon cylinder – 1 No.
3. Oxy-Acetylene cylinder – 1 Set
4. Argon torch - 1 No.
5. Gas welding torch – 1 No.
6. Welding cable.
7. Welding hose.
8. Welding holder
9. Welding Shield / Welding helmet
10. Spot welding machine - 1 No.



## SAFETY PRECAUTIONS TO BE FOLLOWED

1. Always wear apron, head screen and shoes.
2. Always use good conditions tools during the work
3. Appropriate safety device should be used while welding.
4. Switch off the machines when not in use.

# DIRECTORATE OF TECHNICAL EDUCATION

## DIPLOMA IN MARINE ENGINEERING

## III YEAR



## M SCHEME

## VI SEMESTER

2015 -2016 onwards

# FISHING TECHNOLOGY – II PRACTICAL

## CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32788
Semester : VI Semester
Subject Title : FISHING TECHNOLOGY – II PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| Fishing Technology – II Practical | 4 Hrs | 60 Hrs | Internal Assessment | Board Examination | Total | |
| | | | 25 | 75 | 100 | 3 Hrs |



**RATIONALE:**

Diploma holders in marine engineering should have enough knowledge about general survey of marine fishery resources. Apart from different types of fishes, prawns, crabs, Lobsters, Sea cucumber, Turtles and Sea horses are seen near the Indian coast. The inland waters are being polluted by insecticides, herbicides, pesticides, industrial effluents, dye factories, leather processing, textile mills and paper mills.

**GUIDELINES:**

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

**ALLOCATION OF MARKS**

| | |
|---|---|
| Demonstration | 10 marks |
| Figure with parts | 15 marks |
| Procedure | 35 marks |
| Result | 05 marks |
| Viva-voce | 10 marks |
| Total | 75 Marks |

## LIST OF EXPERIMENTS

1. Demonstration of boat engine working.
2. Demonstration of propeller action and rudder movements.
3. Maintenance of engine (a) Oil change (b) Filter cleaning/change.
4. Boat engine starting mechanism.
5. Lowering and gathering of hand net.
6. Practice fishing methods related with hook.
7. Demonstration of different nets used for fishing.
8. Demonstration of different fishing boats and designs.
9. Methods of finding fishes by GPS.
10. Demonstration of anchoring the fishing boats.
11. Demonstration of cyclone indication, rain and wind.
12. Practicing different knots.
13. Repairing of damaged nets.
14. Sea map practice for border finding.
15. Practicing of frozen box maintenance.
16. Practicing oar handling.
17. Handling life saving appliances.
18. Practice the leakage arresting of boats.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN MARINE ENGINEERING

III YEAR



M SCHEME

VI SEMESTER

2015 -2016 onwards

# PROJECT WORK

CURRICULUM DEVELOPMENT CENTRE

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN MARINE ENGINEERING**
**M-SCHEME**
**(to be implemented for the student admitted from the year 2015-2016 onwards)**

Course Name : Diploma in Marine Engineering
Subject Code : 32767
Semester : VI Semester
Subject Title : PROJECT WORK

**TEACHING AND SCHEME OF EXAMINATION:**

No of weeks per semester: 15 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours /Week | Hours /Semester | Marks | | | Duration |
| Project Work | 4 Hrs | 60 Hrs | Internal Assessment | Board Examination | Total | |
| | | | 25 | 75 | 100 | 3 Hrs |

## Project Work

The students of all the Diploma programmes (except Diploma in Modern office Practice) have to do a project work as part of the Curriculum and partial fulfilment for the award of Diploma by the state Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worth while and innovative projects, every year prices are awarded for the best three projects i.e institution wise, region wise and state wise. The selection of project work should be taken up in V$^{th}$ Sem of study. The first project review should be done in 14$^{th}$ week of study in V Semester. The Second project review should be done in the 8$^{th}$ week of the study in the VI$^{th}$ Semester.

**a) Internal Assessment mark for Project work & Viva Voce:**

| | | | |
|---|---|---|---|
| Project Review I | 6$^{th}$ week | … | 10 marks |
| Project Review II | 14$^{th}$ week | … | 10 marks |
| Attendance | | … | 05 marks |
| Total | | | 25 marks |

**EVALUATION FOR BOARD EXAMINATION:**



| Details of Mark allocation | Max Marks |
|---|---|
| Marks for Report Preparation, Demo, Viva-voce | 65 |
| Marks for answers of 4 questions which is to be set by the external examiner from the given question bank consisting of questions in the following two topics Disaster Management and Environmental Management. Out of four questions two questions to appear from each of the above topics i.e. 2 questions x 2 topics = 4 questions<br><br>4 questions x 2 ½ marks = 10 Marks | 10 |
| **Total** | **75** |

## DETAILED SYLLABUS

### ENVIRONMENTAL & DISASTER MANAGEMENT

### 1. ENVIRONMENTAL MANAGEMENT

Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of

Pollution Control – Types of Industries and Industrial Pollution.

Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.

Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.

Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

Noise pollution management – Effects of noise on people – Noise control methods.

## 2. DISASTER MANAGEMENT

Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..

Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings - Cyclone shelters – Warning systems.



Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services - Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.

## LIST OF QUESTIONS

### 1. ENVIRONMENTRAL MANAGEMENT

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?
2. Define Environmental Ethic.
3. How Industries play their role in polluting the environment?
4. What is the necessity of pollution control? What are all the different organizations you know, which deal with pollution control?
5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.
6. What is meant by Hazardous waste?

7. Define Industrial waste management.
8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.
9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
10. What are the objectives of treatments of solid wastes before disposal?
11. What are the different methods of disposal of solid wastes?
12. Explain how the principle of recycling could be applied in the process of waste minimization.
13. Define the term 'Environmental Waste Audit'.
14. List and discuss the factors pertinent to the selection of landfill site.
15. Explain the purpose of daily cover in a sanitary landfill and state the minimum desirable depth of daily cover.
16. Describe any two methods of converting waste into energy.
17. What actions, a local body such as a municipality could take when the agency appointed for collecting and disposing the solid wastes fails to do the work continuously for number of days?
18. Write a note on Characteristics of hazardous waste.
19. What is the difference between municipal and industrial effluent ?
20. List few of the undesirable parameters / pollutants anticipated in the effluents from oil refinery industry / thermal power plants / textile industries / woolen mills / dye industries / electroplating industries / cement plants / leather industries (any two may be asked)
21. Explain briefly the process of Equalization and Neutralization of waste water of varying characteristics discharged from an Industry.
22. Explain briefly the Physical treatments "Sedimentation" and "Floatation" processes in the waste water treatment.
23. Explain briefly when and how chemical / biological treatments are given to the waste water.
24. List the four common advanced waste water treatment processes and the pollutants they remove.
25. Describe refractory organics and the method used to remove them from the effluent.
26. Explain biological nitrification and de-nitrification.
27. Describe the basic approaches to land treatment of Industrial Effluent.
28. Describe the locations for the ultimate disposal of sludge and the treatment steps needed prior to ultimate disposal.
29. List any five Industries, which act as the major sources for Hazardous Air Pollutants.
30. List out the names of any three hazardous air pollutants and their effects on human health.
31. Explain the influence of moisture, temperature and sunlight on the severity of air pollution effects on materials.
32. Differentiate between acute and chronic health effects from Air pollution.
33. Define the term Acid rain and explain how it occurs.

34. Discuss briefly the causes for global warming and its consequences
35. Suggest suitable Air pollution control devices for a few pollutants and sources.
36. Explain how evaporative emissions and exhaust emissions are commonly controlled.
37. What are the harmful elements present in the automobile smokes? How their presence could be controlled?
38. What is the Advantage of Ozone layer in the atmosphere? State few reasons for its destruction.
39. Explain the mechanism by which hearing damage occurs.
40. List any five effects of noise other than hearing damage.
41. Explain why impulsive noise is more dangerous than steady state noise.
42. Explain briefly the Source – Path – Receiver concept of Noise control.
43. Where silencers or mufflers are used ? Explain how they reduce the noise.
44. Describe two techniques to protect the receiver from hearing loss when design / redress for noise control fail.
45. What are the problems faced by the people residing along the side of a railway track and near to an Airport? What provisions could be made in their houses to reduce the problem?

**2. DISASTER MANAGEMENT**



1. What is meant by Disaster Management? What are the different stages of Disaster management?
2. Differentiate Natural Disasters and Man made Disasters with examples.
3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
7. Specify the role played by an Engineer in the process of Disaster management.
8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu ? Specify its epicenter and magnitude.
10. Specify the Earthquake Hazard Zones in which the following towns of Tamilnadu lie: (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones

12. Define basic wind speed. What will be the peak wind speed in (a) Very high damage risk zone – A, (b) High damage risk zone, (c) Low damage risk zone.
13. Specify the minimum distance from the Sea shore and minimum height above the mean sea level, desirable for the location of buildings.
14. Explain how the topography of the site plays a role in the disasters caused by floods and cyclones.
15. Explain how the shape and orientation of buildings could reduce the damages due to cyclones.
16. What is a cyclone shelter ? When and where it is provided ? What are its requirements ?
17. What Precautionary measures have to be taken by the authorities before opening a dam for discharging the excess water into a canal/river ?
18. What are the causes for fire accidents ? Specify the remedial measures to be taken in buildings to avoid fire accidents.
19. What is a fire escape in multistoried buildings ? What are its requirements ?
20. How the imamates of a multistory building are to be evacuted in the event of a fire/Chemical spill/Toxic Air Situation/ Terrorist attack, (any one may be asked).
21. Describe different fire fighting arrangements to be provided in an Industry.
22. Explain the necessity of disaster warning systems in Industries.
23. Explain how rescue operations have to be carried out in the case of collapse of buildings due to earthquake / blast / Cyclone / flood.
24. What are the necessary steps to be taken to avoid dangerous epidemics after a flood disaster?
25. What relief works that have to be carried out to save the lives of workers when the factory area is suddenly affected by a dangerous gas leak / sudden flooding ?
26. What are the difficulties faced by an Industry when there is a sudden power failure? How such a situation could be managed?
27. What are the difficulties faced by the Management when there is a group clash between the workers? How such a situation could be managed?
28. What will be the problems faced by the management of an Industry when a worker dies because of the failure of a mechanical device due to poor maintenance? How to manage such a situation ?
29. What precautionary measures have to be taken to avoid accidents to labourers in the Industry in a workshop / during handling of dangerous Chemicals / during construction of buildings / during the building maintenance works.
30. Explain the necessity of medical care facilities in an Industry / Project site.
31. Explain the necessity of proper training to the employees of Industries dealing with hazardous products, to act during disasters.
32. What type of disaster is expected in coal mines, cotton mills, Oil refineries, ship yards and gas plants?

33. What is meant by Emergency Plan Rehearsal? What are the advantages of such Rehearsals?
34. What action you will take when your employees could not reach the factory site because of continuous strike by Public Transport workers?
35. What immediate actions you will initiate when the quarters of your factory workers are suddenly flooded due to the breach in a nearly lake / dam, during heavy rain?
36. What steps you will take to avoid a break down when the workers union of your Industry have given a strike notice?
37. List out few possible crisis in an organization caused by its workers? What could be the part of the middle level officials in managing such crisis?
38. What types of warning systems are available to alert the people in the case of predicted disasters, such as floods, cyclone etc.
39. Explain the necessity of Team work in the crisis management in an Industry / Local body.
40. What factors are to be considered while fixing compensation to the workers in the case of severe accidents causing disability / death to them?
41. Explain the legal / financial problems the management has to face if safely measures taken by them are found to be in adequate.
42. Describe the importance of insurance to men and machinery of an Industry dealing with dangerous jobs.
43. What precautions have to be taken while storing explosives in a match/ fire crackers factory?
44. What are the arrangements required for emergency rescue works in the case of Atomic Power Plants?
45. Why residential quarters are not constructed nearer to Atomic Power Plants?

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