**MODULE 12 BEACONING OF WATERWAYS AND FAIRWAYS CHANNELS**

**PART 1‐ COURSE OVERVIEW**

1. **SCOPE**

This course is intended to provide technicians with the theoretical training necessary to have a basic understanding of the principles of the beaconing of waterways and fairways.

This introductory course is intended to be supported by further training modules on theoretical aspects of beaconing design and the AtoN necessaries for that purpose.

1. **OBJECTIVE**

Upon successful completion of this course, participants will have acquired sufficient knowledge and skill to understand the principles of the beaconing of waterways and fairways channels and AtoN within their organisations.

1. **COURSE OUTLINE**

This course is intended to cover the knowledge required for a technician to understand the principles of operation of the beaconing of waterways and fairways channels. The complete course comprises 3 classroom modules, each of which deals with a specific subject covering aspects of the beaconing of waterways and fairways channels. Each module begins by stating its scope and aims, and then provides a teaching syllabus.

**4. TEACHING MODULES**

***Table 1 Table of Teaching Modules***

|  |  |  |
| --- | --- | --- |
| ***Module Title*** | ***Time in hours*** | ***Overview*** |
| Introduction | 5 | Description of the evolution, requirements, design considerations and AtoN systems. |
| AtoN sizing and design | 15 | This modules provides an overview and description of the purpose of AtoN . |
| Beaconing design | 5 | This module provide a satisfactory understanding of a beaconing design. |

1. **SPECIFIC COURSE RELATED TEACHING AIDS**

This course involves classroom instruction with the use of sample equipment, programming units and PCs.

Classrooms should be equipped with blackboards, whiteboards, and overhead projectors to enable presentation of

the subject matter.

1. **TABLE OF CONTENTS**

**MODULE 1 – INTRODUCTION (5h)**

1. Introduction
   1. Evolution of the navigation
      1. Background
      2. E-navigation
   2. User requirements
      1. Generalities
      2. Accuracy
      3. Reliability
      4. Special requirements
      5. User queries
   3. Design considerations
   4. Performance parameters of AtoN systems
      1. Positioning accuracy
      2. Redundancy
      3. Perception

**MODULE 2 – AIDS TO NAVIGATION SIZING AND DESIGN (15h)**

1. Aids to Navigation sizing and design
   1. Luminous systems
      1. Lantern types
      2. Light basics
      3. Intensity and range calculation
      4. Choice of luminous equipment
   2. Days Marks
      1. Types of daymarks
      2. Characteristics
      3. Day Mark sizing
   3. Electronic systems
      1. Radar
      2. AIS – Automatic Identification System
   4. Leading lights
      1. Leading light types
      2. Two-light leading lights
      3. Sector leading lights

**MODULE 3 – BEACONING DESIGN (5h)**

1. Beaconing Design
   1. Previous considerations
      1. MBS
   2. Beaconing of navigable boundaries
      1. Basic principles for the design of waterways
      2. Others Aids to Navigation
   3. Design methodology
      1. Procedure
      2. Maintenance
      3. Risk assessment
      4. Simulation
   4. Examples
   5. Conclusion
2. **REFERENCES**
3. 1010 Ed2 Racon Range Performance\_June 2005
4. 1018 Ed.3 Risk Management\_May2013
5. 1023 Ed1.1 Design of Leading Lines December 2005
6. 1033 Ed.1 Provision of AtoN for Different Classes of Vessels, including HSC\_Dec2003
7. 1041 Ed3 on Sector Lights\_June 2016
8. 1046 Ed.2 Response Plan for Marking New Wrecks\_June 2019
9. 1051 Ed.1 Provision & Identification of AtoN in Built-up Areas\_Dec2005
10. 1058 Ed.2 Use of Simulation as a Tool for Waterway Design and AtoN Planning\_June 2011
11. 1061 Ed.1 Light Applications Illumination of Structures\_Dec2008
12. 1079 Ed.1 Establishing and Conducting User Consultancy by Aids to Navigation Authorities\_Dec2009
13. 1148 Ed.1 Guideline G1148 on determination of required luminous intensity for marine signal lights
14. G1078 Ed2.0 The Use of AtoN in the Design of Fairways Channels
15. G1094-Ed2.1-Daymarks-for-Aids-to-Navigation-June-2016
16. G1134 Surface Colours Used as Visual Signals on AtoN Ed2.0
17. G1135 Effective Intensity Ed2.0 December 2020
18. G1163 Ed1.0 The Marking of Breakwaters and Barriers
19. M1000 Navguide 2018 Ed8 Compressed
20. R0101 Marine Radar Beacons (Racons) (R-101) Ed2.1 December 2004
21. R0108 The Surface Colours used as Visual Signals on Marine Aids to Navigation (E-108) Ed4.1 December 2017
22. R0110 Rhythmic Characters of Lights on Aids to Navigation Ed5.0
23. R0111 Port Traffic Signals (E-111) Ed1.3 December 2019
24. R0112 Leading Lights (E-112) Ed1.2 December 2005
25. R0113 The Marking of Fixed Bridges and other Structures over Navigable Waters (O-113) Ed2.1 December 2011
26. R0126 (A-126) The Use of the AIS in Marine Aids to Navigation Services Ed2.0
27. R0130 Categorisation and Availability Objectives for Short Range Aids to Navigation (O-130) Ed3.1 June 2017
28. R0138 The Use of GIS and Simulation by Aids to Navigation Authorities (O-138) Ed1.1 December 2007
29. R0139 (0-139) The Marking of Man-made Structures Ed3.0
30. R0201 Marine Signal Lights-Colours (E200-1) Ed3.1 December 2018
31. R0202 Marine Signal Lights-Calculation, Definition and Notation of Luminous Range (E200-2) Ed2.1 December 2017
32. R0203 Marine Signal Lights Part 3 - Measurement (E-200-3) Ed1.1 December 2008
33. R0204 Marine Signal Lights-Determination and Calculation of Effective Intensity (E-200-4) Ed2.1 December 2017
34. R0205 Marine Signal Lights Part 5 - Estimation of the Performance of Optical Apparatus (E-200-5) Ed1.1 December 2008
35. S1010 AtoN Planning & Service Requirements Ed1