SYLLABUS FOR WORKSHOP CALCULATION & SCIENCE

OF

MARINE FITTER

(SEMESTER PATTERN)

UNDER

CRAFTSMEN TRAINING SCHEME

Re-Designed

in

2015

By

Government of India Ministry of Skill Development & Entrepreneurship Directorate General of Training CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE Block - EN - 81 SECTOR - V, SALT LAKE CITY, KOLKATA - 700 091

Syllabus of Workshop calculation and science for 3rd semester – Duration: 42 hours

MARINE FITTER

SI. No.	Workshop calculation and science
	WORKSHOP TECHNOLOGY
1.	Heat treatment of iron and steel – Description and purpose of heat treatment – principle methods of heat treatment.
2.	Pattern making and foundry works General description, casting processes, types of pattern, moulding sand, How to make mould, defects in casting
3.	Fastenings General description – classification of fasting - Rivets and riveting – keys: different types and purposes, Cotter joints: different types and purposes, Pin joints: different types and purposes, nut & bolts: different types and purposes – construction of nuts bolts, rivets, screw threads, shaft keys.
4.	Power transmission
	Types of belt drive – types of pulleys – jockey pulley or rider pulley Chain drive – types of clutches – types of gear drive – cam drive – rope drive
5.	Bearings General description – different kinds of bearings and purposes – material of each bearings
6.	Sheet metal
	General description, method of operation types of tools and materials- Carrying out job works
7.	Lathe General description - classification of lathe and uses. Parts of lathe, feed mechanism, tumbler gear mechanism, method of holding the work and attachments, steady rest, follower rest, catch plate and carriers, lathe tools, different methods of taper turning, Carrying out jobs on the machine Calculation of thread cutting, taper turning etc.
	HYDRUALICS II
1.	Types of hydraulic pump, mechanical working arrangement, fluid operation dynamic pressure – positive displacement – fixed and variable displacement Reciprocation pump – gear pump – vane pump – piston type pump – Centrifugal pump - Free hand sketch of all pumps and accessories –Discharge capacity, power of pumps calculations –operational level
2.	Motors Hydraulic Motors – types – working arrangement – high speed low torque – Low speed high torque motors vane motors – gear motors – radial piston motor – axial piston motor – internal gear motor – power and efficiency- Free hand sketch of

	all motor and accessories- Power and capacity calculations - operational level
3.	Practice Dismantling and assembling of pumps Field visit to acquaint systems Dismantling and assembling of all motors Dismantling and assembling of filters
4.	Control system direction control – pressure control – volume control – pressure relief valve – brake valve– rotary valve– spool control valve– pressure regulator– check valve– solenoid valve Other devices Tank and accessories– piping– strainers– oil seals– filters- oil cooler- Free hand sketch
	NAVAL ARCHITECTURE AND SHIP CONSTRUCTION
5.	Hydrostatics - Density – Relative density – pressure exerted by a liquid - load on an immersed plane - centre of pressure - load diagram - sheering force on bulkhead stiffeners – Calculation on hydro pressure, load etc.
6.	Displacement, TPC, coefficients of form
	Archimedes principle – displacement – tonne per cm immersion coefficient of form – wetted surface area – similar figures – shearing force and bending moment - Calculation of displacement, TPC, coefficient, W.S.A etc.
	Centre of gravity Centre of gravity – effect of addition of mass – effect of movement of mass – effect of suspended mass
7.	Stability of ships
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Syllabus of Workshop calculation and science for 4th semester – Duration: 42 hours

MARINE FITTER

SI. No.	Workshop calculation and science
	HYDRUALICS AND PNEUMATICS III
1.	General – Hydraulic circuit – closed system – open system – power units - – desirable properties of hydraulic oil and its grades – loss of head – cavitations – air purging
2.	Deck Machineries
	Trawl winch – Wind lass – Net drum- purse seine winch – triplex winch- power block – line hauler – cargo winch – gun wale roller – side thrusters - Construction, working principle, circuit diagram Free hand sketch
	Power and capacity calculations – operational level
3.	Trouble shooting – cause and remedies
4.	Introduction to Pneumatics
	Pneumatic system and physical units, Basic requirements for pneumatic system, Air compressor, pneumatic cylinder and air motor valves, circuits, Hydro pneumatics- Free hand sketch
	FISHING TECHNIQUE
5.	Operation of fishing gear A brief introduction about various types of gear now being used Local visit (Fishing villages and fishing harbour)
6.	Fishing without gear Method of using, knife, shovels and picks for catching Molluscs and crabs
7.	Wounding gear Harpoon, spear, blow pipe and bow and arrow
8.	Stupefying Dynamiting, poisoning and electric fishing
9.	 Code of conduct for responsible fishing Selective fishing gear and practices – Environmentally, eco-friendly gear and enhancement of resources Fish Traps To catch fishes by attracting them to the desired cages, Fyke net, Plunge basket, crab pot.
10.	Traps for jumping fishes Changadam, Raft, etc.
11.	Bag nets with fixed mouth Dol net (Bombay) Stake net (Kerala backwaters)
12.	Dragged gear

	Beam trawl, otter trawl Bull trawl
- 10	On board practical training.
13.	Surrounding gear To catch shoaling fishes, purse seine and ring net
	Encircling gear
	To catch shoaling fishes purse-seine and ring net
	Dip or lift nets
	Hand dip net, Chinese dip net
14.	Falling nets
	Cast nets, with strings and string-less
	Gill and tangle nets
	To catch fishes by gilling and entangling
	Set and drift gill nets Trammel nets
	Energy conservation Fishing gear and methods, vessel technology. Various fishing
	techniques followed during fishing operation.
15.	Elementary Acoustics Sound waves and propagation of sound, Velocity,
	wavelength, reflection, echo, ultrasound, range, measuring distance by sound.
	Fish finding equipments Principle of Echo sounding, Block diagram of echo
	sounder, operation, main parts of echo sounder, controls, video echo sounders and
	features, SONAR and NET SONDE Errors of Echo sounders.
16.	Parts of ship
	Principal dimensions, Port, star board, beam, bow Quarter free board, draft Bulwork
	etc.
	On board practicals
	Identification of parts on board the fishing vessel and make sketches
	Rope works, Types of ropes, care and maintenance of synthetic and wire ropes
	(6 hrs)
	Knots and splices, breaking strength, working load, and problems connected
	therewith. On board, class room. Practicals on making different types of knots and
	splices such as eye slice, short splice, back splice and long splice
	SEAMANSHIP AND NAVIGATION
17.	Blocks & purchases
	Types of blocks, frictional resistance and problems connected therewith different
	types of tackles, safety practices to be followed, care and maintenance of blocks and
	tackles. On board, class room. Identification of blocks and tackles. Practical on
	marking different tackle and to calculate safe working load
	Chart, Latitudes, longitudes, Fixing position on the chart, setting course and
	finding the distance. (8 hrs)
	Abbreviations and symbols
	Using chart, Fix the vessels position on a navigational charts and measure the course
	and distance between two given position. Identification of various symbols and
	abbreviations on chart
	Lead lines (2 hrs)
	Deep sea lead line and hand lead line. On board Fabricate a handle lead line on a
	given rope and make proper makings
18.	Sea Anchor, Fire fighting Fire muster, Fire drill, care and maintenance of Fire fighting
	appliances. Principles of Fire fighting. Fire triangle. Engine room fire etc. Prevention of
	fire, principles of fire fighting, fire extinguishers and fire hoses. On board and class
	room. Prepare a must list for a fishing vessels. Practicals on operation and refilling of
	extinguishers.
	Life saving appliances (10 hrs)
	Life jacket, life buoy, Life raft, class 'C' boat, Rescue boat, FPIRB, SART, life boat its
	care and maintenance
	On board and class room Practicals on using life buoy and life jacket. Inflate the life

 19. Accidents Grounding, Beaching, Refloat. Collision and leaks, man overboard Class room and on board Prepare a collision mate model. Distress signals & its penalty, procedure for sending distress call Procedure for sending urgency and safety messages. Identify the various distress signals, such as a hand, flare parachute, smoke float and sketch the equipment and
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mark the parts
Buovago system
Buoyage system
NAVAL ARCHITECTURE AND SHIP CONSTRUCTION
20. Importance of lotting in boat building Construction
Dealthere examply Duilding steels making the moulde Dahhat huilding of wood Livil
Backbone assembly Building stock, making the moulds Rabbet building of wood Hull
planking - different types Framing and longitudinal Deck beams and carlings Knees,
Riders and pointer, Deck planking Floor timbers and Engine bearers. Stern tube
arrangements, Bulkhead Construction of model boat
21. Engine installation, alignment Tanks and plumbing work
Deck fittings
22. Stresses in ship structure
Longitudinal bending in still water and waves – transverse bending – stresses when
docking – pounding – panting
Free hand sketches
Bottom and side framing
Double bottom – internal structure – side framing – tank side bracket – beam knees –
web frames
Free hand sketches
Shell and decks
Shell plating – bulwarks – deck plating – beams – deck gurders and pillars
discontinuitios batches batch corners
Free hand electrones
Pile Idiu Sketches
DUIK Hedus Weter tight hulls haad, weter tight dears, non weter tight, hullshaad
Water light bulk head – water light doors – hon-water light – bulkhead
Free hand sketches
Fore end arrangements
Stem plating – anchor – cable arrangement Free hand sketches
Aft end arrangements
I ransom stern – stern frame and rudder – ship tunnel - Kort nozzle – fixed pitch
propeller – variable pitch propeller Free hand sketches
Fish hold
Insulated fish hold. Free hand sketches
Caulking and stopping
Wheel house and other superstructures, rigging
Sheathing) Underwater fittings Painting and varnishes
WORKSHOP TECHNOLOGY
23. Drilling machine - General description and uses. Types of drilling machine, feed
mechanism, method of holding the drill, chucks. Carrying out jobs on the machine
24. Grinding machine - General description uses & method of operation - precaution.
Carrying out jobs on the machine
25. Arbour Press & hydraulic press
General description, uses & method of operation
Carrying out jobs on the machine
26 Engine room and workshop lay out Workshop layout