

سازمان بنادر و دریانوردی

دستور العمل اجرایی برگزاری دوره آموزشی و آزمونهای شایستگی دریانوردی سمت

افسر مهندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل

The Code of Practice for Conducting Third Engineer Officer on Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages Training Course and Competency Assessments

کد مدرک : P6-W85

شماره بازنگری	تاریخ بازنگری	شرح تغییرات (علت و محل)	تهیه کننده	تأیید کننده	تصویب کننده
۰۲	۹۳/۰۶/۰۳	بر اساس بازنگری کلی کنوانسیون STCW 78, As Amended	رئیس اداره استانداردهای دریانوردان نصرت اله علی پور	مدیرکل امور دریانوردان حسین میرزایی	معاون امور دریایی سید علی استیری

صفحه: ۱ از ۱۷





مرکز آموزش دریانوردی

دستورالعمل اجرایی برگزاری دوره آموزشی و آزمونهای شایستگی دریانوردی سمت افسر مهندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات سرفهی نزدیک بر ساحل
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شماره صفحه : ۲ از ۱۷

فهرست مندرجات

صفحه	عنوان	ماده/بند
۱	کنترل مدرک	
۲	فهرست مندرجات	
۳	مقدمه	
۴	هدف از تدوین	۱
۴	دامنه کاربرد	۲
۴	تعاریف	۳
۸	مسئولیتها	۴
۸	روش اجرا	
۸	هدف از برگزاری دوره آموزشی	۵-۱
۸	طول دوره	۵-۲
۸	تعداد شرکت کنندگان دوره	۵-۳
۹	شرایط ورود به دوره	۵-۴
۹	دانش، درک و مهارت مورد نیاز	۵-۵
۱۰	عناوین دروس و ریز مواد درسی و آزمون	
۱۰	جدول آزمون شایستگی سمت افسر مهندس سوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل	۵-۶-۱
۱۲	مواد درسی دوره افسر مهندس سوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل	۵-۶-۲
۱۲	امکانات مورد نیاز جهت برگزاری دوره	۵-۷
۱۵	شرایط مدرسین و مربیان دوره	۵-۸
۱۶	ارزیابی و صدور گواهینامه	۵-۹
۱۶	شرایط تمدید/تجدید گواهینامه	۵-۱۰
۱۶	روش تایید دوره	۵-۱۱
۱۷	سوابق	۶
۱۷	مراجع	۷
۱۷	ضمائم	۸





سازمان بنادر و دریانوردی

دستورالعمل اجرایی برگزاری دوره آموزشی و آزمونهای شایستگی دریانوردی سمت افسر مهندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل
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کد مدرک : P6-W85/2

شماره صفحه : ۳ از ۱۷

مقدمه

سازمان بنادر و دریانوردی در راستای اجرای وظایف و اختیارات قانونی ناشی از ماده ۱۹۲ قانون دریایی جمهوری اسلامی ایران مصوب شهریور ماه ۱۳۴۳ و بند ۱۰ ماده ۳ آئین نامه تشکیل سازمان بنادر و دریانوردی مصوب بهمن ماه ۱۳۴۸ کمیسیون های خاص دو مجلس که صدور هر گونه سند یا گواهینامه و پروانه مربوط به کشتی، فرماندهان، افسران و کارکنان کشتی ها را در صلاحیت این سازمان قرار داده و در راستای رعایت مفاد کنوانسیون بین المللی استانداردهای آموزش، صدور گواهینامه و نگهبانی دریانوردان (STCW- as amended) مصوب مرداد ماه سال ۱۳۷۵ مجلس شورای اسلامی و با عنایت به مقرره III/1 کنوانسیون و بخش الف - III/1 بند ۱۰ آیین نامه مذکور " دستورالعمل اجرایی برگزاری دوره آموزشی و آزمون های شایستگی دریانوردی سمت افسر مهندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل " را تدوین نموده و پس از تصویب هیأت عامل قابل اجرا می باشد.

یادداشت: قانون تغییر نام سازمان بنادر و دریانوردی و کشتیرانی به سازمان بنادر و دریانوردی در تاریخ ۱۳۸۷/۰۲/۱۰ به تصویب مجلس شورای اسلامی رسید.





سازمان بنادر و دریانوردی

دستورالعمل اجرایی برگزاری دوره آموزشی و آزمونهای صلاحیت دریانوردی سمت افسر مهندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات نیروی نزدیک ساحل
The Code of Practice for Conducting Third Engineer Officer on Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages Training Course and Competency Assessments

کد مدرک : P6-W85/2

شماره صفحه : ۴ از ۱۷

۱- هدف از تدوین

هدف از تدوین این دستورالعمل ارائه حداقل نیازمندیهای برگزاری دوره آموزشی سمت افسر مهندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل می باشد.

۲- دامنه کاربرد

این دستورالعمل برای کلیه مراکز آموزشی مورد تایید سازمان و مجری برگزاری دوره آموزشی سمت افسر مهندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل کاربرد دارد.

۳- تعاریف

اصطلاحات استفاده شده در راستای اهداف این دستورالعمل دارای معانی ذیل می باشند.

۳-۱ تایید (Approved):

به معنای تایید اداره استانداردهای دریانوردان مطابق با دستورالعمل های سازمان می باشد.

۳-۲ گواهی خدمت دریایی (Seagoing Service Documentary Evidence):

به معنای تأییدیه خدمت دریایی دریانوردان جهت شرکت در دوره های آموزشی، آزمونهای دریانوردی و صدور گواهینامه های دریانوردی می باشد که علاوه بر ثبت در شناسنامه دریانوردی، توسط شرکت کشتیرانی/ مالک کشتی و یا اتحادیه مالکان کشتیها به صورت فرم کامپیوتری (computer sheet)، نامه اداری شماره شده و یا فرم تعریف شده (به ضمیمه این دستورالعمل) قابل ارائه می باشد.

۳-۳ گواهینامه شایستگی دریانوردی (Certificate of Competency):

به معنای گواهینامه صادره طبق مفاد بند ۵,۴ این دستورالعمل برای فرماندهان، افسران و کاربران مخابرات می باشد و دارندهی قانونی آن محق به خدمت در سمت و عمل به وظایف مربوطه در سطح مسئولیت مشخص شده در آن است.



سازمان بنادر و دریانوردی



سازمان بازرسی دریانوردی

دستورالعمل اجرایی برگزاری دوره آموزشی و آزمونهای شایستگی دریانوردی سمت افسر مهندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات متریک نزدیک ساحل
The Code of Practice for Conducting Third Engineer Officer on Ships of Propulsion
Power KW<3000 Engaged on Near Coastal Voyages Training
Course and Competency Assessments

کد مدرک : P6-W85/2

شماره صفحه : ۵ از ۱۷

۳-۴ گواهینامه مهارت دریانوردی (Certificate of Proficiency):

به معنای گواهینامه‌ای به غیر از گواهینامه شایستگی صادر شده برای دریانورد است که نشان می‌دهد الزامات آموزشی، شایستگی‌ها یا خدمت دریایی مندرج در کنوانسیون را برآورده می‌نماید.

۳-۵ دستورالعمل (Code of Practice)

به معنای مجموعه قوانین، مقررات ملی و الزامات مندرج در این دستورالعمل است که توسط اداره کل امور دریانوردان تدوین و به تصویب هیات عامل سازمان رسیده است.

۳-۶ شرکت کشتیرانی (Company):

به معنای مالک کشتی، هر شخصی مانند مدیر یا اجاره کننده در بست کشتی است، که مسئولیت عملیات کشتی از طرف مالک کشتی بر وی فرض شده است، و با قبول چنین مسئولیتی، کلیه وظایف و مسئولیت‌های محول شده بر شرکت کشتیرانی توسط این دستورالعملها را بر عهده گرفته است.

۳-۷ گواهی طی دوره (Course Completion Certificate or Documentary Evidence):

به معنای گواهی است که مرکز آموزشی مورد تایید سازمان به فراگیر پس از گذراندن موفقیت آمیز دوره مربوطه ارائه می‌دهد.

۳-۸ افسر مهندس (Engineer Officer):

به معنای افسری است که مطابق با الزامات مقرر ۳/۱، ۳/۲، یا ۳/۳ کنوانسیون دارای صلاحیت است.

۳-۹ آئین نامه ی امنیت کشتی ها (ISPS Code):

به معنای آئین نامه بین المللی امنیت کشتی ها و تسهیلات بندری است که در تاریخ ۲۰۰۲ میلادی طی قطعنامه شماره ۲ کنفرانس دولتهای متعاقد به کنوانسیون بین المللی ایمنی جان اشخاص در دریا ۱۹۷۴ (SOLAS) به تصویب رسیده و ممکن است توسط سازمان بین المللی دریانوردی براساس اصلاحیه های بعدی تغییر یابد.

۳-۱۰ فرمانده (Master):

به معنای شخصی است که عهده دار فرماندهی کشتی می باشد.

۳-۱۱ گواهینامه سلامت پزشکی (Medical Fitness Certificate):

به معنای گواهینامه ای است که توسط پزشک معتمد سازمان طبق دستورالعمل مربوطه و جهت متقاضیانی که از نظر پزشکی از سلامت برخوردار باشند، صادر می گردد.





۳-۱۲ کشتی تجاری (Merchant Ship):

به معنای هر نوع شناوری است (به استثنای شناورهای خدماتی، سکوهای متحرک فراساحلی، صیادی و یا نظامی) که در امر جابجایی کالاهای تجاری، مسافر و بار تسهیلات مربوط به کالاهای تجاری بکار گرفته می شود.

۳-۱۳ ماه (Month):

جهت محاسبه خدمت دریایی هر ماه متشکل از ۳۰ روز می باشد.

۳-۱۴ سازمان (Ports & Maritime Organization):

به معنای سازمان بنادر و دریانوردی جمهوری اسلامی ایران می باشد.

۳-۱۵ دستگاه نظارت بندر (Port's Monitoring Office)

به معنای معاونتی که اداره امتحانات و اسناد دریانوردان بنادر زیر مجموعه آن می باشد و به نیابت از اداره استانداردهای دریانوردان، وظیفه صدور مجوز دوره های آموزشی و نظارت بر مراکز آموزشی محل استان جغرافیایی خود را به عهده دارد. اداره یا بخشهای دیگر در مجموعه معاونت مربوطه به عنوان دستگاه نظارت محسوب نمی گردند.

۳-۱۶ قدرت رانش موتور (Propulsion Power):

به معنای مجموع حداکثر قدرت موجود در موتورهای کشتی بر حسب کیلووات که در گواهینامه ثبت کشتی و یا دیگر مدارک مربوطه درج شده باشد.

۳-۱۷ خدمت دریایی (Seagoing Service):

به معنای مدت زمان دریانوردی بر روی کشتی است که می بایست مرتبط با صدور و یا تجدید گواهینامه های شایستگی و یا مهارت در یانوردان می باشد.

۳-۱۸ کشتی دریا پیمای (Seagoing Ship):

به معنای کشتی است که غیر از آنهائیکه منحصرأ در آبهای سرزمینی، نزدیک یا مجاور آبهای پناه گاهی و یا مناطق مشمول مقررات بندری، تردد می کنند.





سازمان بنادر و دریانوردی

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کد مدرک : P6-W85/2

شماره صفحه : ۷ از ۱۷

۳-۱۹ وظایف امنیتی (Security Duties)

به معنای تمامی مسئولیتها و وظایف امنیتی روی کشتی‌ها مطابق با تعریف مندرج در کنوانسیون بین‌المللی جان اشخاص در دریا، ۱۹۷۴ (اصلاح شده) و آیین‌نامه بین‌المللی امنیت کشتی و تسهیلات بندری (ISPS) می‌باشد.

۳-۲۰ کنوانسیون (Convention):

به معنای کنوانسیون اصلاح شده بین‌المللی استانداردهای آموزشی، صدور گواهینامه و نگهداری دریانوردان (STCW-78 as amended) می‌باشد.

۳-۲۱ آئین‌نامه‌ی کنوانسیون (STCW Code):

به معنای آئین‌نامه‌ی استانداردهای آموزشی، صدور گواهینامه و نگهداری دریانوردان که طی قطعنامه‌ی شماره ۲ کنفرانس سال ۱۹۹۵ میلادی تصویب و ممکن است توسط سازمان بین‌المللی دریانوردی بر اساس اصلاحیه‌های بعدی تغییر یابد، می‌باشد.

۳-۲۲ سطح پشتیبانی (Support Level)

به معنای سطحی از مسئولیت اطلاق می‌گردد که وظایف، تکالیف و مسئولیت‌های محوله بر روی کشتی را تحت نظر افراد سطح مدیریتی و یا عملیاتی انجام می‌پذیرد.

۳-۲۳ افسر مهندس سوم (Third Engineer Officer):

به معنای افسر مهندسی است که مسئولیت نگهداری در موتورخانه را در زمان معینی بر عهده دارد و بر اساس مفاد مربوطه واجد شرایط باشد.

۳-۲۴ مرکز آموزشی (Training Center):

به معنای دانشگاه، شرکت، موسسه یا هر ارگانی که بر اساس مجوز اخذ شده از سازمان در زمینه آموزشهای دریانوردی فعالیت می‌کند.

۳-۲۵ سفرهای نامحدود (Unlimited Voyages):

به معنای سفرهای است که محدود به سفرهای نزدیک به ساحل نباشد.





۴- مسئولیت ها

- ۴-۱ مسئولیت بازنگری این دستورالعمل بر عهده دستگاه نظارت مرکز می باشد.
- ۴-۲ مسئولیت تایید اصلاحیه ها به این دستورالعمل بر عهده اداره کل امور دریانوردان می باشد.
- ۴-۳ مسئولیت تصویب اصلاحیه ها به این دستورالعمل بر عهده معاون امور دریایی به نیابت از هیات عامل سازمان می باشد.
- ۴-۴ مسئولیت اجرای کامل دوره آموزشی بر اساس عناوین اعلام شده بر عهده مرکز آموزشی می باشد.
- ۴-۵ مسئولیت نظارت بر حسن اجرای این دستورالعمل در مراکز آموزشی دریانوردی بر عهده دستگاه نظارت مرکز می باشد.

۵- روش اجرا

۵-۱- هدف از برگزاری دوره آموزشی

هدف از برگزاری دوره آموزشی ، آماده نمودن فراگیران برای کسب توانمندی های مندرج در ستون ۱ از جدول بخش ۱/۱-۱ الف آیین نامه کنوانسیون STCW می باشد

۵-۲- طول دوره

۵-۲-۱- طول دوره حداقل ۵۳۱ ساعت ، که شامل ۴۵۰ ساعت به صورت نظری (تئوری) ، ۲۴ ساعت

تمرین و ۵۷ ساعت عملی (بدون احتساب مدت زمان آموزش کارورزی) می باشد.

۵-۲-۲- حداکثر مدت زمان آموزش روزانه برای هر فراگیر ۸ ساعت می باشد.

۵-۳- تعداد شرکت کنندگان در دوره

۵-۳-۱- حداکثر فراگیران شرکت کننده در هر دوره ۲۰ نفر می باشد.

۵-۳-۲- در صورت افزایش حداقل فضا، تجهیزات و امکانات مرتبط کمک آموزشی بر اساس دستورالعمل صدور مجوز و نظارت بر اجرای دوره ها در مرکز آموزشی دریانوردی و پس از اخذ تاییدیه از دستگاه نظارت ذیربط، تعداد شرکت کنندگان دوره می تواند حداکثر تا ۳۰ نفر افزایش یابد.





سازمان بازرسی دریایی

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Power KW<3000 Engaged on Near Coastal Voyages Training
Course and Competency Assessments*

کد مدرک : P6-W85/2

شماره صفحه : ۹ از ۱۷

۴-۵- شرایط ورود به دوره

۱-۴-۵- داشتن حداقل ۱۸ سال سن

۲-۴-۵- دارای گواهینامه سلامت پزشکی معتبر بر اساس دستورالعمل مصوب سازمان

۳-۴-۵- دارا بودن مدرک تحصیلی حداقل دیپلم مورد تایید وزارت آموزش و پرورش.

۵-۵- دانش، درک و مهارت مورد انتظار

۱-۵-۵- کسب اطلاعات کافی در خصوص راه اندازی ماشین آلات موتور تحت سرپرستی مهندسین ارشد کشتی

۲-۵-۵- کسب اطلاعات کافی در خصوص تعمیر و نگهداری ماشین آلات موتورخانه تحت سرپرستی مهندسین ارشد کشتی

۳-۵-۵- توانایی بر عهده گیری نگهداری مستقل موتورخانه

۴-۵-۵- مهارت در بکارگیری قوانین ایمنی در حدود اختیارات و وظایف

۵-۵-۵- درک نیاز به کوشش برای حفاظت از محیط زیست

۶-۵-۵- توانایی درک دستورات مافوق و ایجاد ارتباط در محیط کاری



سازمان بازرسی دریایی



سازمان بازرسی دریایی

دستورالعمل اجرایی برگزاری دوره آموزشی و آزمونهای شایستگی دریانوردی سمت افسر مهندس سوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات نفرهای نزدیک به ساحل
The Code of Practice for Conducting Third Engineer Officer on Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages Training Course and Competency Assessments

کد مدرک : P6-W85/2

شماره صفحه : ۱۰ از ۱۷

۵-۶- عناوین دروس و ریز مواد درسی

۵-۶-۱- جدول آزمونهای شایستگی سمت افسر مهندس سوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات

سفرهای نزدیک به ساحل

ملاحظات	مواد امتحانی (بند دستورالعمل)	حد نصاب قبولی (درصد)	نوع آزمون	مدت ساعت	تعداد سوالات	نام آزمون	ردیف
	4-4-1-1, 4-4-1-2-2, 4-4-1-2-3, 4-4-1-2-4, 4-4-1-3, 4-4-1-4-1, 4-4-1-4-2, 4-4-1-5, 4-4-1-7-2, 4-4-1-7-3, 4-4-3-1, 4-4-3-2, 4-4-3-4-1, 4-4-3-4-2	۶۰	کتبی	۳	۶	دانش مهندسی دریایی (موتور)	۱
	4-1-1-1, 4-1-1-2, 4-1-1-3, 4-1-1-4, 4-1-2, 4-1-3, 4-2-1, 4-4-1-2-1, 4-4-1-6, 4-4-1-7-1, 4-4-1-7-4, 4-4-1-7-5, 4-4-1-7-6, 4-4-1-8, 4-4-1-9-1, 4-4-1-10, 4-4-1-11, 4-4-2, 4-4-3-4-3, 4-4-3-4-4, 4-5-1, 4-5-2-1, 4-5-2-2, 6-1, 6-2, 6-3-1, 6-3-2, 6-3-3, 6-3-4, 6-4-1, 6-4-2, 6-4-3, 6-4-4, 6-5-1, 6-6-1, 6-6-2, 6-7, 6-8-1, 6-8-2, 6-8-3, 6-8-4, 6-8-5, 6-8-6, 6-8-7, 3-9-1, 3-9-3-1, 3-9-3-2, 3-9-3-3, 3-9-3-4, 3-9-4-1, 3-9-4-2, 3-9-4-3, 3-9-4-4, 3-9-4-5, 3-9-5-1, 3-9-5-2, 3-9-5-3, 3-9-5-4	۶۰	کتبی	۳	۸	دانش مهندسی دریایی (عمومی)	۲



سازمان بازرسی دریایی



سازمان بازرسی دریانوردی

دستورالعمل اجرایی برگزاری دوره آموزشی و آزمونهای صلاحیت دریانوردی ستانفرمندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات مغزهای نزدیک به ساحل
The Code of Practice for Conducting Third Engineer Officer on Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages Training Course and Competency Assessments

کد مدرک : P6-W85/2

شماره صفحه : ۱۱ از ۱۷

ردیف	نام آزمون	تعداد سوالات	مدت ساعت	نوع آزمون	حد نصاب قبولی (درصد)	مواد امتحانی (بند دستورالعمل)	ملاحظات
۳	الکتروتکنولوژی دریایی	۶	۲/۵	کتبی	۵۵	5-1-1-1, 5-1-1-2-1, 5-1-1-2-2, 5-1-1-2-3, 5-1-1-3, 5-1-1-4-1, 5-1-1-4-2, 5-1-1-5, 5-1-1-6, 5-1-2-1, 5-1-2-2, 5-1-2-3, 5-1-3-1, 5-1-3-2, 5-2-1, 5-2-2, 5-2-3, 5-2-4, 5-2-5-1, 5-2-5-2, 5-2-5-3, 5-2-6	
۴	آرشیفتکت دریایی، ایمنی کشتی و حفاظت از محیط زیست	۶	۲/۵	کتبی	۵۵	4-5-3-1, 4-5-3-2, 3-1-1, 3-1-2, 3-1-3, 3-2, 3-3, 3-4-1-13-4-1-2, 3-4-1-3, 3-4-2, 3-4-3, 3-4-4-1, 3-4-4-2, 3-4-4-3, 3-4-4-4, 3-4-4-5, 3-4-4-6, 3-8-1	
۵	شفاهی / عملی / شبیه ساز	نامحدود	حداکثر ۳ ساعت	شفاهی	نمره ندارد	4-1-1-1, 4-1-1-2, 4-1-1-3, 4-1-1-4, 4-1-2, 4-1-3, 4-1-4-1, 4-1-4-2, 4-1-4-3, 4-1-4-4, 4-1-4-5, 4-3-1-1, 4-3-1-2, 4-4-1-2-1, 4-4-2, 4-4-3-1, 4-4-3-2, 4-4-3-3, 4-5-1, 4-5-2-1, 4-5-2-2, 4-5-3-1, 4-5-3-2, 6-4-1, 6-4-2, 6-4-3, 6-4-4, -5-1, 6-6-1, 6-6-2, 6-7, 6-8-1, 6-8-2, 6-8-3, 6-8-4, 6-8-5, 3-1-1, 3-1-2, 3-1-3, 3-2, 3-3, 3-8-1, 3-9-1, 3-9-2, 3-9-3-1, 3-9-3-2, 3-9-3-3, 3-9-3-4, 3-9-4-1, 3-9-4-2, 3-9-4-3, 3-9-4-4, 3-9-4-5, 3-9-5-1, 3-9-5-2, 3-9-5-3, 3-9-5-4	در زمان آزمون شفاهی ارایه دفترچه کارآموزی در دریا و شناسنامه دریانوردی الزامی میباشد

❖ مهندسی کشتی با سیستم رانش توربین بخار مواد درسی 4-4-1-12-1, 4-4-1-12-2, 4-4-1-12-3 را نیز شامل می گردد

❖ داوطلبان خدمت بر روی کشتی های با سیستم رانش توربین بخار از مواد درسی 4-4-1-2-2, 4-4-1-2-3, 4-4-1-2-4 معاف می باشند



هیئت عامل سازمان بازرسی دریانوردی



مرکز آموزش دریانوردی

دستورالعمل اجرایی برگزاری دوره آموزشی و آزمونهای شایستگی دریانوردی ست افسر مهندس سوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات نزدیک ساحل
The Code of Practice for Conducting Third Engineer Officer on Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages Training Course and Competency Assessments

کد مدرک : P6-W85/2

شماره صفحه : ۱۷ | ۱۶

۲-۶-۵- مواد درسی دوره افسر مهندس سوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل در بخش انگلیسی این دستورالعمل می باشد.

۷-۵- امکانات مورد نیاز جهت برگزاری دوره

جهت برگزاری دوره های آموزشی علاوه بر فضای آموزشی قید شده در "دستورالعمل نحوه صدور مجوز و نظارت بر مراکز آموزشی دریانوردی" مصوب سازمان، تجهیزات کمک آموزشی مشروحه زیر نیز مورد نیاز می باشد:

۱-۷-۵- سالن / کلاسها می بایست مجهز به سیستم تهویه و نور کافی و وسایل سمعی و بصری و امکانات مورد نیاز برای تدریس باشد.

۲-۷-۵- کتابخانه مجهز به کتب تخصصی مورد نیاز تدریس و اطلاعات جامع دیگر در خصوص دوره.

۳-۷-۵- سالن سمعی و بصری و امکانات مورد نیاز برای تدریس زبان انگلیسی تخصصی و عمومی.

۴-۷-۵- آزمایشگاه و کارگاه مکانیک

1- Mechanical laboratory (Materials and equipment)

- 1- Portable refrigeration demonstration unit, to show evaporation and condensation.
- 2- Four-stroke diesel engine on a test bed, fitted with a dynamometer, fuel flow meter, cooling water thermometer and RPM indicator (tachometer).
- 3- Acidic, alkaline and neutral solutions.
- 4- Alkalinity/acidity indicators such as litmus papers.
- 5- Samples of aluminum and copper with an oxide.
- 6- Samples of pitting corrosion.
- 7- Samples of graphitized cast Iron.
- 8- Samples of gasoline, kerosene, diesel fuel, boiler residual fuel oil and a viscometer.
- 9- A water- content measurement apparatus.
- 10- Work benches fitted with vices, tool storage lockers and cabinets.



مرکز آموزش دریانوردی



- 11- Portable power tools such as drilling machines, small bench or pedestal grinder.
- 12- Measuring equipment: external and internal verniers, inside and outside calipers, standard adjustable inside and outside micrometers, depth and dial gauges (Mechanical or electronic).
- 13- Hand tools: chisels, center punches, hacksaws, scrapers, drills, bits, reamers, hammers, taps and dies, nuts, spanners and wrenches, files.
- 14- A marking table.
- 15- Scribers, scribing blocks, try-square, trammels, protector, dividers, straight-edge.
- 16- Bending machine for small-diameter pipes.
- 17- Oxy-acetylene brazing and cutting equipment.
- 18- Electric arc-welding equipment.
- 19- Working benches.
- 20- Soldering equipment.
- 21- Protective clothing, including aprons, gloves, masks, goggles and welding boots.
- 22- Fume extraction/ventilation.
- 23- Gas bottles storage.
- 24- Welding electrodes.
- 25- Filler rods.
- 26- Steel plates up to 10 mm thick.
- 27- Various steel bars, pipes angles and sections.
- 28- Metal-turning lathes including:
 - a- Three –and four-jaw chucks
 - b- Face-plates
 - c- Drill bits
 - d- Tool holders
 - e- Protective equipment
 - f- Various lathe tools: straight parting tool, round nose, finishing, cranked and boring tools



29- A range of cutting tools.

30- Work-securing vice.

۵-۷-۵ کارگاه و آزمایشگاه برق و الکترونیک و ابزار دقیق

Electrical and electronic engineering laboratory and workshop

1 Apparatus to demonstrate static electricity, examples of electrical diagrams (i.e., block system, circuit and wiring diagrams); apparatus to demonstrate control circuit ammeters, voltmeters, watt meters, megger tester, wiring connectors, resistors, electrical source, a selection of marine cables, equipment and cable runs for testing purpose, insulation testers, continuity testers, digital and analogue multi-meters, thermistors, diodes, a clampmeter, live-line tester, lead-acid and alkaline batteries, a charging circuit distilled water, hydrometer, magnets, iron filing solenoid iron-cored solenoid, induction coil, model A.C and D.C generators used A.C and D.C generators and motor, motor starters, switches, circuit breakers, fuses, a sectioned transformer, equipment suitable for use in oil, gas and chemical tankers (intrinsically safe).

2 Over currents, reverse-power and under voltage-protection relays, high-rupturing-capacity fuses and housings, preferential trips, instrument and relay transformers, a main switch board, emergency switch board, operational three-phase terminal box, automatic voltage regulator, induction motors with direct on-line and star-delta and autotransformer starters, speed controllers, a selection of lighting equipment, a model navigation light system.



۵-۸- شرایط مدرسین و مربیان دوره

مدرسین و مربیان دوره های آموزشی مندرج در این دستورالعمل می بایست علاوه بر گذراندن دوره مدرسی (TFT) مورد تأیید سازمان دارای حداقل مدارک و تجارب مشروحه زیر باشند:

۵-۸-۱- مدرسین

۵-۸-۱-۱- دارای حداقل مدرک تحصیلی دیپلم مورد تایید وزارت آموزش و پرورش.

۵-۸-۱-۲- گواهینامه شایستگی معتبر افسر مهندس سوم بر روی کشتیهای با قدرت رانش ۷۵۰ کیلووات یا بیشتر - سفرهای نامحدود با حداقل ۱۲ ماه خدمات دریایی در آن سمت ; و یا

۵-۸-۱-۳- جهت ارایه مواد درسی مندرج در جدول مربوطه ردیف ۱، ۲، ۳ و ۴ ماده ۱-۶-۵ این دستورالعمل، گواهینامه شایستگی معتبر مهندس دوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل و یک سال خدمت دریایی در آن سمت.

۵-۸-۱-۴- جهت ارایه مواد درسی مندرج در جدول مربوطه ردیف ۳، ماده ۱-۶-۵ این دستورالعمل، فوق لیسانس مرتبط با موضوع درس و یا حداقل دارای گواهینامه شایستگی افسر مهندس الکترونیک بر روی کشتی های با قدرت رانش ۳۰۰۰ کیلووات یا بیشتر سفرهای نامحدود و یک سال خدمت دریایی در آن سمت.

۵-۸-۱-۵- دارندگان مدرک لیسانس در رشته های معماری و سازه کشتی یا مهندس دوم و افسر اول در کشتی های با ظرفیت ناخالص ۳۰۰۰ یا بیشتر سفر های نامحدود با حداقل ۶ ماه خدمت دریایی در آن سمت می توانند مدرس بخشهای آرشیتکت کشتی باشند.

۵-۸-۱-۶- ارزیابی کنندگان کارآموزی در دریا (افسر آموزشی) میبایست از حداقل شرایط مشروحه زیر برخوردار باشند:

۵-۸-۱-۶-۱- ارزیابی کنندگان کارآموزی داوطلبان گواهینامه افسر مهندس سوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل می بایست ضمن گذراندن دوره





مدرسی (T.F.T) مورد تأیید سازمان حداقل دارای گواهینامه افسر مهندس دوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل و یک سال خدمت دریایی در آن سمت باشند.

۲-۸-۵- مریان

- ۱-۲-۸-۵ دارای حداقل مدرک تحصیلی فوق دیپلم مکانیک دریایی با حداقل ۱۲ ماه خدمت دریایی؛ و یا
- ۲-۲-۸-۵ دارای گواهینامه معتبر ملوان موتور با حداقل ۳ سال خدمت دریایی بر روی شناورهای تجاری.

۹-۵- ارزیابی و صدور گواهینامه

۱-۹-۵ در صورت موفقیت فراگیران در ارزیابی های حین و یا پایان دوره، گواهی طی موفقیت آمیز دوره مربوطه توسط مرکز آموزشی مورد تأیید و مجری برگزاری دوره صادر می گردد.

۲-۹-۵ سپس فراگیران می توانند درخواست حضور در آزمون شایستگی و مهارت دریانوردی سازمان را بر اساس مفاد بند ۱-۶-۵ این دستورالعمل ارائه نمایند؛ و

۳-۹-۵ نهایتاً اداره امتحانات و اسناد دریانوردان سازمان برای آن دسته از شرکت کنندگان که آزمون مربوطه را با موفقیت طی نموده باشند و حائز دیگر شرایط لازم باشند، گواهینامه مرتبط بر اساس دستورالعمل صدور، تمدید و تجدید صادر می نماید.

۱۰-۵- شرایط تمدید/ تجدید گواهینامه

گواهینامه های شایستگی و مهارت دریانوردی بر اساس مفاد دستورالعمل صدور، تمدید، و تجدید گواهینامه های شایستگی و مهارت دریانوردن تمدید و یا تجدید می گردد.

۱۱-۵- روش تأیید دوره

تأیید دوره بر اساس مفاد مندرج در دستورالعمل صدور مجوز و نظارت بر اجرای دوره ها در مراکز آموزش دریانوردی صورت می پذیرد.





سازمان بازرسی دریایی

دستورالعمل اجرایی برگزاری دوره آموزشی دانشمندی کشتی‌های با قدرت رانش کمتر از ۳۰۰۰ کیلووات نیروی نزدیک بر ساحل
*The Code of Practice for Conducting Third Engineer Officer on Ships of Propulsion
Power KW<3000 Engaged on Near Coastal Voyages Training
Course and Competency Assessments*

کد مدرک : P6-W85/2

شماره صفحه : ۱۷ از ۱۷

۶- سوابق

کلیه سوابقی که نشان دهنده رعایت موارد مندرج در این دستورالعمل باشد.

۷- مراجع

۷-۱ کنوانسیون اصلاح شده STCW و آیین نامه مربوطه

۷-۲ مدل کورس سازمان بین المللی دریانوردی (IMO) شماره ۷/۰۴

۷-۳ دستورالعمل صدور ، تمدید و تجدید گواهینامه های دریانوردان

۷-۴ دستورالعمل صدور مجوز و نظارت بر اجرای دوره ها در مراکز آموزشی دریانوردی

۸- ضمیمه

ندارد




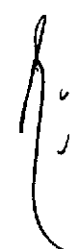
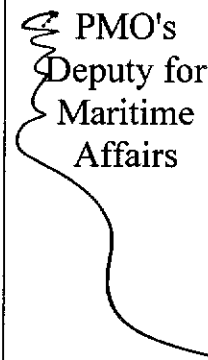
سازمان بازرسی دریایی



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***The Code of Practice for Conducting Third Engineer Officer on
Ships of Propulsion Power KW<3000 Engaged on Near Coastal
Voyages Training Course and Competency Assessments***

P6-W85

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02	25/AUG/2014	STCW Convention, as amended	N.Alipour Head of Seafarers' Standards' Directorate 	H.Mirzaei Director General of Seafarers' Affairs 	S.A.Estiri  PMO's Deputy for Maritime Affairs





No.	Title	Page No.
	Control (covering) page	1
	List of Contents	2
	Introduction	3
1	Objective	4
2	Scope of application	4
3	Definition	4
4	Responsibilities	7
	Procedure	8
5-1	Course objective	8
5-2	Course duration	8
5-3	Number of trainees	8
5-4	Course entry requirements	8
5-5	Expected knowledge, understanding and proficiency	8
5-6	Course syllabi and competency assessment	9
5-7	Facilities and equipment required for conducting the course	48
5-8	Lecturer and instructor minimum qualifications	51
5-9	Assessment and Certification	52
5-10	Revalidation and renewal of certificates	52
5-11	Course approval	52
6	Records	52
7	References	52
8	Appendices	52





Introduction

Ports and Maritime organization (P.M.O) of the Islamic republic of Iran in performing its duty and in exercising its prerogative resulting from article 192 of the Islamic republic of Iran maritime code, 1964 and paragraph 10 of article 3 of P.M.O manifesto, 1970 enabling it to issue any document, certificate or license for ships, masters, officers and other ship personnel and also in accordance with the provisions of the international convention on standards of training, certification and watch keeping for seafarers (STCW), 1978, as amended adopted by the Islamic consultative assembly in 1996 and taking into account regulations III/1 of the mentioned Convention and section A-III/1 of the STCW Code, develops this "code of practice for conducting third engineer officer on ships of propulsion power KW<3000 engaged on near coastal voyages training course and competency assessment" which is applicable after endorsement by the of board of executives of Ports & Maritime Organization.

NOTE: The title of Ports and Shipping Organization changed to Ports and Maritime Organization dated 29.04.2008 through parliamentary act and approved by Islamic council assembly.





1 Objective

The objective of this code of practice is to specify the minimum requirements for conducting third Engineer Officer on Ships of Propulsion power KW<3000 engaged on near coastal voyages training course and competency assessments.

2 Scope of application

This code of practice is applicable to all approved training centers that conduct third Engineer Officer on Ships of Propulsion power KW<3000 engaged on near coastal Voyages training course.

3 Definition

For the purpose of this code of practice, unless expressly provided otherwise;

3-1 Approved

Means approved by the Seafarer's Standards Directorate in accordance with the PMO's Codes of practices.

3-2 Approved Seagoing Service / Documentary Evidence

Means approved sea going service required to be presented for participating in a training course, maritime examination and issuance of certificate. These documentary evidence should be inserted in CDC and authenticated by company or ship owner or ship owner's associations and in addition be presentable in a form of computer sheet, official letter or other forms as defined in the annex to this code of practice.

3-3 Certificate of Competency (COC)

Means a certificate issued and endorsed for masters, officers and GMDSS radio operators in accordance with the provisions of chapters II, III, IV or VII of the STCW Convention and entitling the lawful holder thereof to serve in the capacity and perform the functions involved at the level of responsibility specified therein.

3-4 Certificate of Proficiency (COP)

Means a certificate, other than a certificate of competency issued to a seafarer, stating that the relevant requirements of training, competencies or seagoing service in the STCW Convention have been met.





3-5 Code of Practice

Means all national rules, regulations and requirements specified in this document which have been drafted by the PMO's General Directorate of Maritime affairs and endorsed by the PMO's board of executive.

3-6 Company

Means the owner of the ship or any other organization or person such as the manager, or the bareboat charterer, who has assumed the responsibility for operation of the ship from the ship owner and who, on assuming such responsibility, has agreed to take over all the duties and responsibilities imposed on the company by these Codes of practices.

3-7 Course Completion Certificate or Documentary Evidence

Means a certificate issued through the training center, after successfully completion of training program by the applicants

3-8 Engineer officer

Means an officer qualified in accordance with the provisions of regulation III/1, III/2 or III/3 of the Convention

3-9 ISPS Code

Means the International Ship and Port Facility Security (ISPS) Code adopted on 12 December 2002, by resolution 2 of the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, as may be amended by the Organization.

3-10 Master

Means the person having command of a ship

3-11 Medical Fitness Certificate

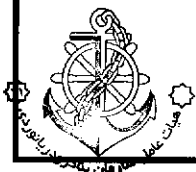
Means a certificate issued by the PMO's recognized medical practitioner to the candidates who found to be medically fit.

3-12 Merchant Ship

Means any ship (other than servicing vessel, mobile offshore platform, fishing and naval ships) used for carriage of cargoes, passenger and/or provisions

3-13 Month

Means a calendar month or 30 days made up of periods of less than one month.





3-14 PMO

Means Ports & Maritime Organization (PMO) of the Islamic Republic of Iran.

3-15 Port's Monitoring Office

Means the deputy of general directorate in ports in which the directorate of examinations & seafarers' documents is included and on behalf of seafarers' standards directorate is responsible for approving and monitoring training courses conducted in the province that port is situated

3-16 Propulsion Power

Means the total maximum continuous rated output power, in kilowatts, of all the ship's main propulsion machinery which appears on the ship's certificate of registry or other official document.

3-17 Seagoing service

Means service on board a ship relevant to the issue or revalidation of a certificate or other qualification.

3-18 Seagoing Ship

Means a ship other than those which navigate exclusively in inland waters or in waters Within, or closely adjacent to, sheltered waters or areas where port regulations apply.

3-19 Security duties

include all security tasks and duties on board ships as defined by chapter XI-2 of the International Convention for the Safety of Life at Sea (SOLAS 1974, as amended) and the International Ship and Port Facility Security (ISPS) Code

3-20 STCW Convention

Means international convention on standards of training, certification and watch keeping for Seafarers, 1978, as amended.

3-21 STCW Code

Means the seafarers' training, certification and watchkeeping (STCW) code as adopted by the 1995 conference resolution 2, as it may be amended by the international maritime organization.

3-22 Support Level

Means the level of responsibility associated with performing assigned tasks, duties or responsibilities on board a seagoing ship under the direction of an individual serving in the operational or management level.





3-23 Third Engineer Officer

Means officer in charge of an engineering watch qualified in accordance with the relevant provisions of the Code of practice for issuing, revalidation, renewal certificates of competency and proficiency for seafarers.

3-24 Training center

Means maritime university/center/ directorate/ department/company and/or any organization conducting maritime training course approved by PMO.

3-25 Unlimited Voyages

Means voyages not limited to the near coastal voyages.

4- Responsibilities

4-1 Central monitoring office is responsible for revising this code of practice.

4-2 General Director of Seafarers' Affairs is responsible for approving amendments to this code of practice.

4-3 Deputy of maritime affairs is responsible to endorse amendments to this code of practice on behalf of PMO's board of executive.

4-4 Training centers are to conduct training course in accordance with this Code of practice.

4-5 Central monitoring office is responsible for supervising the implementation of this code of practice in training centers.





5- Procedure

5-1 course objective

The objective of this Training Course is to prepare trainees to achieve competencies set out in the column 1 of table A-III/1 of the STCW Code.

5-2 course duration

5-2-1 A minimum of 531 hours which includes 450 hours theoretical, 24 hours exercise and 57 hours practical for each trainee.

5-2-2 Maximum daily contact hours for each trainee is 8.

5-3 number of trainees

5-3-1 the maximum number of trainees in each course is 20.

5-3-2 the number of trainees may be increased to 30 when the relevant facilities, teaching aids and class-room space are increased as per criteria set out in the code of practice for approving and monitoring training courses and is approved by the relevant monitoring office.

5-4 Course entry requirement

The course trainees should, at least;

5-4-1 be at least 18 years old;

5-4-2 hold valid medical fitness certificate issued by a medical practitioner recognized by the PMO;

5-4-3 hold general education diploma approved by ministry of education.

5-5 Expected Knowledge, Understanding and Proficiency

5-5-1 Knowledge of how machineries work in engine room under supervision of ship senior engineers.

5-5-2 Gaining information and proficiency in repairing and maintaining machineries in engine room under supervision of ship senior engineers.

5-5-3 Ability to take engineering watch in the engine room independently.

5-5-4 Proficiency in practicing safeties in the vicinity of working environment and at the time of taking duties.

5-5-5 Proficiency in practicing and protecting environmental safeties;

5-5-6 Ability to manage and practice superior instructions as well as being able To communicate in the working environment.





5-6 course syllabi and competency assessment

5-6-1 Competency assessment details;

No	Title	Number of Question	Time (hours)	Type	Pass mark	Subjects as per syllabi mentioned in 5-6-2	Remarks (if any)
1	Motor	6	3	written	60	4-4-1-1, 4-4-1-2-2, 4-4-1-2-3, 4-4-1-2-4, 4-4-1-3, 4-4-1-4-1, 4-4-1-4-2, 4-4-1-5, 4-4-1-7-2, 4-4-1-7-3, 4-4-3-1, 4-4-3-2, 4-4-3-4-1, 4-4-3-4-2	
2	General	8	3	written	60	4-1-1-1, 4-1-1-2, 4-1-1-3, 4-1-1-4, 4-1-2, 4-1-3, 4-2-1, 4-4-1-2-1, 4-4-1-6, 4-4-1-7-1, 4-4-1-7-4, 4-4-1-7-5, 4-4-1-7-6, 4-4-1-8, 4-4-1-9-1, 4-4-1-10, 4-4-1-11, 4-4-2, 4-4-3-4-3, 4-4-3-4-4, 4-5-1, 4-5-2-1, 4-5-2-2, 6-1, 6-2, 6-3-1, 6-3-2, 6-3-3, 6-3-4, 6-4-1, 6-4-2, 6-4-3, 6-4-4, 6-5-1, 6-6-1, 6-6-2, 6-7, 6-8-1, 6-8-2, 6-8-3, 6-8-4, 6-8-5, 6-8-6, 6-8-7, 3-9-1, 3-9-3-1, 3-9-3-2, 3-9-3-3, 3-9-3-4, 3-9-4-1, 3-9-4-2, 3-9-4-3, 3-9-4-4, 3-9-4-5, 3-9-5-1, 3-9-5-2, 3-9-5-3, 3-9-5-4	





No	Title	Number of Question	Time (hours)	Type	Pass mark	Subjects as per syllabi mentioned in 5-6-2	Remarks (if any)
3	Electro technology	6	2.5	written	55	5-1-1-1, 5-1-1-2-1, 5-1-1-2-2, 5-1-1-2-3, 5-1-1-3, 5-1-1-4-1, 5-1-1-4-2, 5-1-1-5, 5-1-1-6, 5-1-2-1, 5-1-2-2, 5-1-2-3, 5-1-3-1, 5-1-3-2, 5-2-1, 5-2-2, 5-2-3, 5-2-4, 5-2-5-1, 5-2-5-2, 5-2-5-3, 5-2-6	
4	Naval Architecture	6	2.5	written	55	4-5-3-1, 4-5-3-2, 3-1-1, 3-1-2, 3-1-3, 3-2, 3-3, 3-4-1-13-4-1-2, 3-4-1-3, 3-4-2, 3-4-3, 3-4-4-1, 3-4-4-2, 3-4-4-3, 3-4-4-4, 3-4-4-5, 3-4-4-6, 3-8-1	
5	Oral	unlimited	maximum 3 hours	oral	No mark	4-1-1-1, 4-1-1-2, 4-1-1-3, 4-1-1-4, 4-1-2, 4-1-3, 4-1-4-1, 4-1-4-2, 4-1-4-3, 4-1-4-4, 4-1-4-5, 4-3-1-1, 4-3-1-2, 4-4-1-2-1, 4-4-2, 4-4-3-1, 4-4-3-2, 4-4-3-3, 4-5-1, 4-5-2-1, 4-5-2-2, 4-5-3-1, 4-5-3-2, 6-4-1, 6-4-2, 6-4-3, 6-4-4, 5-1, 6-6-1, 6-6-2, 6-7, 6-8-1, 6-8-2, 6-8-3, 6-8-4, 6-8-5, 3-1-1, 3-1-2, 3-1-3, 3-2, 3-3, 3-8-1, 3-9-1, 3-9-2, 3-9-3-1, 3-9-3-2, 3-9-3-3, 3-9-3-4, 3-9-4-1, 3-9-4-2, 3-9-4-3, 3-9-4-4, 3-9-4-5, 3-9-5-1, 3-9-5-2, 3-9-5-3, 3-9-5-4	At the time of oral examination seaman book and record book must be presented

Notes;

- In Oral/practical/simulator assessment questions from written assessments may also be asked.
- For engineering on ships with gas turbines systems the subject items of 4-4-1-12-1, 4-4-1-12-2, 4-4-1-12-3 are also included.
- For Engineers serve on ships with gas turbines systems are exempted from the subject items 4-4-1-2-2, 4-4-1-2-3, 4-4-1-2-4.





5-6-2 Course minimum syllabi

(450 hours Theoretical, 24 hours exercise, 57 hours practical)

FUNCTION 4 : MARINE ENGINEERING AT THE OPERATIONAL LEVEL (243 hours Theoretical)

Competence 4-1: Maintain a safe engineering watch (13 hrs.T)

4-1-1-Thorough knowledge of principles to be observed in keeping an engineering watch, including: (4 hrs.T)

4-1-1-1-Duties associated with taking over and accepting a watch (1 hrs.T)

Knowledge and understanding of: Ensuring the members of the relieving engineering watch are fully capable of performing their duties, standing orders and special instructions of the chief engineer officer relating to the operation of the ship's system and machinery effectively; The nature of all work being performed on machinery and systems; The personnel involved and potential hazards; The level and the condition of water or residues in bilge's, ballast tanks, slop tanks, reserve tanks, fresh water tanks, sewage tanks and any special requirements for/ or disposal of the contents there of; The condition and level of fuel in the reserve tanks, settling tank, day tank and other fuel storage facilities; Special requirements relating to sanitary system disposal; Condition and mode of operation of the various main and auxiliary systems, including the electrical power distribution system; The condition of monitoring and control console equipment, and which equipment is being operated manually; The condition and mode of operation of automatic boiler controls such as flame safeguard control systems, limit control systems, combustion control systems, fuel supply control systems and other equipment related to the operation of steam boilers; Any special modes of operation dictated by equipment failure or adverse ship conditions; The availability and use of fire fighting appliances; The state of completion of engine room log.

4-1-1-2-Routine duties undertaken during a watch (1 hrs.T)

Knowledge and understanding of: Performing watch keeping duties as per schedule approved by chief engineer; Use of appropriate internal communication system; Escape routes from machinery spaces; Engine room alarm systems and be able to distinguish between the various alarms, with special reference to the fire extinguishing media alarm; The number, location and types of firefighting equipment and damage control gear in the machinery spaces to be observed; Operating the propulsion equipment in response to needs for changes in direction or speed; Keeping the main propulsion plant and auxiliary system under constant supervision until properly relieved and periodically inspect the machinery and steering gear spaces are made for the purpose of observing and reporting equipment malfunctions or break downs, performing or directing routine adjustment, required upkeep and any other necessary task; Take the action necessary to contain the effects of damage resulting from equipment malfunction or failure and take immediate remedial actions to ensure the safety of the ship, cargo operation, the port and its environment when vessel in port.





4-1-1-3-Maintenance of the machinery space logs and the significance of the readings taken (1 hrs.T)

Knowledge and understanding of: Keeping the machinery space log book up date; Performing the engine room machinery repairs as instructed by senior engineer officer; Co-operating with any engineer in charge of maintenance work during all preventive maintenance, damage control or repairs; Isolating and bypassing machinery to be worked on; Adjusting the remaining plant to function adequately and in a safe manner during the maintenance period, recording in the engine room log book, the equipment worked on and the personnel involved, and safety steps have to be taken , for the benefit of relieving officers and for record purposes; Testing and putting into service when necessary the repaired machinery or equipment; Ensuring any engine room rating who perform maintenance duties are available to assist in the manual operation of machinery in the event of automatic equipment failure; Detailed repair maintenance involving repairs to electrical, mechanical, hydraulic, pneumatic or application electronic equipment throughout the ship shall be performed and recorded.

4-1-1-4- Duties associated with handing over a watch (1 hrs.T)

Knowledge and proficiency in: The officer in charge of the engineering watch should not hand over the watch to the relieving officer if there is reason to believe that the latter is not capable of carrying out the watch keeping duties effectively, in which case the chief engineer officer to be notified; The state of any special modes of operation dictated by equipment failure to be reported to take over officer; Condition and mode of operation of the various main and auxiliary systems including the electrical power distribution system to be reported to take over officer; Ensuring that all events related to the main and auxiliary machinery which have occurred during the watch are suitably recorded.

4-1-2-Safety and emergency procedures; changing-over of remote/automatic to local control of all system (2 hrs.T)

Knowledge and understanding of: Stating what is meant by emergency in accordance with components of the machinery; Taking necessary action to assess the effects of damage resulting from equipment breakdown, fire, flooding, collision, stranding, or other cause; When the engine room put in a stand by condition, the officer in charge of the engineering watch shall ensure that all machinery and equipment which may be used during maneuvering is in a state of immediate readiness and that an adequate reserve of power is available for steering gear and other requirements; Directing any other member of the engineering watch to inform them of the potentially hazardous conditions of which may adversely affect the machinery or jeopardize the safety of life or the ship; Changing in speed resulting from machinery malfunction or any loss of steam which may imperil the safety of the ship and life at sea, bridge should be immediately notified, in the event of fire and of any impending action in machinery spaces that may cause reduction in the ship's speed, imminent steering failure, stoppage of the ship's propulsion system or any alteration in the generation of electric power or similar threat to safety; Chief engineer to be notified, when engine damage or a malfunction occurs; Ensuring all machinery involved with the maneuvering of the ship is facing troubles; Emergency steering, generator and other auxiliary equipment should be ready for immediate operation; Measures to be taken to protect the environment from pollution by the ship and that applicable pollution prevention regulations are complied with; All damage control and fire fighting systems are in readiness; In emergencies, sound





the alarm when the situation so demands and take all possible measures to prevent damage to the ship, its cargo and persons on board; Beware of the duty officer's needs relating to the equipment repaired in the loading or unloading of the cargo and the additional requirements of the ballast and other ship stability control systems; Remote and local control of all machineries; Limitations of each; Actions to be taken prior to change over from remote to local and vice versa; Correct change over procedure; The key important parameters that may affect the safe operation of machinery while on local control; Safeties and automation which are by passed /affected when change over takes place; Personal attendance while in local control; Points and parameters to pay more attention while control position is shifted; Slowdown and shutdown activation /reset of main machinery in both remote and local control; Being familiar with the operation & procedure of the changing /taking over of the remote /local control of the main engine and steering gear systems.

4-1-3-Safety precautions to be observed during a watch and immediate actions to be taken in the event of fire or accident, with particular reference to oil systems (2 hrs.T)

Knowledge and Proficiency in: Mustering; The immediate actions to be taken while fire and other accidents occur; Time constrains; Correct actions; Minimize errors; Fast response; Sounding the alarms when the situation so demands and take all possible measures to prevent damage to the ship, its cargo and persons on board; Information given to bridge /chief engineer as appropriate; Personal safety/minimize the fire hazards in engine room specially oil, rectifying leakages, oil impregnated laggings, oil returns, double skin pipes ,alarms ,oil leak tanks/ including overflow tanks alarm, sounding pipes/self closing, oil fire extinguishing, storage tank temperatures; Measures to be taken to protect the environment from pollution by the ship and that applicable pollution prevention regulation are complied with; All damage control and fire fighting systems are in readiness in emergencies.

4-1-4-Engine-room resource management, knowledge of engine-room resource management principles, including (5 hrs.T)

4-1-4-1-Allocation, assignment, and prioritization of resources (1 hr.T)

Knowledge and understanding of: The main tenets of resource management relate to the non-technical skills associated with the social interaction between team members, situation awareness and the decision-making, Planning and Prioritizing; Efficient use of resources and delegation; Proper arrangements for watchkeeping personnel shall be ensured in accordance with the situations; Any limitation in qualifications or fitness of individuals shall be taken into account when deploying watchkeeping personnel; Understanding of watchkeeping personnel regarding their individual roles, responsibility and team roles shall be established; Identification of cause of problem and timely correct response; Environmental issues; Safety of Operations.





4-1-4-2-Effective communication (1 hr.T)

Knowledge and understanding of: Communications, Methodical and logical approach to fault diagnosis and problem solving and Error Trapping; Watchkeeping personnel shall understand information and how to respond to information from each station/installation/equipment; Information from the stations/installations/equipment shall be appropriately shared by all the watchkeeping personnel; Watchkeeping personnel shall maintain an exchange of appropriate communication in any situation; and; Watchkeeping personnel shall notify the master/chief engineer officer/officer in charge of watch duties without any hesitation when in any doubt as to what action to take in the interest of safety.

4-1-4-3-Assertiveness and leadership (1 hr.T)

Knowledge and understanding of: Leadership and Workload Management; Human Factors and Human Error; Contingency Planning; The officer in charge of watch duties shall maintain a proper watch, making the most effective use of the resources available, such as information, installations/equipment and other personnel.

4-1-4-4-Obtaining and maintaining situational awareness (1 hr.T)

Knowledge and understanding of: Situational Awareness Management; Risk Assessment and Risk Management; Emergency Preparedness; Watchkeeping personnel shall understand functions and operation of installations/equipment, and be familiar with handling them.

4-1-4-5-Consideration of team experience (1 hr.T)

Knowledge and understanding of: Co-operation and Teamwork, Identification of and breaking error chains, team building and Development.

Competence 4-2: Use English in written and oral form (8 hrs.T)

**4-2-1-Adequate knowledge of the English language to enable the officer to use
engineering publications and to perform engineering duties (8 hrs.T)**

Proficiency in: Using English language to communicate correctly with members of watch in normal and emergency situations; Using engineering publications, operational manuals, shipboard drawings and fault finding instructions written in English; Writing letters, precise reporting and filling all reports and forms relevant to engineering duties in English; Developing correctness in English communication through speech, written skill and understanding; Standard communicative and technical marine words used during watch keeping, repair, maintenance and emergency.





Competence 4-3: Use internal communication systems (4 hrs.T)

4-3-1-Operation of all internal communication systems on board (4 hrs.T)

4-3-1-1-Transmission and reception of messages (3 hrs.T)

Knowledge of: Means to be provided for communicating orders from navigating bridge to the position in the machinery space or in the control room; Principle operation of an engine room telegraph; Appropriate mean of communication provided to any other positions from which the engines controlled, purpose of using engineer's alarm and where they are located; Means of communication provided between the navigation bridge and the steering gear compartment; Means of local communication provided between the main machinery control room and the engineer officer's accommodation; Means provided in a centralized control position with alarm panels and instrumentation indicating any alarm; Alarm system provided for all important pressures, temperatures and other essential parameters; Alarm for automatic change-over; Communicating through the medium of normal ship board reporting procedure; The officers and crew should communicate with each other in a common language; Principles of using public address, talk back system; Sound power phone, internal walkie talkie and telephone exchange on board the ship; Distinguishing between the various alarms.

4-3-1-2-Communication recordings (1 hr.T)

Knowledge and proficiency in: Ship's movement recording during maneuvering and passage in the navigation bridge and in engine control room; Automatic and manual recording of important and essential parameters in engine log book; Standing orders and special instructions of the chief engineer officer; Recording of reports for ship staff and machinery performances; Records of any events related to the main and auxiliary machinery occurred during the engineering watch.

Competence 4-4: Operate main and auxiliary machinery and associated control systems (206 hrs.T)

4-4-1-Basic construction and operation principles of machinery systems, including (179 hrs.T)

4-4-1-1-Basic engineering science, mechanics and hydromechanics (69 hrs.T)

1-Static-(6 hrs.T)

Knowledge and proficiency in: Definition of mass, force, weight, scalar and vector quantities; Vector diagrams, resultant and equilibrium; Parallelogram of forces to obtain the resultant of two forces; Triangle of forces; Polygon of forces; Equilibrium in the polygon of forces; Solving simple numerical and graphical problems related to objectives.

2-Kinematics (2 hrs.T)

Knowledge of: Newton's first law; Solve simple numerical and graphical problems related to objectives.





Knowledge and proficiency in : Definition of linear motion, speed, calculating mean speed, linear and resultant velocity and acceleration; Newton's first law; Solving simple numerical and graphical problems related to objectives.

3-Dynamics (4 hrs.T)

Knowledge and proficiency in: Definition of force of gravity, inertia, momentum and friction; Newton's second law; Accelerating force; Coefficient of friction; Friction force required to overcome friction on a horizontal plane; Solving simple numerical problems related to objectives.

4-Friction (2 hrs.T)

Knowledge and proficiency in: Categories of friction; Relation between kinetic and limiting values of friction force; Apparent friction force with regard to rolling resistance; Principles of ball and roller bearings; Effect of area and surface finish on dry friction; Boundary friction; Effect of heavy loading and low speed on bearings working under boundary conditions.

5-Inertia (2 hrs.T)

Knowledge of: Definition of mass in terms of inertia; Relation of mass to weight; Inertia force; Active and reactive forces; Active resistance and its components.

Proficiency in: Applying the principles of inertia force to connected bodies; Solving simple problems which illustrate the effect of inertia forces.

6-Circular motion (1 hrs.T)

Knowledge of: Forces due to circular motion; Derivation of formula " $\omega^2 r = v^2/r$ "; Definition of centripetal/ centrifugal forces and related formula.

7-Periodic Motion (2 hrs.T)

Knowledge of: Simple harmonic motion; Variation of velocity and acceleration of piston in a reciprocating engine; Deriving at the expression " $v = \omega r \sin \theta$ " and " $a = \omega^2 r \cos \theta$ " in simple harmonic motion; Definition of periodic time, frequency and amplitude.

Proficiency in: Solving problems which illustrate the principles of above objectives.

8-Dynamics of rotation (1 hrs.T)

Knowledge of: Linear and angular acceleration; Accelerating torque.

Proficiency in: Solving practical problems concerning the above objectives.

9-Work, power and energy (2 hrs.T)

Knowledge of: Definition of work as force \times distance and its unit; Definition of potential and kinetic Energy; Definition of inertia; Conversion of energy; Deficiency of energy in terms of input





and output; Define power as energy transfer/time taken; Unit of power; Derivation of units of energy.

Proficiency in: Solving problems concerning above objectives.

10-Impulse and momentum (2 hrs.T)

Knowledge of: Impulse of a force; Momentum of a body; Angular impulse; Angular momentum; Derivation of formula and units of equation relating to impulse and momentum.

Proficiency in: Solving problems to demonstrate variation of speed when the position and magnitude of rotating mass are changed.

11-Hydrostatics (4 hrs.T)

Knowledge of: Definition of volume, density as mass over volume, relative density; Formula for pressure exerted by a liquid at any given vertical depth; Deducing the equipment " $f = \rho \times g \times h \times A$ " to give force on the surfaces of a rectangular tank when filled with liquid.

Proficiency in: Solving simple numerical problems related to objective.

12-hydrodynamics (2 hrs.T)

Knowledge of: Energies stored in a liquid; Potential, pressure and kinetic energy; Definition of "head of a liquid"; Rate of flow; Bernoulli's equation for unit mass over unit weight of liquid and its application; Derivation of pressure energy, potential and kinetic energy per unit weight in terms of liquid head.

Proficiency in: Solving simple numerical problems related to objectives.

13-Thermodynamics and heat transmission (31 hrs.T)

13-1-Heat transfer (4 hrs.T)

Knowledge and Understanding in: Methods of heat transfer (Induction, radiation and conduction); Factors influencing the rate of heat transfer by conduction, convection and radiation; Developing an equation for the temperature drop across the outer surfaces of a three-layer composite wall.

Proficiency in: Solving simple problems concerning above objectives to determine surface and interface temperatures and the heat transfer; Application of above to a simple treatment of thin cylinders with not more than one layer of insulation attached to the cylinder; Sketching diagrams showing the nature of temperature gradients across a two layer composite wall and surface films.

13-2-Thermodynamic energy (3 hrs.T)

Knowledge of: The term "the conservation of energy" and its application to the flow of fluid in a system; Steady-flow energy equation (SFEE); Potential and kinetic energy; Internal energy; Displacement energy; Heat transfer; External work done; First law of thermodynamics.





Proficiency in: Developing the (SFEE) to incorporate specific enthalpy; Solving simple problems which prove sufficient understanding of the principles of (SFEE); Explaining the equation: Heat transferred= change of internal energy + work transferred.

13-3-Energy change (1 hrs.T)

Knowledge and proficiency in: “Non-flow” equation and its application; Solving simple problems concerning energy changes in practice.

13-4-Vapours (3 hrs.T)

Knowledge and Understanding in: Process of steam generation from water or generation of vapor from any other liquid at constant pressure; Relationship between temperature change and different phases; Vapor phase; Saturated vapor; Dry vapor; Wet vapor; Dryness fraction and superheated vapor conditions.

13-5-Behavior of gases (4 hrs.T)

Knowledge of: Boyle’s law; Charles’ law; Characteristics equation of a perfect gas to problems related to marine engineering; Meaning of the terms specific heat capacity at constant volume (c_v) and at constant pressure (c_p); Effect of heating gases at constant volume and constant pressure with regard to: (Raise in temperature/raise in internal energy); $T_1/T_2 = (P_1/P_2)^{n-1/n} = (V_1/V_2)^{n-1/n}$; Behavior of a perfect gas when compressed or expanded adiabatically; Polytropic process (Where $n = c_p/c_v$); Introduction of ($n = \gamma = 1.4$) for air; Dalton’s law of Partial Pressure.

Proficiency in: Solving problems related to above objectives and concerning marine heat-engine cycles; Ability to sketch a P-V diagram which shows isothermal, adiabatic and polytropic expansion/ compression from a common starting point; Solving simple problems concerning mixture of a gas and a vapor/ or mixture of two gases.

13-6-Thermodynamic processes (4 hrs.T)

Knowledge and Understanding in: Defining a thermodynamic process; The 2nd law of thermodynamics; Constant pressure, volume and temperature processes; Isothermal and adiabatic processes; Solving simple numerical problems relating to objective.

13-7--Work transfer (2 hrs.T)

Knowledge and Understanding in: Calculating work by force x distance; relation of area or a P.V diagram to the work done when a fluid exerts constant pressure on a piston in a cylinder; Work transfer for a vapor or ideal gas; Work transfer; Apply simple numerical calculations related to objective.

13-8-Marine heat engines, refrigeration and air compressor (10 hrs.T)

13-8-1-Heat engines (4 hrs.T)

Knowledge and Understanding in: Ideal gas cycles as those which use perfect gaseous; Constant





volume cycle (Otto Cycle); Constant Pressure (Diesel Cycle); Dual Combustion Cycle; Joule cycle (Gas Turbine Cycle); Carnot Cycle and thermodynamic processes in each cycle; Definition of swept volume and its unit; Mean effective pressure (m.e.p) and its unit; Indicated power produced in a 4 and 2 stroke engines and its unit; Solving simple numerical problems related to the objective.

13-8-2-Refrigeration (2 hrs.T)

Knowledge and Understanding in: Reversed Carnot Cycle (Refrigeration cycle); Working fluids used; Using of tables of thermodynamic properties; Four main components of refrigeration plant and their function; Direction of flow of working fluid and energy level in the cycle.

Proficiency in: Solving simple numerical problems related to the objective.

13-8-3-Theory of air/gas compression (4 hrs.T)

Knowledge and Understanding in: Compression of air/gas (Isothermal, polytropic and adiabatic); Corresponding pressure-volume diagram of an air compressor, showing suction, delivery, and clearance volume; Factors governing valve opening and closing in a compressor; Swept volume and effective swept volume; Definition of volumetric efficiency and need for high volumetric efficiency; Meaning of the term "free air delivery"; Reason for cooling of air and need for using intercoolers; Application of " $Pv^n = \text{constant}$ " during compression process; Application of " $Pv^n = \text{constant}$ " on air storage tank.

Proficiency in: Solving simple numerical problems related to the objective.

14-Industrial chemistry (8 hrs.T)

14-1-Fundamentals (1 hrs.T)

Knowledge and Understanding in: Definition of an atom, a molecule, chemical element, chemical compound, mixture, an oxide and chemical reaction; Meaning of solution, solubility, a saturated solution, suspension and precipitation.

14-2-Acidity/Alkalinity (1 hrs.T)

Knowledge and Understanding in: Composition of an atom and result of losing or gaining electron; Hydrogen and hydroxyl ions; PH value of a solution.

14-3-Corrosion (3 hrs.T)

Knowledge and Understanding in: Formation of metallic hydroxide when iron is immersed in an acidic solution (State boiler water should be alkaline and free of oxygen); Fundamental process of corrosion; Common engineering materials which produce passive oxide films; Main causes of corrosion; Galvanic cell components; Electrolyte; And anode and common metals selected as relative anodes; Sacrificial anodes; Galvanic action and means of reducing it; Pitting corrosion; Corrosion fatigue; Major factors affecting the corrosion process; Methods of surface protection.





14-4-Fuels and lubricants (3 hrs.T)

Knowledge and Understanding in: Carbon, hydrogen, sulfur and ash content of marine fuels; Flash point and its importance for marine fuels and lubricants; Flash point temperature of petrol, kerosene, marine diesel fuel, heavy fuel oil and lubricating oil; Minimum closed flash point of marine fuels when stored in engine room; Viscosity and necessity for increase of temperature of some fuel oils; Test of flash point and viscosity on fuels and lubricants; Importance of them with respect to storage and transferring.

4-4-1-2-Marine diesel engine (41 hrs.T)

4-4-1-2-1-Marine plant and operation (4 hrs.T)

Familiarization with: List of main and auxiliary machineries for propulsion, steering the ship and providing services; Their individual function; Correct procedures for the preparation, starting up, normal running and shutting down of marine machineries; Importance of data recorded from running machineries (Temperature, pressure and speed); Using data to locate fault; Appropriate procedure following discovery of fault.

4-4-1-2-2-Engine types (24 hrs.T)

Knowledge of: Marine diesel engine types; Low, medium and high speed engines; Their application and how can be used as main propulsion engines; Approximate speed ranges related to low, medium and high speed engines; P-V diagram and relative processes; Ways and methods of scavenging 2- stroke and 4- stroke engines; Reasons for a supercharging system; Different type of turbochargers (Radial & axial); Principle components of turbochargers such as impeller, turbine, turbine blades, labyrinth seals, bearings, inducer, diffuser and etc.; Principle components of medium and high speed (4-stroke) diesel engines and the material of manufacture (Main strength member, crank shaft, con. Rod, fuel pump, piston, cylinder, cylinder cover and mountings); Describes in simple terms the principal features of a typical "V" type medium speed diesel engine; Principle components of a large bore 2- stroke diesel engines and the material of manufacture (Bed plate, Crank shaft, Frame, Connecting rod, Cross head arrangement, camshaft, chain and gear, piston, Cylinder block, Tie rod, Liner and cylinder head); Principle parts, materials and operation of exhaust valves, fuel pump, fuel valve for diesel engines; Engine speed control mechanism including governor to maintain the normal running speed under condition of variable load; How engine over speed is prevented.

4-4-1-2-3-Engine Operation and Safeties (10 hrs.T)

Knowledge of: Internal combustion engines; Compression ignition engines and processes occur in such engine; Spark ignition engines and processes in such engines; Combustion process in compression ignition engines; Processes in 2 and 4 stroke engines; Describes, with the aid of diagrams, the distribution of lubricating oil to the main engine; Turbocharger washing during running (Dry and water washing); Turbocharger surging (Causes and remedies); Running engine while turbocharger is out of service.

Knowledge of: Conditions which can lead to dangerous oil mists in crank case; Crank case relief door; Importance of keeping scavenge air spaces drained and clean; Correct procedure and





actions during scavenge air space fire while engine is running; Starting air line explosion (Causes and remedies); List of essential alarms, slowdowns and shut downs.

Proficiency in: Sketching typical indicator diagrams for 2- stroke and 4- stroke engines; Using of engine builders manuals to obtain applicable information.

Knowledge of: Starting air system including preparation for starting, stopping and reversing, when maneuvering and when at full speed.

Familiarization with: Main components of an air starting system including main starting air valve, air starting valve, air starting distributor and etc.; The purpose of a turning gear and the need for interlocks; To be familiar with the safety devices employed in the system.

4-4-1-2-4-Fuels and combustion systems (3 hrs.T)

Knowledge of: Types of crude oil and refining processes; Characteristics of marine residual fuel; Undesirable elements in marine fuels; Standard fuel; Combustion process in an internal combustion engine; Chemical reaction in a combustion; Result of combustion; Average proportions by percentage of oxygen and nitrogen in atmospheric air; Combustion products; Role of nitrogen in combustion process; Effect of excess in combustion; Signs of poor combustion; Range of CO for good, poor or bad combustion; Atomization of fuel and its importance; Effect of viscosity, atomization, penetration and turbulence on good combustion; Good combustion and its indication.

Knowledge of: Types of filters used and their relative advantages; Correct procedures for the disposal of waste oil, sludge residue and etc.; Place of storage of fuel oil; Minimum flash point of marine fuels; Minimum fuel oil temperature for transfer and settling.

4-4-1-3-Marine steam turbine (2 hrs.T)

Knowledge of: Steam turbine construction, lubrication; Impulse and reaction turbines; H.P & L.P turbines; Materials of blades and other components; Bearings; Thrust bearings; Turbine glands and gland steam systems; Sequential nozzle operation; Vacuum pumps; Air ejectors; Extraction pumps; Gland condensers; Vibration; Procedures for warming through turbine installations; Warming up procedure from cold; Shut down procedures; Preparing the turbine for sea; Standby period components and materials used; Turbine safety devices (Over speed and excessive axial movement trip mechanism; Low vacuum trip; Lubricating oil pressure trip).

4-4-1-4-Marine gas turbine (2 hrs.T)

4-4-1-4-1-Operation principles (1 hrs.T)

Knowledge of: Explaining how a gas turbine is used for; Describing the feature of a gas turbine; Describing the operation principles in terms of four processes, compression, combustion (heating), expansion and exhaust; Comparing a gas turbine with a steam turbine in terms of advantages and disadvantages; Describing the types of gas turbines.





4-4-1-4-2-Basic construction (1 hrs.T)

Knowledge of: Using visual aids, describes the three main components of gas turbine as: (Compressor; combustion chamber; turbine); Describing the types of compressors and their features; Describing the types of combustion chambers and their features; Describing the types of turbine and their features; Lists the attached equipment and explains their feature and functions in simple terms.

4-4-1-5-Marine boiler (6 hrs.T)

Knowledge of: Different types of boilers including: Composite and packaged; Construction of boilers: Furnace and combustion chamber; Tubes and tube plates; Water and steam drum; Combustion system of boiler; Boiler mountings (Safety valves; Main stop valve; Feed check valve; Water level indicator; Low water alarms; Blow down valve; Scum valve; Drain valve; Air vents; Soot blower; Pressure gauge connection; Man hole and hand hole doors); Waste heat utilization; Boiler operation; Boiler water testing and treatment and boiler control.

4-4-1-6-Shafting installations, including propeller (3 hrs.T)

Knowledge of: Water and oil lubricated stern tubes; Seals and lubricating systems; Couplings; Methods of reversing the direction of thrust; Thrust block; Controllable pitch propeller; CPP bridge control; Propellers fitting and removal.

4-4-1-7-Other auxiliaries, including various pumps, air compressor, purifier, fresh water generator, heat exchanger, refrigeration, air-conditioning and ventilation systems (27 hrs.T)

4-4-1-7-1-Pumps (6 hrs.T)

Knowledge of: Requirement of power supply to a pump; Losses of head in a pumping system; Relation of fluid viscosity and pumps design; Types of pumps used on ships and the purpose of their use; Basic action of displacement pump and necessity for fitting a relief valve on discharge of it; Operation of a reciprocating pump and purpose of its attachments; Principle of a rotary displacement pump; Construction and principal parts of a gear pump including reversible type gear pump, rotary vane pump; Screw displacement pump; Principles of operation of an axial flow pump; Principles of a centrifugal pump (Parts such as impeller, volute or diffuser) and its characteristics; Need and ways of air extraction from a centrifugal pump; Principles of an ejector; Procedure for starting up and stopping of pumps; Care for satisfactory operation of adjustable and non-adjustable glands seals; Reasons for loss of performance of a pump.

4-4-1-7-2-Air compressor (3 hrs.T)

Knowledge of: Shipboard uses of compressed air; Principal types of air compressors; Principle of compression process in a 2-stage reciprocating air compressor; Reasons for using inter coolers and after cooler; Construction details and materials of reciprocating air compressor's components; Purpose of relief valve, fusible plugs and water-space pressure relief facility; Construction details of rotary compressors; Giving materials used for main component parts; Means of drive and uses of centrifugal air compressors; Means of storing compressed air; Material and construction requirements of a reservoirs; Important mountings of an air reservoir; Means of protection against





corrosion, and overpressure; Purpose of pressure reducing valve in air distribution systems; Attention needed for filters fitted in air distribution system.

4-4-1-7-3-Purifier (2 hrs.T)

Knowledge and understanding of: Differentiate between static and dynamic separation; Differentiate between purifying and clarifying; Purification process of fuel oil; Correct and safe operating procedure for centrifuges.

4-4-1-7-4-Fresh water generator (2 hrs.T)

Knowledge and Understanding of: Methods of obtaining vapour from sea water; Reasons for using low-pressure fresh water generators.

4-4-1-7-5-Heat exchanger (4 hrs.T)

Knowledge and Understanding of: Heat exchange theory " $Q=U\theta A$ "; Different flow patterns; Definition of contact heat transfer; Types of heat exchangers and cooling media used; Principle of construction of shell and tube and plate type heat exchangers; Single and two pass heat exchangers; Lists the types of heat exchangers used for the following: (Lubricating-oil coolers; Fuel-oil heaters; Fresh-water coolers; Compressed-air coolers; Fresh-water heaters; Steam condensers; Seawater evaporating and distilling plant; Seawater heaters; Evaporators and condensers in refrigerators); Materials used for shell, tubes and tube plate of heat exchangers; Means of controlling temperature; Correct cleaning procedure of heat exchanger; Effect of air in cooling water and remedial action.

4-4-1-7-6-Refrigeration (4 hrs.T)

Knowledge of: Distinguishing between refrigeration, air conditioning and ventilation; Marine refrigeration systems operate on a reversed Rankine cycle (Vapour-compression cycle); Principle of operation of a refrigeration system; System components and their function; Processes which take place in each part of the system; Refrigerants and their properties; Types of compressors in common use and their application; Automatic control of the system using cold room temperatures; Correct operating condition of the system.

4-4-1-8-Steering gear (6 hrs.T)

Knowledge of: Vitality of steering gear with respect to safety of ship and need for its correct operation; Control of steering gear provided in steering compartment; Steering system and function of major components and their relation; Hydraulic telemotor system and properties of telemotor fluid; Malfunction in hydraulic telemotor system (Electrical telemotor system); Hydraulic power operated rudder system; 2 and 4 rams steering system and materials used for main components; Radial vane type steering system and materials used for main components; Function of rotary positive-displacement pumps and their means of drive; Principle operation of radial cylinder pump, swash plate pump and their means of pumping control; Type and condition of oil used in a hydraulic system; Means of absorbing shocks in the system; How a steering is tested according to IMO recommendation; Emergency steering and its possible locations.





4-4-1-9-Automatic control systems (5 hrs.T)

4-4-1-9-1-Fundamentals of automation and control (5 hrs.T)

1-Control engineering (2 hrs.T)

Understanding of: Closed and open control loops; Control terms; Types of control action available and their effect on system condition; Energy forms commonly used in control systems aboard ship; Essential components of control system and their purposes; Essential requirements for the operation of unattended machinery.

2-Instrumentation (2 hrs.T)

Familiarization with: Different types of pressure measuring instrument; Principles of operation, application and methods of testing and installation i.e. U-tube manometer; Well type manometer; Bourdon tube pressure gauge; Quantity and rate flow meters i.e. tachometer; Variable area flow meter; Bi-metal and filled system thermometers; i.e. thermal temperature sensors; Bi-metallic strip thermometers; Liquid glass thermometers; Liquid in steel thermometers; Remote temperature recording devices; Level measuring instrument used at sea; Simple gauge glass; Buoyancy type level indicating instrument; Displacer and torque type of level indicating instrument; Igema gauge; Intermittent and continuous air purge tank measuring system; The electrical pressure, temperature and level measuring instruments and their application on board ship.

3-system (1 hrs.T)

Familiarization with: Automatic controls of jacket water, lubricating oil, scavenge air systems.

4-4-1-10-Fluid flow and characteristics of lubricating oil, fuel oil and cooling systems (4 hrs.T)

Knowledge of: Line diagram of typical engine systems (Fuel oil, lubricating oil, piston cooling, jacket cooling, fuel valve cooling, sea water cooling and camshaft lubricating oil); Normal pressure and temperature of each system; Safety devices employed in each system; Purpose of lagging for hot surfaces and sheathing for high pressure pipes; Way of supporting pipe to reduce vibration; Way of controlling pipes expansion and contraction; Materials used for construction of pipes for carrying various liquids; Principle of construction of a cock; Features of a globe valve, screw lift valve, screw down non return valve, non-return valve, gate valve; Features of a relief valve; Applications of quick closing valve; Purpose and application of a change over chests; Blanking of pipelines; Features of a mud box.

4-4-1-11-Deck machinery (2 hrs.T)

Knowledge of: Familiar with the construction and operating mechanism of deck machineries including mooring winch and windlass, boat winch, hatch cover systems, cargo handling gears, gang way system.





4-4-1-12-Steam propulsion plant machinery (18 hrs.T)

4-4-1-12-1-Rankine cycle (4 hrs.T)

Knowledge of: Stating that the Rankine cycle is the ideal cycle where the working fluid is used in both liquid and vapour phases (Steam power plant and Refrigeration plant); Describing the four main components of steam plant (The steam boiler which produces superheated steam from feed water, the required energy being supplied from the combustion of a fuel in air; The turbine(s) which adiabatically expand the high-pressure superheated steam to obtain useful output work (W); The condenser which receives the low-pressure exhaust steam from the turbine to cool and condense it to water; The feed pump which raises the pressure of the condensate to the boiler pressure and pumps it back into the boiler); Stating the Rankine cycle efficiency as the ratio: Energy derived from the cycle as useful work/Energy supplied to the cycle; Stating that the output energy of the cycle is the turbine work (W); Stating that the turbine work (W) is defined as the difference in energy contained in the superheated steam entering the turbine and the energy contained in the exhaust steam leaving the turbine; Stating that the energy input of the cycle is the energy transferred from the fuel during combustion in the boiler; Stating that since the working fluid is in both the liquid and vapour phases during the cycle then energy levels and other properties for the working fluid must be obtained from tables of thermodynamic properties; Draws and labels a simple line diagram of a steam plant, using "blocks" for the four main components and arrows to indicate flow of the working fluid and indicating energy values at important points in the cycle.

Proficiency in: Solving simple numerical problems related to the above objectives.

4-4-1-12-2-Basic construction (6 hrs.T)

Knowledge of: Names the materials used in the manufacture of the listed items, then describe with the aid of sketches, the assembled construction of these items (High pressure turbine casing; Low pressure turbine casing; Astern turbine casing; Low pressure turbine exhaust casing; High pressure turbine rotor; Low pressure turbine rotor; Receiver pipe; Reduction gear; Wheels; Pinions; Main condenser; Gland condenser gland packing steam leak-off reservoir; Gland packing steam reservoir; Gland packing steam leak-off reservoir; Gland packing; Gland steam make-up valve, Gland steam spill valve; Maneuvering valve; Astern guardian valve; Flexible coupling; Thrust bearing; Labyrinth packing; Nozzles; Moving blade and stationary blade; Shroud); Stating the feature of impulse turbine; Stating the feature of reaction turbine; Sketching types of turbine plant arrangement (Bleeder turbine; Extraction turbine; Regenerative turbine; Reheat turbine).

4-4-1-12-3-Operation principles (8 hrs.T)

Knowledge of: Explaining why main condenser is kept in vacuum; Explaining how to keep main condenser in vacuum; Describing the importance of draining inside turbine casing; Describing with the aids of a sketch/computer aided drawing, function of gland packing steam; Explaining the function of maneuvering valve; Explaining the role of extraction steam; Describing how gland steam pressure is controlled by make-up valve and spill valve; Describing how to keep the hotwell level of condenser; Explaining spinning operation; Explaining the meaning of throttle and nozzle governing which is the way of control of turbine output; Explaining meaning of auto-spinning system; Stating that the main turbines are provided with a satisfactory emergency supply of lubricating oil which will come into use automatically in case of failure of lubricating oil system;





Stating precautions before starting a steam turbine such as confirming steam line, gland steam line, lubricating oil line, condensate water line and circulating line; Describing briefly components constructing each associated system for a steam turbine; Stating preparations and procedures for start of a steam turbine; Describing briefly the control system and its components including their function; Stating the safety devices and their functions.

4-4-2-Safety and emergency procedures for operation of propulsion plant machinery, including control systems (3 hrs.T)

Knowledge and proficiency in: Being familiar with the emergency operation of the main engine from emergency stand; Main engine safeties including slow down and shut down; How they operate; How to reset; Main engine control system and its malfunctions; Procedure of local and emergency operation of steering gear system; Ensuring that all machinery and equipment involved of propulsion plant is in a state of immediate readiness and that an adequate reserve of power is available for steering gear and other requirements; Being informed of potentially hazardous conditions which may adversely affect the machinery or jeopardize the safety of life, ship or environment.

4-4-3-Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems (24 hrs.T)

4-4-3-1-Main engine and associated auxiliaries (4 hrs.T)

Knowledge and proficiency in: Main machinery and their associated systems and components; Preparation of main engine and relevant auxiliaries under time constraint; Warm up and cool down procedures; Stating the need to carry out main engine trial run and necessary precautions; Safe and efficient operation of main engine and its associated systems; Controlling and monitoring all engine parameters with reference to engine builder manual; Stating the importance of engine-room rounds to detect any sign of fault and malfunction; Early fault detection of main engine and relevant auxiliaries; Operation parameter margins/limits; Actions taken while fault is detected, slow down and shut downs; Correct operation and fault detection; Fast response; Avoiding and minimizing damage to components; Parts handling, storage and maintenance for the best performance; Avoid over temperature/pressure/stress and etc. to prevent damage; The critical speed.

4-4-3-2-Steam boiler and associated auxiliaries and steam systems (2 hrs.T)

Knowledge and proficiency in: Preparation of steam boiler for flash up; Test of all safeties; Function of control system; Water level monitoring; Operation; Boiler common faults and malfunction; Alarms; Shutdowns; Correct operation and avoiding damage; Damage caused by overheating, excess pressure, water shortage and burner failure.; Function of steam drum, Hotwell, Circulating and feed pumps, Condenser, Safety valves, Burners.

4-4-3-3-Auxiliary prime movers and associated systems (3 hrs.T)

Knowledge of: Function of Auxiliary prime mover parts, components and systems; Preparation before putting on load; Function and test of safeties(Electrical and mechanical); Load sharing; Correct operation; Running parameters; Maintenance as per manufacturer manual; Early fault detection; Alarms; Correct maintenance; Avoiding and minimizing damage.





4-4-3-4-Other auxiliaries, including refrigeration, air-conditioning and ventilation systems (15 hrs.T)

4-4-3-4-1-Purifier and fuel oil treatment (4 hrs.T)

Knowledge and proficiency in: Explaining the operation of a purifier; Explaining the function of gravity disk; Sludge discharging mechanism of an oil purifier; Approximate temperatures of the oil necessary both in the supply tank and immediately prior to centrifuging; Explaining precautions for starting purifiers and checking points to ensure a good working order; Describing the correct procedures for the disposal of waste oil, sludge residue.

4-4-3-4-2-Air Compressor (4 hrs.T)

Knowledge and proficiency in: Stating that cylinder lubrication must be kept to a minimum; Stating that cylinder lubricating oil should not have a flashpoint below 210°C and the use of synthetic lubricating oil to reduce a hazard; Describing the attention required to keep the intake air filter working effectively; Explaining the reason for fitting drain valves after air coolers; Describing the starting-up and stopping procedures; Explaining the principles upon which air compressors are run automatically; Describing the required quality for compressed air that is to be used in control systems.

4-4-3-4-3-Evaporators and distillers (4 hrs.T)

Knowledge and proficiency in: Describing the need for starting fresh water generator and the limitation of its use; Explaining the starting procedure for fresh water generator; Explaining why the density of the brine must be carefully controlled; Describing the type of scale deposited on the heating surfaces; Explaining how the scale described in the above objective is removed; Describing the function of a distiller as that of condensing fresh water from the vapour produced in an evaporator; Stating that if, during the evaporation process, a temperature of 75°C is not achieved, chemical agents must be added to the water to destroy any harmful bacteria which may be present; Explaining how the water is made potable.

4-4-3-4-4-Refrigeration (3 hrs.T)

Knowledge and proficiency in: Stating the preparation and precautions for starting a refrigeration system; Stating precautions and checking points on a refrigeration system during running; Stating how the operating conditions is identified; Stating what malfunctions/troubles likely to occur in refrigeration equipment; Describing the effect in refrigeration unit of air, moisture and oil; Explaining how to charge refrigerant into a refrigeration system and collection of gas in recovery bottle; Explaining how to charge lubricating oil into a refrigerator; Explaining how to remove air from a refrigeration system.

Competence 4-5: Operate fuel, lubrication, ballast and other pumping systems and associated control systems (16 hrs.T)

4-5-1-Operational characteristics of pumps and piping systems, including control systems (4 hrs.T)





Knowledge and proficiency in: The performance will deteriorate if the temperature of the liquid being handled approaches that at which vapor are produced at the pressure in the suction pipe; Performance deteriorates if the viscosity of the fluid increases; Stating that, if there is no positive head at the inlet to a centrifugal pump, a priming device must be used; The correct procedures for starting up and stopping.

4-5-2-Operation of pumping systems (8 hrs.T)

On board training scheme as per requirements of IMO regulations for various pumping systems.

4-5-2-1-Routine pumping operations (2 hrs.T)

Knowledge and proficiency in: Pumping system with refers to piping diagrams and location of concerned valves in the system; Recording of pumping operation; Ship stability consideration.

4-5-2-2-Operation of bilge, ballast and cargo pumping systems (6 hrs.T)

Knowledge and proficiency in: Operations are planned and carried out in accordance with established rules and procedures to ensure safety of operations and avoid pollution of marine environment; Routine pumping operations including bilge, ballast and cargo pumping systems; Stating that the viscosity of the fluid to be pumped must be within the range specified in the pump design; Sketching diagrammatic arrangement of a bilge pumping system, ballast pumping system, domestic fresh water and sea water pumping systems and states the function of each component in the system; Explaining, using a single line sketch, how a fire main is supplied, including connections with other pumps; Stating the minimum number of independently driven fire pump as laid down by international law; Explaining the purpose of the isolating valve.

4-5-3-Oily-water separators (or-similar equipment) requirements and operation (4 hrs.T)

4-5-3-1-Oily water separator (2 hrs.T)

Knowledge and proficiency in: Function of an oily water separator; Principle of operation of an oily water separator; General construction and material of components parts used; Maintenance and care required; Stating the principles of oil content meter attached to oily water separators/similar equipment; Explaining how to prevent oil being mixed into discharging bilge when oil content exceeds 15 ppm; Stating that the dumping of oil or oil-water mixtures is strictly prohibited; Stating that there is a legal maximum oil content of water to be discharged overboard.

4-5-3-2-Sewage treatment plant (2 hrs.T)

Knowledge and proficiency in: Principles of operation of a biological sewage treatment plant; Discharge tests of aerobic sewage plant (Suspended solid, biochemical oxygen demand, coliform count); Principles of operation of zero discharge system; Sewage retention system.





FUNCTION 5 : ELECTRICAL, ELECTRONIC AND CONTROL ENGINEERING AT THE OPERATIONAL LEVEL (45 hours Theoretical, 14 hours Practical)

Competence 5 : Operate electrical, electronic and control systems (30 hrs.T, 8 hrs.P)

5-1-Basic configuration and operation principles of the following electrical, electronic and control equipment (30 hrs.T, 8 hrs.P)

5-1-1-Electrical equipment (22 hrs.T, 6 hrs.P)

5-1-1-1-Introduction (6 hrs.T, 2 hrs.P)

Knowledge and understanding of: A review on Simple electric circuit; Ohm's Law; Series and parallel circuits; Electromotive force; Voltage; Units of current, Resistance, Voltage, Energy; Wheatstone bridge; Distribution of current in circuits; Unit of power(KW) and energy(J); Meaning of KWh; Current divider and voltage divider circuits; Common theorems used in analyzing electric circuits (KVL and KCL laws, thevenin and Norton, super-position and max power transfer); Magnetic flux and magnetic circuits; Hysteresis curve and losses, Flux density and intensity, m.m.f.; Magnetic field strength; Relative permeability; Reluctance; Role of air gap and its minimizing.

5-1-1-2-Generator and distribution systems (5 hrs.T)

5-1-1-2-1-Introduction (1 hrs.T)

Knowledge and understanding of: Electric machines; Motoring and generating; Classification of electric machines; Structure of rotating electric machines; Machine output equations; E.M.F equations; Torque and speed equation.

5-1-1-2-2-D.C. generator (2 hrs.T)

Knowledge and understanding of: Simple generators with a split ring and its waveform plus commutator and brushes; A practical shunt D.C. generator; Generators classification; Losses and efficiency; DC generators application on board and deck machinery.

5-1-1-2-3-A.C. Generator (2 hrs.T)

Knowledge and understanding of: Resistive, capacitive and inductive circuits; Single phase and 3-phase alternating current/voltage theories; RMS values; Phasors; Active and reactive powers; Apparent power and Power factor; A.C generators operation; Generator construction and cooling methods; Electrical routine checks and maintenances.

5-1-1-3-Preparing, starting, paralleling and changing over Generators (4 hrs.T)

Knowledge and understanding of: Checking and preparing procedures before starting and attempting paralleling generators; Parallel running of two power supply sources and required condition for such operation; Auto load sharing; synchronization; Back up 3-lamps system and synchroscop.





5-1-1-4-Electrical motors including starting methodologies (3 hrs.T, 2 hrs.P)

5-1-1-4-1-D.C. Motors (1 hrs.T)

Knowledge and understanding of: A simple D.C. motor; Motor equations; Motor classification; Speed control; Losses and efficiency; Starting and applications; Different types; The Speed, torque and power curves with results most common type on board, series type.

5-1-1-4-2-A.C. Motors (2 hrs.T, 2 hrs.P)

Knowledge and understanding of: Induction motor operation principle; Synchronous motors; Production of a rotating magnetic field; Synchronous speed; Types of rotor; Squirrel and double cage rotors; Wound rotors; Motor speed and slip; Torque-speed curves, Star-delta, auto-transformer and direct on line starting methods; Comparing advantages and disadvantages of all starting methods; Power and control diagram of the motor starting methods.

5-1-1-5-High-voltage installations (2 hrs.T)

Knowledge and understanding of: Advantages of utilising High Voltage; Major Risk Factors in HV systems; Maritime HV installations and safety working procedures.

5-1-1-6-Sequential control circuits and associated system devices (2 hrs.T)

Knowledge and understanding of: A State diagram; A Sequential function chart (SFC); Elements of state diagrams; States and transitions.

5-1-2-Electronic equipment (5 hrs.T, 1 hrs.P)

5-1-2-1-Characteristics of basic electronic circuit elements (2 hrs.T, 1 hrs.P)

Knowledge and understanding of: Conductors, insulators and semiconductors; Crystal structure; P-type and N-type materials; Diode; Forward and reverse bias; Diode as a switch; Half-wave rectifier; Full-wave rectifier; Transistor symbols.

5-1-2-2-Flowchart for automatic and control systems (2 hrs.T)

Knowledge and understanding of: Basic elements of control; Open loop and close loop systems; Understanding manual and automatic control system; The feedback control systems; Reference input; Controlled output; Controller, actuator, plant, transducer; The meaning of set point.

5-1-2-3-Functions, characteristics and features of control systems for machinery items, including main propulsion plant operation control and steam boiler automatic controls (1 hrs.T)

Knowledge and understanding of: Block and flow diagrams the various simple machineries control systems.





5-1-3-Control systems (3 hrs.T, 1 hrs.P)

5-1-3-1-Various automatic control methodologies and characteristics (1 hrs.T)

Knowledge and understanding of: Split type control; Integrated control system; U.M.S ship characteristics.

5-1-3-2-Proportional- Integral- Derivative (PID) control characteristics and associated system devices for process control (2 hrs.T, 1 hrs.P)

Knowledge and understanding of: Proportional control (P-type); Proportional band; Gain; Proportional control action; Off-set in the system; Derivative and differential controller; D-type derivative action signal; Derivative action time; Integral controller I-type; Integral action signal; Integral action time; Multiple term controllers; Controller's actions in response to process change.

Competence 5-2: Maintenance and repair of electrical and electronic equipment (15 hrs.T, 6 hrs.P)

5-2-1- Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment required before personnel are permitted to work on such equipment (4 hrs.T)

Knowledge and proficiency in: Dangers that can be encountered with electricity; Minimization of the risk; The secondary hazard; Electricity as a form of energy; The amount of shock current (threshold limit); The body resistance; The applied voltage; The effect of frequency; The duration of contact. Safe Electrical Systems/Equipments; Protective Devices; Safe Working Practices; Safety Planning; Proper Maintenances; Special operating procedures; Lockout/tag out High Voltage; Effective isolation of power supply; Clear notification; Safeguard against Direct Contact with Live Electrical system; Adequate insulation of live conductors; Adequate Isolation; Interlocking devices; Safeguards against Indirect Contacts Ground Fault Conditions; Indirect contact with electrical current; Grounding/Earthing on ships; Safe designed equipment; Working on board ship with electric hand tools; Disconnection of fuses and breakers; Automatic Protection; Use of lower voltages, 110 volts or lower suitable for lighting; Electrical safeties in Hazardous area; Documentation of permit to work on hazardous areas; Use of the instruments in hazardous area; Ex- type devices; Need for a step-down device; Emergency procedures in the event of an accident; Equipment emergency shutdown procedure; Electric shock first aid procedure; The need for first-aid training.

5-2-2-Maintenance and repair of electrical system equipment, switchboards, electric motors, generator and DC electrical systems and equipment (2 hrs.T, 1 hrs.P)

Knowledge and proficiency in: General maintenance method: (Corrective, planned and condition monitoring); Maintenance of general electrical equipments; Cables; Cable repairs; Main switchboard, bus bars insulators; Instruments; Main circuit breakers; Panels; Main and emergency lightings; Fuses and protective devices; Replacement procedure of fuses in 3- phase and high voltage system; Correct procedures and preparation of motors and starters for maintenance; Components required particular attention.





5-2-3-Detection of electric malfunction, location of faults and measures to prevent damage (1 hrs.T, 1 hrs.P)

Knowledge and proficiency in: Detecting and correcting faults in motors, starters and protection equipments; Common faults in power supply system and alternators; Low insulation readings of electrical equipments; Insulation Resistance tests and causes of failure.

5-2-4-Construction and operation of electrical testing and measuring equipment (3 hrs.T, 1 hrs.P)

Knowledge and proficiency in: Methods of measurement of current (I), voltage (V), resistance (R) and power (P); The importance of insulation readings IR; Megger equipment and safety concerns of electronic devices; Meaning of Continuity test and insulation test; Instrument transformers (CT's and VT's) and safeties; Sensors and transducers ; Calibration and testing.

5-2-5-Function and performance tests of the following equipment and their configuration (4 hrs.T, 2 hrs.P)

5-2-5-1-Monitoring systems (1 hrs.T)

Knowledge and proficiency in: Unmanned machinery space; Purpose of fully integrated control rooms; Computerized systems; Monitoring of different physical quantities (speed of ship, temperature measurements, air pressure measurement, tanks levels bilge and sludge, viscosity of fuel).

5-2-5-2-Automatic control devices (1 hrs.T)

Knowledge and proficiency in: The propulsion control systems, remote control of the main engines from telegraph, maneuvering lever in the wheelhouse and control room; Automatic start-reverse-stop and speed setting signal to the governor.

5-2-5-3-Protective devices (2 hrs.T, 2 hrs.P)

Knowledge and proficiency in: Essentiality of protecting electrical equipment; Protection of alternators: The over Current Inverse Time relay; Over Current Trip Instantaneous; Negative Phase Sequence; Differential measurement of current; Earth leakage relay; Under and over voltage; Under and over frequency; Lock out; Reverse power; Preferential trip.

5-2-6-The interpretation of electrical and simple electronic diagrams (1 hrs.T, 1 hrs.P)

Knowledge and Understanding of: Block diagram; Wiring diagram; Single line diagram; Power and control diagram; The symbols of electrical and electronic components; Block diagram of main engine automation; Direct on line starter power and circuit diagram.





FUNCTION 6 : MAINTENANCE AND REPAIR AT THE OPERATIONAL LEVEL
(43 hours Theoretical, 43 hours Practical, 24 hours Exercise)

**Competence 6 : Appropriate use of hand tools, machine tools and measuring instruments
for fabrication and repair on board (16 hrs.T, 43 hrs.P)**

**6-1-Characteristics and limitations of materials used in construction and repair of
ships and equipment (3 hrs.T)**

Knowledge and proficiency in: Choice of materials for marine engineering components; Mechanical properties of marine material and usage of cast iron; Definition of alloys; Usage and composition metals of brass, bronze and white metal; Normal range of carbon content in mild steel, cast steel, and cast iron; Ferrous and non-ferrous metal basic differences; Properties of alloying elements such as nickel chromium and molybdenum in marine steels.

6-2-Characteristics and limitations of processes for fabrication and repair (2 hrs.T)

Knowledge of: Various characteristics of metals such as ductility, tensile stress, brittleness; Differentiation between ferrous and non-ferrous metals and their applications (Only a simple comparison of metals commonly used in workshop for fabrication and repairs).

**6-3-Properties and parameters considered in the fabrication and repair of systems
and components (6 hrs.T, 2 hrs.P)**

6-3-1-Basic metallurgy, metal and processes (1 hrs.T, 2 hrs.P)

Knowledge of: Basic heat treatment processes, such as tempering, annealing, normalizing and hardening and their objectives; Heat treatment processes for common carbon steels and properties obtained in each case.

Proficiency in: Identifying samples of various metals; Carrying out basic heat treatment.

6-3-2-Non-metallic materials (1 hrs.T)

Familiarization With: Polymers and other non-metallic materials commonly used and their applications in marine plants.

6-3-3-Materials under load (2 hrs.T)

Knowledge of: Definition and types of stress; Strain in materials; Types of loading on materials; Definition of tensile, compressive and shear forces; Behavior of material under tensile, compressive and shear forces; Definition of elastic limit, yield point, ultimate strength, breaking strength, as applied to an elastic material; Definition and application of hook's law.





6-3-4-Vibration (2 hrs.T)

Knowledge of: Vibration; Vibration frequency; Causes of vibration with regard to unbalanced rotational and reciprocating forces; Main sources of vibration on a ship and its effects; Transmission of vibration; Anti-vibration materials; Stating that if a component is vibrating a reversing stress is present in the material; Stating that in normal working conditions the stresses due to vibrations are well within limits allowed for in the design; Stating that vibrations in a component may be from different sources, which can cause resonance and magnify the effect; Stating that if vibrations become excessive, the stresses induced can cause permanent damage; Stating that machinery should not be allowed to operate either at or close to a critical speed; Stating that critical speed ranges should be passed through as quickly as possible; Methods of reducing and importance of eliminating vibration.

6-4-Methods for carrying out safe emergency/temporary repairs (5 hrs.T, 23 hrs.P)

6-4-1-Permanent joints (2 hrs.T, 2 hrs.P)

Knowledge of: Making permanent joints; Riveting; Soldering; Arc Welding; The principle of common forms of riveted joints and range of rivets commonly used; The basic principle, types and applications of soldering; The main hazards of and precautions necessary when soldering; Self secured joints; Types of threaded fasteners; Use of black and bright nuts and bolts and set screws; Usage and identification of nuts, bolts and studs; Positive locking device and friction locking.

Proficiency in: Making riveted joints; Making soft and hard soldered joints; Making self secured joints; Identifying the different bolts and screws; Fitting studs and bolts using correct tightening procedure; Removing intact and broken studs and split nuts; Protecting finished surfaces.

6-4-2-Welding (3 hrs.T, 18 hrs.P)

Knowledge of: Principles of electric arc welding; Suitability of low, medium and high carbon steels; Welding and voltages used; Electrodes classifications; Purpose of electrode covering; Correct storage of electrode; Tools commonly used when welding; Different Welded joints in Low-Carbon steel; Common Faults in Welded Joints; Principles of thermal cutting; Basic principle of metal arc, gas-shielded and tungsten inert gas welding; Proportions of oxygen and acetylene to produce various flames; Dangers in handling gas cylinders and method of their safe storage; Safety fittings for an acetylene gas cylinder; Safety features of a gas pressure gauge; Principle parts of light pressure blow pipe and routine care necessary for blow pipe nozzles and hoses; Purpose of flash back arrestors; Purpose of the cylinder manifold system; Recognition of different gases using color codes; Left and right hand gas welding techniques and their respective limitations and advantages; Principle of cutting ferrous metals using oxy-acetylene equipment.

Proficiency in: Preparing plate edges for welding; Using correct electric arc gas welding techniques to make butt and fillet welded joints; Carrying out destructive and non-destructive tests on welded joints; Preparation to be made when using an oxygen fuel gas mixture; List of gases commonly used as fuel; Factors affecting quality of cutting; Thermal Cutting; Using an oxygen-fuel gas cutting torch to cut straight and curves in mild steel plate up to 10 mm thick and to crop mild steel sections; Observing Safety and Health when Welding; Wearing Protective clothing protect other personnel when welding; Dangers and effect of radiation from welding and means of dealing with it; Safety





measures when using welding and cutting equipments in a enclosed space; Inspection and testing of welding and fabrication process including pipe work.

6-4-3-Mechanical Cutting (2 hrs.P)

Knowledge of: Basic principles of mechanical cutting; Basic sheet metal cutting operations.

Proficiency in: Mechanical Cutting; Using hand or foot operated machine and small hand-held power tools.

6-4-4-Bonding (1 hr.P)

Knowledge of: The care necessary when using compounds and adhesives to make bonding; Advantage and disadvantages of adhesive bonding; Softening temperature for plastics; Sources and elements of adhesives; Purpose of activator in epoxy resin; Principle of welding Plastics.

Proficiency in: Selecting and using the correct adhesive for a variety of applications and strength testing.

6-5-Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools and measuring instruments (2 hrs.T)

6-5-1-Safe working practices Safety (2 hrs.T)

Knowledge of: Risks and Hazards inherent to any workshop or machinery space; Responsibility of the employee under the health and safety at work; Dangers associated with unsuitable clothing, ear muffs, safety harness; Safety and health risks which may arise when using adhesives, dangerous substances, chemicals, noxious liquid and gases.

6-6-Use of hand tools, machine tools and measuring instruments (18 hrs.P)

6-6-1-Hand tools (2 hrs.P)

Knowledge of: Selecting the correct hand Tools; Types of hacksaw, hammer, taps, die, scrapers, chisels and their applications.

Proficiency in: Use and selection of file, hacksaw, hammer, tap, die, scraper, chisel; Safety measures when using these tools.

6-6-2-Power tools (16 hrs.P)

Knowledge of: Types and the function of Drilling and milling machines; Component parts and drive system of a drilling machine; Operations which can be carried out by different types of drilling machine; Features of twist drill; Trepanning tools and reamers; Function of a shaping machine; Basic cutting action of a shaping machine; Component parts of a shaping machine; Selection of appropriate cutting tools for various cutting operations; Profile of a cutting edge; Essential requirements when setting-up a tool and dimensional tolerances; Usage of straight knife-edge and oblique cutting tools; Difference between grinding and sharpening tools; Function and types of cutting fluid; Function of a center lathe; The component parts and drive system of a center lathe;





Essential movement of a center lathe for various tasks; The purpose and uses of 3 and 4 jaws chucks, carriers, centers and face plate; Finding cutting speed for different tasks; Using center lathe for thread cutting and taper turning; Using center lathe to produce a mild steel bar with good surface finish, cutting threads, taper turning; Use of drills, boring tools on a lathe machine to produce holes to given specifications; Using a shaping machine and safety while producing simple forms to a given specification; Identification and usage of the appropriate cutting tools for various cutting operations.

Proficiency in: Inserting and removing drills with parallel and tapered shanks; Sharpening correctly; Usage of safety twist drills; Clamping and work holding safety; Using drilling machines to produce through and blind holes; Use of drill selection charts for threads and holes; Correct mounting and securing of cutting tools and arbor; Estimating speeds for commonly used materials; Use of milling machine to produce simple forms to a given specifications; Measurements; Safety and care necessary when using a Drilling or milling machine; Care necessary when using a shaping machine or center lathe; Care necessary when drilling soft materials.

6-7-Use of various types of sealants and packings (1 hr.T)

Knowledge and Proficiency in: Sealant, packing and joints material and use of their instruction manual for the compatibility with other materials; Safety consideration with the use of hazardous materials.

Competence 6-8: Maintenance and repair of shipboard machinery and equipment (27 hrs.T, 24 hrs.E)

6-8-1-Safety measures to be taken for repair and maintenance, including the safe isolation of shipboard machinery and equipment required before personnel are permitted to work on such machinery or equipment (4 hrs.T)

Knowledge and proficiency in: Use of safe working practice principle and safe isolation technics; Outline International Safety Management (ISM) code and Safety Management System (SMS); Implementation of safety procedures; Selection of procedures for the conduct of repair and maintenance in accordance with instruction manuals and identifying the correct tools for dismantling, inspection, repairing, reassembling and measurement; Commissioning and performance testing of equipment and systems after repair as per instruction manual; Identify risks (risk assessment) before commencing any repair or maintenance according to SMS; Recording the maintenance activity.

6-8-2-Appropriate basic mechanical knowledge and skills (2 hrs.T)

Knowledge and proficiency in: To acquire basic skills in order to carry out machinery maintenance and repair as per instruction manuals; Ability to work with lifting gear, considering the weight of parts; Lifting techniques; Use of correct and calibrated tool; Use of torque spanner, Hydraulic and pneumatic tools; Avoiding excess stress; Correct handling of parts; Application of seals gaskets; Avoiding ingress of impurities during maintenance; Hazards involved in working with cleansers, solvents, carbon remover.





6-8-3-Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment (6 hrs.T)

On board training scheme according to maintenance manuals of machinery.

Knowledge and proficiency in: Being familiar with different machinery documentations; Safety procedures; Selection of tools and spare gear; Considering the techniques such as marking technique, parts inspection before and during dismantling, labeling, taking photographs and recording measurements and replaced parts; Dismantling, examination, reassembling and adjustment of different type of machinery such as centrifugal pump (Casing, impeller, wear rings, shaft, bearings, gland, seal); Reciprocating pump (Cylinders, pistons, rings, valves, glands, relief valve); Screw and gear pump (Rotors, gears, seals, bearings, relief valves); Valves (Seat, lid, spindle); Air compressor (Suction and delivery valves, pistons and rings, bursting disc); Heat exchanger (Leakage, fouling tubes , tube plate); Diesel engines (Pistons, rings, bearings, heads, exhaust valves); Boiler (Mountings and etc.); Refrigeration system (Compressor, condenser, expansion valve) and any other machinery requires maintenance.

6-8-4-The use of appropriate specialized tools and measuring instruments (1 hr.T)

Knowledge and proficiency in: Being trained and familiar with specialized tools and measuring instruments as required by the machinery documentation and maintenance manuals; Importance of certificates and calibration of the tools and measuring instrument.

6-8-5-Design characteristics and selection of materials in construction of equipment (2 hrs.T)

Knowledge of: Basic metallurgy, metal and processes, Non-metallic materials, Materials under load, Vibration as mentioned in sec 3-1-3; Selection of materials according to design characteristics and construction of equipment.

6-8-6-Interpretation of machinery drawings and handbooks (12 hrs.T, 24 hrs.E)

Knowledge and proficiency in: Being familiar with the different machinery documentations; Pictorial Projection; Purpose of general arrangement plan; Component and assembly drawings; Use of collective and pictorial drawings; Meaning of tolerance, actual size, basic size and normal size; Meaning of clearance fit, transition and interference fit; Meaning of geometrical tolerances and related symbols; Application of lines; Meaning of 1st and 3rd angle projection and their symbols; Use of auxiliary projection; Drawing tangents; complete first and third angle projections; Draw third angle projection with hidden detail; Development; Drawing isometric projection of simple sides; Drawing oblique projections of simple solids; Drawing development of 90° intersection of circular trunking, a cone, a square pyramid; 3-dimension drawing; Perspective drawing; Exploded view of drawings; Tolerances; Part material; Parts list; Technical handbooks; Universal and iso standards; Conversion tables.

6-8-7-The interpretation of piping, hydraulic and pneumatic diagrams

Knowledge and proficiency in: Refer to 14-9-6 & on board training scheme machinery modulling and traceability of hydraulic and pneumatic piping system.





FUNCTION 3 : CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD AT THE OPERATIONAL LEVEL (113 hrs.T)

Competence 3 : Ensure compliance with pollution-prevention requirements (23 hrs.T)

3-1-Prevention of pollution of the marine environment, Knowledge of the precautions to be taken to prevent pollution of the marine environment (20 hrs.T)

3-1-1-International convention for the prevention of pollution from ships, 1973, and the protocol of 1978 relating thereto (MARPOL 73/78) (16 hrs.T)

Knowledge of: The precautions to be taken to prevent pollution of the marine environment; Procedures for monitoring shipboard operations and ensuring compliance with MARPOL.

1-Annex I (Regulation for the prevention of pollution by oil) (4 hrs.T)

Knowledge of: Oil, Oily mixture, Oil fuel, Oil tanker, Combination carrier, Nearest land, Special area, Instantaneous rate of discharge of oil content, Wing tank, Centre tank, Slop tank, Clean tank, Segregated ballast tank; Surveys and inspections required under the provisions of MARPOL73/78; States that certificate issued after International Oil Pollution Prevention (IOPP) survey; List conditions under which oily mixtures may be discharged into the Sea from an oil tanker; List of conditions under which oily mixtures from machinery-space bilges may be discharged into the sea; Applicable provisions for discharge of clean or segregated ballast; Conditions under which the provisions do not apply to the discharge of oily mixtures from machinery spaces where the oil content without dilution does not exceed 15 parts per million; Residues which cannot be discharged into the sea in compliance with the regulations and must be retained on board or discharged to reception facilities; Special areas for the purposes of Annex I that is Antarctic region, the Baltic Sea, Mediterranean sea, Black Sea, The Persian Gulf, Gulf of Aden, Red Sea and north-west European waters; Any discharge into the sea of oil or oily mixtures from an oil tanker or other ships of 400 tons gross tonnage and above is prohibited while in a special area; Conditions under which a ship, other than an oil tanker, may discharge oily mixtures in a special area; Conditions in which processed bilge water from machinery spaces may be discharged in a special area; Limitation, in new ships of 4, 000 gross tonnage and above and in new oil tankers of 150 gross tonnage and above, no ballast water should normally be carried in any oil fuel tank; Requirements for the provision of Oil Record Books ; Lists of entries to be made for machinery space operations in part A of the Oil Record Book and List of entries to be made in respect of cargo or ballast operations in oil tankers; Entries required for accidental or other exceptional discharge of oil and States that the Oil Record Book should be kept on board readily available for inspection and should be preserved for a period of three years after the last entry has been made.





***2-Annex II (regulation for prevention of pollution by noxious liquid substances in bulk)
(2 hrs.T)***

Knowledge of: Requirements of Annex II applicable to all ships carrying noxious liquid substances in bulk; Noxious liquid chemicals divided into four categories, X, Y, Z and OS; Conditions for the discharge of any effluent containing substances falling in those categories; More stringent requirements in special areas, which for the purposes of Annex II are the Baltic Sea area and the Black Sea area; Each ship certified for the carriage of noxious liquid substances in bulk should be provided with a Procedures and Arrangements Manual; Surveys required for ships carrying noxious liquid substances in bulk; Certificate issued on satisfactory completion of the survey (International Pollution Prevention); Certificate for the Carriage of Noxious Liquid Substances in Bulk.

***3-Annex III (Regulation for the prevention of pollution by harmful substances
carried by sea in packaged form) (2 hrs.T)***

Knowledge of: Requirement that empty receptacles, freight containers and portable road and rail tank wagons which have been used previously for the carriage of harmful substances are treated as harmful substances themselves unless precautions have been taken to ensure that they contain no residue that is hazardous to the marine environment; Requirement that packaging, containers and tanks should be adequate to minimize hazard to the marine environment; Requirements for marking and labeling of packages, freight containers, tanks and wagons; Documentation relating to the carriage of harmful substances by sea; Requirement that certain harmful substances may be prohibited for carriage of limited as to the quantity which may be carried aboard any one ship; Jettisoning of harmful substances is prohibition except for the purpose of securing the safety of the ship or saving life at sea.

4-Annex IV (Regulation for the prevention of pollution by sewage) (2 hrs.T)

Knowledge of: Provisions regarding allowable discharge of sewage into the sea and satisfactory treatment results.

5-Annex V (Regulation for the prevention of pollution by garbage) (2 hrs.T)

Knowledge of: Annex V (Garbage; Nearest land; Special area); The provisions of Annex V applicable to all ships; Disposal into the sea of all plastics is prohibited; Regulations concerning the disposal of other garbage.

6-Annex VI (Regulation for the prevention by emission from ships; Air pollution) (4 hrs.T)

Knowledge of: Annex VI (Continuous feeding; Emission; New installations; NOX technical code; Ozone depleting substances; Sludge oil; Shipboard incineration; Shipboard incinerator; SOX emission control area); Types of inspection required under Annex VI; Provision for the issuance of International Air Pollution Prevention certificate; Duration of validity of the IAPP certificate; Regulation regarding NOX in regulation 13 of Annex VI; requirement for SOX emission control area; Requirement for fuel oil quality in regulation 18 of Annex VI.





3-1-2-International convention relating to intervention on the high seas in cases of oil pollution casualties, 1969 (2 hrs.T)

Knowledge of: Describes the rights of Parties to the Convention to intervene on the high seas following a maritime casualty.

3-1-3-International convention on civil liability for oil pollution damage, 1969 (CLC 1969) Competence (2 hrs.T)

Knowledge of: Convention (Ship; Owner; Oil; Pollution damage; Preventive measures; Incident); Occurrences to which the Convention applies; Owner of a ship is strictly liable for any oil pollution damage caused by the ship as the result of an incident; Exceptions to liability.

3-2-Anti-pollution procedures and all associated equipment (1 hr.T)

Knowledge of: Major points of typical shipboard oil pollution emergency plan (SOPEP), a detailed description of the actions to be taken by persons on board in event of any pollution.

3-3-Importance of proactive measures to protect the marine environment (2 hrs.T)

Knowledge, understanding and proficiency in: Actions to ensure that a positive environmental reputation is maintained in respect to environmental damage; Offence under international law for pollution of the sea; Prohibition of dumping of oil or oil water mixture to sea; Legal maximum oil content of water to be discharged overboard; Requirement of pumping bilges through an approved oily water separator; Recording of information in log book which must be entered in the oil record book when pumping bilges; Precautions to be taken to avoid spilling when bunkering purpose of an incinerator for disposal of sludge and refuse; General requirement for discharge of effluent from a sewage plant; Responsibilities of master, officers and ratings on board for protecting the marine environment.

Competence 3-4 : Maintain seaworthiness of the ship (68 hrs.T)

3-4-1-Ship stability, Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment (44 hrs.T)

3-4-1-1-Understanding of the Working knowledge and application of Fundamentals of naval architecture (20 hrs.T)

Knowledge of: Wetted surface area; Wetted surface area calculation: (Calculating wetted surface area using transverse girths making; Calculating wetted surface area using Taylor's approximate formula); Stating the rules for area, volume and second moment of area of similar bodies; Similar figure and example; Pressure exerted by a liquid; Load on an immersed plane; Second moment of area; Theorem of parallel axes; The position of resultant force on submerged plane areas, i.e.. Center of pressure; Determining the position of the center of pressure; Solving problems involving foreseen submerged areas and calculation of the position of center of pressure (Limited to rectangular and circular shapes); Stress and strain diagram; Shearing force on bulkhead and stiffeners; Examples; Archimedes principle; Applying Archimedes principle to volume of displacement at any given draught is represented by the area of water plane area curve to that





draught; Calculating values of displacement for a range of draught and plot the displacement curve; Buoyancy; Relating buoyancy to displacement; LCB; VCB at any given draught; Position of the VCB; TPC; Deriving formula for TPC; Producing the curve of TPC against draught; Using TPC to determine the change in mean draught due to the addition or removal of small masses; Water plane area coefficient; Mid ship section area coefficient; Block coefficient; Prismatic coefficient; Solving problems relating to the coefficients of form specified; Stating Simpson's first rule for three ordinates; Demonstrating how Simpson's rule may be applied with intermediate ordinates; Using Simpson's rule to determine the first moment of area of a plane about an ordinate; Calculating the centroid of a plane; Using the theorem of parallel axis to determine the second moment of area of a plane about its neutral axis; Using Simpson's rule to determine first moment of area of a plane; Calculating the second moment of area of a water plane about the transverse axis passing through its centroid.

3-4-1-2-Ship stability, Working knowledge and application of Stability (12 hrs.T)

Knowledge of: Center of gravity; Longitudinal center of gravity (LCG); Vertical center of gravity (VCG); The importance of the position of the center of gravity in stability and trim calculation; moment of force; Changes in vertical , Longitudinal and transverse center of gravity due to loading, discharging or moving one or more masses; Calculating or moving one or more masses; Solving problems involving suspended masses; Calculating the change in vertical center of buoyancy due to a change in mean draught; Initial stability; Diagrams of stable, unstable and neutral; Tender and stiff ship; Transferred loads; Deriving an expression for the distance of the transverse metacentre above the center of buoyancy; Heights of center of buoyancy and metacentre above the keel calculated at regular intervals of draught and plotted to form the metacentric diagram; Calculating height of metacentre above keel for vessels of ship form and of simple geometric form; Solving problems relating to stability at small angles of heel; Producing an expression for transverse metacentric height due to moving a small mass across the ship; Amendments to obtain the light ship displacement and re-calculating the final light ship displacement and kg from and inclining experiment ; The application of the wall- sided formula; Constructing statical stability curves using cross of stability.

3-4-1-3-Trim and stress tables, diagrams and stress-calculating equipment (12 hrs.T)

Knowledge, understanding and proficiency in: Applying the concepts of longitudinal stability; How trim occurs; Longitudinal center of floatation (LCF); Loading or discharging of masses for maintaining the same trim; Longitudinal meta center and longitudinal meta centric height; Moment to change trim of ship by one centimeter (MCT1C); Calculating change of trim resulting from added, discharged and transferred loads; Constructing shear force and bending moment diagrams; Curves of weights, buoyancy and loads; Preparing shear force and bending moment diagrams for box shape vessels only; Using trim to find the position of the center of floatation; Loading a weight to keep the after draught constant.





3-4-2-Understanding of the fundamentals of watertight integrity (6 hrs.T)

Knowledge of: Effect of bilging on transverse stability; Permeability and stowage factor; Purpose of non watertight longitudinal subdivision of tanks; Moment of statical stability; Initial stability at large angles of heel; Effect of varying freeboard on stability; Movement of a ship with negative metacentric height; Dynamical stability; Load line rules for satisfactory stability.

3-4-3-Understanding of fundamentals actions to be taken in the event of partial loss of intact buoyancy (4 hrs.T)

Knowledge and Understanding in: Reserve buoyancy; Evaluating changes in draughts (Including the effect of permeability) due to bilging amidships compartment; Effect of bilging on longitudinal stability (trim); Find the final draughts due to bilging.

3-4-4-Ship construction, General knowledge of the principal structural members of a ship and the proper names for the various parts (14 hrs.T)

3-4-4-1-Ship dimension and form (2 hrs.T)

Knowledge of: The general arrangements of the most common type of near coastal merchant ships; Forms and dimensional terms used in ship construction of above mentioned vessels.

3-4-4-2-Ship stresses (2 hrs.T)

Knowledge of: Hogging, sagging, racking, panting, pounding; Stress by localized loading.

3-4-4-3-Hull structure (2 hrs.T)

Knowledge of: Detailed components of main and minor ship's structure; Standard steel sections; Framing system; Deck freeing arrangement.

3-4-4-4-Bow and Stern (2 hrs.T)

Knowledge of: Bow and stern arrangement and construction.

3-4-4-5-Fittings (2 hrs.T)

Knowledge of: Hatch cover arrangement and construction; Anchor, chain and mooring arrangement; Main components of derricks and deck crane; Cargo hold bilges and ballast system; Air pipe sounding pipes and container fitting arrangement.

3-4-4-6-Rudder and Propeller (4 hrs.T)

Knowledge of: Rudder types; Construction and its function; Principle of screw propulsion; Terms and definitions of propeller.





Competence 3-5: Prevent, control and fight fires on board

3-5-1-Fire prevention and fire-fighting appliances

Refer to STCW Table A-VI/3 for Competence in Advanced Fire-fighting.

3-5-1-1-Ability to organize fire drills

3-5-1-2-Knowledge of classes and chemistry of fire

3-5-1-3-Knowledge of fire-fighting systems

3-5-1-4-Action to be taken in the event of fire, including fires involving oil systems

Competence 3-6: Operate life-saving appliances

3-6-1-Life-saving

Refer to STCW Table A-VI/2-1 for Competence in Survival Craft and Rescue Boats other than Fast rescue boat.

3-6-1-1-Ability to organize abandon ship drills and knowledge of the operation of survival craft and rescue boats, their launching appliances and arrangements, and their equipment, including radio life-saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids

Competence 3-7: Apply medical first aid on board ship

3-7-1-Medical aid

Refer to STCW Table A-VI/4-1 for Proficiency in Medical First Aid.

3-7-1-1-Practical application of medical guides and advice by radio, including the ability to take effective action based on such knowledge in the case of accidents or illness that are likely to occur on board ship





Competence 3-8: Monitor compliance with legislative requirements (4 hrs.T)

3-8-1-Basic working knowledge of the relevant IMO conventions concerning safety of life at sea, security and protection of the marine environment (4 hrs.T)

Basic working Knowledge of: The relevant IMO conventions relating to Ship inspections; Marine machinery inspection; Hull construction; Hull inspection; Registration of ships; Steering appliances and equipment; Life saving equipment; Boat and fire drills; Fire detection and extinguishing equipment; Dangerous goods shipping; Oil pollution prevention; Sewage pollution prevention; Garbage pollution prevention; Pollutant discharge reporting; Safe working practices; Shipping casualties reporting; Tackling; Crewing; Engagement and discharge of seafarers; Rights of seafarers; Maintenance of discipline; Distressed seafarers; Provisions, health and accommodation; The international labour code, as applicable to shipping industry in relation occupational health and safety; Maritime law; United nations specialized agencies (International Maritime Organization and International Labour Organization); Port state and flag state; Law of the sea (UNCLOS) and related definitions (Conventions on the Law of the Sea; Territorial Sea and the Contiguous Zone; International Straits; High Seas; Protection and Preservation of the Marine Environment); International Convention on Load Line, 1966 (LL 1966), as amended; International Convention on Standards of Training, Certification and Watch keeping for Seafarers, 2010 (STCW), International Convention on tonnage Measurement of ships, 1969, International Convention for the safety of life at sea, 1974 as amended (SOLAS), [Chapter1 (General Provisions), Chapter 2(Construction [subdivision and stability, machinery and electrical installation] and [fire protection , fire detection and fire extinction]), Chapter 3 (Life Saving Appliances and Arrangement), Chapter 4 (Radio communication), Chapter 5 (Safety of Navigation), Chapter7 (Carriage of dangerous goods), Chapter 9 (ISM Code), Chapter 12 (ISPS)]; International Convention for the Control and Management of Ship's Ballast Water Sediments, 2004.

Competence 3-9: Application of leadership and team working skills (18 hrs.T)

3-9-1-Working knowledge of shipboard personnel management and training (3 hrs.T)

Knowledge of: Term "Management"; Following management activities: (Planning; Organizing and Staffing; Directing; Controlling); Roles of company's objectives and goals; Management policy with respect to ships; Managerial issues on: (Operations; Finance; Communications); The company's expectations for ship's officers; Organizing the staff for emergency duties and the use of safety equipment; Organization of repairs and surveys; Training of staff for both normal and emergency duties; Supervision of staff in the absence of ideal safe working conditions.

3-9 -2-A knowledge of related international maritime conventions and recommendations and national legislation (2 hrs.T)

Knowledge of:General knowledge of Islamic Republic of Iran national legislations for implementing international agreement and conventions.





3-9-3-Ability to apply task and workload management, including (4 hrs.T)

3-9-3-1-Planning and coordination (1 hrs.T)

Knowledge of: Planning and use of resources for executing a job; Maintenance planning system; Main elements and objectives of a maintenance planning; Planning system on maintenance books and planning board; Operation cycle of a maintenance planning system based on time schedule; Planning in preparation for emergency action.

3-9-3-2-Personnel assignment (1 hrs.T)

Knowledge of: Evaluating personnel abilities; Assignment of different maintenance jobs to carry out by competent personnel; Preparation of a maintenance planning system for a ship.

3-9-3-3-Time and resource constraints (1 hrs.T)

Knowledge of: Fuel consumption; Reasons for off hire; Port time; Engine efficiency; Machinery break down; Hull corrosion and cracking; Marine growth; Class survey; Lack of spare parts and service facilities; Maintenance in terms of possible reduction in off hire , repair work and fuel consumption and/or increase in speed.

3-9-3-4-Prioritization (1 hrs.T)

Knowledge of: Maintenance jobs according to their importance or urgency, and in relation to the maintenance budget and return on investment; Maintenance planning systems.

3-9-4-Knowledge and ability to apply effective resource management (5 hrs.T)

3-9-4-1-Allocation, assignment, and prioritization of resources (1 hrs.T)

Knowledge of: Resources are allocated and assigned as needed in correct priority to perform necessary tasks; Identify type and scale of the tasks; Initiate actions conform to the emergency procedures and contingency plans for the ship; The order of priority, and the levels and time scales of solving problems and informing personnel on board, are relevant to the nature of the emergency and reflect the urgency of the problem, in order to take promptly.

3-9-4-2-Effective communication on board and ashore (1 hrs.T)

Knowledge of: English language to enable the officer to use maker's manuals and to perform engineering duties; Communicating clearly and understand others; Transmitting information relating to machinery components by means of simple drawings with supplementary notes and specifications; Demonstrating "effective communication" (Oral, Written & Non-Verbal) with others; Interpretation and carry out verbal instructions.





3-9-4-3-Decisions reflect consideration of team experiences (1 hrs.T)

Knowledge of: Processing of group meeting management; Sources of organizational conflict; Techniques for preventing group conflicts; Analyses some important factors that may affect group behavior, discipline and the amount of work done by the crew; Efficient method of establishing an open communication style on board that encourages challenges and appropriate responses from the team; Need for evaluation of outcomes effectiveness; Team member(s) share accurate understanding of current and predicted engine room and associated systems state, and of external environment, and take necessary actions.

3-9-4-4-Assertiveness and leadership, including motivation (1 hrs.T)

Knowledge of: Transactional leadership; Transformational leadership; Democratic leadership; Autocratic leadership; Directive leadership; Supportive leadership; Participative leadership; Achievement-oriented leadership; Factors that influence the way the leaders' behavior affects subordinates' response: (Job pressure; Job satisfaction; Subordinates' need for information; Subordinates' expectations); Assessment of personnel competence and capabilities and operational Requirements with effective leadership behaviors in order to tackle the jobs.

3-9-4-5-Obtaining and maintaining situational awareness (1 hrs.T)

Knowledge of: Keeping the operation of the propulsion plant under control during any situation; responding to bridge maneuvers at any time; Informing the bridge or a superior officer of any abnormal situations; Preparing the main and auxiliary machinery for maneuverings operations; Determining order of priority among problems encountered; Resolving problems in an orderly manner; Writing appropriate entries in a log book and notice unusual readings; Writing appropriate entries in the Oil Record Book; Bringing the propulsion system back on line after a power failure; Transferring controls from bridge to engine room.

3-9-5-Knowledge and ability to apply decision-making techniques (4 hrs.T)

3-9-5-1-Situation and risk assessment (1 hrs.T)

Knowledge of: Identifying potential risk on board; Importance of carryout situation and risk assessment before commencing major operation; Risk assessment procedure; Objective and scope of assessment; Implementation of risk reduction measure and preventive actions for the risk factors; The potential risk in safety and health activities for the ship and crew; The change of working condition and operational circumstances and personal resource.

3-9-5-2-Identify and consider generated options (1 hrs.T)

Knowledge of: Preparation and plan of risk assessment; Method of risk assessment; Risk grade; Countermeasures for the risk assessment; Risk control affairs on shipboard; Identification of new risk; Monitoring and improvement.





3-9-5-3-Selecting course of action (1 hrs.T)

Knowledge of: Preparation, implementation and general management of risk assessment plan; Setting up and distribution of standards for the risk assessment and grade; Training ship' personnel for the technique of the risk assessment and risk control.

3-9-5-4-Evaluation of outcome effectiveness (1 hrs.T)

Knowledge of: Review the effectiveness for risk assessment; Evaluate periodically the implementation of the risk assessment and risk control; Updating of safety and health information related to task in charge.

Competence 3-10: Contribute to the safety of personnel and ship

3-10-1-Knowledge of personal survival techniques

Refer to STCW Code Table A-VI/1-1 for Competence in personal survival techniques.

3-10-2-Knowledge of fire prevention and ability to fight and extinguish fires

Refer to STCW Code Table A-VI/1-2 for Competence in fire prevention and fire fighting.

3-10-3-Knowledge of elementary first aid

Refer to STCW Code Table A-VI/1-3 for Competence in elementary first aid.

3-10-4-Knowledge of personal safety and social responsibilities

Refer to STCW Code Table A-VI/1-4 for Competence in personal safety and social responsibility.





5-7 facilities and equipment required for conducting the course:

Apart from those facilities, equipments and or requirements mentioned in Code of practice for approval and monitoring of maritime training courses followings have to be provided:

5-7-1 Classroom with air conditioning facilities, sufficient lighting and other facilities, suitable for delivering theoretical subjects

5-7-2 library with related technical books and references

5-7-3 English lab with audio and visual facilities.

5-7-4 Mechanical laboratory (Materials and equipment)

- 1- Portable refrigeration demonstration unit, to show evaporation and condensation.
- 2- Four-stroke diesel engine on a test bed, fitted with a dynamometer, fuel flow meter, cooling water thermometer and RPM indicator (tachometer).
- 3- Acidic, alkaline and neutral solutions.
- 4- Alkalinity/acidity indicators such as litmus papers.
- 5- Samples of aluminum and copper with an oxide.
- 6- Samples of pitting corrosion.
- 7- Samples of graphitized cast Iron.
- 8- Samples of gasoline, kerosene, diesel fuel, boiler residual fuel oil and a viscometer.
- 9- A water- content measurement apparatus.
- 10- Work benches fitted with vices, tool storage lockers and cabinets.
- 11- Portable power tools such as drilling machines, small bench or pedestal grinder.
- 12- Measuring equipment: external and internal verniers, inside and outside calipers, standard adjustable inside and outside micrometers, depth and dial gauges (Mechanical or electronic).
- 13- Hand tools: chisels, center punches, hacksaws, scrapers, drills, bits, reamers, hammers, taps and dies, nuts, spanners and wrenches, files.
- 14- A marking table.





- 15- Scribes, scribing blocks, try-square, trammels, protector, dividers, straight-edge.
- 16- Bending machine for small-diameter pipes.
- 17- Oxy-acetylene brazing and cutting equipment.
- 18- Electric arc-welding equipment.
- 19- Working benches.
- 20- Soldering equipment.
- 21- Protective clothing, including aprons, gloves, masks, goggles and welding boots.
- 22- Fume extraction/ventilation.
- 23- Gas bottles storage.
- 24- Welding electrodes.
- 25- Filler rods.
- 26- Steel plates up to 10 mm thick.
- 27- Various steel bars, pipes angles and sections.
- 28- Metal-turning lathes including:
 - a- Three –and four-jaw chucks
 - b- Face-plates
 - c- Drill bits
 - d- Tool holders
 - e- Protective equipment
 - f- Various lathe tools: straight parting tool, round nose, finishing, cranked and boring tools
- 29- A range of cutting tools.
- 30- Work-securing vice.





5-7-5 Electrical and electronic engineering laboratory and workshop

1 Apparatus to demonstrate static electricity, examples of electrical diagrams (i.e., block system, circuit and wiring diagrams); apparatus to demonstrate control circuit ammeters, voltmeters, watt meters, megger tester, wiring connectors, resistors, electrical source, a selection of marine cables, equipment and cable runs for testing purpose, insulation testers, continuity testers, digital and analogue multi-meters, thermistors, diodes, a clampmeter, live-line tester, lead-acid and alkaline batteries, a charging circuit distilled water, hydrometer, magnets, iron filing solenoid iron-cored solenoid, induction coil, model A.C and D.C generators used A.C and D.C generators and motor, motor starters, switches, circuit breakers, fuses, a sectioned transformer, equipment suitable for use in oil, gas and chemical tankers (intrinsically safe).

2 Over currents, reverse-power and under voltage-protection relays, high-rupturing-capacity fuses and housings, preferential trips, instrument and relay transformers, a main switch board, emergency switch board, operational three-phase terminal box, automatic voltage regulator, induction motors with direct on-line and star-delta and autotransformer starters, speed controllers, a selection of lighting equipment, a model navigation light system.





5-8 Lecturers and instructors minimum qualifications

Lecturers and instructors shall have completed a course in instructional techniques (TFT) in one of the training centers approved by the PMO, and;

5-8-1 for lecturing in theoretical subjects should;

5-8-1-1 possess minimum general diploma which is approved by ministry of education.

5-8-1-2 possess valid third engineer certificate of competency for ships of $KW \geq 750$ engaged on unlimited voyages with minimum 12 month of seagoing service in that rank; Or

5-8-1-3 For lecturing theoretical subjects mentioned in this code of practice as mentioned in chart 5-6-1 column 1, 2, and 4 lecturers must possess valid second engineer certificate of competency for ships of $KW < 3000$ engaged on unlimited voyages as well as having one year of seagoing service in that rank.

5-8-1-4 For lecturing electro-technology subjects as mentioned in this code of practice as mentioned in chart 5-6-1 column 3 lecturers must possess at least relevant Master of Science degree or have electro technology valid certificate of competency with one year of seagoing service experiences on ships of $KW \geq 3000$ engaged on unlimited voyages.

5-8-1-5 holders of Master of Science degree in ship architecture and shipbuilding or second engineer and chief officer certificate of competency for ships of $GT \geq 3000$ engaged on unlimited voyages with six month of seagoing service experience can be assigned in teaching ship stability and ship construction subjects.

5-8-1-6 training officer for the cadets on board training should;

5-8-1-6-1 in addition to completing a course in instructional techniques (TFT) in one of the training centers approved by the PMO, should Possess valid second engineer certificate of competency for ships of $KW < 3000$ engaged on near coastal voyages as well as having one year of seagoing service in that rank.

5-8-2 for delivering practical training should;

5-8-2-1 possess minimum mechanical higher diploma as well as having 12 months

of seagoing service; Or

5-8-2-2 possess valid engine rating certificate of proficiency and 3 years of experience

on that rank on merchant ships.





5-9 Assessment and Certification

- 5-9-1 upon successful completion of the examination which is carried out during and at the end of the course, the trainee will be awarded relevant course completion certificate issued by the approved training center;
- 5-9-2 then after trainee applies for the PMO competency assessments specified in above paragraph 5-6-1; and
- 5-9-3 finally, Seafarers' Examination and Documents Directorate of the PMO will issue a CoC for those candidates who have passed above mentioned PMO competency assessments and fulfill other relevant certification requirements set out in the "Codes of practices for issuing, revalidation and renewing certificates for seafarers".

5-10 revalidation/renewal of certificates:

- 5-10-1 CoPs and CoCs will be revalidated and renewed in accordance with provisions of the "Codes of practices for issuing, revalidation and renewing certificates of competency for seafarers".

5-11 course approval:

- 5-11-1 It will be carried out as per code of practice for approval and monitoring of maritime training courses.

6-Records

- 6-1 All records which present the implementation of the content of this code of practice.

7- References

- 7-1 STCW Convention and STCW Code;
- 7-2 IMO Model course number 7.04
- 7-3 Code of practice for approval and monitoring of maritime training courses; and
- 7-4 Codes of practices for issuing, revalidation and renewing certificates for seafarers.

8- Appendixes

Nil.

