



سازمان بنادر و دریانوردی

دستور العمل اجرایی برگزاری دوره آموزشی تطبیقی سمت

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

The Code of Practice for Conducting Second Engineer Officer on
Ships of Propulsion Power KW<3000 Engaged on Near
Coastal Voyages Upgrading Training Course

کد مدرک : P6-W102

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صفحه: ۱ از ۱۰





سازمان آموزش و پرورش دریایی

دستورالعمل اجرایی برگزاری دوره آموزشی تطبیقی ست افسر مهندس دوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک بر ساحل
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کد مدرک : P6-W102/2

شماره صفحه : ۲ از ۱۰

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	
۷	مسئولیت ها	۴	
۷	روش اجرا	۵	
۷	هدف از برگزاری دوره آموزشی		۵-۱
۷	طول دوره		۵-۲
۷	تعداد شرکت کنندگان دوره		۵-۳
۸	شرایط ورود به دوره		۵-۴
۸	دانش، درک و مهارت مورد نیاز		۵-۵
۸	عناوین دروس و ریز مواد درسی		۵-۶
۸	مواد درسی دوره تطبیقی افسر مهندس دوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک به ساحل		
۹	امکانات مورد نیاز جهت برگزاری دوره		۵-۷
۹	شرایط مدرسین و مربیان دوره		۵-۸
۱۰	ارزیابی و صدور گواهینامه		۵-۹
۱۰	شرایط تمدید/تجدید گواهینامه		۵-۱۰
۱۰	روش تایید دوره		۵-۱۱
۱۰	سوابق		۶
۱۰	مراجع	۷	
۱۰	ضمائم	۸	





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شماره صفحه : ۳ از ۱۰

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مقدمه

سازمان بنادر و دریانوردی در 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 هرگونه 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 نگرهبانی دریانوردان (STCW- as amended) مصوب مرداد ماه سال ۱۳۷۵ مجلس شورای اسلامی و با عنایت به بند ۴ از مقرر ۱/۱۱ کنوانسیون مذکور ، این "دستورالعمل اجرایی برگزاری دوره آموزشی تطبیقی سمت افسر مهندس دوم 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



سازمان مازو دریانوردی

دستورالعمل اجرایی برگزاری دوره آموزشی تطبیقی سمت افسر مهندس دوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک بر ساحل
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۱- هدف از تدوین

هدف از تدوین این دستورالعمل ارائه حداقل نیازمندیهای برگزاری دوره آموزشی سمت تطبیقی افسر مهندس دوم بر روی کشتی های 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 تطبیقی افسر مهندس دوم بر روی کشتی های 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.

۱- ۳ مصوب (Approved)

به معنای مصوبات اداره استانداردهای دریانوردان مطابق با دستورالعمل های سازمان بنادر و دریانوردی می باشد

۲- ۳ گواهی خدمت دریایی مورد تایید (Approved 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 می بایست علاوه بر ثبت در شناسنامه دریانوردی ، تأییدیه 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 است.

۳- ۳ گواهینامه شایستگی (Certificate of Competency)

به معنای گواهینامه صادره و یا شناسایی شده ای است که مطابق الزامات فصل های ۲، ۳، ۴ و یا ۷ کنوانسیون برای فرماندهان، افسران و افسران مهندس الکترونیک صادر و یا تایید می شود و دارنده ی قانونی آن محق به خدمت در مقام و عمل به وظایف مربوطه در سطح مسئولیت مشخص شده در آن است.

۴- ۳ دستگاه نظارت مرکز (Central Monitoring Office)

به معنای اداره یا بخشی که وظیفه صدور مجوز فعالیت آموزش دریانوردی و نظارت بر مراکز آموزشی را بر عهده دارد. دستگاه نظارت در ستاد سازمان ، اداره استانداردهای دریانوردان می باشد. مدیر کل امور دریانوردان نیز جزء دستگاه نظارت مرکز بوده و می تواند صدور مجوز فعالیت آموزش دریانوردی و نظارت بر مراکز آموزش دریانوردان را تایید نماید.



سازمان مازو دریانوردی



۳-۱۳ 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.

۳-۱۴ ماه (Month)

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

۳-۱۵ افسر (Officer)

به معنای عضوی از خدمه ی شناور به غیر از فرمانده است که بر اساس قوانین و مقررات ملی و یا بین المللی انتخاب شده باشد.

۳-۱۶ سازمان (Ports & Maritime Organization of Iran (Islamic Republic)

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

۳-۱۷ 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.

۳-۱۸ 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.

۳-۱۹ افسر مهندس دوم (Second Engineer Officer)

به معنای افسر مهندسی است که جانشین افسر سر مهندس است و مسئولیت رانش مکانیکی و عملیات و نگهداری تاسیسات الکتریکی و مکانیکی کشتی را در مواقع عدم توانایی سر مهندس بر عهده دارد.

۳-۲۰ کنوانسیون (STCW Convention)

به معنای کنوانسیون اصلاح شده بین المللی استانداردهای آموزشی، صدور گواهینامه و نگرهبانی دریانوردان (STCW-78 as amended) می باشد.

۳-۲۱ آئین نامه ی کنوانسیون (STCW Code)

به معنای آئین نامه ی آموزش، صدور گواهینامه ها و نگرهبانی دریانوردان (STCW) که طی قطعنامه ی شماره ۲ کنفرانس 1995 تصویب که ممکن است توسط سازمان بین المللی دریانوردی بر اساس اصلاحیه های بعدی تغییر یابد.





۳-۲۲ سفرهای نامحدود (Unlimited Voyages)

به معنای سفرهای بین المللی 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 این دوره آموزشی ، آماده نمودن فراگیران برای کسب توانمندی های مندرج در بند ۱-۶-۵ این دستورالعمل می باشد

۵-۲ طول دوره

۵-۲-۱- طول دوره حداقل ۷۰ ساعت به صورت نظری (تئوری)

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 آموزش و تدارکات دریایی

کد مدرک : P6-W102/2

شماره صفحه : ۸ از ۱۰

دستورالعمل اجرایی برگزاری دوره آموزشی تطبیقی سمت افسر مهندس دوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک بر ساحل

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۴-۵ - شرایط ورود به دوره

- ۱-۴-۵ - دارای گواهینامه سلامت پزشکی معتبر بر اساس دستورالعمل مصوب سازمان
- ۲-۴-۵ - دارا بودن مدرک معتبر مهندس دوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک به ساحل و یا گواهی موفقیت آمیز طی دوره فوق.

۵-۵ - دانش ، درک و مهارت مورد انتظار:

- ۱-۵-۵ - کسب اطلاعات کافی در خصوص راه بری نیروی انسانی و ماشین آلات موتور خانه
- ۲-۵-۵ - کسب اطلاعات کافی در خصوص مدیریت تعمیر و نگهداری ماشین آلات موتورخانه و عرشه
- ۳-۵-۵ - کسب توانایی بر عهده گیری مدیریت مستقل فنی کشتی
- ۴-۵-۵ - کسب مهارت در اتخاذ تدابیر لازم و عملی به جهت پیاده سازی قوانین ایمنی
- ۵-۵-۵ - کسب مهارت در اتخاذ تدابیر لازم به جهت حفاظت از محیط زیست
- ۶-۵-۵ - کسب توانایی در مدیریت و پیاده سازی دستورات مافوق و ایجاد ارتباط در محیط کاری و همچنین

آموزش نفرات تحت نظر

۶-۵ - عناوین دروس و ریز مواد درسی

- عناوین دروس و ریز مواد درسی مربوطه برای داوطلبین دوره آموزش تطبیقی سمت افسر مهندس دوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک به ساحل به شرح ذیل می باشد
- ۱-۶-۵ - حداقل مواد درسی دوره آموزش تطبیقی سمت افسر مهندس دوم بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک به ساحل ، در بخش انگلیسی این دستورالعمل می باشد .



سازمان آموزش و تدارکات دریایی



سازمان بازرسی دریانوردی

دستورالعمل اجرایی برگزاری دوره آموزشی تطبیقی سمت افسر مهندس دوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک بر ساحل
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شماره صفحه : ۹ از ۱۰

۵-۷- امکانات مورد نیاز جهت برگزاری دوره

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

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

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

۵-۸- شرایط مدرسین و مربیان دوره

۵-۸-۱- مدرسین

۵-۸-۱-۱- حداقل مدرک تحصیلی لیسانس مهندسی کشتی و یا مهندسی مکانیک موتورهای دریایی.

۵-۸-۱-۲- گواهینامه شایستگی معتبر افسر سرمهندس بر روی کشتیهای با قدرت رانش کمتر از ۳۰۰۰ کیلووات سفرهای نزدیک به ساحل با حداقل ۱۲ ماه خدمت دریایی در آن سمت; و یا

۵-۸-۱-۳- گواهینامه شایستگی معتبر افسر مهندس دوم بر روی کشتی های با قدرت رانش ۳۰۰۰ کیلووات یا بیشتر سفرهای نامحدود با حداقل ۱۲ ماه خدمت دریایی در آن سمت.

۵-۸-۱-۴- دارندگان مدرک فوق لیسانس مرتبط یا گواهینامه شایستگی افسر مهندس الکترونیک که حداقل ۱ سال بر روی کشتیهای با قدرت رانش ۳۰۰۰ کیلووات یا بیشتر و در سفرهای نامحدود خدمت نموده اند، با ۲ سال تجربه کاری می توانند مدرس بخشهای برق و الکترونیک باشند.

۵-۸-۱-۵- دارندگان مدرک فوق لیسانس در رشته های معماری و سازه کشتی یا مهندس دوم بر روی کشتی های با قدرت رانش ۳۰۰۰ کیلووات یا بیشتر سفرهای نامحدود و یا افسر اول بر روی کشتی های با ظرفیت ناخالص ۳۰۰۰ تن یا بیشتر سفر های نامحدود با حداقل یک سال تجربه تدریس می توانند مدرس بخشهای آرشیتکت کشتی باشند.

۵-۸-۲- مربیان

۵-۸-۲-۱- دارای حداقل مدرک تحصیلی فوق دیپلم مکانیک دریایی با حداقل ۲۴ ماه خدمت دریایی; و یا

۵-۸-۲-۲- دارای گواهینامه معتبر ملوان موتور با حداقل ۵ سال خدمت دریایی بر روی شناورهای تجاری.





سازمان بنادر و دریانوردی

دستورالعمل اجرایی برگزاری دوره آموزشی تطبیقی سمت افسر مهندس دوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک بر ساحل
The Code of Practice for Conducting Second Engineer Officer on Ships of Propulsion
Power KW<3000 Engaged on Near Coastal Voyages Upgrading Training Course

کد مدرک : P6-W102/2

شماره صفحه : ۱۰ از ۱۰

۹-۵- ارزیابی و صدور گواهینامه

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

۹-۵-۲- متعاقبا اداره امتحانات و اسناد دریانوردن سازمان بر اساس مفاد دستورالعمل صدور، تمدید و تجدید گواهینامه های شایستگی و مهارت دریانوردان و رعایت دیگر شرایط لازم گواهینامه شایستگی و یا مهارت دریانوردی مرتبط 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 تایید دوره

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

۶- سوابق

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

۷- مراجع

۷-۱- دستورالعمل صدور، تمدید و تجدید گواهینامه های شایستگی و مهارت دریانوردان.

۷-۲- دستورالعمل اجرایی برگزاری دوره آموزشی تطبیقی سمت افسر مهندس دوم بر روی کشتی های با قدرت رانش کمتر از ۳۰۰۰ کیلووات - سفرهای نزدیک به ساحل .

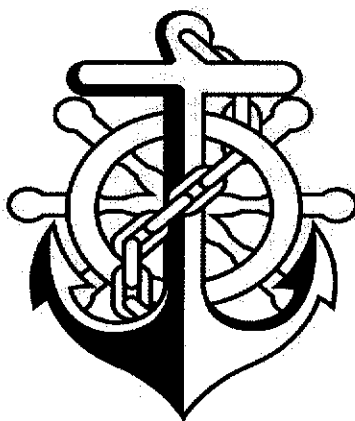
۷-۳- دستورالعمل صدور مجوز و نظارت بر اجرای دوره ها در مراکز آموزشی دریانوردی.

۸- ضمیمه

ندارد



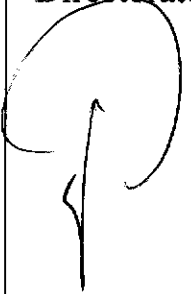

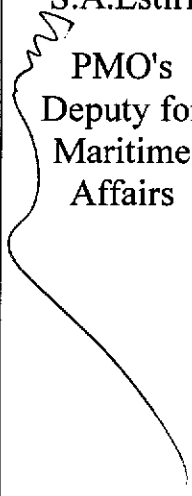
هیئت عامل سازمان بنادر و دریانوردی



PMO

**The Code of Practice for Conducting Second Engineer Officer
on Ships of Propulsion Power KW<3000 Engaged on Near
Coastal Voyages Upgrading Training Course**

P6-W102

Revision No.	Date of revision	Comment on revision	provider	approving amendments authority	endorsing amendments authority
02	18/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	
5	Procedure	7	
	5-1	Course objective	7
	5-2	Course duration	7
	5-3	Number of trainees	7
	5-4	Course entry requirements	7
	5-5	Expected knowledge, understanding and proficiency	8
	5-6	Course syllabi	9
	5-7	Facilities and equipment required for conducting the course	32
	5-8	Lecturer and instructor minimum qualifications	32
	5-9	Assessment and Certification	33
	5-10	Revalidation and renewal of certificates	33
5-11	Course approval	33	
6	Records	33	
7	References	33	
8	Appendices	33	





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 I/11, paragraph 4 of the mentioned Convention, develops this "code of Practice for Conducting Second Engineer Officer on Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages Upgrading Training Course " 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 Second Engineer Officer on Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages Upgrading Training Course.

2 Scope of application

This code of practice is applicable to all approved training centers that conduct Second Engineer Officer on Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages Upgrading 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 Central Monitoring Office

Central monitoring office which is responsible for approving and monitoring training courses is the Seafarer's standard directorate of the PMO.

3-5 Chief Engineer Officer

Means the senior engineer officer responsible for the mechanical propulsion and the operation and maintenance of the mechanical and electrical installations of the ship.





3-6 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

3-7 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.

3-8 Course Completion Certificate or Documentary Evidence

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

3-9 Engineer officer

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

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 Medical fitness certificate Issuing Center

Means a center in which candidates are to be tested medically as per requirement of relevant Code of Practice

3-13 Merchant Ship

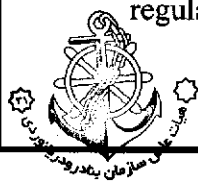
Means any ship (other than servicing vessel, mobile offshore platform, fishing and naval ships) used for carriage of cargoes, passenger and/or provisions

3-14 Month

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

3-15 Officer

Means a member of the crew, other than the master, designated as such by national law or regulations or, in the absence of such designation, by collective agreement or custom.





3-16 PMO

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

3-17 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.

3-18 Seagoing service

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

3-19 Second Engineer Officer

Means the engineer officer next in rank to the chief engineer officer and upon whom the responsibility for the mechanical propulsion and the operation and maintenance of the mechanical and electrical installations of the ship will fall in the event of the incapacity of the chief engineer officer.

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 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 course is to upgrade the competencies of trainees to those set out in paragraph 5-6 of the "code of practice for conducting second engineer on ships of propulsion power KW<3000 engaged on near coastal voyages.

5-2 course duration

- 5-2-1 A minimum of 70 hours theoretical 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.

5-4 Course entry requirement

The course trainees should, at least;

- 5-4-1 hold valid medical fitness certificate issued by a medical practitioner recognized by the PMO;
- 5-4-2 hold valid certificate of competency as second engineer officer for Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages, or above mentioned course completion certificate.





5-5 Expected Knowledge, Understanding and Proficiency

- 5-5-1 Knowledge of how machineries work in engine room as well as leading working personnel;
- 5-5-2 Proficiency in maintaining machineries in engine room and deck;
- 5-5-3 Ability to manage engine department personnel independently;
- 5-5-4 Proficiency in practicing safeties;
- 5-5-5 Proficiency in practicing and protecting environmental safeties;
- 5-5-6 Ability to manage and practice superior instructions as well as educating personnel under command in working environmental.





5-6 Course minimum syllabi (70 hours Theoretical)

FUNCTION 4 : MARINE ENGINEERING AT THE MANAGEMENT LEVEL (28 hrs.T)

Competence 4-1: Manage the operation of propulsion plant machinery (11 hrs.T)

4-1-1-Design features, and operative mechanism of the following machinery and associated auxiliaries: (11 hrs.T)

4-1-1-1-Marine diesel engine (6 hrs.T)

4-1-1-1-1-Engine components (1 hrs.T)

Knowledge of: Engine frame and column; Tie bolts (Single/Twin, Vertical/Horizontal); Crankshaft alignment and slippage; Camshaft bearing arrangements.

4-1-1-1-2-Engine lubrication (0.5 hr.T)

Knowledge of: Lubrication of top end bearing.

4-1-1-1-3-Fuel injection (1 hrs.T)

Knowledge of: Latest fuel common rail features; Fuel valve with return line; Identify common service faults, symptoms, and causes of combustion problems.

4-1-1-1-4-Scavenging and supercharging (0.5 hrs.T)

Knowledge of: Scavenging process of two stroke engines; Purpose of relief devices fitted to scavenge trunks.

4-1-1-1-5-Starting and reversing (1 hrs.T)

Knowledge of: Starting systems of two stroke diesel engines; Concept of reversing and need for retiming with respect to fuel pump; Exhaust valve and distributor; Emergency maneuvering and crash astern procedure; Fuel limit; Starting and reversing system malfunctions; Fault tracing and detection.

4-1-1-1-6-Diesel engine control (1 hrs.T)

Knowledge of: Governor maintenance; Load limit program; Unattended machinery space requirement; Procedure to follow if oil mist in crankcase; Oil mist detection; Scavenge fire; Relieving the pressure in a crankcase and in scavenge trunk when explosion occur; Cylinder relief valve purpose and construction; Starting air line explosion and safety devices fitted; Typical engine shut downs and slow downs.





4-1-1-2-Marine steam turbine (0.5 hrs.T)

Knowledge of: Steam turbine construction, lubrication; Impulse and reaction turbines; H.P and L.P turbines; Materials of blades and other components; Bearings; Thrust bearings; Turbine glands and gland steam systems; Sequential nozzle operation; 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; Loss of lubricating oil pressure trip).

4-1-1-3-Marine gas turbine (0.5 hrs.T)

Knowledge of: Analysis the flow of air and gas through a simple marine gas turbine; Identifying the materials and construction of a gas turbine compressor, combustion system, and turbine for single and two shaft design; Discussing the design features related to maintenance requirements associated with optimum performance of a marine gas turbine plant; Describing with the aid of sketches the operative mechanism of a marine gas turbine (Lubrication system; Fuel system; Starting system; Monitoring and control system; Other ancillary equipment).

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

4-1-1-4-1-Types of boiler (0.5 hrs.T)

Knowledge of: Marine boilers including: Composite boiler, packaged boiler.

4-1-1-4-2-Boiler Construction (0.5 hrs.T)

Knowledge of: Furnace and combustion chamber; Attachment of furnace to the water drum; Types of tubes; Tube and tube plates; Water drum and steam drum; Common defects and methods of repair of above sections.

4-1-1-4-3-Combustion of fuel in Boilers (0.5 hr.T)

Knowledge of: Combustion in a boiler furnace; Fuel oil system; Automatic combustion control system.

4-1-1-4-4-Boiler Mountings (1 hrs.T)

Knowledge of: Safety valves; Main stop valve; Feed check valve; Feed water regulator; Water level indicator (Direct and remote); Low water level alarms and cut out; Blow down valves; Scum valve; Drain valve; Air vents; Soot blower master steam valve; Pressure gauge connection; Man hole and hand hole doors.





4-1-1-4-5-Waste heat utilization (0.5 hrs.T)

Knowledge of: Normal minimum differences between the temperatures of exhaust gas and water or steam being heated; Steam pressure produced by waste heat systems.

4-1-1-4-6-Boiler Operation (0.5 hrs.T)

Knowledge of: Safe procedure of raising steam from cold state; Correct procedure of blowing down and opening up a boiler; Boiler cleaning; Hydraulic test; Watch keeping general precaution; Taking a boiler out of service for examination; Ingress of oil into boiler, its effect and cleaning procedures.

4-1-1-4-7-Water treatment (0.5 hrs.T)

Knowledge of: Purpose of treatment of feed water; Effect of treating feed water with calcium hydroxide and sodium carbonate; Treatment with caustic soda; Using of phosphate and its advantage; Boiler water chloride control; Using of coagulants in boiler water; Chemicals used to remove dissolved oxygen form boiler water; Precautions for storing and handling hydrazine; Effect of pH value of boiler water; Purpose of antifoams; Avoiding the caustic embrittlement.

4-1-1-4-8-Water testing (0.5 hr.T)

Knowledge of: Function of a salino-meter; Litmus paper; Phenolphthalein and total alkalinity tests; Chloride test; Sulphite test; Phosphate test; Hardness test; PH value; Dissolved oxygen test; Total dissolved solids test; Hydrazine test.

4-1-1-4-9-Boiler control and safety devices (0.5 hrs.T)

Knowledge of: Automatic controls; Methods available for pressure controlling of oil fired and exhaust gas boilers; Sequence of firing a burner; Furnace blow back; Safeties such as (Flame failure; High pressures alarms and cut out; Low fuel pressure alarm and cut out; High level alarm); Emergency stop.





Competence 4-2: Plan and schedule operations (12 hrs.T)

4-2-1-Theoretical knowledge (12 hrs.T)

4-2-1-1-Thermodynamic and heat transmission (1 hrs.T)

Knowledge of: Thermodynamics Fundamentals: Reversible and irreversible processes; First law applied to non-flow and flow processes; Throttling, nozzles and mixing of streams; Properties of vapours: (Saturation, dryness fraction and superheat; T-s, p-h, p-v, h-s diagrams); Steam cycles (Rankine cycle; Thermal efficiency; Cycle on T-s diagram); Combustion: (Air-fuel ratio; Excess air; Volumetric analysis of combustion products; Calorific value); Refrigeration and air conditioning: (Enthalpy and entropy; Refrigeration; Cycle on p-h diagram; Coefficient of performance; Refrigerant mass flow).

Proficiency in: Refrigeration compressor calculations; Air Conditioning; Comfort conditions; Psychrometric charts; Wet and dry bulb temperatures; Humidity; Dew point; Dehumidifying and humidifying processes).

4-2-1-2-Heat cycle, thermal efficiency and heat balance of the following: (1 hrs.T)

4-2-1-2-1-Marine diesel engine (0.5 hrs.T)

Knowledge of: Heat cycle of marine diesel engine; Thermal efficiency; How thermal efficiency can be increased; Heat balance for analysis of cooling water loss; Dual cycle; Thermal efficiency of dual cycle.

4-2-1-2-2-Marine steam turbine (0.5 hrs.T)

Knowledge of: Heat cycle of marine steam turbine; Thermal efficiency; How thermal efficiency can be increased; Heat balance of marine steam turbine.

4-2-1-2-3-Marine gas turbine (0.5 hrs.T)

Knowledge of: Brayton cycle; Thermal efficiency of Brayton cycle; Heat balance of marine gas turbine plant.

4-2-1-2-4-Marine steam boiler (0.5 hrs.T)

Knowledge of: Heat cycle of Marine steam boiler; Thermal efficiency; How thermal efficiency can be increased.





4-2-1-3-Physical and chemical properties of fuel and lubricants (2 hrs.T)

4-2-1-3-1-Fuel system (1.5 hrs.T)

Knowledge of: Blending system; Homogenizer; Automatic control of fuel viscosity; Correct bunkering strategy (Including correct sampling method, MARPOL sample, bunker delivery note and associated regulation); Precautions taken during bunkering to avoid pollution; Bunker dispute; Common tricks and short lifting techniques some suppliers follow; Effect of temperature on density; Temperature correction on fuel density.

4-2-1-3-2-Oil purification (0.5 hrs.T)

Knowledge of: Principle of an oil centrifuge (Including those capable of separating fuel with density as high as 1010 kg/m³); Effect of temperature on density of fuel versus water; Modern centrifuges.

4-2-1-4-Technology of materials (7 hrs.T)

4-2-1-4-1-Metallurgy of steel and cast iron (0.5 hr.T)

Knowledge of: Metallurgy of steel and cast iron; Production of cast iron; Effect of adding carbon to steel.

4-2-1-4-2-Testing and properties of materials (1hrs.T)

Knowledge of: Material properties (Ductility; Ultimate tensile and yield stress); Ultimate tensile strength; Testing of material (Tensile, hardness, impact, creep, fatigue, bend); Non-destructive tests for surface cracks (optical aids, dye-penetrant, magnetic crack detection); Non-destructive test for cracks within a material (Hammer, radiography, ultrasonic).

4-2-1-4-3-Heat treatment of metals (0.5 hrs.T)

Knowledge of: Hardening and tempering; Annealing and normalizing; Work hardening; Nitriding; Flame hardening.

4-2-1-4-4-Alloying elements in irons and steels (0.5 hr.T)

Knowledge of: The principle reason for adding various elements (Cobalt; Nickel; Chromium; Molybdenum; Vanadium; Tungsten; Copper; Manganese; Silicon; Titanium) and their marine application.

4-2-1-4-5-Non-ferrous metals (0.5 hr.T)

Knowledge of: Effect of corrosive conditions on brass and way of reducing it; Reasons for adding alloying elements to bronze; White metal and its application in marine engineering; Range of melting temperature of white metals.





4-2-1-4-6-Non-metallic materials (0.5 hr.T)

Knowledge of: Application of non-metallic materials, including polymers and composites; Risk involved when working with asbestos and necessary precautions.

4-2-1-4-7-Welding (1 hrs.T)

Knowledge of: Principle feature of the argon arc welding process; Types of welding employed in marine practice and their application; Edge preparation; Welding techniques (Butt, lap, fillet) and materials normally used on ship; Flux material and reason for it; Typical faults in a weld and way of avoiding or rectifying it; Gas cutting.

4-2-1-4-8-Direct stress and strain (0.5 hrs.T)

Knowledge of: Stress and strain; Direct stress, strain, hooks law; Young's modulus of elasticity; Factor of safety; Strain energy; Resilience; Impact and suddenly applied force.

Proficiency in: Solving simple numerical examples related to above objectives.

4-2-1-4-9-Stress in pressure vessels (0.5 hrs.T)

Knowledge of: Stress in pressure vessels; Hook stress and axial stress in a thin walled cylindrical pressure vessel; Joint efficiency.

Proficiency in: Solving simple numerical examples related to above objectives.

4-2-1-4-10-Bending of beams (0.5 hrs.T)

Knowledge of: Condition of equilibrium; Concentrated and distributed load; Shearing force and bending moment diagrams.

Proficiency in: Solving simple numerical examples related to above objectives.

4-2-1-4-11-Stresses in beams (0.5 hrs.T)

Knowledge of: Neutral axis; Fundamental bending equation; Modulus of section; Combined bending and direct stress.

Proficiency in: Solving simple numerical examples related to above objectives.

4-2-1-4-12-Torsion (0.5 hrs.T)

Knowledge of: Fundamental torsion equation; Relationships between torque, stress and power; Torsional resilience; Maximum and mean torque; Coupling bolts.

Proficiency in: Solving simple numerical examples related to above objectives.





Competence 4-3: Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery (5 hrs.T)

4-3-1-Practical knowledge (5 hrs.T)

4-3-1-1-Start up and shut down main propulsion and auxiliary machinery, including associated systems (0.5 hr.T)

Knowledge and proficiency in: Preparation of main machinery (warm up) and associated auxiliaries for starting; Running gear tests; Fault detection during running and actions taken; Root cause analysis of faults.

4-3-1-2-Operating limits of propulsion plant (0.5 hr.T)

Knowledge and proficiency in: Following maker's instruction to avoid operation over hazardous limits such as over speed, Over load, Over stress, Vibration and critical speed; Speed increase procedure to avoid thermal and mechanical over stress.

4-3-1-3-The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery (0.5 hrs.T)

Knowledge and proficiency in: Combustion and performance monitoring of main machinery during operation; Vibration monitoring.

4-3-1-4-Functions and mechanism of automatic control for main engine (0.5 hrs.T)

Knowledge of: Open and closed control loops; Two step, proportional, integral, and derivative control actions.

Knowledge and proficiency in: Main engine control diagrams; Experience in automatic and remote control of main engine; How change over from remote to local maneuvering is done; Speed increase; Speed reduction; Crash maneuvering; Safety features including shut down and slow down; Reset of safeties.

4-3-1-5-Functions and mechanism of automatic control for auxiliary machinery including but not limited to: (3 hrs.T)

4-3-1-5-1-Generator distribution systems (0.5 hrs.T)

Knowledge and proficiency in: Instrumentation and safety in main switchboard construction and generator and distribution system ; Function of short circuit protection; Fuses; Main circuit breakers; The generator air circuit breaker; Overload relay; Under voltage relay; Reverse power protection; Fault tracing in distribution circuits; Auxiliary diesel generator alarm and shut down; Automatic starting of propulsion auxiliaries.





4-3-1-5-2-Steam boilers (0.5 hrs.T)

Knowledge of: Function of automatic control of auxiliary boiler; Automatic combustion monitoring; Monitoring safety of boiler; Boiler warm up/ cool down; Correct operation; Avoiding excess pressure; Water level control; Alarms and safety features operation; Tests adjustments, safety activation and action taken after the alarm; Feed water high salinity; High water level; Boiler pressure high and low; Superheater outlet temperature high; Fuel pump low outlet pressure; Heavy fuel temperature high and low (or high and low viscosity); Uptake high gas temperature; Control system power failure; Automation steam and air pressure low; Automatic shutdown of boiler: Low water level; Supply air pressure failure; Ignition or flame failure.

4-3-1-5-3-Oil purifier (0.5 hrs.T)

Knowledge of: Function of automatic control of Oil purifier; Operation monitoring; Correct operation; Automatic de-sludging; Alarms and safety features incorporated; Automatic action if feed condition i.e. temperature and pressure over limits; Vibration; Correct operation and monitoring to avoid and minimize damage to purifiers.

4-3-1-5-4-Refrigeration system (0.5 hrs.T)

Knowledge of: Automation, monitoring and alarms in refrigeration system; Automatic start and stop of compressor at normal running condition; Automatic shut down and alarm in case of high pressure in discharge line; Manual reset for restarting of compressor; Low lubrication oil pressure alarm and shut down; Control of defrosting units.

4-3-1-5-5-Cargo-handling equipment and deck machinery (1 hrs.T)

Knowledge of: Deck machineries and Different media of powering deck machineries; Hydraulic system components; Passenger ship's typical water tight doors system; Basic electric control of hydraulic circuits; Different kinds of windlass arrangements; Windlass brake; Constant tension mooring winch; Cargo gear electrical and mechanical safeties (Limit switches, relays, stoppers, automatic shut downs at abnormal operating conditions).





**FUNCTION 5 : ELECTRICAL, ELECTRONIC AND CONTROL ENGINEERING
AT THE MANAGEMENT LEVEL (71 hrs.T)**

**Competence 5-1: Manage operation of electrical and electronic control
equipment (12 hrs.T)**

5-1-1-Theoretical knowledge (12 hrs.T)

**5-1-1-1-Marine electro technology, electronics, power electronics, automatic
control engineering and safety devices (3 hrs.T)**

5-1-1-1-1-Electromagnetism (0.5 hrs.T)

Knowledge of: Faradays and Lenz laws; The Bio-Savar law; Magnetism fundamentals and its relationship to electromagnetism; How magnetic leakage occurs; The effect of a nonmagnetic core; Hysteresis loss; Lists the various losses which take place in electric machines and transformers; Necessities for air gap in magnetic circuits and its relative permeability; Comparing electrical and magnetic circuits; Series simple magnetic circuits; Application of magnetism in ship control and automation.

5-1-1-1-2-A.C. Circuit Theory, Power Factor and its improvement (1 hrs.T)

Knowledge of: 'Reactance' concept and its correct symbol; Approximate waveforms to show how power is affected when: The circuit is purely capacitive; The circuit is resistive and capacitive; Impedance triangle; Power factor; The effect of changing current and its associated magnetic flux on the induced e.m.f. in a coil; Self-inductance (L); Henry(H); Induced e.m.f. formula; The effect of different values of inductance and resistance on power consumption; Apparent power and lagging power factor; Type of ship loads; Mesh Current and node voltage network analysis for A.C. circuits; Action of a capacitor in a A.C. circuits; Ratings of electrical equipment; Typical power factors for different loads; Power in the sinusoidal steady state, average power; Complex power and methods of obtaining them including: Rectangular form; Polar form; The effect of placing an appropriately sized capacitor in parallel with an inductive load on: The line current; The line power loss; The motor current; The motor power.

Proficiency in: Calculating impedance's and power factors; Sketching graphs showing the variation of current, applied voltage and back e.m.f over one cycle when an A.C. is applied to: A choke having inductance; A circuit with only pure resistance; Sketching a phasor diagram to show current and voltage components in a circuit with resistance and inductance; Given diagrams of the waveforms, identifies the current and voltage waves; Drawing phasor and circuit diagrams as an aid to determine impedance, reactance, resistances, power factors, currents and voltages across: Inductors; Resistors; Capacitors; When connected in series; The use of apparent power in practice; Demonstrating, how power factors can be improved; Drawing vector diagrams showing the similarity between: Active current component and KW power; Reactive current component and KVAR; Line current and KVA; Solving problems on power - factor improvement to find total KVA, power and power factor, using phasor diagrams (Current and KVA) and the tabular method; Methods of obtaining resultant powers and power factor in a multi- load network either single or three phase systems.





7-P.L.C.

Knowledge of: Programmable logic controllers (PLC) function; Comparison of relays and PLC control circuits; Ship- board application of PLC.

5-1-1-2-Design features and system configurations of automatic control equipment and safety devices for the following: (3 hrs.T)

5-1-1-2-1-Main engine

Refer to section 4-3-1-4.

5-1-1-2-2-Generator and distribution system (3 hrs.T)

5-1-1-2-2-1-Insulation and Temperature Rating: (0.5 hr.T)

Knowledge of: Explaining the effect of changing ambient temperatures on the temperature rise of a continuously rated machine; The recognized current overload in a continuous maximum rated machine is 50% for 15 seconds.

5-1-1-2-2-2- Poly-phase Supplies, A.C. Generators, Automatic voltage Regulation and A.C. Switchgear (Main Circuit Breaker), Generators Protection, Synchronizing and Load Sharing: (1 hrs.T)

Knowledge of: Arrangements of connections in a star and delta connected alternator; Voltage and current phasor diagrams for objective above, using conventional notation; The purpose of the return wire in a four - wire system; Practical reasons why in modern generators armature winding and field windings are interchanged; All safety rules and regulations, minimum required values and setting for marine generators in various classification societies; The requirements for satisfactory power sharing between generators; Care necessary when replacing diodes in a rotating rectifier; The principle of converting the voltage- comparison signal into a form suitable for control of the excitation; A.V.R. performance, trouble- shootings, rules, regulations, settings, care and maintenance; Using generator load test characteristics speed/ active power and voltage/ reactive power to explain: flat, isochronous and drooped sharing of load; All requirements regarding droop.

Proficiency in: Sketching the alternator and motor connections in a three - wire system, and why the power factor governs the physical size of a generator; Sketching the relationship between voltage and time when a load is suddenly applied, for different excitation systems.

5-1-1-2-2-3-D.C. Generators and D.C. Switchgear: (1 hrs.T)

Knowledge of: The purpose of commutating poles; How to remedy a reversal of polarity; The differences in operational techniques of open-front and dead-front switchboards; Construction, operation and maintenance of main switchboards, showing : Ammeter; Voltmeter; Circuit breaker; Low voltage release; Over current trip; Reverse current trip; Armature; Series field and Shunt field and Shunt field rheostat; Principle operation of all protective devices including: Reverse current; Preferential trip; Short circuit; Fuses; How continuation of supply to essential services is ensured; What is meant by discrimination in protective devices; The principles of construction of bus bars;





How bus bars are cooled and the effect of overheating; Checking for the correct operation of protective devices.

Proficiency in: Sketching a diagrammatic arrangement of the field coils and the armature of a compound generator; Graph showing the relationship between current and voltage; Performing the procedure for isolating machinery prior to inspection or maintenance.

5-1-1-2-2-4-Lightings and lamps: (0.5 hr.T)

Knowledge and proficiency in: Principles construction of High and low pressure mercury fluorescent and sodium vapor lamps; The navigation lights circuit, rules and regulations and surveying; The Stereo- boscopic effect relating to fluorescent lamps and the methods of minimizing it.

5-1-1-2-3-Steam boiler

Refer to 4-3-1-5-2.

5-1-1-3-Design features and system configurations of operational control equipment for electrical motors (4 hrs.T)

5-1-1-3-1-D.C.Motors, A.C. (Induction) Motors and Motors Control and Protection: (1 hrs.T)

D.C. Motors:

Knowledge of: Armature reaction, brush shifting and methods of decreasing it; D.C. motors losses and efficiency; D.C. motors application on deck machinery; Braking D.C. motors: frictional, dynamic action and plugging types.

A.C. Motors:

Knowledge and proficiency in: Proving that the rotating magnetic field produced in induction motors is of constant value; Principle of starting and speed control; Supply voltage reduction on running and starting torques; The attention necessary for roller or ball bearings; Names common applications for 3.3 kV and 6.6 k V motors; Effect of running an induction motor on reduced voltage; Comparing three starting methods from different point of views: usage, run- up time, starting torque and current, voltage dip obtained, etc.; Magnetic brake, its types, application, and simple diagram; Ingress protection codes by their standard chart and application; Differential protection relay and its usage; How back protection is carried out for induction motors; Function of a high- rupturing - capacity (HRC) fuse; States how miniature circuit breakers must be calibrated; Range of capacity of molded - case circuit breakers (MCCBs).

5-1-1-3-2-Transformers as Static A.C. Machines: (0.5 hrs.T)

Knowledge and proficiency in: Typical applications of transformers; Why three single - phase transformers are sometimes used in place of one three- phase transformer; Stating the methods of calculating 3Ph- power triangle for transformers; Magnetic amplifiers, static and rotary types.





5-1-1-3-3-Deck Machinery: (1.5 hrs.T)

Knowledge and proficiency in: Machinery used for lowering loads are fitted with a fail - safe brake system; Principles of coil - operated brake suitable for winches and other deck machinery; How speed of lowering is controlled on the cable lifter of a windlass; The need for the various speeds of a windlass; How dynamic braking is applied to the slewing movement; Factors influence drum speed; Given a basic circuit for a potentiometer control; Indicating the different speed connections when: lifting, lowering, in the off position with dynamic braking; The purpose of a load discriminator, reverse - delay relay, voltage lock- out, contactor lock – out, torque - limit relay, time- delay relay; Field control and voltage control methods on speed control; Application of the ward - Leonard system to the control of deck machinery; The function of booster control, a reducer; Warping winches and capstans; The purpose and setting of a torque - limit relay in the control; System of a warping winch or capstan, including the provision for emergency heavy pulls; Speed variation necessary when handling slack ropes; A.C. systems used for winch controls; Principle of a three- speed cage winch motor; How the cage motor has been applied to windlass operation; Control arrangement of a capstan drive using a two - speed cage motor; Principle of a slip- ring motor drive to a warping winch, including: Reversing, overload, torque limiting, speed control, fail - safe braking; Electrical steering system on board, including: Manual and Automatic steering of a vessel; Electronic methods of speed control; Development of Ward- Leonard system in various fields, such as position control and velocity or rate control; All safety, care and maintenance aspects of deck- machinery.

5-1-1-3-4-Insulation Testing: (0.5 hr.T)

Knowledge of: The advantages, disadvantages and differences between two models of insulation resistance testers: handle type and push button type; Insulation classes together with ambient and hot spot temperatures with methods of measuring them.

5-1-1-4-Design features of high-voltage installations (0.5 hrs.T)

Knowledge and proficiency in: Economical necessities for large ships and their standards common at 3.3, 6.6 and even 11 Kv; Reduction of size of conductors and current value; Distribution system types on such H.V ships; Systems working at 3.3 KV are normally designed to operate with an earthed neutral via a resistor; Normal limit allowed for an earth- fault current; Sketches arrangement of earthing with resistors for a 3.3 KV system; A mixed system of earthing.

5-1-1-5-Features of hydraulic and pneumatic control equipment (2 hrs.T)

1-Hydraulic Control Equipments (1 hrs.T)

Knowledge and proficiency in: System components; Hydraulic circuits; Hydraulic system fitting and maintenance; Describing with the aid of computer aided drawing or workshop facilities the operation of conventional electro-hydraulic marine type crane incorporated with P.L.C.; Describing the function of each component in the system; Fault finding and possible remedies.





2-Pneumatic Control Equipment (1 hrs.T)

Knowledge and proficiency in: Pneumatic circuits; Pneumatic system fitting and maintenance components and troubleshooting; Computer aided drawing or workshop facilities the principle operation of electro-pneumatic control systems of Main engine and auxiliary engine.

Competence 5-2: Manage trouble-shooting, restoration of electrical and electronic control equipment to operating condition (5 hrs.T)

5-2-1-Kknowledge of: (5 hrs.T)

5-2-1-1-Troubleshooting of electrical and electronic control equipment (3 hrs.T)

5-2-1-1-1-Electric Shock and Electrical Interference: (0.5 hrs.T)

Knowledge and proficiency in: Signal interference and shielding resulted in low level signal of many sources e.g. fluorescent lamps, switching power supplies, motors; Types of equipment susceptible to interference; Common sources of interference; All equipment should meet requirements for radio interference suppression; Typical examples of ship's cables susceptible to interference and the necessary precautions; Capacitive interference and its minimizing.

5-2-1-1-2-Ships Electrical Surveying Requirements: (1.5 hrs.T)

Knowledge and proficiency in: The importance of relevance electrical surveying; Items which are electrically under surveying with their time intervals; All the guide-notes of surveying for: Generators, circuit breakers and switch boards, protection relays, cables, insulation resistance, motors and starters, emergency power supply equipments, steering gear, navigation lights, unattended machinery spaces (UMS) ships, tankers and their hazardous areas.

5-2-1-1-3-Tankers: (0.5 hrs.T)

Knowledge and proficiency in: The dangerous or hazardous spaces of a tanker; Protection necessary if it is essential to install electrical equipment in a dangerous space; Requirement for lighting in a pump- room; Selection of type of protection according to hazardous areas; What are certification bodies, certification bodies overseas and equipment identification tags.

5-2-1-2-Function test of electrical, electronic control equipment and safety devices (0.5 hrs.T)

Knowledge and proficiency in: Function test of Over Current Relay (OCR), Relays and magnetic contactors, Timers, Fuses, MCCB, ACB, Diodes, Silicon Controlled Rectifier (SCR), Temperature, Pressure and Level transmitters, Overspeed Protection Devices, Flame Scanners and Fire Detecting System.





5-2-1-3-Troubleshooting of monitoring systems (2 hrs.T)

5-2-1-3-1-General requirements: (1 hrs.T)

Knowledge and proficiency in: Sequential monitoring; Computer data storage; Data logging and VDU displays; Assessment of operating condition and automatic adjustment; Machinery condition monitoring; Alarm system, with automatic reset; Manual reset; Lock in means; Time delay; Event recorder and first in flooding alarm.

5-2-1-4-Software version control

5-2-1-4-1-General requirements including: (1 hrs.T)

Knowledge of: Typical safety systems; Machinery auto start-up; Reduction of power; Shut downs; Level detections; Safe programmed policies and calibration or pre-settings; All With on board testing and maintenance following rules and regulations.





FUNCTION 6 : MAINTENANCE AND REPAIR AT THE MANAGEMENT LEVEL
(4 hrs.T)

Competence 6-1: Manage safe and effective maintenance and repair procedures
(2 hrs.T)

6-1-1-Theoretical knowledge (0.5 hrs.T)

6-1-1-1-Marine engineering practice (0.5 hrs.T)

6-1-1-1-1-Preparation for maintenance (0.5 hrs.T)

Knowledge of: Permit to work; enclosed spaces entry procedure; Planning the maintenance strategy according to classification society rules, regulations and survey schedule; Considering renewal of class and statutory certificates when planning maintenance schedule and job procedures; Planned maintenance system (PMS); Updating of maintenance schedule, spare parts inventory and records.

6-1-2-Kknowledge of: (1.5 hrs.T)

6-1-2-1-Manage safe and effective maintenance and repair procedures (1.5 hrs.T)

Knowledge of: Maintenance policy and type of maintenance including the Objective of planned maintenance system; Planned maintenance, condition monitoring, and breakdown maintenance as applied to a plant.

Competence 6-2: Detect and identify the cause of machinery malfunctions and correct faults (1 hrs.T)

6-2-1-Kknowledge of: (1 hrs.T)

6-2-1-1-Non-destructive examination (0.5 hrs.T)

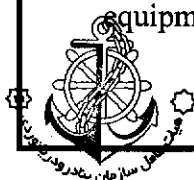
Knowledge and proficiency in: Different types of non-destructive examination including, Use of optical aids, Dye penetrant test (Use of cleaner, penetrant and developer), Magnetic particle Testing, Radiography (Use of radiography in welding), Portable Hardness test.

Competence 6-3: Ensure safe working practices (1 hrs.T)

6-3-1-Kknowledge of: (1 hrs.T)

6-3-1-1-Safe working practices (1 hrs.T)

Knowledge and proficiency in: Code of safe working practice, safety and health of the ship's staff, risk assessment (Elements of risk assessment; Identify hazards; Identify risk controls; Estimate risks; Determine tolerability of risks; Prepare risk control action plan); Safety officials (Safety officer; Safety committee; Safety inspector; Investigation for accidents and dangerous occurrences); Personal protective equipment; Work equipment (Maintenance; inspection; training; electrical equipment); Safety induction (Emergency procedures and fire precautions; Accidents and medical





emergencies; Health and hygiene; Good housekeeping; Environmental responsibilities; Occupational health and safety; Fire precaution (Smoking; Electrical fittings; Spontaneous combustion; Precautions in machinery spaces); Emergency procedures (Action in the event of fire; Muster and drills); Safe handling (Lighting; Guarding of openings; Watertight doors); Safety at works (Working aloft; Portable ladders; Lagging of steam and exhaust pipes; Unmanned machinery spaces; Refrigeration machinery); Entering enclosed or confined spaces (Identifying hazards such as Oxygen deficiency; Toxicity of oil and other substances; Flammability; Other hazards); Breathing apparatus and resuscitation equipment; Preparing the space for entry; Testing atmosphere of the space; Procedures and arrangement before entry; Procedures and arrangements during entry; Procedures on completion; Permit to work (Work in unmanned machinery spaces; Entry into enclosed or confined spaces; Hot work; Working aloft; Electrical system for other than electrical officer); Manual handling (Musculo-skeletal injuries due to an unsatisfactory working method; Appropriate steps to reduce risk of injury); Use of work equipment (Use of tools and equipment; Abrasive wheels; High pressure hydraulic and pneumatic equipments; Ropes); Lifting equipment (Safe working load (SWL); Register for lifting appliances, markings and certificates; Regular maintenance; Examination, inspection and testing; operational Safety measures); Maintenance of machinery (Precautions before maintenance; Warning notices not to start machines; Securing heavy parts during maintenance); Hot work (Pre-use equipment test; precautions against fire and explosion; Precautions during use of electric arc welding; Compressed gas cylinders; Gas welding and cutting); Painting (Preparation, precautions and storage); Hazardous substances (Carcinogens and mutagens; Asbestos dust; use of chemical agents); Noise and vibrations.





**FUNCTION 3 : CONTROLLING THE OPERATION OF THE SHIP AND CARE
FOR PERSONS ON BOARD AT THE MANAGEMENT LEVEL (21 hrs.T)**

Competence 3-1: Control trim, stability and stress (3 hrs.T)

3-1-1-Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability (1 hrs.T)

3-1-1-1- trim and stress tables, diagrams and stress-calculating equipment (1 hrs.T)

Knowledge of: 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 flotation; Loading a weight to keep the after draught constant.

3-1-2-Knowledge of the effect on trim and stability of a ship in the event of damage to, and consequent flooding of, a compartment and countermeasures to be taken (1 hrs.T)

3-1-2-1-Understanding of the fundamentals of watertight integrity (1 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.

3-1-3-Knowledge of IMO recommendations concerning ship stability (1 hrs.T)

3-1-3-1- Damage control (1 hrs.T)

Knowledge of: International Code of Intact Stability 2008 (2008 IS code); Damage control plan.

Competence 3-2: Monitor and control compliance with legislative requirements and Measures to ensure safety of life at sea, security and protection of the marine environment (4 hrs.T)

3-2-1-Knowledge of relevant international maritime law embodied in international agreements and conventions, Regard shall be paid especially to the following subjects: (4 hrs.T)

3-2-1-1-Certificates and other documents required to be carried on board ships by international conventions, how they may be obtained and the period of their legal validity (0.5 hr.T)

Knowledge of: Document of authorization for grain loading; ISM related certificates; Any other appropriate certificates depends on ships type as applied by SOLAS; How each certificate may be obtained and the period of their validity.





3-2-1-2-Responsibilities under the relevant requirements of the International Convention on Load Lines, 1966, as amended (0.5 hrs.T)

Knowledge of: Free board, free board deck, free board categories, free board correction; Load line markings; Requirements for free board assignment, maintenance of conditions of assignment, Provisions for determining the freeboard of ships by subdivision and damage stability calculations; The potential hazards present in different zones and different seasons; The safety measures concerning doors; Freeing ports; Hatchways and other items; The main purpose of these measures is to ensure the watertight integrity of ships' hulls below the freeboard deck; Requirements for initial and periodical inspections and endorsements on the international load line (ILL) certificate; load line Fittings and appliances that are inspected.

3-2-1-3-Responsibilities under the relevant requirements of the International Convention for the Safety of Life at Sea, 1974, as amended (1 hrs.T)

Knowledge of: Brief description of SOLAS Chapter II-1: (Construction – structure, subdivision and stability, machinery and electrical installations); Chapter II-2: (Construction – fire protection, fire detection and fire extinction); Chapter III: (Life saving appliances and arrangements); Chapter IV: (Radio communications); Chapter VI: (Carriage of cargoes); Chapter VII: (Carriage of dangerous goods); Chapter IX: (Management for the safe operations of ships; International safety management (ISM) code (Aims and objectives; Advantages and disadvantages of ISM and SMS (Safety management systems); SMS certification and audit); Chapter XI-2: (Special measures to enhance maritime security); The international ship and port facility security code (ISPS Code); Minimum manning requirements.

3-2-1-4-Responsibilities under the International Convention for the Prevention of Pollution from Ships, as amended (0.5 hrs.T)

Knowledge of: Record of construction and equipment as supplement to the IOPP certificate; Requirements for initial and periodical surveys; Requirements for periodical inspections and endorsements on the IOPP certificate; International sewage pollution prevention certificate; Duration of validity of certificate; Garbage management plan; Garbage record book; Garbage disposal restrictions.

3-2-1-5-Maritime declaration of health and the requirements of the International Health Regulations (0.5 hrs.T)

Knowledge of: The International Health Regulations (IHR), as an international legal instrument; The Member States of world Health Organization (WHO); The rights and obligations of countries to report public health events, And establish a number of procedures that WHO must follow in its work to uphold global public health security.

3-2-1-6-Methods and aids to prevent pollution of the environment by ships (1 hrs.T)

3-2-1-6-1-Oily water separator (0.5 hrs.T)

Knowledge of: Function and Principle of operation of an oily water separator; General construction and material of components; Maintenance and care required.





3-2-1-6-2-Sewage treatment plant (0.5 hrs.T)

Knowledge of: 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; Vacuum type sewage system.

Competence 3-3: Maintain safety and security of the vessel, crew and passengers and the operational condition of life-saving, firefighting and other safety systems (2 hrs.T)

3-3-1-Organization of fire and abandon ship drills (1 hrs.T)

Knowledge and understanding of: Importance of fire and abandon ship drills; Each member of the crew shall participate in at least one abandon ship drill and one fire drill every month; Limitations of these drills when 25% of the crew have not participated in abandon ship and fire drills on board that particular ship in the previous month; Abandon ship and fire drills should be organized and managed in such a manner that fulfill requirements of SOLAS convention; Fire drills should be planned in such a way that due consideration is given to regular practice in the various emergencies that may occur depending on the type of ship and its cargo; The equipment used during drills shall immediately be brought back to its fully operational condition, and any fault and defects discovered during the drills shall be remedied as soon as possible; The drills shall be organized, as far as practicable, as if there were an actual emergency.

3-3-2-Maintenance of operational condition of life-saving, fire-fighting and other safety systems (0.5 hrs.T)

Knowledge and proficiency in: Skill that is required to maintain the operational condition of life saving, firefighting and other safety systems, including the coordination of the monitoring of systems and their components to ensure that they function in the event of fire and other shipboard emergencies on board vessel which includes: Monitoring of operational condition of lifesaving, fire detection, firefighting and other safety systems on board a vessel; Coordinate the checking and replacement of consumable materials and items in lifesaving, fire detection, firefighting and other safety systems; Maintain documentation on the condition of lifesaving, fire detection, firefighting and other safety systems on board a vessel.

3-3-3-Actions to limit damage and save the ship following fire, explosion, collision or grounding (0.5 hr.T)

Knowledge and proficiency in: Contingency plans for response to emergencies; Means of limiting damage and salvaging the ship following a fire or explosion; Procedures for abandoning ship.

Competence 3-4: Use leadership and managerial skills (12 hrs.T)

3-4-1-Knowledge of shipboard personnel management and training (1 hrs.T)

Knowledge of: 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; Management; Functions,





characteristics and skills of engineers, supervisor and managers; Crew management; Staff appraisal; Training needs analysis; Planning and organization of training programmes; Training methods; Debriefing after training exercises; Evaluation of training programmes; Maintenance techniques; Machinery maintenance, surveys planning and organization; An insight into Reliability Centered Maintenance.

3-4-2-A knowledge of international maritime conventions and recommendations and related national legislation (1 hrs.T)

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

3-4-3-Ability to apply task and workload management, including: (2 hrs.T)

3-4-3-1-Planning and coordination (0.5 hrs.T)

Knowledge of: Main elements and objectives of maintenance planning; Minimum requirements for a maintenance planning; Planning based on maintenance books and planning on board; Planning in preparation for emergency action.

3-4-3-2-Personnel assignment (0.5 hrs.T)

Knowledge of: Methods of evaluating personnel abilities, assignment of different maintenance jobs to carry out by competent personnel, preparation for maintenance.

3-5-3-3-Time and resource constraints (0.5 hrs.T)

Knowledge and proficiency in: Fuel consumption; Off hire; Port time class survey; 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.

3-4-3-4-Prioritization (0.5 hrs.T)

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

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

3-4-4-1-Allocation, assignment, and prioritization of resources (0.5 hrs.T)

Knowledge of: Resources allocated and assigned as needed in correct priority to perform necessary tasks; Type and scale of the tasks; Actions conforming to the emergency procedures and contingency plans for the ship, in order of priority, 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.





3-4-4-2-Effective communication on board and ashore (0.5 hrs.T)

Knowledge of: English language to enable the officers to use makers' manuals and to perform engineering duties; Communicating clearly and to understand others; Transmitting information relating to machinery components by means of simple drawings with supplementary notes and specifications; Verbal and non-verbal communication; Report writing; Presentation; Group discussion; Meetings.

3-4-4-3-Decisions reflect consideration of team experience (0.5 hrs.T)

Knowledge of: Current and predicted engine room and associated systems condition, and of external environment; Team working; Group dynamics; Approaches to team building; Committees.

3-4-4-4-Assertiveness and leadership, including motivation (0.5 hrs.T)

Knowledge of: Assessment of personnel competence and capabilities and operational requirements with effective leadership behaviors in order to tackle the jobs.

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

Knowledge and proficiency in: Operation of the propulsion plant under control during any situation; Response to bridge maneuvers at any time; Switchboard parameters at a normal value and to keep electrical power available for ship and bow-thruster; Different pumping systems; To inform the bridge or a superior officer of any abnormal situation; The main and auxiliary machinery for maneuvering operations; Manage boiler operation during maneuvering; Determine order of priority among problems encountered; Resolve problems in an orderly manner; Write appropriate entries in a log book and notice unusual readings; Write appropriate entries in the Oil Record Book; Manually bring the electrical power system back to working order after a power failure; Bring the propulsion system back on line after a power failure; Transfer controls from bridge to engine room.

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

3-4-5-1-Situation and risk assessment (1.5 hrs.T)

Knowledge of: Potential risk on board; 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 operational circumstances and personal resource.

3-4-5-2-Identify and generate options (0.5 hrs.T)

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





3-4-5-3-Select course of action (0.5 hrs.T)

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

3-4-5-4-Evaluation of outcome effectiveness (0.5 hrs.T)

Knowledge of: Review of the effectiveness of risk assessment; Periodical evaluation of implementation of the risk assessment and risk control; Updating safety and health information related to tasks.

**3-4-6-Development, implementation, and oversight of standard operating procedures
(1 hrs.T)**

Knowledge of: Project planning and controlling processes, GANTT charts, Critical Path Method, Program Evaluation and Review Techniques; Application of Fault Tree Analysis and similar Reliability Engineering; Techniques to solve practical shipboard problems.





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.

5-8 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 Bachelor Science in ship building engineering or mechanical engineering.

5-8-1-2 possess valid chief engineer certificate of competency for ships of Propulsion Power KW<3000 Engaged on Near Coastal voyages as well as having one year of seagoing service in that rank. Or

5-8-1-3 Possess valid second engineer certificate of competency for ships of KW \geq 3000 Engaged on Unlimited Voyage 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 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 and also have 2 years of working experiences in teaching electro technology subjects.

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

5-8-2 for delivering practical training should;

5-8-2-1 possess minimum mechanical higher diploma as well as having 24 months of seagoing service; Or

5-8-2-2 possess valid engine rating certificate of proficiency and 5 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; and

5-9-2 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 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 Code of practice for approval and monitoring of maritime training courses;
- 7-2 Code of practice for Conducting Second Engineer Officer on Ships of Propulsion Power KW<3000 Engaged on Near Coastal Voyages Upgrading Training Course;
- 7-3 Code of practice for issuing revalidation and renewing certificates of competency for seafarers.

8- Appendixes

Nil.

