SUBJECT TEACHING GUIDE

G1118 - Steam and Gas Turbines II

Degree in Maritime Engineering

Academic year 2016-2017

1. IDENTIFYING DATA					
Degree	Degree in Maritime Engineering			Type and Year	Compulsory. Year 3
Faculty	School of Maritime Engineering				
Discipline	Third Year Subjects Topic Module: Specific Technology Propulsion and Ship Services				
Course unit title and code	G1118 - Steam and Gas Turbines II				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. CIENCIAS Y TECNICAS DE LA NAVEGACION Y DE LA CONSTRUCCION NAVAL
Name of lecturer	SERGIO GARCIA GOMEZ
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Other lecturers	ANTONIO VEGA OMAÑA

3.1 LEARNING OUTCOMES
- To calculate the internal and external of the TV losses.
- Calculate powers and peripherals and internal performance, effective power and mechanical performance on TV.
- To acquire knowledge about the regulation of power steam turbines
- Calculate the thermal balance of an installation of a ship turbines.
- Optimize the constructive elements of the steam turbine.
- Knowing how to perform the operation start-up, shutdown and operation of steam turbines aboard a ship.
- Knowing how to calculate the power and efficiency of the steam turbine installation
- Knowing how to apply the techniques of maintenance and inspection in a steam turbine.
- Knowing how to calculate the surface heat exchange in a condenser of a steam turbine installation. Analysis, control and minimize the problem caused by biofouling (biofouling) of the exchange surface condenser.
- Knowing the possible techniques for optimizing the basic cycles of gas turbines.
- Knowing the operation of the compressor gas turbines.
- Knowing the bodies of gas turbines: combustion chambers, nozzles and heat exchangers.
- Ability to start operation and regulation of gas turbines.

4. OBJECTIVES
Knowing how to power steam turbines is regulated, what internal and external losses of these turbines are and know how to calculate the power and performance. Knowing the construction and materials of different parts of steam turbines and gas. Knowing techniques maintenance and driving steam turbines in ships. Study capacitors turbine installations steam and compressors in gas turbines. Knowing how you can optimize the basic cycles of turbines organic gas and make the study of them.

6. COURSE ORGANIZATION

	CONTENTS
1	Analysis of internal losses in steam turbines: Losses nozzles. Losses on fixed and mobile pallets. Losses output speed. Frictional losses disc and ventilation. Interstitial internal losses. External losses in a steam turbine: Losses mechanical. Losses by radiation and heat conduction To the exterior. Interstitial external losses. losses operation outside the design point Loses shock. Methods to reduce losses. Powers and performances. thermal balance.
2	Power control in steam turbines. Methods of power regulation. Regulation qualitative or throttling of steam. Regulation quantitative or varying the degree of admission. Mixed regulation. Regulation by direct steam passage I live to an intermediate staging. Regulating Condensing turbine. Turbine regulation backpressure. Willans straight.
3	Construction of steam turbines. materials used in the construction of steam turbines. Vanes. Discs and drums. Axes. Stator. diaphragms nozzle holder. Rotor. Types. Balanced static and dynamic. Manufacturing processes. Axis. Bearings. Shutters.
4	Capacitors steam turbines. Calculation heat exchange surface. Growth control biological fouling film (Biofouling). Removal of biofouling
5	Maintenance techniques. Importance of the gaps. Measurement of radial clearances. Measure clearances Axial. Importance of forced lubrication. Elements to inspect the turbine. Frequency of testing and inspections. General information on damage control. Driving steam turbines. Reasons for appropriate heating. Heating the turbine. Removing machines. Emergency operation. Safety precautions during operation. Using the toner. Lashing and the shaft destrincado sea.
6	Basic optimization cycle gas turbines. Regenerative open with intermediate cooling cycle compression. Regenerative open cycle intermediate heating on expansion. closed cycles and combined

7	Compressors used in turbines gas.Teoría of compression. Euler equation. static energy and Kinetic energy. A compression ratio staggering. moving blades. Influence angle output blade. Diffuser. Volute and divergence. and losses yields. characteristic curves
8	Organic Study of gas turbines. cameras combustion. Types. Injectors exchangers hot. Starting and regulation of TG

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Description Theory exam	Written exam	Yes	Yes	50,00
Description Laboratory practices	Work	Yes	No	20,00
Description Classroom Practices	Work	Yes	Yes	20,00
Description continuous assessment	Others	No	No	10,00
TOTAL				100,00

Observations

The final exam will have a maximum score of 75%. Therefore, un-student who chooses not to follow in the continuous assessment procedure and go exclusively to the final exam, you can only get a '7.5' as highest rating. On second call partial grades obtained during the course are not saved.

Observations for part-time students

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

- Kostyuk A. &Frolov V. Steam and Gas Turbines. MIR, Moscú. 1988.

- Mataix C. Turbomáquinas Térmicas: Turbinas de Vapor, Turbinas de Gas y Turbocompresores. Editorial Dossat 2000. 3ª Edición. Madrid. 2000.

- Schegliaev A.V. Turbinas de Vapor. Editorial Mir. Moscú. 1985.

- Troyanovsky B.M., Filippov G.A., Bulkin A.E. Turbinas de Vapor y de Gas de las Centrales Nucleoeléctricas . MIR, Moscú. 1987.

- Pérez del Rio J. Tratado General de Máquinas Marinas. Máquinas de Vapor. Editorial Planeta. Volumen VII. Madrid. 1972.

- Muñoz Torralbo M. et al. Turbomáquinas Térmicas. Editorial Sección de Publicaciones de la E.T.S. de Ingenieros Industriales. Madrid. 2001.