NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF MECHANICAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM

MN464 – LABORATORY OF MECHANICAL ENGINEERING III

I. GENERAL INFORMATION

CODE : MN464 Laboratory of mechanical engineering III
CYCLE : 8
CREDITS : 2
HOURS PER WEEK : 3 (Laboratory)
PREREQUISITES : MS213
CONDITION : Mandatory - Elective

II. COURSE INTRODUCTION

Centrifugal Pump, Centrifugal Pumps, 02 Step Compressors, Steam Turbines, Turbine Pump, Positive Displacement Pump, Heat Exchanger, Cooling

III. COURSE OUTCOMES

The students, at the end of the course, using measurement data and taking into account the characteristics of the equipment tested, will prepare a technical report.
-Tabulating the data and plotting the characteristic curves of the equipment, in power plants, heat and cold generation, turbomachinery and comprehension systems.
-Evaluating and interpreting the results obtained.

IV. LEARNING UNITS

1. INTRODUCTION

Formation of groups. Theory of experiments centrifugal fan, Centrifugal pumps, Pump-Turbine, Positive displacement pump.

2. CENTRIFUGAL VENTILATION

Introduction, fan, types of fans, formulas that govern the behavior of fans, characteristic curves, efficiencies; Its determination, technical data of the test equipment, test objective, procedure, calculation of: flow, effective height, aerodynamic power; Power to fan axis, calculation of total efficiency, calculation of characteristic figures. Plot of the characteristic curves and determination of the system curve.

3. CENTRIFUGAL PUMPS

Introduction, types of pumps and their main uses. Classification, centrifugal pumps. Description of its parts and components, types of installation, formulas governing the behavior of centrifugal pumps. Description of the installations in series and in parallel. Uses of manuals. Tables and curves for selecting the most efficient and economical pump, characteristic curves, description of the equipment and accessories, test procedure, description of the data table to be taken**.**

4. PUMP TURBINE

Use of a pump as a turbine. Efficiency of pump and turbine. Characteristic curves. Compression of characteristic curves Thermal data of the equipment to be tested. Objective, test basis, data collection, calculations and graphs.

5. POSITIVE DISPLACEMENT PUMP

Principle of operation comparison with rotodynamic pumps Characteristic curves, technical data of the equipment to be tested, objectives, test procedures, data acquisition, calculations and graphs.

6. STEAM TURBINE

Definition, classification of turbines, applications of steam turbine, regulation of steam turbines, Williams line. Equipment used data

Technical, experience procedure, expansion efficiency calculation, mechanical efficiency, shaft power, actual steam power, turbo generator efficiency, specific steam consumption, plotting of curves, steam consumption, specific consumption, expansion efficiency, efficiency Mechanics, turbo generator efficiency.

7. 2-STAGE COMPRESSOR

Understanding air; Comprehension curves, understanding work, optimum intermediate pressure, indicating diagram, indicated mean pressure, types of air compressors, cooling systems, energy balance. Technical data of the equipment, procedure of experience, water and air flows, power supplied to each motor, to each compressor, indicated power, heat absorbed by the cooling water, mechanical efficiency, real volumetric efficiency, isothermal power, Sankey diagram , Work curve Vs. Relationship of pressures**.**

8. HEAT EXCHANGER

Types of heat transfer, heat exchange; Conductive coefficient, film coefficient, global coefficient, types of heat exchangers: basic types, object of experience of the experience, equipment knowledge, procedure, calculation of: heat transfer, film coefficients (air, water), global transfer coefficient (U), efficiency of the heat exchangers, Number of transfer units (NUT), graphs: Vs. Reynolds.

Film Coefficient Vs. No. Reynalds Global Coefficient Vs Reynalds Number Temperature Difference Vs Reynalds Number. Efficiency Vs Number of Transfer Units

9. REFRIGERATION

Definition, reversed Carnot cycle: Cooling machine, heat pump, types of cooling systems; Cycle by understanding steam, parts and types. Refrigerants, classification, application. Object of the experiment, procedure for taking data, pressure, temperature, voltage, power, refrigerant flow of the coefficient of performance, network, adiabatic comprehension efficiency, air velocity in radiators, heat in condenser and evaporator, report.

V. METHODOLOGY

Exposition and experimentation of the scheduled laboratories.

VI. FORMULA EVALUATION

A. Evaluation System: D
B. Evaluation Subsystem (practical part of the course)

VII. BIBLIOGRAPHY

- Autor: Faires Moring Virgil, Termodimanica, Limusa, 2008, 668pg.
- Gaffert Gustaf Adolf, Centrales de Vapor, Revertè, 1981, 602 pg.
- Polo Encinas Manuel, Turbomaquinas Hidraulicas, Limusa, 1976, 261 pg.
- Hicks Tyler, Bombas: Su Seleccion y Aplicacion, Continental, 1981, 530 pg.
- Marks, Manual del ingeniero Mecanico, dos tomos Mc. Graw-Hill, 1995