



دبلوم تطبيقات التحكم الأوتوماتيكي في نظم القوى الميكانيكية

MEP 577 Using Virtual Lab Applications for Industrial Gas Turbine Plants

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What do we study? **ملاحظة:** هذا ليس مقررتدريس نظريات التوربينات الغازية ولكن **مقررمتقدم** للتدريب على نظم التحكم الأوتوماتيكي لمحطاتها.

مق 577 تطبيقات المعامل الافتراضية في التحكم في محطات التوربينات الغازية:

Interactive Automatic Control System for Gas Turbine Plants:

هذا المقررالتفاعلي التدريبي يستخدم برنامج للمعامل الافتراضية بالحاسب الآلي ويتضمن العناصر التالية: أساسيات تصميم وتشغيل نظم التوربيناتالغازية، الوعاء الحاوي الخارجي للتوربينة،فلترومدخل ومأخذ الهواء للضاغط الدواروالجزء الناشر من المدخل، نظم التحكم في الضاغط وزيت التبريد، غرفة ونظم الإحتراق، نظام إشعال الوقود، الجزءالتوربيني لتمدد الغازات وتوليدالطاقة، مسارات خروج غازات العادم ونواتج الحريق،كراسى المحاوروموانع التسرب ونظام التزييت،مضخات وفلاتر سائل التزييت، مبردات الزيت، الأجهزة والمعدات الضرورية في محطات التوربينات الغازية وتتضمن: نظم التحكم الهيدروليكية للتشغيل بواسطة كل من إمدادات الوقود الغازي أوالسائل والديزل، نظم التحكم النيوماتية أو الهيدروليكية لبدائية التشغيل للمحطة لكل نوع من انواع الوقود، نظم إكتشاف وإحتواء وإطفاء الحريق في مختلف أجزاء المحطة. أساسيات توليد الطاقة وأجزاء المولد الكهربائي، نظام التحكم في المولد وزيت التبريد.

What do we have in the Industrial Gas Turbine Plants?

MEP 577 - Applications of Virtual Labs for Control of Gas Turbines Plants:

Contents: Interactive Automatic Control System for Gas Turbine Plants:

This is interactive computer-based training course that includes the following items: Engine Design- Operating Principles- Engine Case & Air inlet- Compressor Section- Diffuser & Combustion- Turbine & Exhaust- Ignition System- Bearing & Seals- Lubrication & Lube Oil- Lube Oil Pumps- Lube Oil Filters & Coolers- Lube Oil Instrumentation- Hydraulic Oil System- Trip Oil System- Fuel System – Fuel Gas Supply System- Fuel Gas Control System- Liquid Fuel System- Liquid Fuel system Operation- Pneumatic Starting System- Hydraulic Starting System- Diesel Starting System- Enclosures- Fire Detection- Gas Detection-Fire Extinguisher Systems- Principles of Power Generation- Generator Components- Generator Lube Oil- Generator Control- Principles of Compression- Compressor Components- Compressor Lube Oil- Compressor Control System.

Fundamentals of Gas Turbine Operation

01 : Engine Design

11 : Lube Oil Filters & Coolers

21 : Hydraulic Starting System

31 : Generator Control

02 : Operating Principles

12 : Lube Oil Instrumentation

22 : Diesel Starting System

32 : Principles of Compression

03 : Engine Case & Air Inlet

13 : Hydraulic Oil System

23 : Enclosures

33 : Compressor Components

04 : Compressor Section

14 : Trip Oil System

24 : Fire Detection

34 : Compressor Lube Oil

05 : Diffuser & Combustion

15 : Fuel System

25 : Gas Detection

35 : Compressor Control

06 : Turbine & Exhaust

16 : Fuel Gas Supply System

26 : Extinguisher Systems

07 : Ignition System

17 : Fuel Gas Control System

27 : Principles of Power Gen

08 : Bearings & Seals

18 : Liquid Fuel System

28 : Generator Components

09 : Lubrication & Lube Oil

19 : Liquid Fuel System Ops

29 : Generator Lube Oil

10 : Lube Oil Pumps

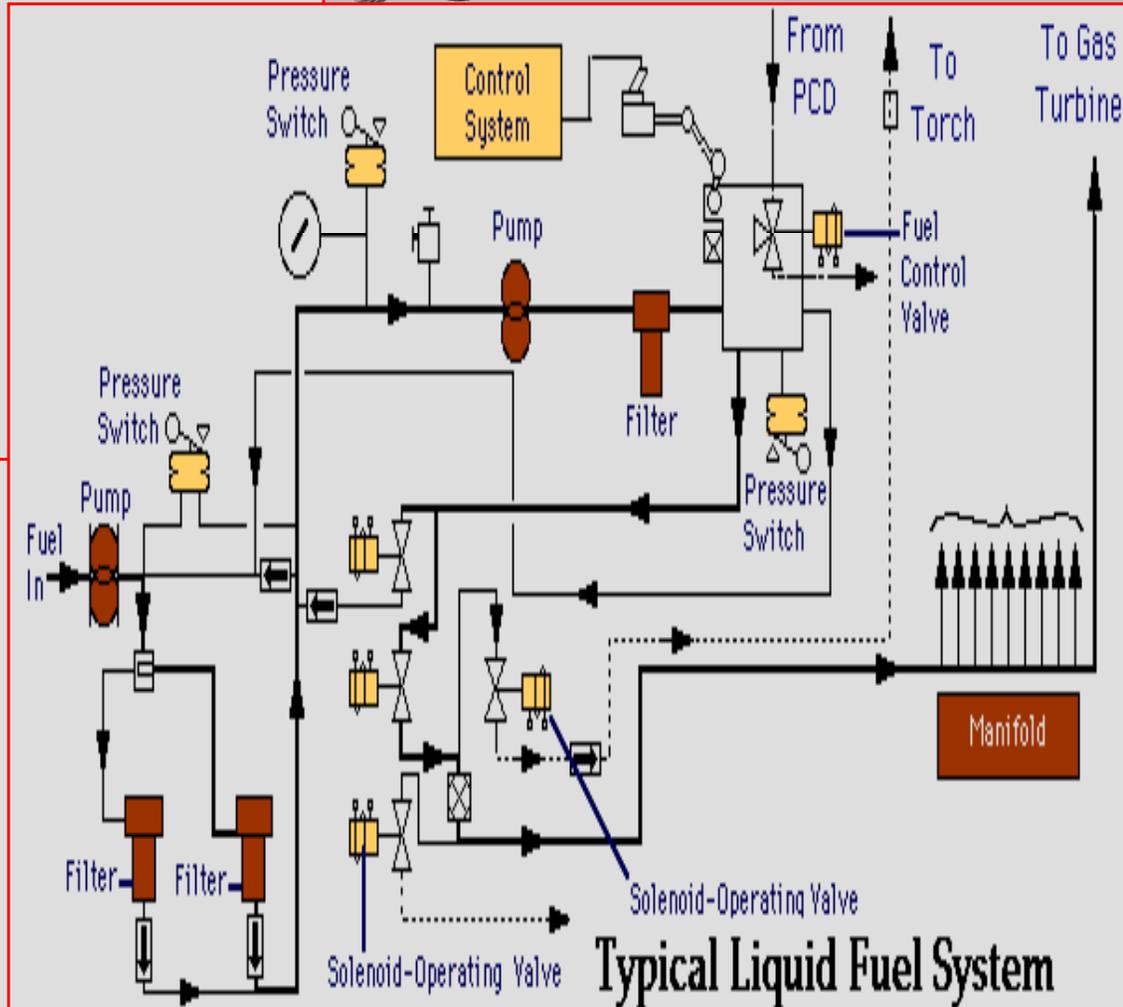
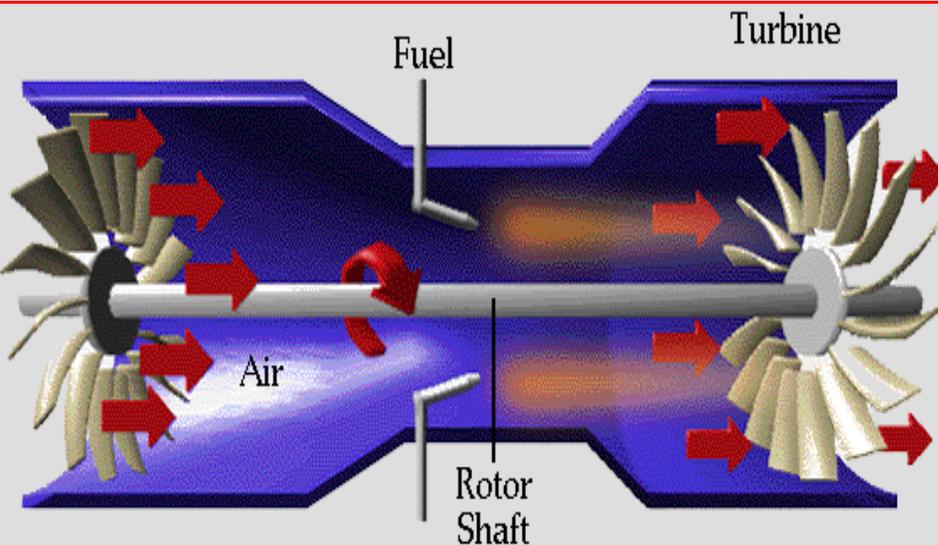
20 : Pneumatic Starting System

30 : Generator Cooling

Fundamentals of Gas Turbine Operation



Gas Turbine Design



Course Specifications & Basic Information

1. Title:	Using Virt. Lab Applications for Control of Industrial Gas Turbine Plants			Code:MEP576
2. Credit hrs per week	Lectures= 3 hours per week	Tutorial= 0.0	Practical= 0.0	Total=3 Cr.Hrs

B- Professional Information

1. Course description: Overall Aims:

This is an interactive computer-based training course that includes the following items: Engine Design- Operating Principles- Engine Case and Air inlet- Compressor Section- Diffuser and Combustion- Turbine and Exhaust- Ignition System- Bearing and Seals- Lubrication and Lube Oil- Lube Oil Pumps- Lube Oil Filters and Coolers- Lube Oil Instrumentation- Hydraulic Oil System- Trip Oil System- Fuel System – Fuel Gas Supply System- Fuel Gas Control System- Liquid Fuel System- Liquid Fuel system Operation- Pneumatic Starting System- Hydraulic Starting System- Diesel Starting System- Enclosures- Fire Detection- Gas Detection-Fire Extinguisher Systems- Principles of Power Generation- Generator Components- Generator Lube Oil- Generator Control- Principles of Compression- Compressor Components- Compressor Lube Oil- Compressor Control System.

2. Intended Learning Outcomes of Course (ILOs):

a) Knowledge and Understanding:

Having successfully completed this course, the post-graduate student should have knowledge and understanding of:

- Theories, Information, sciences and specialized technologies in the fields of automatic control of mechanical power equipments and systems of Industrial Gas Turbine Plants.
- Moral, legal essentials & quality control principals related to the graduate's professional practices in automatic control fields.
- Various effects of eng. professional practices of Industrial Gas Turbine Plants on different components of the environment.
- Methods used for emission/pollution control and energy rationalization and maximization of the benefits of Industrial Gas Turbine Plants.

b) Intellectual Skills:

Having successfully completed this course, the student should have the ability to do:

- Identify scientific and practical problems related to auto. control of Industrial Gas Turbine Plants.
- Analyze and propose professional, technical solutions and algorithms for automatic control problems.
- Analytical reading of research and report topics related to control of Industrial Gas Turbine Plants.
- Evaluate and estimate various risks involved in professional practices related to of Industrial Gas Turbine Plants.
- Take effective actions and professional decisions in accordance with and/or based on available data and technical information.

c) Professional and Practical Skills:

Having successfully completed this course, the student should have the ability to do:

- Apply professional and practical skills in the fields of auto. control of Industrial Gas Turbine Plants.
- Execute short term project and write engineering technical report that involves graphs, charts, and diagrams.
- Perform professional presentation and suggest possible alternative solutions for automatic control problems of Industrial Gas Turbine Plants.
- Write technical requirements & selecting engineering reference standards for Industrial Gas Turbine Plants.

d) General and Transferable Skills:

Having successfully completed this course, the student should have the ability to do:

- Perform engineering calculations, draw feed-back control circuits, block diagrams, graphical presentation of experimental data, and perform data-regression analysis.
- Transfer knowledge, Work in group, & Communicate in written & oral forms, in English.
- Use IT& evolutionary technological tools& PC applications (Excel, Mat lab, Virtual labs, .etc).
- Prepare & write reports, Manipulate & sort data, Think logically, and continuous self-E-learning.
- Identify practical problems, compare between different technologies for measurement systems.
- Organise & manage time & resources effectively; for short-term and longer-term commitments.