Cairo University
Faculty of Engineering
Mech. Power Department

دبلوم تطبيقات التحكم الأوتوماتيكى فى نظم القوى الميكانيكية

MEP 575 Using Virtual Lab Applications for Solar Heating Plant

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What do we study? ملاحظة: هذا ليس مقررلتدريس نظريات الطاقةالشمسيةولكن مقررمتقدم للتدريب علىنظم التحكم الأوتوماتيكى لهذه المحطات

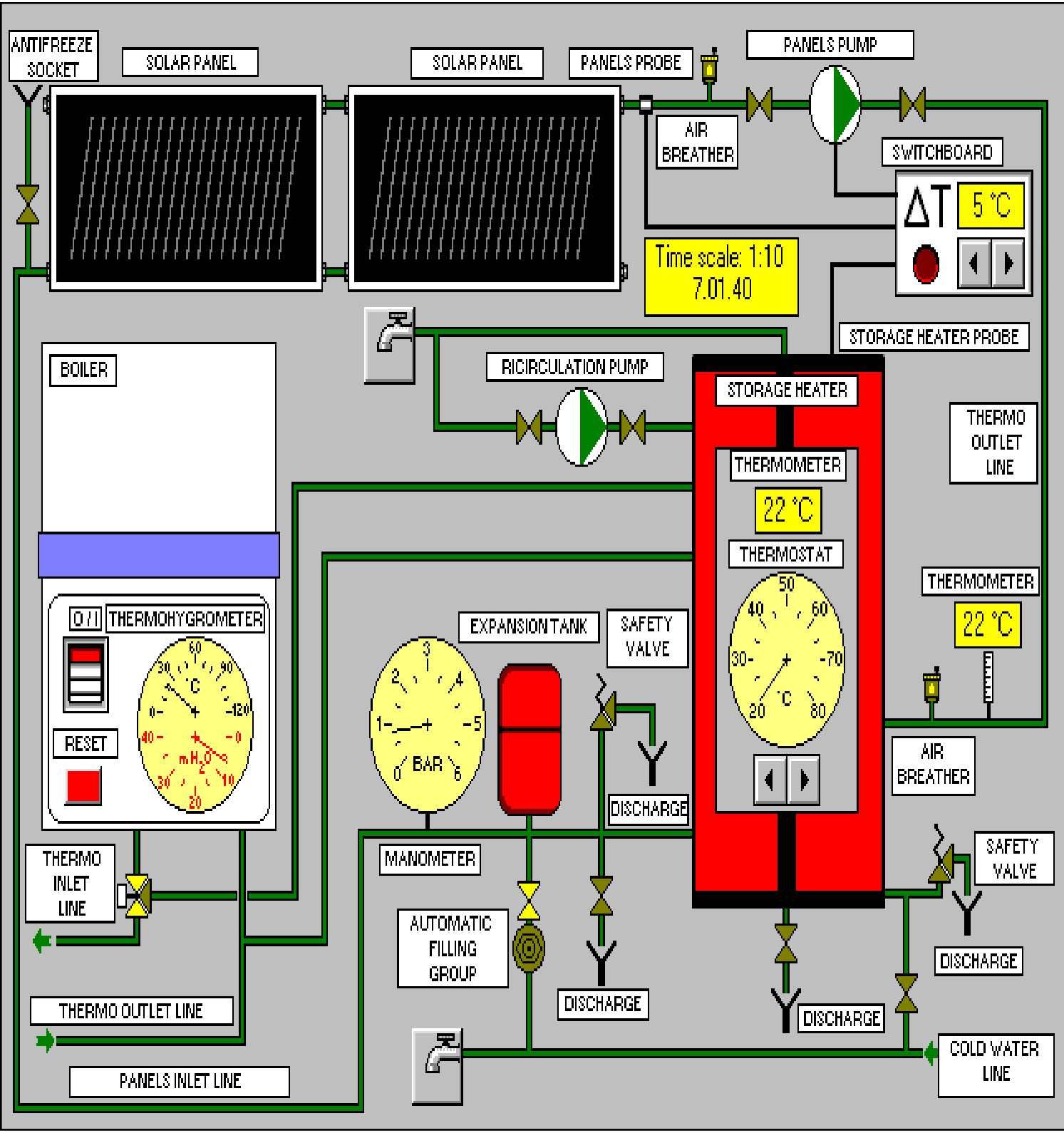
مكق 575 تطبيقات المعامل الإفتراضية فى محطات تسخين مياه بالطاقة الشمسية:

Interactive Automatic Control System for an Industrial Solar Heating Plant with 2-Flat Plate collectors and auxiliary boiler:

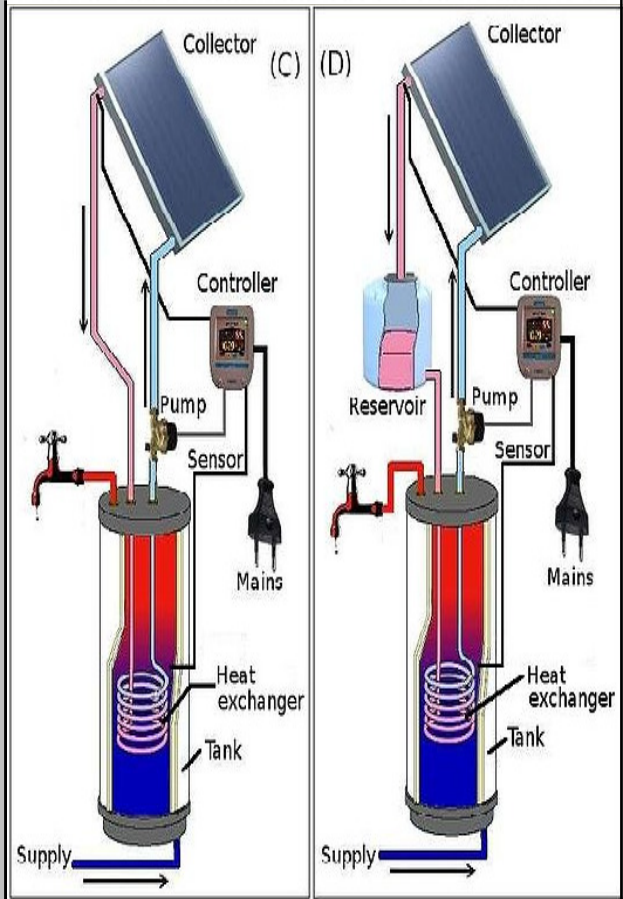
يتضمن المقرر دراسة والتعرف على وتحليل عناصرالعديد من مكونات وأجهزة ومعدات نظم التحكم الآلى المستخدمة فى محطات تسخين المياه بالطاقة الشمسية والمجمعات المستوية Flat Plate collectors وتخزينها لكافة ظروف وزمن الإستهلاك مع الإستعانةبنظام مساعد للتسخين الحرارى التقليدىAuxiliary boiler. كما يتضمن المقررذلك دراسة حالة تطبيقية من خلال برنامج معامل إفتراضية تفاعلى للتحكم الأوتوماتيكى وتشغيل وإدارة كافة أجزاء محطة تسخين مياه بالطاقة الشمسية تشمل عدد 2 من المجمعات المستوية Two Flat Plate collectorsوخزان للمياه ونظام مساعد للتسخين الحرارى التقليدىAuxiliary boiler..

What do we have in the Industrial Solar Heating Plant?

Contents: **Interactive Automatic Control System for an Industrial Solar Heating Plant with 2-Flat Plate collectors and auxiliary boiler: This is an interactive computer-based training course that includes an investigation, a virtual computer simulation and flow visualization. The course is designed to give the participant a broad based understanding of the most important concepts of practical automatic control and real thermo-fluid processes existing in an Industrial Solar Heating Plant with 2-Flat Plate collectors and an auxiliary boiler. The simulation includes many critical control alarms, input/output signals, operation and instrumentation parameter-boards, diagnostic tools, error-report filling, help/trouble-shooting menus & Thermal Balance Calculations & Plotting tools.**



monobloc (thermosiphon) solar heater



Indirect active systems: (C) Indirect system with heat exchanger in tank; (D) Drainback system with drainback reservoir. In these schematics the controller and pump are driven by mains electricity

Course Specifications & Basic Information

1. Title:	Using Vir.Lab Applications for Control of Industrial Solar Heating Plant			Code:MEP575
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 an investigation, a virtual computer simulation and flow visualization. The course is designed to give the participant a broad based understanding of the most important concepts of practical automatic control and real thermo-fluid processes existing in an Industrial Solar Heating Plant with 2-Flat Plate collectors and an auxiliary boiler. The simulation includes many critical control alarms, input/output signals, operation and instrumentation parameter-boards, diagnostic tools, error-report filling, help/trouble-shooting menus & Thermal Balance Calculations & Plotting tools.

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 Solar Heating 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 Solar Heating Plants on different components of the environment.
-Methods used for emission/pollution control and energy rationalization and maximization of the benefits of Industrial Solar Heating Plants.

b) Intellectual Skills:

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

-Identify scientific & practical problems related to auto. control of Industrial Solar Heating Plants.

- Analyze & propose professional, technical solutions and algorithms for automatic control problems.

- Analytical reading of research &report topics related to control of Industrial Solar Heating Plants.

- Evaluate and estimate various risks involved in professional practices related to of Industrial Solar Heating 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 automatic control of Industrial Solar Heating 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 Solar Heating Plants.

Write technical requirements & selecting engineering reference standards for Industrial Solar Heating 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.