

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Steam Power Plants		Module Delivery
Module Type	C	☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	ATU12051		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level		Semester of Delivery	
Administering Department	ATU12	College	PMETC
Module Leader		e-mail	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. To study the power generation scenario, the components of thermal power plant, improved Rankin cycle, Cogeneration cycle. 2. To understand details of steam condensing plant, analysis of condenser, the environmental impacts of thermal power plant, method to reduce various pollution from thermal power plant. 3. To study layout, component details of hydroelectric power plant, hydrology and elements, types of nuclear power plant. 4. To understand components; layout of diesel power plant , components; different cycles ; methods to improve thermal efficiency of gas power plant. 5. To study the working principle, construction of power generation from nonconventional sources of energy. 6. To learn the different instrumentation in power plant and basics of economics of power generation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle. 2. Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same. 3. Recognize the layout, component details of hydroelectric power plant and nuclear power plant. 4. Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle. 5. Emphasize the fundamentals of non-conventional power plants. 6. Describe the different power plant components and basic principles of economics of power generation.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Steam power plant :Rankine cycle, superheated processes, reheated processes, regeneration and cogeneration (open feed water, closed backward feedwater, closed forward feed water), Boiler operation(fire tube boiler, water tube boiler, water circulation in boiler). Steam turbine: Impulse turbine and reaction turbine(velocity diagram, developed power, axial thrust, tangential thrust, diagram efficiency), condenser, cooling tower, pumping system. Gas power plant: Gas turbine, air compressor, combustion chamber(mixing of air and fuel, design and efficiency of combustion chamber). Wind power plant: wind turbine. Nuclear power plant, pressurized water reactor, boiling water reactor. Hydroelectric power plant.
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Learning and Teaching Strategies استراتيجيات التعلم والتعلي م	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through class interactive tutorials and by considering types of simple experiments involving so sampling activities that are interesting to the students. Each student must present a seminar about one of the subjects of power plant and renewable energy.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوع			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعي	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعي	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module تقييم Evaluation المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	3 and 11	LO #1, #2 and #10, #
	Assignments	2	10% (10)	4 and 12	LO #3, #4 and #12, #
	Projects / Lab.	5	10% (10)	Continuous	All
Summative assessment	Report	1	10%(10)	10	#10
	Midterm Exam	2hr	10% (10)	9	LO #1 - #8
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Steam power plant cycle (Rankin cycle)
Week 2	Power station superheated processes
Week 3	Power station reheated processes
Week 4	Steam power plant regeneration and cogeneration
Week 5	Open feed water, Closed backward feed water, Closed forward feed water
Week 6	Function of power plant parts [boiler operation (fire tube boiler, water tube boiler)], water circulation in boiler
Week 7	Steam turbine, Impulse steam turbine (principle of impulse steam turbine, velocity diagram, power produced by it, efficiency of stages).
	Reaction turbine (principle of reaction steam turbine, velocity diagrams, power produced by turbine stages and efficiency of these stages)

Week 8	Condensers, Principle of condenser operation, Circulation of water system Cooling tower (system classification, operation performance)
Week 9	Pumping system (circulation of water)
Week 10	Gas turbine power plant station(classification, system operation), Air compressor (classification, system operation)
Week 11	Combustion chamber, Operation and performance (mixing the air and fuel, design principle), Efficiency of combustion chamber
Week 12	Wind power plants, wind turbines (classification, system operation)
Week 13	Nuclear power plant, Principle of nuclear power plant (classification and performance), pressurized water reactor, boiling water reactor.
Week 14	Hydroelectric power stations
Week 15	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Calculation of heat generation from boiler and heat dissipation from condenser in steam plant
Week 2	Calculation of efficiency of boiler in steam power plant
Week 3	Calculation of combustion efficiency of burner in steam power plant
Week 4	Simulation and calculation of two shift gas turbine power plant
Week 5	1. Measuring the Irradiation of the different Light sources. 2.The Solar Cell as a Converter of Energy
Week 6	1. The Solar Cell as a Converter of Energy /as Diode. 2.The short-circuit current and the No-load voltage of solar cell / Shading.
Week 7	1.The short-circuit current and the No-load voltage with different Irradiations ,Angles and orientation 2.Series connection of solar cells /shading.
Week 8	7- Parallel connection of solar cells. 8- Voltage – current characteristic curve of solar cell and determination of the efficiency factor MPP
Week 9	1. Measuring wind speed of the blower in relation to the potentiometer position . 2- Measuring the output power of the wind energy converter in relation to wind speed.
Week 10	1.Measuring the output power of the wind energy converter in relation to the form and the number of the wings. 2.Measuring the output power of the wind energy converter in relation to the position of the wings.

Week 11	1. Measuring the Volume Ratio of the Gases Produced. 2. Measuring the Gas Volumes Produced per Time Unit in Relation to the Current.
Week 12	1. Determining the Energy and Faraday Efficiency Factors of the Electrolyser 2. Determining the Current –Voltage Characteristic Curve of the Electrolyser.

Learning and Teaching Resources مصادر التعلم والتدريس	
	Text
Required Texts	Power Plant Engineering, P.K. Nag, Tata McGraw Hill.
Recommended Texts	1. Power Plant Engineering, F.T. Morse, Affiliated East-West Press Pvt. Ltd, New Delhi/Madras 2. Power Plant Technology El-Vakil, McGraw Hill.
Websites	https://www.youtube.com/watch?v=tYBgzsli98&list=PLLy_2iUCG87BT8H9uMufjrcPF5e6Qc

Grading Scheme مخطط الدرجات ت				
Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

