



Ministry of Higher Education and Scientific Research
Al-Furat Al-Awsat Technical University
Musayyib Technical College
Department of Electrical Engineering Techniques



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	ELECTRICAL POWER GENERATION STATION		
Module Type	CORE	☒ Theory Lecture ☒ Lab Tutorial ☒ Practical ☒ Seminar	
Module Code	ATU23074		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	4	Semester of Delivery	1
Administering Department	DEPARTMENT OF ELECTRICAL ENGINEERING TECHNIQUES	College	
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	14/06/2023	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	The student will be familiar with the methods of generating electrical energy by the variance electrical stations. Each type of these station has a special method for generating electrical energy.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the principles of electrical power generation and the different types of power stations. 2. Identify the components and systems of a power generation station, including turbines, generators, transformers, and switchgear. 3. Explain the operation and maintenance requirements of various power generation technologies, such as coal-fired, gas-fired, nuclear, hydroelectric, and renewable energy systems. 4. Analyze the environmental and social impacts of power generation, including air and water pollution, greenhouse gas emissions, land use, and community health and safety concerns. 5. Evaluate the economic and regulatory factors that influence power generation, including

	fuel costs, government policies, and market demand. 6. Apply engineering principles to design and optimize power generation systems for efficiency, reliability, and sustainability. 7. Develop communication and teamwork skills by collaborating with peers on projects related to power generation station design and operation. 8. Demonstrate knowledge of safety procedures and regulations in power generation operations, including electrical safety, fire prevention, and emergency response planning.
Indicative Contents المحتويات الإرشادية	1. Introduction to electrical power generation and the importance of electricity in modern society 2. Types of power stations, including thermal, hydroelectric, nuclear, and renewable energy systems 3. Components of a power generation station, including turbines, generators, transformers, and switchgear 4. Operation and maintenance requirements of different power generation technologies, such as coal-fired, gas-fired, nuclear, hydroelectric, and renewable energy systems 5. Environmental and social impacts of power generation, including air and water pollution, greenhouse gas emissions, land use, and community health and safety concerns 6. Economic and regulatory factors that influence power generation, including fuel costs, government policies, and market demand 7. Design principles for efficient, reliable, and sustainable power generation systems 8. Safety procedures and regulations in power generation operations, including electrical safety, fire prevention, and emergency response planning 9. Case studies of successful power generation projects around the world 10. Emerging technologies in power generation, such as energy storage and smart grids.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Types of power stations, including thermal, hydroelectric, nuclear, and renewable energy systems: This section will describe the different types of power stations and their key features, including the fuel sources used, efficiency, and environmental impacts. 2. Components of a power generation station, including turbines, generators, transformers, and switchgear: This section will provide an overview of the key components of a power generation station and their functions in converting fuel into electricity. 3. Operation and maintenance requirements of different power generation technologies, such as coal-fired, gas-fired, nuclear, hydroelectric, and renewable energy systems: This section will discuss the operational requirements and maintenance considerations for different types of power generation technologies. 4. Environmental and social impacts of power generation, including air and water pollution, greenhouse gas emissions, land use, and community health and safety concerns: This section will examine the environmental and social impacts associated with power generation and the measures that can be taken to mitigate these impacts.
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	5. Economic and regulatory factors that influence power generation, including fuel costs, government policies, and market demand: This section will explore the economic and regulatory factors that influence power generation, including the cost of fuel, government policies, and market demand for electricity. 6. Design principles for efficient, reliable, and sustainable power generation systems: This section will discuss the design principles that are critical for building efficient, reliable, and sustainable power generation systems. 7. Safety procedures and regulations in power generation operations, including electrical safety, fire prevention, and emergency response planning: This section will describe the safety procedures and regulations that must be followed in power generation operations to ensure the safety of workers and the surrounding community. 8. Case studies of successful power generation projects around the world: This section will highlight successful power generation projects from around the world and the key factors that contributed to their success. 9. Emerging technologies in power generation, such as energy storage and smart grids: This section will explore emerging technologies in power generation, including energy storage and smart grids, and their potential to transform the way electricity is generated and distributed.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	3.133
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	9	10% (10)	Continuous	All
	Report	6	10% (10)	2, 12	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1-8
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
1	Introduction
2	Thermal stations.
3	Hydro-electric stations.

4	Diesel electric stations.
5	Nuclear power stations.
6	Gas turbine plants.
7	Combined operation of power system.
8	Major electrical equipment's in power stations.
9	Variable load problem.
10	Power plant economics.
11	Solar energy.
12	Wind turbine energy.
13	Geothermal energy.
14	Tidal energy.
15	Final Examination

Delivery Plan (Weekly Lab. Syllabus)

المناهج الأسبوعي للمختبر

	Material Covered
1	Lab 1: Types of electrical power generation.
2	Lab 2: Thermal station diagram.
3	Lab 3: Hydro plant diagram.
4	Lab 4: Diagram of the diesel electric station.
5	Lab 5: Diagram of the nuclear power station.
6	Lab 6: Gas turbine plant diagram.
7	Lab 7: Power system (combined operation diagram).
8	Lab 8: Main electrical equipment's of power stations.
9	Lab 9: Illustrate the problems of variable load.
10	Lab 10: Economics of power plants.
11	Lab 11: Solar energy system diagram.
12	Lab 12: Wind turbine system diagram.
13	Lab 13: Geothermal system diagram.
14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Power Generation Technologies by Paul Breeze 2. Electric Power Generation, Transmission, and Distribution by Leonard L. Grigsby 3. Power Plant Engineering by R.K. Rajput 4. Renewable Energy Systems: The Choice and Modeling of 100% Renewable Solutions by Henrik Lund 5. Power System Analysis and Design by J. Duncan Glover, Mulukutla S. Sarma, and Thomas Overbye 6. Wind Energy Engineering: A Handbook for Onshore and Offshore Wind Turbines by Trevor M. Letcher	Yes

	7. Solar Energy Engineering: Processes and Systems by Soteris A. Kalogirou 8. Microgrids and Active Distribution Networks by Nikos Hatziargyriou and Francisco M. Gonzalez-Longatt 9. Energy Storage for Sustainable Microgrid by Kankar Bhattacharya and Rajesh Kumar Malhotra 10. Blockchain Enabled Applicati...	
Recommended Texts	Electric Power Generation, Transmission, and Distribution by Leonard L. Grigsby	No
Websites	ELECTRICAL POWER GENERATION STATION https://www.amazon.com/Electric-Generation-Transmission-Distribution-Engineering/dp/1439856281	

APPENDIX:

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GRADING SCHEME				
مخطط الدرجات				
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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
NB 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.				