هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title: Power Generation Systems
Course Code: 234MMET
Program: Mechanical Maintenance Engineering Technology
Department: Mechanical Engineering Technology
College: College of Applied Industrial Technology
Institution: Jazan University
Version: V2022
Last Revision Date : 03-03-2024

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	3CR hours				
2. Course type					
a.	University ☐	College ☐	Department √	Track☐	Others☐
b.	Required √	Elective☐			
3. Level/year at which this course is offered: Sixth level/ 2nd Year					
4. Course general Description This course deals with different types of power generation systems, particularly steam power plants, gas power plants, combined cycle power generation, and internal combustion engines. It covers combustion, operation and control of boilers, super-heaters, condensers, cooling towers, and water treatment. Students learn to analyze steam and gas power plants. It also deals with the operation, maintenance, and troubleshooting of internal combustion engines. Students acquire hands-on skills in selected engine types. The course is introduced through three classes weekly. They are: 2 classes (2 hour each) for the theoretical part and 2 hours' class for laboratory for which students apply and implement the concepts of the lectures.					
5. Pre-requirements for this course (if any): 091 Physics					
6. Co- requirements for this course (if any): Nil					
7. Course Main Objective(s) This course offers an introduction to the principles of operation, configuration, characteristics and key implementation issues of various types of power plants. The course is of particular interest to technicians employed in the field of mechanical engineering technology.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	44	100
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	22
2.	Laboratory/Studio	22
3.	Field	---
4.	Tutorial	---
5.	Others (specify)	---
	Total	44

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Outline the various technologies of power generation, and recognize the different types of plant, types of energy and renewable energy sources	K1.2	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams
…				
2.0	Skills			
2.1	Explain the interconnected operations of different power generation systems and evaluate, relevant measurement data	S1.2	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams
2.2	Evaluate load factor and cost of power generation and prepare an appropriate scheduling of electric power to satisfy the demand constraint	S2.1	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams
2.3	Working principle and application of renewable energy sources of solar, wind, geothermal, ocean and biomass energy	S4.3	Lecture, active learning, discussion, Practical class	Quizzes, Assignments, tutorials & exams, Lab training and lab exam
3.0	Values, autonomy, and responsibility			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Compare the environmental aspects of site selection for various types of power plant	V1.2	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams, Lab training and lab exam
3.2	Soft skills: Discuss the skills and work under pressure to manage team work	V2.2	Lecture, active learning, discussion	Lab work, Lab exam and viva-voce exam
...				

C. Course Content

No	List of Topics	Contact Hours
1	Introduction: Amount of generation of electric power from Conventional and non conventional sources of energy.	6
2	Steam Power Station: Arrangement, advantages and disadvantages, efficiency of steam power station, characteristic, and environmental aspects for selecting the sites and locations of thermal power stations	6
3	Hydro Power Station: Arrangement, advantages and disadvantages, choice of site constituents of hydro power plant, Hydro turbine, and environmental aspects for selecting the sites and locations of hydro power stations.	8
4	Diesel Power Station: Introduction, arrangement, advantages and disadvantages, and choice and characteristic of diesel engines.	6
5	Gas Turbine Power Plant: Arrangement, advantages and disadvantages of Gas turbine power plant, Open cycle and Closed cycle gas turbine power plant, Combined cycle power plant, Comparison of various power plants.	Self Study Report
6	Nuclear power plant: Nuclear fission and fusion processes. Components and types of nuclear reactors. Advantages and disadvantages and site selection	8
7	Power generation by non-conventional energy sources	8
8	Revision of course material	2
Total		44

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz #1	4th week	10%
2.	Midterm	7thweek	15%
3.	Self study report	3rd week	10%
4	Assignments, Tutorials and Oral exam	All weeks	10%
5	Soft skill (Lab work, Lab exam and Viva-voce)	All weeks	15%
6	Final Exam	As scheduled	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Power Plant Engineering" by Black & Ve*atch*, *Springer Publications,* (1996). • "Power Plant Engineering" by A.K. Raja, Amit Prakash Srivastava & Manish Dwivedi, *New Age International (P) Limited Publishers, New Delhi,* (2006). • Internal Combustion Engines, by V. Ganesan, *Tata McHraw Hill Publishing Company Limited, New Delhi,* Fourth Reprint, (2008). • "A course in Power Systems", J.B.Gupta, *S.K.Kataria and sons, reprint* (2010-2011). • "Text Book on Power System Engineering", A. Chakrabarti, P.V. Gupta, Soni Ml, *Dhanpat Rai Publishing Company Ltd.*, (2008)
Supportive References	• Classroom policy • Renewable Energy Technologies", Chetan Singh Solanki,*Prentice Hall India Learning Private Limited,* (2008). • "Power Plant Engineering", P.K. Nag, *Tata McHraw Hill Publishing Company Limited, New Delhi*, Third Reprint, (2008) • "Renewable Energy Resources", Hohn Twidell, Tony Weir, *Routledge Publishing Company*, (2015). •
Electronic Materials	*www.learnthermo.com/*
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms should be furnished with • White board and appropriate Chairs • Laboratory with different temperature and pressure apparatus, as well as some experiments related to fluid Mechanics-Under graduate level
Technology equipment (projector, smart board, software)	Digital board, Computer with data show
Other equipment (depending on the nature of the specialty)	Not utilized

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Confidential student Course Evaluation Survey	Institution	Online Direct Survey
End of semester CLO	Course Coordinator	Direct Survey
Confidential student Course Evaluation Survey	Institution	Online Direct Survey
The extent to which CLOs have been achieved	Students	CLO survey, exams
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	MET
REFERENCE NO.	CAITMET20243
DATE	03-03-2024