SULTAN KUDARAT STATE UNIVERSITY
Isulan Campus, Isulan Sultan Kudarat
College of Industrial Technology

ET 312 - POWER PRODUCTION AND MANAGEMENT SYSTEMS

UNIVERSITY VISION

A leading University in advancing scholarly innovation, multi-cultural convergence, and responsive public service in a borderless Region.

UNIVERSITY MISSION

The University shall primarily provide advanced instruction and professional training in science and technology, agriculture, fisheries, education and other related fields of study. It shall also undertake research and extension services, and provide progressive leadership in its areas of specialization.

UNIVERSITY STRATEGIC GOALS

a. Deliver quality service to stakeholders to address current and future needs in instruction, research, extension, and production
b. Observe strict implementation of the laws as well as the policies and regulations of the University
c. Acquire with urgency state-of-the-art resources for its service areas
d. Bolster the relationship of the University with its local and international customers and partners
e. Leverage the qualifications and competences in personnel action and staffing
f. Evaluate the efficiency and responsiveness of the University systems and processes

INSTITUTIONAL OUTCOMES (IO)

a. Enhance competency development, commitment, professionalism, unity and true spirit of service for public accountability, transparency and delivery of quality services
b. Provide relevant programs and professional trainings that will respond to the development needs of the region
c. Strengthen local and international collaborations and partnerships for borderless programs
d. Develop a research culture among faculty and students
e. Develop and promote environmentally-sound and market-driven knowledge and technologies at par with international standards
f. Promote research-based information and technologies for sustainable development
g. Enhance resource generation and mobilization to sustain financial viability of the university

PROGRAM OUTCOMES (PO) COMMON TO ALL PROGRAMS AND ITS RELATIONSHIPS TO INSTITUTIONAL OUTCOMES

A graduate of the BIndTech program can:	INSTITUTIONAL OUTCOMES (IO)						
	a	b	c	d	e	f	g
a. Analyze broadly defined industrial technology processes by using analytical tools that enhance creativity, innovativeness, and intellectual curiosity to improve methods, processes, and systems that meet the industry standards;	✔	✔				✔	
b. Design and implement broadly defined industrial systems, components, products, or processes to meet specific industry needs with proficiency and flexibility in the area of	✔	✔		✔		✔	

	a	b	c	d	e	f	g	h
specialization in accordance with global standards;								
c. Apply appropriate techniques, resources, and state-of-the-art industrial technology tools to meet current industry needs and use these modern tools and processes to improve and increase entrepreneurial activities upholding the safety and health standards of business and industry;	✔		✔	✔	✔			
d. Communicate with diverse groups of clienteles the appropriate cultural language with clarity and persuasion, in both oral and written forms, including understanding and giving of clear instructions, high comprehension level, effectiveness in delivering presentations and writing documents, and articulating technological innovation outputs;	✔	✔	✔	✔	✔			
e. Develop leadership and management skills in a team-based environment by making informed decisions, keeping the team motivated, acting and delegating responsibility, and inspiring positive changes in the organization by exercising responsibility with integrity and accountability in the practice of one's profession;	✔	✔	✔	✔	✔			
f. Practice the moral responsibilities of an industrial technologist to manage and balance wider public interest and uphold the norms and safety standards of the industrial technology profession;				✔	✔		✔	✔
g. Demonstrate enthusiasm and passion for continuous personal and professional development in broadly defined industrial technology and effecting positive changes in the entrepreneurial and industrial endeavor; and	✔	✔	✔	✔	✔		✔	✔
h. Recognize the need for, and an ability to engage in lifelong learning.	✔	✔	✔	✔	✔		✔	✔

COURSE CODE ET312

COURSE TITLE POWER PRODUCTION AND MANAGEMENT SYSTEMS

PREREQUISITE NONE

CREDITS 3 units

5 COURSE DESCRIPTION

This course, the students will learn advance components on the operation, control, design, regulation and management of the power systems and networks. Critically evaluate methodologies, analytical procedures and research methods in energy power system and management.

6 COURSE LEARNING OUTCOMES (CLO) AND ITS RELATIONSHIPS TO PROGRAM OUTCOMES

Course Learning Outcomes (CLO)	Program Outcomes							
At the end of the course, a student can:	a	b	c	d	e	f	g	h
a. Understand SKSU-VGMO, Classroom Policies, Course Overview, Course Requirements and Grading System;	✔	✔	✔	✔	✔	✔	✔	✔
b. Describe the basic components and functions of digital electronic circuits.	✔	✔	✔	✔	✔	✔	✔	✔
c. Analyze and design combinational logic circuits using various logic gates, implement sequential logic circuits, and understand their timing diagrams.;	✔	✔	✔	✔	✔	✔	✔	✔
d. Apply Boolean algebra to simplify digital circuits.	✔	✔	✔	✔	✔	✔	✔	✔

e.	Utilize number systems and codes in digital electronics.		✔	✔	✔	✔	✔	✔	✔	✔
f.	Design and troubleshoot digital circuits using simulation software.		✔	✔	✔	✔	✔	✔	✔	✔
g.	Demonstrate the functionality of basic digital devices, including multiplexers and flip-flops.		✔	✔	✔	✔	✔	✔	✔	✔
h.	Construct and analyze 7-segment display systems.		✔	✔	✔	✔	✔	✔	✔	✔

7 COURSE CONTENTS

WEEK	CONTENT	INTENDED LEARNING OUTCOMES((ILOs)	TEACHING AND LEARNING ACTIVITIES (TLA)	OUTCOMES-BASED ASSESSMENT (OBA)	COURSE LEARNING OUTCOMES (CLOs)
1	**Course Orientation** *SKSU VMGO, Classroom Policies, Course Overview, Course Requirements, Grading System*	At the end of the week, the student can: a. Discuss the University's VMGO, classroom policies, course overview, requirements, and grading system	Discuss the VMGO of the University, the classroom policies, scope of the course, course requirements and grading system	a. Participation in discussions	abcdefg
2	**Types Of Generating System** a. Fossil Fuel-Based Power generator b. Renewable energy-based power generator	At the end of the week, the students can: a. Explain the working principles of fossil fuel-based and renewable energy-based power generators. b. Differentiate between fossil fuel-based and renewable energy-based power generators based on environmental impact and efficiency. c. Identify various types of fossil fuel and renewable energy generators with their specific applications. d. Identify various types of fossil fuel and renewable energy generators with their specific applications.	a. Show educational videos on power plants and renewable energy installations. b. Case study analysis on the effects of fossil vs. renewable energy use. c. Presentation of images and videos showing different types d. Create a simple power generation plan for a house, school, or small farm.	a. Oral recitation b. Participation and reasoning quality in debate/discussion c. Picture identification test or flashcard game. d. Group project presentation	abcdefg

		At the end of the week, the students can:			abcdefg
3	**Generator Set Control And Monitoring** a. Automatic Voltage Regulation (AVR) b. Remote Monitoring System	At the end of the week, the students can: a. Explain the function and working principle of Automatic Voltage Regulation (AVR) in generator sets. b. Describe the function and advantages of remote monitoring systems in generator operation. c. Identify the components and indicators used in generator AVR and remote monitoring systems. d. Interpret and respond to data provided by AVR systems and remote monitoring dashboards.	a. PowerPoint Presentation b. Lecture with schematic diagrams showing AVR operation and integration into generator systems. c. Interactive labeling of parts using printed schematics or touchscreen software d. Create a troubleshooting	a. Short written quiz b. Practical test c. Practical performance task d. Observation checklist during practical activities	abcdefg
4	**Load Dependent Start/Stop** a. Load threshold configuration and generator sequencing b. Integration with power management system (PMS)	At the end of the week, the students can: a. Explain the principles of load dependent start/stop and its importance in generator operation. b. Configure load thresholds and generator sequencing parameters in a simulated or real environment. c. Describe the sequencing logic of multiple generators in load-sharing scenarios. d. Integrate LDSS with a Power Management System (PMS) for automated generator control.	a. interactive lecture with animated visuals showing how LDSS works in multi-generator systems. b. Hands-on workshop c. Troubleshooting activity d. Simulation game	a. Written or oral quiz b. Performance task c. Practical exam d. Simulation output analysis	abcdefg
5	**Block Out Restart**	At the end of the week, the students can: a. Show a video or animation of a black start scenario in a power plant.		a. Short written quiz b. Group reporting	abcdefg

a. Black start capability and procedures b. Black start testing and preparedness	a. Explain the concept of black start and its importance in power system recovery. b. Identify the key components and systems involved in black start operations. c. Describe and outline the standard black start procedure in emergency power recovery. d. Conduct and evaluate black start testing and preparedness procedures.	b. Diagram labeling activity c. Case study d. Create a readiness checklist for black start equipment and procedures.	c. Written assessment d. Practical assessment

6	

MIDTERM EXAM

| 7 | Load sharing

a. Droop control method
b. Isochronous control method | At the end of the week, the students can:

a. Explain the concept of load sharing in multi-generator systems.

b. Differentiate between droop control and isochronous control methods.

c. Demonstrate how to configure generators using droop and isochronous load sharing controls.

d. Analyze the behavior of generators under droop and isochronous modes during parallel operation. | a. Interactive lecture with diagrams showing how multiple generators share load.

b. Venn diagram comparison of droop vs. isochronous control.

c. Lab simulation

d. Troubleshooting activity | a. Short quizzes

b. Observation

c. Practical assessment

d. Evaluate students ability | abcdefg |

8	**Start blocking of heavy consumers** a. Prioritization of critical loads b. Integration with power management system (PMS)	At the end of the week, the students can: a. Explain the concept and importance of start blocking of heavy consumers in power systems. b. Identify and categorize critical loads that should be prioritized during start blocking. c. Explain how start blocking is integrated with Power Management Systems (PMS) for automation and load management. d. Implement and test start blocking procedures for critical and non-critical loads in a simulated environment.	a. Present a visual diagram illustrating heavy consumer start blocking during power up. b. Lecture on the classification of loads (critical, non-critical, essential). c. Group brainstorming d. Troubleshooting session	a. Short quizzes b. Observation c. Practical assessment d. Evaluate students ability	
9	**Load shedding** a. underfrequency load shedding (UFLS) b. Under voltage load shedding (UVLS)	At the end of the week, the students can: a. Explain the concept of load shedding and its importance in maintaining grid stability. b. Describe the principle and mechanism of Under-frequency Load Shedding (UFLS) in power systems. c. Explain the principle and working mechanism of Under Voltage Load Shedding (UVLS). d. Analyze the implementation of UFLS and UVLS in practical scenarios and test their effectiveness in preventing grid failure.	a. Discussion b. Diagram explanation c. Presentation d. Troubleshooting session	a. Short quizzes b. Observation c. Practical assessment d. Evaluate students ability	
10			**FINAL EXAMINATION**		

8 COURSE REQUIREMENTS AND COURSE POLICIES

COURSE REQUIREMENTS

Each student is required to:

1. submit accomplished assignments, and activities;
2. make a PowerPoint presentation, and a written summary of the assigned report;
3. participate actively in all discussion;
4. discuss an assigned topic to report and participate in class discussions; and
5. pass the major exams (midterm and final)

COURSE POLICIES

Attendance: A student will be marked late if he/she enters the class 5 minutes after start of class period. Any student who comes to class 15 minutes after the scheduled time or always late for three consecutive meetings shall be marked absent.

Missed work or exam: Any student who missed to submit a work assignment or to take a test should consult the concerned instructor for immediate compliance

Cheating and Plagiarism: Any student who committed any form of academic dishonesty (e.g., copy-paste plagiarism) shall be given disciplinary action provided in the SKSU Student's Handbook

Use of Technology: Cell phones should be turned off while the session is in progress. Using laptops, notebook PCs, smart phones, and tablets shall be allowed only when needed. A scientific calculator (e.g. Casio fx-991ES) shall be utilized in solving.

9 GRADING SYSTEM AND RUBRICS FOR GRADING

GRADING SYSTEM

Midterm Grade

Midterm Examination	50%
Attendance/ Class Participation	5%
Quizzes	5%
Recitation	5%
Activity	20%
Report	15%
TOTAL	100%

Final Term Grade

Final Term Examination	50%
Attendance/Class Participation	5%
Quizzes	5%
Recitation	5%
Activity	20%
Report	15%
TOTAL	100%

FINAL GRADE

Midterm Grade	50%
Final Term Grade	50%
TOTAL	100%

Materials used: Laptop, PowerPoint presentations, and video clips
Books, Magazines, Online slides, Teacher-made slides

References:

- *Power System Protection and Switchgear by B. Ravindranath & M. Chander*
- *Power System Analysis and Design by J. Duncan Glover, Thomas Overbye, and Mulukutla S. Sarma*
- *Power Generation, Operation, and Control by Allen J. Wood, Bruce F. Wollenberg, and Gerald B. Sheble (2013)*
- *Electric Power Systems: A Conceptual Introduction by Alexandra von Meier (2006)*
- *Renewable Energy: Power for a Sustainable Future by Godfrey Boyle (2012)*
- *Power System Analysis by John J. Grainger and William D. Stevenson (1994)*
- *Energy Management Systems: Operation and Control of Electric Energy Systems by R. C. D. Santos and A. C. C. de Almeida (2018)*
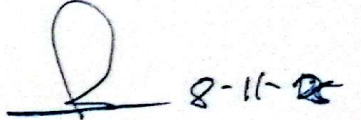
Prepared: Reviewed: Noted:

8-11-25

ROLANDO F. ARENDAIN JR.

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