Sana'a University
Faculty of Engineering
Department: Electrical Engineering
Title of the Program: Electrical Power and Machines Engineering

49. Course Specification of Power System Analysis 2

I. Course Identification and General Information:

1.	Course Title:	Power System Analysis 2				
2.	Course Code & Number:	PME333				
3.	Credit hours:	C.H.				TOTAL C.R.
		Th.	Tu.	Pr	Tr.	
		2	2	-	-	3
4.	Study level/ semester at which this course is offered:	Fifth Year/ First Semester				
5.	Pre –requisite (if any):	Power System Analysis I (PME332)				
6.	Co –requisite (if any):	NA				
7.	Program (s) in which the course is offered:	Electrical Power and Machines Engineering				
8.	Language of teaching the course:	English Language.				
9.	Location of teaching the course:	Class				
10.	Prepared By:	Dr. Muhammad Al-yadoumi				
11.	Date of Approval:					

II. Course Description:

This course prepares students to work professionally in the area of Electric power Engineering and power related fields. The subjects focus on the study of the power system components behavior during normal and up-normal operating conditions when subjected to disturbances. The course includes the following topics:symmetrical components and sequence networks Analysis, fault Analysis, stability Analysis, economic operation of power system operation, economic dispatch problem, automatic Generation Control (AGC) and unit commitment. In addition, the course includes a group-based term project in which students will choose any subject covered throughout the course to model and study the performance of a choosing small power system using one of the very common software packages used in power system analysis such as ETAB and MATLAB.

III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a1.	Define the theoretical and mathematical aspects of power systems analysis.	A1
a2.	Demonstrate knowledge of the effect of parameters design on the power system performance.	A2

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b1.	Study the behavior of power system components during normal and up-normal operating conditions.	B1, B2
b2.	Compare between alternative mathematical, and computation techniques used in power system analysis and select the appropriate one according to the needed specifications.	B3
c1.	Use simulation tools to perform comprehensive short circuit, transient, stability, economic operation, and automatic power generation studies commonly practiced in power systems analysis.	C4
c2.	Perform analysis of power systems subject to normal and up-normal operation conditions to assess the effect of parameter design on the system performance.	C2
d1.	Develop student's cooperative work though efficient team works, through projects work.	D1
d2.	Communicate effectively to professionals and non-specialists alike through reports and presentations	D4

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Define the theoretical and mathematical aspects of power systems analysis.	• Active Lectures. • Tutorials. • Computer Analysis • Discussion	• Written Exams • Homework • Computer Analysis Results
a2. Demonstrate knowledge of the effect of parameters design on the power system performance.	• Active Lectures. • Tutorials. • Computer Analysis • Discussion	• Written Exams • Homework • Class activities. • Computer Analysis Results

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Study the behavior of power system components during	• Active Lectures. • Tutorials. • Brainstorming	• Written Exams • Homework • Class activities.

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	normal and up-normal operating conditions.	• Computer Analysis	• Computer Analysis Results
b2.	Compare between alternative mathematical, and computation techniques used in power system analysis and select the appropriate one according to the needed specifications.	• Active Lectures. • Tutorials. • Computer Analysis • Discussion	• Written Exams • Homework • Class activities. • Computer Analysis Results

© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
c1.	Use simulation tools to perform comprehensive short circuit, transient, stability, economic operation, and automatic power generation studies commonly practiced in power systems analysis.	• Active Lectures. • Analysis and Problem solving • Computer simulations	• Written Exams • Homework • Class activities. • Computer Analysis Results
c2.	Perform analysis of power systems subject to normal and up-normal operation conditions to assess the effect of parameter design on the system performance.	• Active Lectures. • Analysis and Problem solving • Computer simulations	• Homework • Simulations reports • Class activities.

(D) Alignment Course Intended Learning Outcomes of Transferable Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1.	Develop student's cooperative work though efficient team works, through projects work.	• Group works • Projects	- Project reports - Presentation
d2.	Communicate effectively to professionals and non-specialists alike through reports and presentations	• Group works • Projects	• Presentations • Project reports • Homwork reports

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact Hours
1.	Introduction	a1, d1, d2	**Overview of the course:** ▪ learning objectives and outcomes ▪ Course organization ▪ Methods and measures of assessment ▪ Course requirements, guidelines to comply with the course, and ▪ Course Policies ▪ Project	1	2
2.	Symmetrical Components Analysis	a1, b1	▪ Introduction, a operator ▪ Synthesis of Unsymmetrical Phasors from Their Symmetrical ▪ Symmetrical Y and Δ. Circuits ▪ Power in Terms of Symmetrical Components ▪ Sequence Impedances of Transmission Lines, Transformers, and Synchronous machines ▪ Sequence Networks: Positve, Negative, and Zero	1	2
3.	Unsymmetrical Fault Analysis	a1, a2, b1, b2, c1, c2	▪ Review of Three Phase Symmetrical faults ▪ Unsymmetrical faults: Single line to ground (LG), Line to line (LL) fault, Double line to ground (LLG) faults, Open Conductor faults. ▪ Bus impedance matrix methods for analyzing of unsymmetrical faults.	2	4
4.	Economic Operation of Power Systems	a1, a2	▪ Distribution of Load between Units within a Plant ▪ System constraints ▪ Distribution of Load between Plants, penalty factor ▪ The Transmission-Loss Equation	2	4

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			▪ Classical Economic Dispatch including transmission losses		
5.	Automatic Generation Control	a1, a2, b1, b2, c1	▪ Speed-governing characteristic Of Synchronous Generator ▪ Frequency-Power Characteristics of a Synchronous Generator ▪ Operation of Generators in Parallel with Large Power Systems ▪ Operation of Generators in Parallel with Other Generators of the Same Size ▪ The house diagram ▪ Single area Load frequency control ▪ Block diagram of load frequency ▪ Multi area load frequency control ▪ Area Control Error (ACE).	2	4
6.	Unit Commitment	a1, b2, c1, d1, d2	▪ Unit Commitment Definition ▪ Dynamic Programming: ▪ Solving the Unit Commitment Problem ▪ Unit Commitment Example	2	4
7.	Transient in Power System Elements	a1, a2, b1, b2, c1,c2	▪ Transients in transmission line ▪ Transient in synchronous machines, Sup-transient, Transient, and steady state ▪ Transient in Transformer	1	2
8.	Power system Stability:	a1, a2, b1, b2, c1,c2	▪ Definition of the Stability Problem ▪ Classification of Power System Stability ▪ steady state stability ▪ Dynamics of Synchronous Machine and the Swing Equation ▪ Power Angle Equation ▪ Synchronizing Power Coefficients ▪ Transient Stability: single Machine-Infinite Bus case, Equal area Criterion Analysis	2	4

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			▪ Multi Machines Stability studies, Numerical Solution of Swing Equation ▪ Factors Affecting Transient Stability ▪ Voltage Stability		
9.	Project	a1, a2, b1, b2, c1,c2, d1, d2	▪ Project Dissections	1	2
Number of Weeks /and Units Per Semester				**14**	**28**

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B - Tutorial Aspect:				
Order	**Tutorial**	**Learning Outcomes**	**Number of Weeks**	**Contact Hours**
1.	**Symmetrical Components Analysis** a operator, Synthesis of Unsymmetrical Phasors from Their Symmetrical, Symmetrical Y and Δ. Circuits, Power in Terms of Symmetrical Component	a1, b1	1	2
2.	**Sequence Impedances and Sequence Networks** • Sequence Impedances of Transmission Lines, Transformers and Synchronous Machines • Sequence Networks: Positve, Negative, and Zero	a1, a2, b1, b2, c1,c2	1	2
3.	**Unsymmetrical Fault Analysis part 1** • Review of Three Phase Symmetrical faults • Single line to ground (LG) fault,	a1, a2, b1, b2, c1,c2	1	2
4.	**Unsymmetrical Fault Analysis part 2** • Line to line (LL) fault, • Double Line to Ground (LLG) fault, • Open Conductor Faults. • Unsymmetrical Faults Analysis using Bus Impedance Matrix Methods	a1, a2, b1, b2, c1,c2	1	2
5.	**Economic Operation of Power Systems** • Distribution of Load between Units within a Plant • System Constraints • Distribution of Load between Plants, Penalty factor • The Transmission-Loss Equation • Classical Economic Dispatch including Transmission Losses	a1, a2	2	4
6.	**Automatic Generation Control** • Load Frequency Control	a1, a2, b1, b2, c1	1	2

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	• Single area Load frequency control • Block diagram of load frequency • Multi area load frequency control • Area Control Error (ACE).			
7.	• Mid-Term Exam Solution	a1,a2, b1, b2, c1, d2	1	2
8.	**Unit Commitment** • Dynamic Programming: • Solving the Unit Commitment Problem • Unit Commitment Example	a1, b2, c1, d1, d2	1	2
9.	**Transient in Power System Elements** • Transients in Transmission Line • Transient in Synchronous Machines, Sup-Transient, Transient, and Steady state • Transient in Transformer	a1,a2, b1, b2, c2	1	2
10.	**Power system Stability part1:** • Steady State Stability • Dynamics of Synchronous Machine and the Swing Equation • Power Angle Equation • Synchronizing Power Coefficients	a1, a2, b1, b2, c2	1	2
11.	**Power system Stability part 2:** • Single Machine-Infinite Bus case, Equal Area Criterion Analysis • Multi Machines Stability studies, Numerical Solution of the Swing equation • Factors Affecting Transient Stability • Voltage Stability	a1,a2,b1,b2 ,,c1, c2.	2	4
12.	• Projects presentation and discussion	a1,a2,b1,b2 ,c1 , c2, d1, d2	1	2
Number of Weeks /and Units Per Semester			**14**	**28**

V. Teaching strategies of the course:

- Active Lectures.
- Tutorials.
- The use of Computer and Web-Based Learning.

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- Directed Self Study.
- Group Learning and Problem Based Learning.
- laboratory works
- Self and cooperative learning
- Dialogue, discussion and class activities
- Analysis and Problem solving.
- Project work
- Simulation tools (ETAP, Matlab With Simulink)
- Brainstorming

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Problem set NO. 1 Symmetrical Components Analysis	a1, b2, d1	2nd	1.5
2.	Problem set NO. 2 Sequence Impedances and Sequence Networks	a1, b2, d1	3rd	1.5
3.	Problem set NO. 3 Unsymmetrical Fault Analysis part 1	a1, b2,,c2, d1	4th	1.5
4.	Problem set NO. 4 Unsymmetrical Fault Analysis part 2	a1, a2, b1, b2, c2, d1	5th	1.5
5.	Problem set NO. 5 Economic Operation of Power Systems	a1,a2, b1, b2, d1	6th	1.5
6.	Problem set NO. 6 Automatic Generation Control	a1, a2, b1, b2, c2, d1	8th	1.5
7.	Problem set NO. 7 Unit Commitment	a1, a2, b1, b2, c2, d1	11th	2
8.	Problem set NO. 8 Transient in Power System Elements	a1,a2, b1, b2, c2, d1	12th	2
9.	Problem set NO.9 Power system Stability part	a1, a2, b1, b2, c2, d1	14th	2
Total				**15**

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes

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1.	Attendance and Class activities	Every Class	15	10%	a1, b1, b2, d1, d2.
2.	Assignments	2^{nd} to 14^{th}	15	10 %	a1, a_2, b1,b2, c1, d1,d2.
4.	Course Project	15^{th}	15	10%	a1, b1,b2, c1, c2, d1,d2.
5.	Midterm exam	7^{th}	30	20%	a1,a2, b1, b2
6.	Final Exam	16^{th}	75	50%	a1,,a2 b1, b2
	Total		**150**	**100%**	

VIII.Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1. John.J.Grainger, William D. Stevenson, Jr ,"Power System Analysis", Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.
2. Hadi Sadat, "Power System Analysis", Tata Mc Graw Hill Publishing company, New Delhi, 2002.

2- Essential References.

1. Nagarath I.J. and Kothari D.P. ,"Modern Power System Analysis", Fourth Edition, Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.
2. Stephen J. Chapman "ELECTRIC MACHINERY FUNDAMENTALS" FIFTH EDITION, McGraw HILL, 2012

3- Electronic Materials and Web Sites etc.

1. All About : Matlab Package
2. www.mathworks.com

IX. Course Policies:

1.	**Class Attendance:** -A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic
2.	**Tardy:** - For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** - A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.

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4.	**Assignments & Projects:** - The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5.	**Cheating**: - For cheating in exam, a student will be considered as failure. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

Reviewed By	**Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat** **President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi** **Name of Reviewer from the Department: Assoc. Prof. Dr. Radwan Al bouthigy**
	Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa **Assoc. Prof. Dr. Ahmed Mujahed** **Asst. Prof. Dr. Munasar Alsubri**

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49. Template for Course Plan of Power System Analysis 2

I. Information about Faculty Member Responsible for the Course:

		Office Hours					
Name of Faculty Member	Asst. Prof. Dr. Muhammad Al-yadoumi						
Location& Telephone No.	**Electrical Engineering** Department 777811668	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail	Alyadoumi@hotmail.com						

II. Course Identification and General Information:

1.	Course Title:	Power System Analysis 2				
2.	Course Number & Code:	PME333				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	2	-	-	3
4.	Study level/year at which this course is offered:	Fifth Year/ First Semester				
5.	Pre –requisite (if any):	Power System Analysis I (PME332)				
6.	Co –requisite (if any):	NA				
7.	Program (s) in which the course is offered	Electrical Power and Machines Engineering				
8.	Language of teaching the course:	English Language.				
9.	System of Study:	Regular				
10.	Mode of delivery:	Semesters.				
11.	Location of teaching the course:	Class				

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III. Course Description:

This course prepares students to work professionally in the area of Electric power Engineering and power related fields. The subjects focus on the study of the power system components behavior during normal and up-normal operating conditions when subjected to disturbances. The course includes the following topics:symmetrical components and sequence networks Analysis, fault Analysis, stability Analysis, economic operation of power system operation, economic dispatch problem, automatic Generation Control (AGC) and unit commitment. In addition, the course includes a group-based term project in which students will choose any subject covered throughout the course to model and study the performance of a choosing small power system using one of the very common software packages used in power system analysis such as ETAB and MATLAB.

IV. Intended learning outcomes (ILOs) of the course:

Brief summary of the knowledge or skill the course is intended to develop**:**

1. Define the theoretical and mathematical aspects of power systems analysis .
2. Demonstrate knowledge of the effect of parameters design on the power system performance .
3. Study the behavior of power system components during normal and up-normal operating conditions.
4. Compare between alternative mathematical, and computation techniques used in power system analysis and select the appropriate one according to the needed specifications .
5. Use simulation tools to perform comprehensive short circuit, transient, stability, economic operation, and automatic power generation studies commonly practiced in power systems analysis.
6. Perform analysis of power systems subject to normal and up-normal operation conditions to assess the effect of parameter design on the system performance .
7. Develop student's cooperative work though efficient team works, through projects work.
8. Communicate effectively to professionals and non-specialists alike through reports and presentations

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V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1.	Introduction	**Overview of the course:** ▪ learning objectives and outcomes ▪ Course organization ▪ Methods and measures of assessment ▪ Course requirements, guidelines to comply with the course, and ▪ Course Policies ▪ Project	1st	2
2.	Symmetrical Components Analysis	▪ Introduction, a operator ▪ Synthesis of Unsymmetrical Phasors from Their Symmetrical ▪ Symmetrical Y and Δ. Circuits ▪ Power in Terms of Symmetrical Components ▪ Sequence Impedances of Transmission Lines, Transformers, and Synchronous machines ▪ Sequence Networks: Positve, Negative, and Zero	2nd	2
3.	Unsymmetrical Fault Analysis	▪ Review of Three Phase Symmetrical faults ▪ Unsymmetrical faults: Single line to ground (LG), Line to line (LL) fault, Double line to ground (LLG) faults, Open Conductor faults. ▪ Bus impedance matrix methods for analyzing of unsymmetrical faults.	3rd ,4th	4
4.	Economic Operation of Power Systems	▪ Distribution of Load between Units within a Plant ▪ System constraints ▪ Distribution of Load between Plants, penalty factor ▪ The Transmission-Loss Equation ▪ Classical Economic Dispatch including transmission losses	5th ,6th	4
5.	Mid-Term Exam	▪ Topics Covered in the previous Lectures	7th	2

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6.	Automatic Generation Control	▪ Speed-governing characteristic Of Synchronous Generator ▪ Frequency-Power Characteristics of a Synchronous Generator ▪ Operation of Generators in Parallel with Large Power Systems ▪ Operation of Generators in Parallel with Other Generators of the Same Size ▪ The house diagram ▪ Single area Load frequency control ▪ Block diagram of load frequency ▪ Multi area load frequency control ▪ Area Control Error (ACE).	8^{th} ,9^{th}	4
7.	Unit Commitment	▪ Unit Commitment Definition ▪ Dynamic Programming: ▪ Solving the Unit Commitment Problem ▪ Unit Commitment Example	10^{th} ,11^{th}	4
8.	Transient in Power System Elements	▪ Transients in transmission line ▪ Transient in synchronous machines, Sup-transient, Transient, and steady state ▪ Transient in Transformer	12^{th}	2
9.	Power system Stability:	▪ Definition of the Stability Problem ▪ Classification of Power System Stability ▪ steady state stability ▪ Dynamics of Synchronous Machine and the Swing Equation ▪ Power Angle Equation ▪ Synchronizing Power Coefficients ▪ Transient Stability: single Machine-Infinite Bus case, Equal area Criterion Analysis ▪ Multi Machines Stability studies, Numerical Solution of Swing Equation ▪ Factors Affecting Transient Stability ▪ Voltage Stability	13^{th} ,14^{th}	4
10.	Project	▪ Project Dissections	15^{th}	2
11.	Final Exam	▪ Topics Covered throughout the course	16^{th}	2
Number of Weeks /and Units Per Semester			**16**	**32**

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B - Tutorial Aspect:			
Order	**Tutorial**	**Number of Weeks**	**Contact Hours**
1.	**Symmetrical Components Analysis** a operator, Synthesis of Unsymmetrical Phasors from Their Symmetrical, Symmetrical Y and Δ. Circuits, Power in Terms of Symmetrical Component	1st	2
2.	**Sequence Impedances and Sequence Networks** • Sequence Impedances of Transmission Lines, Transformers and Synchronous Machines • Sequence Networks: Positve, Negative, and Zero	2nd	2
3.	**Unsymmetrical Fault Analysis part 1** • Review of Three Phase Symmetrical faults • Single line to ground (LG) fault,	3rd	2
4.	**Unsymmetrical Fault Analysis part 2** • Line to line (LL) fault, • Double Line to Ground (LLG) fault, • Open Conductor Faults. • Unsymmetrical Faults Analysis using Bus Impedance Matrix Methods	4th	2
5.	**Economic Operation of Power Systems** • Distribution of Load between Units within a Plant • System Constraints • Distribution of Load between Plants, Penalty factor • The Transmission-Loss Equation • Classical Economic Dispatch including Transmission Losses	5th ,6th	4
6.	**Automatic Generation Control** • Load Frequency Control • Single area Load frequency control • Block diagram of load frequency • Multi area load frequency control • Area Control Error (ACE).	7th	2
7.	• Mid-Term Exam Solution	8th	2
8.	**Unit Commitment** • Dynamic Programming: • Solving the Unit Commitment Problem	9th	2

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	• Unit Commitment Example		
9.	**Transient in Power System Elements** • Transients in Transmission Line • Transient in Synchronous Machines, Sup-Transient, Transient, and Steady state • Transient in Transformer	10th	2
10.	**Power system Stability part1:** • Steady State Stability • Dynamics of Synchronous Machine and the Swing Equation • Power Angle Equation • Synchronizing Power Coefficients	11th	2
11.	**Power system Stability part 2:** • Single Machine-Infinite Bus case, Equal Area Criterion Analysis • Multi Machines Stability studies, Numerical Solution of the Swing equation • Factors Affecting Transient Stability • Voltage Stability	12th ,13th	4
12.	• Projects presentation and discussion	14th	2
Number of Weeks /and Units Per Semester		**14**	**28**

VI. Teaching strategies of the course:

- Active Lectures.
- Tutorials.
- The use of Computer and Web-Based Learning.
- Directed Self Study.
- Group Learning and Problem Based Learning.
- laboratory works
- Self and cooperative learning
- Dialogue, discussion and class activities
- Analysis and Problem solving.
- Project work
- Simulation tools (ETAP, Matlab With Simulink)
- Brainstorming

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VII. Assignments:

No	Assignments	Week Due	Mark
1.	Problem set NO. 1 Symmetrical Components Analysis	2nd	1.5
2.	Problem set NO. 2 Sequence Impedances and Sequence Networks	3rd	1.5
3.	Problem set NO. 3 Unsymmetrical Fault Analysis part 1	4th	1.5
4.	Problem set NO. 4 Unsymmetrical Fault Analysis part 2	5th	1.5
5.	Problem set NO. 5 Economic Operation of Power Systems	6th	1.5
6.	Problem set NO. 6 Automatic Generation Control	8th	1.5
7.	Problem set NO. 7 Unit Commitment	11th	2
8.	Problem set NO. 8 Transient in Power System Elements	12th	2
9.	Problem set NO.9 Power system Stability part	14th	2
Total			**15**

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Attendance and Class activities	Every Class	15	10%
2.	Assignments	2nd to 14th	15	10 %
4.	Course Project	15th	15	10%
5.	Midterm exam	7th	30	20%
6.	Final Exam	16th	75	50%
	Total		**150**	**100%**

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IX. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1. John.J.Grainger, William D. Stevenson, Jr ,"Power System Analysis", Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.
2. Hadi Sadat, "Power System Analysis", Tata Mc Graw Hill Publishing company, New Delhi, 2002.

2- Essential References.

1. Nagarath I.J. and Kothari D.P. ,"Modern Power System Analysis", Fourth Edition, Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.
2. Stephen J. Chapman "ELECTRIC MACHINERY FUNDAMENTALS" FIFTH EDITION, McGraw HILL, 2012

3- Electronic Materials and Web Sites etc.

1. All About : Matlab Package
2. www.mathworks.com

X. Course Policies:

1.	**Class Attendance:** -A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic
2.	**Tardy:** - For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** - A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4.	**Assignments & Projects:** - The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5.	**Cheating**: - For cheating in exam, a student will be considered as failure. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.

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6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

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