Sana'a University
Faculty of Engineering
Electrical Engineering Department
B.Sc. of Computer and Control Engineering

33. Template for Course Plan of Fields Theory

I. Course Identification and General Information:

1.	Course Title:	Fields Theory				
2.	Course Code & Number:	CNE213				
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:	Second Year/ Second Semester				
5.	Pre –requisite (if any):	Electrical Circuits 2 (PME112) Engineering Physics (FR002)				
6.	Co –requisite (if any):	None.				
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:	Asst. Prof. Dr. Muhammad Al-yadoumi				
11.	Date of Approval:					

II. Course Description:

This course provides students with fundamental theories of Electrostatics, Magneto statics, and electromagnetic waves. The Course topics include: mathematical background, electrostatics magnetostatics, time-varying electromagnetic fields The Students will acquire respectable knowledge of electrostatic and magneto static fields which in future help them to recognize the accurate applications of the course subjects in the various of Electrical engineering aspects involving electromagnetic fields such as: electric power transmission, Lighting protection, Magnetic separators, Development of electric generators and motors, transformers, electromagnetic pump and so on. Material will be introduced through

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textbook readings, then expanded upon in active lectures and tutorials. Student are encouraged to use Matlab simulation package in solving problems and applications encounter throughout the course delivery.

III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a1.	Define of the theoretical and mathematical aspects of electric field, magnetic fields, and electromagnetic wave analysis.	A1
a2.	Recognize the depth of static and time-varying electromagnetic fields as governed by Maxwell's equations.	A1
b1.	Recognize the behavior of the electric and magnetic s fields and their application in different aspects of electrical engineering	B1, B2
b2.	Differentiate between electric and magnetic quantities and their role in electrical equipment design.	B2
c1.	Apply the concepts of the electromagnetic field in studying and analyzing electrical devices performance.	C1
c2.	Formulate of the problems involving electromagnetic force, torque, and energy.	C2
d1.	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 of the theoretical and mathematical aspects of electric field, magnetic fields, and electromagnetic wave analysis.	• Active Lectures. • Tutorials. • Discussion	• Written Exams • Homework
a2.	Recognize the depth of static and time-varying electromagnetic fields as governed by Maxwell's equations..	• Active Lectures. • Tutorials. • Discussion	• Written Exams • Homework

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(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1.	Recognize the behavior of the electric and magnetic s fields and their application in different aspects of electrical engineering	• Active Lectures. • Tutorials. • Brainstorming	• Written Exams • Homework
b2.	Differentiate between electric and magnetic quantities and their role in electrical equipment design.	• Active Lectures. • Tutorials. • Discussion	• Written Exams • Homework

© 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.	Apply the concepts of the electromagnetic field in studying and analyzing electrical devices performance.	• Active Lectures. • Analysis and Problem solving	• Written Exams • Homework
c2.	Formulate of the problems involving electromagnetic force, torque, and energy.	• Active Lectures. • Analysis and Problem solving • Computer simulations	• Written Exams • Homework

(D) Alignment Course Intended Learning Outcomes of Transferable Skillsto Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1.	Communicate effectively to professionals and non-specialists alike through reports and presentations	• Project	• Homwork reports

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IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact Hours
1.	Vector analysis	a1	• Overview of the course • Concept of Scalar and Vector Quantities, • vector notation • Scalar and Vector Fields • Vector components and unit vectors • Vector Algebra, • Dot product, Cross product.	1	2
2.	Orthogonal Coordinate Systems	a1	• Rectangular (Cartesian,) Coordinate System, • Circular Cylindrical Coordinates system, • Spherical Coordinate System • Relationship between Different Coordinate Systems • Transformation of vectors	1	2
3.	Coulomb's Law and Electric Field Intensity (E)	a1, b2, c2	• The Experimental Law of Coulomb • Electric Field Intensity • Charge distributions: point charge, volume charge, Line charge, and Sheet charge Distribution • Field Arising from a Continuous Volume Charge Distribution, • Field of a Line Charge	1	2

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			• Field of a Sheet of Charge • Streamlines and Sketches of Fields		
4.	Electric Flux Density, Gauss's Law, and Divergence	a1, a2, b2, c1	• Electric Flux Density, • Gauss Law • Applications of Gauss Law: Symmetrical Charge Distributions, Differential Volume Element • Divergence and Maxwell's First Equation • The Vector Operator ∇ and the Divergence Theorem	2	4
5.	Potential and Energy	a1, b2, c1, c2	• Energy Expended in Moving a Point Charge in an Electric Field • The Line Integral • Potential and Potential Difference • The Potential Field of a Point Charge • The Potential Field of a System of Charges: • Conservative Property • Potential Gradient • The Electric Dipole • Energy Density in the Electrostatic Field	1	2
6.	Conductors and Dielectrics	a1, b2, c1	• Current and Current Density • Continuity of Current • Metallic Conductors • Conductor Properties and Boundary Conditions	1	2

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			• The Method of Images • Semiconductors • The Nature of Dielectric Materials • Boundary Conditions for Perfect Dielectric Materials		
7.	Capacitance	a1, b1, b2, c1, c2	• Capacitance of: Parallel-Plate Capacitor, coaxial cable, spherical capacitor, and Capacitance of a Two-Wire Line • Poisson's and Laplace's Equations	1	2
8.	The Steady Magnetic Field	a1, b1, b2, c1,c2	• Biot-Savart Law • Amp`ere's Circuital Law • Curl • Stokes' Theorem • Magnetic Flux and Magnetic Flux Density • The Scalar and Vector Magnetic Potentials	2	4
9.	Magnetic Forces, Materials, and Inductance	a1, b1, b2, c1,c2	• Force on a Moving Charge • Force on a Differential Current Element • Force between Differential Current Elements • Force and Torque on a Closed Circuit • The Nature of Magnetic Materials • Magnetization and Permeability • Magnetic Boundary Conditions	2	4

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			• The Magnetic Circuit • Potential Energy and Forces on Magnetic Materials • Inductance and Mutual Inductance		
10.	Time-Varying Fields and Maxwell's Equations	a1, a2, b1, b2, c1, c2	• Faraday's Law • Displacement Current • Maxwell's Equations in Point Form • Maxwell's Equations in Integral Form	1	2
11.	Plane Electromagnetic Waves.	a1, a2, b1, b2, c1, c2	• Wave Propagation in Free Space • Wave Propagation in Dielectrics • Poynting's Theorem and Wave Power • Propagation in Good Conductors: • Skin Effect • Wave Polarization	1	2
Number of Weeks /and Units Per Semester				**14**	**28**

B - Tutorial Aspect:

Order	Tutorial	Learning Outcomes	Number of Weeks	Contact Hours
1.	**Vectors Analysis** • Concept of Scalar and Vector Quantities,	a1	1	2

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	• vector notation • Scalar and Vector Fields • Vector components and unit vectors • Vector Algebra, • Dot product, Cross product.			
2.	**Orthogonal coordinate systems** • Rectangular (Cartesian,) Coordinate System, • Circular Cylindrical Coordinates system, • Spherical Coordinate System • Relationship between Different Coordinate Systems • Transformation of vectors	a1	1	2
3.	**Coulomb's Law and Electric Field Intensity (E)** • The Experimental Law of Coulomb • Electric Field Intensity • Charge distributions: point charge, volume charge, Line charge, and Sheet charge Distribution • Field Arising from a Continuous Volume Charge Distribution, • Field of a Line Charge • Field of a Sheet of Charge • Streamlines and Sketches of Fields	a1, b2, c2	1	2
4.	**Electric Flux Density, Gauss's Law, and Divergence** • Electric Flux Density, • Gauss Law • Applications of Gauss Law: • Symmetrical Charge Distributions, Differential Volume Element • Divergence and Maxwell's First Equation • The Vector Operator ∇ and the Divergence Theorem	a1, a2, b2, c1	1	2

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5.	**Potential and Energy** • Energy Expended in Moving a Point Charge in an Electric Field • The Line Integral • Potential and Potential Difference • The Potential Field of a Point Charge • The Potential Field of a System of Charges: • Conservative Property • Potential Gradient • The Electric Dipole • Energy Density in the Electrostatic Field	a1, b2, c1, c2	2	4
6.	**Conductors and Dielectrics** • Current and Current Density • Continuity of Current • Metallic Conductors • Conductor Properties and Boundary Conditions • The Method of Images • Semiconductors • The Nature of Dielectric Materials • Boundary Conditions for Perfect Dielectric Materials	a1, b2, c1	1	2
7.	**Capacitance** • Capacitance of: Parallel-Plate Capacitor, coaxial cable, spherical capacitor, and Capacitance of a Two-Wire Line • Poisson's and Laplace's Equations	a1, b1, b2, c1, c2	1	2
8.	**The Steady Magnetic Field** • Biot-Savart Law • Amp`ere's Circuital Law • Curl • Stokes' Theorem	a1, b1, b2, c1,c2	1	2

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	• Magnetic Flux and Magnetic Flux Density • The Scalar and Vector Magnetic Potentials			
9.	**Magnetic Forces, Materials, and Inductance** • Force on a Moving Charge • Force on a Differential Current Element • Force between Differential Current Elements • Force and Torque on a Closed Circuit • The Nature of Magnetic Materials • Magnetization and Permeability • Magnetic Boundary Conditions • The Magnetic Circuit • Potential Energy and Forces on Magnetic Materials • Inductance and Mutual Inductance	a1, b1, b2, c1,c2	1	2
10.	**Time-Varying Fields and Maxwell's Equations** • Faraday's Law • Displacement Current • Maxwell's Equations in Point Form • Maxwell's Equations in Integral Form	a1, a2, b1, b2, c1, c2	2	4
11.	**Plane Electromagnetic Waves..** • Wave Propagation in Free Space • Wave Propagation in Dielectrics • Poynting's Theorem and Wave Power • Propagation in Good Conductors: • Skin Effect • Wave Polarization	a1, a2, b1, b2, c1, c2	2	4
Number of Weeks /and Units Per Semester			**14**	**28**

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V. Teaching strategies of the course:

- Active Lectures.
- Tutorials.
- Analysis and Problem solving.
- Brainstorming
- Computer simulations
- Project

VI. Assignments:

No	Assignments	Aligned CILOs (symbols)	Week Due	Mark
1.	Problem set NO. 1 Vectors Analysis	a1	2nd	2
2.	Problem set NO. 2 Orthogonal coordinate systems, and coordinate transformations	a1	3rd	2
3.	Problem set NO. 3 Coulomb's Law and Electric Field Intensity (E)	a1, b2, c2	4th	2
4.	Problem set NO. 4 Electric Flux Density, Gauss's Law, and Divergence	a1, a2, b2, c1	5th	3
5.	Problem set NO. 5 Potential and Energy	a1, b2, c1, c2	7th	3
6.	Problem set NO. 6 Conductors and Dielectrics	a1, b2, c1	8th	3
7.	Problem set NO. 7 Capacitance	a1, b1, b2, c1, c2	9th	3
8.	Problem set NO. 8 The Steady Magnetic Field	a1, b1, b2, c1,c2	11th	3
9.	Problem set NO.9	a1, b1, b2, c1,c2	12th	3

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	Magnetic Forces, Materials, Magnetic Circuit, and Inductance			
10.	Problem set NO.11 Time-Varying Fields and Maxwell's Equations	a1, a2, b1, b2, c1, c2	14th .	3
11.	Problem set NO.12 Plane Electromagnetic Waves	a1, a2, b1, b2, c1, c2	15th	3
	Total			**30**

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Class activities	Every Class	15	10%	a1, b1, b2, c1, d1, d2.
2.	Assignments	2-15	30	20 %	a1, a_2, b1,b2, c1, d1,d2.
3.	Midterm exam	7	30	20%	a1,a2, b1, b2,
4.	Final Exam	16	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- Engineering Electromagnetics by W.H. Hayt and J A Buck, Tata McGraw Hill Publications, 9th Edition, 2019 .
2- Fundamentals of Electromagnetics with Engineering Applications, Stuart M. WentWorth. Wiley, 1st edition, ISBN: 0-471-26355-9.

2- Essential References.

1- M. N. O. Sadiku, Elements of Electromagnetics, 5th Ed., Oxford University Press, 2010.

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	2- F. T. Ulaby and U. Ravaioli, Fundamentals of Applied Electromagnetics, 7th Ed., Pearson, 2015. 3- Sunil Bhooshan, 'Fundamentals of Engineering Electromagnetics', Oxford University press, 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.
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.

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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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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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33. Template for Course Plan of Fields Theory

I. Information about Faculty Member Responsible for the Course:

Name of Faculty Member	Dr. Muhammad Al-yadoumi	**Office Hours**					
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:	Fields Theory				
2.	Course Number & Code:	CNE213				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	2	-		3
4.	Study level/year at which this course is offered:	Second Year/ Second Semester				
5.	Pre –requisite (if any):	Electrical Circuits 2 (PME112) Engineering Physics (FR002)				
6.	Co –requisite (if any):	None				
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 provides students with fundamental theories of Electrostatics, Magneto statics, and electromagnetic waves. The Course topics include: mathematical background, electrostatics magnetostatics, time-varying electromagnetic fields The Students will acquire respectable knowledge of electrostatic and magneto static fields which in future help them to recognize the accurate applications of the course subjects in the various of Electrical engineering aspects involving electromagnetic fields such as: electric power transmission, Lighting protection, Magnetic separators, Development of electric generators and motors, transformers, electromagnetic pump and so on. Material will be introduced through textbook readings, then expanded upon in active lectures and tutorials. Student are encouraged to use Matlab simulation package in solving problems and applications encounter throughout the course delivery.

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

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

1. Define of the theoretical and mathematical aspects of electric field, magnetic fields, and electromagnetic wave analysis .
2. Recognize the depth of static and time-varying electromagnetic fields as governed by Maxwell's equations.
3. Recognize the behavior of the electric and magnetic s fields and their application in different aspects of electrical engineering
4. Differentiate between electric and magnetic quantities and their role in electrical equipment design .
5. Apply the concepts of the electromagnetic field in studying and analyzing electrical devices performance .
6. Formulate of the problems involving electromagnetic force, torque, and energy.
7. 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.	Vector analysis	• Overview of the course • Concept of Scalar and Vector Quantities, • vector notation • Scalar and Vector Fields • Vector components and unit vectors • Vector Algebra, • Dot product, Cross product.	1st	2
2.	Orthogonal Coordinate Systems	• Rectangular (Cartesian,) Coordinate System, • Circular Cylindrical Coordinates system, • Spherical Coordinate System • Relationship between Different Coordinate Systems • Transformation of vectors	2nd	2
3.	Coulomb's Law and Electric Field Intensity (E)	• The Experimental Law of Coulomb • Electric Field Intensity • Charge distributions: point charge, volume charge, Line charge, and Sheet charge Distribution • Field Arising from a Continuous Volume Charge Distribution, • Field of a Line Charge • Field of a Sheet of Charge • Streamlines and Sketches of Fields	3rd	2
4.	Electric Flux Density,	• Electric Flux Density, • Gauss Law • Applications of Gauss Law:	4th , 5th	4

	Gauss's Law, and Divergence	Symmetrical Charge Distributions, Differential Volume Element • Divergence and Maxwell's First Equation • The Vector Operator ∇ and the Divergence Theorem		
5.	Potential and Energy	• Energy Expended in Moving a Point Charge in an Electric Field • The Line Integral • Potential and Potential Difference • The Potential Field of a Point Charge • The Potential Field of a System of Charges: • Conservative Property • Potential Gradient • The Electric Dipole • Energy Density in the Electrostatic Field	6th	2
6.	Midterm Exam		7th	2
7.	Conductors and Dielectrics	• Current and Current Density • Continuity of Current • Metallic Conductors • Conductor Properties and Boundary Conditions • The Method of Images • Semiconductors • The Nature of Dielectric Materials • Boundary Conditions for Perfect Dielectric Materials	8th	2
8.	Capacitance	• Capacitance of: Parallel-Plate Capacitor, coaxial cable, spherical capacitor, and Capacitance of a Two-Wire Line • Poisson's and Laplace's Equations	9th	2

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9.	The Steady Magnetic Field	• Biot-Savart Law • Amp`ere's Circuital Law • Curl • Stokes' Theorem • Magnetic Flux and Magnetic Flux Density • The Scalar and Vector Magnetic Potentials	10^{th} , 11^{th}	4
10.	Magnetic Forces, Materials, and Inductance	• Force on a Moving Charge • Force on a Differential Current Element • Force between Differential Current Elements • Force and Torque on a Closed Circuit • The Nature of Magnetic Materials • Magnetization and Permeability • Magnetic Boundary Conditions • The Magnetic Circuit • Potential Energy and Forces on Magnetic Materials • Inductance and Mutual Inductance	12^{th} , 13^{th}	4
11.	Time-Varying Fields and Maxwell's Equations	• Faraday's Law • Displacement Current • Maxwell's Equations in Point Form • Maxwell's Equations in Integral Form	14^{th}	2
12.	Plane Electromagnetic Waves.	• Wave Propagation in Free Space • Wave Propagation in Dielectrics • Poynting's Theorem and Wave Power • Propagation in Good Conductors: • Skin Effect • Wave Polarization	15^{th}	2
13.	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.	**Vectors Analysis** • Concept of Scalar and Vector Quantities, • vector notation • Scalar and Vector Fields • Vector components and unit vectors • Vector Algebra, • Dot product, Cross product.	1st	2
2.	**Orthogonal coordinate systems** • Rectangular (Cartesian,) Coordinate System, • Circular Cylindrical Coordinates system, • Spherical Coordinate System • Relationship between Different Coordinate Systems • Transformation of vectors	2nd	2
3.	**Coulomb's Law and Electric Field Intensity (E)** • The Experimental Law of Coulomb • Electric Field Intensity • Charge distributions: point charge, volume charge, Line charge, and Sheet charge Distribution • Field Arising from a Continuous Volume Charge Distribution, • Field of a Line Charge • Field of a Sheet of Charge • Streamlines and Sketches of Fields	3rd	2
4.	**Electric Flux Density, Gauss's Law, and Divergence** • Electric Flux Density, • Gauss Law • Applications of Gauss Law: • Symmetrical Charge Distributions, Differential Volume Element • Divergence and Maxwell's First Equation	4th	2

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	• The Vector Operator ∇ and the Divergence Theorem		
5.	**Potential and Energy** • Energy Expended in Moving a Point Charge in an Electric Field • The Line Integral • Potential and Potential Difference • The Potential Field of a Point Charge • The Potential Field of a System of Charges: • Conservative Property • Potential Gradient • The Electric Dipole • Energy Density in the Electrostatic Field	5^{th} , 6^{th}	4
6.	**Conductors and Dielectrics** • Current and Current Density • Continuity of Current • Metallic Conductors • Conductor Properties and Boundary Conditions • The Method of Images • Semiconductors • The Nature of Dielectric Materials • Boundary Conditions for Perfect Dielectric Materials	7^{th}	2
7.	**Capacitance** • Capacitance of: Parallel-Plate Capacitor, coaxial cable, spherical capacitor, and Capacitance of a Two-Wire Line • Poisson's and Laplace's Equations	8^{th}	2
8.	**The Steady Magnetic Field** • Biot-Savart Law • Amp`ere's Circuital Law • Curl • Stokes' Theorem • Magnetic Flux and Magnetic Flux Density • The Scalar and Vector Magnetic Potentials	9^{th}	2

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9.	**Magnetic Forces, Materials, and Inductance** • Force on a Moving Charge • Force on a Differential Current Element • Force between Differential Current Elements • Force and Torque on a Closed Circuit • The Nature of Magnetic Materials • Magnetization and Permeability • Magnetic Boundary Conditions • The Magnetic Circuit • Potential Energy and Forces on Magnetic Materials • Inductance and Mutual Inductance	10^{th}	2
10.	**Time-Varying Fields and Maxwell's Equations** • Faraday's Law • Displacement Current • Maxwell's Equations in Point Form • Maxwell's Equations in Integral Form	11^{th} , 12^{th}	4
11.	**Plane Electromagnetic Waves..** • Wave Propagation in Free Space • Wave Propagation in Dielectrics • Poynting's Theorem and Wave Power • Propagation in Good Conductors: • Skin Effect • Wave Polarization	13^{th} , 14^{th}	4
Number of Weeks /and Units Per Semester		**14**	**28**

VI. Teaching strategies of the course:

- Active Lectures.
- Tutorials.
- Analysis and Problem solving.
- Brainstorming
- Computer simulations
- Project

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VII. Assignments:

No	Assignments	Week Due	Mark
1.	Problem set NO. 1 Vectors Analysis	2nd	2
2.	Problem set NO. 2 Orthogonal coordinate systems, and coordinate transformations	3rd	2
3.	Problem set NO. 3 Coulomb's Law and Electric Field Intensity (E)	4th	2
4.	Problem set NO. 4 Electric Flux Density, Gauss's Law, and Divergence	5th	3
5.	Problem set NO. 5 Potential and Energy	7th	3
6.	Problem set NO. 6 Conductors and Dielectrics	8th	3
7.	Problem set NO. 7 Capacitance	9th	3
8.	Problem set NO. 8 The Steady Magnetic Field	11th	3
9.	Problem set NO.9 Magnetic Forces, Materials, Magnetic Circuit, and Inductance	12th	3
10.	Problem set NO.11 Time-Varying Fields and Maxwell's Equations	14th .	3
11.	Problem set NO.12 Plane Electromagnetic Waves	15th	3
	Total		**30**

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Class activities	Every Class	15	10%

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2.	Assignments	2-15	30	20 %
3.	Midterm exam	7	30	20%
4.	Final Exam	16	75	50%
	Total		**150**	**100**

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. Engineering Electromagnetics by W.H. Hayt and J A Buck, Tata McGraw Hill Publications, 9th Edition, 2019 .
2. Fundamentals of Electromagnetics with Engineering Applications, Stuart M. WentWorth. Wiley, 1st edition, ISBN: 0-471-26355-9.

2- Essential References.

1. M. N. O. Sadiku, Elements of Electromagnetics, 5th Ed., Oxford University Press, 2010.
2. F. T. Ulaby and U. Ravaioli, Fundamentals of Applied Electromagnetics, 7th Ed., Pearson, 2015.
3. Sunil Bhooshan, 'Fundamentals of Engineering Electromagnetics', Oxford University press, 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.

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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 fail. 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

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