

Department: Communication Techniques

Major: Communications

Department	Communications Techniques	Major	Communications
<p>Program Description:</p> <p>The program is designed to match the training needs in the local labor market, based on the national professional standards for a communication technician. The training in this program includes general skills in the English language, mathematics, computer science, human communication methods and dealing with others. It also includes the basic skills of communication techniques; including analog and digital communications. The program also informs the trainees about the importance of safety rules and their application, and the major skills in transmission media, antennas, microwave and satellite networks, telephone systems and mobile communications.</p> <p>During the training, the main focus will be on the practical and applied sections, and linking them with the theoretical background. The basic practical training will help to provide authentic scenarios to trainees. Successful implementation of the training program requires cooperation with the sectors related to the trainees' major. The program includes (1612) training hours, in addition to the (420) hours of training in the labor market.</p> <p>At the end of the program, graduates are given a diploma certificate in communication technology and they are expected to work in related fields.</p>			
<p>General Program Goal:</p> <p>This program aims at providing trainees with the necessary skills and information, allowing them to practice in the field of communication technology at the fourth level of the National Professional Vocational Qualifications system.</p>			

Detailed Program Objectives:**At the end of this program, the trainees should be able to:**

1. Deal with analog and digital communication techniques.
2. Use equipments to test and measure communication circuits.
3. Install and operate and repair transmission lines and optical fibers.
4. Perform communication systems maintenance.
5. Participate in controlling different communication networks.
6. Be familiar with technical terms in communication technology.
7. Be familiar with concepts and basic skills in the area of data transmission.
8. Deal with microwave and satellite techniques..
9. Deal with mobile communication systems, focusing on GSM networks.
10. Deal with digital switching techniques and telephone systems.

	Course Code & Number	Course Title	Prerequisite	Number of Units				
				HRC	L	P	T	CTH
First	ISL 101	Islamic Culture - 1	-	2	2	-	-	2
	ARB 101	Arabic Language	-	2	2	-	-	2
	ENG 106	General English Language	-	4	4	-	2	6
	MAT 113	General Mathematics	-	4	4	-	-	4
	101 CMP	Introduction to Computer Applications	-	2	-	4	-	4
	PHY 115	General Physics	-	3	3	-	1	4
	VOC 107	Vocational Guidance & Excellence	-	2	2	-	-	2
	Total Number of Units				19	17	4	3

	Course Code & Number	Course Title	Prerequisite	Number of Units				
				CRH	L	P	T	CTH
Second	ISL 102	Islamic Culture - 2	ISL 101	2	2	-	-	2
	MAT 114	Specialized Mathematics	MAT 113	3	3	-	1	4
	COM 115	Electric Circuit - 1	PHY 115	4	3	2	-	5
	CMP 210	Operating Systems	CMP 101	2	-	4	-	4
	ENG 145	Specialized English Language - 1	ENG 106	4	4	-	2	6
	Total Number of Units				15	12	6	3

	Course Code & Number	Course Title	Prerequisite	Number of Units				
				HRC	L	P	T	CTH
Third	COM 116	Electric Circuit - 2	COM 115	4	3	2	-	5
	COM 123	Logic Circuits & Microprocessors	MAT 114	4	3	2	-	5
	COM 127	Electronics	COM 115	3	2	2	-	4
	COM 136	Basics of Communications	COM 115	5	4	2	-	6
	ENG 244	Specialized English Language - 1	ENG145	4	4	-	2	6
	Total Number of Units				20	16	8	2

	Course Code & Number	Course Title	Prerequisite	Number of Units				
				HRC	L	P	T	CTH
Fourth	COM 224	Electronic Workshop	COM 127	2	-	4	-	4
	COM 227	Electronic Communications	COM 127	3	2	2	-	4
	COM 231	Basics of Digital Communications	COM 136	5	4	2	-	6
	COM 232	Antennas & Wave Propagation	COM 136	4	3	2	-	5
	COM 240	Transmission Lines & Optical Fibers	COM 136	5	4	2	-	6
	Total Number of Units				19	13	12	0

	Course Code & Number	Course Title	Prerequisite	Number of Units				
				HRC	L	P	T	CT H
Fifth	COM 245	Basic Telephony & Digital Switching	COM 231	4	3	2	-	5
	COM 246	Data Communications & Networks	COM 231	4	3	2	-	5
	COM 247	Microwave & Satellite Techniques	COM 231	4	3	2	-	5
	COM 248	Mobile Communications	COM 231	4	3	2	-	5
	MGT101	Professional Ethics & Communication Skills		MG T 101	2	2		
	ENG 137	Communication Skills - 1	ENG 106	4	4	-	2	6
	Number of Units Total				22	18	8	2

	Course Code & Number	Course Title	Prerequisite	Number of Units	
				HRC	
Cooperative Training	299 COM	Cooperative Training		4	420 Training Hours
	Total Number of Units				

	No	Trimester	Total Number of Units Per Trimester				
			HRC	L	P	T	CT H
Total Number of Units	1	First	19	17	4	3	24
	2	Second	15	12	6	3	21
	3	Third	20	16	8	2	26
	4	Fourth	19	13	2	0	25
	5	Fifth	22	18	8	2	28
	6	Cooperative Training		4	0	0	0
Total Number of Units			99	76	38	10	124

Program Total Training Hours ($420 + 124 \times 13$)	2032
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CRH: Credit Hours **L:** Lecture **P:** Practical **T:** Tutorial **CTH:**
Contact Hours

Note:

About related skills coding:

First left digit: Specialization number (1: Switching, 2: Transmission, 3: Mobile)

Last alphabet and digit: Number of vocational standard for specific specialization

Example: **3A5** means A5 standard in mobile specialization.

Department	Communication Techniques	Major	Communications					
Course Title	Electric Circuits-1	Code	COM 115					
Prerequisites	PHY 115							
Course Description: This course covers an introduction to the fundamentals of electrical circuits, quantities, components, analysis methods of DC circuits and the use of measuring equipment.	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)		4					
	Contact Hours (Hour/week)	L		3				
		W		2				
T								
General Goal: This course is designed to give trainees the basic knowledge of the quantities and electric elements, using measuring equipment, understanding and application of the methods of analysis for DC circuits.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Use analysis theorems for simple DC circuits.	Knowledge of theorems used in DC circuit analysis		1A6,1C8,1C10, 2B3, 3B2, 3B4					
2- Analyze R, L and C circuits.	Series and parallel circuits		1A6,1C8,1C10, 2B3, 3B2, 3B4					

3- Measure electrical components and quantities.	Measuring voltage, current, power and resistance	1A6,1C8,1C10, 2B2, 2B3, 3B2, 3B4
4- Test electric circuits.	Fault location of simple circuits	1A6,1C8,1C10, 3A3, 3E3, 3E4, 2B2,2B3, 2E5,3E2
<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Be familiar with characteristics of electrical components and quantities.	Be familiar with specifications of R, L and C	1A6,1C8,1C10, 2B4, 3B2
2- Be familiar with measuring equipments.	Reading electrical quantities using electrical measuring equipments and DC voltage sources	1A6,1C8,1C10, 2B2, 2H4, 2E7 3A3, 3B2, 3B4, 3E3, 3E4,2B4,2E2
3- Use basic electrical circuits laws.	Knowledge of Ohm's and Kirchhoff;s Laws, voltage and current dividers	1A6,1C8,1C10, 2B3, 2B4, 3B2, 3B4
<p>Safety Requirements:</p> <p>Commitment to the safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		

Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> Electrical quantities and units 	1A6,1C8, 2B4, 3B2	Connecting cabinets to power sources Testing new spare parts Preparing required test and measuring equipments Taking the readings of the mobile phone position
<ul style="list-style-type: none"> Ohm's Law 	1A6,1C8, 2B4, 3B2	Connecting cabinets to power sources Testing new spare parts Preparing required test and measuring equipments Taking the readings of the mobile phone position
<ul style="list-style-type: none"> Resistance in DC circuits 	1A6,1C8, 2B4, 3B2	Connecting cabinets to power sources Testing new spare parts Preparing required test and measuring equipments Taking the readings of the mobile phone position
<ul style="list-style-type: none"> Inductors in DC circuits 	1A6,1C8, 2B4, 3B2, 2E6	Connecting cabinets to power sources Testing new spare parts Preparing required test and measuring equipments Taking the readings of the mobile phone position

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
5	<p>Electric quantities and units:</p> <ul style="list-style-type: none"> • Scientific notations and metric units conversion • Eclectic charge, Current, voltage and resistance 	<p>Oral Questions Written Questions Study Cases</p>
6	<p>Ohm's Law:</p> <ul style="list-style-type: none"> • Application of Ohm's law in electric circuits • Power in electric circuits • Power loss and voltages drop in resistance 	<p>Oral Questions Written Questions Study Cases</p>
21	<p>Resistance in DC circuits:</p> <ul style="list-style-type: none"> • Resistors in series • Kirchhoff's voltage law • Power in series circuits • Resistors in parallel • Kerchief current law • Power in parallel circuits • Analysis of series-Parallel circuits • Circuits with more than one voltage source • Thevenin's theorem • Matching conditions 	<p>Oral Questions Written Questions Study Cases</p>

4	Capacitors in DC circuits: <ul style="list-style-type: none">• Types of capacitors• Series capacitors• Parallel capacitor• Capacitor charging and discharging	Oral Questions Written Questions Study Cases
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Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
3	Inductors in DC circuits: <ul style="list-style-type: none">• Types of inductors• Series inductors• Parallel inductors	Oral Questions Written Questions Study Cases

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
6	<ul style="list-style-type: none"> • Introduction to safety procedures • Familiarization with electrical equipment • Familiarization with electrical components and quantities 	<p>Oral Questions Written Questions Study Cases</p>
8	<p>Ohm's law and R circuits:</p> <ul style="list-style-type: none"> • Ohm's Law • Resistors in series (Kirchhoff's voltage law) • Resistors in parallel (Kirchhoff's current law) 	<p>Oral Questions Written Questions Study Cases</p>
8	<p>Series – Parallel circuits:</p> <ul style="list-style-type: none"> • Measurement of total resistance in series-parallel circuits • Determining of current and voltage across any resistor • Circuits with more than voltage source 	<p>Oral Questions Written Questions Study Cases</p>
4	<p>Capacitors in DC circuits</p> <p>Inductors in DC circuits</p>	<p>Oral Questions Written Questions Study Cases</p>

References	Tomas L. Floyd, "Electric Circuit Fundamentals", 5 th edition, Prentice Hall Inc., 2001.
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Department	Communication Techniques	Major	Communications					
Course Title	Electric Circuits-2	Code	COM 116					
Prerequisites	COM 115							
Course Description: This course covers an introduction to the fundamentals of electrical circuits, quantities, components, analysis methods of ac circuits and the use of measuring equipment.	Trimester		1	2	3	4	5	6
	Credit Hours (Hour/week)				4			
	Contact Hours (Hour/week)	L			3			
		W			2			
T								
General Goal: This course is designed to give the trainees basic knowledge of the quantities and electrical elements; using measuring equipment, understanding and application of methods of analysis for AC circuits.								
Detailed Course Objectives			Required Performance			Related Tasks		
Firstly: Procedural Objectives: The trainees should be able to:								
1- Use analysis theorems for simple AC circuits.			Knowledge of theorems used in DC circuit analysis			1A6,1C8,1C10, 2B3, 3B2, 3B4		
2- Analyze R, L and C in ac circuits.			Series, parallel and resonance circuits			1A6,1C8,1C10, 2B3, 3B2, 3B4		

3- Measure electrical components and quantities.	Measuring voltage, current, power and resistance	1A6,1C8,1C10, 2B2, 2B3, 3B2, 3B4
4- Test electrical circuits.	Fault location of simple circuits	1A6,1C8,1C10, 3A3, 3E3, 3E4, 2B2,2B3, 2E5,3E2
<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Be familiar with the characteristics of electrical components and quantities in AC circuits.	Be familiar with specifications of R, L and C in AC circuits	1A6,1C8,1C10, 2B4, 3B2
2- Be familiar with AC measuring equipment.	Reading electrical quantities using multimeter, oscilloscope, function generator and voltage sources	1A6,1C8,1C10, 2B2, 2H4, 2E7 3A3, 3B2, 3B4, 3E3, 3E4,2B4,2E2
3- Use basic electrical circuit laws.	Knowledge of Ohm's and Kirchhoff's Laws, voltage and current dividers in AC circuits	1A6,1C8,1C10, 2B3, 2B4, 3B2, 3B4
<p>Safety Requirements:</p> <p>Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		

Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> • Introduction to alternating current 	1A6,1C8, 2B4, 3B2	Connecting cabinets to power sources Testing new spare parts Preparing required test and measuring equipments Taking the readings of the mobile phone position
<ul style="list-style-type: none"> • RC and RL circuits 	1A6,1C8, 2B4, 3B2	Connecting cabinets to power sources Testing new spare parts Preparing required test and measuring equipments Taking the readings of the mobile phone position
<ul style="list-style-type: none"> • RLC circuits 	1A6,1C8, 2B4, 3B2	Connecting cabinets to power sources Testing new spare parts Preparing required test and measuring equipments Taking the readings of the mobile phone position

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
12	<p>Introduction to alternating current and voltage:</p> <ul style="list-style-type: none"> • The sine wave • Current and voltage values of sine waves • Angular measurements of a sine wave • Ohm’s law in ac circuits • Kirchhoff’s laws in ac circuits • Nonsinusoidal waveforms • Transformers 	<p>Oral Questions Written Questions Study Cases</p>
18	<p>RC and RL circuits:</p> <ul style="list-style-type: none"> • Capacitors in ac circuits • Analysis of series RC circuits • Analysis of parallel RC circuits • Power in RC circuits • Inductors in ac circuits • Analysis of series RL circuits • Analysis of parallel RL circuits • Power in RL circuits 	<p>Oral Questions Written Questions Study Cases</p>

9	RLC circuits: <ul style="list-style-type: none">• Analysis of series RLC circuits• Analysis of parallel RLC circuits• Series resonance• Parallel resonance	Oral Questions Written Questions Study Cases
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Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
4	Introduction to alternating current and voltage: <ul style="list-style-type: none"> • Measurement of ac periodic waves • Using of AC measurement equipments to verify voltage and current Kirchhoff's laws 	Oral Questions Written Questions Study Cases
2	Capacitive Reactance	Oral Questions Written Questions Study Cases
16	AC Circuits: <ul style="list-style-type: none"> • Series RC circuit • Series RL circuit • Parallel RC circuit • Parallel RL circuit • Series RLC circuit • Parallel RLC circuit • Resonance circuit 	Oral Questions Written Questions Study Cases
4	Applications <ul style="list-style-type: none"> • Complex circuits (Series-Parallel) • Measuring electrical power using voltage and current meters 	Oral Questions Written Questions Study Cases

References	Tomas L. Floyd, "Electric Circuit Fundamentals", 5 th edition, Prentice Hall Inc., 2001.
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Department	Communication Techniques	Major	Communications					
Course Title	Electronics	Code	COM 127					
Prerequisites	COM 115							
Course Description: This course covers an introduction to electronic devices and circuits.	Trimester		1	2	3	4	5	6
	Credit Hours (Hour/week)				3			
	Contact Hours (Hour/week)	L			2			
		W			2			
T								
General Goal: This course is designed to give the trainees the basic knowledge of the common electronic devices, their functions, and applications in electronic circuits operating with DC and AC.								
Detailed Course Objectives			Required Performance			Related Tasks		
Firstly: Procedural Objectives: The trainees should be able to:								
1- Deal with diode types and their applications.			Knowledge of diode types and their main applications			1C8,2B3,3B4, 3E2, 3E3		
2- Use bipolar transistors in different applications.			Knowledge of transistor types and their main applications			1C8,2B3,3B4, 3E2, 3E3		

<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Be familiar with different types of electronic devices.	Ability to discriminate between different electronic devices	1C8,2B3,3B4, 3E2, 3E3
2- Be familiar with electronic devices' specifications.	Ability to deal with technical specifications of different electronic devices	1C8,2B3,3B4, 3E2, 3E3
3- Test electronic devices'.	Ability to use required test equipments	1C8, 2B2, 3B3, 3E4
<p>Safety Requirements:</p> <p>Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		
Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> • Diode types and applications 	1C8, 2B3, 3E2	<ul style="list-style-type: none"> • Test new spare parts • Perform Protective Maintenance • Locate faults
<ul style="list-style-type: none"> • Special-purpose diodes 	1C8, 2B3, 3E2	<ul style="list-style-type: none"> • Test new spare parts • Perform Protective Maintenance • Locate faults

<ul style="list-style-type: none">• Bipolar junction transistor	1C8, 2B3, 3E2	<ul style="list-style-type: none">• Test new spare parts• Perform protective maintenance• Locate faults
<ul style="list-style-type: none">• Bipolar transistor bias circuits	1C8, 2B3, 3E2	<ul style="list-style-type: none">• Test new spare parts• Perform protective maintenance• Locate faults
<ul style="list-style-type: none">• Small-signal bipolar amplifiers	1C8, 2B3, 3E2	<ul style="list-style-type: none">• Test new spare parts• Perform protective maintenance• Locate faults
<ul style="list-style-type: none">• Power amplifiers	1C8, 2B3, 3E2	<ul style="list-style-type: none">• Test new spare parts• Perform protective maintenance• Locate faults

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
6	<p>Diode types and applications:</p> <ul style="list-style-type: none"> • Introduction • Diode characteristics • Half-wave rectifiers • Full-wave rectifiers 	<p>Oral Questions Written Questions Study Cases</p>
2	<p>Special-purpose diodes:</p> <ul style="list-style-type: none"> • Zener diodes • Varactor diodes • Light-emitting diodes (LEDs) • Photodiodes 	<p>Oral Questions Written Questions Study Cases</p>
4	<p>Bipolar junction transistor (BJT):</p> <ul style="list-style-type: none"> • Basic construction and operation • Collector characteristics • Transistor characteristics and parameters • The transistor as an amplifier • The transistor as a switch 	<p>Oral Questions Written Questions Study Cases</p>
2	<p>Bipolar transistor bias circuits:</p> <ul style="list-style-type: none"> • The base bias circuit • The emitter bias circuit • Voltage divider • The collector bias circuit 	<p>Oral Questions Written Questions Study Cases</p>

<p>4</p>	<p>Small-signal bipolar amplifiers:</p> <ul style="list-style-type: none"> • Common-emitter amplifiers • Common-collector amplifiers • Common-base amplifiers • Examples and problems • Multistage amplifiers 	<p>Oral Questions Written Questions Study Cases</p>
<p>2</p>	<p>Field effect transistor (FET)</p> <ul style="list-style-type: none"> • Description and operation • JFET transfer characteristic • JFET as an amplifier • JFET biasing 	<p>Oral Questions Written Questions Study Cases</p>
<p>4</p>	<p>FET Amplifier</p> <ul style="list-style-type: none"> • Common-source amplifiers • Common-drain amplifiers • Common-gate amplifiers 	<p>Oral Questions Written Questions Study Cases</p>
<p>2</p>	<p>Power amplifiers:</p> <ul style="list-style-type: none"> • Class A amplifiers • Class B and class AB push-pull amplifiers • Class C amplifiers 	<p>Oral Questions Written Questions Study Cases</p>

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
4	Diode characteristics	Oral Questions Written Questions Study Cases
4	Special-purpose diodes applications	Oral Questions Written Questions Study Cases
4	Bipolar junction transistor characteristics	Oral Questions Written Questions Study Cases
4	Bipolar junction transistor applications	Oral Questions Written Questions Study Cases
4	FET transistor characteristics	Oral Questions Written Questions Study Cases
4	FET transistor applications	Oral Questions Written Questions Study Cases

2	Power amplifiers	Oral Questions Written Questions Study Cases
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References	Floyd, "Electronic Devices", 5th edition, Prentice Hall, 1999.
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Department	Communication Techniques	Major	Communications					
Course Title	Communication Electronics	Code	COM 227					
Prerequisites	COM 127							
Course Description: This course covers the main electronic circuit applications used in communications.	Trimester		1	2	3	4	5	6
	Credit Hours (Hour/week)					3		
	Contact Hours (Hour/week)	L				2		
		W				2		
T								
General Goal: This course is designed to give trainees knowledge of the fundamental electronic circuits used in communication systems.								
Detailed Course Objectives			Required Performance			Related Tasks		
Firstly: Procedural Objectives: The trainees should be able to:								
1- Analyze and design filters and oscillators.			Knowledge of filter and oscillator types			1C8,2B3,3B4, 3E2, 3E3		
2- Analyze and use operational amplifiers in different applications.			Knowledge of operational amplifier characteristics and applications			1C8,2B3,3B4, 3E2, 3E3		

<p>3- Analyze modulation and demodulation circuits.</p>	<p>Knowledge of the characteristics and applications of the modulation and demodulation circuits</p>	<p>1C8,2B3,3B4, 3E2, 3E3</p>
<p>Secondly: Assistant Objectives: The trainee should be able to:</p>		
<p>1- Be familiar with different electronic communication circuits.</p>	<p>Ability to discriminate between different electronic communication circuits</p>	<p>1C8,2B3,3B4, 3E2, 3E3</p>
<p>2- Be familiar with technical specifications of different electronic communication circuits.</p>	<p>Ability to deal with technical specifications of different electronic communication circuits</p>	<p>1C8,2B3,3B4, 3E2, 3E3</p>
<p>Safety Requirements: Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		
<p>Topics (Theoretical & Practical)</p>	<p>Related Tasks</p>	
<ul style="list-style-type: none"> • Operational amplifier principles 	<p>1C8, 2B3, 3E2</p>	<ul style="list-style-type: none"> • Test new spare parts • Perform Protective Maintenance • Locate faults

<ul style="list-style-type: none"> • Operational amplifier applications 	1C8, 2B3, 3E2	<ul style="list-style-type: none"> • Test new spare parts • Perform protective maintenance • Locate faults
<ul style="list-style-type: none"> • Filters 	1C8, 2B3, 3E2	<ul style="list-style-type: none"> • Test new spare parts • Perform protective maintenance • Locate faults
<ul style="list-style-type: none"> • Oscillators 	1C8, 2B3, 3E2, 3H2	<ul style="list-style-type: none"> • Test new spare parts • Perform protective maintenance • Locate faults
<ul style="list-style-type: none"> • Modulation Circuits 	1C8, 2B3, 3E2	<ul style="list-style-type: none"> • Test new spare parts • Perform protective maintenance • Locate faults
<ul style="list-style-type: none"> • Demodulation Circuits 	1C8, 2B3, 3E2	<ul style="list-style-type: none"> • Test new spare parts • Perform protective maintenance • Locate faults

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
4	<p>Operational amplifier:</p> <ul style="list-style-type: none"> • The operational amplifier parameters • The negative feedback • Operational amplifier characteristics and configurations 	<p>Oral Questions Written Questions Study Cases</p>
4	<p>Basic operational amplifier applications:</p> <ul style="list-style-type: none"> • The comparators • The summing amplifiers • The integrator • The differentiator 	<p>Oral Questions Written Questions Study Cases</p>
4	<p>Filters:</p> <ul style="list-style-type: none"> • Low-Pass filters • High-Pass filters • Band-pass filter • Band-reject filter 	<p>Oral Questions Written Questions Study Cases</p>
4	<p>Oscillators:</p> <ul style="list-style-type: none"> • Oscillator principles • Sinusoidal oscillators • Nonsinusoidal oscillators • 555 timer as an oscillator 	<p>Oral Questions Written Questions Study Cases</p>

5	Modulation circuits: <ul style="list-style-type: none">• Mixers• Amplitude modulators• Frequency modulators• Phase Modulators	Oral Questions Written Questions Study Cases
5	Demodulation circuits: <ul style="list-style-type: none">• Amplitude demodulator circuits• Frequency demodulator circuits• Phase demodulator circuits	Oral Questions Written Questions Study Cases

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
6	Operational amplifier applications	Oral Questions Written Questions Study Cases
6	Filters	Oral Questions Written Questions Study Cases
4	Oscillators	Oral Questions Written Questions Study Cases
6	Modulation circuits	Oral Questions Written Questions Study Cases
4	Demodulation circuits	Oral Questions Written Questions Study Cases

References	Floyd, “Electronic Devices”, 5th edition, Prentice Hall, 1999.
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Department	Communication Techniques	Major	Communications					
Course Title	Logic Circuits & Microprocessors	Code	COM 123					
Prerequisites	MAT 114							
Course Description: This course covers the basics of logic circuits and microprocessors: numbering systems, logic gates, timers, counters, flip-flops, shift registers comparators, Boolean algebra, and logical functions. It then presents the 8085 microprocessor architecture, principle of operation and assembly language programming.	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)			4				
	Contact Hours (Hour/week)	L			3			
		W			2			
T								
General Goal: This course aims to give trainees the basic knowledge in operation and design of different logic gates and circuits. Allowing them to deal with modern digital systems, microprocessors and programmable microcontrollers, and application examples.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Understand numbering systems and conversion between them.	Performing conversion between numbering systems		1B1, 1B2, 1B3, 2B3,3C2					
2- Have a good knowledge of logic circuit fundamentals.	Ability to deal with fundamental logic equations and gates		1B1, 1B2, 1B3, 2B3,3C2					

3- Obtain truth tables for logic circuits .	Putting truth tables for logic circuits	1B1, 1B2, 1B3, 2B3,3C2
4- Write and simplify Boolean expressions.	Writing logic equations and simplifying them	1B1, 1B2, 1B3, 2B3,3C2
5- Explain basic computer structure, microprocessor structure and its operation.	Knowledge of computer structure, characteristics and functions	1B8, 1B10, 2F1,3C2, 3D4, 3D5
6- Program a microprocessor using assembly language.	Ability to program certain type of microprocessors	1B8, 1B10, 2F1,3C2, 3D4, 3D5
<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Be familiar with logic gates symbols.		1C8,2B3,3B4, 3E2, 3E3
2- Access specifications and data of logic gates and circuits.		1C8,2B3,3B4, 3E2, 3E3
3- Access specifications and data of microprocessors.		

Safety Requirements:		
Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.		
Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> • Simple logic circuits 	1B1 2B3 3B3	<ul style="list-style-type: none"> • Know new numbers • Perform protective maintenance • Test transmission base station
<ul style="list-style-type: none"> • Combinational logic circuits 	1B1 2B3 3B3	<ul style="list-style-type: none"> • Know new numbers • Perform protective maintenance • Test transmission base station
<ul style="list-style-type: none"> • Sequential logic circuits 	1B1 2B3 3B3	<ul style="list-style-type: none"> • Know new numbers • Perform protective maintenance • Test transmission base station
<ul style="list-style-type: none"> • Introduction to microprocessors and microcomputers 	1B1 2B3 3B3	<ul style="list-style-type: none"> • Know new numbers • Perform protective maintenance • Test transmission base station
<ul style="list-style-type: none"> • Input/output units 	1B1 2B3 3B3	<ul style="list-style-type: none"> • Know new numbers • Perform protective maintenance • Test transmission base station

<ul style="list-style-type: none">• Memory structure	1B1 2B3 3B3	<ul style="list-style-type: none">• Test new spare parts• Perform protective maintenance• Locate faults
<ul style="list-style-type: none">• Data processing	1B1 2B3 3B3	<ul style="list-style-type: none">• Know new numbers• Perform protective maintenance• Test transmission base station
<ul style="list-style-type: none">• Microprocessor programming	1B10 3C2	<ul style="list-style-type: none">• Reboot control unit• Participate in analyzing the signal level and quality

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
3	Numbering systems: <ul style="list-style-type: none"> • Decimal • Binary • Hexadecimal 	Oral Questions Written Questions Study Cases
4	Simple logic circuits: <ul style="list-style-type: none"> • Logic gates: AND, OR, NAND, NOR, NOT • Boolean expressions and their representation using logic gates and truth tables 	Oral Questions Written Questions Study Cases
7	Combinational logic circuits: <ul style="list-style-type: none"> • Truth tables for logic circuits • Boolean expressions • Karnaugh map • De Morgan's theorem • Adding and subtraction circuits 	Oral Questions Written Questions Study Cases
8	Sequential logic circuits: <ul style="list-style-type: none"> • Timers • Counters • Flip-Flops • Shift registers • Multiplexers 	Oral Questions Written Questions Study Cases

3	<p>Introduction to microcomputers:</p> <ul style="list-style-type: none"> • Basic microcomputer concepts • Microcomputer functions and characteristics • Microcomputer architecture • ASCII code 	<p>Oral Questions Written Questions Study Cases</p>
4	<p>Input/output units:</p> <ul style="list-style-type: none"> • I/O interfacing concepts • Memory-Mapped I/O • Handshaking • Interrupting • Direct memory accessing 	<p>Oral Questions Written Questions Study Cases</p>
5	<p>Internal memory structure:</p> <ul style="list-style-type: none"> • Semiconductor memory technique • Internal memory mapping • Semiconductor registers • Data transfer between registers • Read/write memory (R/W) • Read only memory (ROM) • Memory structure • Memory access • Memory expansion 	<p>Oral Questions Written Questions Study Cases</p>

5	Data processing: <ul style="list-style-type: none">• The function of microprocessors• Data processing• Instructions processes• Arithmetic/Logic unit• Address register• Program counter• Instructions cycle• Absolute jump• Subroutines• Instructions compiler	Oral Questions Written Questions Study Cases
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Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
4	<p>Simple logic circuits:</p> <p>Gates: AND, OR, NOT, NOR, NAND</p>	<p>Oral Questions Written Questions Study Cases Projects</p>
4	<p>Combinational logic circuits:</p> <ul style="list-style-type: none"> • Truth tables • Boolean expressions • Karnaugh map • DeMorgan's theorem • Adding and subtracting circuits 	<p>Oral Questions Written Questions Study Cases Projects</p>
6	<p>Sequential logic circuits:</p> <ul style="list-style-type: none"> • Timers • Counters • Flip flops • Shift registers 	<p>Oral Questions Written Questions Study Cases Projects</p>

2	<p>Introduction to microprocessors:</p> <ul style="list-style-type: none"> • Microcomputer structure • Microcomputer software and hardware • Microprocessors • Microcomputer bus • Read and write operations • Binary code and its applications • Measuring the address signals on the address bus • Measuring the data signals on the address bus • Checking the control signals • Tristate technology • Signal-time diagram for bus systems • Short circuits on bus lines • Open circuits on bus lines 	<p>Oral Questions Written Questions Study Cases Projects</p>
2	<p>Input/output units:</p> <ul style="list-style-type: none"> • Typical microcomputer application: Traffic lights • Input/Output technology • Interfacing technology • Construction & addressing of input/output units • Reading data from the input port and outputting it to the output port • Testing the input port address comparator • Testing the output port address comparator 	<p>Oral Questions Written Questions Study Cases Projects</p>

2	<p>Data processing:</p> <ul style="list-style-type: none"> • The parts of microprocessor (CPU) • Data transfer by bus • Instructions • Registers • State register • Arithmetic/Logic (ALU) unit • Instructions and how they are executed 	<p>Oral Questions Written Questions Study Cases Projects</p>
4	<p>Microcomputer and microprocessor programming:</p> <ul style="list-style-type: none"> • Different types of instructions • Data transfer instructions • Logic instructions • Arithmetic instructions • Program control instructions • Program layout 	<p>Oral Questions Written Questions Study Cases Projects</p>
2	<p>Application examples (practical work)</p>	<p>Oral Questions Written Questions Study Cases Projects</p>

<p>References</p>	<p>Floyd, T. L., “Digital Fundamentals”, Last edition, Prentice Hall. Ramesh S. Gaonkar, “Microprocessor Architecture; Programming and Application with the 8085”, Third edition, Prentice Hall.</p>
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Department	Communication Techniques	Major	Communications					
Course Title	Basics of Communications	Code	COM 136					
Prerequisites	COM 115							
Course Description: This course covers an introduction to communication principles and fundamentals, including different types of modulation and demodulation techniques. Also, the effect of noise on signal transmission is described.	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)			5				
	Contact Hours (Hour/week)	L			4			
		W			2			
T								
General Goal: At the end of this course, the trainees will be able to understand block diagrams, describing different modulation methods and frequency division techniques. Also they will have the ability to distinguish between different receiver structures.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Deal with communication principles and fundamentals.	Ability to deal with communication terms, parameters , specifications and technical manuals		1A1, 1E1, 2A4,2C3,3B2, 3H2, 3H4					

2- Deal with analogue communication systems.	Ability to deal with AM and FM communication systems	1A1, 1E1, 2E4, 2D5, 3B3, 3F3, 3F4
3- Deal with receiver technical specifications and compare between them.	Understanding the performance of different receiver types	1A1, 1E1, 2E4, 3B3, 3F4
4- Deal with the factors affecting transmitter and receiver performance.	Knowledge the effect of negative factors on transmitter and receiver performance	1A1, 1E1, 2E4, 2F1, 2F4, 3B3, 3F3, 3F4
<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Deal with different practical modulation circuits.	Understanding system block diagrams and manuals	1E1, 2B3, 2D1, 2E4, 2F1, 3B2, 3H2, 3H4
2- Deal with different practical transmitter and receiver circuits.	Understanding block diagrams and manuals for transmitters and receivers	1E1, 2B4, 2D1, 2E4, 2F1, 3B3, 3F3, 3F4
3- Deal with analogue communication simulation methods.	Ability to use different programs simulating analog communication systems	1A7, 1B11, 1G3, 2A4, 2C3, 2F1, 3B3, 3D2, 3F3, 3F4

Safety Requirements:		
Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.		
Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> Introduction to communications 	2B33B2 2B2	<ul style="list-style-type: none"> Perform protective maintenance Taking mobile position readings Preparing required testing and measuring equipments
<ul style="list-style-type: none"> AM transmission and reception 	1A12B33B2 2A3 2B4 2C3 2D1 2F1 2B2	<ul style="list-style-type: none"> Dealing with switching manuals Perform protective maintenance Taking mobile position readings Preparing required testing and measuring equipments Checking site equipments Comparing readings with references Connecting transmission circuits Dealing with transmission manuals Checking transmission system performance

<ul style="list-style-type: none"> • FM transmission and reception 	<p>1A12B33B2 2A3 2B4 2C3 2D1 2F1 2B2</p>	<ul style="list-style-type: none"> • Dealing with switching manuals • Perform protective maintenance • Taking mobile position readings • Preparing required testing and measuring equipments • Checking site equipments • Comparing readings with references • Connecting transmission circuits • Dealing with transmission manuals • Checking transmission system performance
<ul style="list-style-type: none"> • Frequency division multiplexing (FDM) 	<p>1G5 3H1</p>	<ul style="list-style-type: none"> • Participating in forming data base • Participating in survey for increasing cell needs

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
18	<p>Introduction to electronic communication:</p> <ul style="list-style-type: none"> • Introduction • Modulation and demodulation • The electromagnetic spectrum • Bandwidth and information capacity • Transmission modes • Signal analysis • Mixing. • Noise analysis • Signal-to-noise ratio 	<p>Oral Questions Written Questions Study Cases</p>
15	<p>Amplitude modulation transmission and detection:</p> <ul style="list-style-type: none"> • Principles of amplitude modulation • AM modulator circuits • AM transmitters • AM receiver block diagrams • Receiver parameters • AM receivers 	<p>Oral Questions Written Questions Study Cases</p>
15	<p>Angle modulation transmission and reception:</p> <ul style="list-style-type: none"> • Introduction • Angle modulation • Frequency modulation transmitters • Frequency modulation receivers 	<p>Oral Questions Written Questions Study Cases</p>

4	Frequency division multiplexing (FDM)	Oral Questions Written Questions Study Cases
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Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
2	Introduction to the laboratory	Oral Questions Written Questions Study Cases
2	Introduction to electronic equipments used in the laboratory	Oral Questions Written Questions Study Cases
4	Signal analysis	Oral Questions Written Questions Study Cases
8	Amplitude modulation	Oral Questions Written Questions Study Cases
8	Frequency modulation	Oral Questions Written Questions Study Cases
2	Frequency division multiplexing (FDM)	Oral Questions Written Questions Study Cases

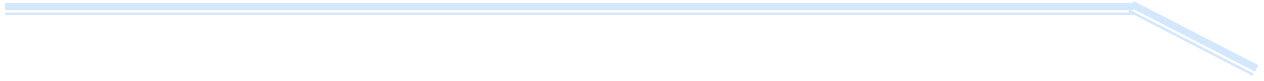
References	G.M. Miller, "Modern Electronic Communications Systems", Fifth Edition, Prentice Hall, 1996
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Department	Communication Techniques	Major	Communications					
Course Title	Electronic Workshop	Code	COM 224					
Prerequisites	COM 127							
Course Description: This course covers two areas: - Safety in laboratories and workshops including aims, protection ways and first aid. - The correct way to deal with electronic components and elements, and how to install a complete electronic device; showing installation steps and the principles of operation	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)				2			
	Contact Hours (Hour/week)	L						
		W			4			
T								
General Goal: The objective of this course is to give the trainees the necessary information and skills for soldering and human safety in the laboratories and workshops. Also, to teach them how to identify and install electronic elements and devices. Also covered is how to test and determine fault locations in these devices and circuits related to communication systems.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Be careful and follow safety precautions in workshops and laboratories.	Ability to deal electricity and first aid procedures		1A6,1C9, 1C10, 2A3, 2B1 2B2, 3B1, 3B2, 3B4					

2- Be careful when dealing with electronic equipments.	Ability to use testing and measuring equipments	1A6,1C9,1C8 1C10,2B2,2B3 2H4,3B1,3B2 3B3 3B4, 3E2,3E4
3- Perform the installation steps of an electronic device and circuit, and test and solder them.	Ability to solder and test electronic components	1E1, 1E2, 1E4,2B3, 2B5, 2E6, 3E3, 3A3
4- Follow the block and circuit diagrams.	Knowledge deal with circuit blocks and diagrams	1A1,1E1, 1E3,2B1, 2D1, 2E2, 3B2, 3B3 3B4, 3E2,3E4
5- Deal with manuals and technical specifications of electronic devices; their characteristics and equivalentents.	Choosing correct electronic devices after referring to their handbooks and manuals	1A1,1A2,1D1,2B3, 2E2, 2E5, 3E3, 3A3
Secondly: Assistant Objectives: The trainees should be able to:		
1- Use test and measuring equipment.	Checking the condition and characteristics of electronic devices by using required equipments	1A6,1C9,1C8 1C10,2B2,2B3, 2H4,3B1,3B2, 3B3, 3B4, 3E2,3E4
2- Access technical specifications of electronic devices using internet services.	Using internet services to access electronic websites	1A1,1A2,1D1,2B3, 2E2, 2E5, 3E3, 3A3

Safety Requirements:		
<p>Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools. Knowledge of first aid procedures in the case electrical shock.</p>		
Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> Human safety 	1A62A33B 2 3B4	<ul style="list-style-type: none"> Connecting cabinets to power sources Taking mobile position readings Checking site equipment Testing external alarm system
<ul style="list-style-type: none"> Introduction to workshop 	1C82B23B1 3B2 3B4	<ul style="list-style-type: none"> Testing new spare parts Preparing required testing and measuring equipment Checking site parts Taking mobile position readings Testing external alarm system
<ul style="list-style-type: none"> Electronic circuits devices and elements 	1E42B32E6 3E33A3	<ul style="list-style-type: none"> Replacing faulty parts Performing protective maintenance Repairing faults Repairing site faults Repairing faults through network

<ul style="list-style-type: none"> • Electronic soldering 	<p>1E42B33E3 3A3</p>	<ul style="list-style-type: none"> • Replacing faulty parts • Performing protective maintenance • Repairing site faults • Repairing faults through network
<ul style="list-style-type: none"> • Application on an electronic circuit 	<p>1E42B33E3 3A3</p>	<ul style="list-style-type: none"> • Replacing faulty parts • Performing protective maintenance • Repairing site faults • Repairing faults through network
<ul style="list-style-type: none"> • Installing all elements on an electronic board 	<p>1E42B33E3 3A3</p>	<ul style="list-style-type: none"> • Replacing faulty parts • Performing protective maintenance • Repairing site faults • Repairing faults through network



Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
4	<p>Safety:</p> <ul style="list-style-type: none"> • Safety in electrical installation and electronics • Safety fundamentals when dealing with electricity • First aid and electrical hazards • Risks when using hand tools • First aid when using hand tools 	<p>Oral Questions Written Questions Study Cases Project</p>
4	<p>Introduction to workshops:</p> <ul style="list-style-type: none"> • Introduction to workshop • Introduction to measuring equipments (multimeter, power supply, oscilloscope, function generator 	<p>Oral Questions Written Questions Study Cases Project</p>
6	<p>Electronic devices:</p> <ul style="list-style-type: none"> • Introduction to fundamental electronic devices and elements like, resistors, capacitors, inductors, diodes, transistors, integrated circuits. • Their types, testing and data sheets 	<p>Oral Questions Written Questions Study Cases Project</p>

10	<p>Electronic soldering:</p> <ul style="list-style-type: none"> • Introduction • Soldering techniques • Soldering steps • Soldering tools • Printed circuits soldering • Desoldering components 	<p>Oral Questions Written Questions Study Cases Project</p>
8	<p>Application example:</p> <ul style="list-style-type: none"> • AM – FM radio • Telephone circuit with known device characteristics, block and circuit diagrams 	<p>Oral Questions Written Questions Study Cases Project</p>
20	<p>Installation of all components on a printed board:</p> <ul style="list-style-type: none"> • Installing all components on a printed board • Testing the installation at each stage 	<p>Oral Questions Written Questions Study Cases Project</p>

Department	Communication Techniques	Major	Communications					
Course Title	Basics of Digital Communications	Code	COM 231					
Prerequisites	COM 136							
Course Description: This course covers the main digital communication fundamentals: pulse modulation, time-division multiplexing, pulse code modulation, digital transmission and coding, digital coding techniques and source coding.	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)				5			
	Contact Hours (Hour/week)	L				4		
		W				2		
T								
General Goal: This course aims to give trainees the basic digital communication fundamentals which can help to understand corresponding communication techniques.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Understand basic digital communication concepts.	Ability to deal with communication terms, parameters, specifications and technical manuals		1A1,3B2,2B4,2D1, 2F1,3H2, 3H4					

2- Distinguish between digital and analogue communication systems.	Ability to understand fundamentals, characteristics and specifications for each communication systems	1A1, 1E1,2E2, 2F1,3B2,3B3 3F4, 3C2
3- Have the ability to recognize different integrated circuits used in digital communications.	Correct dealing with related integrated circuits	1A1, 1E1, 2C4,2D1, 2D5,3B3 3B4
4- Understand different digital modulation techniques.	Understanding operation principles of different modulation techniques	1A1, 1E1, 2F1, 3B3 3B4, 3F4
5- Understand line coding and decoding.	Understanding different coding and decoding techniques	1A1, 1E1, 2F1, 3C2, 3F3, 3F4
Secondly: Assistant Objectives:		
The trainees should be able to:		
1- Deal with practical different digital modulation circuits.	Understanding system block diagrams and manuals	1A1, 1E1, 2D1, 2E4, 3B3 3B4, 3F4
3- Deal with digital communication simulation methods.	Ability to use different programs simulating digital communication systems	1A7,1B11, 1G3,2C3, 2F1,3B3, 3D2, 3F3, 2G5 3F4

Safety Requirements:		
Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.		
Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> Pulse modulation 	1A12F13B2 3B3	<ul style="list-style-type: none"> Dealing with switching manuals Checking for transmission network performance Taking site mobile readings Test transmission base station
<ul style="list-style-type: none"> Pulse code modulation 	1E12F13B2 3B3	<ul style="list-style-type: none"> Locate site faulted unit Checking for transmission network performance Taking site mobile readings Test transmission base station
<ul style="list-style-type: none"> Time-division multiplexing 	1E12F13B2 3B33H43H 1	<ul style="list-style-type: none"> Locate site faulty unit Checking for transmission network performance Taking site mobile readings Test transmission base station Participating in frequency allocation planning Participating in sites surveying for cells upgrading

<ul style="list-style-type: none"> • Digital transmission and coding 	<p>1E12F13B2 3B32D11</p>	<ul style="list-style-type: none"> • Locate site faulty unit • Checking for transmission network performance • Taking site mobile readings • Test transmission base station • Test transmission units performance
<ul style="list-style-type: none"> • Digital modulation techniques 	<p>1E12F13B2 3B3</p>	<ul style="list-style-type: none"> • Locate site faulty unit • Checking for transmission network performance • Taking site mobile readings • Test transmission base station
<ul style="list-style-type: none"> • Source coding techniques 	<p>1E12F13B2 3B3</p>	<ul style="list-style-type: none"> • Locate site faulty unit • Checking for transmission network performance • Taking site mobile readings • Test transmission base station

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
4	Introduction to digital communications	Oral Questions Written Questions Study Cases
5	Pulse time modulation: <ul style="list-style-type: none"> • Introduction • Pulse amplitude modulation (PAM) • Pulse width modulation (PWM) • Pulse position modulation (PPM) 	Oral Questions Written Questions Study Cases
8	Pulse code modulation: <ul style="list-style-type: none"> • Why digital? • How to obtain signal modulation • Pulses: (sampling, waveforms, quantization, coding) • Nonuniform quantization • Applications 	Oral Questions Written Questions Study Cases
8	Time-division multiplexing (TDM): <ul style="list-style-type: none"> • Time-division multiplexing • Time-division multiple access • Applications 	Oral Questions Written Questions Study Cases

9	<p>Digital transmission and coding:</p> <ul style="list-style-type: none"> • Digital communication system parameters • Transmission rate • Line coding • Line decoding • Demultiplexing • Digital coding schemes • Return to zero code (RZ) • Non return to zero code (NRZ) • AMI code • Manchester code 	<p>Oral Questions Written Questions Study Cases</p>
9	<p>Digital modulation techniques:</p> <ul style="list-style-type: none"> • Introduction • Amplitude shift keying (ASK) • Frequency shift keying (FSK) • Phase shift keying (PSK) • MPSK • Applications 	<p>Oral Questions Written Questions Study Cases</p>
9	<p>Source coding techniques:</p> <ul style="list-style-type: none"> • Introduction • Synchronous and asynchronous transmission • Coding schemes using in PCs • Huffman's coding • Hamming coding • Golay coding 	<p>Oral Questions Written Questions Study Cases</p>

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
2	Introduction to the laboratory	Oral Questions Written Questions Study Cases
4	Pulse amplitude modulation (PAM): <ul style="list-style-type: none"> • PAM signal generation • PAM signal demodulation 	Oral Questions Written Questions Study Cases
2	Pulse amplitude modulation – Time division multiplexing (PAM – TDM): <ul style="list-style-type: none"> • PAM – TDM transmission • PAM – TDM reception 	Oral Questions Written Questions Study Cases
	Pulse code modulation (PCM): <ul style="list-style-type: none"> • PCM signal generation and demodulation • PCM signal – TDM 	Oral Questions Written Questions Study Cases
	Line coding: <ul style="list-style-type: none"> • Encoding • Decoding 	Oral Questions Written Questions Study Cases

	<p>Frequency shift keying (FSK):</p> <ul style="list-style-type: none"> • FSK signal generation • FSK asynchronous detection • FSK synchronous detection 	<p>Oral Questions Written Questions Study Cases</p>
	<p>Phase shift keying (PSK):</p> <ul style="list-style-type: none"> • PSK signal generation • PSK synchronous detection 	<p>Oral Questions Written Questions Study Cases</p>
	<p>Amplitude shift keying (ASK):</p> <ul style="list-style-type: none"> • ASK signal generation • ASK synchronous detection 	<p>Oral Questions Written Questions Study Cases</p>

<p>References</p>	<p>1- Martin S., “Analog and Digital Communication Systems”, Last Edition, Prentice Hall.</p> <p>2- Bernard Sklar, “Digital Communications; Fundamentals and Applications”, Last edition, Prentice Hall</p>
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Department	Communication Techniques	Major	Communications					
Course Title	Antennas and Wave Propagation	Code	COM 232					
Prerequisites	COM 136							
Course Description: This course covers the fundamentals in electromagnetic, wave propagation, and antenna types and characteristics. The use of different equipment to test and measure electromagnetic waves.	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)				4			
	Contact Hours (Hour/week)	L				3		
		W				2		
T								
General Goal: The trainees should be able to discuss, explain, and deal with different techniques in the area of antennas and wave propagation.								
Detailed Course Objectives	Required Performance			Related Tasks				
Firstly: Procedural Objectives: The trainees should be able to:								
1- Test and measure electromagnetic waves.	Using specified equipments to test and measure electromagnetic waves			2A3-2B2-3C2-3D2				
2- Distinguish between different wave types, their characteristics and applications.	Be familiar with wave types, their characteristics and applications			3H2-3H4				

<p>3- Test different antenna types, their characteristics and applications</p>	<p>Be familiar with antenna types, their characteristics and applications</p>	<p>3G1-3G5</p>
<p>Secondly: Assistant Objectives: The trainees should be able to:</p>		
<p>1- Be familiar with electromagnetic waves.</p>	<p>Knowledge of electric and magnetic fields</p>	<p>3H3</p>
<p>2- Be familiar with electromagnetic wave types, characteristics and applications.</p>	<p>Knowledge of wave types, characteristics and applications</p>	<p>3H6</p>
<p>3- Be familiar with antenna types, characteristics and applications.</p>	<p>Knowledge of antenna types, characteristics and applications</p>	<p>3G1- 3G5</p>
<p>Safety Requirements: Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		
<p>Topics (Theoretical & Practical)</p>	<p>Related Tasks</p>	
<ul style="list-style-type: none"> • Electric and magnetic fields 	<p>3C2</p>	<ul style="list-style-type: none"> • Participating in analysis of information about signal level quality

<ul style="list-style-type: none"> • Electromagnetic waves 	3H1	<ul style="list-style-type: none"> • Participating in site surveying for upgrading cells
<ul style="list-style-type: none"> • Planar wave propagation 	3G1	<ul style="list-style-type: none"> • Testing the area that may require an additional tower
<ul style="list-style-type: none"> • Antenna fundamentals 	3G1-3G5	<ul style="list-style-type: none"> • Testing the area that may require an additional tower • Supervising tower installation
<ul style="list-style-type: none"> • Antenna arrays 	3F4	<ul style="list-style-type: none"> • Studying the movement of radio stations
<ul style="list-style-type: none"> • Practical antenna systems 	3G5	<ul style="list-style-type: none"> • Supervising mobile tower installation

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
Wave Propagation		
3	Electric and magnetic fields: <ul style="list-style-type: none"> • Electric field • Magnetic field 	Oral Questions Written Questions Study Cases
5	Electromagnetic waves: <ul style="list-style-type: none"> • Introduction • Characteristics of electromagnetic waves • Wave velocity • Rays and wavefront • Spherical waves and the inverse square law • Polarization • Optical properties of radio waves: <ul style="list-style-type: none"> - Refraction - Reflection - Diffraction - Interference • Propagation of waves: <ul style="list-style-type: none"> - Ground-wave propagation - Space-wave propagation - Sky-wave propagation • Propagation characteristics: <ul style="list-style-type: none"> - Critical frequency - Critical angle - Virtual height 	Oral Questions Written Questions Study Cases

5	<p>Planar wave propagation:</p> <ul style="list-style-type: none"> • Introduction • Wave equation • Homogenous planar wave • Lossy media • Lossless media • Insulators and conductors • Perfect conductors • Perfect insulators • Polarization of planar waves • Normal incidence of planar waves • Oblique Incidence of planar waves 	<p>Oral Questions Written Questions Study Cases</p>
Antennas		
8	<p>Fundamentals of antennas:</p> <ul style="list-style-type: none"> • Introduction • Antenna structure: <ul style="list-style-type: none"> - Size - Supports - Feed lines - Conductors - Insulators - Weather protection • Antenna parameters: <ul style="list-style-type: none"> - Radiation pattern - Near and far fields - Radiation resistance - Antenna efficiency - Directive gain - Power gain - Antenna polarization - Antenna beam width - Antenna input impedance 	<p>Oral Questions Written Questions Study Cases</p>

8	<p>Basic radiators and feed methods:</p> <ul style="list-style-type: none"> • Introduction • Short dipole • Half-wave dipole • Loop antenna • Helical antenna • Horn antenna • Parabolic (Dish) antenna • Microstrip antenna • Feed methods 	<p>Oral Questions Written Questions Study Cases</p>
5	<p>Antenna arrays:</p> <ul style="list-style-type: none"> • Introduction • Broadside array • End-fire array • Circular array 	<p>Oral Questions Written Questions Study Cases</p>
5	<p>Practical antenna systems:</p> <ul style="list-style-type: none"> • GSM antennas • Yagi-Uda antennas • Mobile antennas 	<p>Oral Questions Written Questions Study Cases</p>

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
2	Introduction to laboratory and measuring equipment	Oral Questions Written Questions Study Cases
2	Electric and magnetic fields	Oral Questions Written Questions Study Cases
2	Wave propagation	Oral Questions Written Questions Study Cases
2	Standing waves	Oral Questions Written Questions Study Cases
2	Radiation pattern of half-wave dipole at 1 GHz	Oral Questions Written Questions Study Cases
2	Radiation pattern open waveguide at 10 GHz	Oral Questions Written Questions Study Cases
2	Gain of the pyramidal horn antenna	Oral Questions Written Questions Study Cases

2	<ul style="list-style-type: none"> • $\lambda/2$, λ, and $3\lambda/2$ dipole antenna. • $\lambda/2$ folded antenna 	<p>Oral Questions Written Questions Study Cases</p>
	<ul style="list-style-type: none"> • Monopole antenna • Loop antenna 	<p>Oral Questions Written Questions Study Cases</p>
	<p>Circular polarization and helical antenna</p>	<p>Oral Questions Written Questions Study Cases</p>
	<p>Yagi-uda antenna</p>	<p>Oral Questions Written Questions Study Cases</p>
	<ul style="list-style-type: none"> • Slot antenna • Rectangular patch antenna 	<p>Oral Questions Written Questions Study Cases</p>
	<p>Micro-strip planar antenna</p>	<p>Oral Questions Written Questions Study Cases</p>

<p>References</p>	<p>KENEDY. D, “Electronic Communication Systems”, McGraw, 1993. C. Balanis, “Antenna Theory”, John Wiley and Sons Inc, 1997.</p>
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Department	Communication Techniques	Major	Communications					
Course Title	Transmission Lines and Optical Fibers	Code	COM 240					
Prerequisites	COM 136							
Course Description: This course covers the principle of operation and types of transmission lines and optical fibers and their technical specifications. Also covered are methods of connecting optical fibers, transmission characteristics of optical fibers, light sources and photodetectors, fiber optic measurements and testing	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)				5			
	Contact Hours (Hour/week)	L				4		
		W				2		
T								
General Goal: This course aims to give trainees the basic knowledge in the field of optical fibers, transmission characteristics and to participate in the design of optical fiber communication systems								
Detailed Course Objectives	Required Performance			Related Tasks				
Firstly: Procedural Objectives: The trainees should be able to:								
1- Be familiar with electrical characteristics of two-wire and coaxial lines.	Knowledge of electrical characteristics of transmission lines like characteristic impedance, propagation constant and their dependence on frequency and line length			1A4 2A2 1E9				

2- Be familiar with impedance matching and ways to obtain it.	Knowledge the meaning of impedance matching and practical methods to achieve it, like $\lambda/4$ transformer and Shunt Stubs Method	1A5 2D6 2D11 2C4
3- Understand the principle of operation of optical fibers and their types.	Using ray transmission theory and fundamental laws and formulas to illustrate light propagation through optical fiber	1A4 2A2
4- Be familiar with classification of optical fibers.	Classifying optical fibers according to number of modes, refractive index profile and material from which are fabricated	2A2
5- Be familiar with transmission characteristics of optical fibers.	Knowledge of attenuation and dispersion, their reasons and ways to reduce them	2A2 1E10
6- Be familiar with optical sources and detectors.	Knowledge of optical sources and detectors structures, types, characteristics and specifications	1A4 1C3 1C8 2A3
7- Be familiar with fiber optic cables, construction, types and characteristics.	Knowledge of fiber optic cable types, applications and associated problems	2A6 2D11 2E6
8- Design simple fiber optic links.	Ability to select needed components and calculate link budget	2D9 2D6 2D10

9- Be familiar with fiber optic connection problems.	Knowledge of Fresnel reflection and misalignment loss (lateral, angular)	1C3 2D11 2C3 1D2
10- Practice with transmission methods through optical fiber.	Dealing with analog and digital transmission methods	2D1 2A4
11- Practice with fiber optic test and measurement methods.	Ability to measure characteristic impedance of transmission lines, light source and photodetector characteristics and attenuation for glass and plastic fibers	1E1 1E2 2E4 2E5 1E9 1E10 2D11 2D11 1E11
<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Determine transmission line specifications.	Specifications according to accredited standards	1A5
2- Determine optical fiber types and specifications.	Specifications according to accredited standards	2A2
3- Determine fiber optic cables types and specifications.	Specifications according to accredited standards	2A2

4- Determine light source and photo-detector types and specifications.	Specifications according to accredited standards	2A3 2A6
5- Participate in the design of a simple fiber optic link.	Design procedure and step requirements	2A2 2C4 2D5 2D6 2D9
6- Master optical fiber splicing.	Splicing optical fibers using fusion and mechanical methods	2A3 2E4 1A2
7- Test optical fibers to locate faults and repair them.	Testing, fault locating and repairing optical fibers	1E10 1E4 2E5
8- Prepare testing and measuring records for transmission lines and optical fibers.	Specifications according to accredited standards	2D12 2E8
<p>Safety Requirements:</p> <p>Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		
Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> Transmission lines fundamentals 	1A4	<ul style="list-style-type: none"> Installing Peripheral units
<ul style="list-style-type: none"> Optical fibers; principle of operation, types and specifications 	2A2	<ul style="list-style-type: none"> Collecting data about faults

<ul style="list-style-type: none"> • Fiber optic cables 	2A6	<ul style="list-style-type: none"> • Fixing protective (alternative) routes
<ul style="list-style-type: none"> • Transmission characteristics of optical fibers 	2A2 1E10	<ul style="list-style-type: none"> • Choosing proper connection circuit • Repairing routes between exchanges
<ul style="list-style-type: none"> • Light sources and photodetectors 	2A3 2A6	<ul style="list-style-type: none"> • Checking of site equipment • Fixing protective (alternative) routes
<ul style="list-style-type: none"> • Optical fiber connections 	1C3 2D11 2C3	<ul style="list-style-type: none"> • Linking transmission circuits • Checking for transmission units performance
<ul style="list-style-type: none"> • Fiber optic installation and splicing 	2A3 2E4 1A2	<ul style="list-style-type: none"> • Checking of site equipment • Analyzing transmission network faults • Fixing proper position for switching cabinets
<ul style="list-style-type: none"> • Fiber optic system design 	2C4 2D5	<ul style="list-style-type: none"> • Checking of site equipment • Installing Peripheral units
<ul style="list-style-type: none"> • Fiber optic measurements and testing 	2A3 2B2	<ul style="list-style-type: none"> • Checking of site equipment • Preparing required test and measuring equipment

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
8	Transmission lines fundamentals: <ul style="list-style-type: none"> • Two-wire lines • Coaxial lines 	Oral Questions Written Questions Study Cases
7	Principle of operation of optical fibers: <ul style="list-style-type: none"> • Optical fiber fundamentals • Optical fiber types • Optical fiber specifications 	Oral Questions Written Questions Study Cases
6	Transmission characteristics of optical fibers: <ul style="list-style-type: none"> • Attenuation • Decibel unit review • Dispersion • Fiber bandwidth 	Oral Questions Written Questions Study Cases
6	Fiber optic cables: <ul style="list-style-type: none"> • Fiber optic cables requirements • Fiber optic cables types • Technical specifications 	Oral Questions Written Questions Study Cases
6	Fiber optic connections: <ul style="list-style-type: none"> • Fresnel reflection • Misalignment problems • Misalignment loss calculations • Connector types and applications • Couplers types and applications 	Oral Questions Written Questions Study Cases

5	<p>Fiber optic installation and splicing:</p> <ul style="list-style-type: none"> • Installation methods • Splicing methods and techniques • Fiber optic termination 	<p>Oral Questions Written Questions Study Cases</p>
10	<p>Light sources and photo-detectors:</p> <ul style="list-style-type: none"> • Light sources requirements • Light emitting diodes (LEDs) • Laser diodes • Photodetector requirements • Photodetector types • Photodetector noise 	<p>Oral Questions Written Questions Study Cases</p>
4	<p>Fiber optic system design:</p> <ul style="list-style-type: none"> • Design fundamentals • Design methods • Fiber optic system components 	<p>Oral Questions Written Questions Study Cases</p>

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
4	Characteristic impedance for two-wire and coaxial lines	Oral Questions Written Questions Study Cases
2	Light emitting diode measurements: <ul style="list-style-type: none"> • Relation between voltage and current • Power measurements as a function of forward current for different wavelengths 	Oral Questions Written Questions Study Cases
2	Receiver measurements: <ul style="list-style-type: none"> • Glass fiber • Plastic fiber • Power measurements as a function of forward current 	Oral Questions Written Questions Study Cases
2	Attenuation measurements as a function of wavelength: <ul style="list-style-type: none"> • For plastic fiber • For glass fiber 	Oral Questions Written Questions Study Cases
2	Transmission methods through optical fibers: <ul style="list-style-type: none"> • Analogue transmission • Digital transmission 	Oral Questions Written Questions Study Cases

2	Numerical aperture measurement: <ul style="list-style-type: none"> • For plastic fiber • For glass fiber 	Oral Questions Written Questions Study Cases
2	Fiber to fiber coupling loss	Oral Questions Written Questions Study Cases
2	Rejection of higher order modes	Oral Questions Written Questions Study Cases
8	Splicing optical fibers and testing using OTDR	Oral Questions Written Questions Study Cases

References	<ol style="list-style-type: none"> 1- Djafar K. Mynbaef, Lowell L. Sheiner, "Fiber Optic Communications Technology", Prentice Hall, 2001. 2. Bob Chomycz, "Fiber Optic Installers Field Manual", Mc Graw-Hill, 2000. 3. Jeff Hecht, "Understanding Fiber Optics", Prentice Hall, 1991.
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Department	Communication Techniques	Major	Communications					
Course Title	Basic Telephony & Digital Switching	Code	COM 245					
Prerequisites	COM 231							
Course Description: This course covers an introduction to telephone network structure, digital switching concepts, processing steps of a telephone call, signaling system between exchanges, telephone traffic, charging, numbering, and application examples covering the above mentioned topics.	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)					4		
	Contact Hours (Hour/week)	L					3	
		W					2	
T								
General Goal: The aim of this course is to give trainees the basic concepts and skills to understand the operation and functions of different exchange systems.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Analyze basic components of a telephone network.	Knowledge of the basic components of the telephone network		1A1 1A2					
2- Test digital switching systems and their characteristics.	Knowledge of the characteristics of digital switching		1B4 , 1B7,1B5					

3- Deal with the exchange blocks and their functions.	Knowledge of exchange parts and their functions	1E4
4- Test subscriber lines, numbers and routes between exchanges..	Knowledge of subscriber lines, numbers, routes between exchanges and principles of numbering system	1B1-1E10-1G1,1D4,1D5
5- Explain the telephone call route through a particular exchange.	Understanding telephone call route	1G4-1F6-1G6-1D4
<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Be familiar with basic components of a telephone network.	Knowledge of basic components of the telephone network	1A1
2- Be familiar with digital exchange characteristics.	Understanding digital exchange characteristics	1B7
3- Be familiar with the exchange blocks and their functions.	Analyzing different exchange parts	1E5-1E6
4- Understand time and space switching.	Knowledge of switching types	
5- Be familiar with subscriber lines, numbers and routes between exchanges.	Knowledge of numbering system and routing between exchanges	1E9-1G1

6- Be familiar with signaling system used in telephone networks.	Understanding signaling methods used in telephone networks	1F5
7- Be familiar with the principles of tariff system.	Understanding tariff system principles used in telephone networks	1F3
8- Be familiar with the telephone call route through a particular exchange.	Understanding telephone call route	1D4
<p>Safety Requirements:</p> <p>Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		
Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> Introduction to external telephone network 	1F1 1A1	<ul style="list-style-type: none"> Organizing daily study programs Looking on exchange manuals
<ul style="list-style-type: none"> Digital exchange 	1B4	<ul style="list-style-type: none"> Be familiar with new exchanges
<ul style="list-style-type: none"> Time and space switching 		
<ul style="list-style-type: none"> Subscriber lines and routing 	1E9 1F4	<ul style="list-style-type: none"> Repairing subscriber lines Following routes performance between exchanges
<ul style="list-style-type: none"> Signaling systems 	1F5	<ul style="list-style-type: none"> Following performance of SS7 network

<ul style="list-style-type: none">• Numbering plan	1B1 1B2	<ul style="list-style-type: none">• Defining new numbers• Defining new subscriber number
<ul style="list-style-type: none">• Charging methods	1F3	<ul style="list-style-type: none">• Studying occupancy rate in digital exchanges
<ul style="list-style-type: none">• 5ESS exchange	1B5	<ul style="list-style-type: none">• Supervising new exchanges performance
<ul style="list-style-type: none">• Telephone call path in 5ESS	1D4	<ul style="list-style-type: none">• Following call route

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
5	Introduction to external telephone networks: <ul style="list-style-type: none"> • Network parameters • Numbering system in telephone networks 	Oral Questions Written Questions Study Cases
5	Digital exchange: <ul style="list-style-type: none"> • Introduction • Local exchange, its components and functions • Exchange types 	Oral Questions Written Questions Study Cases
3	Time and space switching: <ul style="list-style-type: none"> • Time-division multiplexing (TDM) • Time switching • Space switching 	Oral Questions Written Questions Study Cases
3	Subscriber lines and traffic routing: <ul style="list-style-type: none"> • Subscriber lines characteristics • Routing methods 	Oral Questions Written Questions Study Cases
3	Signaling system: <ul style="list-style-type: none"> • In channel signaling • Common signaling 	Oral Questions Written Questions Study Cases

2	Numbering plan in telephone networks	Oral Questions Written Questions Study Cases
2	Charging systems	Oral Questions Written Questions Study Cases
3	Telephone traffic	Oral Questions Written Questions Study Cases
10	5ESS exchange: <ul style="list-style-type: none"> • Preface • Switching unit • Communication unit • Control unit • Remote switching module 	Oral Questions Written Questions Study Cases
3	Telephone call route in 5ESS	Oral Questions Written Questions Study Cases

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
2	Introduction and overview of digital exchange	Oral Questions Written Questions Study Cases
2	Subscriber unit	Oral Questions Written Questions Study Cases
4	Multiplexing and de-multiplexing unit	Oral Questions Written Questions Study Cases
4	Time and space switching unit	Oral Questions Written Questions Study Cases
2	Control unit	Oral Questions Written Questions Study Cases
2	Control unit with a personal computer	Oral Questions Written Questions Study Cases
4	Operation of the complete training board	Oral Questions Written Questions Study Cases

6	Operation of the complete training board with a personal computer	Oral Questions Written Questions Study Cases
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References	<ol style="list-style-type: none">1- Roger L. Freeman, "Fundamentals of Telecommunications", Wiley Interscience, 1999.2- Pete Moulton, "Telecommunications Survival Guide", Prentice Hall, Nt, 2000.3- 5ESS Switch System Overview.
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Department	Communication Techniques	Major	Communications					
Course Title	Data Communications & Networks	Code	COM 246					
Prerequisites	COM 231							
Course Description: This course covers the fundamental concepts in data transmission, transmission media, data coding, ATM networks, LAN networks, wireless LANs and installation of networks using the software of hardware components.	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)					4		
	Contact Hours (Hour/week)	L					3	
		W					2	
T								
General Goal: The aim of this course is to give trainees the basic concepts and skills describing data transmission and networks.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Be familiar with data transmission.	Knowledge of data transmission techniques		1G3,2F1,3B3					
2- Recognize the network type at the site.	Insuring that the specified network matches standards		1F5,2A4,2D3 3G1,3G5,3H5					

3- Determine network devices and connections.	Devices, cable types and speed match standards	1F5,2A3, 2D4,3G5,
4- Install operating software to operate network devices.	Knowledge of subscriber lines, numbers, routes between exchanges and principles of numbering system	1B8,1F5,2D8,2G4, 3C1,3C4
5- Participate in network design modification.	Insuring that the final network design matches standards	1F5,2C3,2D1,2H1, 3G1, 3G2
6- Participate in network design development.	Insuring that the network modifications match standards and improve performance	1F5,2F1,2F2, 2G3,3G2,3G5
<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Understand modern data communication techniques.		1G3,2F1,3B3
2- Understand data transmission techniques.	Familiarity with data, signals, speeds, bandwidth and factors affecting transmission	1G3,2F1,3B3
3- Deal with different transmission media, their characteristics and specifications.	Knowledge of different transmission media, their characteristics, installation methods and applications in data transmission	1E9,1E10,2A22C4, 2D6,3D3

4- Use different coding techniques.	Knowledge of different coding techniques, their advantages and disadvantages	1G3,2F1,3B3
5- Use different digital modulation techniques.	Knowledge of different digital modulation techniques	1G3,2F1,3B3
6- Deal with different multiplexing techniques.	Knowledge of different multiplexing techniques and their applications	1G3,2F1,3B3
7- Install ATM networks.	Knowledge of ATM network components, its layers and levels	1G3,2F1,3B3
8- Install and operate wired and wireless LAN.	Knowledge of LAN network components and how to design and install simple LAN	1G3,2F1,3B3
<p>Safety Requirements:</p> <p>Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		
Topics (Theoretical & Practical)		Related Tasks
<ul style="list-style-type: none"> Introduction to data communications and networks 	<p>1F5 2F1 3B3</p>	<ul style="list-style-type: none"> Following performance of the network Ensuring performance of the network Testing transmission station

<ul style="list-style-type: none"> • Data transmission 	<p>1F5 2F1 3B3</p>	<ul style="list-style-type: none"> • Following network performance • Ensuring network performance • Testing transmission station
<ul style="list-style-type: none"> • Transmission media 	<p>1F5 2F1 3B3</p>	<ul style="list-style-type: none"> • Following network performance • Ensuring network performance • Testing transmission station
<ul style="list-style-type: none"> • Signal coding techniques 	<p>1F5 2F1 3B3</p>	<ul style="list-style-type: none"> • Following network performance • Ensuring network performance • Testing transmission station
<ul style="list-style-type: none"> • Digital transmission techniques 	<p>1F5 2F1 3B3</p>	<ul style="list-style-type: none"> • Following network performance • Ensuring network performance • Testing transmission station
<ul style="list-style-type: none"> • Multiplexing 	<p>1F5 2F1 3B3</p>	<ul style="list-style-type: none"> • Following network performance • Ensuring network performance • Testing transmission station
<ul style="list-style-type: none"> • ATM networks 	<p>1F5 2F1 3B3</p>	<ul style="list-style-type: none"> • Following performance of network • Ensuring performance of network • Testing transmission station

<ul style="list-style-type: none">• LAN networks and devices	1F5 2F1 3B3	<ul style="list-style-type: none">• Following network performance• Ensuring network performance• Testing transmission station
<ul style="list-style-type: none">• Wireless LAN networks	1F5 2F1 3B3	<ul style="list-style-type: none">• Following network performance• Ensuring network performance• Testing transmission station

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
6	Introduction to data communications and networks	Oral Questions Written Questions Study Cases
3	Data transmission	Oral Questions Written Questions Study Cases
3	Transmission media	Oral Questions Written Questions Study Cases
3	Signal coding methods	Oral Questions Written Questions Study Cases
3	Digital transmission techniques	Oral Questions Written Questions Study Cases
3	Multiplexing	Oral Questions Written Questions Study Cases
3	ATM networks	Oral Questions Written Questions Study Cases

6	LAN networks and devices	Oral Questions Written Questions Study Cases
6	Wireless networks	Oral Questions Written Questions Study Cases
3	Applications	Oral Questions Written Questions Study Cases

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
2	Introduction to the laboratory	Oral Questions Written Questions Study Cases
2	TCP/IP protocol testing	Oral Questions Written Questions Study Cases
4	Preparing and testing of transmission media	Oral Questions Written Questions Study Cases
4	Line coding	Oral Questions Written Questions Study Cases
2	Error detection	Oral Questions Written Questions Study Cases
6	Preparing and setting of a LAN network	Oral Questions Written Questions Study Cases
4	Preparing of a wireless LAN network	Oral Questions Written Questions Study Cases

4	Network application examples	Oral Questions Written Questions Study Cases
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References	William Stallings, “Data & Computer Communications”, Seventh Edition, 2003.
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Department	Communication Techniques	Major	Communications					
Course Title	Microwave & Satellite Techniques	Code	COM 247					
Prerequisites	COM 231							
Course Description: This course covers the main topics in microwave techniques; main components and propagation paths of microwave network, also the basics of satellite and space communications; their parameters and design method.	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)					4		
	Contact Hours (Hour/week)	L					3	
		W					2	
T								
General Goal: The aim of this course is to give the trainees the basic concepts in microwave techniques and satellite communication systems.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Be familiar with the main components of microwave networks.	Knowledge of microwave devices, components and their specifications and standards		2A3 2C2 2C3 2C4					
2- Determine microwave propagation paths.	Calculation of power budget for the microwave links		2A2 2B2					

3- Be familiar with satellite communication links and their operation.	Knowledge of satellite devices and components and their specifications and standards	2A2 2C2 2C3 2C4
4- Participate in the design of satellite communication links.	Calculation of power budget for the satellite communication links	2H1
5- Be familiar with space communication links and their operation.	Knowledge of space communication systems	2H5 2A4
<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Be familiar with microwave frequency bands.	Knowledge of frequency bands and their characteristics	2A2
2- Analyze different transmission line characteristics.	Familiarity with physical and electrical characteristics of transmission lines	2C3
3- Be familiar with waveguide electrical and propagation characteristics.	Knowledge of waveguide modes, cutoff frequency, wave velocity and propagation constant	2C3

<p>4- Use a Smith chart to calculate transmission line characteristics.</p>	<p>Calculating reflection factor, standing wave ratio, input and load impedances for different line lengths, and impedance matching to achieve maximum power transfer</p>	<p>2A2</p>
<p>5- Determine microwave propagation paths.</p>	<p>Calculating link budget, antenna gain, and be familiar with microwave paths (line of sight, troposphere or through obstacles)</p>	<p>2C3</p>
<p>6- Understand satellite communication techniques.</p>	<p>Applying Kepler theorem to determining satellite position and estimating link power budget</p>	<p>2D5 2F1</p>
<p>7- Be familiar with satellite communication systems and techniques.</p>	<p>Studying multiplexing and access techniques (FDMA, CDMA ,SCPC, MCPC)</p>	<p>2D2 2F2</p>
<p>Safety Requirements:</p> <p>Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		
<p>Topics (Theoretical & Practical)</p>	<p>Related Tasks</p>	
<ul style="list-style-type: none"> • Microwave fundamentals and components 	<p>2A2</p>	<ul style="list-style-type: none"> • Choosing proper communication link

<ul style="list-style-type: none">• Modulation methods used in microwave systems	2H1 2H4 2D2	<ul style="list-style-type: none">• Receiving design circuits from design department• Testing circuits after installation• Following the implementation of transmission projects
<ul style="list-style-type: none">• Fundamentals of satellite communications	2A2 2C3	<ul style="list-style-type: none">• Choosing proper communication link• Performing transmission circuits connections
<ul style="list-style-type: none">• Modulation methods used in satellite communications	2D2	<ul style="list-style-type: none">• Following the implementation of transmission projects

Detailed Curriculum (Theory)		
Hrs	Contents	Assessment Tools
3	Introduction to microwaves and transmission lines	Oral Questions Written Questions Study Cases
3	Waveguides	Oral Questions Written Questions Study Cases
9	Smith chart	Oral Questions Written Questions Study Cases
3	Microwave elements and devices	Oral Questions Written Questions Study Cases
3	Microwaves propagation	Oral Questions Written Questions Study Cases
3	Introduction to satellite communications	Oral Questions Written Questions Study Cases
6	Satellite communication link design	Oral Questions Written Questions Study Cases

6	Modulation and multiplexing techniques in satellite communications	Oral Questions Written Questions Study Cases
3	Multiple access systems	Oral Questions Written Questions Study Cases

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
2	Familiarization	Oral Questions Written Questions Study Cases
2	Gun Oscillator	Oral Questions Written Questions Study Cases
4	Polarization of the radiated field	Oral Questions Written Questions Study Cases
2	Absorption of microwaves	Oral Questions Written Questions Study Cases
2	Demonstration of Doppler effect	Oral Questions Written Questions Study Cases
2	Attenuators	Oral Questions Written Questions Study Cases
2	The slotted measuring line	Oral Questions Written Questions Study Cases

2	Complex reflection coefficient and standing wave ratio	Oral Questions Written Questions Study Cases
4	Measuring load impedance using a Smith chart	Oral Questions Written Questions Study Cases
4	Matching load and line impedances using matching transformer	Oral Questions Written Questions Study Cases

References	<p>1- Stephen C. Harsany, "Principles of Microwave Technology", Prentice Hall, 1999.</p> <p>2- Timothy Pratt; Charles W. Bosian, "Satellite Communications", Joho Wiley & sons. 2000.</p>
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Department	Communication Techniques	Major	Communications					
Course Title	Mobile Communications	Code	COM 248					
Prerequisites	COM 231							
Course Description: This course covers an introduction to mobile telecommunications, GSM system and networks, network components, transmission methods, as well as negative factors affecting performance and their solutions	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)					4		
	Contact Hours (Hour/week)	L					3	
		W					2	
T								
General Goal: The aim of this course is to give the trainees the basic knowledge in mobile telecommunications and GSM systems. Focusing on GSM networks, specifications, transmission methods and affecting factors.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Analyze mobile communication systems, focusing on GSM.	Knowledge of mobile communication systems		3C1 3F4					
2- Test the geographical structure of GSM networks, its switching system and its components.	Understanding geographical structure of GSM network		3H1-3B3 3C1,3G4,3G1,3B5					

3- Follow the transmission steps in GSM, negative factors affecting performance and their solution.	Knowledge of transmission steps in GSM, negative factors affecting performance and their solution	3C3-3C4
4- Use logical and physical channels.	Understanding the concepts of logical and physical channels	3F1 3C2
<p>Secondly: Assistant Objectives:</p> <p>The trainees should be able to:</p>		
1- Be familiar mobile communication systems, focusing on GSM.	Knowledge of mobile telephony	3F2
2- Be familiar with the basics of GSM structure.	Knowledge of cell and mobile switching center (MSC)	3G1
3- Understand the transmission steps in GSM, negative factors affecting performance and their solution.	Knowledge of transmission steps in GSM, negative factors affecting performance and their solution	3B3-3C4
4- Deal with logical and physical channels.	Knowledge of traffic channels, bursts and frames	3F3,3F4,3H4,3F5

Safety Requirements:		
<p>Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.</p>		
Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> • Introduction to mobile communications and GSM 	3F1	<ul style="list-style-type: none"> • Collecting reports about GSM network performance
<ul style="list-style-type: none"> • A general overview of GSM networks and switching system components 	3F2	<ul style="list-style-type: none"> • Studying mobile call traffic
<ul style="list-style-type: none"> • A general study of wireless communication, its frequencies, modulation types, negative effects, and the recommended solutions 	3H4	<ul style="list-style-type: none"> • Participating in frequency planning
<ul style="list-style-type: none"> • A study of the physical and logical channels 	3F3 3F2	<ul style="list-style-type: none"> • Studying of signal movement • Studying mobile call traffic

Detailed Curriculum (Theory & Practice)		
Hrs	Contents	Assessment Tools
12 + 8	<p>Introduction to mobile communications and GSM:</p> <ul style="list-style-type: none"> • Mobile telephony: <ul style="list-style-type: none"> - Introduction to mobile communications - Standards used in mobile communications • GSM: <ul style="list-style-type: none"> - Historical review - GSM specifications - Developing steps • GSM components: <ul style="list-style-type: none"> - Switching system (SS) components - Base station system (BSS) components - Network control center - Mobile station (Mobile phone) • Geographical structure of GSM: <ul style="list-style-type: none"> - Cell - Local area (LA) - MSC service area - Coverage area - GSM service area • GSM frequency bands: <ul style="list-style-type: none"> - 900 MHz - 1800 MHz - 1900 MHz 	<p>Oral Questions Written Questions Study Cases</p>

<p>9 + 6</p>	<p>Overview of GSM System:</p> <ul style="list-style-type: none"> • GSM system architecture • SS implementation • OMC implementation • NMC implementation • Additional network components 	<p>Oral Questions Written Questions Study Cases</p>
<p>9 + 6</p>	<p>Wireless Concepts:</p> <ul style="list-style-type: none"> • Frequency concepts: <ul style="list-style-type: none"> - Frequency - Bandwidth - Channels - Transmission rate - Modulation method - Access method: TDMA • Analog and digital transmission • Path loss • Shadowing • Multipath fading • Time dispersion • Time alignment • Combined signal loss • Solutions to transmission problems • Channel coding • Antenna diversity • Interleaving • Adaptive equalization • Frequency hopping • Timing advance • GSM transmission process: <ul style="list-style-type: none"> - Analog to digital conversion - Segmentation - Speech coding - Interleaving - Ciphering/Encryption - Burst formatting - Modulation and transmission 	<p>Oral Questions Written Questions Study Cases</p>

<p>9 + 6</p>	<p>Channel concepts:</p> <ul style="list-style-type: none"> • Introduction to physical and logical channels • Logical channels: <ul style="list-style-type: none"> - Control channels - Traffic channels • Bursts: <ul style="list-style-type: none"> - Burst types - The relationship between bursts and frames • Mapping of logical channels onto physical channels 	<p>Oral Questions Written Questions Study Cases</p>
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<p>References</p>	<p>1- Ericsson Training Manuals. 2- William Lee, “Mobile Cellular Telecommunications”, McGraw Hill, 2001. 3- J. Schiller, Addison, “Mobile Communication”, Wesley, 2000.</p>
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Department	Communication Techniques	Major	Communications					
Course Title	Operating Systems	Code	CMP 210					
Prerequisites	CMP 101							
Course Description: This course covers an introduction to LINUX operating system, commands, the files' system in LINUX, important commands, and creating files and directories.	Trimester	1	2	3	4	5	6	
	Credit Hours (Hour/week)					4		
	Contact Hours (Hour/week)	L					3	
		W					2	
T								
General Goal: The aim of this course is to give the trainees an introduction to the LINUX operating system, focusing on the most important commands used to operate the system.								
Detailed Course Objectives	Required Performance		Related Tasks					
Firstly: Procedural Objectives: The trainees should be able to:								
1- Understand the basics of the LINUX system.	Knowledge of the Linux system and compare it to other systems		1A7,1B8 1B10,1C102E4,2F 1, 2D8,3A1, 3A2,3A3					
2- Work on the Command Line.	Ability to enter and exit from the system and create simple commands		1A7,1B8 1B10,1C102E4,2F 1, 2D8,3A1, 3A2,3A3					

3- Display the files system in LINUX.	Ability to display different files	1A7,1B8 1B10,1C102E4,2F 1, 2D8,3A1, 3A2,3A3
4- Perform the most important commands in LINUX.	Ability to fix users and displaying their information	1A7,1B8 1B10,1C102E4,2F 1, 2D8,3A1, 3A2,3A3
5- Create files and directories.	Ability to create new files and directories	1A7,1B8 1B10,1C102E4,2F 1, 2D8,3A1, 3A2,3A3
6- Perform operations on files and directories.	Ability to copy, move and rename files and directories	1A7,1B8 1B10,1C102E4,2F 1, 2D8,3A1, 3A2,3A3
Secondly: Assistant Objectives: The trainees should be able to:		
1- Deal with personal computers.	Ability to operate and use personal computers	1A7,1B8 1B10,1C102E2,2G 1, 2G2,2G4,2G5,3A1, 3A2, 3A3

Safety Requirements:		
Commitment to safety procedures given in operating and maintenance manuals, and to be careful when dealing with electrical instruments, connections and tools.		
Topics (Theoretical & Practical)	Related Tasks	
<ul style="list-style-type: none"> • Computer fundamentals 	1B82G5 3A2	Creating databases
<ul style="list-style-type: none"> • Introduction to the LINUX operating system 	1B102E4 3A3	Analyzing faults in transmission network
<ul style="list-style-type: none"> • Working on the Command Line 	1D2 2E4 3A3	Analyzing faults in transmission network
<ul style="list-style-type: none"> • Showing files system in LINUX 	2E4 1D2 3A3	Analyzing faults in transmission network
<ul style="list-style-type: none"> • Important commands in LINUX 	1E8 2E4 3A3	Analyzing faults in transmission network
<ul style="list-style-type: none"> • Creating files and directories 	1B112E4 3A3	Analyzing faults in transmission network
<ul style="list-style-type: none"> • Operation on files and directories 	1C122E4 3A3	Analyzing faults in transmission network

Detailed Curriculum (Practice)		
Hrs	Contents	Assessment Tools
4	Computer fundamentals: <ul style="list-style-type: none"> • Hardware • Software 	Direct Observation Oral Questions Written Questions Study Cases
6	Introduction to LINUX operating system: <ul style="list-style-type: none"> • What's LINUX? • LINUX functions • Types of operating systems • Comparing between LINUX and other operating systems • Linux overview • Distributions 	Direct Observation Oral Questions Written Questions Study Cases
8	Linux installation: <ul style="list-style-type: none"> • Introduction to installation • File systems • Installation steps • (KDE) Desktop • Textual system interface 	Direct Observation Oral Questions Written Questions Study Cases

14	<p>Basic commands in LINUX:</p> <ul style="list-style-type: none"> • Textual system interface • Files system in Linux • Basic commands when dealing with files system • Creating and deleting files and directories • Copying and moving files and directories • Other commands • Printing 	<p>Direct Observation Oral Questions Written Questions Study Cases</p>
6	<p>Text editor:</p> <ul style="list-style-type: none"> • Text editing in Linux • Basic concepts with vim editor • Using vim editor • Advanced commands 	<p>Direct Observation Oral Questions Written Questions Study Cases</p>
14	<p>System management:</p> <ul style="list-style-type: none"> • General command to manage the system • User accounts management • Groups management • Authorizations • Operations management 	<p>Direct Observation Oral Questions Written Questions Study Cases</p>

References	Linux System Manual
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