Professional Regulation Commission

TABLE OF SPECIFICATIONS

Board Subject: Mathematics		Weight	No. Of Items	Level of Difficulty						
COMPETENCY		**20%**	**100**	**Easy (Introductory)**		**Moderate (Enabling)**	**Difficult (Demonstrative)**			
COURSE	**TOPICS**			**K**	**C**	**A**	**A**	**S**	**E**	
				Knowledge	**Comprehension**	**Application**	**Analysis**	**Synthesis**	**Evaluation**	
1.0 Differential Calculus		**3%**	**15**	**1**	**3**	**8**	**3**			
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	Functions, Continuity, and Limits	0.4	2	1	1					
	Derivatives and Its Applications	0.6	3		1	2				
	Higher-Order Derivatives	0.6	3			2	1			
	Parametric Equations	0.8	4		1	2	1			
	Partial Differentiation	0.6	3			2	1			
2.0 Integral Calculus		**3%**	**15**	**2**	**4**	**6**	**3**			
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	Integration Concepts/Formulas	0.4	2	1	1					
	Integration Techniques	0.8	4		1	1	2			
	Improper Integrals	0.6	3		1	1	1			
	Application of Integral	0.8	4	1	1	2				
	Multiple Integration and its applications	0.4	2			2				
3.0 Differential Equation		**3%**	**15**	**1**	**2**	**10**	**2**			
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	First-Order, First-Degree ODE and its Applications	1.2	6	1	1	4				
	Higher-Order ODE and its Application	0.8	4		1	2	1			
	Laplace Transforms, Inverses, and its applications	1	5			4	1			
4.0 Advanced Engineering Mathematics for ECE		**3%**	**15**	**0**	**0**	**10**	**5**			
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	Complex Numbers and its Applications	0.4	2			2				
	Series and Transforms	0.8	4			2	2			
	Ordinary and Partial Differential Equations	0.6	3			2	1			

	Simultaneous linear and non-linear equations	0.6	3			2	1
	Numerical Differentiation, Integration and Optimization	0.6	3			2	1
5.0 Engineering Data Analysis		**3%**	**15**	**2**	**3**	**6**	**4**
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	Obtaining Data	0.4	2	1	1		
	Statistical Sampling, distribution, and intervals		5			3	2
	Test of Hypothesis	0.4	2	1	1		
	Regression and Correlation	0.4	2		1	1	
	Design of experiments	0.8	4			2	2
6.0 Electromagnetic	**(Shares with ELECTRONICS)**	**1.8%**	**9**	**3**	**1**		**5**
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems.	Vector Analysis	0.6	3	1			2
	Directional derivative, gradient, divergence, curl	0.6	3	1			2
	Integral Theorems, Green's Lemma, Divergence Theorem and Strokes' Theorem	0.6	3	1	1		1
PO-e. Identify, formulate, and solve complex engineering problems	(c/o ELEX)						
7.0 Signals, Spectra & Signal Processing	**(Shares with EST)**	**1.6%**	**8**	**2**	**3**		**3**
PO-b. Design and conduct experiments, as well as to analyze and interpret data	N/A						
PO-e. Identify, formulate, and solve complex engineering problems	Z-Transforms	0.4	2		1		1
	Convolution	0.6	3	1	1		1
	Correlation	0.6	3	1	1		1
8.0 Feedback and Control Systems	**(Shares with ELEX)**	**1.6%**	**8**		**3**		**5**
PO-b. Design and conduct experiments, as well as to analyze and interpret data	N/A						
	Pole and zero determination	0.4	2		1		1

PO-e. Identify, formulate, and solve complex engineering problems	Transient response	0.6	3		1		2		
	Block diagram and signal flow	0.6	3		1		2		
TOTAL		**20%**	**100**	**11**	**19**	**40**	**30**		

Scope:

1.0 Differential Calculus

1.1 Functions, Continuity, Limits

1.2 Derivatives and Its Applications

1.3 Higher-Order Derivatives

1.4 Parametric Equations

1.5 Partial Differentiation

2.0   Integral Calculus

2.1 Integration Concepts/Formulas

2.2 Integration Techniques

2.3 Improper Integrals

2.4 Application of Integral

2.5 Multiple Integration and its application

3.0 Differential Equation

3.1 First-Order, First-Degree ODE and its Application

3.2 Higher-Order ODE and its Application

3.3 Laplace Transforms, Inverses, and its applications

4.0 Advanced Engineering Mathematics for ECE

4.1 Complex Numbers and its Applications

4.2 Series and Transforms (Power Series, Bessel, Legendre, Fourier Series and Applications; Fourier Transforms, Inverses, and applications

4.3 Partial Differential Equations

4.4 Simultaneous linear and non-linear equations

4.5 Numerical Differentiation, Integration and Optimization

5.0 Engineering Data Analysis

5.1 Obtaining Data

5.2 Statistical Sampling, distribution, and intervals (Probability Distributions, Sampling Distributions and Point Estimation of parameters, Statistical Intervals)

5.3 Test of Hypothesis

5.4 Regression and Correlation

5.5 Design of Experiments

6.0 Electromagnetics

6.1 Vector Analysis (algebra of vectors, vector product, calculus of vectors and vector identities, derivative of a vector functions)

6.2 Directional derivative, gradient, divergence, curl

6.3 Integral Theorems, Green's Lemma, Divergence Theorem and Strokes' Theorem

7.0 Signals, Spectra & Signal Processing

7.1 Z-Transforms

7.2 Convolution

7.3 Correlation

8.0 Feedback and Control Systems
8.1 Pole and zero determination
8.2 Transient response
8.3 Block diagram and signal flow

		Professional Regulation Commission

TABLE OF SPECIFICATIONS

Board Subject: General Engineering and Applied Sciences		Weight	No. Of Items	Level of Difficulty					
COMPETENCY		20%	100	Introductory		Enabling	Demonstrative		
Course/Subject	TOPICS			K	C	A	A	S	E
				Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
1.0 Chemistry for Engineers		**2%**	**10**	**6**	**4**				
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	**Energy**	0.6	3	2	1				
	Chemistry of Engg Materials	0.6	3	2	1				
	Chemistry of the Nano materials	0.4	2	1	1				
	Chemistry of the Environment, and Special Topics specific to the field of expertise	0.4	2	1	1				
2.0 Physics for Engineers		**3%**	**15**	**10**	**5**				
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	**Work, Energy and Power, Impulse and Momentum, Kinematics, Dynamics, Rotation**	1	5	3	2				
	Dynamic of Rotation, Elasticity, Oscillations/Waves	0.8	4	2	2				
	Fluids, Heat Transfer	0.4	2	2					
	Electrostatics, Electricity, Magnetism, Optics	0.8	4	3	1				
PO-b. Design and conduct experiments, as well as to analyze and interpret data	N/A								
3.0 Engineering Economics		**1.2%**	**6**	**3**	**3**				
PO-l. apply knowledge of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments	**Engg Economics Introduction Terms**	0.2	1	1					
	Money-Time Relationship and Equivalence, and Basic Economy Study Methods	0.4	2	2					
	Decisions Under Certainty	0.2	1		1				

	Decisions Recognizing Risk, and Decision Admitting Uncertainty	0.4	2				2		
4.0 Engineering Management		**1.8%**	**9**						
PO-l. apply knowledge of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments	Evolution of Mgt Theory, and Management and Its Function	0.4	2	2					
	Planning, Leading, Organizing and Controlling	0.8	4	4					
	Managing Product and Service Operations	0.2	1	1					
	Managing the Marketing Function, and Managing the Finance Function	0.4	2				2		
5.0 Technopreneurship 101		**2%**	**10**				5	3	2
PO-l. apply knowledge of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments	Technopreneurship Introduction, Customers, and Value Proposition / Ethics, social responsibility, and Globalization	0.6	3				2		1
	Market Identification and Analysis, and Creating Competitive Advantage	0.4	2				1	1	
	Business Models, and Introduction to Intellectual Property	0.4	2				1	1	
	Execution and Business Plan, Financial Analysis, Accounting Basics, and Raising Capital	0.6	3				2	1	
6.0 Physics 2		**2%**	**10**				6	3	1
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	Thermodynamics, Condensed Matter, Atomic/Nuclear, and Condensed Matter	0.8	4				2	1	1
	Electricity, Magnetism, and EM Induction	0.6	3				3	0	0
	Inductance/AC	0.4	2				1	1	
	Optics	0.2	1					1	
7.0 Materials Science and Engineering		**1.6%**	**8**	6	2				
	Review Fundamentals, Modern material's atomic structure and interatomic bonding,	0.4	2		2				

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PO	Topic	Weight	No.	A	B	C	D	E	F
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	The structure of crystalline materials, and Crystalline and non-crystalline materials								
	Economic, environmental, and societal issues in Materials science and Engg, Imperfections in solid, Diffusion in solids, Mechanical properties of metals, and Application and Processing of metal alloys	0.4	2	2					
	Structure and properties of ceramics, Applications and processing of ceramics, Polymer textures and properties, Applications and processing of polymers, and Composites	0.4	2	2					
	Electrical properties, Dielectric behavior, Magnetic Optical, and Thermal properties	0.4	2	1	1				
8.0 Computer Programming		**2%**	**10**	**7**	**3**				
PO-k. Use techniques, skills, and modern engineering tools necessary for engineering practice	Introduction to Object Oriented Programming and UML, and Object-Oriented Analysis and Design	0.8	4	4					
	Programming Language Fundamentals, and Advanced Programming Language Fundamentals	0.6	3	1	2				
	Exception Handling	0.2	1	1					
	Graphical User Interface Programming	0.4	2	1	1				
9.0 Environment Science and Engineering		**2%**	**10**				6	2	2
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	Nature and Ecology, and Natural Systems and Resources	0.8	4				4		
	Environmental Concerns and Crisis	0.4	2				2		
	Environmental Impact Assessment	0.4	2					2	
	Sustainable Development	0.4	2						2

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10.0 ECE Laws, Contracts, Ethics, Standards & Safety		**2%**	**10**			**4**	**3**	**3**	
PO-f. Apply professional and ethical responsibility	**Fundamentals of the Laws, Obligations and Contracts**	0.4	2			1		1	
	Pledge of ECE & CSC Guidelines, The Board Examination, and Regulating the ECE Procession (PRC)	0.6	3			3			
	Practicing the ECE Profession	0.2	1				1		
	Other ECE Related Statutes, Safety Standards, and PEC Codes	0.4	4				2	2	
11.0 CAD		**0.4%**	**2**						
PO-k. Use techniques, skills, and modern engineering tools necessary for engineering practice.	**Introduction to CAD Software and its environment, Snapping and construction elements, Dimensioning, Plotting and inputting of images**	0.4	2	1	1				
TOTAL		**20%**	**100**	**40**	**20**	**21**	**11**	**8**	

Scope

1.0 Chemistry for Engineers
　　Energy
　　Chemistry of Engg Materials
　　Chemistry of the Nano materials
　　Chemistry of the Envi
　　Special Topics specific to the field of expertise

2.0 Physics for Engineers

Work, Energy and Power
Impulse and Momentum
Kinematics
Dynamics
Rotation
Dynamic of Rotation
Elasticity
Oscillations/Waves
Fluids
Heat Transfer
Waves
Electrostatics
Electricity
Magnetism
Optics

3.0 Engineering Economics

Engg Economics Introduction Terms
Money-Time Relationship and Equivalence
Basic Economy Study Methods
Decisions Under Certainty
Decisions Recognizing Risk
Decision Admitting Uncertainty

4.0 Engineering Management

    Evolution of Mgt Theory

    Management and Its Function

    Planning

    Leading

    Organizing

    Controlling

    Managing Product and Service Operations

    Managing the Marketing Function

    Managing the Finance Function

5.0 Technopreneurship 101

    Technopreneurship Introduction/ Ethics, social responsibility, and Globalization

    Customers

    Value Proposition

    Market Identification and Analysis

    Creating Competitive Advantage

    Business Models

    Introduction to Intellectual Property

    Execution and Business Plan

    Financial Analysis and Accounting Basics

    Raising Capital

    Ethics, social responsibility, and Globalization

6.0 Physics 2

    Thermodynamics

    Electricity

Magnetism

EM Induction -

Inductance/ Condensed Matter

AC

Optics

Atomic/nuclear

Condensed Matter

7.0 Materials Science and Engineering

Review Fundamentals

Modern material's atomic structure and interatomic bonding

The structure of crystalline materials

Crystalline and non-crystalline materials/ Economic, environmental, and

societal issues in Materials science and Engg

Imperfections in solid

Diffusion in solids

Mechanical properties of metals

Application and Processing of metal alloys

Structure and properties of ceramics

Applications and processing of ceramics

Polymer textures and properties

Applications and processing of polymers

Composites

Electrical properties

Dielectric behavior

Magnetic properties

Optical properties

Thermal properties

Economic, environmental, and societal issues in Materials science and Engg

8.0 Computer Programming
Introduction to Object Oriented Programming and
UML
Object Oriented Analysis and Design
Programming Language Fundamentals
Advanced Programming Language Fundamentals
Exception Handling
Graphical User Interface Programming

9.0 Environment Science and Engineering
Nature and Ecology
Natural Systems and Resources
Environmental Concerns and Crises
Environmental Impact Assessment
Sustainable Development

10. ECE Laws, Contracts, Ethics, Standards & Safety
Fundamentals of the Laws, Obligations and
Contracts
Pledge of ECE & CSC Guidelines
The Board Examination
Regulating the ECE Procession (PRC)
Practicing the ECE Profession
Other ECE Related Statutes

Safety Standards
PEC Codes

11. CAD

Introduction to CAD Software and its environment
Snapping and construction elements
Dimensioning, Plotting and inputting of images

Board Subject: ELECTRONICS ENGINEERING		Weight	No. Of Items	Level of Difficulty						
COMPETENCY		**30%**	**100**	Easy (Introductory)		Moderate (Enabling)	Difficult (Demonstrative)			
COURSE / SUBJECT	**TOPICS**			**K**	**C**	**A**	**A**	**S**	**E**	
				Knowledge	**Comprehension**	**Application**	**Analysis**	**Synthesis**	**Evaluation**	
1.0 DC Electrical Circuits		**3.6%**	**12**							
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	Resistive Network	0.6	2			1	1			
	Mesh and Node Equations	0.9	3			1	2			
	Network Theorems	0.9	3	1	1	1				
	Transient Analysis	0.3	1				1			
	Solution to DC Network Problems	0.9	3			1	2			
2.0 AC Electrical Circuits		**3.6%**	**12**							
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	Solution to AC Network Problems	0.9	3			1	1	1		
	Impedance and Admittance	0.6	2			1	1			
	Resonance	0.6	2			1	1			
	Power in AC Circuits	0.6	2			1	1			
	Two-Port Network Parameters and Transfer Function	0.9	3			1	1	1		
3.0 Electromagnetics	**(shared w/ MATH)**	**2.4%**	**8**							
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	c/o MATH									
PO-e. Identify, formulate, and solve complex engineering problems	Steady Electric and Magnetic Fields	0.6	2		2					
	Dielectric and Magnetic Materials	0.6	2		2					
	Coupled and Magnetic Circuits	0.6	2			2				
	Time-Varying Fields and Maxwell's Equation	0.6	2			2				
4.0 Electronic Devices and Circuits		**4.2%**	**14**							

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PO	Topic								
PO-a. Apply knowledge of mathematics and science to solve complex engineering problems	Diode Wave Shaping Circuits and Special Diode Applications	0.9	3			2	1		
	BJT and FET Small Signal Analysis	1.2	4				2	1	1
PO-e. Identify, formulate, and solve complex engineering problems	Diode Equivalent Circuits	0.3	1	1					
	Voltage Multipliers, Power Supply, and Voltage Regulation	0.6	2			2			
	Bipolar Junction Transistor and FET	1.2	4	2	2				
5.0 Electronic Circuit Analysis and Design		**4.2%**	**14**						
PO-e. Identify, formulate, and solve complex engineering problems	BJT and FET Frequency Response	1.2	4	1	1	1	1		
	Cascade and Cascode Connections	0.6	2			1	1		
	Current Mirrors and Current Source	0.3	1			1			
	Differential and Operational Amplifier	0.6	2			1	1		
	Feedback Systems, Oscillators, and Filters	1.5	5			1	2	1	1
6.0 Electronic Systems and Design	**(shared w/ EST)**	**2.4%**	**8**						
PO-e. Identify, formulate, and solve complex engineering problems	SCR's, UJT, PUT, TRIAC, DIAC, and other Thyristors	0.6	2			1	1		
	Optoelectronic Devices and Sensors	0.3	1			1			
	Transducers, Data Acquisition, and Interfacing Techniques	0.3	1			1			
	Programmable Logic Controllers	0.3	1	1					
PO-c. Design a system to meet desired needs within the realistic constraints	Design and Integration in Building Management Systems and HVAC Controls, Security, Safety, and Surveillance Control Systems, and Audio-Video and Lighting Controls	0.9	3			1	1	1	
7.0 Logic Circuits and Switching Theory		**3.6%**	**12**						
PO-e. Identify, formulate, and solve complex engineering problems	Boolean Algebra and Logic Gates	0.9	3			2	1		
	Minimization of Combinational Logic Circuits	1.2	4			2	1	1	

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	Sequential Logic Circuits	0.9	3			1	1	1	
	Algorithmic State Machine (ASM)	0.3	1			1			
	Asynchronous Sequential Logic	0.3	1		1				
8.0 Microprocessor & Microcontroller Systems and Design		**3.6%**	**12**						
	Microprocessor Unit	0.9	3			2	1		
	Memory Subsystem	0.6	2	1		1			
PO-e. Identify, formulate, and solve complex engineering problems	I/O Subsystem	0.6	2	1		1			
	Instruction Set Architecture and Assembly Programming	0.6	2	1		1			
	Microcontrollers	0.9	3	1		1		1	
9.0 Feedback and Control Systems	**(shared w/ MATH)**	**2.4%**	**8**						
	Block Diagram Representation and Signal Flow Graphs	0.3	1			1			
	LTI Systems and Transient Analysis	0.3	1			1			
PO-e. Identify, formulate, and solve complex engineering problems	System Modeling and Transfer Function	0.6	2			1	1		
	Poles and Zeros, Root Locus, and Stability Analysis	0.6	2			1	1		
	Steady State Analysis and Frequency Response	0.6	2			1	1		
TOTAL		**30%**	**100**	**10**	**20**	**40**	**22**	**8**	**0**
					30	40		30	

Scope:
1.0 DC Electrical Circuits
Resistive Network
Mesh and Node Equations
Network Theorems

Transient Analysis
Solution to DC Network Problems
2.0 AC Electrical Circuits
Solution to AC Network Problems
Impedance and Admittance
Resonance
Power in AC Circuits
Two-Port Network Parameters and Transfer Function
3.0 Electromagnetics
Steady Electric and Magnetic Fields
Dielectric and Magnetic Materials
Coupled and Magnetic Circuits
Time-Varying Fields and Maxwell's Equation
4.0 Electronic Devices and Circuits
Diode Wave Shaping Circuits and Special Diode Applications
BJT and FET Small Signal Analysis
Diode Equivalent Circuits
Voltage Multipliers, Power Supply, and Voltage Regulation
Bipolar Junction Transistor and FET
5.0 Electronic Circuit Analysis and Design
BJT and FET Frequency Response
Cascade and Cascode Connections
Current Mirrors and Current Source
Differential and Operational Amplifier
Feedback Systems, Oscillators, and Filters

6.0 Electronic Systems and Design
SCR's, UJT, PUT, TRIAC, DIAC, and other Thyristors
Optoelectronic Devices and Sensors
Transducers, Data Acquisition, and Interfacing Techniques
Programmable Logic Controllers
Design and Integration in Building Management Systems and HVAC Controls, Security, Safety, and Surveillance Control Systems, and Audio-Video and Lighting Controls
7.0 Logic Circuits and Switching Theory
Boolean Algebra and Logic Gates
Minimization of Combinational Logic Circuits
Sequential Logic Circuits
Algorithmic State Machine (ASM)
Asynchronous Sequential Logic
8.0 Microprocessor and Microcontroller Systems and Design
Microprocessor Unit
Memory Subsystem
I/O Subsystem
Instruction Set Architecture and Assembly Programming
Microcontrollers
9.0 Feedback and Control Systems
Block Diagram Representation and Signal Flow Graphs
LTI Systems and Transient Analysis
System Modeling and Transfer Function
Poles and Zeros, Root Locus, and Stability Analysis
Steady State Analysis and Frequency Response

TABLE OF SPECIFICATIONS

Board Subject: ELECTRONICS SYSTEMS AND TECHNOLOGIES		Weight	No. Of Items	Level of Difficulty						
COMPETENCY		30%	100	Easy (Introductory)		Moderate (Enabling)	Difficult (Demonstrative)			
Course / Subject	TOPICS			K	C	A	A	S	E	
				Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation	
1.0 Signals, Spectra, Signal Processing		**1%**	**10**							
[PO-A] Apply knowledge of mathematics and science to solve complex engineering problems.	1. Classification and Characteristics of signals	0.6	2	1	1					
	2. Sampling theorem and Aliasing	0.6	2			1	1			
	3. Difference equations for FIR and IIR filters	0.9	3		1	2				
	4. Convolution and correlation, Z transforms, Pole-zero-gain filters, Fourier transforms, Filtering, FiR/IIR	0.9	3		1	1	1			
2.0 Principles of Communications		**7.5%**	**25**							
[PO-A] Apply knowledge of mathematics and science to solve complex engineering problems.	1. Introduction to Communications Systems	1.2	4	1	1	2				
	2. Noise	1.5	5			3	2			
	3. Amplitude Modulation, Single-Sideband Techniques, Frequency Modulation	1.8	6			4	2			
	4. Radio Receivers	0.9	3		1	1	1			
	5. Pulse Modulation, Digital Modulation, Broadband Communication System	2.1	7	1	2	2	2			
3.0 Digital Communications		**4.5%**	**15**							
[PO-A] Apply knowledge of mathematics and science to solve complex engineering problems.	1. Introduction to Digital Communications Systems	0.6	2	1	1					
	2. Digital Transmission, PAM, PWM, PPM, Pulse Code Modulation	0.9	3			2	1			

	3. Digital Communications, ASK, FSK, PSK, QAM	1.2	4		1	2	1
	4. Basics of Information Theory, Error Detection	0.6	2			1	1
	5. FDM, TDM, WDM, FDMA, CDMA, TDMA	1.2	4		1	2	1
4.0 Transmission and Antenna Systems		**6.9%**	**23**				
[PO-A] Apply knowledge of mathematics and science to solve complex engineering problems.	1. Transmission Lines Circuits, losses and parameters, Matching TL, Smith Chart	1.5	5	1	1	2	1
	2. Radio Wave Propagation, Power Density and Field Strength Calculations,	2.4	8		1	5	2
	3. Antenna Systems	1.8	6		2	2	2
	4. Wave guides, Fiber Optics	1.2	4			2	2
5.0 Electronics 3: Electronic Systems and Design		**2.1%**	**7**				
[PO-A] Apply knowledge of mathematics and science to solve complex engineering problems.	1. Optoelectronic Devices and Sensors, Transducers	0.6	2		1		1
	2. Interfacing techniques, Programmable Logic Controllers	0.6	2		1		1
	3. Building Management Systems including HVAC Controls, Security and Surveillance Control System, Audio-Video and Lighting Controls, Supervisory Controls and Data Acquisition, Fire and Life Safety Controls	0.9	3		1	1	1
6.0 Data Communications		**6%**	**20**				
[PO-A] Apply knowledge of mathematics and science to solve complex engineering problems.	1. Introduction to Data Communications, Category of Data Communication, Configurations and Network Topology	1.5	5	1	1	2	1
	2. Transmission Modes, Two-wire vs. Four-Wire Circuits,	1.2	4		2		2

3. Types of Synchronization, Network Components (Terminal, multiplexer, concentrators), Network Components (LCU, FEP, Serial Interface), Security, Cryptography	0.9	3	1	1	1		
4. Open System Interconnection, System Network Architecture, TCP/IP Architecture, Character-Oriented Protocols, Bit-Oriented Protocols	1.5	5	1	1	1	2	
5. LAN/MAN/WAN/GAN, ISDN/B-ISDN	0.9	3			1	2	
TOTAL	**30%**	**100**	**30**		**40**		**30**

Scope:
1.0 Signals, Spectra, Signal Processing
Classification and Characteristics of signals
Sampling theorem and Aliasing
Difference equations for FIR and IIR filters
Convolution and correlation
Z transforms
Pole-zero-gain filters
Fourier transforms
Filtering
FiR/IIR
2.0 Principles of Communications
Introduction to Communications Systems
Noise, Amplitude Modulation
Single-Sideband Techniques

Frequency Modulation
Radio Receivers
Radiation and Propagation of Waves
Pulse Modulation
Digital Modulation
Broadband Communication System
3.0 Digital Communications
Introduction to Digital Communications Systems
Digital Transmission
PAM, PWM, PPM, Pulse Code Modulation
Digital Communications
ASK, FSK, PSK, QAM
Basics of Information Theory
Error Detection
FDM, TDM, WDM, FDMA, CDMA, TDMA
4.0 Transmission and Antenna Systems
Transmission Lines Circuits
Losses and parameters
Matching TL
Smith Chart
Radio Wave Propagation
Power Density and Field Strength Calculations
Antenna Systems

Wave guides
Fiber Optics
5.0 Electronics 3: Electronic Systems and Design
SCRs, UJT, PUT, TRIAC, DIAC, and other Thyristors
Optoelectronic Devices and Sensors
Transducers
Interfacing techniques
Programmable Logic Controllers
Building Management Systems including HVAC Controls, Security and Surveillance Control System, Audio-Video and Lighting Controls, Supervisory Controls and Data Acquisition, Fire and Life Safety Controls
6.0 Data Communications
Introduction to Data Communications
Category of Data Communication
Configurations and Network Topology
Transmission Modes
Two-wire vs. Four-Wire Circuits
Types of Synchronization
Network Components (Terminal, multiplexer, concentrators)
Network Components (LCU, FEP, Serial Interface)
Security, Cryptography
Open System Interconnection
System Network Architecture
TCP/IP Architecture
Character-Oriented Protocols
Bit-Oriented Protocols

LAN/MAN/WAN/GAN, ISDN/B-ISDN
7.0 CAD (Transferred to GEAS)
Introduction to CAD Software and its environment
Snapping and construction elements
Dimensioning, Plotting and inputting of images