Syllabus for 4 Year B. Tech Course in Electronics and Communication Engineering

FIFTH SEMESTER

Sl. No.	Code	Subject	Contacts			Credits
			L	T	P	
A Theory						
1	TIU-UEN-T30#	Career Advancement & Skill Development-V-Aptitude and Soft Skills	2	0	0	2
2	TIU-UEE-T311	Control System	3	0	0	3
3	TIU-UCS-T311	Computer Architecture and Organization	3	0	0	3
4	TIU-UEC-T303	EM Theory and Antenna	3	0	0	3
5	TIU-UEC-T305	Analog Communication	3	0	0	3
B. Practicals						
1	TIU-UEE-L31#	Control System Lab	0	0	3	1.5
2	TIU-UEC-L30#	Antenna Lab	0	0	3	1.5
3	TIU-UEC-L30#	Analog Communication Lab	0	0	3	1.5
C. Sessionals						
1	TIU-UES-S399	Entrepreneurship Skill Development	0	0	2	2

Total	20.5

TIU-UEN-T30#: Career Advancement & Skill Development-V-Aptitde and Soft Skills
L-T-P: 2-0-0
Credits: 2
Detailed Syllabus:
Module-1: Production Planning and Exaction
Understand a manufacturing process cycle. P Porganization structure. Master Data, Bill of Material, Material Requirement Planning, Multi-Level Scheduling, Production Order, Material Withdraw, Conformation, Goods Receipt, Order Settlement

Module-2: Financial Accounting and Controlling
Overview of SAP FICO, FICO organization structure, GL Configuration & Operation, Create Vendor, Master Data Cost center accounting

Module-3: Human Capital Management
Overview of HR Module and Organization structure, Organizational Management, Personnel Administration, Recruitment Performance, Management, Personnel Controlling

Module-4: SAP Analytics Cloud
Introduction to SAP Analytics Cloud, Overview of connections and its type, Live data with CORS and Import data connection, Creating Data modeling and Modeler navigation, Creating storying and data exploration, AP Analytics Cloud Analytics Designer and Microsoft Office Integration

TIU-UEE-T311: Control System
L-T-P: 3-0-0
Credits: 3
Course Outcomes:
At the end of this course students will demonstrate the ability to

1. Characterize a system and find its study state behavior.
2. Investigate stability of a system using different tests.
3. Design various controllers.
4. Solve linear, nonlinear and optimal control problems.

Detailed Syllabus:
Module-1: Basic concepts:
Notion of feedback, open- and closed-loop systems.

Module-2: Modeling and representations of control systems:
Ordinary differential equations, Transfer functions, Block diagrams, Signal flow graphs, State-space representations,

Module-3: Performance and stability:
Time-domain analysis, Second-order systems, Characteristic-equation and roots, Routh-Hurwitz criteria,

Module-4: Frequency-domain techniques:
Root-locus methods, Frequency responses, Bode-plots, Gain-margin and phase-margin, Nyquist plots,

Module-5: Compensator design:
Proportional, PI and PID controllers, Lead-lag compensators. State-space concepts: Controlability, Observability, pole placement result, Minimal representations.

Recommended Textbooks:

1. M. Gopal, "Control Systems: Principles and Design", Tata McGraw-Hill, 1997.
2. B. C. Kuo, "Automatic Control System", Prentice Hall, sixth edition, 1993.
3. K. Ogata, " Modern Control Engineering", Prentice Hall, second edition, 1991.
4. I. J. Nagrath and M. Gopal, "Modern Control Engineering", New Age International.
5. N. S. Nise, "Control Systems Engineering", John Wiley
6. G. Franklin, J. D. Powell & A. Emami-Naeni, "Feedback Control of Dynamic Systems", Addson-Wesley
7. C. L. Phillips and R. D. Harbour, "Feedback Control Systems", Prentice Hall
8. P. Ramesh Babu, "Control Systems Engineering", Scitech
9. A. K. Jairath, "Problems and Solutions of Control Systems", CBS

TIU-UCS-T311: Computer Architecture and Organization
L-T-P: 3-0-0
Credits: 3
Course Outcomes:
At the end of this course students will demonstrate the ability to

1. Learn how computers work.
2. Know basic principles of computer's working.
3. Analyze the performance of computers.
4. Know how computers are designed and built.
5. Understand issues affecting modern processors (caches, pipelines etc.).

Detailed Syllabus:
Module-1: Basic functional blocks of a computer:
CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU registers, instruction execution cycle, RTL interpretation of instructions, addressing modes instruction set. Case study - instruction sets of some common CPUs.

Module-2: Data representation:
Signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder,

carry look-ahead adder, etc. multiplication - shift-and-add, Booth multiplier, carry save multiplier, etc. Division - restoring and non-restoring techniques, floating point arithmetic.

Module-3: CPU control unit design:
Hardwired and micro-programmed design approaches, Case study - design of a simple hypothetical CPU.

Module-4: Memory system design:
Semiconductor memory technologies, memory organization.

Module-5 Peripheral devices and their characteristics:
Input-output subsystems, I/O transfers-program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions.

Module-6: Performance enhancement techniques; Pipelining:
Basic concepts of pipelining, throughput and speedup, pipeline hazards. Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Recommended Textbooks:

1. J. P. Hayes, “Computer Architecture and Organization”, McGraw Hill Professional
2. M. Morris Mano, “Computer System Architecture”, Pearson
3. C. Hamacher, Z. Vranesic & S. Zaky, “Computer Organization”, Tata McGraw Hill
4. W. Stallings, “Computer Organization and Architecture”, Pearson
5. A. S. Tanenbaum, “Computer System Architecture”, PHI Learning
6. Y. Chu, "Computer Organization and Microprogramming”, II, Englewood Cliffs, N.J. Prentice Hall Edition
7. C. W. Gear, “Computer Organization and Programming”, McGraw Hill, N.V. Edition
8. B. Ram, “Computer Fundamentals Architecture and Organization”, New Age
9. V. Rajaraman, “Computer Organization & Architecture”, Prentice Hall of India

TIU-UEC-T304: EM Theory and Antenna
L-T-P: 3-0-0
Credits: 3
Course Outcomes:
At the end of this course students will demonstrate the ability to

1. Understand characteristics and wave propagation on high frequency transmission lines.
2. Carry out impedance transformation on TL.
3. Use sections of transmission line sections for realizing circuit elements.
4. Characterize uniform plane wave.
5. Calculate reflection and transmission of waves at media interface.
6. Analyze wave propagation on metallic waveguides in modal form.

7. Understand principle of radiation and radiation characteristics of an antenna.

Detailed Syllabus:

Module 1:

Recapitulation of Scalar & Vectors, Gradient, Divergence & Curl and their physical interpretation, Divergence Theorem & Stokes Theorem, Scalar and Vector Potential. (L-6)

Module 2:

Coulomb's law, Electric flux & Gauss Law, Method of images; Biot and Savart Law, Ampere's Law. (L-6)

Module 3:

Maxwell's equations: Integral & Differential form, its significance, displacement current, equation of continuity, boundary conditions. (L-6)

Module 4:

Propagation of uniform plane waves in unbounded medium: reflection, refraction, phase and group velocities. (L-6)

Module 5:

Transmission lines and waveguides: modes, design, travelling waves, standing waves, pulse propagation, characteristic impedance, cut-off frequency, attenuation, dispersion, power-handling capability. (L-8)

Module 6:

Radiation concept, Antennas: elementary dipole, half-wave dipole, radiation patterns, directivity, gain, Image Theory, Friis Transmission Formula, pattern multiplication, other basic antennas, Microstrip Patch Antennas. (L-8)

Module 7:

Numerical Technique in Electromagnetics: Method of Moment. (L-4)

Recommended Textbooks:

1. M. N. O. Sadiku, "Principles of Electromagnetics", Oxford University Press.
2. W. H. Hayt & J. A. Buck, "Engineering Electromagnetics", McGraw Hill.
3. E. C. Jordan & K. G. Balmain, "Electromagnetic Waves & Radiating Systems", Prentice Hall.
4. J. D. Kraus, "Antennas", McGraw Hill.
5. J. D. Kraus & D. Fleisch, "Electromagnetics with Applications", McGraw Hill.
6. R. F. Harrington, "Introduction to Electromagnetic Engineering", Dover Publications.
7. J. D. Ryder, "Networks, Lines and Fields", Pearson.
8. G. S. N. Raju, "Electromagnetic Field Theory and Transmission Lines", Pearson.
9. G. S. N. Raju, "Antenna and Wave Propagation", Pearson.
10. J. A. Edminister and M. Nahmi, "Schaum's Outlines in Fundamentals of Electromagnetics", McGraw Hill.

11.David K. Cheng, “Field and Wave Electromagnetics”.
12.I. J. Bahl and P. Bhartia, “Micro Strip Antennas”, Artech House.
13.R. L. Yadava, “Electromagnetic Fields & Waves”, Khanna Publishing House.
14.R. K. Shevgaonkar, “Electromagnetic Waves”, Tata McGraw Hill.
15.Narayana Rao, “Engineering Electromagnetics”, Prentice Hall of India.
16.K. D. Prasad, “Antennas and Wave Propagation”, Satya Prakashan.

TIU-UEC-T306: Analog Communication
L-T-P: 3-0-0
Credits: 3
Course Outcomes:
At the end of this course students will demonstrate the ability to

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth.
2. Analyze the behavior of a communication system in presence of noise.
3. Investigate pulsed modulation system and analyze their system performance.

Detailed Syllabus:
Module-1
Modulation, Types, Analysis of Modulation, Sideband and energy consideration, low pass and band pass signals,

Module-2
Demodulation, Types of detection, Analysis of amplitude and frequency modulation; Modulators

Module-3
Nonlinear modulation techniques, FM and PM, narrowband FM, wideband FM, Generation of FM wave, Classification of FM detectors, Radio transmitters and receivers;

Module-4
Sampling a signal by periodic pulse stream: spectra of ideally sampled signal, Nyquist sampling theorem, Discriminator, Slope detector, Staggered tuned discriminator, Foster-Seely discriminator, Analysis of Centre tuned discriminator, Noise Sources in transmitting and receiving systems, Thermal noise, Shot noise, Noise Figure

Module-5
Time-division multiplexing, Wireless power transfer, Near-field techniques, Far-field techniques, Plasma channel coupling, wireless energy transmission technologies.

Recommended Textbooks:
1. H. Taub, D. L. Schilling and G. Saha, “Principles of Communication Systems”, McGraw Hill.

2. W. Tomasi, “Electronic Communication Systems: Fundamentals through Advanced”, Pearson.
3. S. Haykin and M. Moher, “Introduction to Analog and Digital Communications”, Wiley.
4. S. Haykin and M. Moher, “Communication Systems”, Wiley.
5. B. P. Lathi and Z. Ding, “Modern Digital and Analog Communication Systems”, Oxford.
6. G. Kennedy, B. Davies and S. R. M. Prasanna, “Electronic Communication Systems”, McGraw Hill.
7. V. Chandra Sekar, “Analog Communications”, Oxford.
8. R. Singh and S. Sapre, “Communication Systems: Analog and Digital”, Tata McGraw Hill.
9. D. Mitra, “Analog and Digital Communications”, Tata McGraw Hill

TIU-UEE-L30#: Control System Lab
L-T-P: 0-0-3
Credits: 1.5

List of Experiments:

1. Familiarization with the basics of Matlab / Scilab.
2. Simulation of the transient response of linear time invariant systems in Matlab / Scilab.
3. Analysis of SISO LTI systems in state-space using Matlab / Scilab.
4. Control System Analysis in the Frequency Domain using Matlab / Scilab.
5. Root Locus analysis using Matlab / Scilab.

TIU-UEC-L30#: Antenna Lab
L-T-P: 0-0-3
Credits: 1.5

List of Experiments:

1. Study of Half-Wave Folded Dipole Antenna.
2. Study of Yagi Uda Antenna.
3. Study of Circular Loop Antenna.
4. Study of log periodic Antenna.
5. Study of Slot Antenna.
6. Study of Microstrip Patch Antenna.

TIU-UEC-L30#: Analog Communication Lab
L-T-P: 0-0-3
Credits: 1.5

List of Experiments:

1. SSB SC Modulation.
2. SSB SC Demodulation.

3. PHASE MODULATION.
4. Emphasis & de-emphsis circuit.
5. To study of PLL detector, capture and lock range.
6. Amplitude Modulation Using DSB TC Modulator.
7. Amplitude Modulation Using DSB SC Modulator.
8. Frequency Modulation and Demodulation using reactance modulator and detuned resonant detector.