Diploma in Electronics and Instrumentation

SUBJECT CODE	Category	SUBJECT N AME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment *	END SEM University Exam	Teachers Assessment *				
DTEI501		Data Communication & Networks	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. Evolution of computer networks and the concepts data communication.
2. To give student understanding of principles of network design and compare the different network topologies.
3. Describe the mechanism and techniques of encoding.
4. To provide Knowledge general principles of circuit and packet switching.
5. Understanding of wireless Local Area Networks.
6. Provide students with in-depth knowledge of data link layer fundamental such as error detection, correction and flow control techniques; multiple access control techniques.

Course Outcomes (COs):

The students will be able to
1. Understand the basic principles of network design;
2. Describe the concept data communication within the network environment;
3. Explain the conflicting issues and resolution techniques in data transmission;

Syllabus

UNIT-1 8hr

Basic data communication concepts:-Introduction to Data communication, channel capacity, parallel and serial transmission, Asynchronous and Synchronous transmission, Simplex, Half Duplex and Full Duplex modes of transmission and their applications. Multiplexing strategies like TDM, FDM, WDM and SDM.

UNIT-2 7hr

Communication Networks and its technology:- OSI reference Model, Introduction to TCP/IP protocol suite and comparison of the OSI TCP/IP layered Models.Classification of networks under the heading LAN, WAN and MAN and their characteristics & Performance analysis.

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UNIT-3 6hr

Error detection techniques such as Parity check, Vertical and longitudinal redundancy check, CRC code and their error detecting capabilities. Data link layer issues Point to point and multipoint links, flow control, sliding window protocol, various ARQ techniques for error and flow control and their comparison.

UNIT-4 7hr

Concept of Circuit switching, message switching and packet switching, their comparison and application. Computer Networks and concept of layering. Medium Access control: Aloha, carrier sense medium access (CSMA), CSMA-CD, token passing, CDMA

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UNIT-5 7hr

Digital interface standards ; RS-232C standard and X.21 standard, connecting a DTE in RS-232 C. RS-449, RS-422A and RS-423A standards High speed desktop serial interfaces.
Need for Modems for data communication and their types

List of Experiments:

1. To study and Analysis of serial port.
2. To Perform serial communication in syncronous mode.
3. To Perform serial communication in ayncronous mode.
4. Analysis of flow controls in serial communications.
5. To study and analysis of fiber optic communication.
6. To study & analysis of Protocols in data communication.
7. To established communication using Modem.
8. To Perform and analysis of wireless communication.
9. To study of parallel port.
10. To study and analysis of parallel communication

Text Book

[1] Behrouz. Forouzan, "Data Communication and Networking" 5th Ed Tata McGraw Hills,2013
[2] Andrew S. Tanenbaum, "Computer Networks", 4th Edition Pearson Education, 2003.

Reference Book

[1] Douglas E. Comer, David L. Stevens, "Internetworking with TCP/IP Vol. II design, Implementation of Intranets:, PHI, 3nd Edition 2000
[2] William. Stalling, "Network Security and Cryptography", 4th Edition Pearson Education, 2006.

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SUBJECT CODE	CAE GOR Y	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
DTEI502		Control System Engineering	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To gain knowledge of open loop and close loop systems
2. To understand the time and frequency-domain responses of first and second-order systems to step and sinusoidal inputs.
3. To learn various type of stability criteria of first and second order systems.

Course Outcomes (COs):

The students will be able to

1. Demonstrate an understanding of the fundamentals of control systems.
2. Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
3. Express and solve system equations in state-variable.
4. Determine the stability of a closed-loop control system

Syllabus

UNIT – 1 **8hr.**

Introduction of control system, Multidisciplinary nature, Open loop and Closed loop systems, Differential equation, classification Control system components , Error detectors ,servomotor, tachogenerator, Laplace transform and transfer function of linear system block diagram, Advantages of closed loop systems.

UNIT - 2 **8hr.**

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Transfer function and its interpretation in terms of impulse and frequency responses, Block-diagram and signal flow graph manipulations Steady state errors and system types, block diagram reduction, signal flow graph.

UNIT - 3 **8hr.**

Time Domain Analysis: Standard test signals, Time response of first order systems, Characteristic Equation of Feedback control systems, Transient response of second order systems, Steady state response, Steady state errors and error constants . Routh - Hurtwitz Criterion.

Unit 4 **8hr.**

Frequency domain Analysis: Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots.

UNIT – 5 **7hr.**

State variable methods:- introduction to state variable concepts - state variable description of linear dynamic systems - representation in matrix forms ,Transfer matrix from state equations.

Text Books:

1. J.Nagrath and M.Gopal," Control System Engineering", New Age International Publishers, 5th Edition, 2007.
2. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 2nd Edition, 2002.

References:

1. Benjamin.C.Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition, 1995.

2. M.Gopal, Digital Control and State Variable Methods, 2nd Edition, TMH, 2007. Schaum's Outline Series,'Feedback and Control Systems' Tata McGraw- Hill, 2007.
3. John J.D'azzo & Constantine H.Houpis, 'Linear control system analysis and design', Tata McGrow -Hill, Inc., 1995.
4. Richard C. Dorf & Robert H. Bishop, " Modern Control Systems", Addidon – Wesley, 1999.

List of Experiments:-

1. To obtain a transfer function from given poles and zeroes using Matlab
2. To obtain zeros and poles from a given transfer function using Matlab

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3. To obtain the step response of a transfer function of the given system using Matlab
4. To plot the root locus for a given transfer function of the system using Matlab
5. To obtain bode plot for a givan transfer function of the system using Matlab
6. Analysis of performance characteristics of an angular position error detector using two potentiometers.
7. Analysis of performance characteristics of a d.c. motor angular position control system
8. To demonstrate the dynamic characteristics of a system with an intentional nonlinearity viz. a simulated relay.
9. Determine and Plot the Speed-Torque Characteristics of AC Motor using open loop /Closed loop (P)system.
10. Determine the Speed-Torque Characteristics of AC Motor using close loop (PI) controller.

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			THEORY			PRACTICAL					
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHERS ASSESSMENT	END SEM UNIVERSITY EXAM	TEACHERS ASSESSMENT	Th	T	P	CREDITS
DTEI503		Microprocessor & Microcontroller	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To gain knowledge of basics of Microprocessor & microcontroller & Learn development of assembly language programs.
2. To learn the programming skills of 8086 microprocessor & 8051 microcontroller.
3. To learn the interfacing of external devices(LED, LCD, ADC, DAC) with the microcontroller 8051.

Course Outcomes (COs):

The students will be able to

1. Apply the concept of buses, microprocessor & microcontroller architecture and interrupts.
2. Interface memory and I/O devices with 8051 microcontroller
3. Program assembly language / C programming of 8051 & 8086.
4. Design microcontroller based small system
5. Interface 8051 with LED, LCD, ADC, DAC etc.

Syllabus

UNIT – 1

Introduction to 8086 Microprocessor **7hr**

Introduction to 8086 microprocessor, Architecture of 8086, Signals and pins of 8086 microprocessor, Memory Segmentation in 8086. Maximum Mode, Minimum Mode, Timing diagram, Comparative study of Salient features of 8086, 80286 & 80386.

UNIT - 2 **6hr**

Microprocessor 8086 programming

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8086 Instructions set . Addressing mode of 8086, Assembly directives. Stack, Interrupts of 8086, Assembly language programs of 8086.

UNIT - 3 **7hr**

Introduction to 8051 Microcontroller

Introduction, Difference between Microprocessors and Microcontrollers. Overview of 8051 Microcontroller family, Architecture of 8051 Microcontroller, registers, 8051 register banks

UNIT - 4 **8hr**

8051 Assembly Language Programming

Introduction to 8051 assembly programming, Structure of Assembly language, Assembling and running an 8051 program, 8051 data types and directives, interrupts,8051 Addressing Modes & Instruction set

UNIT – 5 **8hr**

8051 Programming in C

Data types and time delay in 8051 C, I/O programming in 8051 C, Logic operations in8051 C, Data conversion programs in 8051 C, Accessing code ROM space in 8051 C, Interfacing with LEDs, LCDs ADCs, DACs.

List of Experiment:

1. Introduction of register of 8086 and their utility.
2. Design program for the Arithmetic/logical operations
3. Write program to assign an array in memory of 8086.
4. Implement program to copy memory block from one location to another.
5. Implement program to find the smallest number in an array.
6. Design program to arrange the random array in ascending order/.
7. Design program to check the given number is even or odd.
8. Introduction to IDE and Assembler directives.
9. 8051 Assembly language programming for addition, subtraction, multiplication and division of two 8-bit numbers.
10. 8051 Assembly language programming for block data transfer between internal and external memory including overlapping blocks.
11. 8051 Assembly language programming using Arithmetic/logical instructions
12. 8051 Assembly language programming for code conversions/ Timers in different modes
13. I/O port programming in embedded C.
14. Programming of LCD in embedded C.

Text Books:

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1. A.K. Ray & K.M.Bhurchandi, Advanced Microprocessors and peripheral-Architecture, Programming and Interfacing, Tata McGraw –Hill, 2012(Third Edition)
2. The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2/e by Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay,2008(Second Edition, Pearson Education)
3.The 8051 Microcontroller & Embedded Systems using Assembly and C By Kenneth J. Ayala, Dhananjay V. Gadre (Cengage Learning , India Edition).

Reference Books:

1. Hall Douglas V.,Microprocessor and interfacing, Revised second edition 2006, Macmillan, McGraw Hill
2. Using the MCS-51 Microcontrollers By Han Way Huang Oxford Uni Press, 2000
3. Programming and Customizing the 8051 Microcontroller by Myke Predko Tata McGraw Hill,1999
4. Microcontrollers Architecture, programming, interfacing and system design by Raj kamal Pearson education, 2009

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
DTEI504		Analytical Instrumentation	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):
The course is designed to aid students understand the fundamentals of Analytical Instrumentation and applying the principles of Analytical Instrumentation to carry out the analysis of different samples present in species.

Course Outcomes (COs):

After completing the course the students should be able to:
1. Understand the building blocks of analytical Instrumentation
2. Use of various spectroscopy techniques and principle of measurement of constituent species in a sample to carry out qualitative and quantitative analysis.
3. Determine various parameters used in analytical Instrumentation.
4. Describe air pollution and water pollution monitoring methods.

Syllabus

Unit – I **7hr**

Block diagram of Analytical Instrumentation, Electromagnetic Spectrum in Analytical Instrumentation, Chemical analysis, Introduction to Spectroscopy, fundamental laws of photometry.

Separation techniques: Chromatography, principle, Classification, Various types of Chromatographic techniques, Gas Chromatography.

Unit-II **6hr**

Spectrophotometer, types, working principle, UV-VIS Spectrophotometer, Colorimeters, IR spectrophotometer, Interferogram.

Unit-III **6hr**

Mass spectrometer system, working principle, types, Introduction to x-ray spectrometry, Instrumentation for X-ray spectrometry.

Unit-IV **7hr**

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pH measurement, pH meter, measurement science of viscosity, DO meter, turbidity, conductivity measurements.

Unit-V **6hr**

Introduction to Flame photometry, Working principle, constructional details. Air pollution and water pollution monitoring instruments.

Textbook:

1. Gurdeep R. Chatwal, Sham K. Anand, Instrumental methods of Chemical Analysis, Himalaya Publishing House
2. Galen W. Ewing, Instrumental Methods of Chemical Analysis, McGraw-Hill Book Company, Fifth edition.
3. Gillian McMahon, Analytical Instrumentation: A Guide to Laboratory, Portable and Miniaturized Instruments, John Wiley and Sons, 2007
4. Douglas A. Skoog, F. James Holler, Stanley R. Crouch, Principles of Instrumental Analysis, Cengage Learning.

References:

1. Willard, Merritt, Dean, Settle, Instrumental Methods of Analysis, CBS Publishers & Distributors, New Delhi, Seventh edition.
2. R. S. Khandpur, Handbook of Analytical Instruments, Tata McGraw–Hill Publications, 3rd edition

List of Practicals:

1. To determine percentage transmittance and percentage absorbance of a given sample using colorimeter.
2. To determine % transmittance and absorbance using UV-VIS Spectrophotometer.
3. Study of Mass Spectrometer.
4. Study of X-ray Spectrometer.
5. Study of the basic principle of Gas Chromatography and its various parts.
6. To find the turbidity of a given solution using turbidity meter.
7. To determine the pH and ionic concentration of a given sample using pH meter.
8. To determine conductivity of an unknown liquid using conductivity meter.
9. To find the amount of dissolved oxygen in a given solution using DO meter.
10. Study of Flame Photometry.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
DTEI505		Generation, Transmission and Distribution of Power	60	20	20	30	20	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course objectives:

1. To study electric power generation from conventional and non conventional energy source.
2. To develop expressions for the computation of transmission line parameters.
3. To analyze the performance of short, medium and long transmission lines and discusses the HVAC & HVDC transmission.
4. To discuss insulator strings and cables and methods to improve the same.
5. To understand the operation of the different distribution schemes.

Course Outcomes:

Students will be able to-

1. Understand the importance of non-conventional source of energy and different power plants like solar, wind, tidal, hydro, nuclear, thermal etc.
2. Compare A.C transmission and D.C transmission and derive the expression of transmission line parameters.
3. Determine the equivalent circuits for the transmission lines based on distance and operating voltage for determining voltage regulation and efficiency.
4. Discuss various insulator materials & their testing and underground cable.
5. Describe the A.C and D.C distribution System and its classification.

Unit-I **5hr**

Electric Power Generation

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Introduction-Structure of electric power system, Conventional methods of power generations, schematic arrangement and choice of site for Hydro, thermal, Nuclear power plants, General layout & operation, Advantages and Disadvantages, comparison of these power plants.

Non-conventional Energy Source: solar energy its radiation, collection, storage and application. Wind energy, Biomass energy, geothermal energy and ocean energy as alternative energy sources.

Unit-II **6hr**

Electric Power Transmission

A.C.Transmission: Introduction-Typical Layout of A.C. Power supply scheme various of power Transmission-Advantages and Disadvantages of A.C Transmission

Transmission Line Parameters: Parameters of single and three phase transmission lines with single and double circuits – Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition – application of self and mutual GMD; skin and proximity effect.

H.V.D.C Transmission: Advantages and Disadvantages of D.C Transmission-Layout Scheme and principle of High Voltage D.C Transmission,. Comparison with AC transmission.

Unit-III **7hr**

Performance of Transmission Lines: Classification of lines – short line, medium line and long line – equivalent circuits, phasor diagram, real and reactive power flow in lines, transmission efficiency and voltage regulation, simple problems, Ferranti effect., Corona- formation and corona loss-Factors affecting Corona

Unit-IV **5hr**

Line Insulators and Cables: Introduction-Line Insulator materials-Properties of Insulators-Types, causes of failure of Insulators, voltage distribution in insulator string, improvement of string efficiency, testing of insulators. Underground cables – Types of cables, Capacitance of Single-core cable, Grading of cables, Power factor and heating of cables, Capacitance of 3- core belted cable, D.C cables.

Unit-V **6hr**

Electric Distribution System: Introduction to distribution systems, Different types of supply system and their comparison, DC/AC Distribution system, their types.

Text Books:

1. C.L.Wadhwa, 'Electrical Power Systems', New Age International Publishers.
2. V.K. Mehta, Principles of Power System, S. Chand & Co., New Delhi.
3. D.P.Kothari , I.J. Nagarath, 'Power System Engineering', Tata McGraw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.
4. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

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Reference Books:

1. Soni, Gupta, Bhatnagar, Electrical Power (Generation, Transmission, Distribution, Protection and Utilization), dhanpath Rai and Sons, Delhi.
2. B.R.Gupta, , S.Chand, 'Power System Analysis and Design'New Delhi, Fifth Edition, 2008.
3. Hadi Saadat, 'Power System Analysis,' Tata McGraw Hill Publishing Company', 2003
4. C.L.Wadhwa, 'Electrical Power Systems', New Age International Publishers.
5. D.P.Kothari , I.J. Nagarath, 'Power System Engineering', Tata McGraw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.
6. Luces M. Fualkenberry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 1996.

List of Experiments:

1. To study the electrical symbols.
2. Study the layout of national grid.
3. To study the working of Thermal power station.
4. To study the working of Hydro power station.
5. To study the working of Tidal power station.
6. To study the working of Solar power station.
7. To study the working of Wind power station.
8. To study the construction of cable.
9. Study the pin type & suspension type of insulator.
10. To study different types of AC distribution system.

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