DAV UNIVERSITY
JALANDHAR

Course Scheme & Syllabus

For

B. Tech. in Electrical Engineering

1st TO 8th SEMESTER
Examinations 2018–2022 Session

Syllabi Applicable For Admissions in 2018

DAV UNIVERSITY, JALANDHAR

Mandatory Induction program(Appendix A)

[Induction program for students to be offered right at the start of the first year.]

3 Weeks Induction Program(Mandatory)
• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to Local Areas • Familiarization to Dept./Branch & Innovations

DAV UNIVERSITY, JALANDHAR

Scheme of Courses
B. Tech. in Electrical Engineering
Semester-1

S.NO.	PAPER CODE	COURSE TITLE	L	T	P	CR	NATURE OF COURSE
1	MTH151A	ENGINEERING MATHEMATICS-I	4	0	0	4	CORE
2	ELE105	BASIC ELECTRICAL ENGINEERING	4	0	0	4	CORE
3	MEC103	MECHANICAL ENGINEERING FUNDAMENTALS	4	0	0	4	CORE
4	MEC104	MANUFACTURING PRACTICE	0	0	4	2	AECC
5	PHY151B	ENGINEERING PHYSICS	4	0	0	4	CORE
6	PHY152	ENGINEERING PHYSICS LAB	0	0	2	1	AECC
7	SGS107B	HUMAN VALUES AND GENERAL STUDIES	4	0	0	0	NON CREDIT
8	ELE106	BASIC ELECTRICAL ENGINEERING LABORATORY	0	0	2	1	CORE
TOTAL			20	0	8	20	

L: Lectures T: Tutorial P: Practical Cr: Credits

Scheme of Courses
B. Tech. in Electrical Engineering
Semester-2

S.NO.	PAPER CODE	COURSE TITLE	L	T	P	CR	NATURE OF COURSE
1	MTH152A	ENGINEERING MATHEMATICS-II	4	0	0	4	CORE
2	CHE151A	CHEMISTRY	4	0	0	4	CORE
3	CSE101A	COMPUTER FUNDAMENTALS AND PROGRAMMING	4	0	0	4	CORE
4	ENG151A	BASIC COMMUNICATION SKILLS	3	0	0	3	CORE
5	EVS100A	ENVIRONMENTAL STUDIES	4	0	0	0	NON CREDIT
6	MEC101A	ENGINEERING DRAWING	2	0	4	4	CORE
7	CHE152	CHEMISTRY LAB	0	0	2	1	CORE
8	CSE103	COMPUTER FUNDAMENTALS AND PROGRAMMING LAB	0	0	2	1	CORE
9	ENG152	BASIC COMMUNICATION SKILLS LABORATORY	0	0	2	1	CORE
TOTAL			21	0	10	22	

L: Lectures T: Tutorial P: Practical Cr: Credits

Note: *At the end of the examination of 2nd Semester the students will undergo compulsory Swachh Bharat Summer Internship for a period of 100Hrs duration. The credits for this will be included in the 3rd semester.*

Visit to nearby power plant Hydro, Thermal, Nuclear.

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Scheme of Courses
B. Tech. in Electrical Engineering
Semester-3

SR. NO.	COURSE CODE	COURSE TITLE	L	T	P	CR.	NATURE OF COURSE
1.	ELE201	CIRCUIT THEORY	4	0	0	4	CORE
2.	ELE202A	ELECTRICAL MACHINES-I (DC MACHINES & TRANSFORMERS)	4	0	0	4	CORE
3.	ELE209A	ELECTRICAL MEASUREMENT AND INSTRUMENTATION	4	0	0	4	CORE
4.	MTH252A	ENGINEERING MATHEMATICS-III	4	0	0	4	
5.	ELE216	GENERATION & CONTROL OF POWER	4	0	0	4	CORE
6.	ELE203	ELECTRICAL MACHINES I (DC MACHINE & TRANSFORMERS) LABORATORY	0	0	2	1	CORE
7.	ELE210	ELECTRICAL MEASUREMENT AND INSTRUMENTATION LABORATORY	0	0	2	1	CORE
8.		SWACHH BHARAT SUMMER INTERNSHIP	0	0	0	2	
TOTAL			20	0	4	24	

L: Lectures T: Tutorial P: Practical Cr: Credits

Scheme of Courses
B. Tech. in Electrical Engineering
Semester-4

SR. NO.	COURSE CODE	COURSE TITLE	L	T	P	CR.	NATURE OF COURSE
1.	ECE211	ANALOG ELECTRONICS	4	0	0	4	CORE
2.	ELE204	ELECTROMAGNETIC FIELD THEORY	4	0	0	4	CORE
3.	ELE205A	ELECTRICAL MACHINES-II (ASYNCHRONOUS & SYNCHRONOUS MACHINES)	4	0	0	4	CORE
4.	ELE217	POWER SYSTEM-I (TRANSMISSION & DISTRIBUTION)	3	0	0	3	CORE
5.	ELE214A	RENEWABLE ENERGY SOURCES AND MANAGEMENT	4	0	0	4	CORE
6.	ELE207	ELECTRICAL MACHINE-II (ASYNCHRONOUS & SYNCHRONOUS MACHINES) LABORATORY	0	0	2	1	CORE
7.	ECE214	ANALOG ELECTRONICS LABORATORY	0	0	2	1	CORE
8.	ELE470	ESTIMATION AND COSTING LABORATORY	0	0	4	2	CORE
TOTAL			19	0	8	23	

L: Lectures T: Tutorial P: Practical Cr: Credits

Note: *At the end of the examination of 4^{th} Semester the students will undergo compulsory industrial training for a period of 4 weeks duration in reputed industries. Every student will submit the Training Report within two weeks from the start of teaching for 5^{th} Semester. The credit for this will be included in the 5^{th} Semester.*

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Scheme of Courses
B. Tech. in Electrical Engineering
Semester-5

SR. NO.	COURSE CODE	COURSE TITLE	L	T	P	CR.	NATURE OF COURSE
1.	ELE330	SIGNAL AND SYSTEMS	3	0	0	3	CORE
2.	ELE306A	POWER ELECTRONICS	4	0	0	4	CORE
3.	ELE 310	POWER ELECTRONICS LABORATORY	0	0	2	1	CORE
4.	ELE314	DIGITAL ELECTRONICS	3	0	0	3	CORE
5.	ELE336	POWER SYSTEM-II (STABILITY & FAULT ANALYSIS)	3	0	0	3	CORE
6.	ELE318	TRANSDUCER AND SIGNAL CONDITIONING	4	0	0	4	CORE
7.	ELE331	DIGITAL ELECTRONICS LABORATORY	0	0	2	1	CORE
8.	ELE350	INDUSTRIAL TRAINING I	0	0	0	2	TRAINING, D AND P
9.	ELE317	DESIGN AND SOFTWARE LABORATORY	1	0	3	2	CORE
TOTAL			18	0	7	23	

Scheme of Courses
B. Tech. in Electrical Engineering
Semester-6

SR. NO.	COURSE CODE	COURSE TITLE	L	T	P	CR.	NATURE OF COURSE
1.	ELE337	POWER SYSTEM – III(SWITCHGEAR & PROTECTION)	4	0	0	4	CORE
2.	ELE338	CONTROL SYSTEM	4	0	0	4	CORE
3.	ELE339	CONTROL SYSTEM LABORATORY	0	0	2	1	CORE
4.	MTH256A	NUMERICAL METHODS	3	0	0	3	CORE
5.	ENG351	TECHNICAL COMMUNICATION	3	0	0	3	AECC
6.	ELE326	ELECTRIC DRIVES	4	0	0	4	CORE
7.	ELE33X	DISCIPLINE SPECIFIC ELECTIVE-I	4	0	0	4	DSE I
8.	ELE309	POWER SYSTEM LABORATORY	0	0	2	1	CORE
TOTAL			22	0	4	24	

L: Lectures T: Tutorial P: Practical Cr: Credits

Note:

- *Discipline specific elective-I should be from the basket of "Discipline Specific Elective-I".*
- *At the end of the examination of 6th Semester the students will undergo compulsory industrial training for a period of 6 weeks duration in reputed industries. Every student will submit the training report within two weeks from the start of teaching of 7th Semester. The credits for this will be included in the 7th semester.*

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Scheme of Courses
B. Tech. in Electrical Engineering
Semester-7

SR. NO.	COURSE CODE	COURSE TITLE	L	T	P	CR.	NATURE OF COURSE
1.	ELE413	POWER SYSTEM –IV (COMPUTER AIDED POWER SYSTEM ANALYSIS)	4	0	0	4	CORE
2.	ELE410	MICROPROCESSOR & MICROCONTROLLER	4	0	0	4	CORE
3.	ELE411	MICROPROCESSOR, MICROCONTROLLER & PLC LABORATORY	0	0	2	1	CORE
4.	ELEXXX	DISCIPLINE SPECIFIC ELECTIVE –II	4	0	0	4	DSE-II
5.	ELEXXX	DISCIPLINE SPECIFIC ELECTIVE –III	4	0	0	4	DSE-III
6.		GENERIC ELECTIVE - I	4	0	0	4	GENERIC ELECTIVE -I
7.	ELE406A	INDUSTRIAL TRAINING-II	0	0	0	2	TRAINING, D AND P
8.	ELE451A	PROJECT LABORATORY	0	0	8	4	TRAINING, D AND P
TOTAL			20	0	10	27	

L: Lectures T: Tutorial P: Practical Cr: Credits

Note:

- *Discipline specific elective-II should be from the basket of "Discipline Specific Elective-II".*
- *Generic elective-I should be from the "Generic Elective Basket"*

Scheme of Courses
B. Tech. in Electrical Engineering
Semester-8

SR. NO.	COURSE CODE	COURSE TITLE	L	T	P	CR.	NATURE OF COURSE
1.	ELEXXX	DISCIPLINE SPECIFIC ELECTIVE –IV	4	0	0	4	DSE-IV
2.	ELEXXX	DISCIPLINE SPECIFIC ELECTIVE -V	4	0	0	4	DSE-V
3.	ELE307	HIGH VOLTAGE ENGINEERING	4	0	0	4	CORE
4.	ELE412	UTILIZATION & TRACTION	4	0	0	4	CORE
5.		GENERIC ELECTIVE - II	4	0	0	4	GENERIC ELECTIVE -II
6.	ELE452	SEMINAR	0	0	4	2	TRAINING, D AND P
TOTAL			20	0	4	22	

L: Lectures T: Tutorial P: Practical Cr: Credits

Note:

- *Discipline specific elective-III & IV should be from the basket of "Discipline Specific Elective-III & IV" respectively.*
- *Generic elective-II should be from the "Generic Elective Basket"*

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Discipline Specific Elective-I

Sr. No.	Course Code	Course Title	L	T	P	Credit
1	ELE327	ELECTRICAL MACHINE DESIGN	4	0	0	4
2	ELE332	ENERGY EFFICIENT MACHINES	4	0	0	4
3	ELE333	BIOMEDICAL ENGINEERING	4	0	0	4
4	ELE334	INDUSTRIAL PROCESS CONTROL	4	0	0	4
5	ELE335	COMMUNICATION SYSTEMS	4	0	0	4
Discipline Specific Elective-II						
Sr. No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credit**
1	ELE431	RELIABILITY ENGINEERING	4	0	0	4
2	ELE443	HVDC AND EHVAC TRANSMISSION	4	0	0	4
3	ELE447	DIGITAL CONTROL SYSTEMS	4	0	0	4
4	ELE439	MICROSENSORS AND SMART DEVICES	4	0	0	4
5	ELE437	DIGITAL SIGNAL PROCESSING	4	0	0	4
Discipline Specific Elective-III						
Sr. No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credit**
1	ELE448	OPTIMAL CONTROL	4	0	0	4
2	ELE436	FUNDAMENTALS OF VIRTUAL INSTRUMENTATION	4	0	0	4
3	ELE449	COMPUTATIONAL ELECTROMAGNETICS	4	0	0	4
4	ELE450	ELECTRICAL ENGINEERING MATERIALS	4	0	0	4
5	ELE468	ADVANCED INSTRUMENTATION	4	0	0	4
Discipline Specific Elective-IV						
Sr. No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credit**
1	ELE459	ELECTRICAL AND HYBRID VEHICLES	4	0	0	4
2	ELE460	NEURAL NETWORKS AND FUZZY LOGICS	4	0	0	4
3	ELE408	ELECTRICAL ENERGY AUDITING AND DEREGULATION	4	0	0	4
4	ELE461	POWER QUALITY AND FACTS	4	0	0	4
5	ELE435	OPTIMIZATION TECHNIQUES	4	0	0	4
Discipline Specific Elective-V						
Sr. No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credit**
1	ELE463	POWER SYSTEM DYNAMICS AND CONTROL	4	0	0	4
2	ELE464	INDUSTRIAL ELECTRICAL SYSTEMS	4	0	0	4
3	ELE465	ADVANCED ELECTRIC DRIVES	4	0	0	4
4	ELE467	CONTROL SYSTEMS DESIGN	4	0	0	4
5	ELE407	POWER PLANT ENGINEERNING	4	0	0	4

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Generic Elective Basket

S.NO.	PAPER CODE	COURSE TITLE	L	T	P	CR
1	ELE801	ELECTRO-MECHANICAL ENERGY CONVERSION	4	0	0	4
2	ELE802	TRANSDUCERS AND SIGNAL CONDITIONING	4	0	0	4
3	ELE 803	FUNDAMENTALS OF ELECTRICAL MEASUREMENT AND INSTRUMENTATION	4	0	0	4
4	CHL801	INDUSTRIAL POLLUTION CONTROL	4	0	0	4
5	CHL802	FUEL CELL TECHNOLOGY	4	0	0	4
6	MEC801	INDUSTRIAL ENGINEERING TECHNIQUES	4	0	0	4
7	MEC802	ENERGY RESOURCES	4	0	0	4
8	CSE801	SOFTWARE ENGINEERING & PROJECT MANAGEMENT	4	0	0	4
9	CSE802	COMPUTER NETWORKS	4	0	0	4
10	ECE801	COMMUNICATION AND MEDIA FOUNDATIONS	4	0	0	4
11	ECE802	ELECTRONIC DISPLAYS	4	0	0	4
12	ECE803	EVERYDAY ELECTRONICS	4	0	0	4
13	CIV801	CONSTRUCTION MATERIALS AND TECHNIQUES	4	0	0	4
14	CIV802	RAILWAY AND TUNNEL ENGINEERING	4	0	0	4
15	MGT151A	FUNDAMENTALS OF MANAGEMENT	4	0	0	4
16	MGT152	FUNDAMENTALS OF ADVERTISING	4	0	0	4
17	MGT153	FUNDAMENTALS OF STOCK MARKET	4	0	0	4
18	MGT154	FUNDAMENTALS OF RESEARCH METHODS	4	0	0	4
19	MGT155	FUNDAMENTALS OF ACCOUNTING & FINANCE	4	0	0	4

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B Tech Course Structure

CBCS	Nature of Courses	Core	Elective Courses			Ability Enhancement Courses		Total Credits
Year	Course Structure	Core	Dissertation/ Project	Generic Elective	Discipline Specific Elective	Ability Enhancement Compulsory Courses	Skill Enhancement Courses	
2015	Electrical	146	10	8	16	11	4	195

Core	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology	Engineering Sciences (ES) including Materials, WS, ED, Basics of EE/ME/CSE	Interdisciplinary Core	Discipline Core	Total Credits
146	18-26	20	04-20	80-104	146

DAV UNIVERSITY, JALANDHAR

Detailed Syllabus

DAV UNIVERSITY, JALANDHAR

Course Title: Engineering Mathematics-I

Paper Code: MTH151A

L	T	P	Credits
4	0	0	4

Objective: The aim of this course is to familiarize the students with the theory of matrices which are used in solving equations in mechanics and the other streams. This course also provides a comprehensive understanding of the origin and development of ideas to exhibit the techniques origin and development of ideas to exhibit the techniques of solving ordinary differential equations.

Unit-A

Rank of matrices, Inverse of Matrices, Gauss Jordan Method, reduction to normal form, Consistency and solution of linear algebraic system of equations, Gauss Elimination Method, Eigenvalues and Eigenvectors, Diagonalisation of Matrix, Cayley Hamilton theorem. Orthogonal, Hermitian and unitary matrices.

Unit-B

Concept of limit and continuity of a function of two variables, Partial derivatives, Homogenous Function , Euler's Theorem, Total Derivative, Differentiation of an implicit function, chain rule, Change of variables,Jacobian, Taylor's and McLaurin's series. Maxima and minima of a function of two and three variables: Lagrange's method of multipliers.

Unit-C

Formation of ordinary differential equations, solution of first order differential equations by separation of variables, Homogeneous equations, Reduce to Homogenous, exact differential equations, equations reducible to exact form by integrating factors, equations of the first order and higher degree, clairaut's equation.

Unit-D

Solution of differential equations with constant coefficients: method of differential operators. Non – homogeneous equations of second order with constant coefficients: Solution by method of variation of parameters, Simultaneously Linear differential equation.

References:

1. Grewal, B.S. *Higher Engineering Mathematics*. New Delhi: Khanna Publication, 2009.
2. Kreyszig, Erwin. *Advanced Engineering Mathematics*. New Delhi: Wiley Eastern Ltd.,

2003.

3. Jain, R K, and K Iyengar S R. *Advanced Engineering Mathematics*, New Delhi: Narosa Publishing House, 2003.
4. Thomas, George B. and Finney Ross L. *Calculus and Analytic Geometry*. New Delhi Addison Wesley, 1995.

DAV UNIVERSITY, JALANDHAR

Course Title: Chemistry

Course Code: CHE151A

L	T	P	Credits
4	0	0	4

Course Objectives:

The objective of the Engineering Chemistry is to acquaint the student with the basic phenomenon/concepts of chemistry for the development of the right attitudes by the engineering students to cope up with the continuous flow of new technology. The student will able to understand the new developments and breakthroughs efficiently in engineering and technology.

Expected Prospective:

This course will equip students with the necessary chemical knowledge concerning the fundamentals as well as new technology in the field of chemistry.

Unit- A

Spectroscopy and its Applications

General Introduction: Introduction, electromagnetic spectrum, absorption and emission spectrum, atomic and molecular spectroscopy, types of molecular spectra, experimental techniques, selection rules, width and intensities of spectral lines.

UV/Visible Spectroscopy: types of electronic Transitions,Chromophores, Auxochromes, Effect of conjugation on Chromophores, Factors affecting λmax and intensity of spectral lines, effect of solvent onλmax, isobestic point, applications.

IR Spectroscopy: Infrared region, fundamental modes of vibrations and types, theory of infrared spectra, vibrational frequency and energy levels, anharmonic oscillator, modes of vibrations of polyatomic molecules, characteristic signals of IR spectrum, fingerprint region, factors affecting vibrational frequency; applications.

NMR Spectroscopy: Principle and instrumentation, relaxation processes, proton magnetic resonance spectroscopy, number of signals, Chemical shift, Spin-Spin Splitting, coupling constant, applications.

Unit- B

Water and its treatment

Introduction, hardness of water, degree of hardness, units of hardness, boiler feed water: specification, scales and sludge formation; priming& foaming, boiler corrosion, caustic embrittlement, treatment of boiler feed water, internal treatment of water; softening of water by lime-soda, zeolite and ion exchange methods, desalination of water; Water for domestic use:

purification of water for domestic use.

Corrosion and its Prevention

Introduction; different types of corrosion - wet and dry corrosion; mechanism of wet corrosion; comparison of dry and wet corrosion, Types of electrochemical corrosion: galvanic corrosion, concentration cell corrosion or differential aeration corrosion, waterline corrosion, pitting corrosion, crevice corrosion, stress corrosion, intergranular corrosion; other forms of corrosion: atmospheric corrosion, soil corrosion, microbiological corrosion, erosion corrosion, Filliform corrosion, stray current corrosion, passivity, galvanic series, factors influencing corrosion, various methods of corrosion control.

Unit-C

Chemistry in Nanoscience and Technology

Introduction,Materials self-assembly, molecular vs. material self-assembly, hierarchical assembly, self-assembling materials, two dimensional assemblies, mesoscale self-assembly, coercing colloids, nanocrystals, supramolecular structures, nanoscale materials, future perspectives applications,nanocomposities and its applications.

Unit-D

Polymers and polymerization

Introduction, monomer and repeating unit, degree of polymerization, functionality, classification of polymers: based on origin, monomers, structure, method of synthesis, tacticity or configuration, action of heat, chemical composition, ultimate form; types of polymerization, specific features of polymers, regularity and irregularity, tacticity of polymers, average molecular weights and size, determination of molecular weight by number average methods, effect of molecular weight on the properties of polymers, introduction to polymer reinforced composites.

References:

1. William Kemp, *Organic Spectroscopy*, Palgrave Foundations, 1991.

2. D. A. Skoog, F. J. Holler and A. N. Timothy, *Principle of Instrumental Analysis*, 5th Edition., Saunders College Publishing, Philadelphia, 1998.

3. C. P. Poole, Jr., F. J. Owens, *Introduction to Nanotechnology*, WileyInterscience, 2003.

4. L.E. Foster, Nanotechnology, *Science Innovation & Opportunity*, Pearson Education, 2007.

5. P. Ghosh, *Polymer Science and technology*(2nd Edition), Tata McGraw Hill, 2008.

6. Wiley *Engineering Chemistry*, Second Edition, 2013.

DAV UNIVERSITY, JALANDHAR

Course Title: Computer Fundamentals and Programming

Course Code: CSE101A

L	T	P	Credits
4	0	0	4

Course Objective: To get basic knowledge of computers (hardware and software), its components and Operating systems. To acquire programming skills in C, basic knowledge of Internet

Unit-A

Introduction to Computers

Define a Computer System, Block diagram of a Computer System and its working, memories, Volatile and non-volatile memory, cache, virtual, secondary storage devices-Magnetic Tape, Hard Disk, CD-DVD, Magnetic Disk, Various input devices including keyboard, Mouse, Joystick, Scanners and Various output devices including Monitors, Printers, Plotters

Operating Systems

Computer Software and its types and Hardware, Operating Systems, their types and functions

Unit-B

Working Knowledge of Computer System

Introduction to word processors and its features, creating, editing, printing and saving documents, spell check, mail merge, creating power point presentations, creating spreadsheets and simple graphs.

Fundamentals of Internet Technology

Local area networks, MAN and wide area network, Internet, WWW, E-mail, Browsing and Search engines, Internet Connectivity, Network Topology, Hub, Switches, Router, Gateway.

Unit-C

Basic Constructs of C

Keywords, Identifiers, Variables, Data Types and their storage, Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Increment & Decrement Operators, Expressions, Conditional Expressions, Assignment Operators and Expressions, External Variables and Scope of Variables, Structure of C Program.

Control Structures

Decision making statements: if, nested if, if – else ladder, switch, Loops and iteration: while loop, for loop, do – while loop, break statement, continue statement, goto statement.

Unit-D

Functions

Advantages of functions, function prototype, declaring and defining functions, return statement, call by value and call by reference, recursion, and storage classes.

Arrays and Strings

Declaration of arrays, initialization of array, accessing elements of array, I/O of arrays, passing arrays as arguments to a function, strings, I / O of strings, string manipulation functions (strlen, strcat, strcpy, strcmp)

References:

1. V.K. Jain: "*Fundamentals of Information Technology and Computer Programming*", PHI. Latest Edition.
2. Anita Goel: "*Computers Fundamentals*", Pearson Publications
3. Brian Kernighan and Dennis M. Ritchie: "*The C Programming Language*", Prentice Hall, 2nd Edition 2007.
4. K.N.King : "*C Programming : A Modern Approach*", W.W. Norton Company 2nd edition (2008).
5. Herbert Schildt : "*C: The Complete Reference*", Tata Mcgraw Hill Publications 4th edition.
6. Gottfired : "*Programming in ANSI C, Schaum Series*", TMH publications, 2nd Edition (1996).

DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Studies

Paper Code: EVS100A

L	T	P	Credits
4	0	0	S/US

Course Objective: This course aims at understanding the students in aspects of environmental problems, its potential impacts on global ecosystem and its inhabitants, solutions for these problems as well as environmental ethics which they should adopt to attain sustainable development.

Unit- A

The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

Natural Resources: Renewable and non-renewable resources:

Natural resources and associated problems

1. **Forest resources:** Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

2. **Water resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

3. **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

4. **Food resources:** World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

5. **Energy resources:** Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

6. **Land resources:** Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

Ecosystem:

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
  Energy flow in the ecosystem

  Ecological succession

Food chains, food webs and ecological pyramids

Introduction, types, characteristic features, structure and function of the following ecosystem:

2. Forest ecosystem
3. Grassland ecosystem
4. Desert ecosystem
5. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Unit -B

Biodiversity and its conservation

- Introduction – Definition: Genetic, Species and Ecosystem Diversity
- Bio-geographical classification of India
- Value of biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and Option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity, global and national efforts.

Environmental Pollution

- Definition, causes, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies

- Disaster management: floods, earthquake, cyclone and landslides

Unit- C

Social Issues and the Environment

- Population growth, variation among nations, Population explosion – Family Welfare Programmes.
- Environment and human health,
- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Environmental Laws: The Environment Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and control of Pollution) Act 1974; The Wildlife Protection Act, 1972; Forest Conservation Act, 1980.
- Issues involved in enforcement of environmental legislation
- Public Awareness

Unit- D

Human Population and Environment

- Population Growth and Variations among Nations
- Population Explosion
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

Field Work

- Visit to a local area to document environmental assets river/ forest/

grassland/hill/mountain

- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-Pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Suggested Readings:

1. Odum, EP. *Basic Ecology*. Japan: Halt Saundurs, 1983.
2. Botkin, DB, and Kodler EA. *Environmental Studies: The Earth as a living planet.* New York: John Wiley and Sons Inc., 2000.
3. Singh, JS, Singh, SP, and Gupta SR. Ecology, *Environment and Resource Conservation.* New Delhi: Anamaya Publishers, 2006.
4. De, AK. *Environmental Chemistry*. New Delhi: Wiley Eastern Ltd., 1990.
5. Sharma, PD. *Ecology and Environment*. Meerut Rastogi Publications, 2004

DAV UNIVERSITY, JALANDHAR

Course Title: Engineering Drawing

Course Code: MEC101A

L	T	P	Credits
2	0	4	4

Course Objectives: Students will be able to use the techniques to interpret the drawings and to use it in the field work of engineering. They will learn various lines, planes, solids and their sectioning and to develop their lateral surfaces. Concepts of orthographic and isometric projections

Unit-A

Drawing Techniques

Introduction to drawing instruments, various types of lines and their convention, principles of dimensioning, Engineering symbols, Gothic lettering in single stroke as per SP-46 code (Vertical and inclined)

Scales

Concept of scaling, construction of plane and diagonal scales

Unit-B

Projection of Points

Concept of plane of projections (Principle planes), First and third angle projections; projection of points in all four quadrants, shortest distance problems

Projection of Lines and Planes

Projection of line parallel to both planes, perpendicular to one plane, inclined to one and both the reference planes and their traces. Plane perpendicular to one plane inclined to one and both the reference planes and their traces. Concept of profile plane and auxiliary planes, To find the true length, α, β, θ and Φ.

Unit-C

Projection of Solids

Right and oblique solids; solids of revolution and polyhedrons, projection of solid with axis perpendicular to one plane and parallel to one or both reference planes. Projection of solid with axis inclined to one or both reference planes.

Sectioning of Solids

Theory of sectioning, types of section planes, their practice on projection of solids, Sectioning by auxiliary planes,to find true section of truncated solids.

DAV UNIVERSITY, JALANDHAR

Unit-D

Development of Surfaces

Method of Development, Development of surfaces: Parallel line and Radial line method. Development of oblique solids, Development of curved surfaces.

Orthographic and Isometric Views

Draw orthographic views from isometric view or vice-a-versa, Missing line and missing view

References:

1. Jolhe, A.J., "*Engineering Drawing*", Tata McGraw-Hill, New Delhi.
2. Gill, P.S., *"Engineering Drawing",* S.K. Kataria and Sons, Ludhiana
3. French T.E. and Vierck, C.J., *"Graphic Science"*, McGraw-Hill, New York
4. Zozzora F., *"Engineering Drawing",* McGraw Hill, New York

DAV UNIVERSITY, JALANDHAR

Course Title: Basic Communication Skills

Course Code: ENG151A

L	T	P	Credits
3	0	0	3

Course Objective:

- To enhance students' vocabulary and comprehensive skills through prescribed texts.
- To hone students' writing skills.

Learning Outcomes: Students will be able to improve their writing skills as well as will enrich their word power.

Unit – A

Applied Grammar (Socio-Cultural Context)

1. Parts of Speech: Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection
2. Tenses (Rules and Usages in Socio-cultural contexts)
3. Modals: Can, Could, May, Might, Will, Would, Shall, Should, Must, Ought to
4. Passive/Active
5. Reported/Reporting Speech

Unit – B

Reading (Communicative Approach to be followed)

1. J M Synge: Riders to the Sea (One Act Play) 2.
Anton Chekhov : Joy (Short Story)
3. Swami Vivekanand : The Secret of Work (Prose)

Unit – C

Writing

1. Essay Writing and Letter Writing
2. Report Writing
3. Group Discussion & Facing an Interview

References: a.

Books

1. Kumar, Sanjay and PushpLata. *Communication Skills*. India: OUP, 2012. Print.
2. Vandana, R. Singh. *The Written Word* by. New Delhi: Oxford University Press, 2008. Print.

b. Websites

1. www.youtube.com (to download videos for panel discussions). Web.

2. www.letterwritingguide.com. Web.
3. www.teach-nology.com.Web.
4. www.englishforeveryone.org.Web.
5. www.dailywritingtips.com.Web.
6. www.englishwsheets.com.Web.
7. www.mindtools.com.Web.

DAV UNIVERSITY, JALANDHAR

Course Title: Chemistry Lab

Course Code: CHE152

L	T	P	Credits
0	0	2	1

Course Objectives:

This course is intended to learn the basic concepts of Engineering Chemistry Laboratory. The present syllabus has been framed as per the recent research trends in the subject. The various experiments have been designed to enhance laboratory skills of the undergraduate students.

Expected Prospective:

The students will be able to understand the basic objective of experiments in Engineering chemistry, properly carry out the experiments, and appropriately record and analyze the results through effective writing and oral communication skills. They will know and follow the proper procedures and regulations for safe handling and use of chemicals.

List of Practicals:

1. Verify Lambert Beer's law using spectrophotometer and $CoCl_2$ or $K_2Cr_2O_7$ solution.
2. Determine the strength of HCl solution by titrating against NaOHsolutionconductometerically.
3. Determination of the strength of HCl solution by titrating against NaOH using pH meter.
4. Determination of total hardness of water (tap) using standard EDTA solution and Eriochrome black T indicator.
5. Determination of alkalinity of water.
6. Determination of surface tension of given liquid by using Stalagmometer.
7. Determination of residual chlorine in a water sample.
8. Determination of Flash & Fire point of given a given lubricating oil by Pensky-Marten's apparatus.
9. Determination of the viscosity of given lubricating oil by using Redwood Viscometer.
10. Preparation of a polymer phenol/urea formaldehyde resin.
11. Determination of moisture, volatile matter and ash content in a given sample of coal by proximate analysis.
12. Determination of dissolved oxygen present in given sample of water.

References:

1. Levitt, B.P. Findlay's Practical Physical Chemistry, 9th edition, Longman Group Ltd., 1973.

2. Yadav, J.B. Advanced Practical Physical Chemistry.

3. Vogel, A. I. A textbook of Quantitative Inorganic Analysis, Longman Gp. Ltd, 4^{th} edition (2000).

DAV UNIVERSITY, JALANDHAR

Course Title: Computer Fundamentals and Programming Lab

Course Code: CSE103

L	T	P	Credits
0	0	2	1

Instruction for Students: The students will be attending a laboratory session of 2 hours weekly and they have to perform the practical related to the following list.

1. Practical know-how of various internal and external Hardware components of a computer (including basic working of peripheral devices).
2. Introduction to Operating Systems; installing Windows; basics of windows.
3. Working knowledge of Internet.
4. Introduction to word processor and mail merge.
5. Introduction to MS-Excel.
6. Working on MS-PowerPoint.
7. Introduction to basic structure of C program, utility of header and library files.
8. Implementation of program related to the basic constructs in C
9. Programs using different data types in C
10. Programs using Loops and Conditional Statements in C
11. Programs using functions by passing values using call by value method.
12. Programs using functions by passing values using call by reference method.
13. Programs using arrays single dimension in C.
14. Program to implement array using pointers
15. Programs related to string handling in C

DAV UNIVERSITY, JALANDHAR

Course Title: Basic Communication Skills Lab

Course Code: ENG152

L	T	P	Credits
0	0	2	1

Course Objective:

- To improve fluency in speaking English.
- To promote interactive skills through Group Discussions and role plays.

Learning Outcome: Students will get exposure to speaking through the above mentioned interactive exercises. In addition, they will develop a technical understanding of language learning software, which will further improve their communicative skills.

Unit – A Speaking/Listening

1. Movie-Clippings (10 Hrs)
2. Role Plays (10 Hrs)
3. Group Discussions (10 Hrs)

References:

1. Gangal, J. K. *A Practical Course in Spoken English.* India: Phi Private Limited, 2012. Print.
2. Kumar, Sanjay and PushpLata. *Communication Skills*. India: OUP, 2012. Print.

Websites

1. www.youtube.com (to download videos for panel discussions).Web.
2. www.englishforeveryone.org.Web.
3. www.talkenglish.com.Web.
4. www.mindtools.com.Web.

DAV UNIVERSITY, JALANDHAR

Course Title: Engineering Mathematics-II
Course Code: MTH152A

L	T	P	Credits
4	0	0	4

Objective:

The objective of the course is to equip the students with the knowledge of concepts of vectors and geometry and their applications. A flavour of pure mathematics is also given to the readers.

Unit-A

Functions of Complex Variables: Complex Numbers and elementary functions of complex variable De-Moivre's theorem and its applications. Real and imaginary parts of exponential, logarithmic, circular, inverse circular, hyperbolic, inverse hyperbolic functions of complex variables.Summation of trigonometric series. (C+iS method).

Unit-B

Integral Calculus: Rectification of standard curves; Areas bounded by standard curves; Volumes and surfaces of revolution of curves;

Multiple Integrals: Double and triple integral and their evaluation, change of order of integration, change of variable, Application of double and triple integration to find areas and volumes. Centre of gravity and Moment of inertia

Unit-C

Vector Calculus: Scalar and vector fields, differentiation of vectors, velocity and acceleration. **Vector differential operators**: Del, Gradient, Divergence and Curl, their physical interpretations. Line, surface and volume integrals.

Application of Vector Calculus: Flux, Solenoidal and Irrotational vectors. Gauss Divergence theorem.Green’s theorem in plane, Stoke’s theorem (without proofs) and their applications

Unit-D

Infinite Series: Convergence and divergence of series, Tests of convergence (without proofs): Comparison test, Integral test, Ratio test, Raabe's test, Logarithmic test, Cauchy's root test and Gauss test. Convergence and absolute convergence of alternating series, Uniform Convergence and Power Series

References:

1. Grewal, B.S., *Higher Engineering Mathematics*. New Delhi: Khanna Publication, 2009
2. Kreyszig, Erwin, *Advanced Engineering Mathematics*. New Delhi: Wiley Eastern Ltd., 2003.
3. Jain, R K, and K Iyengar S R., *Advanced Engineering Mathematics*, New Delhi: Narosa Publishing House, 2003.
4. Thomas, George B. and Finney Ross L., *Calculus and Analytic Geometry*. New Delhi Addison Wesley, 1995

DAV UNIVERSITY, JALANDHAR

L	T	P	Cr.
4	0	0	4

COURSE NAME: ENGINEERING PHYSICS

COURSE CODE: PHY151B

Total Lecture-60

AIM. The aim of this course on physics is to make the student of engineering understand the basic concepts of physics which will form the basis of certain concept in their respective fields.

Unit-1

PHYSICAL OPTICS: (14)

Interference: Division of wave front, Fresnel's biprism, division of amplitude, Newton's rings and applications.

Diffraction: Difference between Fraunhofer and Fresnel diffraction, Fraunhofer diffraction through a slit, plane transmission diffraction grating, its dispersive and resolving power.

Polarization: Polarized and unpolarized light, double refraction, Nicol prism, quarter and half wave plates.

Unit-II (15)

LASER: Spontaneous and stimulated emission, Laser action, Characteristics of laser beam, concept of coherence, He-Ne laser, Semiconductor laser, Ruby laser and applications, Holography.

FIBRE OPTICS: Propagation of light in fibres, numerical aperture, single mode and multimode fibres, applications

Unit-III (13)

DIELECTRICS: Molecular Theory, polarization, displacement, susceptibility, dielectric coefficient, permittivity, relations between electric vectors, Gauss's law in the presence of a dielectric, energy stored in an electric field, Behavior of dielectric in alternating field and clausius-Mossotti equation.

Unit-IV (18)

QUANTUM MECHANICS: Difficulties with Classical physics, Introduction to quantum mechanics simple concepts, Black Body radiation, Planck's Law of radiation and its limitations, Group velocity and phase velocity, Schrodinger's wave equations and their applications.

NANOPHYSICS: Introduction to Nanoscience and Nanotechnology, Electron confinement, Nanomaterials, Nanoparticles, Quantum structure, CNT, Synthesis of Nanomaterials and Application of Nanomaterials .

SUPER CONDUCTIVITY: Introduction (experimental survey), Meissner effect, Type I and type II superconductors, London equation, Elements of BCS theory, Applications of superconductors.

Suggested Books:

1.Sear, F.W. Electricity and Magnetism. London: Addison-Wesley, 1962.

2.Resnick and Halliday. Physics.New York: Wiley, 2002.

3.Lal,B. and Subramanyam, N.A Text Book of Optics. New Delhi: S. Chand and Company Limited, 1982.

4.Jenkins, and White. Fundamental of Physical Optics. New York: Tata McGraw-Hill, 1937.

5.Griffiths,D. Introduction to Electrodynamics, New Delhi: Prentice Hall, 1998.

6.Beiser, A. Perspective of Modern Physics. New Delhi: McGraw Hill Ltd., 2002.

7.Verma, N.K Physics for Engineers. New Delhi: Prentice Hall., 2014.

DAV UNIVERSITY, JALANDHAR

Course Title: **Mechanical Engineering Fundamentals**

Course Code: MEC103

L	T	P	Credits
4	0	0	4

Course Objectives:

To impart the basic knowledge of thermodynamic principles, design principles, power transmission devices, power producing and power absorbing devices.

Unit-A

Fundamental Concepts of Thermodynamics

Introduction, Thermodynamic System and its types, Boundary and its types, Surroundings, Thermodynamic properties, State, Path, process and cycles, Thermodynamic Equilibrium, Working Substance, Microscopic and Macroscopic Analysis, Units and Dimensions, Quasi Static Process, Reversible and Irreversible processes, Point Function and Path Function, Mechanical and Thermodynamic work, P-dv Work (Displacement Work), Work is a Path Function, Equations for work done in various processes

Laws of Thermodynamics

Zeroth law of Thermodynamics, Temperature, Thermometry (Measurement of temperature), Temperature Scales, Energy, Potential and Kinetic Energies at Micro and Macro Level, Internal Energy, Law of conservation of energy, Joule's Experiment, First law of thermodynamics (Open and Closed System), Energy – A property of system, Enthalpy, Entropy, Heat, Heat vs Temperature, specific heat, Heat Capacity, Specific heat at constant volume, Specific heat at constant pressure, Adiabatic Index, Limitations of first law of thermodynamics

Unit-B

Pressure

Pressure Concept and Definition, Pressure conversion Table, Atmospheric pressure, Standard Atmospheric Pressure, Gauge Pressure, Vacuum Pressure, Absolute pressure, Properties of fluid, Pressure head of a Liquid, Pascal's Law, Pressure measurement: Mechanical Gauges and Manometers, Mechanical Gauges: (Bourdon tube pressure gauge, Diaphragm pressure gauge, Dead weight), Manometers: (Principle/Advantage/Limitation/ Classification), Piezometer, Single U tube manometer (Numerical for Vacuum and Gauge pressure), [Simple problems on above topics]

Heat Transfer

Introduction, Heat Transfer vs Thermodynamics, Applications, Thermal Conductivity, Thermal Resistance, Modes of heat transfer, Spectrum of electromagnetic radiation, Surface emission properties, Absorptivity, Reflectivity and Transmissivity, Fourier law, Newton's law of cooling, Stefan Boltzmann's Law, Heat Exchangers (Applications, Selection, Classification), Thermal

Insulation (Properties of insulation, Types of Insulations, Thermal Insulating Materials)

Power Absorbing Devices

Power Absorbing Devices, Difference between Hydraulic pump, Air compressor, Fan, Blower, Pump (Function, Selection, Applications), Classification of Pump, Positive displacement and Dynamic Pumps, Reciprocating Pumps and its types, Rotary Pumps and its types, Centrifugal Pump, Axial Pump

Unit-C

Power Producing Devices Boiler

States of matter, Changing State of Matter, Sublimation, Effect of temperature during change of Phase, Steam boiler, Application, Classification of boilers, Types of boilers (Brief Description), Essentials of a good boiler, Advantages of superheating the steam, Comparison between Water tube and Fire tube boilers, Function of boiler Mountings and Accessories

Turbines

Turbine, Classification based on working fluid, Classification of hydraulic turbines, Selection of hydraulic turbines, Impulse Turbines (Pelton Wheel/ Turgo/ Cross Flow), Reaction Turbines (Francis/ Kaplan/ Propeller)

Internal Combustion Engines

Heat Engine, Types of Heat Engine, Advantages, Disadvantages and Applications, Classification of IC Engine, Engine Components (Location, Function and Material), Basic Terminology used in IC engine, Four stroke Cycle Engines (SI and CI), Two stroke Cycle Engines (SI and CI)

Unit-D

Principles of Design

Need of design, Product Life Cycle, Material properties and selection, Factors affecting

material selection, Stress and Strain and its types, Hooke's law, Modulus of Elasticity, Longitudinal and Lateral Strain, Poisson's ratio, Stress- Strain Curve for ductile material and brittle material, Factor of Safety, Centre of Gravity, Centroid, Centroid of areas of plain, Figures (Without

Derivation), Centroid of areas of composite sections (Without Derivation), Moment of Inertia, Radius of gyration, Theorem of perpendicular axis, Theorem of parallel axis, MI of L, I and T sections, [Simple problems on above topics]

Power Transmission Devices and Machine Elements

Individual and group drive system (advantages and Disadvantages), Belt drive (Types: V and Flat Belts and their Applications, Advantages and Disadvantages), Ropes drive (Types: Fiber and Wire Ropes and their Applications, Advantages and Disadvantages), Chain drive (Applications, advantages and Disadvantages, Sprockets), Gear drive (Types of Gears), Power transmission shafts, Types of shafts, Application of shafts, Axle, Keys (Function, Classification),

Coupling (Function, Classification: Rigid and Flexible), Flanged coupling, Oldham's coupling,

Universal coupling, Bearings and their types, Flywheel construction and types

References:

1. Rajan T.S. *Basic Mechanical Engineering*, New Delhi: New Age Publishers.

2. Singh Sadhu *Principles of Mechanical Engineering*, New Delhi: S Chand Publishers.

3. Shankar V.P., *Basic Mechanical Engineering*, New Delhi: Laxmi Publishers.

4. Phthak G. K., *Basic Mechanical Engineering*, New Delhi: Rajsons Publications.

5. Kumar Parveen, *Basic Mechanical Engineering*, New Delhi: Pearson Education

DAV UNIVERSITY, JALANDHAR

Course Title: Basic Electrical Engineering

Course Code: ELE105

L	T	P	Credits
4	0	0	4

Course Objective: This course provides basic knowledge of DC and AC Circuit Analysis and Network Theorems, Magnetic Circuits and various electrical devices & installation e.g. MCB, ELCB, MCCB, DC Machines, AC Machines etc.

Learning Outcomes: Apply the knowledge of Electrical Engineering principles to solve DC and AC circuits. Formulate and analyze electrical circuits. Understand basic principles of electromagnetism to implement in electrical machines and transformers. Identify and select various electrical machines according to the applications. Apply the ethical principles for troubleshooting & installation of safety devices as per norms of engineering practice

Unit-A

D.C Circuit Analysis:

Voltage source, current source, dependent and independent sources, analysis of D.C circuit by KCL and KVL , Nodal and Mesh analysis, Superposition theorem, Maximum Power Transfer Theorem, Thevenin and Norton Theorems.

Unit-B

A.C Circuit Analysis:

Review of single phase A.C. circuit under sinusoidal steady state, RMS Value , Average Value, Form factor, Peak factor solution of RL, RC, R.L.C. Series circuit, the j operator, complex representation of impedance, solution of series circuit, series resonance, 3 phase A.C. Circuit, star and delta connections, line and phase quantities solution of 3 phase circuits, balance supply voltage and balanced supply voltage and balance load, Phasor diagram, measurement of power and power factor, power factor improvement.

Unit-C

Magnetic Circuit & Transformers:

B-H Curve, saturation leakage and fringing. Hysteresis and eddy currents. Single phase transformer, basic concepts constructional, voltage, current Transformation, Ideal transformer and its phasor diagram, voltage regulation, OC/SC test, losses and efficiency, Autotransformer.

Unit-D

Rotating Electrical Machines:

Basic concepts, working principle and general construction of DC machines (motor/generators), torque and EMF expression. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor.

Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Various faults in Batteries, and battery backup.

References:

1. M.S. Sukhija, T.K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford

   University Press, 2012.

2. Ashfaq Husain, Harsoon Ashfaq, " Fundamentals of Electrical Engineering, 4th Edition, Dhanpat Rai and Co., 2013

3. V.N. Mittle, "Basic Electrical Engineering", 2nd Edition, Tata McGraw Hill Publication.
4. B.L. Theraja, A.K. Theraja, " A Text Book of Electrical Technology, Volume-1, S. Chand Publication

5. Debashisha Jena, "Basic Electrical Engineering", 1st edition, Wiley India Publication, 2012.
6. B.L. Theraja, R.S. Sedha, " Principles of Electric Devices and Circuits", S. Chand

   Publication, 1st edition, 2006

DAV UNIVERSITY, JALANDHAR

Course Title: Human Values and General Studies

Course Code: SGS107B

L	T	P	Credits
4	0	0	0

Course Objectives

a) To sensitize students about the role and importance of human values and ethics in personal, social and professional life.

b) To enable students to understand and appreciate ethical concerns relevant to modern lives.

c) To prepare a foundation for appearing in various competitive examinations

d) To sensitize the students about the current issues and events of national and international importance

e) To provide opportunity to the students to study interdisciplinary subjects like Geography, Science, Economy, Polity, History, International Relations etc.

Unit-A

Human Values

1. **Concept of Human Values:** Meaning, Types and Importance of Values.
2. **Value Education :** Basic guidelines for value education
3. **Value crisis and its redressal**

Being Good and Responsible

1. Self Exploration and Self Evaluation
2. Acquiring Core Values for Self Development
3. Living in Harmony with Self, Family and Society
4. Values enshrined in the Constitution: Liberty, Equality
5. Fraternity and Fundamental Duties.

Unit-B

Value – based living

1. Vedic values of life
2. *Karma Yoga* and *Jnana Yoga*
3. *AshtaMarga* and *Tri-Ratna*

Ethical Living:

1. Personal Ethics

2. Professional Ethics
3. Ethics in Education

Unit-C

General Geography

World Geography

The Universe, The Solar System, The Earth, Atmosphere, The World we live in, Countries rich in Minerals, Wonders of the World, Biggest and Smallest.

Indian Geography

Location, Area and Dimensions, Physical Presence, Indian States and Union Territories, Important sites and Monuments, Largest-Longest and Highest in India.

General History

Glimpses of India History, Ancient Indian, Medieval India, Modern India, Various Phases of Indian National Movement, Prominent Personalities, Glimpses of Punjab history with special reference to period of Sikh Gurus

Glimpses of World History

Important Events of World History, Revolutions and Wars of Independence, Political Philosophies like Nazism, Fascism, Communism, Capitalism, Liberalism etc.

Indian Polity: Constitution of India

Important Provisions, Basic Structure, Union Government, Union Legislature and Executive, State Government: State Legislature and Executive, Indian Judiciary, The Election Commission, Panachayati Raj System, RTI etc.

General Economy

The process of liberalization, privatization, globalization and Major World Issues, Indian Economy, Indian Financial System, Major Economic Issues, Economic Terminology.

Unit-D

General Science

General appreciation and understandings of science including the matters of everyday observation and experience, Inventions and Discoveries

Sports and Recreation

The World of Sports and recreation, Who's Who is sports, Major Events, Awards and Honours.

Famous personalities, Festivals, Arts and Artists

Current Affairs

National and International Issues and Events in News, Governments Schemes and Policy Decisions

Miscellaneous

Information Who is

who

Books and Authors, Persons in News, Awards and Honours, Abbreviations and Sports

References:

1. Human Values, A N Tripathi, New Age International Publishers, New Delhi, Third Edition, 2009
2. Professional Ethics, R. Surbiramanian, Oxford University Press, New Delhi, 2013.
3. Human Values and Professional Ethics, RishabhAnand, SatyaPrakashan, New Delhi, 2012
4. Human Values and Professional Ethics, Sanjeev Bhalla, SatyaPrakashan, New Delhi, 2012.
5. Human Values and Professional Ethics, RituSoryan Dhanpat Rai & Co. Pvt. Ltd., First Edition, 2010.
6. Human Values and Professional Ethics by Suresh Jayshree, Raghavan B S, S Chand & Co. Ltd. , 2007.
7. Human Values and Professional Ethics, Yogendra Singh, AnkurGarg, Aitbs publishers, 2011.
8. Human Values and Professional Ethics, Vrinder Kumar, Kalyani Publishers, Ludhiana, 2013.
9. Human Values and Professional Ethics, R R Gaur, R. Sangal, GP Bagaria, Excel Books, New Delhi 2010.
10. Values and Ethics, Dr.BramwellOsula, Dr.SarojUpadhyay, Asian Books Pvt. Ltd., 2011.
11. Indian Philosophy, S. Radhakrishnan, George Allen &Unwin Ltd., New York: Humanities Press INC, 1929.
12. Essentials of Hinduism, Jainism and Buddhism, A N Dwivedi, Books Today, New Delhi – 1979

13. Dayanand : His life and work, SurajBhan, DAVCMC, New Delhi – 2001.
14. Esence of Vedas, KapilDevDwivedi, Katyayan Vedic SahityaPrakashan, Hoshiarpur, 1990.
15. Vedic Concepts, Prof. B BChaubey, Katyayan Vedic SahityaPrakashan, Hoshiarpur, 1990.
16. Advance Objective General Knowledge, R. S. Aggarwal, S. Chand Publisher (2013)
17. Concise General Knowledge Manual 2013, S. Sen, Unique Publishers,2013
18. Encyclopedia of General Knowledge and General Awareness by R P Verma, Penguin Books Ltd (2010)
19. General Knowledge Manual 2013-14, Edgar Thorpe and Showick Thorpe, The Pearson, Delhi.
20. General Knowledge Manual 2013-14, MuktikantaMohanty, Macmillan Publishers India Ltd., Delhi.
21. India 2013, Government of India (Ministry of Information Broadcasting), Publication Division, 2013.
22. Manorama Year Book 2013-14, MammenMethew, Malayalam Manorama Publishers, Kottayam, 2013.
23. Spectrum's Handbook of General Studies – 2013-14, Spectrum Books (P) Ltd., New Delhi

CURRENT

AFFAIRS

Magazines

Economic and Political Weekly, Yojna, the Week, India Today, Frontline, Spectrum. Competition Success Review, Competition Master, Civil Services Chronicle, Current Affairs, World Atlas Book

Newspapers

The Hindu, Times of India, The Hindustan Times, The Tribune

DAV UNIVERSITY, JALANDHAR

Course Title: **Manufacturing Practice**

Course Code: MEC104

L	T	P	Credits
0	0	4	2

Course Objective:

1. Know basic workshop processes, Read and interpret job drawing.
2. Identify, select and use various marking, measuring, holding, striking and cutting tools

   & equipment's
3. Operate and control different machines and equipment's.

CARPENTRY SHOP

a) Preparation of half lap joint

b) Preparation of Mortise and Tenon Joint

c) Preparation of a Dove & Tail joint

d) To prepare a White board duster

Welding Shop:

a) Preparation of Joint by Arc Welding

b) Preparation of Joint by using Gas Welding

c) Preparation of Joint by MIG/ TIG Welding

d) Preparation of Joint by Spot/ Seam Welding

Smithy Shop

a) To Forge the L – Hook

b) To Forge a Chisel

c) To Forge a Cube from a M.S Round

d) To forge a screw driver

Fitting Shop

a) Filing a dimensioned rectangular or square piece and prepare a sq. fitting

b) Preparation of T fitting male part

c) Preparation of U fitting Female part

d) Internal thread Cutting in Square piece and external thread cutting on a rod and assembling as a paper weight

Foundry Shop:

a) To make a Mould of solid pattern

b) To prepare a mould of sleeve fitting using gating system

c) To make a Mould of Split Pattern using Cope & Drag

d) To check the Hardness of the Mould

To check the Moisture Content in the Molding Sand

To check the Compressive Strength of Molding Sand

Sheet-Metal Shop

a) Preparation of a funnel from G.I. sheet

b) Preparation of a book rack stand from G.I. Sheet

c) Preparation of a leak proof tray with inclined edges from G.I. Sheet

d) Preparation of a square pen stand from G.I. Sheet with riveting at corners

Machine Shop

1. To make a job using step turning and grooving
2. To make a job using knurling and threading
3. To make a multi operation job on a Lathe machine
4. To make V – slot by using shaper machine

Electrical Shop

a) Layout of electrical tube light wiring

b) Layout of stair case wiring using two way switch

c) Testing and rectification of simulated faults in electrical appliances such as 'Electric Iron' Ceiling Fan. Electric kettle

d) To fabricate a circuit for the electrical wiring of, Fan with regulator and Bulb through a main switch and its testing using a series lamp

References:

1. Johl K. C., "Mechanical Workshop Practice", Prentice Hall India, 1st Edition.
2. Bawa H.S., "Workshop Technology", Tata McGraw Hill, 7th Edition.

DAV UNIVERSITY, JALANDHAR

Course Title: Engineering Physics Lab

Course Code: PHY152

L	T	P	Credits
0	0	2	1

Objective: The laboratory exercises have been so designed that the students learn to verify some of the concepts learnt in the theory courses. They are trained in carrying out precise measurements and handling sensitive equipments.

Note:

- Students are expected to perform at least eight-ten experiments out of following list. The experiments performed in first semester cannot be repeated in second Semester.
- The examination for both the courses will be of 3 hours duration

List of Experiments:

Experimental skills: General Precautions for measurements and handling of equipment, representation of measurements, Fitting of given data to a straight line, and Error analysis, Significant figures and interpretation of results.

1. To determine the Refractive Index of the Material of a given Prism using Sodium Light.
2. To determine the Dispersive Power and resolving power of the Material of a given Prism using Mercury Light.
3. To determine wavelength of sodium light using Fresnel Biprism.
4. To determine wavelength of sodium light using Newton's Rings.
5. To determination Wavelength of Sodium Light using Michelson's Interferometer.
6. To determine the wavelength of Laser light using Diffraction of Single Slit.
7. To determine the wavelength of (1) Sodium and (2) Mercury Light using Plane Diffraction Grating.
8. To determine the (1) Wavelength and (2) Angular Spread of HeNe Laser using Plane Diffraction Grating.
9. To study the wavelength of spectral lines of sodium light using plane transmission grating.
10. To study the specific rotation of sugar solution Laurent's half shade polarimeter method
11. To study the numerical aperture and propagation losses using HeNe laser Optical fibre set up.
12. To compare the focal length of two lenses by Nodal slide method.
13. To find the unknown low resistance by Carey Foster bridge.
14. To determine the beam divergence of the HeNe laser.
15. To study the Meissner's effect in superconducting sample.

16. To study the Faraday law of electromagnetic induction.
17. To study the capacitance by flashing/quenching of Neon bulb kit
18. To compare the two unknown capacitances of two capacitors by using DeSauty's bridge.
19. To find our out the unknown inductance by using the Anderson's bridge method.
20. To study the numerical aperture and propagation losses for He-Ne laser by using the optical fibre set up for
21. To study the Planck's constant by using photoelectric cell method.

DAV UNIVERSITY, JALANDHAR

Course Title: Basic Electrical Engineering Laboratory

Course Code: ELE106

L	T	P	Credits
0	0	2	1

Course Objective: This course provides a practical aspect of Circuit Analysis using Ohm's law, Kirchhoff's laws and network theorems, to understand the constructional detail of Electrical machines.

List of Experiments

1. To verify Ohm's Law, Kirchhoff's Current Law and Kirchhoff's Voltage Law.
2. To verify Thevenin's and Norton's theorems.
3. To verify Superposition theorem.
4. To verify Maximum Power Transfer theorem.
5. To plot frequency response of a series R-L-C circuit and determine resonant frequency and Q-factor for various values of R, L and C
6. To plot frequency response of a parallel R-L-C circuit and determine resonant frequency and Q-factor for various values of R, L and C.
7. To perform direct load test of a transformer and plot efficiency versus load characteristics.
8. To perform open circuit and short circuit test on transformer.
9. To perform speed control of DC motor.
10. Measurement of power in a three phase system by two wattmeter method.
11. To plot the V-I characteristics of PN-junction diode.
12. To verify the truth table of logic gates.
13. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors. Meggers.
14. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor)

DAV UNIVERSITY, JALANDHAR

SEMESTER-3rd

Course Title: Circuit Theory
Paper Code: ELE201

L	T	P	Credits
4	0	0	4

Objective:
The objective of the course is to enable the students to understand the basic concepts related to Network Theorems for AC and DC Networks, Network Analysis and Synthesis, Circuit Theory and Filters and their applications.

Unit-A

Circuit Concepts and Network Theorems: Energy Sources, Independent and dependent sources, Source transformation, Kirchhoff's Laws, Nodal and Mesh analysis in electric circuits, A.C. and D.C. Network Theorems: Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum Power Transfer theorem, Millman's theorem, Reciprocity theorem, Substitution theorem, Compensation theorem, Tellegen's theorem, Numerical Problems. Three-phase circuits. Mutual coupled circuits, Dot Convention in coupled circuits.

Unit-B

Graph Theory: Concept of network graph, terminology used in network graph, relation between twigs and links, formation of incidence matrix, tie-set matrix, cut-set matrix, Kirchhoff's voltage law into topological form, Kirchhoff's current law into topological form, relationship between branch voltage matrix, twig voltage matrix and node voltage matrix, relation between branch current matrix and loop current matrix.

Unit-C

Two Port Network Analysis: Introduction, Network elements, classification of network, network configuration, Open Circuit Impedance Parameters, Short-Circuit admittance parameters, Hybrid Parameters, ABCD Parameters, Inter-Relationships between parameters of two port network, Expression of Input-Output impedances in terms of two port parameters, different types of interconnections of two port networks.
Time and Frequency Domain Analysis: Representation of basic circuits in terms of generalized frequency and their response, Laplace t ransform of shifted functions, transient and steady response, Time domain behaviors from poles and zeros, Convolution Theorem

Unit-D

Network Synthesis: Network functions, Impedance and Admittance function, Transfer functions, Hurwitz Polynomials, Positive real functions, LC Network Synthesis, Foster's Canonic Form, Relationship between transfer and impulse response, poles and zeros and restrictions, Network function for two terminal pair network, Sinusoidal network in terms of poles and zeros, Real liability condition for impedance synthesis of RL and RC circuits, Network synthesis techniques for 2-terminal network, Foster and Cauer forms, Foster and Cauer forms.
Filters: Classification of filters, characteristics impedance and propagation constant of pure reactive network, Ladder network, T-section, π-section, terminating half section, Pass bands

and stop bands, Design of constant-K, m-derived filters, Composite filters.

Suggested Book:

1. Chakraborty Abhijit, "*Circuit Theory"*, 2nd Edition, Dhanpat Rai, 2001.
2. Bird John, "*Electrical Circuit Theory and Technology"*, 2nd Ed., Newnes.
3. Chaudhury D. Roy, "*Networks and Synthesis"*, New Age International.
4 .Edminister J.A., "*Electric Circuits"*, 4th Edition, Tata McGraw Hill, 2002.
5. Iyer T.S.K.V., "*Circuit Theory"*, Tata McGraw Hill, 2006.
6. Mohan, Sudhakar Sham, "*Circuits and Networks Analysis and Synthesis"*, 2NdEdition, Tata McGraw Hill, 2005.
7. Van Valkenberg, M.E., "*Network Analysis and Synthesis"*, PHI learning, 2009.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
4	0	0	4

Course Title: Engineering Mathematics-III
Paper Code: MTH 252A

Course Objective: The objective of the course is to enable the students to understand the basic concepts related to Laplace transforms, Fourier series, ordinary differential and partial differential equations and their applications.

Unit-A

Fourier series: Periodic functions, Euler's formula. Dirichlet's conditions. Fourier series of discontinuous functions. Fourier series of Even and Odd functions, half range expansions, Fourier series of different wave forms, Complex form of Fourier series. Fourier Transformation.

Unit-B

Laplace Transforms: Laplace transforms of various standard functions, Linear property of Laplace transforms, Shifting property and change of scale, inverse Laplace transforms, transform of derivatives and integrals, Laplace transform of unit step function, impulse function, periodic functions, applications to solution of ordinary linear differential equations with constant coefficients, and simultaneous differential equations.

Unit-C

Partial Differential Equations: Formulation of partial differential equations, Linear partial differential equations, homogeneous partial differential equations with constant coefficients. Wave equation and Heat conduction equation in one dimension. Two dimensional Laplace equation and their applications, solution by the method of separation of variables.

Unit-D

Analytic Function: Limits, continuity and derivative of the function of complex variable, Analytic function, Cauchy-Riemann equations, conjugate functions, harmonic functions
Complex Integration: Line integrals in the complex plane, Cauchy's theorem, Cauchy's integral formula and derivatives of analytic function. Taylor's and Laurent's expansions (without proofs), singular points, poles, residue, Integration of function of complex variables using the method of residues.

Suggested Books:

1. Jain R K and Iyengar S R K, *Advanced Engineering Mathematics*, 2nd Ed., Narosa Publishing House, New Delhi, 2003.
2. Singh Ravish R. and Bhatt M., *Engineering Mathematics a Tutorial Approach*, McGraw Hill.
3. Grewal B.S, *Higher Engineering Mathematics*, Khanna Publication, Edition 40th Edition.
4. Kreyszig Erwin, *Advanced Engineering Mathematic*, Wiley Eastern Limited, 8th edition, 2006.

5. Zill Dennis G., Shanahan Patrick D., *A first course in complex analysis with applications*, Jones and Bartlett Learning, 2003.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
4	0	0	4

Course Title: Generation and Control of Power
Paper Code: ELE216

Course Objective: This course provides a comprehensive understanding of various power plant for generating electricity. Various characteristics and selection criteria for power plants.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the various power plant and its economic aspect. The participants will learn how the load factors and diversity factors are important to design any power system. The course will equip them with the understanding of the concepts of hydroelectric coordination.

Unit-A

Introduction: Electrical energy sources, organization of power sector in India, single line diagram of thermal, hydro and nuclear power stations. Classification of power plants in base load and peak load plants

Power Plant Economics: Capital cost of plants, annual fixed cost, operating costs and effect of load factor on cost of energy, depreciation.

Loads and Load curves: Types of load (fixed voltage loads, resistive loads, Inductive motor loads, Mechanical load), effect of load on supply voltage, Maximum demand, Group diversity factor, Peak diversity factor, Types of load, chronological load curves, load-duration Curve, mass curves, load factor, capacity factor, utilization factor, base load and peak load plants, load forecasting.

Unit-B

Tariffs and power factor improvement: Objectives of tariff making, different types of tariff (domestic, commercial, agricultural and industrial loads). Need for power factor (p.f.) improvement, power factor improvement using capacitors, determination of economic power factor.

Hydroelectric plants: Choice of site, classification of hydroelectric plants, main parts and working of plants and their layouts, characteristics of hydroelectric generators.

Thermal power plants: Choice of site, main and auxiliary equipment fuel gas flow diagram, water stream flow diagram, working of power plants and their layout, characteristics of turbogenerators.

Unit-C

Nuclear power plants: Choice of site, classification of plants, main parts, layout and their working, associated problems.

Diesel power plants: Diesel plant equipment, diesel plant layout and their working, application of diesel plants.

Combined working of plants: Advantages of combined operation plant requirements of base load and peak load operation. Combined working of runoff river plant and steam plant.

Unit-D

Power station equipment and control

Excitation system- Purpose and requirements of excitation system, brushless excitation system. Voltage regulators – Function and characteristics of automatic voltage regulators, solid regulator. Speed Governing – Purpose of speed governing system, Hydraulic type, speed governing system for steam turbines and steam turbines and hydro turbines. Automatic generation control - types of interconnection, advantages of interconnection, real and reactive power control, single area automatic generation control, automatic generation control for two area system, types of automatic generation control for interconnection power systems.

Pollution and environmental problems: Energy and environment, Air pollution, Aquatic impacts, nuclear plant and hydro plant impacts.

Cogeneration: Definition and scope, Topping and Bottoming Cycles, Benefits, cogeneration technologies.

Suggested Books:

1. Deshpande M.V., "*Power Plant Engineering",* Tata McGraw Hill, 2004.
2. EI-Wakit M.M., "*Power Plant Engineering*" McGraw Hill, USA
3. Rajput R.K., "*Power Plant Engineering"*, Luxmi Publications
4. Sharma P.C., "*Power Plant Engineering"*, Kataria and Sons
5. Skrotzki B.G.A. and Vapot W.A., "*Power Station Engineering and Economy"*, Tata McGraw-Hill
6. Arora S.C. and Dom Kundwar S., "*A course in Power Plant Engineering",* DhanpatRai.
7. Nag, P.K., "*Power Plant Engineering",* Tata McGraw Hill
8. Gupta B.R., "*Generation of Electrical Energy",* S. Chand, 1998.
9. Nagrath I.J. and Kothari D.P., "*Power System Analysis*" , Tata McGraw-Hill Publication

DAV UNIVERSITY, JALANDHAR

Course Title: Electrical Measurement and Instrumentation
Paper Code: ELE209A

L	T	P	Credits
4	0	0	4

Course Objective: To understand the basic concepts of measurements in electrical engineering.

Learning Outcomes: Students will feel comfortable in understanding the working of moving coil instruments, magnetic field instruments and their role in measurement

UNIT-A

Measurements and Measurement Systems: Measurements, significance of measurements, methods of measurements, direct methods, indirect methods, instrument and measurement systems, mechanical, electrical and electronic instruments, classification of instruments, deflection and null type instruments- deflection type, null type, comparison of deflection and null type instruments, Analog and digital modes of operation, functions of instruments and measurement systems, applications of measurement systems, types of instruments systems, information and signal processing,extension of the range of voltmeter and ammeter.
Elements of a generalized measurement system- primary sensing element, variable conversion element, data presentation element, input-output configurations of measuring instruments and measurement systems- desired inputs, inferring inputs, modifying inputs, methods of correction for interfering and modifying inputs.

UNIT-B

Characteristics of instruments and measurement systems: Measurement system performance, static calibration , static characteristics, errors in measurements, true value, static error, static correction, scale range and scale span, error calibration curve, reproducibility and drift repeatability, noise –signal to noise ratio, source of noise, Johnson noise, power spectrum density, noise factor and noise figure, accuracy and precision, indications of precision, significant figures, range of doubt, possible errors and doubtful figures, static sensitivity, linearity, hysteresis, threshold, dead time, dead zone, resolution of discrimination, loading effects, input and output impedances- input impedances, input admittance, output impedance, output admittance, loading effect due to shunt connected instruments, loading effects due to series connected instruments, generalized impedance and stiffness concepts, static stiffness and static compliance, impedance matching and maximum power transfer.
Potentiometer: Introduction to basic principle, Laboratory type Crompton's potentiometer, Dual range potentiometer, Volt ratio box, application of dc potentiometer, self-balancing potentiometer.

UNIT-C

Measurement of Resistances: Classification of resistances, measurement of medium resistance, Measurement of low resistance (Kelvin double bridge, Ammeter-Voltmeter) and Measurement of high resistance including loss of charge method and Mega ohm bridge method.
AC Bridges: General theory of ac bridge, Measurement of self-inductance, Measurement of capacitance, Measurement of mutual inductance, Measurement of frequency, Sources of error in ac bridges and their minimization.

UNIT-D

Electromechanical Indicating Instruments: Operating forces, Constructional Details, Control System, Torque Weight ratio, Damping System: Air friction Damping, Fluid Friction Damping, Eddy Current Damping, Electromagnetic Damping.

Analog Ammeter, Voltmeter: Introduction, Types of instruments, PMMC-Construction Torque Equation, MI Instruments- Construction, general Torque Equation, Classification of MI Instruments, Attraction Type, repulsion Type, Extension of range, Advantages & Disadvantages, Applications, Electrodynamometer Type instruments Induction type Energy meter.

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram and working of each block, Typical CRT connections, study of various stages in brief, high-frequency CRO considerations, measurement of phase &frequency, electrostatic deflection, dual trace & dual beam oscilloscope, Sampling and storage oscilloscope

Suggested Books:

1. Murty D.V. S., "*Transducers & Instrumentation*", PHI, New Delhi, 2000.
2. Sawhney A. K., "*Electrical and Electronics Measurements and Instrumentation*", Dhanpat Rai and Sons, New Delhi, 2000.
3. Kalsi H S, "*Electronic Instrumentation*", Tata McGraw Hill, New Delhi, 4th Ed. , 2001.
4. Patranabis D, *"Sensors and Transducers*", PHI, New Delhi, 2003.
5. Doebelin Ernest O, *"Measurement Systems: Application and Design*", Tata McGraw Hill Ltd., New Delhi , 2004.

DAV UNIVERSITY, JALANDHAR

Course Title: Electrical Machines-I (DC Machines & Transformers)
Paper Code: ELE202A

L	T	P	Credits
4	0	0	4

Course Objective: The objective of the course is to enable the students to understand the basic concepts related Electromechanical Energy Conversion, Transformer, DC Motor and DC Generator and their applications.

Unit-A

Electromechanical Energy Conversion: Principle of electromechanical energy conversion, calculation of electrical energy input, energy stored in magnetic field, mechanical work done, expression for force and torque for singly excited and doubly excited magnetic system. Force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element. Examples - galvanometer coil, relay contact, lifting magnet, rotating element with eccentricity or saliency

Unit-B

Single Phase Transformers: Principle of single-phase transformer, E.M.F. Equation, turn ratio, phasor diagram of ideal and real transformer at no load and loaded condition, equivalent circuit,OC/sc test voltage regulation, losses and efficiency, all day efficiency and its calculation. Parallel operation of single-phase transformers, division of load between transformers in parallel (equal/unequal voltage ratio).

Three Phase Transformers: Three phase transformers: star/star connection, delta/delta connection, star/delta connection, delta/star connection 0^o and $+30^o$ connection .choice of star delta connection, open delta connection, three winding transformer. Phase conversion - Scott connection, three-phase to six-phase conversion.

Unit-C

D.C. Generators: Constructional detail, voltage equation, lap and wave wound machines, equalizer, connection, armature reaction and method of overcoming its detrimental effects , equivalent circuit of d.c generator, separately excited, and self excite generator , voltage equation and terminal characteristics of shunt, series, and compound d.c generator .voltage buildup in shunt generator , failure to build up voltage in shunt generator , voltage regulation , parallel operation of d.c generators

Unit-D

D.C. Motors: Torque generated in particle D.C. motor, equivalent circuit of motor, various types' terminal characteristics of shunt, series and compound motors. Speed control of dc motor by shunt field method and armature voltage method. Ward –Leonard speed control method, static ward Leonard method and multi quadrant speed control through ward – Leonard method Need of starter in dc motor, three-point and four starter of dc shunt motors, testing of DC motors.

DAV UNIVERSITY, JALANDHAR

Suggested Books:

1. Bimbhra P.S., "*Electrical Machinery", Khanna Publishers*
2.Fitzgerald A.E., Kingsley C. and Umans S.D., "*Electric Machinery"*, 6th Edition, McGraw Hill
3. Langsdorff E.H., "*Principles of A.C. Machines"*, tata McGraw Hill
4.Nagrath I.J. and Kothari D.P., "*Electrical Machines"*, 4th Edition, Tata McGraw Hill,
5.Say M G, "*Alternating Current Machines"*, 5th edition, Sir Isaac pitman & Sons Ltd.

DAV UNIVERSITY, JALANDHAR

Course Title: Electrical Machines-I(DC Machines & Transformers) Laboratory
Paper Code: ELE203

L	T	P	Credits
0	0	2	1

Course Objective: The purpose of this course is to introduce to the students the basics of single phase and three phase Transformer, DC series, shunt and Compound motor/generator and to analyze their characteristics

Learning Outcomes: At the end of this course, the students will learn

- Working of single and three phase transformers
- Working of different types of DC Motors
- Working of Series/Shunt/Compound DC Generators
- Various characteristics of DC machines

List of Experiments

1. To perform Load test on a single phase transformer.
2. To perform Open circuit and short circuit tests on a single phase transformer.
3. To find the efficiency and voltage regulation of single phase transformer under different loading conditions.
4. To perform parallel operation of two single-phase transformers.
5. To perform the various connections of three-phase transformer.
6. To measure armature and field resistance of direct current (DC) shunt generator and to obtain its open circuit characteristics.
7. To obtain load characteristics of direct current (DC) shunt generator.
8. To obtain load characteristics of direct current (DC) series generator.
9. To obtain load characteristics of direct current (DC) compound generator.
10. To draw speed-torque characteristics of direct current (DC) shunt generator.
11. To draw speed-torque characteristics of direct current (DC) series generator
12. To draw speed-torque characteristics of direct current (DC) compound generator
13. To perform Swinburne's test (no load test) to determine losses of direct current (DC) shunt motor.

DAV UNIVERSITY, JALANDHAR

Course Title: Electrical Measurement & Instrumentation Laboratory
Paper Code: ELE210

L	T	P	Credits
0	0	2	1

Instruction for Students: The candidate will be attending a laboratory session of 2 hours weekly and students have to perform the practical related to the following list.

List of Experiments

1. Study of principle of operation of various types of electromechanical measuring instruments.
2. Determination of frequency, Amplitude, RMS Value, Average Value ,Phase Angle, Time Period and Lissajiuos Patterns using Cathode Ray Oscilloscope and DSO.
3. To calibrate and use the Digital Energy Meter.
4. Measurement of resistance using Wheatstone Bridge.
5. Measurement of resistance using Kelvin's Bridge.
6. Measurement of self-inductance using Anderson's Bridge.
7. Measurement of capacitance using Schering Bridge.
8. Measurement of capacitance using Desauty's Bridge.
9. Measurement of frequency using Wien's Bridge.
10. To measure the unknown resistance with the help of Voltmeter and Ammeter.

DAV UNIVERSITY, JALANDHAR

SEMESTER-4th

Course Title: Power System-I (Transmission & Distribution)
Paper Code: ELE217

L	T	P	Credits
3	0	0	3

Course objective: This course provides a comprehensive understanding of the origin and development of power system and basics of transmission line, its construction and economic design.

Learning Outcomes: After the completion of this course the participants would be able to basics of overhead and underground transmission line.

Unit-A

Introduction: Power supply network, effect of voltage in conductor size, comparison of conductor vol. in typical systems elementary high voltage DC transmission and its advantages and disadvantages. Structure of a power system: Bulk Power Grids and Micro-grids.
Supply System: Introduction to Transmission and Distribution systems, Comparison between DC and AC systems for Transmission and Distribution, comparison of cost of conductors, choice of working voltage for transmission and distribution, economic size of conductors-Kelvin's law, Radial and mesh distribution networks, Voltage regulation.

Unit-B

Conductors and Transmission Line Construction: Conductor materials; solid, stranded, ACSR, hollow and bundle conductors. Different types of supporting structures for overhead lines. Elementary ideas about transmission line construction and erection. Stringing of conductors, spacing, sag and clearance from ground, overhead line insulators, Concept of string efficiency. Phenomenon of corona, electric stress, corona discharge.
Transmission Line Parameters: Introduction to line parameters, Resistance of transmission line, inductance of single-phase two-wire line, concept of G.M.D., Inductance of three-phase line, Use of bundled conductor, transposition of power lines, capacitance of 1-phase and 3-phase lines, effect of earth on capacitance of conductors. Double circuit lines, Skin and Proximity effect

Unit-C

Performance of transmission lines: Representation of short transmission line, medium length line (nominal T & II circuits), long length line by hyperbolic equations and equivalent T & II circuits. Power flow through transmission lines, ABCD constants, Voltage regulation.

Unit-D

Underground Cables: Classification of cables based upon voltage and dielectric material, insulation resistance and capacitance of single core cable, dielectric stress, Capacitance of 3 core cables, methods of laying, heating effect, Maximum current carrying capacity, cause of failure, comparison with overhead transmission lines.

Suggested Books:

1. Elgerd O.L., "*Electrical Energy System Theory - An introduction"*, Tata McGraw-Hill Publication
2. Gupta B.R., "*Power System Analysis & Design"*, Wheeler Publishing
3. Nagrath I.J. and Kothari D.P.," *Power System Analysis"*,Tata McGraw-Hill Publication
4. Stevenson Jr. W.D., "*Elements of Power System Analysis"*, Tata McGraw-Hill Publication
5. Wadhwa C.L.*, "Course in Electrical Power"*, New Age International Pvt. Ltd.

DAV UNIVERSITY, JALANDHAR

Course Title: Analog Electronics
Course Code: ECE211

L	T	P	Credits
4	0	0	4

Course Objectives: The purpose of this course is to introduce to the students the basics of biasing transistor circuits, feedback amplifiers, large signal amplifiers, tuned amplifiers, oscillators, wave shaping circuits, and to design and analyze various electronic circuits and systems

Learning Outcomes:

At the end of this course, the students will learn

- Working of power amplifiers and tuned amplifiers.
- Working of different types of feedback amplifiers & oscillators.
- Frequency response and design of tuned amplifiers.
- Basic working & design of wave shaping circuits.

Unit-A

High Frequency Transistor: The high frequency T model, common base short-circuit current frequency response, alpha cutoff frequency, common emitter short-circuit current frequency response, hybrid pi CE transistor model, hybrid pi conductance in terms of low frequency h parameters, CE short circuit current gain obtained with hybrid-pi model, current gain with resistive load.

Tuned Amplifiers: Single tuned, double tuned and stagger tuned amplifiers and their frequency response characteristics.

Unit-B

Large Signal Amplifiers: Class A direct coupled with resistive load, Transformer coupled with resistive load, harmonic distortion, variation of output power with load, Push-Pull Amplifiers, operation of class- B push-pull amplifier, crossover distortion, transistor phase inverter, complementary- symmetry amplifier.

Unit-C

Feedback Amplifiers: Concept of feedback, Positive and negative feedback, Voltage and current feedback, Series and shunt feedback, Effect of feedback on performance characteristics of an amplifier.

Oscillators : Condition for sustained oscillation, Barkhausen criterion, R-C phase shift, Hartley, Colpitts, Crystal and Wien Bridge Oscillators, Frequency stability criterion.

Unit-D

Wave shaping circuits: Multi-vibrators (A stable, Mono-stable, Bi-Stable), High pass and low pass filters using R-C Circuits and R-L, R-L-C Circuits & their response to step input, Pulse input, Square input and Ramp Input

Regulated Power Supplies: Zener diode as Voltage Regulator, Transistor Series and Shunt Regulators, Current limiting, Line and Load Regulation.

Suggested Books:

1. Boylestad Nashelsky, "*Electronic Devices and Circuit Theory*", 10th Ed., Pearson Education, 2009.

2. Floyd, Thomas L, "*Electronic Devices*", Pearson Education Inc., Delhi, Sixth Edition, 2002.
3. Sedra, Adel S and Smith, Kenneth C, "*Microelectronic Circuits*", Oxford University Press, New York, Sixth Edition, 2013.
4. Millman, Jacob and Halkias, Christos C, "*Integrated Electronics*" Tata McGraw- Hill, New Delhi.
5. Streetman Ben J, Banerjee Sanjay, "*Solid State Electronic Devices*", 5th Ed. PHI, 2004.

DAV UNIVERSITY, JALANDHAR

Course Title: Electromagnetic Field Theory
Paper Code: ELE204

L	T	P	Credits
4	0	0	4

Course Objective: This course provides a comprehensive understanding of electrostatics, Magnetostatics and development of Maxwell's equation and EM wave equations and their applications in transmission lines. It enables the students to understand the universal theoretical concepts in three-dimensional real world and find solution to problems related to electromagnetic wave propagation.

Learning Outcomes:

- To impart knowledge on the basic concepts of electrostatics and magnetostatics.
- To educate scientifically about Maxwell's equations and Poynting theorem
- To interpret the Wave propagation in between parallel plates.
- To emphasize the significance of different types of transmission lines.

After the completion of this course the participants would gain the knowledge of the vector analysis, Electrostatics and Magnetostatics phenomenon, Maxwell's and EM wave equations and transmission lines.

Unit-A

Review of Vector Analysis: Vector analysis, Physical interpretation of gradient, divergence and curl; vector relations in other coordinate systems, integral theorems: divergence theorem, Stoke's theorem, Green's theorem and Helmholtz theorem, numerical problems.

Unit-B

Electrostatics: Introduction to fundamental relations of electrostatic field; Gauss's law and its applications; potential function; Field due to continuous distribution of charges; Equipotential surfaces; Divergence theorem; Poisson's equation and Laplace's equation, capacitance, electrostatic energy, Conditions at Boundary between dielectrics, Uniqueness theorem.

Magnetostatics: Magnetic induction and Faraday's laws; magnetic Flux Density; magnetic field strength and magnetomotive force; Ampere's work Law in the differential vector form; permeability; energy stored in a magnetic field ; ampere's force law; magnetic vector potential, Analogies between electric and magnetic fields.

Unit-C

Maxwell's Equations and Time-Varying Fields: Equation of continuity for time-varying fields, Inconsistency of Ampere's law, Maxwell's equations in integral and differential form for static and time-varying fields, conditions at a Boundary surface, Concept of Poynting vector, Poynting Theorem, Interpretation of ExH

Unit-D

Electromagnetic Waves Propagation: Solutions for free-space conditions; Uniform Plane Wave Propagation; Wave equations for a conducting medium; Sinusoidal time variations; Polarization; Conductors and Dielectrics; Direction Cosines; Reflection by Perfect Conductor-normal and oblique incidence, Perfect Dielectric-normal incidence, Perfect Insulator–Oblique incidence; Brewster angle, Reflection at a surface of Conductive medium, Surface impedance, wave impedance, velocities of propagation

Transmission Lines: Circuit representation of parallel plane transmission lines. Parallel plane transmission line with losses. Low loss RF and UHF transmission lines. Distortion less condition. Transmission line charts-impedance matching, Introduction to waveguides.

Suggested Books:

1. Matthew N.O.Sadiku, *Elements of Electromagnetic*, Oxford Univ. Press, 4th ed., 2009
2. Edward C. Jordan and Keith G Balmain, *Electromagnetic Waves and Radiating Systems*, Prentice-Hall Inc.
3. Kraus John D. *Electromagnetics, McGraw-Hill Publishers*
4. Edminister Joseph A., *Schaum's Theory and Problems of Electromagnetics, McGraw-Hill*
5. Rao N. Narayana, *Elements of Engineering Electromagnetics, Pearson Education*
6. K.D Prasad., "*Electromagnetic field and waves*"
7. R.G.Kaduskar., "*Principles of Electromagnetic*"

DAV UNIVERSITY, JALANDHAR

Course Title: Electrical Machines-II(Asynchronous and Synchronous Machines)
Paper Code: ELE205A

L	T	P	Credits
4	0	0	4

Course objective: Understand the basic principles of operation of rotating electric machines, their classification, and basic efficiency and performance characteristics.

Learning Outcomes: After the completion of this course the participants would gain the knowledge to distinguish working procedure of induction motor and generator and their constructional feature.

Unit-A

Fundamentals of AC machine windings
Physical arrangement of windings in stator and cylindrical rotor; slots for windings; single turn coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, 3D visualization of the above winding types, Air-gap MMF distribution with fixed current through winding - concentrated and distributed, Sinusoidally distributed winding, winding distribution factor
Polyphase Induction Machines: Analogy between induction motor and transformer, production of rotating field in space distributed three-phase winding, constructional features, concept of slip and operation, rotor frequency, current and power, equivalent circuit, phasor diagram, torque-slip characteristics, effect of rotor circuit resistance, starting torque, crawling and cogging, cage motors(double cage and deep bar motor).

Unit-B

Starting Methods and Speed Control: Starting methods, speed control: (i) control of speed of rotating field, (ii) control of slip speed. Effect of voltage injection in rotor circuit of slip ring induction motor. Motor tests for estimation of equivalent circuit parameters.
Fundamentals of Synchronous Motor: principle of operation, phasor diagram, operation of constant load with variable excitation. V curve, two reaction theory.

Unit-C

Synchronous Generator: principal of operation of alternators, construction feature of turbo generators, distribution and coil span factor. Emf equation, armature reaction, synchronous impedance, regulation of alternators and its determination by synchronous impedance method, load characteristics and input and output power of alternator.
Single –Phase Motors: Double revolving field theory, types of single phase motors, characteristics and equivalent circuit. Shaded pole motor: working principle and characteristics.

Unit-D

Special Purpose Motors: Stepper Motors: construction, principle of operation and applications, Linear Induction Machines: construction, principle of operation and applications. Universal Motor: construction, principle of operation and applications and Hysteresis Motor.

Suggested Books:

1. Fitzgerald A.E., Kingsley C. and Umans S.D., "*Electric Machinery"*, 6th Edition,

McGraw Hill
2. Langsdorff E.H., "*Principles of A.C. Machines"*, McGraw Hill
3. Nagrath I.J. and Kothari D.P., "*Electrical Machines"*, 4th Edition, Tata McGraw Hill,
4. Bimbhra P.S., "*Electrical Machinery", Khanna Publishers*
5. Say M G, "*Alternating Current Machines"*, 5th edition, Sir Isaac pitman & Sons Ltd.

DAV UNIVERSITY, JALANDHAR

Course Title: Renewable Energy Sources and Management

L	T	P	Credits
4	0	0	4

Paper Code: ELE214A

Course Objective: This course provides a comprehensive understanding renewable energy systems, their processing and analyses.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the various corresponding sources of energy. The participants will learn how the thermoelectric, MHD generators are analyzed as the great source of energy.

UNIT A

Introduction: Global energy requirement, Limitations of Conventional Energy sources, uses & growth of alternate energy sources, Basic schemes & application of direct energy conversion, Applications of carbon credit.

Energy Management: Principles of energy conservation, Energy Audit, energy conservation approach/technologies, co-generation, waste heat utilization, power factor improvement, regeneration methods, energy storage, efficient energy management, techniques, Energy management system in India.

UNIT B

MHD Generators: Basic principle, gaseous conduction & Hall Effect, generator & motor effect, different types of MHD generators, practical MHD generators, applications & economic aspects.

Thermo-Electric Generators: Thermoelectric effects, thermoelectric converters, figure of merit, properties of thermoelectric materials, brief description of construction of thermoelectric generators, applications & economic aspects.

UNIT C

Photo Voltaic Effect & Solar Energy: Photo Voltaic effect, different types of photoelectric cells, cell fabrication, characteristics of photovoltaic cells, conversion efficiency, solar batteries, solar radiation analysis, solar energy in India, solar collector, solar furnaces & applications.

UNIT D

Other Sources: Introduction to tidal and geothermal sources of energy, Fuel cells, principle of action, general description of fuel cells, conversion efficiency, operational characteristics & applications. Low-level hydro plants, definition of low head hydropower, Choice of site, choice of turbines. Wind power, history of wind power, wind machines, theory of wind power, characteristics of suitable wind power sites, Biomass energy, conversion processes. Different biomass energy resources, electric equipment, precautions, and applications.

Suggested books:

1. Chakrabarti, A. *" Energy Engineering and Management",* PHI, 2013
2. Kashbari "*Energy Resources Demand & Conservation with special reference to India*" TMH.
3. R.A. Coormbe "*An Introduction to Direct Energy Conservation*".
4. Kettani, M "*Direct Energy Conversion*".
5. Robert L. Loftness "*Energy Handbook*".

6. Considine "*Energy Technology Hand Book*".
7. G.D. Rai "*Non-Conventional sources of Energy*"
8. S. Rao, Parulekar "*Energy Technology, Non-Conventional, Renewable & conventional*".
9. A Ter-Gazarian "*Energy storage for Power system*", (peter Peragimus Ltd.)

DAV UNIVERSITY, JALANDHAR

Course Title: Electrical Machines-II(Asynchronous and Synchronous Machines) Laboratory
Paper Code: ELE207

L	T	P	Credits
0	0	2	1

Course Objective: This course provides a practical understanding of the rotating machines, e.g. Single Phase and Three Phase Induction Motors, Significance of slip, concept of armature reaction and its detrimental effects.

Learning Objectives: After completing this laboratory course students would be able to understand significance of slip and how torque is varied with slip and practical concept of AC machines.

List of Experiments

1. To perform load-test on three-phase Induction motor and to plot torque versus speed characteristics.
2. To perform no-load and blocked–rotor tests on three-phase Induction motor to obtain equivalent circuit..
3. To perform the speed control of three-phase Induction motor by Kramer's Concept.
4. To perform the speed control of three-phase Induction motor by cascading of two induction motors, i.e. by feeding the slip power of one motor into the other motor.
5. To perform star- delta starters physically and
   a) To draw electrical connection diagram
   b) To start the three-phase Induction motor using it.
   c) To reverse the direction of three-phase Induction motor
6. To start a three-phase slip–ring induction motor by inserting different levels of resistance in the rotor Circuit and to plot torque-speed characteristics.
7. To perform no-load and blocked–rotor test on single-phase Induction motor and to determine the parameters of equivalent circuit. Drawn on the basis of double revolving field theory.
8. To perform load–test on single-phase. Induction motor and plot torque-speed characteristics.
9. To perform no load and short circuit. Test on three-phase alternator and draw open and short circuit characteristics.
10. To find voltage regulation of an alternator by zero power factor (ZPF) method.
11. To study effect of variation of field current upon the stator current and power factor with synchronous motor running at no load and draw Voltage and inverted Voltage curves of motor.
12. To measure negative sequence and zero sequence reactance of Synchronous Machines.
13. Parallel operation of three-phase alternators using
    • Dark lamp method
    • Two-Bright and one dark lamp method
14. To study synchroscope physically and parallel operation of three-phase alternators using synchroscope.
15. Starting of synchronous motors using
    - Auxiliary motor
    - Using Damper windings

DAV UNIVERSITY, JALANDHAR

Course Title: Analog Electronics Laboratory

L	T	P	Credits
0	0	2	1

Paper Code: ECE214

Course Objective: The purpose of this course is to introduce to the students the basics of biasing transistor circuits, feedback amplifiers, large signal amplifiers, tuned amplifiers, oscillators, wave shaping circuits, and to design and analyze various electronic circuits and systems

Learning Outcomes: At the end of this course, the students will learn
- Working of power amplifiers and tuned amplifiers.
- Working of different types of feedback amplifiers & oscillators.
- Frequency response and design of tuned amplifiers.
- Basic working & design of wave shaping circuits

List of Experiments

1. Frequency response analysis of Tuned amplifiers.
2. Frequency response analysis of Feedback amplifier.
3. Study of Multi-vibrators (A-stable, Mono-stable, Bi-stable Multi-vibrator).
4. To plot the characteristics of a Class- A amplifier.
5. To plot the characteristics of Class- B amplifier.
6. To plot the characteristics of Class- B push-pull amplifier.
7. To plot the characteristics of complementary symmetry amplifier.
8. To plot the response of RC phase shift oscillator and determine frequency of oscillation.
9. To plot the response of Hartley oscillator and determine frequency of oscillation.
10. To plot the response of Colpitt's oscillator and determine frequency of oscillation.
11. To plot the response of Wien Bridge oscillator and determine frequency of oscillation

DAV UNIVERSITY, JALANDHAR

SEMESTER-5th

Course Title: Transducer and Signal Conditioning
Paper Code: ELE318

L	T	P	Credits
4	0	0	4

Course Objective: This course provides a comprehensive understanding of the Transducers and Signals Conditions and their applications for various measurements in Electrical Engineering

UNIT-A

Introduction: Measurement systems, Basic electronic measuring system, advantage of electric transducers Transduction principles, Classification of transducers, General transducers characteristics, Criteria for transducer selection, characteristics of transducers: input characteristics, transfer characteristics, output characteristics

Resistive Transducers: Principles of operation, construction, theory, advantages and disadvantages, applications of Potentiometers, strain gauges, (metallic and semiconductor type), Resistance Thermometer, Thermistors.

Inductive Transducers: Types of Inductive transducer, Principles of operation, construction, Advantages & disadvantages and applications. Various variable Inductive Transducers: LVDT Linear variable differential transformer(LVDT), advantages & disadvantages of LVDT. Uses of LVDT, Rotary Variable Differential Transformer (RVDT), applications

Capacitive Transducers: Types of capacitive transducer, Principles of operation, construction, theory, advantages and disadvantages and applications, of capacitive transducers based upon familiar equation of capacitance

Elastic Transducers: Spring bellows, diaphragm, bourdon tube – their special features and application.

UNIT-B

Active Transducers: Principle of operation, construction, theory, advantages and disadvantages and applications of following transducers: Thermocouple, Piezo-electric transducer, Magnetostrictive transducer, Hall effect transducer, Photo-voltaic transducer and Electrochemical transducer.

Other Transducers: Optical transducers: photo-emissive, photo-conductive and Photo-voltaic cells, Digital

Opto–Electronic Transducers: photoconductive cells, semiconductor photodiode , Phototransistors, Optical encoder, Shaft encoder. Feedback fundamentals, introduction to Inverse transducer.

UNIT-C

Measurement Using Transducers: Motion, Force and Torque measurement, fundamental standards, standard, relative displacement, transnational and rotational relative; velocity transducers: rotational relative, transnational and rotational relative; acceleration measurements: seismic and absolute display, Accelerometers: Standards and Calibration, Basic methods of force measurement, Characteristics of elastic force Iran lucers, Torque Measurement of rotating Shafts, dynamometers, Pressure measurement: standards and Calibration, Basic Methods of Pressure measurement, U tube Manometers ,Thermocouple Vacuum Gauge, PiraniGauge, Ionization Type, Vacuum Gauges, Elastic Transducers, High Pressure Measurement, Low Pressure (Vacuum) measurement, Flow measurement Local flow velocity, Magnitude and direction Gross volume flow rate, Gross Mass flow rate, Turbine Meters Effect.

UNIT-D

Signal Conditioning: Concept of signal conditioning, Introduction to AC/DC Bridges. Op-amp circuits used in instrumentation, Instrumentation amplifiers, analog-digital sampling, introduction to A/D and D/A conversion, signal filtering, averaging, correlation, Interference, grounding , and shielding. Basic telemetry system.

Suggested Books:

1. Murty D V S, "*Transducers & Instrumentation*", PHI, New Delhi, 2000.
2. Sawhney A K, "*Electrical and Electronics Measurements and Instrumentation*", Dhanpat Rai and Sons, New Delhi, 2000.
3. Kalsi H S, "*Electronic Instrumentation*", Tata McGraw Hill, New Delhi, 4th Ed. , 2001.
4. Patranabis D, "*Sensors and Transducers*", PHI, New Delhi, 2003.
5. Doebelin Ernest O, *"Measurement Systems: Application and Design*", Tata McGraw Hill Ltd., New Delhi , 2004.

DAV UNIVERSITY, JALANDHAR

Course Title: Signal and Systems
Course Code: ELE330

L	T	P	Credits
3	0	0	3

Course Objectives: The purpose of this course is to introduce students to the fundamentals of signals and systems which are basic to Signal Processing. The main objective of this subject is to help the students to mathematically analyze different types of signals and their associated systems

Learning Outcomes:

At the end of this course, the students will be able to understand the

- Various classifications of both Continuous time and discrete time Signals and Systems.
- Spectral analysis of Periodic and Aperiodic Signals using Fourier series.
- Analysis and characterization of the CT system through Laplace transform.
- Analysis and characterization of the DT system through Difference equation.
- Analysis and characterization of the DT system through Z transform**.**

Unit-A

Classification of Signals And Systems: Classification of Signals: Continuous time signals , Discrete-time signals,Periodic and Aperiodic signals , Even and odd signals, Energy and power signals ,Deterministic and random signals ,Complex exponential and Sinusoidal signals .Unit step, Unit ramp, Unit impulse ,Representation of signals in terms of unit impulse .Classification of Systems: Continuous time systems, Discrete-time systems , Linear system,Time Invariant system,causal system ,BIBO system ,Systems with and without memory ,LTI system.

Unit-B

Analysis of Continuous-Time Signals: Fourier series: Representation of Continuous time Periodic signals ,Trigonometric and exponential, Symmetry conditions, Properties of Continuous-time Fourier series ,Parseval's relation for power signals ,Frequency spectrum. Fourier transform: Representation of Continuous-time signals, Properties of Continuous-time Fourier transform ,Parseval's relation for energy signals ,Frequency spectrum,Analysis of LTI system using Fourier methods.

LTI Continuous Time System: System modeling: Solution of Differential equation with initial conditions, Zero state response and Zero input response, impulse response ,Frequency response , Convolution ,Analysis and characterization of LTI system using Laplace transform.

Unit-C

Analysis Of Discrete-Time Signals And Systems: Representation of sequences,Discrete-Time Fourier Transform (DTFT) , Discrete Fourier Transform (DFT) and its properties,Solution of linear constant coefficient difference equations with initial conditions, Zero state response and Zero input response– impulse response , Convolution sum , Frequency response.

Unit-D

LTI DT System Characterization and Realization:

Unilateral and Bilateral Z transforms and its properties, Inverse Z transform: Power series expansion and Partial fraction methods , Analysis and characterization of DT system using Z transform, Realization of structures for DT systems , Direct form-I, Direct form II, , Parallel, Cascade forms

Sampling and Reconstruction

The Sampling Theorem and its implications. Spectra of sampled signals. Reconstruction:ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.

Suggested Books:

1. Oppenheim Allan V., Wilsky S. and Nawab S.H., "*Signals and Systems*", Pearson Education.
2. Rawat Tarun Kumar , "*Signal and Systems*", First edition 2010, Oxford Press
3. Edward W. Kamen & Heck Bonnie's, "*Fundamentals of Signals and Systems*", Pearson Education.
4. Haykins Simon, "*Communication Signals & System*", John Wiley & Sons.
5. Hsu H. P., Ranjan Rakesh, Schaum's Outlines , "*Signals and Systems*", Tata McGraw Hill.
6. Salivahanan S., Vallavaraj A., Gnanapriya C., *"Digital Signal Processing*", McGraw Hill International.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
3	0	0	3

Course Title: Digital Electronics
Paper Code: ELE314

Course Objectives:
The purpose of this course is to develop a strong foundation in analysis and design of digital electronics.

Learning Outcomes: At the end of the course students should be able to

1. Understand concepts of combinational and sequential circuits.
2. Analyze the synchronous and asynchronous logic circuits.
3. Understand concepts of memory, programmable logic and digital integrated circuits.
4. Design Combinational and sequential systems.

Unit-A

Number System and Binary Code : Introduction, Binary, Octal, Hexadecimal & some nonstandard Number :- Conversions, Addition, Subtractions, Multiplication, Division, Weighted- Non weighted codes, Signed - unsigned numbers, Binary Subtractions using 1's and 2's compliment, ASCII code, Excess 3 code, Grey code, BCD code and BCD additions & BCD Subtractions.

Unit-B

Minimization of logic function : Review of gates: - OR, AND, NOT, NOR, NAND, EX-OR, EXNOR,Universal gates, Basic theorem of Boolean algebra, Sum of Products and Product of Sums, canonical form, Minimization using: - Boolean algebra, K-map and Q-M method.

Unit-C

Combinational Circuits : Introduction, Combinational circuit design, Encoders, decoders, Adders, Sub tractors and Code converters, Parity checker, seven segment display, Magnitude comparators. Multiplexers, De-multiplexer, Implementation of Combinational circuit using MUX & De-MUX.

Sequential Circuits : Introduction, flip flops, Clocked flip-flops, SR, JK, D, T and edge-triggered flipflops, Conversions of Flip flops, Shift Registers, Type of Shift Registers, Ring Counter, Twisted Ring Counter, Counters, Counter types, counter design with state equation and state diagrams.

Unit-D

D/A and A/D Converters: Introduction, Weighted register D/A converter, binary ladder D/A converter, steady-state accuracy test, monotonicity test, D/A accuracy and resolution, A/D converter:- Simultaneous, Counter type, Continuous, Successive approximation, Single and dual slope A/D converter, A/D accuracy and resolution.

Semiconductor Memories

Introduction, Memory organization, Classification and characteristics of memories, Sequentialmemories, ROMs, R/W memories, Content addressable memories, PLA and PAL.

Logic Families: RTL, DCTL, DTL, TTL, ECL, CMOS and its various types, Comparison of logic families.

Suggested Books:

1. Morris Mano, "*Digital Design*", Prentice Hall of India Pvt. Ltd
2. Donald P.Leach and Albert Paul Malvino, "*Digital Principles and Applications"*, 5 ed., TataMcGraw Hill Publishing Company Limited, New Delhi, 2003.

3. R.P.Jain, "*Modern Digital Electronics*", 3ed., Tata McGraw–Hill publishing Company limited, New Delhi, 2003.
4. Thomas L. Floyd, " *Digital Fundamentals"*, Pearson Education, Inc, New Delhi, 2003
5. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, *"Digital System -Principles and Applications"*, Pearson Education.
6. Roth, *"Fundamentals of Logic Design"*, Cengage Learning

DAV UNIVERSITY, JALANDHAR

Course Title: Power Electronics

L	T	P	Credits
4	0	0	4

Paper Code: ELE306A

Course Objective: This course provides a comprehensive understanding of the Thyristor family. it's turning on and off technique.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of power electronic switch like thyristor, chopper phase controlled rectifier. The participants will learn working mechanism of frequency changer devices.

Unit-A

Thyristors and their characteristics: Introduction to Thyristor family, V-I characteristics of silicon-controlled rectifier (SCR), gate turn-off thyristor (GTO), Bidirectional diode for alternating current (DIAC) and Bidirectional, Triode for Alternating Current (TRIAC). Principle of operation of silicon-controlled rectifier (SCR). Two transistor analogy. Turn on methods of a thyristor Switching characteristics of thyristors during tum-on and turn-off. Gate characteristics. Firing of thyristors. Gate triggering circuits. Series and parallel operation of silicon-controlled rectifiers (SCR) and their triggering circuits. Thyristor specifications; such as latching current and holding current, critical rate of rise of off-state voltage (dv/dt) and critical rate of rise of on-state current (di/dt) etc. Protection of SCR from over voltage and overcurrent. Snubber circuits. Power dissipation.

Unit-B

Thyristor commutation techniques: Self-commutation by resonating the load (Class A), Self-commutation by LC circuit (class B), Complementary commutation (class C), Auxiliary commutation (class D), External pulse commutation (class E), AC Line commutation (class F).

Phase controlled techniques: Introduction to phase angle control. Single phase half wave controlled rectifiers. Single phase half controlled and fully controlled bridge rectifiers. Three phase full controlled bridge rectifiers. Effect of resistive, inductive and resistive cum inductive loads. Basic circuit and principle of operation of Dual Converter, circulating current mode and non-circulating current mode of operation. Applications of rectifiers and dual converters to speed control of DC motor drives. Introduction to AC regulators, types and applications.

Unit-C

Inverters: Introduction & Classification of inverter. Operating principle, Single phase half bridge voltage source inverters, Single phase full bridge inverter. Modified McMurray half-bridge and full-bridge inverter. Three-phase bridge inverter. Voltage control (Pulse-width modulation (PWM) control etc.) and reduction of harmonics in the inverter output voltage. Series inverter.

Unit-D

Cyclo-converters: Basic principle of operation, Single phase to. single phase cyclo-converter. Three phase half wave cyclo-converter. Advantages disadvantages of cyclo converters

DC-DC buck converter

Elementary chopper with an active switch and diode, concepts of duty ratio and average voltage, power circuit of a buck converter, analysis and waveforms at steady state, duty ratio control of output voltage.

DC-DC boost converter

Power circuit of a boost converter, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

Suggested Books:

1. Bimbhra, P.S., "*Power Electronics"*, Khanna Publishers.
2. Singh M.D. and Khanchandani K.B., "*Power Electronics"*, Tata McGraw Hill Publishing company limited.
3. Rashid M.H., "*Power Electronics, Circuits Devices and Applications"*, Prentice Hall, India.
4. Sen, P.C., "*Power Electronics"*, Tata McGraw Hill Publishing Company limited.
5. Bhattacharya S.K. and Chatterji, S., "*Industrial Electronics and Control",* New Age international Publications (P) Ltd, New Delhi.

DAV UNIVERSITY, JALANDHAR

Course Title: Power System-II (Stability & Fault Analysis)
Paper Code: ELE336A

L	T	P	Credits
3	0	0	3

Course Objective: This course provides a comprehensive understanding of the origin and development of ideas in power system.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the system modeling and power flow analysis. The participants will learn how the symmetrical and unsymmetrical fault occurs and how it's detrimental effect seen on power system.

Unit-A

System Modelling: System modeling of synchronous machines, transformers, loads etc, per unit system, single line diagram of electrical networks, single phase impedance diagrams, line reactance diagrams, Formulation of impedance and admittance matrices for the electrical networks.

Unit-B

Fault Analysis: Symmetrical Component transformation, construction of sequence networks of synchronous machines, transmission lines. Unsymmetrical Line-to-ground (LG), Line-to line (LL), double line to ground (LLG) faults using symmetrical components.
Transients in Power Systems: Transients electric phenomenon, transients in simple circuits, travelling waves, reflection & refraction of waves with different line termination, lightning phenomenon, protection against dangerous pressure rises.

Unit-C

Stability of Power System: Concepts of stability, power angle characteristics of synchronous, steady state and transient stability swing waves.
Grounding: Grounded & Ungrounded neutral systems, resonant grounding, solid grounding, resistance grounding, reactance grounding. Voltage transformer earthing. Harmonic suppressors, grounding practice, grounding of sub-station.

Unit-D

HVAC &HVDC Power Transmission: Need of EHVAC & HVDC transmission, aspects of EHVAC power transmission, principles of HVDC system operation, use of bundled conductors, advantages of DC transmission, converter station equipment, Introduction to SCADA. Block diagram for SCADA, Introduction to FACTS.

Suggested Books:

1. Elgerd O.I., "*Electric Energy Systems Theory",* Tata McGraw Hill
2. Nagrath I.J., Kolthari D.P., "*Modern Power System Analysis",* Tata McGraw Hill
3. Stevenson W.D., "*Elements of Power System* Analysis", McGraw Hill
4. Nagrath I.J. and Kothari D.P.," *Power System Engineering", Tata McGraw Hill*
5. Chakrabarti A., Soni, M.L. Gupta P.V. and Bhatanagar U.S., "*A Textbook on Power System Engineering"*, Dhanpat Rai and Co
6. Deshpande M.V., *"Switchgears and Protection*", Tata McGraw Hill.
7. Wadhawa C.L. , "*A Course in Electrical Power*", New Age international Pvt. Ltd

8. Gupta B.R., "*Power System Analysis & Design"*, Wheeler Publishing

DAV UNIVERSITY, JALANDHAR

Course Title: DESIGN AND SOFTWARE LABORATORY

Paper Code: ELE317

L	T	P	Credits
1	0	3	2

Course Objective:

At the end of the course, students will demonstrate the ability to

- Understand the practical issues related to practical implementation of applications using electronic circuits.

  - Choose appropriate components, software and hardware platforms.
  - Design a Printed Circuit Board, get it made and populate/solder it with components.
  - Analyze various types of Control System using MATLAB software.

List of Experiments

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At the End of the course the students should be capable enough to implement their technical skills on a given/selected task. Design solutions for real-life problems using engineering knowledge. Prepare a Written Report on the Study conducted for presentation. Final Seminar, as oral Presentation before respective Project Coordinator.

To perform exercises related to the following using Control System Toolbox by writing computer programs and functions in MATLAB:

1.To study the various toolboxes and environment of MATLAB.
2. To Draw the Point, Line, Circle and Ellipse using MATLAB
3. Write a MATLAB Program to perform various operation of higher order Matrix.
4. Write the transfer function of a 1^{st} order system using MATLAB and find the transient response.
5.Design of Control Systems using MATLAB and SIMULINK.
6. PCB design and layout
7. Introduction to PC based data acquisition
10. Study of Sensors and signal conditioning circuits.

Sensors and signal conditioning circuits, Electronic system design, Analog system design, Interfacing of analog and digital systems, Embedded systems, Electronic system design employing microcontrollers, CPLDs, and FPGAs, PCB design and layout; System assembly considerations.
Group projects involving electronic hardware (Analog, Digital, mixed signal) leading to Implementation of an application.

DAV UNIVERSITY, JALANDHAR

Course Title: Power Electronics Laboratory

Paper Code: ELE310

L	T	P	Credits
0	0	2	1

Course Objective: This course provides a practical aspect of the SCR, UJT, and other semiconductor switches.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of thyristor family, chopper, UJT etc

List of Experiments

1. To study principle of operation of SCR, plot V-I characteristics and study the effect of gate triggering on turning on of SCR.
2. To draw V-I characteristics of an UJT and to use UJT as relaxation oscillator.
3. To study the effect of free-wheeling diode on power factor for single-phase half-wave rectifier with R-L load.
4. To plot waveforms for output voltage and current, for single-phase full-wave, fully controlled bridge rectifier, for resistive and resistive cum inductive loads.
5. To perform the microcontroller based firing control of a bridge converter.
6. To perform three phase fully controlled bridge converter and plot waveforms of output voltage, for different firing angles.
7. To perform Jones chopper or any chopper circuit to check the performance.
8. Microcontroller based thyristorised speed control of a D.C. Motor.
9. Microcontroller based speed Control of three phase induction motor using thyristors.
10. To check the performance of series inverter circuit.
11. To check the performance of a single-phase cyclo-converter.
12. To check the performance of a McMurray half-bridge inverter

DAV UNIVERSITY, JALANDHAR

Course Title: Digital Electronics Laboratory

Paper Code: ELE331

L	T	P	Credits
0	0	2	1

Course Objective: To reinforce learning in the accompanying ECE201 course through hands-on experience with digital electronic circuit analysis, design, construction, and testing.

Learning Outcomes: To develop necessary skill in designing, analyzing and constructing digital electronic circuits.

List of Experiments

1. Verification of the truth tables of TTL gates, e.g., 7400, 7402, 7404, 7408, 7432, 7486.
2. Verify the NAND and NOR gates as universal logic gates.
3. Verification of the truth table of the Multiplexer 74150.
4. Verification of the truth table of the De-Multiplexer 74154.
5. Design and verification of the truth tables of Half and Full adder circuits.
6. Design and verification of the truth tables of Half and Full subtractor circuits.
7. Design and test of an S-R flip-flop using NOR/NAND gates. a) Verify the truth table of a J-K flip-flop (7476) b) Verify the truth table of a D flip-flop (7474)
8. Operate the counters 7490, 7493 and 74194. Verify the frequency division at each stage and with a low-frequency clock (say 1 Hz) display the count on LEDs.
9. Verify the truth table of decoder driver 7447/7448. Hence operate a 7 segment LED display through a counter using a low-frequency clock.
10. Repeat the above with the BCD to Decimal decoder 7442 and an array of LEDs
11. Design and test D/A converter using R-2R Ladder Network 12. Study and test of A/D converter.

DAV UNIVERSITY, JALANDHAR

Course Title: Industrial Training-I

L	T	P	Credits
0	0	0	2

Paper Code: ELE350

Note: At the end of the examination of 4th Semester the students will undergo compulsory summer training for a period of 4 weeks. Every student will submit the Summer Training Report within two weeks from the start of teaching for 5th Semester.

Objective of the training programme is to

1. Enrich the students with a basic understanding of the Electrical Engineering, towards developing a holistic perspective to understand various practical issues and latest trends in the field.
2. Familiarize and provide "hands-on" training experience with the requisite simulation, design, and analytical tools and techniques.
3. Achieve a long-term goal of transforming themselves into a brilliant blend of theoretician and practicing engineer.
4. Introduce the way of troubleshooting various engineering faults related to respective fields.
5. Make the students able to present work in written, oral or formal presentation formats.

DAV UNIVERSITY, JALANDHAR

Semester-6th

Course Title: Power System –III (Switchgears & Protection)

L	T	P	Credits
4	0	0	4

Paper Code: ELE337

Course Objective: This course provides a comprehensive understanding of the basics of substation and development of ideas in circuit breaker. It traces the protection of feeder and transformer.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the isolator, fuses. Working knowledge of circuit breakers. The participants will learn various types of circuit breaker. The participants of this course will also learn about the protection against overvoltage and earthing.

Unit-A

Sub-Station: Types, Main equipment in Substation, substation layout, Busbar-arrangements.
Isolators and Fuses: Isolating switches functions, Types, Rating and operation. Fuse-types, Rating, Selection, theory and characteristics, applications.

Unit-B

Circuit Breakers: Need for Circuit Breakers, Arc phenomenon, Theory of Arc Interruption, Recovery Voltage and Restriking Voltage, Various Types of Circuit Breakers. Principles and Constructional Details of Air Blast, Minimum Oil, SF6, Vacuum Circuit Breakers etc.
Protective Relays: Introduction, classification, constructional features; and Characteristics of Electromagnetic, Induction, Thermal, Overcurrent relays, Directional relays, Distance relays, Differential, Translay, Negative sequence relay, introduction to static and up-based relays.

Unit-C

Protection of Feeders: Time graded protection, Differential and Distance protection of feeders,choice between Impedance, Reactance and Mho relays, Elementary idea about carrier current protection of lines.
Protection of Generators and Transformers: Types of faults on alternator, Stator and rotor protection, Negative sequence protection, Loss of excitation and overload protection. Types of fault on transformers, percentage differential protection, Gas relays.

Unit-D

Protection against overvoltage and earthing: Ground wires, Rod gap, Impulse gap, Valve type and Metal Oxide Arresters, Line Arrester/Surge Absorber. Ungrounded neutral system, Grounded neutral system and Selection of Neutral Grounding. Introduction to Lightening arresters.

Suggested Books:

1. Rao S., "*Switchgear and Protection",* Khanna Publishers
2. Chakrabarti A., Soni, M.L. Gupta P.V. and Bhatanagar U.S., "*A Textbook on Power System Engineering",* DhanpatRai and Co.
3. Wadhawa C.L. , "*A Course in Electrical Power"*, New Age international Pvt. Ltd
4. Badri Ram and Vishwakarma D.N.*, "Power system Protection and Switchgear"*, Tata McGraw Hill
5. Deshpande M.V.*, "Switchgears and Protection"*, Tata McGraw Hill

DAV UNIVERSITY, JALANDHAR

Course Title: Control System
Paper Code: ELE338

L	T	P	Credits
4	0	0	4

Course Objective: This course provides a comprehensive understanding of the introductory concept of control systems. and. It traces the evolution of controller thought from its earliest days to the present, by examining the backgrounds, ideas and influences of its major contributors.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the servomechanism, regulating systems, open and closed loop control systems . The course will equip them with the understanding of the concepts of time domain, and frequency domain analysis. The participants of this course will also learn about the various type of compensation network.

Unit-A

Introductory Concepts: Plant, Systems, Servomechanism, regulating systems, disturbances, Open loop control system, closed-loop control systems, linear and non-linear systems, time variant and invariant, continuous and sampled-data control systems, Block diagrams, some illustrative examples.

Modeling of Control System: Formulation of equation of linear electrical, mechanical, thermal, pneumatic and hydraulic system, electrical, mechanical analogies. Use of Laplace transforms, Transfer function, concepts of state variable modeling. Block diagram representation, signal flow graphs and associated algebra, characteristics equation.

Unit-B

Time Domain Analysis: Typical test–input signals, Transient response of the first and second order systems. Time domain specifications, Dominant closed-loop poles of higher order systems. Steady state error and coefficients, pole-zero location and stability, Routh-Hurwitz Criterion.

Root Locus Technique: The extreme points of the root loci for positive gain. Asymptotes to the loci, Breakaway points, intersection with imaginary axis, location of roots with given gain and sketch of the root locus plot.

Unit-C

Frequency Domain Analysis: Closed loop frequency response, Bode plots, stability and loop transfer function. Frequency response specifications, Relative stability, Relation between time and frequency response for second-order systems. Log. Magnitude versus Phase angle plot, Nyquist criterion for stability

Introduction to P, I,D,PI, PD,PID Controllers, Digital implementation of controllers.

Compensation: Necessity of compensation, series and parallel compensation, compensating networks, applications of lag and lead-compensation.

Unit-D

Variable Analysis: Concept of state, state variable and state model, state models for linear continuous-time systems, diagonalization solution of state equations, concept of controllability and observability, Discrete-time systems. Pole-placement by state feedback Difference Equations. State-space models of linear discrete-time systems. Stability of linear discrete-time systems.

Control System Components: Error detectors–potentiometers and synchros, servo motors,

A.C. and D.C. techno generators, Magnetic amplifiers.

Suggested Books:

1. Nagrath I.J. and Gopal M., "*Control System Engineering"*, Wiley Eastern Ltd
2. Ogata K., "*Modern Control Engineering*", Prentice Hall
3. Kuo B. C., "*Automatic Control System*", Prentice Hall
4. Dorf Richard C. and Bishop Robert H., "*Modern Control System"*, Addison –Wesley, Pearson New Delhi

DAV UNIVERSITY, JALANDHAR

Course Title: Electric Drives
Paper Code: ELE326

L	T	P	Credits
4	0	0	4

Course Objective: This course provides a comprehensive understanding of the electric machine implemented in drives.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the various mechanism of operation of drives. The participants will learn how the traction systems are implemented.

Unit – A

Introduction: Definition & Classification of different type of drives, review of characteristics and components of electric drives, speed control methods of various a.c. and d.c. drives, its advantages and applications, acceleration and retardation time, energy consideration.

Braking of drives: Various methods of braking of a.c. and d.c. drives, automatic control arrangement, characteristics and application, acceleration and retardation time, energy consideration.

Unit-B

D.C. drives: Rectifier controlled circuits, single phase fully controlled and half controlled rectifier fed separately excited d.c. motor, 3-phase fully and half controlled fed separately excited d.c. motor, performance and characteristics of single phase and 3-phase rectifier controlled d.c. drives. Control techniques of d.c. drives using chopper, multi-quadrant control of chopper fed motors.

Unit-C

Induction motor (A.C) drives: Basic principle of induction motor drives, 3-phase a.c. voltage controller fed I.M. drive, variable frequency control, voltage source inverter (VSI) and current source inverter (CSI), Cycloconverter fed IM drive, slip power control, static rotor resistance control, chopper control of 3-phase slip ring induction motor.

Dynamics of electric drives: Components & classification of load torque, fundamental load torque equation, permissible frequency of starting and stopping, definite time, speed torque conventions. Speed and current limit control, automatic starting and pulling operation of synchronous motors.

Unit-D

Digitally controlled (Microprocessor control of electric drives): Application areas and functions of HP in drive technology, block diagram of arrangement and comparison with other method, components for digital control, vector control of IM drive using HP. Synchro motors.

Suggested Books:

1. Dubey, G.K, "*Fundamentals of Electrical Drives*", Narosa.
2. S.K. Pillai "*Electric drives*", Wiley.
3. S.K. Sen "*Thyrister D.C. Drives*" ,Wiley.

4. Siskind "*Control system industry*",MGH
5. Fransver "*Electric Machines & Drives*"

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
3	0	0	3

Course Title: Numerical Methods

Paper Code: MTH256A

Course Objectives

The aim of this course is to teach the applications of various numerical techniques for a variety of problems occurring in daily life. At the end of the course, the students will be able to understand the basic concepts in Numerical Analysis of differential equations.

Unit-A

Approximate numbers, Significant figures, rounding off numbers, Error Absolute, Relative and percentage

Non-Linear Equations: Bisection, Regula-Falsi, Secant, Newton-Raphson, General Iteration Method. Rate of convergence

Unit-B

Systems of Simultaneous Linear Equations: Direct methods: Gauss elimination method, Gauss Jordon method, Matrix inversion method; Iterative methods: Jacobi method and Gauss-Seidel method, Power method for finding largest Eigenvalue.

Unit-C

Operators: Forward, Backward and Shift (Definitions and some relations among them). Newton forward and backward, Gauss backward and forward interpolation, Stirling formula, Bessel formula, Lagrange's interpolation, Hermite Interpolation, Newton divided difference Interpolation. Numerical Differentiation, Maximum and Minimum values of a tabulated function.

Unit-D

Numerical Integration: General Quadrature formula, Trapezoidal Rule, Simpson's 1/3-Rule, Simpson's 3/8-Rule, Boole's rule, Weddle's Rule. Numerical solutions to first order ordinary differential equations: Taylor's Series method, Picard's Method, Euler's and modified Euler's methods, Runge-Kutta methods.

References:

1. Jain, M.K. *Numerical Analysis for Scientists and Engineers*. New Delhi: S.B.W. Publishers, 1971.
2. Grewal B.S. *Numerical Methods in Engineering & Science With Programs In C& C++*. New Delhi: Khanna Publishers, 2012.
3. Golub G.H. and Ortega, J.M. *Scientific Computing and Differential Equations: An Introduction to Numerical Methods*. London: Academic Press, 1992.
4. John H. Mathews and Kurtis D. Fink, *Numerical Methods using Matlab*, 4th Ed., PHI Learning Private Limited, 2012.

DAV UNIVERSITY, JALANDHAR

Course Title: Technical Communication
Course Code: ENG351

L	T	P	Credits
3	0	0	3

Course Objective: This paper, with a practice-oriented approach, aims to hone students skills in all the dimensions of technical communication.
Learning Outcomes: Students will show adequate understanding of technical communication skills.

Unit-A

- Nature of Technical Communication
- Verbal and Non-Verbal Communication
- Barriers to Communication

Unit-B

- Conversation: Formal and Informal
- Sounds of English (Speech Skills)
- Panel Discussion and Group Discussion
- Oral Presentation

Unit-C

- Report Writing
- Business and Technical Proposals
- Memos

Unit-D

- C.V. and Resume
- Business Letters and Application Letters
- Interview

Suggested Readings

1. Koneru, Aruna. *Professional Communication*. Delhi: McGraw, 2008. Print.
2. Rizvi, M. Ashraf. *Effective Technical Communication*. Delhi: McGraw, 2005. Print.
3. Sharma, R.C. and Krishna Mohan. *Business Correspondence and Report Writing*. Delhi: McGraw, 2013. Print.
4. Tyagi, Kavita and Padma Misra. *Basic Technical Communication*. Delhi: PHI Learning, 2013. Print

DAV UNIVERSITY, JALANDHAR

Course Title: Control System Laboratory
Paper Code: ELE339

L	T	P	Credits
0	0	2	1

Course Objective: This course provides a practical aspect of control characteristics.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of various speed control, position control, temperature control mechanisms

LIST OF EXPERIMENTS:

1. Experiment to perform D.C. position control system.
2. Experiment to perform light intensity control using P, I, D & PID controller.
3. Experiment to perform D.C. motor speed control.
4. Experiment to perform ON/OFF temperature controller.
5. Experiment to perform Temperature control system.
6. Experiment to perform Compensation design.
7. Experiment to perform relay control system.
8. Experiment to perform Potentials metric Error Detector.
9. Experiment to perform synchros motor.
10. To measure the displacement using LVDT.
11. To measure the temperature using RTD.
12. To measure the temperature using Thermocouple.
13. To check the voltage induced using photo transistor, photodiode.
14. Write a program in MATLAB to find poles and zeros of transfer function and show poles as zeros in s-plane.
15. Write a program in MATLAB to draw unit step, ramp and parabolic response of second-order system.
16. Write a program in MATLAB to determine the time response for unity feedback control system.
17. Write a program to determine the static error coefficients and steady-state error for an open loop transfer function using test signals.
18. To plot and verify Bode plot for higher order system using MATLAB.
19. To plot and verify Root locus for higher order system using MATLAB.

Hands-on/Computer experiments related to the course contents

DAV UNIVERSITY, JALANDHAR

Course Title: Power System Laboratory

Paper Code:ELE309

L	T	P	Credits
0	0	2	1

Course Objective: This course provides a practical understanding of the design of transmission line and substation.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of load flow analysis. The participants will learn how the transmission line is designed.

List of Experiments

1. To find string efficiency of string insulator.
   i. Without guard ring
   ii. With guard ring
2. To analyze the performance of a transmission line. Also compute its ABCD parameters, hybrid parameter and image parameter of given transmission model.
3. To plot power angle characteristics of transmission line.
4. Parallel operation of two alternators.
5. To create unbalanced voltage system and to measure the sequence voltage by segregating network.
6. To study the characteristics of transmission line represented by
   i. T- network
   ii. Pie-network.
7. To study the characteristics of differential relay.
8. To plot the characteristics of an IDMT static relay.
9. Testing of current transformer.
10. To find zero sequence component of three-phase line.
11. To draw the characteristics of thermal overload relay.
12. To analyze the characteristics of overcurrent and earth fault protection.
13. To study the operating characteristics of fuse. (HRC or open type)
14. To find the earth resistance and electrode resistance using three spikes/Megger earth tester test electrodes.
15. To study the different types of faults on transmission line/on three phase transformer demonstration panel/model.
16. To analyze the radial feeder performance when (a) Fed at one end. (b) Fed at both ends (c) Fed at center (d) Ring main distribution system
17. To study the performance of under voltage relay
18. To study the performance of overvoltage relay.
19. To study the characteristics of bimetal mini circuit breakers.
20. To study the characteristics of Distance Relay.
21. To perform short circuit analysis – symmetrical faults.
22. To perform short circuit analysis – unsymmetrical faults.
23. To perform transient stability analysis.
24. To perform harmonic analysis.

DAV UNIVERSITY, JALANDHAR

Semester- 7th

Course Title: Power System - IV(Computer Aided Power Systems Analysis)

L	T	P	Credits
4	0	0	4

Paper Code: ELE413

Course Objective: This course provides a comprehensive understanding of power flow analysis and development of ideas in power systems. It traces the fault analysis and power system robustness.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of load flow from different buses, concept of slack bus, significance of x/r ratio and stability considerations.

Unit: A

General: Impact of computers, orientation of engineering problems to computers, review of matrices and matrix operations.

Incidence and Network Matrices: Network graph, various incidence matrices, generalized element representation, primitive network and primitive network matrices, formation of various network matrices by singular transformations, interrelations between various incidence matrices and network.

Unit-B

Bus Impedance and admittance matrices: Building algorithms for bus impedance matrix, modification of bus impedance matrix for change of reference bus and for network changes, formation of bus admittance matrix and modification of three-phase network elements, treatment under balanced and unbalanced excitation, transformation matrices, and unbalanced elements.

Unit-C

Short-Circuit Studies: Introduction, network short circuit studies using Z bus, short circuit calculations using symmetrical components for various types of faults.

Load-Flow Studies: Introduction, importance of load flow studies, classification of buses, load flow equations, iterative methods, computer algorithms and load flow solutions using Gauss Seidel and Newton Raphson methods, decoupled and fast decoupled load flow solutions, representation of regulating and off nominal ratio transformers, comparison of load flow solution methods.

Unit-D

Sparsity: Introduction, optimally ordered triangular factorization, schemes of optimal ordering

Stability Studies: Algorithms flow chart and transient stability solution using modified Euler method.

Power System Security: Introduction, contingency analysis using Z bus and various distribution factors.

Suggested Books:

1. Elgerd O.I., "*Electric Energy Systems Theory",* Tata McGraw Hill
2. Nagrath I.J., Kolthari D.P., "*Modern Power System Analysis",* Tata McGraw Hill

3. Stevenson W.D., "*Elements of Power System* Analysis", McGraw Hill
4. Nagrath I.J. and Kothari D.P., "*Power System Engineering", Tata McGraw Hill*
5. Arrillaga J. and Arnold C.P., "*Computer Analysis of Power Systems", John Wiley & Sons*
6. Stagg Glenn W. and Ei-Abiad Ahmed H., "*Computer Methods in Power System Analysis", Tata* McGraw Hill
7. Kusic G.L., "*Computer Aided Power System analysis", Prentice Hall, India*

DAV UNIVERSITY, JALANDHAR

Course Title: Microprocessors and Microcontrollers
Paper Code: ELE410

L	T	P	Credits
4	0	0	4

Course Objective: This course provides a comprehensive understanding of the origin and development of microcontroller.
Learning Outcomes: After the completion of this course the participants would gain the knowledge of the microcontroller 8051 design and its various applications.

Unit-A

Introduction: Microprocessor, Fundamentals of Microprocessor Architecture. 8-bit microprocessor and Microcontroller architecture, Comparison of 8-bit microcontrollers, 16-bit and 32-bit microcontrollers. Micro-controllers and their comparison. The 8051 Architecture: Introduction, 8051 micro-controller hardware, input/ output, pins, ports and circuits, external memory, counters and timers, serial data input/ output, interrupts
8051 Assembly Language Programming: The mechanics of programming, assembly language programming process, programming tools and techniques, instruction set (data moving, logical operations, arithmetic operations, jump and call instructions)

Unit-B

8051 Microcontroller Design: Micro-controller specification, external memory and memory space decoding, reset and clock circuits, expanding input and output (I/O), memory mapped I/O, memory address decoding, memory access times, testing the design, timing subroutines, lookup tables for the 8051, serial data transmission

Unit-C

Microcontroller Applications: RS232, SPI, I2C. Introduction and interfacing to protocols like Blue-tooth and Zig-bee. Interfacing keyboards, displays, Digital-to-Analog (D/A) and Analog-to-Digital (A/D), multiple interrupts, serial data communications, introduction to the use of assemblers and simulators Embedded Systems: Stepper motor interfacing, DC Motor interfacing, sensor interfacing., technology and design issues, implementation of 8051 core.

Unit-D

Programmable Logic Controllers (PLC): Introduction, operation of PLC, difference between PLC and Hardwired system, difference between PLC and Computer, relay logic and ladder logic, ladder commands and examples of PLC ladder diagram realization, PLC timers, PLC counters, PLC classification.

Suggested Books:

1. Kenneth J Ayola, *The 8051 Micro Controller- Architecture, Programming and Application*, Penram International Publication
2. John B Peatman, *Design with Micro Controller,* Tata McGraw Hill
3. Ray A. K. and Bhurchandi K. M., *Advanced Microprocessors and Peripherals; Architecture,Programming and Interfacing*, Tata McGraw Hill
4. Mazidi M. A. and Mazidi J. G., *The 8051 Micro-controller and Embedded System,* Pearson Education.
5. Udayashankara V. and Mallikarjunaswamy M.S., *8051 Microcontroller Hardware, Software and Applications,* TataMcGraw Hill Education Pvt. Ltd., 2010.

DAV UNIVERSITY, JALANDHAR

Course Title: Microprocessors, Microcontroller and PLC Laboratory

L	T	P	Credits
0	0	2	1

Paper Code: ELE411

Course Objective: This course provides a practical understanding of the programmable logic console. Its ladder logic and its various application..
Learning Outcomes: After the completion of this course the participants would gain the knowledge of NO/NC switch, ladder programming of PLC.

List of Experiments

1. Study of 8085/ 8086 microprocessor kits.
2. Study of 8051/8031 Micro-controller kits.
3. Write a program to add two 8 bit numbers lying at two memory locations and display the result using 8051 MC.
4. Write a program to subtract two 8 bit numbers lying at two memory locations and display the result using 8051 MC.
5. Write a program for multiplication of two 8 bit numbers lying at memory location and display the result using 8051 MC.
6. Write a program for division of two 8 bit numbers lying at memory location and display the result using 8051 MC.
7. Write a program to perform multibyte addition of numbers lying at two memory locations and display the result using 8051 MC
8. Write a program to display largest number in an array and show the result on display
9. Write a program to arrange TEN numbers stored in memory location in ascending and descending order.
10. Write a program to convert BCD to Hexadecimal of a given number.
11. Write a program to convert Hexadecimal to BCD of a given number
12. Write a program to calculate the square root of a number.
13. Implementation of DOL and star delta starter using PLC.
14. Implementation of star delta starter using timer in PLC
15. Make a PLC-based control system for conveyor belt.

DAV UNIVERSITY, JALANDHAR

Course Title: Industrial Training-II

L	T	P	Credits
0	0	0	2

Paper Code: ELE406A

Note: The end of the examination of 6th Semester the students will undergo compulsory summer training for a period of 6 weeks. Every student will submit the Summer Training Report within two weeks from the start of teaching for 7th Semester.

Objective of the training programme is to

1. Enrich the students with a basic understanding of the Electrical Engineering, towards developing a holistic perspective to understand various practical issues and latest trends in the field.
2. Familiarize and provide "hands-on" training experience with the requisite simulation, design, and analytical tools and techniques.
3. Achieve a long-term goal of transforming themselves into a brilliant blend of theoretician and practicing engineer.
4. Introduce the way of troubleshooting various engineering faults related to respective fields.
5. Make the students able to present work in written, oral or formal presentation formats.

DAV UNIVERSITY, JALANDHAR

Course Title: Project Laboratory

Paper Code: ELE451A

L	T	P	Credits
0	0	8	4

Course Objective: This course provides a comprehensive understanding of the origin and development of ideas in management. It traces the evolution of management thought from its earliest days to the present, by examining the backgrounds, ideas and influences of its major contributors.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the world's foremost thinkers of management. The participants will learn how the evolution of management took place. The course will equip them with the understanding of the concepts of management and the people who changed the business world with their work. The participants of this course will also learn about the contemporary management thinkers of India.

The objective of Project Work is to enable the student to take up investigative study in the broad field of Electrical Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work. The assignment normally includes:

1. Survey and study of published literature on the assigned topic;
2. Working out a preliminary approach to the Problem relating to the assigned topic;
3. Conducting preliminary analysis/Modelling/Simulation/Experiment/Design/Feasibility.
4. Preparing a Written Report on the Study conducted for presentation to the Department.
5. Final Seminar, as oral Presentation before a Departmental Committee including external expert

DAV UNIVERSITY, JALANDHAR

Semester 8th

Course Title: Utilization & Traction
Paper Code: ELE412

L	T	P	Credits
4	0	0	4

Course Objective: This course provides a comprehensive understanding of the implementation of electric energy, utilization of the energy to perform industrial work.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the various illumination materials. The participants will learn how traction systems are used with the implementation of electric motors.

UNIT A

Illumination: Term used in illumination, Law's of illumination, sources of Light, arc lamp incandescent lamp, discharge lamp, sodium vapor, mercury vapor lamp, Fluorescent tubes, lightening schemes, method of lightning calculation.

UNIT B

Electrical Heating: Advantages of Electrical Heating, various types of Electrical heating, Power frequency and High-frequency heating, Degree of heating element, Equivalent circuit of arc furnace, Resistance heating, Arc heating, Induction heating, dielectric heating etc.
Electric Welding: All types of electrical welding, resistance welding, arc welding, electrical winding equipment, Comparison between AC & DC welding, types of electrodes, advantages of coated electrodes.

UNIT C

Electroplating: Basic principle, Faraday's law of electrostatics, terms used, Application of electrolysis, factors governing electrodeposition, power supply.
Refrigeration & Air Conditioning: Basic principle, various compression cycle & system its application, electric circuit of refrigerator, air conditioner.

UNIT D

Traction Motors : Different system of electric traction, comparison between AC & DC system, block diagram of traction system ,Starting-Speed control and braking- Speed control and braking –Speed time curves,-Mechanics of Train movement-Tractive effort for acceleration – Power and energy output from driving axles-Specific energy output and consumption-Train resistance.
Rating of motors: Determination of motor rating, nature of loads and classes of motor duty, frequency of operation of motor subjected to intermittent loads, pulse loads etc. thermal model of motor for heating and cooling.

Suggested books:

1. Dr.S.L.Uppal, *"Electrical Power"* Khanna Publishers, New Delhi,1980.
2. M.L. Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarti, "*A Text Book On Power System Engineering",* Dhanpat Rai & Co, 1998.
3. H.Pratap, "*Art and Science of Utilization of Electric Energy"*, Dhanpat Rai & Sons,New Delhi,1980.
4. J.B.Gupta, *"Utilization of electric power and Electric Traction",* S.K.Kataria & Sons.

5. G.C.Garg, *"Utilization of Electric Power and Electric Traction",* Khanna publishers, New Delhi,1995.

DAV UNIVERSITY, JALANDHAR

Course Title: High Voltage Engineering

L	T	P	Credits
4	0	0	4

Paper Code: ELE307

Course Objective: This course provides a comprehensive understanding of the EHVAC and HVDC transmission and its significance and development of ideas of corona.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the various insulating materials for high voltage. The participants will learn how the solid, liquid, and gaseous dielectrics are distinguished.

Unit-A

Extra High Voltage (EHV) Transmission and Corona Loss: Need for EHV Transmission. Use of bundled conductors, corona characteristics of smooth bundled conductors with different configurations, Corona loss. Factors affecting the corona loss. Radio interference due to corona. Shunt and series compensation in EHV lines. Tuned power lines. Insulation Co-ordination.

Unit-B

High Voltage Direct Current (HVDC) Transmission: Advantages, disadvantages and economics of HVDC Transmission system. Types of Direct Current (DC) links, converter station equipment, their characteristics.

Insulating materials for High Voltage Applications of insulating materials used in power transformers rotating machines, circuit breakers, cables, power capacitors.

Generation of high voltage : measurement of R.M.S., and peak value of voltage

Unit-C

Conduction and Breakdown in Gases, Liquids and Solid Dielectrics:

Solids: Intrinsic, electromechanical and thermal breakdown composite dielectrics, solid dielectrics used in practice.

Liquids: Conduction and breakdown in pure and commercial liquids, suspended particle theory, cavitation and bubble theory, stressed oil volume theory, Liquids used in practice.

Gases: Ionization process, Townsend's current growth equations, Ist and 2nd ionization coefficients. Townsend's criterion for breakdown, Streamer theory of breakdown, Pashen's law of Gases. Gases used in practice.

Unit-D

Generation of High Voltages: High Voltage Direct Current (HVDC), High Voltage Alternating Current (HVAC), Power frequency and High frequency: Impulse voltage and impulse current Generation, Tripping and contact of Impulse Generator. Measurement of voltage and current: High voltage direct current, Alternating current and Impulse voltage and currents.

Suggested Books:

1. Bagamudre, Das Rakesh, "*Extra High Voltage A.C. Transmission Engineering"*, New Age International Publishers.
2. Kimbark E.W., "*High Voltage Direct Current Transmission"*, Wiley-Interscience

3. Kamaraju V. and Naidu M.S., "*High Voltage Engineering",* Tata McGraw-Hill Education
4. Jha R.S., "*High Voltage Engineering", DhanpatRai*
5. Kuffel, E. and Abdullah, M., "*High Voltage Engineering"*, Pergamon Press
6. Wadhwa C. L., "*High Voltage Engineering",* New Age Publications.
7. Padiyar, K.R., "*HVDC Power Transmission Systems: Technology and System Interactions"*, New Age International

DAV UNIVERSITY, JALANDHAR

Course Title: Electrical Estimation and Costing Laboratory

Paper Code: ELE470

L	T	P	Credits
0	0	4	2

List of Experiments

1. To study Indian electricity rules
2. To carry out wiring diagram of residential building, Educational Institute and Industry. Giving selection of appropriate wiring, list materials and accessories for given project.
3. To study the design consideration of Panel Boards.
4. To study the design consideration of various electrical systems:
    a. 3 phase four wire distribution systems
    b. Earthing
5. To estimate the cost of a domestic installation (Residential building, laboratory room or Drawing hall etc) with concept of illumination design. TERI (The Energy Research Institute) recommendations on lighting schemes
6. To estimate the cost of industrial installation (Workshop, agriculture, flour mill etc).
7. To estimate the cost of overhead service connection (Single phase and three phase).
8. To estimate the cost of underground service connection (single phase and three phase).
9. To estimate the cost of overhead, 440 V, 3-phase, 4 wire or 3 wire distribution line.
10. To estimate the cost of underground distribution line.
11. To estimate the cost of any one electrical appliance.
12. To estimate the cost of repairs and maintenance of domestic appliance such as heater, electric iron, fans, washing machine, geyser, AC etc
13. To design & fabricate single phase transformer
14. To study various types of light sources and lighting schemes.
15. To make wiring diagrams of motor control circuits for starting of
    a. 3 phase induction motor
    b. Synchronous motor

Suggested Books:

1. Raina K.B. and Bhattacharya S.K., "*Electrical Design, Estimating and Costing"*, Tata McGraw Hill, New Delhi
2. Gupta J.B., "*A course in Electrical Installation, Estimating and Costing"*, SK Kataria and Sons, N.Delhi
3. Sharma B.R. and Rai H.M., "*Electrical Estimating and Costing"*
4. Uppal S.L., "*Electrical Wiring, Estimating and Costin"*
5. Singh Surjeet, "*Estimating and Costing"*, DhanpatRai and Co., New Delhi

DAV UNIVERSITY, JALANDHAR

Course Title: Seminar
Paper Code: ELE452

L	T	P	Credits
0	0	4	2

Course Objectives: To assess the debating capability of the student to present a technical topic. Also to impart training to a student to face audience and present his ideas and thus creating in him self-esteem and courage that are essential for an engineer.

Individual students are required to choose a topic of their interest from energy-related engineering topics preferably from outside the B.Tech syllabus and give a seminar on that topic about 30 minutes followed by a 10 minutes session for discussion/question and answers. A committee consisting of at least three faculty members (preferably specialized in Electrical Engineering) shall assess the presentation of the seminar and award marks to the students. Each
student shall submit two copies of a write up of his / her seminar topic. One copy shall be returned to the student after duly certifying it by the Chairman of the assessing committee and the other will be kept in the departmental library. Internal continuous assessment marks are awarded based on the relevance of the topic, presentation skill, quality of the report and participation.

Note: (i) The seminar topic selected by the student must be approved by the authorized faculty of the department at least two weeks in advance.
(ii) Each student has to submit to the department a seminar report at least three days before the day of seminar.
(iii) Each student has to make the PowerPoint presentation with multi-media projector.

DAV UNIVERSITY, JALANDHAR

Discipline Specific Elective-I

Course Title: ELECTRICAL MACHINE DESIGN
Paper Code: ELE327

L	T	P	Credits
4	0	0	4

Course Objective: This course provides a comprehensive understanding of the design of electrical machines and motors.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the various properties of electrical motors. The participants will learn how the knowledge of computers are implemented in the control of electrical systems.

UNIT A

GENERAL: General features & limitations of electrical machine design, types of enclosures, heat dissipation, temperature rise, heating & cooling cycles, rating of machines, cooling media used & effect of size and ventilation.
DC MACHINES : Output equation, choice of specific loadings, choice of poles and speed, Design of conductors, windings, slots field poles, field coils, commutator and machine design.

UNIT B

TRANSFORMERS: Standard specifications, output equations, design of core, coil, tank and Cooling tubes, calculation of circuit parameters, magnetizing current, losses and efficiency, Temperature rise and regulations from design data.
SYNCHRONOUS MACHINES: Specifications, ratings and dimensions, specific loadings, main dimensions, low-speed machines, turbo generators, armature conductors, cooling.

UNIT C

INDUCTION MOTORS: Three Phase Induction Motor: Standard specifications, output equations, specific loadings, main dimensions, conductor size and turns, no. of slots, slot design, stator core, rotor design, performance calculations.
Single Phase Induction Motor: output equations, specific loadings, main dimensions, design of main and auxiliary winding, capacitor design, equivalent circuit parameters, torque, efficiency.

UNIT D

Computer Aided Design: Computerization of design procedures, development of computer programs & performance predictions, optimization techniques & their application to design problems.

Suggested Books:

1. M.G.Say, "*Performance and design of ac machines*" , CBS Publishers.
2. S.K. Sen., "*Principles of electrical machine design with computer programs*", Oxford and IBH publishing co. 1987.
3. A.E.Clayton, Hencock, "*Performance and design of dc machines*", CBS Publishers.
4. J.H. Kuhlmann, "*Design of electrical operators*", John Willey, 1957.
5. CG Veinott, "*Theory and design of small induction machines*", MGH, 1959.
6. A Shanmugasundarem, "*Electrical machine design databook*", PHI

DAV UNIVERSITY, JALANDHAR

Course Title: ENERGY EFFICIENT MACHINES
Paper Code: ELE332

L	T	P	Credits
4	0	0	4

Objective:
The objective of the course is to enable the students to understand the basic concepts related to efficiency ,improvement of power factor.

Unit-A

Introduction: Need for energy efficient machines, energy cost and two-part tariff, energy conservation in industries and farms -a necessity, introduction to energy management and energy audit system. Review of induction motor characteristics.

Unit-B

Energy efficient motors: Standard motor efficiency, why more efficient motors? An energy efficient motor, efficiency determination methods, Direct Measurement method, Loss segregation method, Comparison, motor efficiency labeling, energy efficient motor standards. Motor life cycle

Unit-C

Power factor: The power factor in sinusoidal systems, power factor improvement, power factor with nonlinear loads, Harmonics and the power factor

Unit-D

Induction motors and adjustable drive systems: Energy Conservation, adjustable speed systems, Application of adjustable speed systems to fans, pumps and constant torque loads.

Suggested books:

1. Andreas John C., "*Energy efficient electric motors"*, Marcel Dekker Inc. 1992.
2. Thuman Albert, "*Introduction to Efficient Electric System Design"*, The Fairmount Press Prentice Hall.
3. Tripathi S.C. , "*Electric Energy Utilization and Conservation"*, Tata McGraw-Hill 1991.
4. Belove Charles, "*Handbook of Modem Electronics and Electrical Engineering"*, John Wiley & Sons.

DAV UNIVERSITY, JALANDHAR

Course Title: BIOMEDICAL ENGINEERING
Paper Code: ELE333

L	T	P	Credits
4	0	0	4

Course Objective To teach students that medical field is based on instrumentation and to enhance their skills in different biomedical instruments.

Learning Objective:

- Origin of bio-electric signals
- Physiological parameters adaptable to bio-telemetry
- security in medical methods

UNIT-A

Physiological Transducers: Introduction to physiological systems, Pressure transducers, Transducer for body temperature measurement. Pulse sensors, Respiration sensors.
Bio-Electric Signals and Electrodes: Origin of bio-electric signals, Recording electrodes, Polarization Skin contact impendence, Electrodes for ECG, EEG, Electrical conductivity of electrode jellies and creams, Microelectrodes.

UNIT-B

Measurement and Analysis Techniques: Blood flow meters, Cardiac Output measurement, Pulmonary function analyzers, Spiro-meter, Respiratory gas analyzers, Blood gas analyzers Blood pH, PCO2, PO2 measurement, Blood cell counters, Audiometer, Pure tone audio meters, Speech audiometers Evoked response audio-metric systems, Oxy-meters.
X-Ray and Ultrasonic Diagnosis: Soft & Hard X-Rays. X-Ray generators for diagnosis. Radiography, Angiography, Fluoroscopy, X-Ray computed tomography, Ultrasonic principles, Application of ultrasonic for diagnosis.

UNIT-C

Physical Medicine and Assist Devices: Diathermy-Short wave, ultrasonic and Microwave, Range and area of irritation of each type, Nerve and muscle simulators, Pacemakers external and implantable pacemakers, DC defibrillators, Defibrillator with synchronizer, Implantable Defibrillators.
Radiotherapy: X-Ray therapy, Radionuclide therapy, Units for radiation and radiation dose.

UNIT-D

Bio-Telemetry: Physiological parameters adaptable to bio-telemetry, Components of a biotelemetry system, Implantable units, Application of telemetry in patient care.
Introduction to Telemedicine: Telemedicine System's classification, input and output peripherals, Characteristic of available transmission media, introduction to communication system for telemedicine. Medical image format standards, introduction to DICOM and PACs technologies various image compression techniques, lossless and lossy image compression for biomedical application. Telemedicine and law, confidentiality of telemedicine records, security in medical methods.

Suggested Books:

1. Khandpur R. S, "*Handbook of Biomedical Instrumentation"*, TMH Publication

2. Pratt Cromwell, "*Biomedical Instrumentation"*, Prentice Hall
3. Webster John G , "*Medical Instrumentation"*, Applications &Design, John Wiley
4. Geddes, Baker "*Principles of Applied Biomedical Instrumentation"*, John Wiley

DAV UNIVERSITY, JALANDHAR

Course Title: INDUSTRIAL PROCESS CONTROL
Paper Code: ELE434

L	T	P	Credits
4	0	0	4

Course Objectives: The major objectives of this course to import the practical knowledge about various types of classical and Intelligent controllers for Industrial Process Control

UNIT-A

Description And Modeling Of Various Industrial Processes: Model Classification, Mathematical Models, Physical Models, Analog Models, Estimation of Model Parameters, System Identification, Experimental Nature of Simulation, Steps Involved in Simulation Studies, Validation of Simulation Models, Computer Simulation of Continuous and Discrete Systems.

UNIT-B

Process Control: Types and Description of Processes, Blending, batch processes, compressor & chiller controls, distillation control, steam turbine & water treatment controls, boiler controls, reactor controls

UNIT-C

Conventional Controllers: On-off Controllers, Cascade and Feed forward Controllers, Split Range Controllers, ratio controls, Single loop, multi loop &self tuning controllers, set point control (SPC), discrete digital control (DDC)

UNIT-D

Intelligent Controllers: Fuzzy logic control, programmable logic controllers, PC based system, conventional and windows NT based DCS systems, artificial intelligence & neural networks, smart & intelligent transmitters.

Suggested Books:

1. Padmanabhan, "*Industrial Process Instrumentation and control"*, Springer Publishing
2. Andrew W.G. & Williams H.B., "*Applied Instrumentation in the Process Industries"*, Gulf Publishing, Houston
3. Nolting B.E., "*Instrumentation Reference Book"*, Elsevier India Pvt ,New Delhi
4. Liptak B.G., "*Instrument Engineer's Handbook (Process Control")*, Elsevier India Pvt ,New Delhi

DAV UNIVERSITY, JALANDHAR

Course Title: COMMUNICATION SYSTEMS

Paper Code: ELE335

L	T	P	Credits
4	0	0	4

UNIT A

Concepts & Terminology: Data communication : data representation, Analog versus digital signals; Direction of Data flow Analog and digital data transmission, data rate limits, Transmission impairments random & nonrandom, Transmission Media- Guided and unguided media, Line configuration, Topology, Categories of networks, Network Architecture – layered protocol TCP/IP and OSI model.

UNIT B

Data Encoding and Modulation: Encoding of digital Data: Line coding schemes, Block coding, Encoding Analog data into digital signal: Pulse code modulation, sampling rate, Modulation of Digital data: ASK, FSK, PSK, QAM, Bit/baud comparison Modulation of Analog data: AM, FM and PM

UNIT C

Transmission of digital data: Asynchronous and Synchronous transmission, DTE-DCE interface, Multiplexing Techniques – FDM: Multiplexing and de-multiplexing process, Applications of FDM, Analog hierarchy, TDM: Time slots and frames, Synchronizing and Bit padding, Statistical TDM, Digital signal service, T lines.

UNIT D

Data link Control: Factor Contributing Errors, , Error Control: Stop & wait ARQ, Go back N & Selective ARQ., Error Detection Methods – parity checking, checksum error detection & CRC, Forward Error Correction Method – block parity, Hamming code, Burst Error Correction Method, Flow control : Stop and wait flow control, Sliding window flow control, Data Link protocols – HDLC, CSMA/CD, token bus, token ring & FDDI.

Suggested Books:

1.Behrouz A Forouzan, "*Data Communications Networking"*, PHI Publishers
2. William Stalling, "*Data and Computer Communication"*, Pearson Education Publishers.
3. Prakash C-Gupta, "*Data Communication"*, PHI Publishers.
4. A. S. Tanenbaum, "*Computer Networks"*, PHI Publishers.

DAV UNIVERSITY, JALANDHAR

DISCIPLINE SPECIFIC ELECTIVE-II

Course Title: RELIABILITY ENGINEERING

Course Code: ELE431

L	T	P	Credits
4	0	0	4

Course Objective:

- To strengthen the knowledge of causes of failure and importance of reliability
- To introduce the concept of Redundancy

UNIT-A

Reliability Fundamentals: Introduction, Importance of reliability, Reliability functions, Failure and Failure Modes, causes of failure, Instantaneous failure rate, General reliability Function

Component Reliability and Hazard Model: Component reliability from Test data, failure data (Failure density, failure rate, reliability, probability of failure) mean failure rate MTTF,MTBF. Hazard Models (Time-dependent Hazard models, Constant Hazard model, Linear Hazard model, non-linear hazard model

UNIT-B

System Reliability: Reliability evaluation of non-maintained systems, series, parallel, series-parallel, non-series, standby configuration, k out of n configuration, complex system, Markov's Method, Fault tree technique, Event space, path Tracing methods, cut-set and tie set method

UNIT-C

Reliability Improvement: Introduction, Improvement of components, redundancy: standby with perfect and imperfect switching. Comparison of component redundancy to system/unit redundancy, mixed redundancy, standby redundancy

Reliability Allocation: Introduction, Redundancy allocation and techniques for reliability allocation

UNIT-D

Availability and Maintainability: Concepts of reliability ,availability and maintainability, types of availability, objectives of maintenance, classification and factor affecting maintenance, maintenance levels, Inventory control of spare parts, Preventive maintenance of some electrical appliances.

Suggested Books:

1. Srinath L.S., "*Reliability Engineering"*, Affiliated East –West Press
2. Balagurusamy E., "*Reliability Engineering"*, Tata McGraw Hill
3. Billinton R. & Allan Ronald N., "*Reliability Evaluation of Engg. Systems: Concepts & Techniques",* Plenum Press
4. Aggarwal K.K., "*Reliability Engineering"*, Academic Press

DAV UNIVERSITY, JALANDHAR

Course Title: HVDC AND EHVAC TRANSMISSION

Course Code: ELE443

L	T	P	Credits
4	0	0	4

Course Objective:
The objective of the course is to enable the students to understand the basic concepts related to HVDC & EHVAC transmission network.

Unit-A

Direct Current (DC) power transmission technology: Introduction, comparison of Alternating Current (AC) and Direct Current (DC) transmission, application of DC transmission, application of DC transmission, description of DC transmission system, Configurations, planning for High Voltage Direct Current (HVDC) transmission, modern trends in DC transmission. Introduction to Device: Thyristor valve, valve tests, recent trends.

Unit-B

Analysis of High Voltage Direct Current (HVDC) converters: Pulse number, choice of converter configuration, simplified analysis of Graetz circuit, converter bridge characteristics, characteristics of a twelve-pulse converter, detailed analysis of converters with and without overlap.

Converter and HVDC system control: General, principles of DC link control, converter control characteristics, system control hierarchy, firing angle control, current and extinction angle control, starting and stopping of DC link, power control, higher level controllers, telecommunication requirements.

Unit-C

Converter faults and protection: Introduction, converter faults, protection against over-currents, over-voltages in a converter station, surge arresters, protection against over-voltages.

Smoothing reactor and DC line: Introduction, smoothing reactors, DC line, transient overvoltages in DC line, protection of DC line, DC breakers, Monopolar operation, effects of proximity of AC and DC transmission lines.

Component models for the analysis of AC/DC systems: General, converter model, converter control, modeling of DC network, modeling of AC networks.

Unit-D

EHV Transmission & Corona Loss:
Need for E.H.V. transmission, use of bundled conductors, corona characteristics of smooth bundled conductors with different configurations, corona loss, factors, affecting the corona. Shunt & Series compensation of E.H.V. lines. Tuned power lines. & H.V.D.C. Transmission: Advantages, disadvantages & economics of H.V.D.C. transmission system. Types of D.C. links,converter station equipment, their characteristics.

Suggested books:

1. Bagamudre, Rakesh Da, "*Extra High Voltage A.C. Transmission Engineering"*, New Age International Publishers.
2. Kimbark E.W., "*High Voltage DC Transmission"*, Wiley-Interscience
3. Kamaraju V. and Naidu M.S., "*High Voltage Engineering",* Tata McGraw-Hill Education

4. Jha R.S., "*High Voltage Engineering", Dhanpat Rai*
5. Kuffel, E. and Abdullah, M. , "*High Voltage Engineering"*, Pergamon Press
6. Wadhwa C. L., "*High Voltage Engineering",* New Age Publications.
7. Padiyar, K.R., "*HVDC Power Transmission Systems: Technology and System Interactions"*, New Age International
8. Kamaraju & Naidu, "*HV Engg*."
9. RS Jha, "*HV Engg*."
10. Bagmudre "*EHV AC Transmission Engg*."
11. Kuffel & Abdullah, "*HV Engg*."
12. Kimbark, "*HVDC Transmission*"

DAV UNIVERSITY, JALANDHAR

Course Title: DIGITAL CONTROL SYSTEMS

Course Code: ELE447

L	T	P	Credits
4	0	0	4

Course Objectives:

At the end of this course, students will demonstrate the ability to

- Obtain discrete representation of LTI systems.
- Analyse stability of open loop and closed loop discrete-time systems.
- Design and analyze digital controllers.
- Design state feedback and output feedback controllers.

UNIT-A

Discrete Representation of Continuous Systems

Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuit. Mathematical Modelling of sample and hold circuit. Effects of Sampling and Quantization. Choice of sampling frequency. ZOH equivalent.

Discrete System Analysis

Z-Transform and Inverse Z Transform for analyzing discrete time systems. Pulse Transfer function. Pulse transfer function of closed-loop systems. Mapping from s-plane to z plane. Solution of Discrete time systems. Time response of discrete time system.

UNIT-B

Stability of Discrete-Time System (4 hours)

Stability analysis by Jury test. Stability analysis using bilinear transformation. Design of digital control system with deadbeat response. Practical issues with deadbeat response design.

UNIT-C

State Space Approach for discrete time systems

State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reach-ability, Reconstructibility and observability analysis. Effect of pole-zero cancellation on the controllability & observability.

UNIT-D

Design of Digital Control System

Design of Discrete PID Controller, Design of discrete state feedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.

Discrete output feedback control

Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete-time systems.

Suggested books:

1. K. Ogata, "*Digital Control Engineering*", Prentice Hall, Englewood Cliffs, 1995.
2. M. Gopal, "*Digital Control Engineering*", Wiley Eastern, 1988.
3. G. F. Franklin, J. D. Powell and M. L. Workman, "*Digital Control of Dynamic Systems*", Addison-Wesley, 1998.
4. B.C. Kuo, "*Digital Control System*", Holt, Rinehart and Winston, 1980.

DAV UNIVERSITY, JALANDHAR

Course Title: MICROSENSORS AND SMART DEVICES

Course Code: ELE439

L	T	P	Credits
4	0	0	4

Course Objective:

- To introduce the concept of Bioinstrumentation
- To make the students familiar with Nanotechnology and fabrication technology

UNIT-A

Overview: Overview of biosensors and their electrochemistry: Molecular reorganization: enzymes, Antibodies and DNA, Modification of biorecognition molecules for Selectivity and sensitivity Fundamentals of surfaces and interfaces.

UNIT-B

Bioinstrumentation: Bioinstrumentation and bioelectronics devices: Principles of potentiometry and potentiometric biosensors, principles of amperometry and amperometric biosensors, Optical Biosensors based on Fiber optics, FETs and Bio-MEMS, Introduction to Chemometrics, biosensor arrays; electronic nose and electronic tongue.

UNIT-C

MEMS Technology: MEMS Technology: Introduction Nanotechnology and MEMS, MEMS design, and fabrication technology, Lithography, Etching, MEMS material, bulk micromachining, Surface micromachining, Microactuator, electrostatic actuation Micro-fluidics.

UNIT-D

Applications: MEMS types and their applications : Mechanical MEMS strain and pressure sensors, accelerometers etc., Electromagnetic MEMS, micromotors, wireless and GPS MEMS etc. Magnetic MEMS, all effect sensors, SQUID magnetometers, Optical MEMS, micromachined fiber optic component, optical sensors, Thermal MEMS, thermo-mechanical and thermo-electrical actuators, Peltier heat pumps.

Suggested Books:

1. Soloman, S., "*Sensors Handbook",* 2 ed, CBS, Publishers, 2010, Print
2. Grimes, "*Encyclopedia of sensors"* CBS Publishers, 2007, Print
3. Mukhopadhyay, "*Smart sensors and sensing technology"*, CBS Publishers, 2008, Print
4. Saliterman, "*fundamentals of Bio-Mems and medical micro devices",* CBS Publishers, 2006, Print
5. Julian W. Gardner, Vijay Varadan& Osama O. Awadelkarim, "*Microsensors, MEMS and Smart Devices",* Wiley-Blackwell,
6. Donald G. Buerk, "*Biosensors: Theory and Applications"*, CRC, Print
7. Xueji Zhang, HuangxianJu & Joseph Wang, "*Electrochemical Sensors, Biosensors and their Biomedical Applications",* Academic Press, Print

DAV UNIVERSITY, JALANDHAR

Course Title: DIGITAL SIGNAL PROCESSING

Course Code: ELE437

L	T	P	Credits
4	0	0	4

Course Objective:
The purpose of this course is to introduce the concepts of Digital signal processing and DSP Processor. The mathematical analysis of FIR and IIR filter design are dealt with in detail

Section A

Review of discrete time signals and systems
Overview of signals and systems, DFT–FFT using DIT and DIF algorithms, Inverse DFT-FFT using DIT and DIF algorithms, Applications, Circular Convolution.

Design and implementation of IIR filters
Design of analog filters using Butterworth and Chebyshev approximations, IIR digital filter design from analog filter using impulse invariance technique and bilinear transformations.

Section B

Design and implementation of FIR filters
Linear phase response, Design techniques for FIR filters, Fourier series method and frequency sampling method–Design of Linear phase FIR filters using windows: rectangular, Henning and Hamming windows.

Section C

Finite word length effects in digital filters
Fixed point arithmetic, effect of quantization of the input data due to Finite word length. Product round off, need for scaling, Zero input limit cycle oscillations - Limit cycle oscillations due to overflow of adders, Table lookup implementation to avoid multiplications.

Section D

Processor Fundamentals
Features of DSP processors – DSP processor packaging (Embodiments) – Fixed point Vs floating point DSP processor data paths – Memory architecture of a DSP processor (Von Neumann – Harvard) – Addressing modes – pipelining – TMS320 family of DSPs (architecture of C5x).

Suggested Books

1. John G. Proakis and Dimitris C. Manolakis,*"Digital Signal Processing Principles, Algorithms and Applications"*, Pearson Education, Fourth edition, 2007.
2. Venkataramani.B, Bhaskar.M, *"Digital Signal Processors, Architecture, Programming and Application"*, Tata McGraw Hill, New Delhi, 2003.
3. Sanjit Mitra, *"Digital Signal Processing, A Computer based approach*", Tata McGraw Hill, New Delhi, 2011.

DAV UNIVERSITY, JALANDHAR

DISCIPLINE SPECIFIC ELECTIVE-III

Course Title: OPTIMAL CONTROL

Course Code: ELE448

L	T	P	Credits
4	0	0	4

Course Objective:
The purpose of this course is to introduce the concepts of controls and optimization. The mathematical analysis of systems, iterative methods are dealt with in detail

Unit A

Introduction and Parametric Optimization: Introduction to optimal control problems, Classification of optimal control problems, performance indices for optimal control and their selection, Dynamic optimization using calculus of variations: Lagrange multiplier, Euler Lagrange's equation for different conditions, Transversality conditions, Dynamic optimization with equality and inequality constraints

Unit B

Pontryegans Max/min Principle: Optimization using Pontryegans maximum (minimum) principles with special emphasis on Bang-Bang type system

Dynamic Programming in Continuous Time: Developments of Hamilton Jacobi equation, Matrix Riccati equation, Optimal control based on quadratic performance indices, Linear regulator and servomechanism problem

Unit C

Dynamic programming in Discrete System: Dynamic programming multi stage decision processes in continuous time. Principle of causality, Invariant inbedding & optimality

Unit D

Iterative Method of Optimization: Optimization using gradient methods and interactive techniques (steepest descent), Newton Raphson and Fletcher Powell. Introduction to multivariable system and decoupling, Introduction to Optimal Filters (Kalman Filter).

Suggested Books:

1. M Gopal, *" Modern Control System Theory"*, Wiley Eastern.
2. Richard C Drof & R H Bishop, *" Modern Control Systems 8th Ed"*, Addision Wesley.
3. Andrew P Sage & C C White-III, *" Optimum Systems COntrol"*, PHI.
4. B D O Anderson & B Moree, *" Optimum System Control"*, PHI.

DAV UNIVERSITY, JALANDHAR

Course Title: Fundamental of Virtual Instrumentation

L	T	P	Credits
4	0	0	4

Paper Code: ELE436

Course Objective: To make the students familiar with software concepts related to electrical energy.

Learning Objective:

- Instrumentation system
- Graphical programming in data flow
- RS 232, RS485, GBIP

UNIT-A

Introduction to Virtual Instrumentation: Historical perspective, Classification of different instruments / instrumentation system, Definition and architecture of virtual instrumentation system, salient features and application area of virtual instrumentation.

UNIT-B

Data Flow Programming Techniques: Graphical programming in data flow, comparison with conventional programming, popular data flow and VI software packages. Building a VI front panel and block diagram, sub VI, for and while loops, case and sequence structure, formula nodes, local and global, string and file I/O, array and clusters, charts and graphs, attributes nodes.

UNIT-C

Data Acquisition Basics: ADC, DAC, D/O, counters and timer, PC hardware structure, timing, interrupts, DMA, software and hardware installation, Configuring data acquisition hardware using the drives in application software, use of DAQ library functions for different analog and digital input/output operations.

Common Instrument Interfaces: Current loop, RS 232, RS485, GBIP. Use of library functions to communicate with different instruments.

UNIT-D

Use of Measurement Analysis Tools: Measurement of Max, Min, Peak-Peak voltage, Mathematical tools, time period of a signal, power spectrum and logging Fourier transform, Correlation methods, windowing and filtering.

Building a web-based virtual instrument: Networking basics for office and industry application.

Suggested Books:

1. Gupta S., "*Virtual Instrumentation Using Labview"*, TMH publication
2. Gupta S. & Gupta J., "*PC Interfacing for data acquisition"*, SA publication
3. Wells Lisa K, Travis Jeffry, "*LabVIEW for everyone"*, PHI publication
4. Johnson Gary W, "*Lab view Graphical Programming"*, McGraw Hill

DAV UNIVERSITY, JALANDHAR

Course Title: COMPUTATIONAL ELECTROMAGNETICS

L	T	P	Credits
4	0	0	4

Paper Code: ELE449

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the basic concepts of electromagnetics.
- Understand computational techniques for computing fields.
- Apply the techniques to simple real-life problems.

UNIT-A

Introduction

Conventional design methodology, Computer-aided design aspects – Advantages. Review of basic fundamentals of Electrostatics and Electromagnetics. Development of Helmholtz equation, energy transformer vectors- Poynting and Slepian, magnetic Diffusion-transients and time-harmonic.

UNIT-B

Analytical Methods

Analytical methods of solving field equations, method of separation of variables, Roth's method, integral methods- Green's function, method of images.

Finite Difference Method (FDM)

Finite Difference schemes, treatment of irregular boundaries, accuracy and stability of FD solutions, Finite-Difference Time-Domain (FDTD) method- Uniqueness and convergence.

UNIT-C

Finite Element Method (FEM)

Overview of FEM, Variational and Galerkin Methods, shape functions, lower and higher order elements, vector elements, 2D and 3D finite elements, efficient finite element computations.

Special Topics

{Background of experimental methods-electrolytic tank, R-C network solution, Field plotting (graphical method)}, hybrid methods, coupled circuit - field computations, electromagnetic - thermal and electromagnetic - structural coupled computations, solution of equations, method of moments, Poisson's fields.

UNIT-D

Applications

Low-frequency electrical devices, static / time-harmonic / transient problems in transformers, rotating machines, actuators. CAD packages.

Suggested Books

1. P. P. Silvester and R. L. Ferrari "*Finite Element for Electrical Engineers*", Cambridge University press, 1996.
2. M. N. O. Sadiku, "*Numerical Techniques in Electromagnetics*", CRC press, 2001.

DAV UNIVERSITY, JALANDHAR

Course Title: ELECTRICAL ENGINEERING MATERIALS

L	T	P	Credits
4	0	0	4

Paper Code: ELE450

Course Objective: This course provides a comprehensive understanding of the conductors,electrical conductivity and semiconductor materials.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the various insulating materials for high voltage. The participants will learn how the solid, liquid, and gaseous dielectrics are distinguished.

UNIT-A

Conductors, Properties of conductors, ACSR, High resistivity materials and their properties, Alloys, Soldering and brazing materials, superconductivity, superconductor materials and their applications.

UNIT-B

Insulators, classifications of insulators, dialectical materials, glass and ceramics refractory materials and their uses, optical fibers, laser and optoelectronics materials, semiconductor materials, properties of semiconductor materials thermosetting and thermoplastic materials.

UNIT-C

Classification of material, Dia, Para, and Ferromagnetic materials-curie law and Curie Weiss law (qualitative study). Ferromagnetism-Qualitative study of domain theory – Hysteresis phenomena. Hard and soft magnetic material and their applications. Ferrites, Structure and property.

UNIT-D

Processes used in Plano technology e.g. Lapping, polishing, cleaning, masking, photolithography, diffusion, oxidation and metallization, welding wire bonding, packaging and encapsulation, Heating induction and dielectric, Electron beam welding and cutting annealing, cold &Hot rolling.

Suggested Books:

1. Kasap S.O, "*Principles of Electrical Engg. Material and Devices*" MGH.
2. Mahajan, "*Principles of Growth and processing of semiconductors*" MGH.
3. Dhir, " *Electronics components and materials and Principles Manufacturing & Maintenance*"
4. Addision, "*Electronics Engg. Material Devices*" TMH.
5. Ruska N Scot, "*Microelectronics processing and introduction to the manufacturer of integrated circuits*", MGH.
6. Seth & Gupta, "*A course in Electrical Engg. Material*" Dhanpat Rai & Sons.
7. Dekker, "*Electrical Engg. Materials*"PHI.

DAV UNIVERSITY, JALANDHAR

Course Title: ADVANCED INSTRUMENTATION
Paper Code: ELE468

L	T	P	Credits
4	0	0	4

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand various design specifications.
- Design controllers to satisfy the desired design specifications using simple controller structures (P, PI, PID, compensators).
- Design controllers using the state-space approach.

Unit A

Electronic Measuring Instruments: Advanced semescope and displays, high-speed oscilloscope, sampling oscilloscope ,DSO wave analyzer, distortion analyzer, modulation analyzer, spectrum analyzer, wavemeter, digital phase meter, frequency synthesizers, logic state analyzer, LCR meters.

Unit B

Advanced Sensors: Current and voltage sensors, intelligent pressure transducer, turbidity measurement, microwave sensor, ceramic sensor as gas sensor.
Vision Sensors: overview, illumination consideration, vision sensors generalties, 2D sensor, 3D sensor, interfacing of vision sensors.

Unit C

Optical Fibre Sensor: Introduction, extrinsix and dynamic fibre optic sensor, elementary principles, the design of optical fibre sensor, development of optical fibre sensor, phase modulated optical fibre sensor, frequency modulation in optical sensor, polarization modulation in fiber sensors, distributed optical fiber sensing DOFS, distributed micro bend strains sensor, distributed optical fibre temperature sensor, using the optical kerr effect, distributed optical fibre sensor for chemical species, fiber optic sensor for air pollution, optical fiber pressure sensor, optical fiber pressure sensor, optical fiber temperature sensor, optical fiber sensor for humidity.

Unit D

Ultrasonic Instrumentation: Sirens, whistles, the wretch whistles, liquid ultrasonic, generators, solid transducers, piezoelectric transducers, magneto strictive transducers, the production of very light intensity, depleted layer transducer, applications of ultrasonic processing, uses of ultrasonic in measurement and control, flow detection, application of ultrasonic to boilers.
Tactile Sensors: Overview, touch sensing, tactile sensing, interfacing of tactile sensors**.**

Suggested Books :

1. Allan Morris, "*Principles of measurement and instrumentation*", PHI.
2. J P Bartley, "*Principles of measurement system*", Longman London
3. Sabrie Soloman, "*Sensors and control system in manufacturing*", McGraw Hill.
4. HKP Newbert, "*Instrument transducer*", Clarendon.
5. Cooper and Helfrick, "*modern electronic instrumentation and measurement techniques*", PHI.

DAV UNIVERSITY, JALANDHAR

DISCIPLINE SPECIFIC ELECTIVE-IV

Course Title: Electrical and Hybrid Vehicles

L	T	P	Credits
4	0	0	4

Paper Code: ELE459

Course Outcomes:
At the end of this course, students will demonstrate the ability to

- Understand the models to describe hybrid vehicles and their performance.
- Understand the different possible ways of energy storage.
- Understand the different strategies related to energy storage systems.

Unit A

Introduction

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance. Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Unit B

Electric Trains

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drivetrain topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

Unit C

Energy Storage

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery-based energy storage and its analysis, Fuel Cell-based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel-based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems.

Unit D

Energy Management Strategies

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

Case Studies: Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV).

Suggested Books:

1. C. Mi, M. A. Masrur and D. W. Gao, "*Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives*", John Wiley & Sons, 2011.
2. S. Onori, L. Serrao and G. Rizzoni, "*Hybrid Electric Vehicles: Energy Management Strategies*", Springer, 2015.
3. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, "*Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design*", CRC Press, 2004.
4. T. Denton, "*Electric and Hybrid Vehicles*", Routledge, 2016.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
4	0	0	4

Course Title: NEURAL NETWORKS AND FUZZY LOGICS

Paper Code: ELE460

Course Objective: This course provides a comprehensive understanding of the origin and development of electrical deregulation policies framed by government of India.

Unit A

Introduction: Expert systems, fuzzy sets and control theory; representation, reasoning and acquisition; inference engines and functions approximator, model-based and training based fuzzy control; neural networks and fuzzy systems; fuzzy-neural control: ideas & para-diagrams

Unit B

Approximate Reasoning Approach: Introduction, Reasoning models, rule aggregation and operator selection, reasoning with uncertain data and rules, architecture of multivariable fuzzy control

Unit C

Rule Base Construction By Self- Learning: Description of system structure, proposed learning algorithm, convergence analysis, error and derivative correction, fuzzy control algorithm, extracting rules from recorded data

Unit D

Fuzzy Controller With Self Learning Teacher: Formulation of the problem, solution using neural networks (BNN network, isomorphic mapping of functionality), BNN based fuzzy controller, learning & rules extracting, hybrid neural network, system structure, dynamical self organizing, adaptive mechanisms, simplified fuzzy control algorithms, representation and reasoning by CPN, self construction of rule base, description of the CMAC and RBF, connecting the CMAC and RBF to the SFCA, self construction of the fuzzified network based controller

Suggested Books:

1. J.M.Zurada, "*Introduction to Neural Systems*", Jaico Publishers.
2. Dr. V.B.Rao and Sh. H.V. Rao, "*Neural Networks and Fuzzy Logic*", BPB Publications.
3. Junhong Nie and Deret Linkens, "*Fuzzy- Neural Control: Principles, Algorithms and Applications*", PHI Publications.
4. Rao & Rao, "*C++ Neural Network and fuzzy logic*", M&T books.

DAV UNIVERSITY, JALANDHAR

Course Title: ELECTRICAL ENERGY AUDITING AND DEREGULATION
Paper Code: ELE408

L	T	P	Credits
4	0	0	4

Course Objective: This course provides a comprehensive understanding of the origin and development of electrical deregulation policies framed by government of India.

Unit-A

Energy Management & Audit: Definition, Energy audit-need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Benchmarking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments

Unit-B

Deregulation: Introduction, Reconfiguring Power systems, unbundling of electric utilities, Background to deregulation and the current situation around the world, benefits from a competitive electricity market after effects of deregulation, Role of the independent system operator, Operational planning activities of ISO: ISO in Pool markets, ISO in Bilateral markets, Operational planning activities of a GENCO: Genco in Pool and Bilateral markets, market participation issues, competitive bidding

Unit-C

Power wheeling, Transmission open access, pricing of power transactions, security management in deregulated environment, and congestion management in deregulation, General description of some ancillary services, ancillary services management in various countries, reactive power management in some deregulated electricity markets

Unit-D

Reliability analysis: interruption criterion, stochastic components, component models, Calculation methods, Network model: stochastic networks, series and parallel connections, minimum cut sets, reliability cost, Generation, transmission and distribution reliability, Reliability and deregulation: conflict, reliability analysis, effects on the actual reliability, regulation of the market

Suggested Books:

1. K. Bhattacharya, MHT Bollen and J.C Doolder, "*Operation of Restructured Power Systems*", Kluwer Academic Publishers, USA, 2001.
2. Lei Lee Lai, "*Power System restructuring and deregulation*", John Wiley and Sons, UK. 2001.
3. Fred I Denny and David E. Dismukes "*Power System Operations and Electricity Markets*", CRC Press, LLC, 2002.

DAV UNIVERSITY, JALANDHAR

Course Title: POWER QUALITY AND FACTS
Paper Code: ELE461

L	T	P	Credits
4	0	0	4

Course Outcomes:
At the end of this course, students will demonstrate the ability to

- Understand the characteristics of ac transmission and the effect of shunt and series reactive compensation.
- Understand the working principles of FACTS devices and their operating characteristics.
- Understand the basic concepts of power quality.
- Understand the working principles of devices to improve power quality.

Unit A

Transmission Lines and Series/Shunt Reactive Power Compensation
Basics of AC Transmission. Analysis of uncompensated AC transmission lines. Passive Reactive Power Compensation. Shunt and series compensation at the mid-point of an AC line. Comparison of Series and Shunt Compensation.

Thyristor-based Flexible AC Transmission Controllers (FACTS)
Description and Characteristics of Thyristor-based FACTS devices: Static VAR Compensator (SVC), Thyristor Controlled Series Capacitor (TCSC), Thyristor Controlled Braking Resistor and Single Pole Single Throw (SPST) Switch. Configurations/Modes of Operation, Harmonics and control of SVC and TCSC. Fault Current Limiter.

Unit B

Voltage Source Converter based (FACTS) controllers
Voltage Source Converters (VSC): Six Pulse VSC, Multi-pulse and Multi-level Converters, Pulse-Width Modulation for VSCs. Selective Harmonic Elimination, Sinusoidal PWM and Space Vector Modulation. STATCOM: Principle of Operation, Reactive Power Control: Type I and Type II controllers, Static Synchronous Series Compensator (SSSC) and Unified Power Flow Controller (UPFC): Principle of Operation and Control. Working principle of Interphase Power Flow Controller. Other Devices: GTO Controlled Series Compensator. Fault Current Limiter.

Unit C

Application of FACTS
Application of FACTS devices for power-flow control and stability improvement. Simulation example of power swing damping in a single-machine infinite bus system using a TCSC. Simulation example of voltage regulation of transmission mid-point voltage using a STATCOM.

Power Quality Problems in Distribution Systems
Power Quality problems in distribution systems: Transient and Steady-state variations in voltage and frequency. Unbalance, Sags, Swells, Interruptions, Wave-form Distortions: harmonics, noise, notching, dc-offsets, fluctuations. Flicker and its measurement. Tolerance of Equipment: CBEMA curve.

Unit D

DSTATCOM

Reactive Power Compensation, Harmonics and Unbalance mitigation in Distribution Systems using DSTATCOM and Shunt Active Filters. Synchronous Reference Frame Extraction of Reference Currents. Current Control Techniques in for DSTATCOM.

Dynamic Voltage Restorer and Unified Power Quality Conditioner

Voltage Sag/Swell mitigation: Dynamic Voltage Restorer – Working Principle and Control Strategies. Series Active Filtering. Unified Power Quality Conditioner (UPQC): Working Principle. Capabilities and Control Strategies.

Suggested Books:

1. N. G. Hingorani and L. Gyugyi, "*Understanding FACTS: Concepts and Technology of FACTS Systems*", Wiley-IEEE Press, 1999.
2. K. R. Padiyar, "*FACTS Controllers in Power Transmission and Distribution*", New Age International (P) Ltd. 2007.
3. T. J. E. Miller, "*Reactive Power Control in Electric Systems*", John Wiley and Sons, New York, 1983.
4. R. C. Dugan, "*Electrical Power Systems Quality*", McGraw Hill Education, 2012.
5. G. T. Heydt, "*Electric Power Quality*", Stars in a Circle Publications, 1991

DAV UNIVERSITY, JALANDHAR

Course Title: OPTIMIZATION TECHNIQUES

L	T	P	Credits
4	0	0	4

Paper Code: ELE435

Objective:
The objective of the course is to enable the students to understand the basic concepts related to optimize for electric Networks, Linear programming and the concepts of non-Linear programming.

Unit-A

Introduction to optimization: Statement of an optimization problem, Classification of optimization problems, Optimization techniques, Engg. applications of optimization.
Classical optimization techniques: Single variable optimization, Multivariable optimization with no constraints, Multivariable optimization with equality constraints, Multivariable optimization with inequality constraints.

Unit-B

Linear programming: Standard form of linear programming ,Graphical solution, Simplex method, Two phase simplex method, Computer implementation of the simplex method, Duality theory.
Transportation problem: North-West Corner rule, Least cost method, Vogel approximation method, testing for optimality.

Unit-C

Non-linear programming:
One–Dimensional Minimization Methods: Unimodal function, Dichotomous search, Fibonacci search, Golden Section, Cubic interpolation method, Direct root, Newton Raphson Method

Unconstrained Multivariable Optimization Techniques: Random search method, Steepest descent method, Conjugate gradient method, Variable metric method. Newton Raphson Method, Evolutionary search, Hooke-Jeeves Method, Simplex search Method

Constrained Optimization Techniques: Interior Penalty function method, Exterior penalty function method, Method of Multipliers, KKT Conditions

Unit-D

Further topics in optimization: Critical path method (CPM), Program evaluation and review technique (PERT). Multiobjective Optimization Techniques, Weighting method, ε-constraint method. Simulated annealing method

Suggested books:

1. Rao, S.S., "*Optimization : Theory and Application"* , Wiley Eastern Press, 2nd edition 1984.
2. Deb Kalyanmoy,. "*Optimisation for Engineering Design-Algorithms and Examples"*., Prentice Hall India-1998
3. Taha,H.A., "*Operations Research -An Introduction*" ,Prentice Hall of India,2003.

4. Fox, R.L., "*Optimization methods for Engineering Design*", Addition Welsey, 1971.
5. Ravindran A., Ragsdell K.M. and Reklaitis G.V. , "*Engineering Optimization: Methods And applications"* , Wiley, 2008
6. Godfrey C. Onwubolu , B. V. Babu , "*New optimization techniques in engineering"* , Springer, 2004

DAV UNIVERSITY, JALANDHAR

Discipline Specific Elective-V

Course Title: POWER SYSTEM DYNAMICS AND CONTROL
Paper Code: ELE463

L	T	P	Credits
4	0	0	4

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the problem of power system stability and its impact on the system.
- Analyse linear dynamical systems and use of numerical integration methods.
- Model different power system components for the study of stability.
- Understand the methods to improve stability.

UnitA

Introduction to Power System Operations

Introduction to power system stability. Power System Operations and Control. Stability problems in Power System. Impact on Power System Operations and control.

Analysis of Linear Dynamical System and Numerical Methods

Analysis of dynamical System, Concept of Equilibrium, Small and Large Disturbance Stability. Modal Analysis of Linear System. Analysis using Numerical Integration Techniques. Issues in Modeling: Slow and Fast Transients, Stiff System.

UnitB

Modeling of Synchronous Machines and Associated Controllers

Modeling of synchronous machine: Physical Characteristics. Rotor position dependent model. D-Q Transformation. Model with Standard Parameters. Steady State Analysis of Synchronous Machine. Short Circuit Transient Analysis of a Synchronous Machine. Synchronization of Synchronous Machine to an Infinite Bus. Modeling of Excitation and Prime Mover Systems. Physical Characteristics and Models. Excitation System Control. Automatic Voltage Regulator. Prime Mover Control Systems. Speed Governors.

Unit C

Modeling of other Power System Components

Modeling of Transmission Lines and Loads. Transmission Line Physical Characteristics. Transmission Line Modeling. Load Models - induction machine model. Frequency and Voltage Dependence of Loads. Other Subsystems – HVDC and FACTS controllers, Wind Energy Systems.

Stability Analysis

Angular stability analysis in Single Machine Infinite Bus System. Angular Stability in multimachine systems – Intra-plant, Local and Inter-area modes. Frequency Stability: Centre of Inertia Motion. Load Sharing: Governor drop. Single Machine Load Bus System: Voltage Stability. Introduction to Torsional Oscillations and the SSR phenomenon. Stability Analysis Tools:Transient Stability Programs, Small Signal Analysis Programs.

UnitD

Enhancing System Stability

Planning Measures. Stabilizing Controllers (Power System Stabilizers). Operational Measures-Preventive Control. Emergency Control.

Text/Reference Books

1. K.R. Padiyar, "*Power System Dynamics, Stability and Control*", B. S. Publications, 2002.
2. P. Kundur, "*Power System Stability and Control*", McGraw Hill, 1995.
3. P. Sauer and M. A. Pai, "*Power System Dynamics and Stability*", Prentice Hall, 1997.

DAV UNIVERSITY, JALANDHAR

Course Title: INDUSTRIAL ELECTRICAL SYSTEMS
Paper Code: ELE464

L	T	P	Credits
4	0	0	4

Course Outcomes:
At the end of this course, students will demonstrate the ability to

- Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
- Understand various components of industrial electrical systems.
- Analyze and select the proper size of various electrical system components.

Unit A

Electrical System Components
LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

Unit B

Residential and Commercial Electrical Systems
Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

Illumination Systems
Understanding various terms regarding light, lumen, intensity, candlepower, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

Unit C

Industrial Electrical Systems I
HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

Industrial Electrical Systems II
DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

Unit D

Industrial Electrical System Automation
Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.

Suggested Books

1. S. L. Uppal and G. C. Garg, "*Electrical Wiring, Estimating & Costing*", Khanna publishers, 2008.
2. K. B. Raina, "*Electrical Design, Estimating & Costing*", New age International, 2007.
3. S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co., 1997.
4. Web site for IS Standards.
5. H. Joshi, "*Residential Commercial and Industrial Systems*", McGraw Hill Education, 2008.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
4	0	0	4

Course Title: ADVANCED ELECTRIC DRIVES
Paper Code: ELE465
Course Outcomes:
At the end of this course, students will demonstrate the ability to

- Understand the operation of power electronic converters and their control strategies.
- Understand the vector control strategies for ac motor drives
- Understand the implementation of the control strategies using digital signal processors.

Unit A

Power Converters for AC Drives
PWM control of inverter, selected harmonic elimination, space vector modulation, current control of VSI, three-level inverter, Different topologies, SVM for 3 level inverter, Diode rectifier with boost chopper, PWM converter as line side rectifier, current fed inverters with self-commutated devices. Control of CSI, H bridge as a 4-Q drive.

Unit B

Induction motor drives
Different transformations and reference frame theory, modeling of induction machines, voltage fed inverter control-v/f control, vector control, direct torque and flux control(DTC).

Unit C

Synchronous motor drives
Modeling of synchronous machines, open loop v/f control, vector control, direct torque control, CSI fed synchronous motor drives.
Permanent magnet motor drives
Introduction to various PM motors, BLDC and PMSM drive configuration, comparison, block diagrams, Speed and torque control in BLDC and PMSM.

Unit D

Switched reluctance motor drives
Evolution of switched reluctance motors, various topologies for SRM drives, comparison, Closed loop speed and torque control of SRM.
DSP based motion control
Use of DSPs in motion control, various DSPs available, realization of some basic blocks in DSP for implementation of DSP based motion control.

Suggested books:

1. B. K. Bose, "*Modern Power Electronics and AC Drives*", Pearson Education, Asia, 2003.
2. P. C. Krause, O. Wasynczuk and S. D. Sudhoff, "*Analysis of Electric Machinery and Drive Systems*", John Wiley & Sons, 2013.
3. H. A. Taliyat and S. G. Campbell, "*DSP based Electromechanical Motion Control*", CRC press, 2003.
4. R. Krishnan, "*Permanent Magnet Synchronous and Brushless DC motor Drives*", CRC Press, 2009.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
4	0	0	4

Course Title: CONTROL SYSTEMS DESIGN
Paper Code: ELE467
Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand various design specifications.
- Design controllers to satisfy the desired design specifications using simple controller structures (P, PI, PID, compensators).
- Design controllers using the state-space approach.

Unit A

Design Specifications
Introduction to design problem and philosophy. Introduction to time domain and frequency domain design specification and its physical relevance. Effect of gain on transient and steady state response. Effect of addition of pole on system performance. Effect of addition of zero on system response.

Unit B

Design of Classical Control System in the time domain
Introduction to compensator. Design of Lag, lead lag-lead compensator in time domain. Feedback and Feedforward compensator design. Feedback compensation. Realization of compensators.

Unit C

Design of Classical Control System in frequency domain
Compensator design in frequency domain to improve steady state and transient response. Feedback and Feedforward compensator design using bode diagram.
Design of PID controllers
Design of P, PI, PD and PID controllers in time domain and frequency domain for first, second and third order systems. Control loop with auxiliary feedback – Feedforward control.

Unit D

Control System Design in state space
Review of state space representation. Concept of controllability & observability, effect of pole-zero cancellation on the controllability & observability of the system, pole placement design through state feedback. Ackerman's Formula for feedback gain design. Design of Observer. Reduced order observer. Separation Principle.
Nonlinearities and its effect on system performance
Various types of non-linearities. Effect of various non-linearities on system performance. Singular points. Phase plot analysis.

Suggested Books :

1. N. Nise, "*Control system Engineering*", John Wiley, 2000.
2. I. J. Nagrath and M. Gopal, "*Control system engineering*", Wiley, 2000.
3. M. Gopal, "*Digital Control Engineering*", Wiley Eastern, 1988.
4. K. Ogata, "*Modern Control Engineering*", Prentice Hall, 2010.
5. B. C. Kuo, "*Automatic Control system*", Prentice Hall, 1995.
6. J. J. D'Azzo and C. H. Houpis, "*Linear control system analysis and design (conventional and modern)*", McGraw Hill, 1995.
7. R. T. Stefani and G. H. Hostetter, "*Design of feedback Control Systems*", Saunders

College Pub, 1994

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
4	0	0	4

Course Title: ADVANCED INSTRUMENTATION
Paper Code: ELE468
Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand various design specifications.
- Design controllers to satisfy the desired design specifications using simple controller structures (P, PI, PID, compensators).
- Design controllers using the state-space approach.

Unit A

Electronic Measuring Instruments: Advanced semescope and displays, high-speed oscilloscope, sampling oscilloscope ,DSO wave analyzer, distortion analyzer, modulation analyzer, spectrum analyzer, wavemeter, digital phase meter, frequency synthesizers, logic state analyzer, LCR meters.

Unit B

Advanced Sensors: Current and voltage sensors, intelligent pressure transducer, turbidity measurement, microwave sensor, ceramic sensor as gas sensor.
Vision Sensors: overview, illumination consideration, vision sensors generalties, 2D sensor, 3D sensor, interfacing of vision sensors.

Unit C

Optical Fibre Sensor: Introduction, extrinsix and dynamic fibre optic sensor, elementary principles, the design of optical fibre sensor, development of optical fibre sensor, phase modulated optical fibre sensor, frequency modulation in optical sensor, polarization modulation in fiber sensors, distributed optical fiber sensing DOFS, distributed micro bend strains sensor, distributed optical fibre temperature sensor, using the optical kerr effect, distributed optical fibre sensor for chemical species, fiber optic sensor for air pollution, optical fiber pressure sensor, optical fiber pressure sensor, optical fiber temperature sensor, optical fiber sensor for humidity.

Unit D

Ultrasonic Instrumentation: Sirens, whistles, the wretch whistles, liquid ultrasonic, generators, solid transducers, piezoelectric transducers, magnetostrictive transducers, the production of very light intensity, depleted layer transducer, applications of ultrasonic processing, uses of ultrasonic in measurement and control, flow detection, application of ultrasonic to boilers.
Tactile Sensors: Overview, touch sensing, tactile sensing, interfacing of tactile sensors**.**

Suggested Books :

1. Allan Morris, "*Principles of measurement and instrumentation*", PHI.
2. J P Bartley, "*Principles of measurement system*", Longman London
3. Sabrie Soloman, "*Sensors and control system in manufacturing*", McGraw Hill.
4. HKP Newbert, "*Instrument transducer*", Clarendon.
5. Cooper and Helfrick, "*modern electronic instrumentation and measurement techniques*", PHI.

DAV UNIVERSITY, JALANDHAR

Course Title: POWER PLANT ENGINEERING

Paper Code: ELE407

L	T	P	Credits
4	0	0	4

Course Objective: This course provides a comprehensive understanding of operation and control of power plant. It traces the evolution of power plant thought from its earliest days to the present, by examining the backgrounds, ideas and influences of its major contributors.

Unit-A

Steam Generators, Condensers And Turbines: Classification of steam generators, selection, operation of locomotive, Babcock Wilcox, Cochran boilers, Types of condensers, effect of air in condensers, Dalton's law of partial pressure, cooling water calculations, steam nozzles, types of steam turbine efficiencies, compounding, governing and control.

Steam Power Plant: Classification, Operation, Description of Rankin cycle, Regenerative cycle, Reheat-Regenerative Cycle, Binary Vapour Cycle, Selection of plant site and its layout, coal handling system, combustion system, Fluidised bed combustion, Ash handling, Feed pumps, Heat exchangers, Economizers, Superheaters, Reheaters, Air preheaters, Feed water heaters, Evaporators.

Unit-B

Hydro-Electric Power Plants: Hydrological Cycle, Hydrograph, Flow duration curve,Selection of site, Essential features, Classification of hydro plants, base and peak load plant, pumped storage plant. Run of river with and without pondage. Selection of water turbines for hydropower plant, Automatic and remote control of hydro-station, layout of hydropower plant.

Nuclear Power Plants: Nuclear physics, Binding energy, Radioactive decay. Fertile material, Mass defect, Nuclear reactions type and application, Generation of nuclear energy by fission, Nuclear reactors. Site selections, safety measures, plant layout, Fusion reaction, Future of nuclear power.

Unit-C

Gas Turbine: Elements of gas turbines, Open and closed cycles for gas turbines, Performance terms, Thermal refinement to gas turbines cycle, Plant layout, applications, gas turbines Cycle calculations.

Diesel Power Plants: Classifications of IC Engines and their performance, Four stroke and two-stroke diesel engines, combustion phenomenon; Essential components, Celane number, knocking, supercharging, operation and layout of diesel power plant.

Unit-D

Combined Operation Of Different Power Plants: Advantages of combined operation of plants, load division between power stations, coordination of different types of Power Plants.

Pollution Control: Pollution from thermal & nuclear plants, Particulate emission and control, electrostatic precipitator, solid waste disposal.

Text Book:

1. Chakrabarti A., Soni, M.L. Gupta P.V. and Bhatanagar U.S., "*A Textbook on PowerSystem Engineering",* Dhanpat Rai & Co.

Reference Books:

1. EI-Wakit M.M., "*Power Plant Engineering"*, McGraw Hill, USA
2. Rajput R.K., "*Power Plant Engineering"*, Luxmi Publications
3. Sharma P.C., "*Power Plant Engineering"*, Kataria& Sons
4. Skrotzki B.G.A. and Vapot W.A., "*Power Station Engineering and Economy"*, Tata McGraw-Hill