DAV UNIVERSITY
JALANDHAR

Course Scheme & Syllabus

For

B. Tech. in Electrical Engineering
(Honour/Pass)

1st TO 8th SEMESTER
Examinations 2015–2016 Session

Syllabi Applicable For Admissions in 2015

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	CHE151A	Chemistry	4	0	0	4	Core
3	CSE101A	Computer Fundamentals and Programming	4	0	0	4	Core
4	EVS100	Environmental Studies	4	0	0	4	AECC
5	MEC101A	Engineering Drawing	2	0	4	4	Core
6	ENG151A	Basic Communication Skills	3	0	0	3	AECC
7	CHE152	Chemistry Lab	0	0	2	1	AECC
8	CSE103	Computer Fundamentals and Programming Lab	0	0	2	1	Core
9	ENG152	Basic Communication Skills Lab	0	0	2	1	Core

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	PHY151A	Engineering Physics	4	0	0	4	Core
3	MEC103	Mechanical Engineering Fundamentals	4	0	0	4	Core
4	ELE101	Electrical and Electronics Technology	4	0	0	4	Core
5	SGS107	Human Values and General Studies	4	0	0	4	AECC
6	MEC104	Manufacturing Practice	0	0	4	2	Core
7	PHY152	Engineering Physics Lab	0	0	2	1	Core
8	ELE102	Electrical and Electronics Technology Lab	0	0	2	1	Core

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

DAV UNIVERSITY, JALANDHAR

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.	MTH252A	Engineering Mathematics-III	4	0	0	4	Core
3.	CSE201	Object Oriented Programming	4	0	0	4	Core
4.	ELE202	Electrical Machines-I (DC Machine & Transformers)	3	0	0	3	Core
5.	ELE209	Electrical Measurement and Instrumentation	4	0	0	4	Core
6.	ELE214	Renewable Energy Sources and Management	3	0	0	3	Core
7.	ELE203	Electrical Machines I (DC Machine & Transformers) Laboratory	0	0	2	1	Core
8.	ELE210	Electrical Measurement and Instrumentation Laboratory	0	0	2	1	Core
9.	CSE202	Object Oriented Programming Laboratory	0	0	2	1	Core

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.	ELE204	Electromagnetic Field Theory	4	0	0	4	Core
2.	ELE205	Electrical Machine-II (Asynchronous & Synchronous Machines)	3	0	0	3	Core
3.	ELE206A	Power System-I	3	0	0	3	Core
4.	ELE212	Electrical Engineering Materials	3	0	0	3	Core
5.	ELE318	Transducer and Signal Conditioning	4	0	0	4	Core
6.	ECE211	Analog Electronics	4	0	0	4	Core
7.	ELE207	Electrical Machine-II (Asynchronous & Synchronous Machines) Laboratory	0	0	2	1	Core
8.	ELE321	Transducer and Signal Conditioning Laboratory	0	0	2	1	Core

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 marks for this will be included in the 5^{th} Semester.*

DAV UNIVERSITY, JALANDHAR

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

Sr. No.	Course Code	Course Title	L	T	P	Cr.	Nature of Course
1.	MTH256A	Numerical Methods	3	0	0	3	Core
2.	ELE314	Digital Electronics	3	0	0	3	Core
3.	ELE315	Switchgears Protection and Relays	4	0	0	4	Core
4.	ELE316	Electrical power Generation & Control	3	0	0	3	Core
5.	ELE306A	Power Electronics	4	0	0	4	Core
6.	ELE211	Signal and Systems	3	0	0	3	Core
7.	ELE320	Switchgears protection and Relays Laboratory	0	0	2	1	Core
8.	ELE 310	Power Electronics Laboratory	0	0	2	1	Core
9.	ELE350	Industrial Training	0	0	0	2	Training, D and P

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

Sr. No.	Course Code	Course Title	L	T	P	Cr.	Nature of Course
1.	ELE325	Microcontroller and Programmable Logic Controller	3	0	0	3	Core
2.	ELE322	Control System Engineering	4	0	0	4	Core
3.	ELE301A	Power System-II	3	0	0	3	Core
4.	ELE326	Electric Drives	4	0	0	4	Core
5.	ENG351	Technical Communication	3	0	0	3	AECC
6.	ELE327	Electrical Machine Design	4	0	0	4	Core
7.	ELE328	Electric Drives Laboratory	0	0	2	1	Core
8.	ELE329	Microcontroller and Programmable Logic Controller Laboratory	0	0	2	1	Core
9.	ELE324	Control System Engineering Laboratory	0	0	2	1	Core

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

Note:

- *Department specific elective-I should be from the basket of "Department 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 marks for this will be included in the 7th semester.*

DAV UNIVERSITY, JALANDHAR

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

Sr. No.	Course Code	Course Title	L	T	P	Cr.	Nature of Course
1.	ELE412	Utilization & Traction	3	0	0	3	Core
2.	ELE307	High Voltage Engineering	3	0	0	3	Core
3.		Discipline Specific Elective -I	4	0	0	4	DSE-I
4.		Discipline Specific Elective -II	4	0	0	4	DSE-II
5.		Generic Elective - I	4	0	0	4	Generic Elective -I
6.	ELE312	Estimation and Costing Laboratory	0	0	2	1	Core
7.	ELE406A	Training	0	0	0	2	Training, D and P
8.	ELE451A	Project	0	0	8	4	Training, D and P

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

Note:

- *Department specific elective-II should be from the basket of "Department 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.	ELE413	Digital & Non Linear Control System	4	0	0	4	
2.		Discipline Specific Elective -III	4	0	0	4	DSE-III
3.		Discipline Specific Elective -IV	4	0	0	4	DSE-IV
4.		Generic Elective - II	4	0	0	4	Generic Elective - II
5.	ELE402A	Computer Aided Power System Analysis	4	0	0	4	Core
6.	ELE304A	Software Programming Laboratory	0	0	2	1	Core
7.	ELE452	Seminar	0	0	4	2	Training, D and P
8.	ELE404	Computer Aided Power System Analysis Laboratory	0	0	2	1	

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

Note:

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

DAV UNIVERSITY, JALANDHAR

Discipline Specific Elective-I

Sr. No.	Course Code	Course Tittle	L	T	P	Credit
1	ELE431	Reliability Engineering	4	0	0	4
2	ELE432	Biomedical Engineering	4	0	0	4
3	ELE433	Industrial Process Control	4	0	0	4
4	ELE434	Power System Instrumentation	4	0	0	4

Discipline Specific Elective-II

Sr. No.	Course Code	Course Tittle	L	T	P	Credit
1	ELE435	Optimization Techniques	4	0	0	4
2	ELE436	Fundamentals of Virtual Instrumentation	4	0	0	4
3	ELE437	Digital Signal Processing	4	0	0	4
4	ELE438	Microprocessor and its applications	4	0	0	4

Discipline Specific Elective-III

Sr. No.	Course Code	Course Tittle	L	T	P	Credit
1	ELE439	Micro Sensors and Smart Devices	4	0	0	4
2	ELE440	Electrical Energy Auditing and Deregulation	4	0	0	4
3	ELE441	Power System Operation and Control	4	0	0	4
4	ELE442	Power System stability	4	0	0	4

Discipline Specific Elective-IV

Sr. No.	Course Code	Course Tittle	L	T	P	Credit
1	ELE443	HVDC and EHVAC Transmission	4	0	0	4
2	ELE444	Energy Efficient Machines	4	0	0	4
3	ELE445	Flexible AC transmission systems	4	0	0	4
4	ELE446	Industrial Drives	4	0	0	4

DAV UNIVERSITY, JALANDHAR

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

DAV UNIVERSITY, JALANDHAR

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, Eigen values and Eigen vectors, Diagonalisation of Matrix, Cayley Hamilton theorem. Orthogonal, Hermition 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'sseries. 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, finger print 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: EVS100

L	T	P	Credits
4	0	0	4

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.

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

Referencees:

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

Course Title: Engineering Physics

L	T	P	Credits
4	0	0	4

Course Code: PHY151A

Course Objective: 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-A

PHYSICAL OPTICS:

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: Polarised and unpolarised light, double refraction, Nicol prism, quarter and half wave plates.

Unit-B

LASER: Spontaneous and stimulated emission, Laser action, Characteristics of laser beam, concept of coherence, HeNe laser, Semiconductor lasers and applications

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

Unit-C

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, Behaviour of dielectric in alternating field and ClausiusMossotti equation.

Unit-D

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.

SUPER CONDUCTIVITY:

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

Reference 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.

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: Electrical and Electronics Technology

Course Code: ELE101

L	T	P	Credits
4	0	0	4

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

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.

Unit-C

Magnetic Circuit:

Review of laws of electromagnetism, Flux, MMF and their relation. Comparison of electrical and magnetic circuit, B-H Curve, saturation leakage and fringing. Analysis of series and parallel magnetic circuit, AC Excitation in magnetic circuits, Hysteresis and eddy currents.

Transformers:

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

Basic Electronics:

P-Type and N-Type semiconductors, Concept of diode & transistor and their application,

DAV UNIVERSITY, JALANDHAR

Introduction to Operational Amplifier, application of op amp as a subtractor, summer, differentiator, integrator, logic gates AND ,OR, NOT, NOR, NAND, Ex-OR, Ex-NOR.

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: SGS107

L	T	P	Credits
4	0	0	4

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 inter disciplinary 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

DAV UNIVERSITY, JALANDHAR

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

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

DAV UNIVERSITY, JALANDHAR

Course Title: Electrical and Electronics Technology Lab

Course Code: ELE102

L	T	P	Credits
0	0	2	1

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 study 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 study 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 characterics of PN-junction diode.
12. To verify the truth table of logic gates.

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.

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

Course Title: Object Oriented Programming
Paper Code: CSE-201

L	T	P	Credits
4	0	0	4

Course Objective: To understand the basic concepts of object oriented programming language.

Learning Outcomes: Students will feel comfortable working with computers and will have practical knowledge about Object-Oriented programming language (C++ Language).

UNIT-A

Object-Oriented Programming Concepts
Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, Basic concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, Declaring and initializing pointers, accessing data through pointers.

Standard Input/Output
Concept of streams, hierarchy of console stream classes, Input/output using overloaded operators >> and << of I/O stream classes, formatting output, Manipulators.

UNIT-B

Functions and Arrays
Defining a function, Actual and Formal Arguments, Local and global variables, Nested functions, recursive functions , Array declaration, character array, multidimensional array, arrays and pointers

Classes and Objects
Specifying a class, creating class objects, accessing class members, Access specifiers, static members, nested classes, local classes, abstract classes, Constructors and Destructors, copy constructor, dynamic constructors, explicit constructors, advantages and disadvantages of constructor and destructor.

UNIT-C

Operator Overloading and Type Conversion
Overloading operators, rules for overloading operators, Overloading of various operators, Type conversion.

Inheritance
Introduction, defining derived classes, Types of inheritance, virtual base class, Pure virtual functions, overriding member functions.

Polymorphism
Concept of binding - early binding and late binding, Virtual functions, abstract classes, Virtual destructors.

UNIT-D

Exception Handling
Review of traditional error handling, basics of exception handling, Exception handling mechanism, Throwing mechanism, catching mechanism.

Files

File streams, hierarchy of file stream classes, Error handling during file operations, Reading/writing of files, updating files.

Suggested Readings:

1. Balagurusamy E., *"Object Oriented Programming with C++",* Tata McGraw Hill.
2. Ravichandran D., "*Programming in C++"*
3. Lafore R., "*Object Oriented Programming in C++",* Waite Group.
4. Schildt Herbert, "*The Complete Reference to C++ Language*", McGraw Hill-Osborne.
5. BjarneStroustrup, "*The C++ Programming Language*", Addison Wesley.
6. Lippman F. B, *"C++ Primer*", Addison Wesley.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
4	0	0	4

Course Title: Electrical Measurement and Instrumentation
Paper Code: ELE209

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.

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

L	T	P	Credits
3	0	0	3

Course Title: Renewable Energy Sources and Management
Paper Code: ELE214

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 analysed 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

MHO Generators: Basic principle, gaseous conduction & Hall effect, generator & motor effect, different types of MHO generators, practical MHO 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 photo voltaic cells, conversion efficiency, solar batteries, solar radiation analysis, solar energy in India, solar collector, solar furnaces & applications.

UNIT D

Other Sources: 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, Bio mass energy, conversion processes. Different bio mass 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 Hand book*".
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-I (DC Machine & Transformers)
Paper Code: ELE202

L	T	P	Credits
3	0	0	3

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

Electromechinal 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

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.

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 buildup voltage in shunt generator , voltage regulation , parallel operation of d.c generator

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 spped control through ward –leonard method Need of starter in dc motor, three point and four starter of dc shunt motors

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

L	T	P	Credits
0	0	2	1

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

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 analyse 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

7. To Load test on a single phase transformer.

8. To perform Open circuit and short circuit tests on a single phase transformer and hence find equivalent circuit, voltage regulation and efficiency.

9. To find the efficiency and voltage regulation of single phase transformer under different loading conditions.

10. To perform parallel operation of two single phase transformers.

11. To study the various connections of three phase transformer.

12. To perform Scott connections on three phase transformer to get two phase supply.

13. To study the constructional details of direct current (DC) machine and to draw sketches of different components.

14. To measure armature and field resistance of direct current (DC) shunt generator and to obtain its open circuit characteristics.

15. To obtain load characteristics of direct current (DC) shunt/series /compound generator.

16. To draw speed-torque characteristics of direct current (DC) shunt/series /compound generator.

17. To study direct current (DC) motor starters.

18. To perform Swinburne's test (no load test) to determine losses of direct current (DC) shunt motor.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
0	0	2	1

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

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 and phase angle using Cathode Ray Oscilloscope.
3. Measurement of unknown voltage using Crompton's potentiometer.
4. To calibrate and use the Induction Energy Meter.
5. Measurement of resistance using Wheatstone Bridge.
6. Measurement of resistance using Kelvin's Bridge.
7. Measurement of self inductance using Anderson's Bridge.
8. Measurement of capacitance using Schering Bridge.
9. Measurement of frequency using Wien's Bridge.
10. To find 'Q' of an inductance coil and verify its value using Q- meter.
11. To measure the unknown resistance with the help of Voltmeter and Ammeter.
12. To study the connections and use of Current and potential transformers and to find out ratio error.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
0	0	2	1

Course Title: Object Oriented Programming Laboratory
Paper Code: CSE202

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.

1. Introduction to basic structure of C++ program, utility of header and library files.
2. Implementation of program related to the basic constructs in C++
3. Programs using different data types in C++
4. Programs using Loops and Conditional Statements in C++
5. Programs using arrays single dimension in C++.
6. Programs using functions by passing values using call by value method and call by reference method.
7. Programs related to string handling in C++
8. Program to demonstrate the objects of the class and their working
9. Programs to implement the working of constructor & destructor
10. Programs to implement the concept of operator overloading
11. Programs to implement Inheritance and its types
12. Programs using early and late binding
13. Programs to show the working of abstract classes
14. Programs to show the working of Exception Handling
15. Program to illustrate the concept of file handling

DAV UNIVERSITY, JALANDHAR

SEMESTER-4th

L	T	P	Credits
3	0	0	3

Course Title: Power System-I
Paper Code: ELE206A

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: Importance of electric power, power system components, Growth of Power systems in India, 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.

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

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

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.

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

L	T	P	Credits
4	0	0	4

Course Title: Analog Electronics
Course Code: ECE211

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

L	T	P	Credits
4	0	0	4

Course Title: Electromagnetic Field Theory
Paper Code: ELE204

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 the students to understand the universal theoretical concepts in three dimensional real world and find solution to problems related to electro-magnetic 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 Magnetostaics 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.

Magneostatics: 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 & Synchronous Machines)
Paper Code: ELE205

L	T	P	Credits
3	0	0	3

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

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 Synchroneous 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.

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: Electrical Engineering Material
Paper Code: ELE212

L	T	P	Credits
3	0	0	3

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, super conductor materials and their applications.

UNIT-B

Insulators, classifications of insulators, dialectical materials, glass and ceramics refractory materials and their uses, optical fibers, laser and opto-electronics materials, semiconductor materials, properties of semiconductor materials thermosetting and thermoplast materials.

UNIT-C

Classification of material, Dia, Para, and Ferro magnetic materials-curie law and curie Weiss law (qualitative study). Ferromagnetism-Qualitative study of domain theory – Hystersis 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 ammealing, cold &Hot rolling.

Suggested Books:

1. Kasap S.O, "*Principles of Electrical Engg. Material and Devices*" MGH.
2. Mahaja, "*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: 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

TRANSDUCERS:
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 semi-conductor 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, Magneto-strictive 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: photo conductive cells, semiconductor photo diode , photo transistors, 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, 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.

DAV UNIVERSITY, JALANDHAR

UNIT-D

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

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-II(Asynchronous & 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. Parameters and to draw circle diagram.
3. To study the speed control of three-phase Induction motor by Kramer's Concept.
4. To study 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 study 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: Transducers and Signal Conditioning Laboratory

L	T	P	Credits
0	0	2	1

Paper Code: ELE321

Course Objective: This course provides a practical understanding of the design of transducers and their applications.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of implementation of transducers based on their working. The participants will learn how the conversion of non electrical signal to electrical signal takes place.

List of Experiments

1. To Measure Temperature using RTD.
2. To Measure Displacement using L.V.D.T.
3. To Measure Load using Load Cell.
4. Pressure Measurement using Cantilever.
5. Light Measurement using LDR & Photo Cell.
6. To Measure Angular Displacement using Capacitive Transducer.
7. To Measure the Variation in Water Level using Capacitive Transducer.
8. To Measure Speed of DC Motor using Reluctance Method.
9. To Measure Strain using Strain Gauge.
10. To Measure Speed using Photo Interrupter Method.

DAV UNIVERSITY, JALANDHAR

SEMESTER-5th

Course Title: Numerical Methods

Paper Code: MTH256A

L	T	P	Credits
3	0	0	3

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 Eigen value.

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

L	T	P	Credits
3	0	0	3

Course Title: Signal and Systems
Course Code: ELE211

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

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*", 3 ed., 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

L	T	P	Credits
4	0	0	4

Course Title: Switchgears Protection and Relays

Paper Code: ELE315

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 over voltage and earthing: Ground wires, Rod gap, Impulse gap, Valve typeand Metal Oxide Arresters, Line Arrester/Surge Absorber. Ungrounded neutral system, Grounded neutral system and Selection of Neutral Grounding.

Suggested Books:

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

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
3	0	0	3

Course Title: Electric power generation and control

Paper Code: ELE316

Course Objective: This course provides a comprehensive understanding of various power plant for generating electricity. Various characterics 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.

Hydro electric plants: Choice of site, classification of hydro electric plants, main parts and working of plants and their layouts, characteristics of hydro electric 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 turbo generators.

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 run off 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: 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. its turning on and off technique.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of power electronic switch like thysistor, 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 over current. 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 full 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 voltagesource 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

Choppers: Introduction of chopper, Basic chopper classification, Basic chopper operations. Control strategies, Chopper configuration, voltage commutated chopper, Current commutated chopper, Load commutated chopper.

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

converters

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

L	T	P	Credits
0	0	2	1

Course Title: Switchgears protection and Relays Laboratory

Paper Code: ELE320

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. Visit to a Local Substation or a Generating Plant and to study the generation and distribution system
2. To Study the Characteristics of over current and earth fault protection.
3. To compute the ABCD parameters of a transmission line and study the performance of transmission line.
4. To study the operating characteristics of HRC or open type fuse.
5. To find the earth resistance using three spikes
6. To study over current static relay.
7. To study the different types of faults on transmission line demostration panel/model.
8. To study the performance of under voltage and over voltage relay.
9. To study the characteristics of bimetal mini circuit breakers.
10. To study the characteristics of Distance Relay.
11. To find the breakdown strength of transformer oil.
12. To obtain the effect of sudden short-circuit on a synchronous generator
13. To study the radial feeder performance when (i) Fed at one end (ii) Fed at both ends

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. Study of the microprocessor based firing control of a bridge converter.
6. To study three phase fully controlled bridge converter and plot waveforms of output voltage, for different firing angles.
7. Study of Jones chopper or any chopper circuit to check the performance.
8. Thyristorised speed control of a D.C. Motor.
9. Speed Control of induction motor using thyristors.
10. Study of series inverter circuit and to check its performance.
11. Study of a single-phase cycloconverter.
12. To check the performance of a McMurray half-bridge inverter
13. To obtain the current harmonics drawn by power electronics interface using MATLAB Simulink

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
0	0	0	2

Course Title: Industrial Training-I
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.

DAV UNIVERSITY, JALANDHAR

Semester- 6th

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

L	T	P	Credits
3	0	0	3

Course Title: Microcontroller and Programmable Logic Controller
Paper Code: ELE325

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, 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: 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: Introduction to PLDs and FPGAarchitecture, 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 andApplications*, TataMcGraw Hill Education Pvt. Ltd., 2010.
6. SurekhaBhanot, *Process Control*, Oxford Higher Education.
7. Otter, Job Dan, *Programmable Logic Controlle*r, P.H. International, Inc, USA
8. Dunning Gary, *Introduction to PLCs*, Tata McGraw Hill
9. Kumar Rajesh, *Module on PLCs and their Applications*, NITTTR Chandigarh

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
4	0	0	4

Course Title: Control System Engineering

Paper Code: ELE322

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 close 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

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.

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: Power System-II

L	T	P	Credits
3	0	0	3

Paper Code: ELE301A

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 modelling 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 modelling 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: Transient electric phenomenon, traveling waves, reflection & refraction of waves with different line termination, protection against dangerous pressure rises.

Unit-C

Stability of Power System: Concepts of stability, power angle characteristics of synchronous, steady sate and transient stability swing waves.

Grounding: Grounded & Ungrounded neutral systems, solid grounding, resistance grounding, reactance grounding. Voltage transformer earthing. Harmonic supressors, 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: 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

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.

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

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.

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 in industry*",MGH
5. Fransver "*Electric Machines & Drives*"

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
3	0	0	3

Course Title: Technical Communication
Course Code: ENG351
Total Lectures: 45

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-1

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

Unit-2

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

Unit-3

- Report Writing
- Business and Technical Proposals
- Memos

Unit-4

- 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

L	T	P	Credits
0	0	2	1

Course Title: Microcontroller and PLC Laboratory

Paper Code: ELE329

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 8051/8031 Micro-controller kits.
2. Write a program to add two numbers lying at two memory locations and display the result.
3. Write a program for multiplication of two numbers lying at memory location and display the result.
4. Write a program to check a number for being ODD or EVEN and show the result on display.
5. Write a program to split a byte in two nibbles and show the two nibbles on display.
6. Write a program to arrange TEN numbers stored in memory location in ascending and descending order.
7. Write a program to find a factorial of a given number.
8. Study of interrupt structure of 8051/8031 micro-controllers.
9. Write a program to show the use of INT0 and INT1.
10. Write a program of flashing LED connected to port 1 of the micro-controller.
11. Write a program to control a stepper motor in direction, speed and number of steps.
12. Write a program to control the speed of DC motor.
13. Implementation of different gates using PLC.
14. Implementation of DOL and star delta starter using PLC.
15. Implement basic logic operations, motor start and stop operation using
(i) Timers
(ii) Counters
16. Motor forward and reverse direction control using PLC.
17. Write and implement the LD control program for rack feeder.
18. Make a PLC based system for separating and fetching work pieces.
19. Make a PLC based control system for conveyor belt.
20. Implement a PLC based traffic light control.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
0	0	2	1

Course Title: Electric Drives Laboratory
Paper Code: ELE328

Course Objective: This course provides a practical aspect of the Electric drives Systems and Regenerative Breaking.

LIST OF EXPERIMENTS:

1. Development of permanent magnet synchronous and brush less dc motor controllers
2. Performance, testing and control of induction motors
3. Microcomputer-controlled power system monitoring and protection
4. Power quality assessment and Improvement in Cycloconverter fed systems with Frequency Selective Sub-harmonic Feedback. Software based transducer linearization
5. Electromagnetic Field Computation
6. Intelligent control strategies for electric drives
7. Application of artificial neural nets in interconnected power systems
8. Design of controllers for MIMO systems
9. Piecewise fast decoupled & Adjusted fast decoupled Load Flow Motors
10. Expert System to Power System Security Analysis
11. Condition Monitoring of Power Transformers and Induction Motors
12. Analysis and Design of Robust Voltage Stabilizers for Thermal Power Station
13. Development of concepts of global Voltage and Security Indicators in Longitudinal Power supply (LPS) System
14. Study on Efficient Voltage Control on Induction Motor Drive
15. Study on the Dynamics of Motor during System Disturbances & Development of a Flexible Auto Changeover Circuit
16. Low cost Sensorless Switched reluctance drive
17. Development of energy efficient battery charger and inverter
18. Control and Performance Improvement of a Brush-less DC

DAV UNIVERSITY, JALANDHAR

Course Title: Control System Engineering Laboratory
Paper Code: ELE324

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 study D.C. position control system.
2. Experiment to study linear system simulator.
3. Experiment to study light intensity control using P & PI controller with provision for disturbance and transient speed control.
4. Experiment to study D.C. motor speed control.
5. Experiment to study the stepper motor characteristics and its control through microprocessor kit.
6. Experiment to study Temperature control system.
7. Experiment to study Compensation design.
8. Experiment to study relay control system.
9. Experiment to study Potentials metric Error Detector.
10. Experiment to study SC Position control system.
11. Experiment to study synchros.

DAV UNIVERSITY, JALANDHAR

SEMESTER-7th

Course Title: High Voltage Engineering

L	T	P	Credits
3	0	0	3

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. Useof 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: Utilization & Traction
Paper Code: ELE412

L	T	P	Credits
3	0	0	3

Course Objective: This course provides a comprehensive understanding of the implementation of electric energy, utilisation 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 vapour, mercury vapour 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 electro deposition, 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: Electrical Estimation and Costing Laboratory
Paper Code: ELE312

L	T	P	Credits
0	0	2	1

List of Experiments

1. To study Indian electricity rules

2. To carryout 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 (Work shop, 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 any one domestic appliance.

13. To study various types of light sources and lighting schemes.

14. To make wiring diagrams of motor control circuits for starting of
    a. 3 phase induction motor

    b. Wound Motor

    c. 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

L	T	P	Credits
0	0	0	2

Course Title: Industrial Training-II

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.

In this training, Students may also learn the programming language/application softwares. All the applications software should be related to the Electrical Engineering. The following are the suggested software tools:

- Any high level procedure oriented or object oriented programming language.
- MATLAB
- LabView
- Mi-Power
- PSpice
- PSCAD
- ERACS
- TRACE ELEC CALC
- ETAP

Students will undertake one project related to the Electrical components and systems based on the software training imparted during the semester in a group of three students. All the group will select different projects. Students will be required to prepare a report on the Project undertaken and deliver a seminar on the project undertaken. The students will be evaluated based on Project undertaken, project report, seminar and viva-voce examination.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
0	0	8	4

Course Title: Minor Project Laboratory

Paper Code: ELE451A

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.

Design, Fabrication, Simulation, Evaluation, Testing etc. related to Electrical Engineering is to be carried out under the supervision of guide(s).

DAV UNIVERSITY, JALANDHAR

SEMESTER-8th

L	T	P	Credits
4	0	0	4

Course Title: Digital and Non-Linear Control System

Paper Code: ELE413

Course Objective:

- To strengthen the knowledge of Digital control
- To inculcate the controller design concepts
- To introduce the concept of Mathematical Modeling of Non-Linear Control System

Learning Objective:

- Basic elements of a discrete data control system
- Different types of non-linearities
- State Space models

UNIT-A

State Space Analysis & Design: Invariance of eigen values, Digonalisation of system matrices having distinct & repeated eigen values, Vander monde & modified Vander monde matrix. Definition of controllability & observability, derivation of controllability & observability matrix, effect of pole zero cancellation on the controllability & observability of the system, pole placement design through state feedback, state feedback with integral control, luenberger observer.

UNIT-B

Non-Linear Control Systems: Different types of non-linearities. Peculiarities of non-linear systems. Definition of describing function. (D.F.) derivation on D.F.'s for various non-linearities, D.F. analysis of non-linear control systems, Limit cycles, Merit and limitations of D.F. analysis. Phase-plane method. Singular points, Construction of phase-plane plots for non -linear systems by isocline method, Obtaining time- domain response from the phase-plane plots, Stable, semistable and unstable limit cycles.

UNIT-C

Discrete Time Control Systems (Part-I) : Basic elements of a discrete data control system & its advantages over the continuous time systems A/D and D/A conversions, Sample and hold device, Pulse transfer function, starred Laplace transforms, Pulse transfer functions of cascaded elements, Pulse transfer function of close loop system Modified Z-transform, Stability analysis of close loop systems in Z-domain, Stability criterion by Jury's test, Stability analysis by bilinear transformation and Routh's stability criterion.

UNIT-D

Discrete Time Control Systems (Part-II) : Discrete time equivalent of continuous time filters, State space representations of discrete time systems, State Space models from pulse transfer functions, Solution of discrete time state space equations, Design of digital control system, PID controller and frequency domain compensation design, State variable method.

Suggested Books:

1. Katsuhiko Ogata, *Modern Control Engineering*, Prentice Hall of India Pvt Ltd
2. Benjamin C. Kuo, *Digital Control Systems*, Pearson Education
3. Gopal M., *Digital Control Engineering*, Wiley Eastern
4. Kuo Benjamin C., *Automatic Control system*, Prentice Hall of India Pvt Ltd

DAV UNIVERSITY, JALANDHAR

Course Title: Computer Aided Power Systems Analysis

L	T	P	Credits
4	0	0	4

Paper Code: ELE402A

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, inter- relations 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 Seided 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: Computer Aided Power System Analysis Laboratory

L	T	P	Credits
0	0	2	1

Paper Code: ELE404

Course Objective: This course provides a comprehensive understanding of software analyses of power system.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of design aspect of transmission line and their control parameters. The participants will learn how the transmission line is erected. The course will equip them with the understanding of the concepts of Y and Z bus formation.

List of Experiments

1. Visit to Thermal/Hydro Power Plant
2. Design of transmission systems for given power and distance.
3. Short circuit calculations and calculations of circuit breaker ratings for a power system network.
4. Design of substations.
5. Design of distribution systems.
6. Y-bus formation.
7. Z-bus formulation.
8. Load flow analysis by Gauss Seidal method
9. Load flow analysis by Newton Raphson method
10. Load flow analysis by R-K Method
11. Fault analysis for line-to-line (L-L), Line-to-Ground (L-G) etc.
12. Design of underground cabling system for substation.
13. To obtain power system stability on High Voltage Alternating current (HVAC) system with the help of Flexible Alternating Current Transmission Systems (FACTS) devices.
14. Optimal Capacitor placement on a system having variable reactive power and low voltage profile.
15. To obtain relay co-ordination on a power system.
16. To obtain optimal generator pricing on hydro-thermal and renewable energy systems.
17. To find synchronous reactances (Transient, sub-transient) during fault analysis.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
0	0	2	1

Course Title: Software Programming Laboratory

Paper Code: ELE304A

Course Objective: The major objectives of this course to import the practical knowledge about MATLAB Software and to analyze various types of Control System using MATLAB software.

List of Experiments

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 define the Transfer Function of a control system and find its poles and zeros.
4. Write a MATLAB program to define the Characteristics equation and determine its roots.
5. Write the transfer function of a 1^{st} order system using MATLAB and find the transient response.
6. Write the transfer function of a 2^{nd} order system and find the transient response.
7. Find the Frequency response of 2^{nd} order control systems
8. Design of Lead, Lag, Lead- Lag compensators using frequency domain analysis.
9. Solving steady state Ricatti Equation.
10. Solving an optimal control problem using Ricatti equation.
11. Implementation of Preliminary Transformations:
    (a) Transfer function to State space models vice- versa.
    (b) Conversion of Continuous to Discrete time systems vice-versa.
12. Draw the Root Locus Plot of a 2^{nd} order control system.
13. To Plot the Polar and Nyquist plot for 1^{st} and 2^{nd} order control system.
14. Design of Control Systems using MATLAB and SIMULINK.
15. Implementation of Least squares error method.
16. Implementation of PID controller and its effects on a given system.

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
0	0	4	2

Course Title: Seminar

Paper Code: ELE452

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 Power Point presentation with multi-media projector.

DAV UNIVERSITY, JALANDHAR

Department specific elective-1

Course Title: Reliability Engineering
Paper 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, on-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, stand by 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 effecting 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

L	T	P	Credits
4	0	0	4

Course Title: Biomedical Engineering
Paper Code: ELE432

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, Audio meter, 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, Pace makers external and implantable pacemakers, DC defibrillators, Defibrillator with synchronizer, Implantable defibrillators.
Radiotherapy: X-Raytherapy, Radio nuclide 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, loss less 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: ELE433

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 widows 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: Power System Instrumentation
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 applications of Instrumentation in various types of Power Systems.

UNIT-A

Introduction: Measurement of electrical quantities, Active and reactive power in power plants, Energy meters, Instrument transformers and their transient response.

Instrumentation Techniques: Telemetry, Remote Control, remote signaling and supervisory control and data acquisition (SCADA), signal formation, conversion and transmission.

UNIT-B

Signal Transmission Techniques: Analog pulse and digital modulation, Amplitude modulation(AM) and Frequency modulation (FM), AM and FM Transmitter and Receiver, Phase Modulation, Pulse modulation, Digital transmission techniques, error detection and correction.

Telemetry: Telemetry errors, DC, pulse and digital telemetry methods and systems.

UNIT-C

Supervisory Control and Data Acquisition: Function of SCADA system remote terminal unit (RTU) details, Control center details, Communication between control centers, control center and remote terminal unit

UNIT-D

Power Plant Instrumentation: Hydroelectric power plant instrumentation, Thermal power plant instrumentation, Nuclear Power plant Instrumentation. Applications of SCADA system to Indian Power Systems.

Suggested Books:

1. Ned Mohan, *Power Electronics*, Wiley publication
2. Dubey, *Power Electronics Drives*, Wiley Eastern
3. Shephered W., Hulley L.N., *Power Electronics & Control of Motor*, Cambridge University Press
4. . Dubey G.K & Kasaravada C.R., *Power Electronics & Drives*, TMH

DAV UNIVERSITY, JALANDHAR

Department specific elective -II

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 optimise 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 in equality constraints.

Unit-B

Linear programming: Standard form of linear programming ,Graphical solution, Simplex method, Twophase 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

Course Title: Fundamental of Virtual Instrumentation

Paper Code: ELE436

L	T	P	Credits
4	0	0	4

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 Inerfacing 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

L	T	P	Credits
4	0	0	4

Course Title: Digital Signal Processing
Paper Code: ELE437

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

Learning Outcomes:

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

- Structures of discrete time signals and systems.
- Fast Fourier Transform Implementations, Frequency response and design of FIR and IIR filters.
- Finite word length effect.

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 look up 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).

Recommended 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

L	T	P	Credits
4	0	0	4

Course Title: Microprocessors and its Applications

Paper Code: ELE438

Course Objectives:
The purpose of this course is to teach students the fundamentals, internal architectural details and functioning of microprocessors systems. The student will be able to incorporate these concepts into their electronic designs for other courses where control can be achieved via a microprocessor implementation.

Learning Outcomes:
Through the use of assembly language, by the end of the course students will become thoroughly familiar with the elements of microprocessor software and hardware. They will be able to:

- Understand fundamental operating concepts behind microprocessors.
- Appreciate the advantages in using microprocessors in engineering applications.
- Design microprocessor based solutions to problems.
- Understand low-level programming.
- Apply this knowledge to more advanced structures.

UNIT-A

Introduction
Introduction to Microprocessors, classification, recent microprocessors.
Microprocessor Architecture
8085 microprocessor Architecture. Bus structure, I/O, Memory &System buses, concept of address Bus, Data Bus & Control Bus, Synchronous & Asynchronous buses. Instruction execution sequence & Data Flow, Instruction cycle.

UNIT-B

I/O memory interface
Data transfer modes: Programmable, interrupt initiated and DMA 8257, Serial & parallel interface, study of 8251 & 8255 programmable peripheral interfaces.

UNIT-C

Instruction set & Assembly Languages Programming
Introduction, instruction & data formats, addressing modes, status flags, 8085 instructions, Data transfer operations, Arithmetic operations, Logical operations, Branch operations.

UNIT-D

Case structure & Microprocessor application
Interfacing of keyboards and seven segment LED display, Microprocessor controlled temperature system (MCTS), Study of traffic light system, stepper motor controller.
Basic architecture of higher order microprocessor
Basic introduction to 8086, Architecture, Segmentation & addressing modes.

Suggested Books:

1. Gaonkar Ramesh, "*8085 Microprocessor"*, PHI Publications.
2. Tabak Daniel, "*Advanced Microprocessors"*, McGraw- Hill, Inc., Second Edition 1995.

3. Hall Douglas V., "*Microprocessors and Interfacing: Programming and Hardware"*, Tata McGraw Hill, Edition, 1986.
4. Gilmore Charles M., "*Microprocessors: Principles and Applications"*, McGraw Hill.
5. B. Ram, "*Microprocessor*", Dhanpat Rai Publications.

DAV UNIVERSITY, JALANDHAR

Discipline specific elective-III

Course Tittle: Micro Sensors and Smart Devices
Paper Code: ELE439

L	T	P	Credits
4	1	0	4

Course Objective:

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

UNIT-I

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

UNIT-II

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-III

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-IV

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, micromachinedfiber optic component, optical sensors, Thermal MEMS, thermo-mechanical and thermo-electrical actuators, Peltier heat pumps.

Reference Books:

1. Soloman, S., *Sensors Handbook*, 2 ed, CBS, Publishers, 2010, Print
2. Grimes, *Encyclopedia of sensor,s* 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: Electrical Energy Auditing and Deregulation
Paper Code: ELE440

L	T	P	Credits
4	0	0	4

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

Learning Outcomes: After the completion of this course the participants would gain the concept of independent power producers. The participants will learn how the evolution of price biding.

Unit-A

Energy Management & Audit: Definition, Energy audit-need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, 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. Bhattacharya K., Bollen MHT and Doolder J.C., "*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, 200

DAV UNIVERSITY, JALANDHAR

Course Title: Power system operation and control

Paper Code: ELE 441

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 unit system and its variation. The subject will further emphasis on economic dispatch problem, control of power system.

Unit-A

Introduction to Power Generation Units: Characteristics and its variations,

Economic Operation of Power Systems: Fuel consumption, Characteristics of thermal unit, Incremental fuel rate and their approximation, minimum and maximum power generation limits.

Unit-B

Economic Dispatch: Economic dispatch problem with and without transmission line losses, Unit Commitment and solution methods. Hydrothermal scheduling: fixed-head and variable head, Short- term and Long-term.

Unit-C

Power System Control: Power system control factors, interconnected operation, tie-line operations, Reactive power requirements, during peak and off peak hours, Elementary ideas of load frequency and voltage, reactive power control; block diagrams of P-f and Q-V controllers, ALFC control, Static and Dynamic performance characteristics of automatic load frequency control (ALFC) and automatic voltage regulator (AVR) controllers, Excitation systems.

Unit-D

Power System Security: Factors affecting security, Contingency analysis, Network sensitivity, correcting the generation dispatch by using sensitivity method and linear programming.

Power flow analysis in AC/DC systems: General, modelling of DC links, solution of DC load flow, discussion, per unit system for DC quantities, solution techniques of AC-DC power flow equations.

Suggested books:

1. Nagrath, I.J. and Kothari, D.P., "*Power System Engineering"*, Tata McGraw Hill (2007).

2. Stevenson W.D. and Grainger J.J., "*Power System Analysis"*, McGraw Hill (2007).

3. Arrillaga J. and Smith Bruce, "*AC-DC Power System Analysis"*, IEE Press

4. Elgerd, O.I., "*Electric Energy Systems Theory: An Introduction*." 2nd Ed., Tata McGraw Hill, 1983.

5. Dhillon J.S., Kothari D.P., "*Power System Optimisation"*, 2nd Ed., Prentice Hall India, 2010

6. Kundur P, "*Power System Stability and Control*", Third Reprint, tat McGraw Hill, 2007

7. Murthy, P.S.R., "*Power System Operation and Control*", Tata McGraw Hill, 1984.

8. Saadat Hadi, "*Power System Analysis*", Tata McGraw Hill Edition, 2002.

9.. Wood, A.J., and B. Wollenberg, "*Power Generation, Operation and Control*", 2nd Edition, John Wiley, NY, 1996.

DAV UNIVERSITY, JALANDHAR

Course Title: Power System Stability

L	T	P	Credits
4	0	0	4

Paper Code: ELE442

Course Objective: To make the students familiar with current scenario of power system componenets and system stability.

UNIT-A

Overview: Angular Stability, Transient stability, steady state stability, dynamic stability, Small Signal, Voltage Stability

Modeling of power system components: Generators (Non-linear and linear models using d-q transformation, power capability curve); Excitation System (IEEE standard models); Turbine and Speed governing System; Loads (Induction motors and composite loads).

UNIT-B

Transient stability analysis: Single Machine - Infinite Bus System; Equal Area Criterion; Multi-machine Stability; Network Reduction and Numerical Integration Methods; Methods of Improvement

UNIT-C

Small signal stability analysis: Eigen Value and Participation Factor Analysis; Single machine - Infinite Bus and Multimachine Simulation; Effect of Excitation System and AVR; Improvement of Damping - Power System Stabilizer and SVS supplementary controls.

UNIT-D

Sub synchronous oscillations: Sub Synchronous Resonance (SSR) Phenomenon; Counter measures to SSR problems

Voltage stability: P-V and Q-V curves, Impact of Load and Tap-changer Dynamics; Static Analysis, Sensitivity and Continuation Methods; Dynamic Simulation, Introduction to Bifurcation Analysis; Proximity Indices, Methods to enhance Stability Margin.

Suggested books :

1. Kundur P, "*Power System Stability and Control"*, McGraw Hill.

2. Taylor C.W., "*Power System Voltage Stability*", McGraw Hill.

3. Anderson P.M. and Foud A. A., "*Power System Control and Stability*", IEEE Press.

4. Kimbark E., "*Power System Stability*", Vol. I, II & III, IEEE Press.

DAV UNIVERSITY, JALANDHAR

Discipline specific elective-IV

Course Title: HVDC and EHVAC Transmission
Paper Code: ELE 443

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 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 over voltages 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, modelling of DC network, modelling 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: Energy Efficient Machines
Paper Code: ELE 444

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 labelling, 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: FLEXIBLE AC TRANSMISSION SYSTEMS

L	T	P	Credits
4	0	0	4

Paper Code: ELE 445

Objective:
The objective of the course is to enable the students to understand the basic concepts related to AC transmission for various electrical system.

Unit-A

Power Transmission control: Fundamental of alternating current (AC) power transmission, transmission problems and needs, the emergence of Flexible Alternating Current Transmission Systems (FACTS), FACTS controller and consideration. Uncompensated transmission lines and compensated transmission lines.

Unit-B

Shunt Compensation: Principle, configuration, control and applications of Shunt Static Var Compensator (SVC) and Static Synchronous compensator (STATCOM).
Series Compensation: Fundamental of series compensation, principle of operation, Application of Thyristor Controlled Series Capacitor (TCSC) for different problems of power system, TCSC layout, Static Synchronous Series Compensator (SSSC): principle of operation.

Unit-C

Phase Shifter: Principle of operation, steady state model of static phase shifter (SPS), operating characteristics of SPS, power current configuration of SPS application.
Unified Power Flow Controllers (UPFC): Basic operating principles and characteristics, control UPFC installation applications, UPFC model for power flow studies.

Unit-D

Reactive Power Control: Introduction, reactive power requirements in steady state, sources of reactive power, static var systems, reactive power control during transients. Harmonics and filters: Introduction, generation of harmonics, design of AC filters, DC filters, carrier frequency and RI noise.
Transmission line steady State Operation: Lossless Transmission lines, Maximum Power Flow, Line loadability, reactive compensation techniques. Congestion management on transmission lines using FACT devices.

Suggested books:

1. Ghosh,A. and Ledwich,G., "*Power Quality Enhancement Using Custom Power Devices"*, Kluwer Academic Publishers (2005).
2. Hingorani, N.G. and Gyragyi,L., "*Understanding FACTS :Concepts and Technology of Flexible AC Transmission System"*, Standard Publishers and Distributors (2005).
3. Sang, Y.H. and John, A.T., "*Flexible AC Transmission Systems"*, IEEE Press (2006).
4. K.R. Padiyar, "*FACTS Controllers in Power Transmission and Distribution"*, New Age International Publisher, 2007.
5. Miller T.J.E., "*Reactive Power Control in Electric Systems"*, John Wiley.

DAV UNIVERSITY, JALANDHAR

Course Title: Industrial Drives

L	T	P	Credits
4	0	0	4

Paper Code: ELE 446

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

Review of semiconductor devices: Conduction Process in semiconductors, pn Junction, Charge control description, Avalanche breakdown, Power diodes, Thyristors, Gate Turn Off thyristor (GTO), VI characteristics, Dynamic characteristics, ratings, protection,
Power mosfet and igbt: Basic structure, I-V Characteristic, switching characteristics, operating limitation and safe operating area.

Unit-B

Emerging devices and circuits: Power junction Field effect transistor (FET), Integrated Gate-Commutated Thyristor (IGCT), Field Control Thyristor, Metal oxide semiconductor (MOS) Control Thyristor etc. Power ICs, New semiconductor materials.

Unit-C

Introduction to electrical drives: Definition, Types of loads, steady state & transient stability of Drive, state of art of power electronics and drives, selection of motor rating. **:** Review of braking and speed control of D.C. motors, Iduction motors and synchronous motors. Modern control techniques: variable structure, adaptive control.

Unit-D

Automation using drives: Introduction, various components of automation, different sensors used in automation, PLC introduction and ladder programming, industrial application of automation, sensor less vector control and DTC drive, Recent trends in automation and case studies.

Suggested books :

1. Mohan, Undeland and Robbins, "*Power electronics: converters, Applications and Design"*, John Wiley and Sons.

2. Rashid M.H., "*Power Electronics Handbook"*, Elsevier Press (Academic Press Series).

3. Finney D., "*The Power Thyristor and its Applications"*, McGraw Hill, New York.

4. Lander C. W. "*Power Electronics"*, McGraw Hill Book Co., U.K.

5. Rashid M.H., "*Power Electronics - Circuits, Devices and Applications*", PHI, India.
6. Dubey G.K., "*Power Semiconductor Controlled Drive"*, Prentice Hall, New Jersey.

7. Sen P.C., "*Thyristor Controlled DC Drives"*, Wiley, New York.

8. Murphy J.M.D. and Turnbull F.G., "*Power Electronics Control of AC Motors"*, Franklin Book Co.

9. Bose B.K., "*Power Electronics and AC Drives"*, Prentice Hall, New Jersey.

10. Bose B.K., "*Power Electronics and Variable Frequency Drives-Technology and applications"*, IEEE Press.